Lessons and games for students
Professional development materials for teachers

Can Take You Places

Teacher’s Guide

A KERA educational project funded by Travelocity
math can take you places
helping kids soar

For more information

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# Math Can Take You Places

## Lesson Plans

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LESSON 1
“Sentence Match”
by Julie Morris

CONCEPT AREA  Equivalency
GRADE LEVEL  5
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW  Students will be able to match problem situations with equations.

LESSON ACTIVITIES OVERVIEW  Students practice creating word problems and matching them with the proper algebraic number sentence.

LEARNING OBJECTIVES  Students will be able to:
• Use equivalent equations for problem-solving situations.
• Apply problem-solving skills to real-life situations.

MEDIA COMPONENTS  Video: Math Can Take You Places #002 “Equivalency”

MATERIALS  • Index cards
• Construction paper
• Pencils
• Markers

PREP FOR TEACHERS  Note:
The concept of fact families will be covered during this lesson. Students may need to review the concept prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

Write some example scenarios to use for demonstration purposes. Also, go through any problem-solving resources (for example, textbooks) to find some story problems to use in the introduction. Emphasize that each word problem can have possibly more than one number sentence that matches.

Additional sample word problems:
1. Sheila has 100 grapes. She wants all 20 students in her class to be able to taste them. How many grapes would students receive if she divided them evenly among her classmates? Answer: 100/20 = C or C * 20 = 100 (C=5)

2. David got a bicycle and $200 in cash for his birthday. He used his money to buy a bicycle helmet for $25, a t-shirt for $17 and two video games for $38 each. How much money does David have left after his shopping? Answer: M = 200 - (25 + 17) - (2 * 38) or 200 = M + (25 +17) + (2 * 38) (M = 82)

3. Macy is trying to calculate her math test average. She has made a 91, a 98, an 87 and a 102. What is her math test average? Answer: (91 + 98 + 87 + 102) / 4 = A or (91 + 98 + 87 + 102) = A * 4

4. Kevin is calculating how many seats there are in his school’s auditorium. There are 14 seats in each of the 33 rows. How many seats total are in the auditorium? Answer: 14 * 33 = S or S / 33 = 14 or S / 14 = 33
INTRODUCTORY ACTIVITY: SETTING THE STAGE

Show students four equations that represent the same quantity. THIS WAY YOU CAN REARRANGE THEM TO SHOW EQUIVALENCE. Examine the equations one at a time and ask the students to develop a scenario that could match the equation. For example, “4 * 9 = N” could match “Four kids have 9 pieces of candy each, so what is the total number of pieces of candy for all four kids?” Discuss using variables to represent the parts of an equation. In earlier grades, students had blanks or boxes in equations instead of unknowns.

Sample equivalent equations:
- 4 * 9 = N
- 43 - N = 36
- N + 24 = 36
- 72 / 2 = N,

so 4 * 9 = 72 / 2
- 43 - 7 = 12 + 24

All of these equations have numbers or variables that represent 36 on both sides of the equals sign.

LEARNING ACTIVITIES

Have the class work in groups to write problems to go with the four equations mentioned earlier. Keep these on a separate sheet of paper or index card for later use. In the meantime, observe students’ work to make sure the equations are correct and appropriate. Have them solve their problems by using a pictorial representation before they write or match the equations. It may be helpful to assign each member of the group a specific task (writer, proofreader or spokesperson). Have students rotate jobs. They may work in pairs.

CULMINATING ACTIVITY

Use the KERA video, Math Can Take You Places, #002 “Equivalency” to show types of equations that can be used in calculating elapsed time. Cue video to approximately 19:224 when the teacher says, “We’ll go around and discuss the number sentences you all got.” Press Play, Stop after the teacher says, “… there are different ways to write this number sentence and still work the problems out.” Discuss how the equations in the video compare to the equations we created.

Switch the scenarios and equations with other groups. Have the students match the equations with the scenarios. Monitor for student understanding.

CROSS-CURRICULAR EXTENSIONS

Use historical or scientific scenarios for the story problems.

Use newspaper articles to create current event story problems.

REAL-WORLD CONNECTIONS

Introduce the concept of Roman numerals. Let students create a “Roman Numeral” matching game with index cards. Write the numerals on one card and the equivalent numbers on another. Students can play the matching game individually or in groups.

ASSESSMENT

Use the student-created materials to make a matching game. All the students have a card with a story problem or an equation. The object of the game is to find the cards’ matches. You may want to have the students look for their matches in rounds to avoid confusion.
LESSON I
“Sentence Match”
by Julie Morris

STUDENT HANDOUTS
None
CONCEPT AREA  Equivalency
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
In this lesson, students will find the decimal equivalents of fractions of a dollar.

LESSON ACTIVITIES OVERVIEW
Students will use 100 pennies to show equivalency between fractions and decimals. Students will start by dividing the 100 pennies first into two equal groups, then into four equal groups, five equal groups and ten equal groups.

LEARNING OBJECTIVES
Students will be able to:
• Convert halves, thirds, fourths, fifths, sixths, eighths and tenths to their decimal equivalent.
• Convert halves, thirds, fourths, fifths, sixths, eighths and tenths to their percent equivalent.

MEDIA COMPONENTS
Video: Math Can Take You Places #002 “Equivalency”
Internet:

"The World of Math Online" is a Web site which includes a section of games that students will have fun playing. http://www.math.com

MATERIALS
Per class:
• Pencil
• Candy bar
• Mechanical pencil
• 12-oz. can of soda

Per group of students:
• Bag of 100 pennies (Have students bring their own or use a substitute material.)
• Circular cut-outs that represent pennies to be divided into thirds, sixths and eighths

PREP FOR TEACHERS
Note:
The following concepts will be covered during this lesson: fraction, equivalency, percent, monetary equivalencies and decimals. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).
• How you group your students will dictate how many pennies each student is responsible for bringing.
• It is very important that pennies are used at the onset of this activity instead of other monetary equivalencies.
• Fourth-grade teachers may want to show the decimal equivalent for thirds, sixths and eighths as extensions at a later date instead of as part of this activity.
• Make sure to reinforce the fraction equivalencies; i.e., 2/4 is equivalent of 1/2 and so on.
This can be a good discovery activity if you are patient. Allow the students to flow with the lesson. A few might catch on quickly and want to move on, while others might struggle.

Make sure that each group actually divides the pennies to reinforce parts of a whole.

**INTRODUCTORY ACTIVITY: SETTING THE STAGE**

Watch the segment of the *Math Can Take You Places* equivalency video where Mrs. Garcia and her class write the equations for Central and Eastern time zones. Stop after the students on-screen offer the correct solutions to the sample problem. Begin discussing the term, “equivalency,” and how it means that what’s on the left side of the equals sign is the same as what’s on the right side.

1. On a table at the front of the classroom, have four items with their costs indicated as a fraction of a dollar. The pencil should be marked as 1/10 of a dollar. The mechanical pencil should be marked as 1/2 of a dollar. The candy bar should be marked as 3/5 of a dollar. The can of soda should be marked as 3/4 of a dollar.

2. Ask students, "Would you know the cost of these four items if fractions were used instead of the dollar and cents signs that are normally used?"

3. Most students will know that the mechanical pencil is worth fifty cents.

**LEARNING ACTIVITIES**

1. Ask one of the students to explain how (s)he would describe to a younger person that one half of a dollar is the same as fifty cents.

2. Depending on that student’s explanation you can solicit another, if needed.

3. You want the student to convey that the denominator of the fraction determines that the 100 pennies would be divided into two equal groups. If a student is unable to clarify this situation, have the students then divide their pennies into two equal groups. How many pennies are in each group? Since the mechanical pencil is worth one out of two groups, then the pencil costs 50 cents.

4. Next, have the students divide the 100 pennies into ten equal groups. How many pennies are in each group? Since the pencil is 1/10 of a dollar, then the pencil costs ten cents, which is one of the ten groups. How many groups of pennies would be needed to make 50 cents? Reinforce that 5/10 is equivalent to 1/2. Ask the students if they can replace ten pennies with another monetary denomination?

5. Now have the students divide the 100 pennies into four equal groups. How many pennies are in each group? How many groups does it take to make 50 cents? Reinforce that 2/4 of a dollar is the same as 1/2 of a dollar. Since the soda’s price shows that it is worth three out of the four groups of a dollar, then the soda costs 75 cents. Ask the students if they can replace the 25 pennies with another monetary denomination? They should respond that one could replace the pennies with a quarter.

6. Now say: “Can you now figure out how much the candy bar would cost if it were marked as 3/5 of a dollar?”

7. Have the students write down their steps for how they would go about finding the equivalent amount in pennies of 3/5 of a dollar. **Give students approximately five minutes to write down this information and then have them exchange with another group.**
8. Each group should follow the directions given by the other group. If the directions are not accurate, then have the students discuss how the directions should be changed.

**CULMINATING ACTIVITY**

Have students create fraction, decimal and percent equivalents. Also have each group write a number sentence describing the costs of the items using variables. For example, since the candy bar is equal to half of a dollar, a sample number sentence could be:

\[
\text{Half of a Dollar} = 50 \text{ Pennies or } 1/2 \text{D} = 50P
\]

**CROSS-CURRICULAR EXTENSIONS**

Music

Ask the music teacher to speak to the class about how musicians use fractions to read music. Let the students work in groups to write their beats using musical time signatures.

**REAL-WORLD CONNECTIONS**

Discuss and define a “budget” and its uses. Help the students budget the average amount of money they receive each month. Use an Excel spreadsheet to display the data. Brainstorm ways to spend their money more wisely.

**ASSESSMENT**

Ask the students the following questions, instructing them to write their solutions for later grading:

1. What is 7/10 of a dollar? ($0.70)
2. Is 75 cents equal to 12/16 of a dollar? Explain your answer using words. (Yes. 12/16 can be reduced to ¾. ¾ of a dollar is $0.75.)
3. Eighty cents is what fraction of a dollar? (8/10 reduces to 4/5.)
4. What is 4/4 of a dollar plus 4/5 of a dollar minus 6/8 or a dollar? ($1.05)

**STUDENT HANDOUTS**

None
CONCEPT AREA  Equivalency

GRADE LEVEL  4-6

TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
The students will complete activities that will give them experiences in equivalent number sentences.

LESSON ACTIVITIES OVERVIEW
Use the data available to complete the task.
Find all the equivalent number sentences, fact families and fractions.

LEARNING OBJECTIVES
Students will be able to:
• define equivalency.
• find equivalent number sentences for a given number/problem.

MEDIA COMPONENTS
Video: Math Can Take You Places #002 “Equivalency”

MATERIALS
One-inch graph paper

PREP FOR TEACHERS
Cue the video to just past the opening.

Note:
The concept of arrays will be covered during this lesson. Students may need to review the concept prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY:
SETTING THE STAGE
Introduce the Math Can Take You Places equivalency video. Ask class to focus on the student problem-solving segments as they watch the video.

LEARNING ACTIVITIES
1. Say: “You just saw how pilots use equivalency in their jobs. Now, we are going to use equivalency to help in a boat rescue. Pretend a luxury liner ran aground on an island. The passengers will need to be taken to the main island by rescue boats. The boats will each transport an equal number of passengers to safety.”
2. Introduce the “Mansfield Luxury Liner” worksheet. Explain that in each scenario, all of the passengers must return to the mainland and each boat must have the same number of passengers. Work number one as a class.
3. Students will decide the number of passengers in each boat by division and give the equivalent number sentences, fact family and fraction that goes with each problem. For example, 432 passengers are on the ship. There are 54 rescue boats to use. How many passengers will travel in each boat?

The fact families are: 54 x 8 = 432, etc.

Equivalent fractions are  \( \frac{1}{54} = \frac{8}{432} \).
LESSON 3
“Just Cruising”
by Monica Abrams

4. Students work in pairs to complete the remainder of “Mansfield Luxury Liner.”
5. Provide additional examples and assistance as needed.

CULMINATING ACTIVITY
1. Discuss the solutions from “Mansfield Luxury Liner.”
2. Use the solutions students calculated during the rescues to make equivalent arrays on
   one-inch graph paper.
3. Allow the students to show the different ways of displaying each of their solutions
   using arrays.

CROSS-CURRICULAR EXTENSIONS
Language Arts/Social Studies: Pretend the shipwrecked passengers decided to stay on
the deserted island and start their own town. Discuss and write the laws that will govern
the newly created community.

REAL-WORLD CONNECTIONS
After watching the entire Math Can Take You Places equivalency video, students can
research time zones. Students then share the information with the class, including the
name of the time zone where the school is located.

ASSESSMENT
"Mansfield Island"
Students will need the following information to solve the returning to the island
scenarios:
• The number of passengers that will be returning to the island.
• The number of boats that will make the return journey.
• The number of passengers that will travel on each boat.
The student will find two of these in each scenario. The student will need to discover
the missing information, then complete the calculations to complete the task.

STUDENT HANDOUTS
“Mansfield Luxury Liner”
“Mansfield Island”
Mansfield Luxury Liner

The passengers on the Mansfield Luxury Liner were preparing to have the time of their lives. With no warning, the ship ran aground. What will happen to them? Will there be enough rescue boats to return all the passengers safely to the mainland?

In each scenario, all of the passengers must return to the mainland, and each rescue boat must have the same number of passengers. After completion of the task, record all the equivalent number sentences, fact families and fractions.

1. 432 passengers are on the ship. They have 54 rescue boats to use to return to the mainland. What number will travel in each boat?

2. 12 rescue boats are carrying 17 passengers each. How many passengers are being transferred to the mainland?

3. There are 464 passengers being transferred in 29 boats. How many are in each boat?

4. 38 boats are being used to transfer all the passengers from the ship. There are 23 in each boat. How many passengers were on the ship?

5. There are 1,431 passengers on the ship, and 53 were transferred on each rescue boat. What was the total number of rescue boats used?
LESSON 3
“Just Cruising”
by Monica Abrams

Mansfield Luxury Liner
Answer Key

1. 8 passengers in each boat
   \[432 \div 8 = 54\]
   \[54 \times 8 = 432\]
   \[432 \div 54 = 8\]
   
   \[\begin{array}{cc}
   1 & = 8 \\
   54 & 432 \\
   \text{Boats} & \text{Passengers}
   \end{array}\]

2. 204 passengers transferred to mainland
   \[12 \times 17 = 204\]
   \[204 \div 17 = 12\]
   \[204 \div 12 = 17\]
   \[17 \times 12 = 204\]
   
   \[\begin{array}{cc}
   1 & = 17 \\
   12 & 204
   \end{array}\]

3. 16
   \[16 \times 29 = 464\]
   \[464 \div 20 = 16\]
   \[464 \div 16 = 29\]
   \[29 \times 16 = 464\]
   
   \[\begin{array}{cc}
   1 & = 17 \\
   29 & 464
   \end{array}\]

4. 874
   \[38 \times 23 = 814\]
   \[874 \div 38 = 22\]
   \[874 \div 22 = 38\]
   \[23 \times 38 = 874\]
   
   \[\begin{array}{cc}
   1 & = 23 \\
   38 & 879
   \end{array}\]

5. 27
   \[27 \times 53 = 1,431\]
   \[53 \times 27 = 1,431\]
   \[1,431 \div 53 = 27\]
   \[1,431 \div 27 = 53\]
   
   \[\begin{array}{cc}
   1 & = 53 \\
   38 & 879
   \end{array}\]
Mansfield Island

After returning home, many of the passengers realized they missed the island and decided to return and build a community there. The same boat company was used to return the passengers to the island. The boats will each transport an equal number of passengers on their return voyage. To solve each scenario, you must have the following information:
1. The number of passengers returning to the island.
2. The number of boats that will make the return trip.
3. The number of passengers that will travel in each boat.

You will find these in each scenario. Record your information by writing a sentence for each fact. You will need to discover the missing information, write a sentence for that information and calculate the data to complete the task. You will then write all the equivalent number sentences, fact families and fractions that go with each problem.

1. Eight boats are carrying 12 passengers each to the island. All together, what is the total number of passengers returning to the island?

We know that:
A.
B.

We discovered that:
C.

Equivalent number sentences:

2. Fourteen passengers are in each boat, and the total number of passengers is 126. What is the number of boats making the journey?

We know that:
A.
B.

We discovered that:
C.

Equivalent number sentences:

3. 288 passengers are making the return trip to the island in 12 boats. What is the total number of passengers in each boat?
We know that:
A.
B.

We discovered that:
C.

Equivalent number sentences:

4. Seventeen boats are carrying 221 passengers to the island. Can you find the number of passengers in each boat?

We know that:
A.
B.

We discovered that:
C.

Equivalent number sentences:

5. 252 passengers are returning to the island. In each boat, there are 14 passengers. How many boats are returning?

We know that:
A.
B.

We discovered that:
C.

Equivalent number sentences:
Mansfield Island
Answer Key

1. A. Twelve passengers in each boat will be returning to the island.
   B. Eight boats will make the trip.
   C. Ninety-six people will be returning to the island.
   Equivalent number sentences:
   \[ 8 \times 12 = 96 \quad 12 \times 8 = 96 \quad 96 \div 12 = 8 \quad 96 \div 8 = 12 \]

2. A. Fourteen passengers are in each boat.
   B. The total number of passengers is 126.
   C. Nine boats will be making the journey.
   Equivalent number sentences:
   \[ 9 \times 14 = 126 \quad 14 \times 9 = 126 \quad 126 \div 9 = 14 \quad 126 \div 14 = 9 \]

3. A. Two hundred eighty-eight passengers are making the return trip to the island.
   B. Twelve boats will make the trip.
   C. Twenty-four passengers will be in each boat.
   Equivalent number sentences:
   \[ 12 \times 24 = 288 \quad 24 \times 12 = 288 \quad 288 \div 12 = 24 \quad 288 \div 24 = 12 \]

4. A. Seventeen boats will make the trip back to the island.
   B. Two hundred twenty-one passengers will be returning to the island.
   C. Thirteen passengers will be in each boat.
   Equivalent number sentences:
   \[ 13 \times 17 = 221 \quad 17 \times 13 = 221 \quad 221 \div 17 = 13 \quad 221 \div 13 = 17 \]

5. A. Two hundred fifty-two passengers will be returning to the island.
   B. Fourteen boats will carry the passengers.
   C. Eighteen passengers will be in each boat.
   Equivalent number sentences:
   \[ 18 \times 14 = 252 \quad 14 \times 18 = 252 \quad 252 \div 18 = 14 \quad 252 \div 14 = 18 \]
Los pasajeros en el Mansfield Luxury Liner se estaban preparando para tener el día más feliz de sus vidas. Sin ningún aviso, el barco quedó varado. ¿Qué les va a pasar a los pasajeros? ¿Habrá suficientes botes de rescate para llevarlos a tierra firme con seguridad?

En cada escenario, todos los pasajeros deben volver a tierra firme, y cada bote de rescate debe tener el mismo número de pasajeros. Después de completar la tarea, escribe todas las oraciones numéricas equivalentes, familias de factores y fracciones.

1. En el barco hay 432 pasajeros. Tienen 54 botes de rescate para volver a tierra firme. ¿Cuántos pasajeros viajarán en cada bote?

2. 12 botes de rescate llevan 17 pasajeros. ¿Cuántos pasajeros están siendo transportados a tierra firme?

3. Hay 456 pasajeros que están siendo transportados en 29 botes. ¿Cuántos hay en cada bote?

4. 38 botes están siendo usados para transportar todos los pasajeros del barco. Hay 23 en cada bote. ¿Cuántos pasajeros había en el barco?

5. Hay 1,431 pasajeros en el barco y 53 pasajeros fueron transportados en cada bote de rescate. ¿Cuál es el número total de botes de rescate?
Isla Mansfield

Después de llegar a casa, muchos de los pasajeros se dieron cuenta que extrañaban la isla y decidieron regresar y empezar una comunidad allí. La misma compañía de botes fue usada para regresar los pasajeros a la isla. Cada bote transportará el mismo número de pasajeros en su viaje de regreso. Para resolver cada escenario, debes tener la siguiente información:

1. El número de pasajeros que regresaron a casa.
2. El número de botes que harán el viaje de regreso.
3. El número de pasajeros que viajarán en cada bote.

Encontrarás esto en cada escenario. Registra tu información escribiendo una oración para cada hecho. Tendrás que descubrir la información que falta, escribir una oración para esa información y calcular los datos para completar la tarea. Entonces escribirás todas las oraciones numéricas equivalentes, familias de factores y fracciones que van con cada problema.

1. Cada uno de los ocho botes están llevando 12 pasajeros a la isla. En total, ¿cuál es el número total de pasajeros que regresan a la isla?

Sabemos que:
A. 
B. 

Descubrimos que:
C. 

Oraciones numéricas equivalentes:

2. En cada bote hay catorce pasajeros, y el número total de pasajeros es 126. ¿Cuál es el número de botes que están haciendo el viaje?

Sabemos que:
A. 
B. 

Descubrimos que:
C. 

Oraciones numéricas equivalentes:
3. 288 pasajeros están regresando a la isla en 12 botes. ¿Cuál es el número total de pasajeros en cada bote?

Sabemos que:
A. 
B. 

Descubrimos que:
C. 

Oraciones numéricas equivalentes:

4. Diecisiete botes están llevando 221 pasajeros a la isla. ¿Puedes encontrar el número de pasajeros para cada bote?

Sabemos que:
A. 
B. 

Descubrimos que:
C. 

Oraciones numéricas equivalentes:

5. 252 pasajeros están regresando a la isla. Hay 14 pasajeros en cada bote. ¿Cuántos botes están regresando?

Sabemos que:
A. 
B. 

Descubrimos que:
C. 

Oraciones numéricas equivalentes:
CONCEPT AREA  Equivalency
GRADE LEVEL  6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students will gain an understanding of equivalency by engaging in different activities. They will understand that the quantity or expression on the left side of the equal sign must equal or represent the same quantity that is on the right. Students will be introduced to variables, which represent an unknown quantity in an equation. They will also learn how to solve an equation for the value of the variable.

LESSON ACTIVITIES OVERVIEW
Students will brainstorm different forms of equivalency, make a human equivalent problem, work in groups, play the game, “Identical Twins,” create word problems to go with equation and do assessment and extension activities.

LEARNING OBJECTIVES
Students will be able to:
• Formulate an equation from a problem situation.
• Use letters (variables) to represent an unknown in an equation.
• Generate equivalent forms of fractions, percents and decimals.
• Understand that equivalency is everywhere in “real-world” situations.

MEDIA COMPONENTS
Video: Math Can Take You Places #002 “Equivalency”

MATERIALS
Per Class:
• Twenty four 5” x 8” index cards
• Large “Equal” sign
• “Identical Twins” laminated cards

Per Pair:
• 2 dice or number cubes
• 2 different colored pencils or pens
• “Percent Tic-Tac-Toe” handout

PREP FOR TEACHERS
• Prepare classroom materials, including index cards.
• Cue video as needed for discussion.

Note:
The concept of fact families will be covered during this lesson. Students may need to review the concept prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE
1. Generate discussion by taking responses from students regarding the “equal sign” displayed on the front board. Call on three student volunteers to come to the front of the room. Place two students on the left of the equal sign and one on the right.

2. Ask the following guided questions:
   a. What have we created?
b. Is it balanced? Why or why not?
c. What needs to be done to demonstrate balance or equivalency? (Take one student away on the left.)
d. How could we write this as an equivalent expression? (2 - 1 = 1)
e. Explain that rational numbers come in all different forms. You can express them as fractions, decimals and percents.

Ex: \( \frac{50}{100} = 0.50 \) or 50%

f. Think of everyday experiences where you have encountered fractions, decimals and/or percents (for example: in sports, newspapers, weather reports, etc.).

3. Explain that an integer is any whole number, its opposite and zero. Say that all integers are rational numbers. Rational comes from the term "ratio." A rational number can be written as the ratio \( \frac{a}{b} \) where both \( a \) and \( b \) are integers and \( b \neq 0 \).

The following numbers are all rational numbers as they can be expressed as a ratio in \( \frac{a}{b} \) form:

\[
\begin{align*}
5 \text{ and } -21
\end{align*}
\]

\[
\begin{align*}
5 &= \frac{5}{1} \text{ and } -21 = \frac{-21}{1}
\end{align*}
\]

4. Explain the importance of comparing rational numbers using the following discussion threads:
   a. Checking ratings, etc.
   b. Comparing cost
   c. Organizing information
   d. Collecting and displaying data

5. “When we compare rational numbers, it is easier to compare them if they have something in common; i.e., a common denominator, decimal form, percent form, etc.”

Examples would include .075 and .7. We would change 0.75 to 75 and \( \frac{10}{100} \) change .7 to its equivalency 70. We could conclude that \( \frac{0.75}{10} \) is the greater \( \frac{100}{100} \) of the two fractions because when the denominators are the same, we can easily compare the two numerators and see that 70 is more than 7.

6. We also know that 1 = 100%; therefore, 2 = 200%. To convert a rational number to a percent, multiply the number by 100.

To write the equivalent form of 4.3 as a percent, multiply by 100:

\[ 4.3 \cdot 100 = 430 \% \]

To write the equivalent form of a percent as a rational number, divide the percent by 100:

\[ 875\% \div 100 = 8.75 \]
LEARNING ACTIVITIES
1. Have students create a word problem that uses these two rational numbers and compares with the inequality sign to show which is larger or smaller.

Examples: Order $\frac{3}{4}$, 5.8, and 550% from greatest to least:

Hint: Write each rational number in decimal form. Add zeros, so that all have the same number of decimal places. Compare by looking at place value. Order:

- $\frac{3}{4} = 0.75$
- 5.8 = 5.80
- 550% = 5.50

Answer: $5.8 > \frac{3}{4} > 550\%$

2. Have students create real-life situations to compare their own rational numbers.

3. “Percent Tic-Tac-Toe” is the final activity, or it can be played on a separate day as a review.

CULMINATING ACTIVITY
Say: “We are going to play ‘Identical Twins.’” After I shuffle the cards, you will each receive a laminated card. When I say ‘go’ you will look at your card and try to find your identical twin. Every player who finds his/her other twin is a winner.”

CROSS-CURRICULAR EXTENSIONS
Math
When all matches are found, have each pair of students create a word problem using their sentence card and giving the answer. Divide the class into two groups and have a contest to see which team can solve the word problems correctly. Play “Percent Tic-Tac-Toe” game using dice or number cubes.

Language Arts
- Read Shoeless Joe & Black Betsy, by Phil Bildner, illustrated by D. F. Payne.
- Have students research former Olympic athletes and record their statistics using fractions, decimals and percents. Then, have students present their findings in an oral presentation.

REAL-WORLD CONNECTIONS
Use a newspaper to locate different forms of numbers that represent equivalency; for example: decimals, percents and fractions.

ASSESSMENT
Students will complete the Equivalency Assessment worksheet that is posted in the handouts.

STUDENT HANDOUTS
“Identical Twins” Playing Cards
Equivalency Assessment
“Percent Tic-Tac-Toe”
**Lesson 4**

**“Identical Twins”**

by Nancy Lachowicz

<table>
<thead>
<tr>
<th>One number is six times another</th>
<th>( x = 6y )</th>
<th>The sum of three consecutive whole numbers is 15</th>
<th>( x + (x+1) + (x + 2) = 15 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>One number is three less than another number</td>
<td>( x = y - 3 )</td>
<td>One number is five more than another number</td>
<td>( x = y + 5 )</td>
</tr>
<tr>
<td>Seven more than twice a number is 15</td>
<td>( 2x + 7 = 15 )</td>
<td>Double a number increased by 8 is 24</td>
<td>( 2x + 8 = 24 )</td>
</tr>
<tr>
<td>Triple a number decreased by 8 is 19</td>
<td>( 3x - 8 = 19 )</td>
<td>Forty increased by a number is four times the number</td>
<td>( 40 + x = 4x )</td>
</tr>
<tr>
<td>Double a number increased by 4 is 20</td>
<td>( 2x + 4 = 20 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identical Twins
Playing Cards
p.1

Identical Twins
Playing Cards
p.2
<table>
<thead>
<tr>
<th>Expression</th>
<th>Equation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seventeen is four more than ( x )</td>
<td>( 17 = x + 4 )</td>
<td>( x = 13 )</td>
</tr>
<tr>
<td>Thirty-six is half of ( x )</td>
<td>( x / 2 = 36 )</td>
<td></td>
</tr>
<tr>
<td>( x ) decreased by seven is 23</td>
<td>( x - 7 = 23 )</td>
<td>( x = 30 )</td>
</tr>
<tr>
<td>Two more than twice ( x ) is 18</td>
<td>( 2x + 2 = 18 )</td>
<td></td>
</tr>
<tr>
<td>Eighty-three is 12 less than ( x )</td>
<td>( 83 = x - 12 )</td>
<td>( x = 95 )</td>
</tr>
<tr>
<td>The quotient of ( x ) divided by three is 7</td>
<td>( x \div 3 = 7 )</td>
<td>( x = 21 )</td>
</tr>
<tr>
<td>The product of seven and ( x ) is 42</td>
<td>( 7x = 42 )</td>
<td>( x = 6 )</td>
</tr>
<tr>
<td>The sum of ( x ) and 35 is 85</td>
<td>( x + 35 = 83 )</td>
<td></td>
</tr>
<tr>
<td>The difference of ( x ) and 17 is 37</td>
<td>( x - 17 = 37 )</td>
<td></td>
</tr>
</tbody>
</table>
1. Recently, a local newspaper reported that 5 out of 20 people watch television less than 2 hours a day. The rest of the people surveyed said they watch television between 2 and 5 hours per day. Which decimal represents the number of people who watch between 2 and 5 hours of television a day?

A. 0.75  
B. 0.2  
C. 0.25  
D. 0.6  

2. Mr. Jones distributed 64 sheets of graph paper to his geometry class. Each student received 2 sheets of graph paper. Which equation can be used to find s: the number of students in the class?

A. \( s = 64 \times 2 \)  
B. \( s = 64 - 2 \)  
C. \( s = 64 + 2 \)  
D. \( s = 64 / 2 \)  

3. Order the following from least to greatest:

\[ \frac{1}{2}, 0.25, \frac{3}{5}, \frac{75}{100} \]

4. On Friday, Lake Rock Middle School reported 25% of their student body absent. What fractional part of the student body was not absent?

A. \( \frac{1}{4} \)  
B. \( \frac{2}{5} \)  
C. \( \frac{1}{5} \)  
D. \( \frac{3}{4} \)  

5. One of the top professional basketball players scored the following points in the last five games: 36, 21, 18, 25, 30. Which equation could be used to determine the player’s average?

A. \( a = \frac{(36 + 21 + 18 + 25 + 30)}{5} \)  
B. \( a = (36 + 21 + 18 + 25 + 30) \times 5 \)  
C. \( a = 2 \times (36 + 21 + 18 + 25 + 30) \)  
D. not here
LESSON 4
“Identical Twins”
by Nancy Lachowicz

Equivalency Assessment
Answer Key

1. A
2. D
3. 0.25, 1/2, 3/5, 75/100
4. D
5. A
PERCENT TIC-TAC-TOE

<table>
<thead>
<tr>
<th>16%</th>
<th>100%</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>33%</td>
<td>75%</td>
<td>60%</td>
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</tbody>
</table>

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<tr>
<th>80%</th>
<th>50%</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>66%</td>
<td>83%</td>
<td>40%</td>
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<tr>
<td>33%</td>
<td>75%</td>
<td>20%</td>
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<table>
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<tr>
<th>16%</th>
<th>25%</th>
<th>20%</th>
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<tbody>
<tr>
<td>40%</td>
<td>100%</td>
<td>75%</td>
</tr>
<tr>
<td>66%</td>
<td>50%</td>
<td>60%</td>
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<tbody>
<tr>
<td>50%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>33%</td>
<td>75%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Materials: Two 1-6 number cubes (or dice), two different colored pens, calculator (optional)

Objective: Recognize equivalent fractions and percents

Directions: This game is played like Tic Tac Toe. Players take turns tossing the number cubes and arranging the numbers into a fraction. Each player determines the equivalent percent and circles it on the Tic Tac Toe grid. If the equivalent percent cannot be found, the player must pass. Players must calculate the equivalent percent and prove their reasoning. (They may use a calculator if the teacher chooses.) Play continues until someone gets 3 in a row, column or diagonal. If neither player gets a Tic Tac Toe, each equivalent percent matched is worth 5 points. Players add up their points to determine the winner of the game.
Jugando a las Cartas

<table>
<thead>
<tr>
<th></th>
<th>x = 6y</th>
<th>x + (x+1) + (x + 2) = 15</th>
<th>x = y + 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un número es seis veces más que otro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un número es menos tres que otro número</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siete más un número duplicado es 15</td>
<td>2x + 7 = 15</td>
<td>El doble de un número más 8 es 24</td>
<td>2x + 8 = 24</td>
</tr>
<tr>
<td>El triple de un número menos 8 es 19</td>
<td>3x - 8 = 19</td>
<td>Cuarenta más otro número es cuatro veces ese número</td>
<td>40 + x = 4x</td>
</tr>
<tr>
<td>El doble de un número más 4 es 20</td>
<td>2x + 4 = 20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LECCIÓN 4
“Gemelos Idénticos”
by Nancy Lachowicz

<table>
<thead>
<tr>
<th>Ecuación Descripción</th>
<th>Ecuación</th>
<th>Ecuación Descripción</th>
<th>Ecuación Descripción</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diecisiete es cuatro más que ( x )</td>
<td>( 17 = x + 4 )</td>
<td>Treinta y seis es la mitad de ( x ).</td>
<td>( ¿ Esto no debería ser ( x / 2 = 36 )? )</td>
</tr>
<tr>
<td>( x ) disminuido siete es 23</td>
<td>( x - 7 = 23 )</td>
<td>El doble de ( x ) más dos es 18</td>
<td>( 2x + 2 = 18 )</td>
</tr>
<tr>
<td>Ochenta y tres es ( x ) menos 12</td>
<td>( 83 = x - 12 )</td>
<td>El cociente de ( x ) dividido entre tres es 7</td>
<td>( \frac{x}{3} = 7 )</td>
</tr>
<tr>
<td>El producto de siete y ( x ) es 42</td>
<td>( 7x = 42 )</td>
<td>La suma de ( x ) y 35 es 85</td>
<td>( x + 35 = 85 )</td>
</tr>
<tr>
<td>La diferencia de ( x ) y 17 es 37</td>
<td>( x - 17 = 37 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Nombre_______________________

Evaluación de la Equivalencia

1. Recientemente, un periódico local informó que 5 personas de cada 20 miran televisión menos de 2 horas por día. El resto de la gente en la encuesta dice que mira televisión entre 2 y 5 horas por día. ¿Cuál decimal representa el número de personas que miran televisión entre 2 y 5 horas por día?

   A. 0.75
   B. 0.2
   C. 0.25
   D. 0.6

2. El Sr. Jones distribuyó 64 hojas de papel para gráficos en su clase de geometría. Cada estudiante recibió 2 hojas para gráficos. ¿Cuál ecuación debe ser usada para encontrar el valor de s: el número de estudiantes en la clase?

   A. s = 64 x 2
   B. s = 64 - 2
   C. s = 64 + 2
   D. s = 64 / 2

3. Ordene lo siguiente de menos a mayor:

   1/2  0.25  3/5  75/100

4. El viernes, la escuela intermedia Lake Rock informó que el 25% de sus estudiantes estuvo ausente. ¿Cuál es la parte fraccional del cuerpo estudiantil que no estuvo ausente?

   A. 1/4
   B. 2/5
   C. 1/5
   D. 3/4

5. Uno de los mejores jugadores de baloncesto profesional marcó los siguientes puntos en los últimos cinco juegos: 36, 21, 18, 25, 30. ¿Cuál ecuación puede ser usada para determinar el promedio del jugador?

   A. a = (36 + 21 + 18 + 25 + 30) / 5
   B. a = (36 + 21 + 18 + 25 + 30) x 5
   C. a = 2 (36 + 21 + 18 + 25 + 30)
   D. no está aquí
LECCIÓN 4
“Gemelos Idénticos”
by Nancy Lachowicz

Evaluación de la Equivalencia
Clave de las Respuestas

1) A
2) D
3) 0.25, 1/2, 3/5, 75/100
4) D
5) A
CONCEPT AREA  Equivalency
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW  Students will use the differences between time zones to practice equivalency concepts.

LESSON ACTIVITIES OVERVIEW  In this lesson, students solve equivalency problems related to time conversions for different areas.

LEARNING OBJECTIVES  Students will be able to:
• Write equations to describe elapsed time.
• Apply problem-solving strategies, understand the problem, write a plan, solve the problem and check the solution for reasonableness.

MEDIA COMPONENTS  Video: Math Can Take You Places #002 “Equivalency”
Internet:
  - World Time Zone Web site: www.worldtimezone.com

MATERIALS  • World maps that shows time zones (see the Official U.S. Time Web site)
  • Large clocks showing military time and/or World Time Zone Web site
  • Student activity sheets
  • Airplane stickers for the back of the clocks (optional)

PREP FOR TEACHERS  • Bookmark the Web sites.
  • Cue video.
  • Focus viewing.
  • Gather the clocks.

Note:  The concepts of equivalency and fact families will be covered during this lesson. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE  1. Introduce the lesson by having the students view the Math Can Take You Places video #002 “Equivalency.” Follow with a discussion of the material presented in the video.
   Have the students think about New Year’s Eve. Possibly have the class countdown from 5 and say “Happy New Year!”

   2. Pause the video after Ms. Garcia asks, “Do you think everyone in the world will be counting down to midnight at the exact same time as we are?” Ask students to discuss the question. Resume the video for responses from the video class. Stop when Ms. Garcia says, “When it is 12:00 a.m. New Year’s Day in Oklahoma City, what time will it be in Philadelphia, Pennsylvania? How do you know?” Students should describe in their explanation that Oklahoma City (Central Time) and Philadelphia (Eastern Time) are in different time zones.
LESSON 5
“Right on Time”
by Rhonda Bailey

3. Refer the students to the map with the time zones and discuss with them that Universal Time is based on the time at Greenwich, England. There are 24 time zones around the world and of those 24, seven time zones include the United States and the territories of Puerto Rico and American Samoa. Starting with the most eastern time zone, they are as follows:

**Atlantic Time**: Puerto Rico; Bermuda; Greenland; U. S. Virgin Islands; Nova Scotia, Canada; and Caracas, Venezuela

**Eastern Time**: New York City; Washington D.C.; Philadelphia, Pennsylvania; Hartford, Connecticut; Boston, Massachusetts; Indianapolis, Indiana; Chicago, Illinois; Atlanta, Georgia; and Miami, Florida

**Central Time**: New Orleans, Louisiana; St. Louis, Missouri; Omaha, Nebraska; Minneapolis, Minnesota; Green Bay, Wisconsin; Houston, San Antonio, Dallas, Fort Worth and Austin, Texas; and Mexico City, Mexico

**Mountain Time**: El Paso, Texas; Phoenix, Arizona; the Grand Canyon; Salt Lake City, Utah; Yellowstone National Park in Wyoming; and Alberta, Canada

**Pacific Time**: Hoover Dam in Nevada; Los Angeles, Hollywood and San Francisco, California; Portland, Oregon and Seattle, Washington

**Alaska Time**: Juno, Anchorage and Fairbanks, Alaska

**Hawaii-Aleutian Time**: Honolulu, Hawaii; the Aleutian Islands of Alaska; and New Zealand

**Samoa Time**: American Samoa, Midway Islands, and Samoa

4. Have students write equations to describe other time zones in terms of the Central Time Zone. Give this one example:

Central Time = Eastern Time – 1 hour, or Central Time + 1 hour = Eastern Time

Central Time = Samoa Time + 5 hours, or Central Time – 5 hours = Samoa Time

If we use the numbers in the time from the original problem, that means: 12:00 a.m. (Central Time) + 1 hour = 1:00 a.m. (Eastern Time).

5. Discuss why pilots use military time, which is based on a 24-hour clock. Share with students the military time conversion chart.

**LEARNING ACTIVITIES**

Cue the video to after the pilot says, “… make it feel in the cockpit like it does in the airplane.” Play the video until Ms. Garcia says, “… begin working in your group to figure out the problem. Stop the video. Say: “Now, pretend you are the pilot flying a 777 airplane from Dallas, Texas to Los Angeles, California. One of your responsibilities is to use time zones to calculate the length of flights using time so you can let your passengers know what time they are landing.”

*Problem: You are the captain flying a 777 airplane from Dallas to Los Angeles. If your flight is scheduled to leave DFW Airport at 5:53 p.m. (Central Time) and arrive at LAX Airport at 7:05 p.m. (Pacific Time), what was the actual length of your flight in hours and minutes? Be sure to write a number sentence to show how you got your solution.

**Possible Solution:** Change 5:53 p.m. (Central Time) to (Pacific Time):

Central Time – 2 hours = Pacific Time or Pacific Time + 2 hours = Central Time

5:53 p.m. (Central Time) – 2 hours = 3:53 p.m. (Pacific Time) for the time of departure
Time of Arrival – Time of Departure = Length of Flight
7:05 p.m. (Pacific Time) – 3:53 p.m. (Pacific Time) = 3 hrs 12 minutes
(* This problem is also number one on the “Follow Up Questions” handout.)
Ask students to explain how they arrived at their solution.

CULMINATING ACTIVITY
Allow students to complete the “Follow Up Questions” handout in groups of 3-4 students. Come back together as a class to discuss their solutions and any questions they may have.

“Follow Up Questions” handout key:
1. See above; explanations may vary.
2. The Atlantic Time Zone is 6 hours ahead of the Hawaii-Aleutian Time Zone, so the time on the watch would be turned back 6 hours.

The number 16:45 (military time) – 6 hours = 10:45 a.m.
10:45 a.m. + 6 hours = 4:45 p.m.

a. 2 hours and 21 minutes, traveling from the Mountain Time Zone to the Central Time Zone, you gain one hour.

b. 2 hours and 6 minutes, traveling from the Central Time Zone into the Eastern Time Zone, you gain another hour.

c. Answers will vary; 9:03 a.m. in Phoenix is 11:03 a.m. in Atlanta.
4:17 p.m. (16:17 military time) – 11:03 a.m. = 5 hours and 14 minutes

CROSS-CURRICULAR EXTENSIONS
Science
It is important that pilots understand weather conditions, so that they have safe flights. Research the different meteorological signs they see on the weather reports, and what the signs mean.

REAL-WORLD CONNECTIONS
Invite a local meteorologist to speak to the class.

ASSESSMENT
Show the students the video, Math Can Take You Places #002 “Equivalency”. Pause the episode after the teacher gives the students in the classroom the time zone problem for the pilot. Allow students time to work the problem individually. Collect their written answers. Resume the tape, so that the students can see how the students in the video worked through the problem.

STUDENT HANDOUTS
“Follow Up Questions” worksheet
“Military Time” conversion chart
“Right On Time”
Follow Up Questions

1. You are the captain flying a 777 airplane from Dallas to Los Angeles. If your flight is scheduled to leave DFW Airport at 5:53 p.m. (Central Time) and arrive at LAX Airport at 7:05 p.m. (Pacific Time), what was the actual length of your flight in hours and minutes? Be sure to write a number sentence to show how you got your solution.

   Explain the process you used to solve this problem.

2. If you are flying from a location in the Atlantic Time Zone to a location in the Hawaii-Aleutian Time Zone, describe how you would change the time on your watch, so that it will reflect the right time when you arrive. Write a number sentence showing this change if it is 4:45 p.m. in the Atlantic Time Zone.

3. Suppose you board a plane in Phoenix, Arizona at 9:03 a.m. headed to Atlanta, Georgia. The flight is scheduled to arrive in Atlanta, Georgia at 4:17 p.m.
   a. First you must fly from Phoenix, Arizona to the Dallas/Ft. Worth or DFW Airport. Your departure time from Phoenix is 9:03 a.m. and your arrival time at DFW is 12:24 p.m. How long was your flight from Phoenix to DFW?
   b. Next, you will leave DFW to fly to Atlanta, Georgia. You depart from DFW at 1:11 p.m. and arrive in Atlanta at 4:17 p.m. What was your flight time?
   c. Write number sentences that describe the total flight time from Phoenix to Atlanta.
**Military Time**

This page is part of [The Marine Corps Wives Website](http://www.marineswives.com)

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<tr>
<th>Civilian Time</th>
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Preguntas Para Reforzar

1. Eres el capitán de un vuelo en un avión 777 que va de Dallas a Los Ángeles. Si el horario del vuelo para salir del aeropuerto DFW es a las 5:53 p.m. (Hora del Centro) y llegar al aeropuerto LAX a las 7:05 p.m. (Hora del Pacífico), ¿cuál fue la duración actual de tu vuelo en horas y minutos? No te olvides de escribir una oración numérica para demostrar cómo lograste tu solución.

Explica el proceso que usaste para resolver el problema.

2. Si estás volando de una localidad en la zona con hora del Atlántico a una localidad en la zona con hora de Hawaii-Aleutian, explica cómo cambiarías la hora en tu reloj, para que pueda reflejar la hora correcta cuando llegas. Escribe una oración numérica para mostrar este cambio si son las 4:45 p.m. en la zona con Hora del Atlántico.

3. Vamos a suponer que subes a un avión en Fénix, Arizona a las 9:03 a.m. camino a Atlanta, Georgia. El horario de llegada a Atlanta, Georgia es 4:17 p.m.

a. Primero tienes que volar de Fénix, Arizona al aeropuerto de Dallas/Fort Worth o Aeropuerto DFW. Tu hora de salida en Fénix es a las 9:03 a.m. y tu hora de llegada a DFW es 12:24 p.m. ¿Cuánto tiempo duró tu vuelo desde Fénix a DFW?

b. Después, saldrás de DFW para volar a Atlanta, Georgia. Sales del DFW a la 1:11 p.m. y llegas a Atlanta a las 4:17 p.m. ¿Cuánto tiempo duró tu vuelo?

c. Escribe oraciones numéricas que expliquen el total de horas de vuelo desde Fénix a Atlanta.
### Hora Militar

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<th>Hora civil</th>
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Página elaborada por hadduck Enterprises

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Lesson 6
“Figure This Out”
by Betty Lewis

Concept Area: Measurement

Grade Level: 4-6

Time Allotment: 60 minutes

Lesson Overview: The investigations will give the students an opportunity to apply and expand their measurement skills by taking their own measurements, as well as measuring items in the classroom. They will compare their measurements to the models presented in the classroom.

Lesson Activities Overview: The students will estimate to determine reasonable results, use logical reasoning to make sense of their world and solve problems involving proportional relationships.

Learning Objectives: Students will be able to:
- Estimate and measure to solve problems involving length and width.
- Apply measurement concepts.
- Define measurement and investigate measurement.
- Estimate and compare the results of the measurements to the model measurements of several basketball players.

Media Components: Video: Math Can Take You Places #001 “Measurement.” Focus student viewing on the size of the players and what accommodations the trainer mentions the players may need because of their height.

Internet: www.nba.com for player statistics and information

Materials: Per group of students:
- Ruler
- Bathroom scale
- Measuring tape
- Yarn
- Pencils
- Notebook paper
- Desk, window sill, width of classroom door, length and width of textbook
- Silhouette of a basketball player (or, the teacher can make a 7-foot
- mark near the classroom doorway for student reference.)
- Construction paper
- Markers
- Scissors
- Handouts

Prep for Teachers:
- Cue the videos
- Reference: Realistically, a 7-foot tall player would have a wingspan of around 7 ft., 6 inches and weigh between 200-230 pounds.
- If students are self-conscious about their weight, ask the nurse for an average weight for students in your classroom. Use that number instead of actually weighing the students.
• The teacher will inquire about measurement and about students’ prior knowledge regarding their experience using measurement.

**Note:**
The following concepts will be covered during this lesson: *customary system of measurement, length, foot, inch and yard*. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

**INTRODUCTORY ACTIVITY: SETTING THE STAGE**

1. Say: “Pretend I have forgotten how to measure the length of an item. Can you give me step-by-step instructions for how to measure the length of this table?”

2. Allow students to walk aloud through the steps of how to properly measure.

3. Show the *Math Can Take You Places #001 “Measurement”* video. Ask students to listen closely and be able to list some of the things that tall basketball players may have to adjust in order to live comfortably.

4. Refer them to the basketball silhouette (or measured mark) near the doorway. Tell them that you will be using him as a reference during today’s lesson. Do not tell them how tall the cutout actually is.

**LEARNING ACTIVITIES**

1. Divide students into pairs to complete the activity. (Teacher hint: To avoid confusion, you may want to group them in same-sex pairings.)

2. Refer the students to the “Measuring Station” handout. Before giving students permission to begin measuring, let them fill out the “estimate” column on the worksheet. Let them have contact with the objects if needed.

3. After the students have filled in their estimates, allow them to choose the measurement tool they think they would need to take the actual measurement of the items.

4. Allow students to work in pairs to complete the “Measuring Station” handout.

5. Monitor to ensure that the students are measuring correctly.

**CULMINATING ACTIVITY**

1. Bring the students back together and ask: “What strategy did you use to determine the measurement?” Say: “Now that we have our charts filled in, would anyone like to share their results?”

2. Ask students questions similar to the following: “Which estimate was the most accurate or the closest to the actual measurement? Which was the least accurate? How could we have made our estimates more accurate?”

3. Say: “Pretend this 7-foot-tall basketball player came to be a substitute teacher in your math class for a week. What items in the classroom would we need to change to accommodate him?”
LESSON 6
“Figure This Out”
by Betty Lewis

CROSS-CURRICULAR EXTENSIONS

Social Studies:
Encourage the students to research the origins of the game of basketball. Let them share the most interesting facts in a class presentation.

REAL-WORLD CONNECTIONS
The world is full of differently-shaped and differently-abled people. Have the students imagine if they were in a wheelchair. Ask them to write about what things would need to be changed for them to move around easily during a normal school day. Invite a person in a wheelchair to speak to the students about the special accommodations s/he uses throughout the day.

ASSESSMENT
Give each student a set of small classroom items (for example, markers, scissors, glue bottles, glue sticks, paperclips, etc.). Be sure to measure them beforehand. Have students measure their lengths. Check their work for accuracy.

STUDENT HANDOUTS
“Measuring Station” worksheet
# Measuring Station

<table>
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<tr>
<th>Object</th>
<th>Estimate measurements</th>
<th>Actual measurement</th>
<th>Difference in measurement</th>
<th>Estimate measurement basketball players</th>
<th>Actual measurement</th>
<th>Difference in measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand (wrist to longest finger)</td>
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<td>Arm span</td>
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## Estación de Medidas

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<th>Medidas Reales</th>
<th>Diferencia en la medida</th>
<th>Medida calculada de los jugadores de baloncesto</th>
<th>Medida Real</th>
<th>Diferencia en la medida</th>
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**CONCEPT AREA**  Measurement

**GRADE LEVEL**  4-6

**TIME ALLOTMENT**  Two 60-minute sessions

**LESSON OVERVIEW**  Students will learn the relationship between the radius and diameter of a circle and the relationship of the diameter and the circumference of a circle. Students will also find the approximate circumference of a circle, given either the diameter or radius.

**LESSON ACTIVITIES OVERVIEW**  After having the teacher read *Sir Cumference and the First Round Table* to the class, the students will measure the diameter of five different circular objects.

**LEARNING OBJECTIVES**  Students will be able to:
- Identify the radius, diameter and circumference of a circle.
- Be able to obtain the diameter, given the radius, and vice versa.
- Find the approximate circumference of a circle, given either the radius or the diameter.
- Find the approximate diameter of a circle, given the radius.
- Measure the diameter and circumference of circular objects.
- Solve a problem situation using prior knowledge.
- Use a chart to organize data.

**MEDIA COMPONENTS**  Drexel University runs this Web site. It contains various links to an array of subjects that encompass math. [http://www.mathforum.org/teacher/](http://www.mathforum.org/teacher/)

This is the Web site for Ivars Peterson, who has written two books, *Math Trek* and *Math Trek 2*. It also contains many other links, including MatheMUSEments, which contains links to articles written by Ivars Peterson for *Muse* magazine. [http://home.att.net/~mathtrek/](http://home.att.net/~mathtrek/)

"The World of Math Online." This Web site includes a section with games that students will have fun playing. [http://www.math.com/](http://www.math.com/)

**MATERIALS**  
- *Sir Cumference and the First Round Table*
- *Sir Cumference and the Dragon of Pi*
- Diagram of Circle (in Student Handouts)

Per group of students:
- Two circular plastic lids (different sizes)
- One circular item (e.g., trash can)
- Ruler with metric units
- Two different colors of string
- One calculator
- Circles (one for each group) cut out of construction paper about eight inches in diameter
LESSON 7
“Don’t Be A Square”
by Michael Torres

PREP FOR TEACHERS

- Students will measure lids as well as other circular items that are in the classroom. Make sure that you have at least one item (that is usually found in the classroom) per group. A circular trash can and some other items have different bases, so either base can be used, or have the group measure both bases [confusing].
- As a reward, order a cookie from the store in the mall for the second day. This is part of the culminating activity. However, it is not mandatory.

Note:
The following concepts will be covered during this lesson: **radius, circumference, diameter, pi, quotient, estimation and ratio**. Students may need to review the concepts prior to beginning the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Read the book *Sir Cumference and the First Round Table: A Math Adventure*.

2. Review the vocabulary words for a circle with the students (radius, diameter, circumference, *pi*; See “Media Component” Web site number three for details).

3. Have the students go back to their stations and trace one of the lids on a clean sheet of paper. They will also label the three parts of a circle discussed in the book (radius, diameter and circumference). One way to find the center of the circle is to fold it in half to create the diameter. Then, fold a second diameter, so that the two diameters intersect. Where the two diameters intersect, mark the center point. Students can then proceed to draw and label the radius and circumference.

LEARNING ACTIVITIES

4. Use Diagram of Circle (in Student Handouts). Ask students if they notice a relationship between any of the three parts of the circle. Most should notice that the radius is half the size of the diameter. To lead students towards this observation, have them record the data as they measure in the chart like the one below. (cont next page)

<table>
<thead>
<tr>
<th>Object</th>
<th>Diameter (mm)</th>
<th>Radius (mm)</th>
<th>Circumference (mm)</th>
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To make the relationship between diameter and circumference easier to see, have the students graph the two sets of data. Use the diameter as the independent variable and the circumference as the dependent variable.

Have the students measure the diameter of each of the three items. The students should record the diameter of each item to the nearest millimeter and then figure the radius of the circle. Ask: “Is there another relationship besides the one between the radius and the diameter? How can we measure the circumference of the lids or of the trash can?”

Some might suggest using a string and then measuring the string.
Some might be familiar with a measuring tape used by carpenters.
Some might be familiar with a measuring tape used by a seamstress.
Have the students measure the diameter of each of their three items using one of the strings.

Using the other color string, have the students measure the circumference of the three items.

Allow the students to work for a while with the strings to see if they come up with a relationship between the diameter and the circumference of each item.

Give each group one of the construction paper circles and have the students record what they think the relationship between the diameter and the circumference is. Allow each group to report its findings to the class.

CULMINATING ACTIVITY

1. After discussing the findings with the class and getting a consensus as to what the relationship is, read Sir Cumference and the Dragon of Pi to the class. (If you purchased a cookie, this would be the time to share it with the class.)

2. Select one of your students to use the calculator to determine the quotient of the four items on page 21. Have another student record the findings on the chalkboard in a table format.

3. Discuss with the students that for now, they will round pi to 3 to get an estimate of the circumference of the items at their stations. (See: “Teacher’s Note” below.)

4. Have the students create a table with four subheadings: “Item Name,” “Diameter,” “Pi,” and “Circumference.” Have the students record the diameter of each item they measured and then figure out the circumference by multiplying (using 3 as the estimate for pi). Remember to have them record the data as they measure.

5. Have the students create another table using the same information, but have the second column be the circumference and the last column be the diameter. Ask: “How will this table differ from the last? Are we going to do the same operation?”

6. Teacher’s Note: The ratio of circumference to diameter will not be equal to 3.14; remember pi is an approximation because it is an irrational number. Be careful not to lead students into thinking that $\pi = 3.14$. This is not true since 3.14 is a terminating decimal and $\pi$, on the other hand, is irrational and never terminates. Make sure that students understand that the definition of $\pi$ is the ratio of the circumference of a circle to its diameter, $C / D = \pi$. The value 3.14 is only an approximation of $\pi$. $\pi \neq 3.14$, not equal to 3.14. Please stress this point! When students physically measure items and find the ratio of the circumference to the diameter, they will probably not get the value 3.14; this is because there will always be error in measurement due to the precision of the measurement tools. Rather they will get a value of 3…. something. Help students to feel secure knowing that the value of $\pi$ is a little more than three.

CROSS-CURRICULAR EXTENSIONS

Language Arts

Have students create their own one-page story that deals with mathematics. This can be as short or as long as you want it to be. Some students will be very creative with their ideas. Encourage this creativity as long as it is mathematically sound and they use the proper vocabulary and terminology.
LESSON 7
“Don’t Be A Square”
by Michael Torres

Art
Using a plastic circle about 12 inches in diameter, have the students label the parts of a circle using yarn. Have the Art teacher demonstrate using a Hula hoop.

REAL-WORLD CONNECTIONS
Have an architect visit the class to discuss how he/she uses the relationships found in a circle in his/her planning process.

ASSESSMENT
Informally monitor students’ responses for mathematical understanding.

STUDENT HANDOUTS
Diagram of Circle
LESSON 8
“Is There Mystery in Measurement?”
by Nancy Lachowicz

CONCEPT AREA  Measurement
GRADE LEVEL  6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students will explore perimeter and area of polygons and determine how changing the dimensions of a figure affects its perimeter and area. Students will estimate the area and perimeter of an irregular figure on grid paper. Finally students will be assessed by using an interactive Web site.

LESSON ACTIVITIES OVERVIEW
Students will explore perimeter and area with index cards. They will use grid paper to create various rectangles and compare different dimensions and will trace their hand to estimate its area and perimeter.

LEARNING OBJECTIVES
Students will be able to:
• Estimate measurements and evaluate reasonableness.
• Use appropriate formulas to calculate area and perimeter.
• Work cooperatively in pairs.
• Compare and contrast similarities and/or differences of area and perimeter.
• Use technology for self-assessment.

MEDIA COMPONENTS
Video: Math Can Take You Places #001 “Measurement”

MATERIALS  Per Student:
• Rulers (centimeter/customary)
• 3 x 5 index cards (3 per student)
• 5 x 8 index cards (3 per student) optional for extension activity
• Pencils
• 4 different colored pencils or crayons
• One-inch grid paper

PREP FOR TEACHERS
• Prepare materials and handouts for students.
• View Web site prior to teaching the lesson so you can choose appropriate level of assessment for each student.
• View video prior to lesson, cue for class discussion.

Note:
The following will be covered during this lesson: length, width, area, perimeter and formula. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.
LESSON 8
“Is There Mystery in Measurement?”
by Nancy Lachowicz

INTRODUCTORY ACTIVITY:
SETTING THE STAGE
1. Pass three 3” x 5” index cards and a ruler to each student. Have students measure the length and width of one card and label all three (l = 5”, w = 3”)

Discuss the following vocabulary terms:
Length, width, perimeter, area, dimensions, formula

Lead the following discussion:
“What do you know about perimeter?” (It is the distance around a polygon.)
“What do you know about area?” (It is the space within the perimeter of the polygon.)

2. Lay your index cards end to end on your desk. What formula would you use to find the perimeter? Area? (Offer one-inch grid paper if students need extra help calculating area and perimeter.)
What is the perimeter? (36 in.) Area? (45 sq. in.)

3. Say: “Now I want you to lay your index cards length to length.”

“Based on our previous findings, estimate what you think the perimeter is? (28 in.)
Now use the appropriate formula to compute the perimeter. What do you notice?
Why is the perimeter smaller than the first model?” (The objects are the same only some of the sides are not edges. Now, they are on the interior of the shape.)

“Use the formula for area to compute the area. (45 sq. in.) Why did the area stay the same?” (The total area of the three cards, regardless of how they are arranged, will be the same.)

4. Have students lay their index cards with two cards stacked length to length and the third card connecting width to width to the bottom card. How do you know the area will be the same? Write two different equations to prove your reasoning:
Students should write: A = (5 x 6) + (5 x 3)
A = (10 x 6) – (5 x 3)
What is the perimeter? (32 in.)

5. Point out that although two or more shapes have the same area they may not have the same perimeter.

LEARNING ACTIVITY:
1. Distribute one-inch grid paper to each student. Ask students to follow the instructions they are given. Ask, “Do shapes with the same perimeter have the same area?”
Draw a 4-inch square (4 x 4) and 3 rectangles with the following dimensions 1 x 7, 2 x 6 and 3 x 5. Determine each shape’s perimeter. (16 in.)
Now compute the area of each. (16 sq. in., 7 sq. in., 12 sq. in., 15 sq. in.)

2. Allow students to create one square and three rectangles of their own with a given perimeter of 24 inches. Help students understand that although two or more shapes have the same perimeter, they may not have the same area.
LESSON 8
“Is There Mystery in Measurement?”
by Nancy Lachowicz

CULMINATING ACTIVITY
Have the students trace their hands on grid paper. Explain how estimates are determined using area and perimeter. Instruct students to make a “key” for whole squares (one color), ¾ full squares (a second color), ½ full squares (a third color). Those squares that are barely included within the perimeter are not counted.

Students are to color their hands according to the key and then count the number of squares. Remember to discuss that two halves equal one whole. To calculate perimeter, students may use string and have a partner help them hold it down.

CROSS-CURRICULAR EXTENSIONS
Social Studies
Research the area of different continents. Arrange in order from greatest to least. Can you figure the perimeter of each continent?

REAL-WORLD CONNECTIONS
View video: Math Can Take You Places, #001 “Measurement”. Ask students to observe the real-world application of area and perimeter in providing comfort for basketball players.

Invite various professionals (i.e., carpenters, homebuilders, land surveyors, architects, etc.) to share how they use measurement, stressing its importance.

ASSESSMENT
Allow students to create their own area and perimeter problems. Encourage them to focus their questions on real-life situations and to create answers. Review their questions and answers for accuracy in order to check for understanding. Use the questions written by the students to create a written assessment.

STUDENT HANDOUTS
None
CONCEPT AREA  Measurement
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students use area and perimeter formulas within a real-life situation.

LESSON ACTIVITIES OVERVIEW
Students will design the layout of a room by investigating the measurement concepts of perimeter and area.

LEARNING OBJECTIVES
Students will be able to:
• Apply their knowledge of measurement concepts to solve problems, including the application of measurement formulas.
• Apply problem-solving strategies.

MEDIA COMPONENTS
Video: Math Can Take You Places #001 “Measurement”

MATERIALS
• One-inch grid paper
• Snap cubes (or 1” x 1” tiles)
• Construction paper (for furniture cutouts)
• Rulers
• 7.5-foot-tall silhouette (or, teachers could also use a tape measure to mark near a doorway where a 7.5-foot-tall person would stand.)

PREP FOR TEACHERS
Note:
The following concepts will be covered during this lesson: area, perimeter, length, width and floor plan. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

• Work with your campus art teacher to help you construct a 7.5-foot-tall silhouette of a basketball player, so that students have a visual of exactly how tall 7.5 feet really is.
• Cue the videotape.
• Gather enough snap cubes for each group of four students to have 60 cubes. You may want to use colored tiles instead to make sure students understand that their problem relates to area, not volume. Be sure to count them out for each group in advance to avoid downtime.
• Cut out squares to represent the nightstand (approximately 2 inches by 2 inches), and rectangles to represent the dresser (approximately 2 inches by 3 1/2 inches). Each group will need one of each. Make sure they are a different color than the one-inch grid paper.
• Each group will also need a sheet of one-inch grid paper with an area of about 400 square inches. Try out the activity beforehand to make sure that the problem is the
right difficulty level for your students. If it seems too easy for them to solve, try making their hotel room grid paper smaller.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Spark students' interest by introducing the sports-team scenario. Say: “Professional sports teams take trips and stay in hotels quite often. No big deal, right? There are plenty of hotels in almost every city. (Cue Math Can Take You Places #001 “Measurement” to the basketball players getting off the bus. Play the video until the classroom teacher asks, “… How we can make a bed in the room more comfortable?”

Ask students, “What are some problems that this player may have trying to use a regular size hotel room?”

2. Resume showing the tape to set the stage. Stop when the teacher says, “… you are able to explain your answer.” Ask students to explain the difference between the area and perimeter of a rectangle.

LEARNING ACTIVITIES

1. Students are to use what they know about area and perimeter to design a bed and arrange the furniture in the hotel room, so that their 7.5-foot-tall basketball player can fit comfortably.

2. The grid paper will represent the space they have in the hotel room. They are to use the cubes to make a bed that has an area no greater than 60 square feet and has the smallest perimeter possible. Then, they are to arrange their bed, dresser and the nightstand in the room, so that the player can move around easily. Instruct students that they should be able to explain the solution when they're done.

Solutions will vary. Solutions must have a bed that is to be at least 7.5 feet long, so an 8-foot by 6-foot bed would meet the criteria, with an area of 48 square feet. This bed would have a perimeter of 28 feet.

3. Students will record the measurement combinations on the Mavericks and Measurement student recording sheet and answer questions related to the problem.

CULMINATING ACTIVITY

Each group should share its findings. They should discuss the reasonableness of their findings.

1. Explain the difference between how a 6-foot-by-8-foot bed would look in the room versus an 8-foot-by-6-foot bed.
2. If a person is actually 7.5 feet tall, what other items around the house might he or she have trouble using?

Resume video from last pause point (after the teacher said, “… you are able to explain your answer.”) Stop at end of equivalency video.

Have students compare the way they solved the problem with the ways the students in the film solved it.

As an extension, ask the students to use their models of the hotel room to create a floor plan, giving the area and perimeter of each piece of furniture in the room as well as the area of the floor space left for the basketball player to walk around in.
CROSS-CURRICULAR EXTENSIONS
Science
People's heights are predetermined by a set of human codes called “genes.” Students should use media resources to collect research on genes and, with the information collected, write reports to be presented to the class.

REAL-WORLD CONNECTIONS
Take a field trip to a home-improvement store. Let students speak to a flooring expert to see how he or she uses area and perimeter.

ASSESSMENT
Have students work individually to develop a word problem where the answer is, “The area equals 80 square feet,” and another where the answer is, “The perimeter equals 40 feet.” Monitor their work for understanding of the concepts.

STUDENT HANDOUTS
“Mavericks Measurement Student Recording Sheet”
Mavericks and Measurement
Student Recording Sheet

<table>
<thead>
<tr>
<th>Length of bed</th>
<th>Width of bed</th>
<th>Sketch of the bed</th>
<th>Perimeter formula for the bed (feet)</th>
<th>Area formula for the bed (square feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

1. Describe how you used the information in the problem to help you solve this problem.

2. What dimensions did you decide on for the design of the bed? Why did you choose these measurements?

3. Explain your plan for solving this problem.
4. Imagine that a bed measures 4 feet by 4 feet. Find the perimeter and the area. Are the perimeter and area of the bed the same? Why or why not? How would you explain the difference between the perimeter and the area?

5. Explain how the measurement units for perimeter and the measurement units for area are different.
6. Look at the following pairs of dimensions and the perimeter.

<table>
<thead>
<tr>
<th>Length (meters)</th>
<th>Width (meters)</th>
<th>Perimeter Process (2 \cdot (l + w))</th>
<th>Perimeter (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>(2 \cdot (1 + 14))</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>(2 \cdot (2 + 13))</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>(2 \cdot (3 + 12))</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>(2 \cdot (4 + 11))</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>(2 \cdot (5 + 10))</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>(2 \cdot (6 + 9))</td>
<td>30</td>
</tr>
</tbody>
</table>

What pattern do you see between the dimensions of the bed and the perimeter? *Hint:* Look at the Process column.

Explain how using the formula for perimeter would help you in finding possible dimensions for a rectangle with a perimeter of 24 feet.
**Medidas y Mavericks**
Hoja de Anotaciones del Estudiante

<table>
<thead>
<tr>
<th>Largo de la cama</th>
<th>Ancho de la cama</th>
<th>Bosquejo de la cama</th>
<th>Fórmula del perímetro para la cama (en pies)</th>
<th>Fórmula del área para la cama (en pies cuadrados)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

1. Explica cómo usaste la información del problema para ayudarte a resolverlo.

2. ¿En cuáles dimensiones te decidiste para el diseño de la cama? ¿Porqué elegiste estas medidas?

3. Explica tu plan para resolver este problema.
4. Imagina que una cama mide 4 pies por 4 pies. Encuentra el perímetro y el área. ¿Son iguales el perímetro y el área de la cama? ¿Porqué sí o porqué no? ¿Cómo explicarías la diferencia entre el perímetro y el área?

5. Explica la diferencia entre las unidades para medir el perímetro y las unidades para medir el área.
6. Mira a los siguientes pares de dimensiones y perímetros.

<table>
<thead>
<tr>
<th>Largo (metros)</th>
<th>Ancho (metros)</th>
<th>Proceso del Perímetro (2 \cdot (l + w))</th>
<th>Perímetro (metros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>(2 \cdot (1 + 14))</td>
<td>30</td>
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<td>2</td>
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<td>(2 \cdot (5 + 10))</td>
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<tr>
<td>6</td>
<td>9</td>
<td>(2 \cdot (6 + 9))</td>
<td>30</td>
</tr>
</tbody>
</table>

¿Qué parecido hay entre las dimensiones de la cama y el perímetro? *Pista:* Mira en la columna Proceso.

Explica cómo el uso de la fórmula para perímetro te ayudaría a encontrar las posibles dimensiones para un rectángulo con un perímetro de 24 pies.
LESSON 10
“Tile My Bathroom Floor”
by Sabrina McCullough

CONCEPT AREA  Measurement
GRADE LEVEL  6
TIME ALLOTMENT  Two 60-minute sessions

LESSON OVERVIEW  Each student will be given a bathroom floor plan and will create his or her own design of floor tiles to cover a bathroom floor.

LESSON ACTIVITIES OVERVIEW  Students will apply real-life problem-solving strategies to a tiling project, focusing on measurement, proportionality, estimation and area. Students will design floor tiles using centimeter graph paper.

LEARNING OBJECTIVES  Students will be able to:
• Apply proportional reasoning unit analysis and measurement conversion throughout the problem-solving process.
• Estimate areas by applying problem-solving strategies.
• Determine the amount of tile that will be required to tile a specified area of a bathroom floor.
• Use problem-solving strategies to calculate the dimensions of the given floor plan, taking into account that there are areas in the bathroom that will not be tiled.
• Verify their estimate by tiling the floor plan using centimeter grid paper.

MEDIA COMPONENTS  Video: Math Can Take You Places #001 “Measurement”
Internet:
  Home Plans - Over 1,000 searchable floor plans.
  http://www.homeandfamilynetwork.com/homeimprovement/plans.html
  HGTV
  The Home and Garden Network Web site has design information, floor plans, remodeling information and cool projects for kids.
  http://www.hgtv.com/
  Discovery Kids - “Trading Spaces for Kids”
  Check out “Boys versus Girls” on “Trading Spaces for Kids,” a popular remodeling show at Discovery Kids.
  http://kids.discovery.com/fansites/tradingspaceskids/tradingspaceskids.html

MATERIALS  Per class
• Books, magazines, photos of tiled bathroom floors
• Videos of home improvement shows
Per pair of students
• Original floor plan
• Construction paper
Per student
• Centimeter graph paper
• Rulers
• Floor plans (bathrooms)
PREP FOR TEACHERS

See example below. This example has a copyright.

Length is approximately 6.25 cm

1 centimeter = 0.5 meter

Collect floor plans (of bathrooms) or create your own floor plans.

A pair of students will have a bathroom floor plan. Students will use the scale given on the bottom of the floor plan to calculate the total area of the bathroom.

Note:
The following concepts will be covered during this lesson: centimeter, meter, area, length and width. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE

Learning Activities

Allow students 15-20 minutes to browse through magazines, books and photos to get some ideas of how bathrooms look with tiled floors. Students may also watch short clips from home improvement shows and/or browse the Internet.

1. Give each pair of students an assigned floor plan. The students will also see different types of tile arrangements that may include various colors and designs. Have students describe the patterns they see and how they think the arrangement was done.

2. Allow students time to analyze the bathroom floor plans and discuss strategies for estimating the area (in square centimeters and square meters) of the bathroom floor that will be tiled.

3. Students will apply problem-solving strategies to arrive at the most accurate estimate. Students will devise and write out a plan that describes how they and their
partner attacked the problem and determined the amount of tile needed to cover the bathroom floor.

4. Students should keep in mind that their solutions must be in both square centimeters and square meters.

5. Once the students have had an opportunity to devise their plans, pass out the centimeter grid paper and colored pencils, so they can begin using their creativity to tile the bathroom floor plan.

6. Students will verify the reasonableness of their estimates based on the number of centimeter squares that they cut out and paste to the tile floor plan.

7. Lastly, students will determine how far off they were from their estimate and the actual number of tiles used to tile the bathroom floor. If some groups had estimates that were much better than others, allow students to share the strategies they used that were more accurate.

**CULMINATING ACTIVITY**

1. Play the video, *Math Can Take You Places* #001 “Measurement”. Students will observe another need for finding area and perimeter.

2. Students will display their problem-solving pages and tiled bathroom floor plans for a gallery walk. Allow students to present their work and share their problem-solving strategies and final tiled floor plans. They will compare their strategy with those demonstrated on the video.

2. Time to remodel. Students will rearrange the tiles to create a new design. Have students duplicate the tile colors and designs from their floor plan using the same colors, because now it’s time to remodel the bathroom! Students will cut out the tiles and rearrange them to create a totally new bathroom floor plan using the same tiles. Allow students to determine the dimensions of the new bathroom, but remind them that the new design must have the same components as the original bathroom. Have students share their new designs.

**CROSS-CURRICULAR EXTENSIONS**

Social Studies

- Have students create a tiled mural representing a cultural, historical or current event. Students will need to estimate the amount and cost of materials needed to create the mural by first calculating the area that will be covered. Students must work cooperatively to plan and create the tiled mural. The mural can be formally presented to the school and community. Invite the art teacher and parents to assist in creating the tiled mural.

**REAL-WORLD CONNECTIONS**

- Invite a contractor, professional flooring/carpeting installation technician or interior designer to visit with your class and discuss how mathematics is applied in their professions.

Extend the lesson by pricing ceramic tiles and carpeting. Have students discuss the pros and cons of tiling the bathroom versus carpeting the bathroom.
ASSESSMENT
Informal assessment can be done to determine clarity and understanding. Observe the students as they work. Decide how well the students are doing based on the following rubric:

- **Complete understanding**
  - If students are completing the project with ease and no questions.

- **Understanding**
  - If students are asking minor questions to get them through the project.

- **Lack of understanding**
  - If students are struggling and unable to work without guidance. Try peer tutoring and/or small pair instruction.

Once students have completed the project, decide on a participation grade as well as a completion grade.

STUDENT HANDOUTS
None
LESSON 11
“Courts of Measure”
by Yvonne Garcia

CONCEPT AREA: Measurement

GRADE LEVEL: 4-6

TIME ALLOTMENT: One to two 60-minute sessions

LESSON OVERVIEW: We all use area when we are trying to fit things into a particular space. For example, how many desks can we fit into a room and still allow students to get in and out of their desks? This lesson gives intermediate-aged students the chance to explore the area and perimeter of their school gym or a nearby school gym. They then transfer this knowledge into finding the actual areas and perimeters of other places games are played.

LESSON ACTIVITIES OVERVIEW: After being shown the Math Can Take You Places measurement video, the students will focus on the way area was used in the video and how the trainer uses math in daily duties. Students should identify the different ways of finding perimeter and area after the completion of the video.

LEARNING OBJECTIVES: Students will be able to:
• Physically measure an area and its perimeter
• Transfer the information learned into a model representation and also number sentences
• Use problem-solving strategies

MEDIA COMPONENTS: Video: Math Can Take You Places #001 “Measurement”: segment with Mavericks interview. This video deals with students setting up the area of a room for a seven-foot-tall basketball player. It also features a Mavericks head trainer and his responsibilities.

MATERIALS: Per class:
• 4 to 5 yardsticks
• 4 to 5 calculators
• 4 to 5 sheets of chart paper
• 1 to 2 pictures of basketball and volleyball courts
• 20 to 25 geo boards
• 4 to 5 sheets of grid paper
• A large bucket of tiles or cubes (approximately 200 to 250)
• Class set of computers (computer lab)

PREP FOR TEACHERS:
• Bookmark Web sites on the computers.
• Watch Math Can Take You Places and cue the videotape.
• Gather all materials needed for each group of students and hands-on elements of the lesson.

Note:
The following concepts will be covered during this lesson: area, length, width, perimeter, model and scale. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.
LESSON 11
"Courts of Measure"
by Yvonne Garcia

INTRODUCTORY ACTIVITY:

SETTING THE STAGE

Day Two

1. Ask: "How many of the students have watched professional basketball? (You should get mostly yeses.)"

2. Ask: Who has played volleyball or basketball in a PE class or little league sports? (You should get all yeses.)

3. Say: “There are people who line these courts. They have to know the correct areas and perimeters in order to keep within the rules of the game. Now let’s discuss some vocabulary words before we start our video about a professional basketball team that relies on the use of math.”

   Vocabulary: area, perimeter, length, width

4. Ask: Has anyone ever seen a seven-foot-tall person in real life?

5. Watch the Math Can Take You Places video.

LEARNING ACTIVITIES

Day One

1. Ask: “How would you go about finding the area of your desk? What about the perimeter? Do you remember the basic concepts and formulas for area and perimeter?”

2. Now, model the two problems with rectangles and squares on the geo boards, showing one way to figure out the area and perimeter. Next, have the students do two to four problems on the geo boards as needed. Then, review how to find missing variables, such as \( x + 7 = 29 \) or \( 37 - x = 14 \).

   Formulas:
   
   \[ A = L \times W \text{ (Area equals length times width) for a rectangle} \]
   \[ A = s^2 \text{ (Area equals side squared) for a square} \]
   The formula for the perimeter of a rectangle is \( P = 2(l + w) \) or \( P = 2l + 2w \), and the formula for the area of a square is \( A = s^2 \) or \( A = l \times w \).

3. Culminating Activities
   a. Group activity: measuring the gym and finding its perimeter and area
   b. Web sites: Practice area and perimeter on each of the sites given.

   The students will focus on the way area was used in the video and how the trainer uses math in daily duties. Students should identify the different ways of finding perimeter and area after the completion of the video.

4. Activity: Visit a junior high or high school gym (if one is within walking distance) or your own school gym. Divide the students into pairs and have them physically walk around and measure the court used for basketball and the court used for volleyball to the nearest inch using a yardstick. Then have them determine the perimeters and areas of both courts. Ask each set of partners to compare the areas and perimeters of the two courts they measured. Next, ask the students to write at least two different number sentences showing the area and two different number sentences showing the perimeter for each court (using all the basic math symbols: +, -, x, and ÷). Then return to class and use mini-cubes to show a model of the area of each court. (Remind them that they can make each cube worth a certain number. For example, 1 cube = 5.) Now have them
transfer the picture they made with cubes onto grid paper.
Example: Given a length of 30 feet and a width of 7 feet ....
Area:
Write a legend showing each mini-cube equaling 10 feet.
30 ft. x 7 ft. = 210 ft.²
7 ft. x 30 ft. = 210 ft.²
Perimeter: 30 ft. + 30 ft. + 7 ft. + 7 ft. = 74 ft.
(2 x 30 ft.) + (2 · x 7 ft.) = 74 ft.
2 (30 ft. + 7 ft.) = 74 ft.

5. Modifications:
a. Give the students extra practice by using a shape explorer
c. Give each of the students a piece of grid paper with the legend marked on it. Then
   ask them to shade only the spaces the cubes covered. Next, have them write the area
   and perimeter.

6. Extension/Enrichment:
a) Have the students make up area and perimeter problems that have missing
   quantities.
b) Then ask them to make a short three- to four-slide PowerPoint presentation,
   showing how they would solve the problem.

CULMINATING ACTIVITY
Next, use these Web sites after the video and group activity to reinforce the concepts
with immediate feedback.
   (perimeter) http://www.shodor.org/interactivate/activities/perm/index.html (area) and/or
   http://www.scienceacademy.com/Bl/ click on perimeter)
http://www.aaamath.com/B/geo78_x7.htm (perimeter)
http://www.aaamath.com/B/geo78_x3.htm (area)

CROSS-CURRICULAR EXTENSIONS
History
Research and compare this to the history of basketball players and their managers.

Writing
Use the elements discovered in the video and/or measuring of the gym to write about
how they can be compared. Interview an architect about the ways s/he uses area and
perimeter.

REAL-WORLD CONNECTIONS
Assign students exercises for finding the perimeter and areas. Examples: Find the area of
the school library. Find the area of the teacher’s desk. Find the area of a classroom
window.

ASSESSMENT
Evaluate your students’ success by asking the following questions in the form of a quiz.
Question types for perimeter and area
1. The coaches were going to buy a mat to fit into the weight room. They needed to
   know the mat’s length and width to see if it would fit. If the shape is a square and the
   area measures 196 square inches, then how long is each side of the mat? (14 ft.)
2. The students in your classroom figured out the area and perimeter of the room they
were going to use to store collected canned foods for the holidays. They figured the area of this rectangular-shaped room to be 48 square feet with a perimeter of 32 feet. However, they forgot to write down the length and width of the room. Write a plan describing how the students can determine the dimensions of the room and then solve for the missing dimensions. (12 ft., 4 ft.)

3. If a student wants to block off a square area on the basketball court to use for ball-handling drills and he/she needs it to be 256 square feet, then what would its length and width be? (16 ft.)
CONCEPT AREA Patterns
GRADE LEVEL 6
TIME ALLOTMENT Two 60-minute sessions

LESSON OVERVIEW Students will become employed at a photo shop and will have to learn how to enlarge or reduce photographs requested by customers.

LESSON ACTIVITIES OVERVIEW Students will use color tiles to represent the original length and width and repeat the pattern to find a new length and width. Students will also show the pattern on a ratio table.

LEARNING OBJECTIVES Students will be able to:
• Use ratios to compare length and width.
• Use original ratio to scale up or down.
• Use a table to show a proportionally similar relationship.

MEDIA COMPONENTS Video: Math Can Take You Places #005 “Patterns”

MATERIALS • Rulers
• Scissors
• Manila paper or construction paper
• Photographs of various sizes
• Color tiles
• Computer (if you want students to create tables on computer)

PREP FOR TEACHERS • Gather materials
• Reproduce poem
• Bring in photographs
• Prepare practice problems for peer practice

Note: The following concepts will be covered during this lesson: ratio, proportion, length and width. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE Begin by watching the Math Can Take You Places patterns video. Ask students to name one way Chef Koval uses patterns in his everyday working situations. Then, ask the students to think of other jobs that may use patterns. Lead them into the lesson by emphasizing that a photographer uses patterns.

1. Have students bring in photographs or magazine pictures from home and discuss enlarging and reducing.

2. Tell students they are beginning a new job working at a photo shop, and they will be responsible for enlarging and reducing customers’ photographs.
3. Tell students that if they become experts at enlarging and reducing, they will be promoted to the framing department.

**LEARNING ACTIVITIES**

1. Tell students that on their first day of the job, they must attend training (as with any new job). Their boss will be conducting the training.

2. In the training, your boss teaches you a poem called, “Tables with Labels.”

   Making tables with labels is fun; can’t you see,
   It’s as easy as 1, 2, 3.
   First you find width, then you find length,
   Your table is almost finished; what do you think?
   Now you multiply, or you divide,
   But that’s all that goes inside.
   Your picture is now larger, or it’s smaller,
   You’re all done, so give me a holler.

3. Next, your boss shows you how to enlarge your first picture. “The customer brings in a photograph that has a length of five inches and a width of three inches. The customer wants one picture with the length and width two times the original, and one picture with the length and width three times the original.”

4. Have students use rulers and scissors to cut out a five-by-three-inch rectangle. Next, have students use red and blue color tiles to show the original length and width. Let blue equal length and red equal width. Have students stack up five blue tiles and three red tiles. Next, have students repeat the pattern showing a second stack of five blue tiles and a second stack of three red tiles. Ask the students to provide the new length and width. Allow them to create a new rectangle with a length of 10 inches and a width of six inches. Have the students repeat the pattern a third time, showing a third stack of five blue tiles and a third stack of three red tiles. Ask students to provide the new length and width. Allow students to create a third rectangle with a length of 15 inches and a width of nine inches. Last, have the students transfer the information to a table.

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>9</td>
</tr>
</tbody>
</table>

Ask students what the stacks of tiles represent.

5. Have students repeat the process using a new photograph, which has a length of 8 inches and a width of 5 inches.

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>24</td>
<td>15</td>
</tr>
</tbody>
</table>

6. Allow students to work with partners to enlarge other photographs.

7. Say, “Next, your boss shows you how to reduce a picture for a customer. The first customer brings in a photograph with a length of eight inches and width of six inches.” Allow students to create the picture and cut it out. The customer wants the photo reduced so that the length and width of the new photograph is half the length and width of the original. Have students use blue tiles to represent length and red tiles to represent width. Have students show eight blue tiles in a stack and six red tiles in a
stack. Next, have students split the stacks in half to create two stacks of four blues and two stacks of three blues. Ask students to provide the new length and width.

8. Students may cut out a new picture or fold the original in half vertically and horizontally. Last, have students transfer the information to a table.

<table>
<thead>
<tr>
<th>Length</th>
<th>8</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

9. Have students repeat the process using an original length of 12 inches and an original width of nine inches. This time the customer wants the original photograph’s length and width to be three times as long as the new.

<table>
<thead>
<tr>
<th>Length</th>
<th>12</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

10. Allow the students to work with partners to create new reductions of photographs. Be sure to monitor students to make sure that they are working with measurements that can produce whole numbers when scaled down by a specific factor.

**CULMINATING ACTIVITY**

1. Tell students after a successful few weeks that they are promoted to the frame shop, where they will be enlarging and reducing photographs and framing them for the customer. They will have to find new lengths and widths and determine how much framing material will be used. (You may want to do a mini-lesson to review perimeter.) Give the students specific instructions about enlarging and reducing the photographs. You can also incorporate cost if you feel the students are ready.

2. Extension: Provide students with a price code for enlarging and reducing photographs and have them determine the cost. Example: The cost of enlarging a photograph is $3.00 to double the length and width and $5.00 to triple the length and width. Sarah took a picture to the photo shop and wants two $3.00 enlargements and four $5.00 enlargements. Write a number sentence to show how to determine the price and give the total before tax. $(2(3.00) + 4(5.00)) = 26.00$

**CROSS-CURRICULAR EXTENSIONS**

Art/Social Studies

- Students study collage and create a class collage from photographs.

Students study famous artists and their works and determine the size of an original masterpiece. Students create prints of the original that are proportionally similar.

**REAL-WORLD CONNECTIONS**

Have a graphics designer visit the class to discuss how he/she uses proportions and ratios in everyday life.

**ASSESSMENT**

Observe students closely as they work in pairs to develop their own reduction scenarios. Check them closely to evaluate whether their understanding of the concepts and proper use of vocabulary.

**STUDENT HANDOUTS**

None
LESSON 13
“Get on Board”
by Betty Lewis

CONCEPT AREA  Patterns

GRADE LEVEL  4-6

TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students will make a table showing the relationship between the number of tickets that are needed for the basketball team to travel from Dallas/Fort Worth to New York City. In the process, students become familiar with developing and using number sentences.

LESSON ACTIVITIES OVERVIEW
Students will:
• Create charts to display patterns relating to the number of passengers and cost of tickets for a bus ride, train ride and airfare.
• Develop a number sentence from the data they develop.
• Work an extension problem using a given number sentence.

LEARNING OBJECTIVES
Students will be able to:
• Determine missing elements in a pattern.
• Select an appropriate operation and/or strategy to solve a problem and justify the solution.
• Use mathematical language to represent the relationships in a table.
• Discuss and elaborate upon the reasonableness of a solution.
• Recognize the pattern in the table.
• Extend the pattern and generalize.
• Understand and present the values in a table with the ordered pairs of numbers.
• Recognize mathematical symbols that represent relationships in a table.

MEDIA COMPONENTS
Video: Math Can Take You Places #005 “Patterns”

Internet:
American Airlines:
www.aa.com

Amtrak Trains:
www.amtrak.com

General travel Web site:
www.travelocity.com

Buses:
www.greyhound.com

MATERIALS
• Calculators
• Overhead projector
• Overhead calculator (optional)
• Pencil and paper
• Internet access (optional)

PREP FOR TEACHERS
Prior to teaching this lesson, preview the video.
LESSON 13
“Get on Board”
by Betty Lewis

Note:
The following concepts will be covered during this lesson: **patterns, number sentences, skip counting and function.** Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

**INTRODUCTORY ACTIVITY:**
**SETTING THE STAGE**

1. Have the students skip count aloud by fives. Remind students that skip counting is patterning. Stop and discuss how they determined the next number in the pattern. As a class, create the chart below to emphasize the concept:

<table>
<thead>
<tr>
<th>Order the pattern (n)</th>
<th>Actual number (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>5</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>10</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>15</td>
</tr>
</tbody>
</table>

(Repeat activity with skip counting by 25s, etc., if needed.)

2. Inform them that mathematics is described as the science of patterns and order, and is especially useful when it helps to predict outcomes. Using number patterns will develop this skill. In later math classes, students will use patterning to solve functions.

3. Ask students to discuss some of the patterns they discovered while participating in the skip-counting activity. Develop an understanding that discovering a pattern requires them to look systematically at specific examples. Once the “rule” or function is discovered, it can be used to determine the remaining solutions to the problem.

4. Ask the students to describe how they would find the 50<sup>th</sup> number in the pattern. Discuss their suggestions. Work together to write a number sentence to state it mathematically (for example, 50 * 5 = n, n = 250). Then, work together to write a number sentence to describe how you would find any number in the pattern (Answer: n * 5 = a).

**LEARNING ACTIVITIES**

1. Give the students the following scenario: “The New York Yorkies are a pro basketball team that has traveled to Dallas by bus for a game. Unfortunately, their bus broke down, and they now need a way back to New York City. Help the Yorkies return home by researching the cost for traveling to New York City by airplane, train and bus. We do not know exactly how many players will be traveling, so we will need to use patterns to create three different charts to display our data.”

2. Offer the students a set amount for each of the costs of one passenger’s bus, airplane and train fare or use the Web sites listed under “Media Components” to calculate actual costs from a town near you to New York City. Students will use those figures to create different patterns for various tickets using various modes of transportation. Allow students to decide how their chart should look. Students should extend the pattern at least to five passengers.

3. The students’ answers will vary. Students make tables showing the relationship between the number of bus tickets bought and the total cost. Students can record the relationship shown in the table as a set of ordered pairs:
CULMINATING ACTIVITY

1. Ask the students to use their charts to calculate the cost for 20 travelers by bus, airplane or train. Discuss the strategies that students used to calculate their totals. Students should respond with answers such as, “I multiplied the total for two tickets by ten” or “I multiplied the answer for four tickets by five.”

2. Then, ask them to find the totals for harder multiples, such as 55, 72 or even 120 passengers. Ask students to develop as many different ways as possible to come up with the total number of passengers.

3. Ask students to write in words how they would find the ticket costs for any number of passengers on any of the different modes of transportation. Allow them to work alone to develop their sentence. Check students’ work as they think through the question. Discuss the answers. Students’ responses should say something similar to the following: The total cost of the tickets for any passengers is equal to the number of passengers times the cost of the ticket.

4. Allow students to brainstorm ways that patterns are used in everyday life (for example: counting money, buying grocery items such as eggs, etc.). Ask, “What if we were going to start a restaurant at our school? What are some ways that we would need to use patterns?” Record some of the student responses on the board. Watch the Math Can Take You Places video #005 “Patterns.” Before the video begins, say: “The students in Ms. Garcia’s class are actually going to plan a kids’ café. Be able to discuss how they used patterns to help them with purchasing the food.” Brainstorm with the students after the video is completed.

5. Write the equation that Mrs. Garcia’s students developed in the video on the board:

\[
\text{Number of People} \times \frac{\text{Number of Servings per Package}}{\text{Number of Packages}} = \text{Total Cost}
\]

Tell the students that they are going to work in groups to use the above equation to solve a problem. Tell them that one hot dog package costs $3.50 and serves ten people. Have students use the number sentences to calculate how many packages will be needed to serve 150 people, and how much the hot dogs will cost. (Answer: Number of packages needed 15; 15 packages cost $52.50)

6. If time permits, discuss how variables are helpful when you have long number sentences such as the one listed above. A letter can be used to stand for each of the different parts of the equation. For example, “P” could stand for the “Number of People,” “C” could stand for the “Cost per Package.” Rewrite the number sentence using variables.

CROSS-CURRICULAR EXTENSIONS

Art
Students can design the look and feel of their own pretend currency, then create it using markers, paint, construction paper, etc. (Also, see “Real-World Connections”). Create a chart that explains how their new currency relates to United States currency.
Language Arts
Have students investigate patterns in other disciplines, such as patterns in music, nature, sports or other areas of interest. Students can interview an expert or teacher in the area of interest to see how the person uses patterns in his/her work. Students would then write a short report of their findings and present it to the class.

REAL-WORLD CONNECTIONS
Invite a local banker to speak to the students about currency exchange rates. Ask students to create their own “currency.” They can work in groups or individually to assign the different forms of their currency creative names and create a chart with specific values as compared to the dollar. Students share their currency charts with the class.

ASSESSMENT
Monitor student responses to the “Culminating Activity” number three to check for understanding of patterns.

STUDENT HANDOUTS
None
LESSON I4
“On the Road Again”
by Elsie Sneed

CONCEPT AREA  Patterns
GRADE LEVEL  4-6

TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
In this lesson, students will learn about the responsibilities of the Head Trainer for an NBA team by viewing the Math Can Take You Places video #001 “Measurement” video.
Students will then find similarities within sets of numbers, create a pattern and develop a general formula from the information they develop.

LESSON ACTIVITIES OVERVIEW
Students will be responsible for purchasing uniforms and other equipment that was lost while the team was on a road trip. Students will use patterns to help them calculate the total cost of each item.

LEARNING OBJECTIVES
Students will be able to:
• Use patterns in multiplication and division.
• Use organizational structures to analyze and describe patterns and relationships mathematically.
• Make generalizations based on observed mathematical patterns and relationships.
• Solve problems involving proportional relations.
• Use letters as variables in mathematical expressions and to represent unknowns in equations.

MEDIA COMPONENTS
Video: Math Can Take You Places #001 “Measurement”

Internet:
Practice problems using patterns:
http://www.aaamath.com

National Basketball Association:
http://nba.com

American Airlines:
http://www.aa.com/

For shoe and warm-up suit pricing:
www.nike.com

For shoes, socks and uniform pricing:
www.reebok.com

MATERIALS
• Graph paper (optional)
• Pencils/paper
• Markers (optional)

PREP FOR TEACHERS
• Bookmark Web sites.
• Cue videotape.
• Prepare student materials.
LESSON 14
“On the Road Again”
by Elsie Sneed

- Review simple patterns using charts if needed.

Note:
The concepts of patterns and estimation will be covered during this lesson. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE
1. Show students the video Math Can Take You Places #001 “Measurement” featuring Roger Hinds, Head Trainer for the Dallas Mavericks. Focus the viewing on the interview portions. Ask the students to pay close attention to what Mr. Hinds’ job is, and to be able to discuss some of his responsibilities.

LEARNING ACTIVITIES
2. Ask students whether they remember from the video what Mr. Hinds does for the Mavericks. Discuss their findings. Say to the class: “He is also responsible for making sure that all of their equipment is ready to go on game days. Pretend the box with all of the Mavericks’ uniforms has mysteriously disappeared. Your job is to use the Internet to find them new socks, shoes, uniforms and warm-up suits. You can find the total number of players for the team on the www.nba.com Web site. Once you have found the items online, use the “Patterns” worksheet to write the Web site address on the line given. Write down the actual costs of each of the items, then the estimated cost to the nearest dollar. Complete the chart using the estimated prices.”

3. Divide the students into groups of two or three.

4. Students will move to the computers to obtain information on costs. (Teacher note: To save time, you can create a listing of the prices of the items for students to use with this activity instead of having them find the prices on the Internet.)

5. Students will place information on the “Patterns” charts, using their estimated prices to calculate the costs of different quantities of each item.

6. Optional: Students can create a graph to illustrate the pattern for each of the items (Cost vs. Quantity).

CULMINATING ACTIVITY
1. Bring students back together as a group to discuss their results. Talk about the patterns that they see on each of the charts on their “Patterns” worksheet. Discuss how they arrived at the answers for the various quantities of items.

2. Ask, “Can you think of a way to find the cost of any number of basketball shoes? For example, what if Mr. Hinds needs to order a lot of pairs to replace the old ones as they wear out? What standard formula or set of steps could he take to figure out the total cost for any number of pairs of shoes?” Work with students to develop the formula (Total Cost = # of pairs needed * cost of one pair or C = n * p).

CROSS-CURRICULAR EXTENSIONS
Social Studies
Research the playing schedule for the NBA team nearest your school on www.nba.com. Determine the city in which the team will play its last away game. Use the Internet to find three interesting historic sites the players could visit in that city before their flight home.
REAL-WORLD CONNECTIONS
Interview the trainer for the local high school football team. Use a Venn diagram to compare and contrast the high school trainers' responsibilities with Roger Hinds'.

ASSESSMENT
Allow students to work individually to attempt to develop the formulas for the uniforms, warm-up suits and socks. Monitor for understanding as they share their answers.

STUDENT HANDOUTS
“Patterns” worksheet
LESSON 14
“On the Road Again”
by Elsie Sneed

Mavericks Equipment Patterns

Patterns

Pretend the box with all of the Mavericks’ uniforms has mysteriously disappeared. Your job is to order them new socks, shoes, uniforms and warm-up suits. Estimate as a class or use the Internet to find the total number of players for the team. Write down the actual cost of each of the items, then the estimated cost to the nearest dollar. Complete the chart using the estimated prices.

Total number of players on the Mavericks: ____________

1. Socks
   Actual cost of one pair ________________
   Estimated cost of one pair (to the nearest dollar) ________________

<table>
<thead>
<tr>
<th>Number of pairs of socks</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
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<tr>
<td>15</td>
<td></td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

2. Basketball shoes
   Actual cost of one pair ________________
   Estimated cost of one pair (to the nearest dollar) ________________

<table>
<thead>
<tr>
<th>Number of pairs of shoes</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
3. Uniforms
Actual cost of one uniform_______________
Estimated cost of one uniform (to the nearest dollar)_______________

<table>
<thead>
<tr>
<th>Number of uniforms</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
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<td>15</td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

4. Warm-up suits
Actual cost of one suit____________________
Estimated cost of one suit (to the nearest dollar)_______________

<table>
<thead>
<tr>
<th>Number of warm-up suits</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
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<td>15</td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

5. Can you think of a way to find the cost of any number of shoes? For example, what if Mr. Hinds needs to order a lot of pairs to replace the old ones as they wear out? What standard formula or set of steps could he take to figure out the total cost for any number of pairs of shoes? First write your answer using words. Then, use variables to stand for the words.

6. What formula could he use to find:
The cost of any number of basketball shoes? _______________________________

The cost of any number of uniforms? _______________________________

The cost of any number of warm-up suits? _______________________________
**Patrones - Equipaje de los Mavericks**

Imagina que la caja con todos los uniformes de los Mavericks ha desaparecido misteriosamente. Tu trabajo es ordenar nuevos calcetines, zapatos, uniformes y conjuntos de gimnasia para ellos. Como parte de la clase o usa la Internet, haz una estimación para encontrar el número total de jugadores en el equipo. Escribe el costo actual de cada artículo, luego el costo estimado (al dólar más cercano). **Completa la tabla usando los precios estimados.**

Nombre___________________________________________ Fecha ____________________

Número total de jugadores de los Mavericks: ________________

1. Calcetines  
   Costo actual de un par de calcetines _____________________
   Costo estimado de un par de calcetines (al dólar más cercano) _________________

<table>
<thead>
<tr>
<th>Número de pares de calcetines</th>
<th>Costo total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

2. Zapatos para baloncesto  
   Costo actual de un par de zapatos para baloncesto _________________
   Costo estimado de un par de zapatos para baloncesto (al dólar más cercano) _________________

<table>
<thead>
<tr>
<th>Número de pares de zapatos para baloncesto</th>
<th>Costo total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>15</td>
<td></td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
3. Uniformes
   Costo actual de un uniforme__________________________
   Costo estimado de un uniforme (al dólar más cercano) ____________

<table>
<thead>
<tr>
<th>Número de uniformes</th>
<th>Costo total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
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<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

4. Conjuntos de gimnasia
   Costo actual de un conjunto de gimnasia ______________________
   Costo estimado de un conjunto de gimnasia (al dólar más cercano) ________________

<table>
<thead>
<tr>
<th>Número de conjuntos de gimnasia</th>
<th>Costo total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
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<td>20</td>
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<tr>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

5. ¿Podrías pensar en una manera de encontrar el costo de cualquier cantidad de pares de zapatos para baloncesto? ¿Por ejemplo, si el Sr. Hinds necesita ordenar muchos pares para reemplazar los viejos que ya están gastados? ¿Qué fórmula estándar ó qué pasos tomarías para saber el costo total de cualquier cantidad de pares de zapatos para baloncesto? Primero, escribe tu respuesta con palabras. Luego, usa variables para reemplazar a las palabras.

6. ¿Cuál fórmula podría usar él para encontrar:
   ¿El costo de cualquier cantidad de pares de zapatos para baloncesto? ________________________________
   ¿El costo de cualquier cantidad de uniformes? ________________________________________________
   ¿El costo de cualquier cantidad de conjuntos de gimnasia? ______________________________________
CONCEPT AREA: Patterns

GRADE LEVEL: 5

TIME ALLOTMENT: 60 minutes

LESSON OVERVIEW: Students will be able to recognize patterns within sets of numbers and predict the next steps within a set.

LESSON ACTIVITIES OVERVIEW: Students use problem solving and patterns to help a rancher buy enough land to feed his herd of cattle.

LEARNING OBJECTIVES: Students will be able to:
- Identify patterns in a given set.
- Describe the process (or rule) for continuing a set.

MEDIAn COMPONENTS:
- Video: Math Can Take You Places #005 “Patterns”
- Internet:
  - Cow Facts: http://www.goetzecandy.com/playarea/cowfacts.cfm
  - Cyberchase Patterns Lesson Plan for additional practice: http://pbskids.org/cyberchase/parentsteachers.lessonplans.lesson4.html

MATERIALS: Chart paper

PREP FOR TEACHERS:
- Cue the video.
- Encourage the class to pay close attention to the student problem-solving segments.

Note: The concepts of patterns will be covered during this lesson. Students may need to review the concept prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Present the class with a local rancher’s problem of making sure the rancher has enough pastures for his or her herd of cattle.

2. The rancher explains to the class that at least 5 acres of land are needed for every cow. There are about 200 cattle. The rancher is negotiating land leases and needs to make sure that there will be enough land to sustain the herd.

3. Can you help this rancher? Solution: At least 1,000 acres.
LESSON 15
“Ranchers and Patterns”
by Julie Morris

LEARNING ACTIVITIES
1. Set up a t-chart. Label one side “Number of cattle” and the other side “Number of acres.” Get students started on entering the data on the chart by giving them two ordered pairs that fit the problem situation; for example, four cows would need how many acres? (20 acres) Then let the students continue entering data into the chart. Did the students agree on how much land the rancher needed to lease? (1,000 acres) Have them draw pictures to illustrate their answers, if necessary.

2. Have the class write an equation that represents a new problem situation. How much land would the rancher need if another 200 head of cattle are added to the herd? (Multiply the 1,000 by 2 to get a solution of 2,000 acres.)

3. Say: “Now let’s explore some other data. We are planting a garden. Each student can plant three plants. How many plants do we need to purchase for the whole class (25) to participate?” Solution: 75 plants. “How many fewer plants would we need if only 17 students wanted to participate?” Solution: 3 (25) – 3 (17) = 24 fewer plants.

CULMINATING ACTIVITY
1. Watch video, Math Can Take You Places #005 “Patterns.” Brainstorm other ways that patterns are used in the real world (for example, currency exchange, grocery shopping for things in bulk, etc.).

2. Allow students to develop and illustrate a problem using rates and ratios on their own, creating their own scenario. Have students exchange their problems and solve. Allow the class to vote for the most creative problem.

CROSS-CURRICULAR EXTENSIONS
Science
Compare weights in pounds on other planets. Ex: 1 pound on Earth equals 90 pounds on Venus. How much does 5 pounds on Venus weigh on the Earth?

Technology
Ask the technology instructor to teach students how to create a Microsoft Excel spreadsheet with formulas that automatically figures the amount of land needed for a set number of cows.

Language Arts
Use the “Cow Facts” link listed in Media Components section to create a trivia game.

REAL-WORLD CONNECTIONS
There are a number of real-world connections. For example, develop ratios for passengers to pieces of luggage, or carry-on luggage on an airplane to passengers. Plan a class camping trip where the students will sleep in cabins. There will be one adult chaperone to every 8 students. How many chaperones are needed if there are 74 students?

ASSESSMENT
For the final assessment, have students solve the following problem where students must apply problem-solving strategies:
A classroom needs 4 square feet per student. How big does the classroom need to be to accommodate 20 students (80 sq. ft.)? 28 students (112 sq. ft.)?

Possible lesson extensions would be to talk about the different dimensions (lengths and widths) that the room could be for the area needed to accommodate 20 students and 28 students.
LESSON 16
“The Snack Bar”
by Rhonda Bailey

CONCEPT AREA  Patterns
GRADE LEVEL  6
TIME ALLOTMENT  60 minutes

**LESSON OVERVIEW**
Students will solve a real-life application problem involving proportional relationships.

**LEARNING OBJECTIVES**
Students will be able to:
- Use ratios in a real-life problem-solving situation.
- Apply estimation skills to find reasonable results in a problem-solving situation.
- Write equations that describe a problem situation.
- Apply problem-solving strategies to determine the solution to a real-life problem-solving situation and effectively communicate their conclusions.

**MEDIA COMPONENTS**
Video: *Math Can Take You Places* #005 “Patterns”
Internet:
Sample food label and explanation:

Student presentations:
Have students create a PowerPoint presentation of their snack bar’s “Grand Opening,” detailing the behind-the-scenes managerial story, such as ordering the supplies and the food.

Have students create spreadsheets and graphs of the data and write a group report of the problem scenario. Students can also insert the charts or graphs into the PowerPoint presentation.

**MATERIALS**
- Activity/Recording sheets
- Chart paper
- Markers
- Meter sticks or ruler
- Calculator (optional)

**PREP FOR TEACHERS**
- Write serving or package sizes where they are visible to all students or bring in packages of each item and set up stations around the room.
  - Hot dogs/franks
  - Hot dog buns
  - 2-liter soft drinks
LESSON 16
“The Snack Bar”
by Rhonda Bailey

- Styrofoam or paper cups
- Mustard (squeeze bottle)
- Ketchup
- Relish or other condiments
- Napkins
- Snacks
- Use pictures of the items listed or empty cleaned packages if the actual items are unavailable. The “Foods, Condiments, and Supplies Descriptions” list also has mock prices and serving sizes, if needed.

Situate students in groups of three to four. Distribute two sheets of chart paper, markers and a meter stick to each group.

Distribute two activity/recording sheets to each student. Each group will be assigned two items from the list on which to work; for example: hot dogs and bottle of ketchup.

**Note:**
The following concepts will be covered during this lesson: proportion, fractions, ratio and estimation. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

**INTRODUCTORY ACTIVITY:**
**SETTING THE STAGE**

1. Tell students that today they are going to prepare for the “Grand Opening” of a student-run snack bar for their school. Say, “Listen closely to the video as Mrs. Garcia explains what we are going to do today.” **Play** the video Math Can Take You Places video #005 “Patterns” from the beginning. **Pause** after the blue chart graphic leaves the screen and before Chef Koval begins speaking.
2. Ask students to brainstorm some ideas on what information they will need to know before they buy the food for the snack bar. Then, ask the following questions:
   a. Why do you think we should open our snack bar with a limited number of items on the menu versus a large variety of items on the menu?
   b. Why do you think that it is important to have an estimate of the amount of food, condiments and supplies before you open the snack bar?
   c. What information would be helpful in determining an estimate of the amount of food, condiments and supplies that will be needed to open the snack bar?
   d. What information will help your group determine whether you should expand the number of items sold at the snack bar?
3. Students are responsible for ordering the food, condiments and supplies. The snack bar will open for business with limited items on the menu: hot dogs, drinks and various snacks. Their group is responsible for creating a purchase order for the food, condiments and supplies and presenting that information to the class. Students will organize and make projections for growth and the addition of new items to the menu.
4. Each group will create a name for the snack bar, then report to the class how it solved this problem. Additional time for this problem/lesson can be given if students are asked to create a PowerPoint presentation, spreadsheet or extended presentation.
LESSON 16
“The Snack Bar”
by Rhonda Bailey

LEARNING ACTIVITIES

1. Work with your group to complete the purchase order for the “Grand Opening” of the school snack bar (on chart paper).

2. Write the ratios, as fractions, for the number of servings (food item, the condiments and the supplies) per package. Have students locate the suggested serving size on each of the condiments. It is important to remember that the package or serving size will vary for each item purchased.

Example: There are eight servings in one package of hot dog buns, so the ratio is 8:1.

3. Using the ratio for each item (food, condiments or supplies) complete each table that shows an estimate of the number of packages (bottles of mustard) of each item needed and the number of servings. Using the cost of each item, find the total cost for purchasing each item for the number of servings given.

Example: The hot dog buns are sold eight to one package, and let’s say one package of buns costs $1.50.

<table>
<thead>
<tr>
<th>Number of Servings</th>
<th>Process to find estimate (based on ratio)</th>
<th>Number of pkgs. or containers</th>
<th>Process to find the total cost</th>
<th>Total cost (dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8:1</td>
<td>1</td>
<td>1 * 1.50</td>
<td>1.50</td>
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</table>

4. Write an equation that describes the estimated number of packages of each item. In this equation, which quantity causes the other quantity to change? Explain your reasoning.

5. Write an equation that describes the cost of the items to be purchased. In this equation, which quantity causes the other quantity to change? How is this different from the situation in Question 3?

6. Explain the effect that the number of servings has on the total cost. Write an equation for each item that shows how you find the total cost given the number of servings.

CULMINATING ACTIVITY

Each group will use the information from Question 6 to write up its part of the purchase order for the two items that were assigned to the group. If two groups that were assigned the same items do not have the same solutions, the class must come to consensus about ordering the items. The class will combine the information of all the items to write one class purchase order.

CROSS-CURRICULAR EXTENSIONS

Health/Science
Students will investigate nutritional information about the food that will be sold in the snack bar. Have students make modifications to the menu to reflect a nutritionally-balanced menu.

Consumer Awareness
Have students do comparison shopping using newspaper/grocery store fliers.
REAL-WORLD CONNECTIONS
Ask a restaurant manager or chef to visit the class and share how he/she uses mathematics in his/her profession. Have students write a proposal for a fund-raiser that includes information related to the lesson. Have students set a sales goal and discuss how they would decide on a selling price in order to reach that sales goal.

ASSESSMENT
Look for the following evidence in the students' work:
1. Students should demonstrate an understanding of using ratios to describe a proportional situation and use that information to solve a real-life problem.
2. Students should be able to write an equation using a variable as an unknown that describes the problem situation.
3. The student should be able to effectively communicate his/her ideas about the problem situation.

STUDENT HANDOUTS
Snack Bar Activity Sheet
The Snack Bar Data Sheets
Foods, Condiments, and Supplies Sheet (optional)
The Snack Bar

1. Locate the serving or package size on each item. Write the ratio of serving or package size as a fraction.

2. Using the ratio for each item (food, condiments or supplies), complete the table that shows an estimate of the number of packages (bottles, etc.) of each item needed.

3. The unit cost of the item is ____________ per ________________.
   Using the unit cost of each item, find the total cost for purchasing each item for the number of servings given.

4. Write an equation that describes the estimated number of packages of each item. In this equation, which quantity causes the other quantity to change? Explain your reasoning.

5. Write an equation that describes the cost of the items to be purchased. In this equation, which quantity causes the other quantity to change? How is this different from the situation in Question 3?

6. Explain the effect that the number of servings has on the total cost. Write an equation for each item that shows how to find the total cost, given the number of servings.
# Data Sheet: Hotdogs and Buns

**Hotdogs:** Cost per package
Servings per package
Ratio of servings in one package

<table>
<thead>
<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5</td>
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<td>Any number of people (n)</td>
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</table>

**Buns:** Cost per package
Servings per package
Ratio of servings in one package

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<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
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<td>Any number of people (n)</td>
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</table>
## Data Sheet: Drinks/Cups/Plates

### Drinks:
- Cost per container: __________
- Servings per package: ________________
- Ratio of servings in one package: ________________

<table>
<thead>
<tr>
<th>Number of Containers</th>
<th>Number of Servings per Container</th>
<th>Number of People Serving</th>
<th>Total Cost of the Containers</th>
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### Cups:
- Cost per package: __________
- Servings per package: ________________
- Ratio of servings in one package: ________________

<table>
<thead>
<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
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### Plates:
- Cost per package: __________
- Servings per package: ________________
- Ratio of servings in one package: ________________

<table>
<thead>
<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
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</tbody>
</table>
Data Sheet: Ketchup and Relish

**Ketchup:** Cost per bottle___________
Servings per package________________
Ratio of servings in one package________________

<table>
<thead>
<tr>
<th>Number of Bottles</th>
<th>Number of Servings per Bottle</th>
<th>Number of People Serving</th>
<th>Total Cost of the Bottles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>Any number of people (n)</td>
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</table>

**Relish:** Cost per jar___________
Servings per package________________
Ratio of servings in one package________________

<table>
<thead>
<tr>
<th>Number of Jars</th>
<th>Number of Servings per Jar</th>
<th>Number of People Serving</th>
<th>Total Cost of the Jars</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>Any number of people (n)</td>
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</tbody>
</table>
# Data Sheet: Cookies

**Cookies #1:**

<table>
<thead>
<tr>
<th>Cost per package</th>
<th>Servings per package</th>
<th>Ratio of servings in one package</th>
</tr>
</thead>
<tbody>
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</table>

<table>
<thead>
<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
</tr>
</thead>
<tbody>
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<tr>
<td></td>
<td>Any number of people (n)</td>
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<td>C =</td>
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</tbody>
</table>

**Cookies #2:**

<table>
<thead>
<tr>
<th>Cost per package</th>
<th>Servings per package</th>
<th>Ratio of servings in one package</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Packages</th>
<th>Number of Servings per Package</th>
<th>Number of People Serving</th>
<th>Total Cost of the Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>560</td>
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<td></td>
<td>Any number of people (n)</td>
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<td>C =</td>
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</tbody>
</table>
## The Snack Bar
### Food, Condiments, and Supplies Descriptions

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
<th>Servings Per Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Dogs</td>
<td>$2.00</td>
<td>10</td>
</tr>
<tr>
<td>Buns</td>
<td>$1.68</td>
<td>8</td>
</tr>
<tr>
<td>Juice</td>
<td>$1.92</td>
<td>6</td>
</tr>
<tr>
<td>Cups</td>
<td>$1.87</td>
<td>50</td>
</tr>
<tr>
<td>Plates</td>
<td>$.94</td>
<td>40</td>
</tr>
<tr>
<td>Ketchup</td>
<td>$.92</td>
<td>23</td>
</tr>
<tr>
<td>Relish</td>
<td>$1.22</td>
<td>22</td>
</tr>
<tr>
<td>Cookies #1</td>
<td>$2.46</td>
<td>8</td>
</tr>
<tr>
<td>Cookies #2</td>
<td>$1.50</td>
<td>30</td>
</tr>
</tbody>
</table>
### Purchase Order

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot dogs/franks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot dog buns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottles of ketchup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottles of mustard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-liter bottles of soft drinks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Napkins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snacks</td>
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<td></td>
<td></td>
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<tr>
<td><strong>Total Order</strong></td>
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</tr>
</tbody>
</table>
El Kiosco de Meriendas

1. Encuentra la porción o el tamaño del paquete de cada artículo. Escribe la razón de la porción ó el tamaño del paquete como una fracción.

2. Usando la razón para cada artículo (comida, condimentos u otros elementos necesarios), completa la tabla que muestra un estimado del número de paquetes (botellas, etc.) de cada artículo que se necesita.

3. El costo del artículo por unidad es ______________ por ______________. Usando el costo del artículo por unidad, encuentra el costo total de cada artículo de acuerdo con el número de porciones dadas.

4. Escribe una ecuación que describa el estimado del número de paquetes de cada artículo. En esta ecuación ¿Cual cantidad causa que cambie la otra cantidad? Explica tu razonamiento.

5. Escribe una ecuación que describa el costo de los artículos para comprar. En esta ecuación ¿Cual cantidad causa el que la otra cantidad cambie? ¿Cómo se diferencia esta situación a la de la situación en la Pregunta 3?

6. Explica el efecto que el número de porciones tiene en el costo total. Escribe una ecuación para cada artículo que muestra cómo encontrar el costo total, de acuerdo al número de porciones.
### Orden de Compra

<table>
<thead>
<tr>
<th>Artículo</th>
<th>Cantidad</th>
<th>Costo por Unidad</th>
<th>Costo Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salchichas/franks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pan para salchichas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botellas de ketchup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botellas de mostaza</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condimento</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrescos en botellas de 2-litros</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vasos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servilletas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bocadillos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total de la orden</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCEPT AREA  Problem Solving
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students will engage in problem-solving situations that make them more aware of their roles as consumers.

LESSON ACTIVITIES OVERVIEW
Students will determine the best purchase price of a product in a problem-solving situation.

LEARNING OBJECTIVES
Students will be able to:
• Determine the reason for solving the problem.
• Devise a plan for solving the problem.
• Utilize a variety of strategies to solve the problem.

MEDIA COMPONENTS
Video: Math Can Take You Places #004 “Problem Solving”
Internet:
Consumer Reports 4 Kids http://www.zillions.org/
First Gov For Kids: Money and Finance http://www.kids.gov/k_money.htm

MATERIALS
• Graph
• Rulers
• Two colored pencils
• Variety of boxes of fruit rolls (chocolate candies for Spanish version)
• Calculators to check work
• Balance for measuring

PREP FOR TEACHERS
Teachers will need to purchase any brand of fruit rolls of varying quantities.

Note:
The following concepts will be covered during this lesson: volume, weight, metric units of measurement and customary units of measurement. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities. They may also need to review how to read a ruler and a balance.
LESSON 17
“Is Your Money Rolling Away”
by Debbie Miskiewicz

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Students enter the classroom. The teacher has placed an individually-wrapped fruit roll, a regular box and a family box of fruit rolls on the table at the front of the classroom.

2. A message is posted either on the chalkboard or overhead that reads, “Analyze these boxes and prices!” Students begin to write down their findings. How are the flavors of fruit rolls packaged? What is the number of fruit rolls in each box? Which purchase is the better buy? Students will also justify their reasoning to each question. The class will have a discussion about the fruit rolls.

LEARNING ACTIVITIES

Watch the video Math Can Take You Places #004 “Problem Solving”. Ask students to listen closely and be able to name three problem-solving strategies. Stop the video after the students on screen list several strategies. Discuss as a class.

Students will solve a real-life problem.
1. Do you want to buy the fruit rolls in regular bulk, family bulk or individually? Help students think through this question by creating charts for each of the three different costs of the fruit rolls. For example, individually, the fruit rolls cost $2.28. For a regular box of 10, the price is $2.56. For a family box of 24, the price is $4.98. For example, students may calculate the cost on each of the graphs of one fruit roll, five, 10, and so on.

Sample Chart (for the regular box):
Cost of the entire box: $2.56 – Number of rolls in the box: 10

<table>
<thead>
<tr>
<th>Number of Fruit Rolls</th>
<th>Estimated Total Cost of These Fruit Rolls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$.26</td>
</tr>
<tr>
<td>5</td>
<td>$1.30</td>
</tr>
<tr>
<td>10</td>
<td>$2.60</td>
</tr>
<tr>
<td>25</td>
<td>$6.50</td>
</tr>
</tbody>
</table>

2. What is the unit price for a fruit roll from a family box? From a regular box?

3. You have a coupon for $0.25 off a fruit rolls family box or two regular boxes. How would you justify which use of the coupon gets the consumer the better buy?

4. If you need 63 fruit rolls for a grade-level party, what is the most cost-effective way to purchase this amount?

5. Students will use graph paper, colored pencils and a ruler to graph three different tables of data (total cost for those fruit rolls vs. the total cost for those fruit rolls), accounting for the three different unit prices.

CULMINATING ACTIVITY

1. Students will use grocery store fliers to compare prices of products sold at each store.

2. Students will verify all box measurements for accuracy. They will evaluate how the box was measured for volume and weight (standard or metric). The students will need balances to weigh fruit rolls.
LESSON 17
“Is Your Money Rolling Away”
by Debbie Miskiewicz

CROSS-CURRICULAR EXTENSIONS

Language/Writing
(How to) How does a consumer make the best purchase?
(Persuasive) Persuade your reader to buy a store brand or name brand box of fruit rolls.
(Descriptive) Use each of your senses to describe a fruit roll.

Science
Is the fruit roll a nutritional snack? What standard does the FDA set that determines whether a fruit roll is a nutritional snack or junk food?

REAL-WORLD CONNECTIONS
Have guest speakers, including retail buyers, grocery store managers, dieticians and parent experts, visit to speak to the class.

ASSESSMENT
Assessments are ongoing through student activities. Teachers will need to design their own rubric for grading.

STUDENT HANDOUTS
“Is Your Money Rolling Away” Activity Sheet
Activity Sheet

1. Fill in the chart below using information for an individual fruit roll.

   Cost of an individual fruit roll: _______________

<table>
<thead>
<tr>
<th>Number of Fruit Rolls</th>
<th>Estimated Total Cost of These Fruit Rolls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

2. Create charts like the one above for the regular box and the family-sized box of fruit rolls. Be sure to write down the cost of each type of box and the number of fruit rolls in each.
3. What is the unit price for a fruit roll from a family box?

From a regular box?

4. You have a coupon for $0.25 off a fruit rolls family box or two regular boxes. How would you justify which use of the coupon gets the consumer the better buy?

5. If you need 63 fruit rolls for a grade-level party, what is the most cost-effective way to purchase this amount?

6. Use words to describe how you would find the cost of 100 individually-wrapped fruit rolls.

7. Write a number sentence to explain how you could calculate the cost of an unknown number of fruit rolls at an unknown cost.
1. Completa la tabla de abajo usando la información de un dulce de chocolate individual.

<table>
<thead>
<tr>
<th>Numero de Dulces de Chocolate</th>
<th>Costo Total Estimado de Estos Dulces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

2. Crea tablas como la de aquí arriba para una caja regular y una caja familiar de dulces de chocolate. Asegúrate que escribas el costo de cada tipo de caja y el número de dulces de chocolates que hay en cada una.
3. ¿Cuál es el precio por unidad de cada caja familiar de dulces de chocolates?

¿De una caja regular?

4. Tú tienes un cupón de $0.25 de descuento para una caja familiar de dulces de chocolates ó dos cajas regulares. ¿Cómo justificarías cual uso del cupón le será al consumidor la mejor compra?

5. Si tú necesitas 63 cajas de chocolates para una fiesta en tu aula, ¿cuál es la manera más ahorrativa para comprar esta cantidad?

6. Usa palabras para describir como tu podrás calcular el costo de 100 dulces de chocolates individuales.

7. Escribe una oración numérica que explique cómo tú podrás calcular un número desconocido de dulces de chocolates con un precio desconocido.
LESSON 18
“Math Game Night”
by Monica Abrams

CONCEPT AREA  Problem Solving
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Plan the room arrangement for Family Game Night.

LESSON ACTIVITIES OVERVIEW
Students will find out how many games and tables will be used at Family Game Night and then use that information to make a diagram of the room. They will use base-ten blocks to show arrangement and evaluate the arrangement.

LEARNING OBJECTIVES
Students will be able to:
• Use a problem-solving model to complete the problem.
• Draw and make a diagram to show completion of the problem.
• Evaluate arrangement.

MEDIA COMPONENTS
Video: Math Can Take You Places #004 “Problem Solving”

MATERIALS
• Tens from base-ten blocks
• Paper for diagram

PREP FOR TEACHERS
• Decide which room could be used for Family Game Night.
• Have an idea of how many tables are in the room and how many games will be played.

Note:
If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE
1. Say, “The principal has asked this class to help plan the room arrangements for a Family Game Night.”

2. Take the class on a tour of the room in which Game Night will be held. Let the students brainstorm to decide what games they would like to play.

3. Ask, “Now that we’ve compiled a list of games we may want to include in our Game Night, what else will we need to know to be able to arrange the room?” Talk about tables, the number of games that will be played and other things the students need in order to arrange the tables.

LEARNING ACTIVITIES
1. Students need to find out how many classes there are and how many games each class or grade level will have. Tell the students how many tables will be available to use that night. With this information, divide the students into groups. Each group will take the information and decide the best way to solve the problem of how to arrange the tables.
2. **Cue** the *Math Can Take You Places* video #004 “Problem Solving” to when Ms. Garcia says, “On our map, we have …” and walks towards the map on the board. Ask students to listen carefully to the problem-solving strategies that the students suggest. **Play** the video until Laura Stanforth says, “OK, never mind. Now, I’ve got it. Thanks.” Ask students whether any of the strategies listed could possibly help them solve their room arrangement problem. Guide them to select the problem-solving model of making and drawing a diagram or picture to complete this problem. Give each group base-ten blocks, the same number of tens as tables. Use the tens of the base-ten blocks to show the arrangement of the room. This needs to be done on the desks.

3. Have the group members walk around to look at other groups’ arrangements to evaluate which one would be the most useful. Using that group’s arrangement, draw a diagram showing the arrangement. Then decide on the number of games that will be on each table.

4. Will this arrangement still work with this number of games? If not, work on another arrangement that may work.

**CULMINATING ACTIVITY**

1. Have a Family Game Night and use the arrangement the class developed.

2. As an extension, have students use yardsticks to measure the area of the intended Game Night room. Use one-inch grid paper, where one square inch equals one square foot. Also, allow students to measure the area of the tables they will be using. Use one-inch color tiles to represent the area of the tables. Work with students to create a scale model of the game-room area.

**CROSS-CURRICULAR EXTENSIONS**

Language Arts/Art

Make advertisements for Family Game Night.

Encourage students to use the library and the Internet to research the origins of different games that students are familiar with, such as video games and pinball machines. Have students present their findings to the class.

**REAL-WORLD CONNECTIONS**

Using the class’s arrangement for Family Game Night.

**ASSESSMENT**

Did the arrangement work with the dimensions of the room and the number of games used? Was there enough room to walk around and play all of the games? How many people were able to walk around and play the games?

**STUDENT HANDOUTS**

None
CONCEPT AREA  Problem Solving  
GRADE LEVEL  4-6  
TIME ALLOTMENT  Two or three 60-minute sessions  

LESSON OVERVIEW  In this lesson, students will plan an end-of-the-school-year party at the Adolphus Hotel.  
LESSON ACTIVITIES OVERVIEW  Students will create a survey to solicit responses from the students in their grade to help them plan a party. Students will determine the favorite menu, music, theme and party favors, then develop a step-by-step party-planning guide.  
LEARNING OBJECTIVES  Students will be able to decide the problem-solving model that is appropriate for developing a successful and fun event. 
MEDIA COMPONENTS  Video: Math Can Take You Places #004 “Problem Solving”  

MATERIALS  • Large poster or 1” graph paper  
• Pencils  
• Sticky notes 4” x 4”  
• Markers  
• Scissors  
• Tape  
• Graph paper 8 ½” x 11”  

PREP FOR TEACHERS  • Prepare survey sheets  
• Cue video  

Note:  
The concept of ratio will be covered during this lesson. Students may need to review the concept prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).  

INTRODUCTORY ACTIVITY:  SETTING THE STAGE  
1. Students will survey the class to find out what type of party theme, music, food and party favors they want most. Take suggestions from the students, and have them vote for the top three for each category. If other classes in the same grade are available, please make them a part of your survey.  
2. As a class, use the one-inch graph paper to make a bar graph to display the results of the survey.  

LEARNING ACTIVITIES  
1. Say: “Now that we know what type of party the students want, there is a lot of planning to be done. We will divide into four different Party Committees to make the plans for the event. Each group will come up with a plan for providing each of our four items: party theme/decorations, music, food and party favors. As you are planning, make sure to keep in mind that we don’t have a lot of money, so try to spend as little as possible.”
2. Divide the students into four groups. Give them about 10 minutes to brainstorm what their very first steps should be. Share those answers aloud.

3. Once each group has some idea of where to start, let the students in the group begin to work to devise their plans. Provide catalogs or Internet access for students to use to be able to determine prices of items needed. Walk around and facilitate the planning among the groups. To make the problem solving more difficult, give each group a specific dollar amount as a spending limit. For example, the decorations group may have a budget of $50.

CULMINATING ACTIVITY

1. After students have completed their plans, discuss them briefly as a class.

2. Have groups discuss and list what steps they had to take to come up with their plans.

3. Say: “You now have a detailed list of steps that you took to plan what you are going to do for our class party. All of the groups have discussed what they’ve done to make sure the party will be a success. Imagine your little brother’s class wants to plan a party, too. Let’s come up with some general steps his class can follow from what we’ve learned.”

4. List all of the ideas the students have, as they are suggested. Discuss what we could have done differently to make the planning go smoother, so we can offer the next group some helpful hints.

5. Have a party!

CROSS-CURRICULAR EXTENSIONS

Language Arts
Create a “Party Planning” book with the general steps in the front, the individual steps listed in different sections and the helpful hints throughout. Let students illustrate.

REAL-WORLD CONNECTIONS

Students assist in planning an actual party at school.

Watch the video, Math Can Take You Places #004 “Problem Solving” with Laura Stanforth. Discuss how she uses problem solving in her job. Brainstorm other ways problem solving is used in other familiar occupations.

ASSESSMENT

Party Time Quiz

STUDENT HANDOUTS

Party Survey sheet
Problem-solving sheets
## Party Survey

<table>
<thead>
<tr>
<th>Favorite Music</th>
<th>Number</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Party Survey

<table>
<thead>
<tr>
<th>Favorite Foods</th>
<th>Number</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Party Survey

<table>
<thead>
<tr>
<th>Favorite Theme</th>
<th>Number</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Party Survey

<table>
<thead>
<tr>
<th>Favorite Transportation</th>
<th>Number</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Party Time Quiz!

1. The students would like to have plenty of room to do their favorite dancing. The room is 50 ft. x 50 ft., but there are tables in a 20 ft. x 30 ft. area. The students need 1,500 square feet for dancing. Will there be enough room? Please explain your answer and show your work!

2. Chartering a bus for the party will cost $85.00 for the first three hours and $25.00 for each additional hour. The bus will arrive at the school at 6 p.m. to take the students to the Adolphus Hotel and will return to the school at 10:30 p.m. The party committee has allotted $140.00 to pay for the bus. Did it allow enough money to pay for the bus? Please explain your answer.

3. The principal would like to have an adult chaperone for every ten students attending the party. If 167 students will be attending the party, how many adult chaperones will the principal need? Please solve this problem two different ways.

4. The beverage for the party is a special mixture of juices and a fruit concentrate. One pint of the concentrate will make two gallons of the beverage. How many pints of the concentrate will be needed to make 20 gallons of the beverage?
Party Time Quiz
Answer Key

1. There will be enough room for dancing because the room is 2500 square feet. and the area for tables is 600 square feet, so $2500 - 600 = 1900$ square feet available for dancing.

2. Yes. The bus trip will take 4 and ½ hours, so it will cost either $135 or $122.50, depending upon whether the bus company charges $25 for the last half-hour or $12.50 for it.

3. 17

4. 10 pints
<table>
<thead>
<tr>
<th>Música Favorita</th>
<th>Número</th>
<th>Relación</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
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<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Encuesta de la Fiesta

<table>
<thead>
<tr>
<th>Comidas Favoritas</th>
<th>Número</th>
<th>Relación</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Encuesta de la Fiesta

<table>
<thead>
<tr>
<th>Tema Favorito</th>
<th>Número</th>
<th>Proporción</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
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<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Encuesta de la Fiesta

<table>
<thead>
<tr>
<th>Transporte Favorito</th>
<th>Número</th>
<th>Relación</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
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<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
¡Preguntas sobre la Fiesta!

1. A los estudiantes les gustaría tener mucho espacio para su baile favorito. El salón tiene 50 pies x 50 pies, pero las mesas ocupan un área de 20 pies x 30 pies. Los estudiantes necesitan 1,500 pies cuadrados para bailar. ¿Habrá suficiente espacio en el salón? Por favor explica tu respuesta y muestra tu trabajo.

2. El alquiler de un ómnibus cuesta $85.00 por las primeras tres horas y $25.00 por cada hora extra. El ómnibus llegará a la escuela a las 6 p.m. para llevar a los estudiantes al Hotel Adolphus y regresará a la escuela a las 10:30 p.m. El comité para la fiesta ha destinado $140.00 para pagar por el ómnibus. ¿Hay suficiente dinero para pagar por el ómnibus? Por favor explica tu respuesta.

3. Al director le gustaría tener un adulto por cada diez estudiantes que vayan a la fiesta. Si 167 estudiantes van a ir a la fiesta, cuántos adultos chaperones necesita el director? Por favor resuelve este problema de dos maneras diferentes.

4. La bebida para la fiesta es una mezcla especial de jugos y un concentrado de fruta. Un octavo de galón del concentrado sirve para hacer dos galones de bebida. ¿Cuántos octavos de concentrado se necesitarán para hacer 20 galones de bebida?
LESSON 20
“How Much . . .?”
by Sabrina McCullough

CONCEPT AREA  Problem Solving
GRADE LEVEL  5
TIME ALLOTMENT  Three to five 60-minute sessions

LESSON OVERVIEW  A soccer team would like to purchase warm-up suits for each player on the team. In order to do so, the team must raise money. The students will sell food to raise money. Students will decide how much food to purchase and how much charge for it. When the fund-raiser is over, the students will determine whether they made enough money to purchase the suits for each player.

LESSON ACTIVITIES OVERVIEW  Students will generate a list of food items and take a field trip to a wholesale retailer.

LEARNING OBJECTIVES  Students will be able to:
• Decide and create a list of items to sell.
• Determine how much of each item should be purchased.
• Determine how much to sell each item for.
• Calculate earnings.
• Evaluate the cost per player.
• Determine if enough money has been raised to buy warm-up suits.

MEDIA COMPONENTS  Video: Math Can Take You Places #004 “Problem Solving”

Websites for warm-up suit prices:
http://www.school-uniforms-store.com/cheerleader-warrunsuitbr.html
http://thestore.adidas.com/cgi-bin/adilive/b2c/index.w?location=b2c/browse.w%3Ftype%3Ddag%26code%3DAM%26silh%3DA0006%26promop%3Doverstor

MATERIALS
Per class:
• Literature book: How the Second Grade Got $8,205.50 to Visit the Statue of Liberty, by Nathan Zimelman.
• Bus (for the field trip)

Per group of four:
• Calculators
• Pencil and paper

Per student:
• Calculators
• Activity sheets (1, 2 and 3)
LESSON 20
“How Much . . .?”
by Sabrina McCullough

PREP FOR TEACHERS

- Call ahead or use the websites listed under “Media Components” to find the cost per suit.
- Make arrangements for the field trip (optional).
- Modification: Visit a wholesale retailer before conducting the lesson and compile a list of possible food items. Give the students a copy of the list without the prices and quantities, so that they may make their choices based solely on preference. See if any of their choices change after they are shown the prices and quantities.
- Make copies of worksheets 1, 2 and 3 for each student.
- Purchase or check out the literature book.

Note:
The following concepts will be covered during this lesson: profit, wholesale price, retail price, quantity and profit. Be prepared to discuss and review the concepts during the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Read the book, How the Second Grade Got $8,205.50 to Visit the Statue of Liberty, by Nathan Zimelman, and write down all new vocabulary words.
2. Discuss the terms and check for understanding of each word.

LEARNING ACTIVITIES

Day One
1. After reading the story, ask the students the following questions:
   a. What is the main idea of the story?
   b. What is the problem in the story?
   c. What is the solution to the problem?

   It is very important to ask the right kinds of questions in order to get students to think and respond in a productive way. Once discussion has taken place, write down all vocabulary words and the meanings (using context clues).

2. Divide students into groups of three to four. Say, “The students in the story were trying to raise money, and so are we. Pretend that our school soccer team of 15 students needs money to purchase new warm-up suits. We want to create a concession stand and sell food to raise the money. Discuss in your groups what food items you think we should sell.” Probe the students to start a list within their groups first. Give the students 7 to 10 minutes. Once each group has completed its list, come together as a class to make a general class list for all to copy. The general list will be used on the field trip to gather prices and determine the cost.

3. Have students take notes as you briefly discuss “profit,” “wholesale price,” “retail price” and “quantity.” Explain to students that the “profit” is the difference between how much we paid for the item and how much we sell the item for. The “wholesale price” is basically how much we actually pay for the items, and “retail” is what we charge people to buy the items. “Quantity” means “how many.” In this case, it is the number of items that we get for the cost. Help the students understand that we want to sell the items that give us the biggest profit.
Day Two
4. During the field trip, spend a few minutes explaining to students how to read the item price markers. Point out that the price, the name of the product and the number of servings (or the quantity in the package) are all listed. Allow students to separate into groups to locate the items. (Teacher’s Note: Make sure that the students are adequately chaperoned at all times.) Students can work from the list of items they created to get them started, but allow them to add other items they come across that they think may be good to sell. Students will write in up to ten items on the “Items, Costs and Quantities” worksheet. Give them a time limit to gather their item information while in the store (for example, 30 minutes). Fill in the chart with items, their costs and quantity per unit. To keep it simple, do not include sales tax.

5. If time permits, come back together as a class when the item search is completed. Allow the groups to share any new discoveries or surprises.

CULMINATING ACTIVITY
Day Three
6. Students will work in their groups during class to complete the remainder of the chart items, using a calculator to answer the questions. Work the sample item at the top of the “Items, Costs and Quantities” sheet with the students before they begin. Complete additional examples if further clarification is needed. Monitor students closely as they work, making sure to answer any questions and intervene when necessary.

7. After the groups have filled in their charts, ask them to move on to answering the “Wrap Up Questions” on the worksheet. Discuss the answers as a class. Compile a list of the class’s top five highest moneymaking items.

CROSS-CURRICULAR EXTENSIONS
Language Arts
• The students will use context clues to determine meaning of words.
• The students will describe the main idea, the problem in the story and the solution.
• Encourage the students to write and illustrate their own stories about how they would raise money for the soccer team, incorporating their experiences with this activity.

REAL-WORLD CONNECTIONS
The students will take a field trip to a wholesale retail store. Actually allow the class to open a concession stand to help raise money for a class field trip. Conclude the activity with the following open-ended questions:
1. What was the total amount of time spent working the concession stand?
2. How much money was raised working the concession stand?
3. On the average, about how much money was raised per hour?
4. How much was spent on purchasing the items for the concession stand?
5. What is the total cost of the suits and bags for the entire team?
6. Was there enough money to make the purchase? How do you know? Show all work and explain.

ASSESSMENT
Quiz students on the definitions of the four vocabulary words defined in “Learning Activities” #3. Ask them for examples as well as the definitions.
LESSON 20
“How Much . . .?”
by Sabrina McCullough

**STUDENT HANDOUTS**
- Soccer Concession Stand “Items, Costs and Quantities”
- Soccer Concession Stand “Wrap Up Questions”
**LESSON 20**

**“How Much . . .?”**

by Sabrina McCullough

---

Name____________________________________________ Date____________________________

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**Soccer Concession Stand**

**Items, Costs and Quantities**

<table>
<thead>
<tr>
<th>A. Item</th>
<th>B. Cost</th>
<th>C. Quantity</th>
<th>D. What is the cost per item? (“B” divided by “C”)</th>
<th>E. Retail Price (How much would you sell each item for?)</th>
<th>F. Profit For Each Item Sold (“E” minus “D”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample: Cupcakes</td>
<td>$4.75</td>
<td>10</td>
<td>$4.75 / 10 = about .48</td>
<td>$1.00</td>
<td>1.00 - .48 = .52</td>
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Soccer Concession Stand

Wrap-Up Questions

1. According to your data, which five items would create the highest profit?

2. What was the one item that would bring the highest profit?

3. How many of that item would we have to sell to buy 15 uniforms that cost $50 apiece?

4. Explain how you think a storeowner makes money.
Nombre_________________________________________ Fecha________________

Concesionaria del Fútbol
Productos, Precios y Cantidad

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<tbody>
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<td>Muestra: Pastelitos</td>
<td>$4.75</td>
<td>10</td>
<td>$4.75 / 10 = cerca de .48</td>
<td>$1.00</td>
<td>1.00 - .48 = .52</td>
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Puesto en la cancha de Fútbol

Preguntas para Resumir

1. ¿De acuerdo a tus datos, cuáles son los cinco productos que darán más ganancia?

2. ¿Cuál es el producto que daría la ganancia más alta?

3. ¿Cuántos productos como éste tendríamos que vender para comprar 15 uniformes que cuestan $50 cada uno?

4. Explica cómo piensas que el dueño de un negocio hace dinero.
LESSON 21
“A Scheduling Dilemma”
by Rhonda Bailey

CONCEPT AREA  Problem Solving
GRADE LEVEL  4-6
TIME ALLOTMENT  60 minutes

LESSON OVERVIEW
Students will investigate a real-life problem situation involving an Amtrak Train.

LESSON ACTIVITIES OVERVIEW
Groups of students will work together on a train-scheduling problem in which the Amtrak Train agent has only 3 seats available to sell, but has 4 passengers who need reservations to 4 different destinations. The students will use the Amtrak Route Map, Seat Map and Train Schedule to come up with a solution that will allow all 4 passengers to get to their destinations.

LEARNING OBJECTIVES
Students will be able to:
• Use the four-step problem-solving model to solve a real-life application problem
• Use an appropriate problem-solving strategy to solve the problem
• Write a solution to the problem situation, justifying why their solution is reasonable

Students must use correct labels and units throughout the problem-solving process, which includes the solution.

MEDIA COMPONENTS
Video: Math Can Take You Places #004 “Problem Solving”
Internet:
An extensive list of links to websites containing rubrics can be found at www.rubrician.com.

Let students investigate 3 x 3 “Magic Squares” problems or other puzzle problems involving arrangements. http://mathforum.org/alejandre/magic.square/toshu1.html

You can find interesting mathematics problems for various grade levels at Grace Church School’s ABACUS International Math Challenge at http://www.gcschool.org/pages/program/Abacus.html.

For Amtrak scheduling information or to order booklets containing schedules http://www.amtrak.com/plan/timetables.html

For Amtrak route maps http://www.amtrak.com/destinations/index.html

MATERIALS
• Amtrak Seat Map (optional)
• Amtrak Route Map (optional)
• Amtrak Train schedule
• Color tiles to represent the 4 passengers
• “A Scheduling Dilemma” student activity sheet system
PREP FOR TEACHERS

- Arrange students in groups of 3 or 4 and distribute sets of materials to each group.
- Each student should have his or her own activity sheet.

Note:
If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Discuss with students how it might be possible to sell two train tickets for the same seat on a train.

2. Ask students to look at the Amtrak Route Map and Train schedule. Ask students to discuss how they might use the Route Map and Train schedule when planning to ride the train.

3. Make sure that students understand they must use the four-step problem-solving process. It may be necessary to review this process.
   a. Understanding the problem
   b. Making a plan
   c. Carrying out the plan
   d. Evaluating the solution for reasonableness

LEARNING ACTIVITIES

Students will work with their group to complete the “Scheduling Dilemma” activity sheet.

CULMINATING ACTIVITY

1. Students will present their scheduling solution to the class.

2. Student groups must show evidence of the problem-solving process in finding their solutions.

CROSS-CURRICULAR EXTENSIONS

Social Studies
Have students plan a train trip using the Amtrak Route Map. Students will compile a journal about the interesting places they visited during their train trip. Let students use the Internet to find photographs of the places they visited and incorporate the photos into their stories.

English Language Arts
Have students write a narrative describing a trip they would like to take on the Amtrak train, detailing why they have selected the particular train route and describing some of the destinations they will visit along the way.

REAL-WORLD CONNECTIONS

Students can investigate other situations that might involve scheduling dilemmas, such as scheduling employees to work in a store that is open from 9 a.m. to 9 p.m.

Have students talk about situations where putting objects in a specific order would be important (locker combinations or class schedules) versus situations where the specific order does not matter (putting coins into a vending machine).
LESSON 21
“A Scheduling Dilemma”
by Rhonda Bailey

ASSESSMENT
Students will complete an individual assessment and show evidence of proficiency using the following criteria:
1. Students use the four-step problem-solving model to solve an application problem.
2. Students use an appropriate problem-solving strategy to solve the problem.
3. Students write a solution to the problem situation, which includes the correct use of labels and units, justifying why their solutions are reasonable.

Use or modify a rubric found at www.rubician.com to evaluate students’ levels of proficiency in each area.

STUDENT HANDOUTS
“A Scheduling Dilemma” student activity sheet
Wrap-Up Question
**Schedule for Amtrak Train 2158**

<table>
<thead>
<tr>
<th>Departure Time</th>
<th>Train Station Abbreviations</th>
<th>Departure City</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM</td>
<td>WAS</td>
<td>WASHINGTON, DISTRICT OF COLUMBIA</td>
</tr>
<tr>
<td>9:35 AM</td>
<td>BAL</td>
<td>BALTIMORE (PENN STATION), MARYLAND</td>
</tr>
<tr>
<td>10:17 AM</td>
<td>WIL</td>
<td>WILMINGTON, DELAWARE</td>
</tr>
<tr>
<td>10:38 AM</td>
<td>PHL</td>
<td>PHILADELPHIA (30TH ST), PENNSYLVANIA</td>
</tr>
<tr>
<td>11:31 AM</td>
<td>NWK</td>
<td>NEWARK (PENN STATION), NEW JERSEY</td>
</tr>
<tr>
<td>12:03 PM</td>
<td>NYP</td>
<td>NEW YORK (PENN STATION), NEW YORK</td>
</tr>
<tr>
<td>2:54 PM</td>
<td>PVD</td>
<td>PROVIDENCE, RHODE ISLAND</td>
</tr>
<tr>
<td>3:18 PM</td>
<td>RTE</td>
<td>ROUTE 128, WESTWOOD, MASSACHUSETTS</td>
</tr>
<tr>
<td>3:27 PM</td>
<td>BBY</td>
<td>BOSTON (BACK BAY), MASSACHUSETTS</td>
</tr>
<tr>
<td>3:33 PM</td>
<td>BOS</td>
<td>BOSTON (SOUTH STATION), MASSACHUSETTS</td>
</tr>
</tbody>
</table>

Train 2158 is completely full, except for three seats. There is a large group traveling from Washington, DC to Boston (South Station), Massachusetts.
The seats that are still available are: 2A, 4B, 5D.

The following passengers want to travel:

<table>
<thead>
<tr>
<th>Passenger Number</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WAS</td>
<td>NWK</td>
</tr>
<tr>
<td></td>
<td>Washington, DC</td>
<td>Newark (Penn Station), NJ</td>
</tr>
<tr>
<td>2</td>
<td>PHL</td>
<td>PVD</td>
</tr>
<tr>
<td></td>
<td>Philadelphia (30th St.), PA</td>
<td>Providence, RI</td>
</tr>
<tr>
<td>3</td>
<td>NYP</td>
<td>BOS</td>
</tr>
<tr>
<td></td>
<td>New York (Penn Station), NY</td>
<td>Boston (South Station), MA</td>
</tr>
<tr>
<td>4</td>
<td>BAL</td>
<td>BBY</td>
</tr>
<tr>
<td></td>
<td>Baltimore (Penn Station), MD</td>
<td>Boston (Back Bay), MA</td>
</tr>
</tbody>
</table>

You must determine the best seat assignment for the next four passengers that call for reservations. Work with your group to solve this scheduling dilemma. Use the problem-solving process to find your solution.
LESSON 21
“A Scheduling Dilemma”
by Rhonda Bailey

- Understanding the problem
- Creating a plan
- Solving the problem
- Checking the reasonableness of your solution
Wrap Up Questions

1. How did your group determine which information was important to solve this problem? Was there any information that you decided was not important?

2. Describe an alternate problem-solving strategy that your group could have used to solve this problem.

3. Is there more than one solution to this problem? How do you know?

4. Describe how the problem would change if 5 passengers had to share 4 seats.
El tren 2158 está completamente lleno, excepto por tres asientos. Hay un grupo grande que viaja desde Washington, DC a Boston (Estación Sur), Massachusetts. Los asientos que están disponibles son: 2A, 4B, 5D.

Los siguientes pasajeros quieren viajar:

<table>
<thead>
<tr>
<th>Número del Pasajero</th>
<th>Desde</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WAS Washington, DC</td>
<td>NWK, Newark (Estación Penn) , NJ</td>
</tr>
<tr>
<td>2</td>
<td>PHL Philadelphia (Calle 30), PA</td>
<td>PVD Providence, RI</td>
</tr>
<tr>
<td>3</td>
<td>NYP New York (Estación Penn), NY</td>
<td>BOS, Boston (Estación Sur), MA</td>
</tr>
<tr>
<td>4</td>
<td>BAL Baltimore (Estación Penn), MD</td>
<td>BBY Boston (Back Bay), MA</td>
</tr>
</tbody>
</table>
Debes decidir y asignar los mejores asientos a los cuatro pasajeros siguientes que llamen por reservaciones. Trabaja con tu grupo para resolver este dilema del horario. Para encontrar la solución, usa el proceso para resolver problemas.

• Entender el problema
• Crear un plan
• Solucionar el problema
• Revisar para ver si la solución es razonable
1. ¿Cómo decidió tu grupo cuál era la información importante para resolver el problema? ¿Hubo alguna información que ustedes decidieron que no era importante?

2. Describe si hubo una segunda estrategia de solución del problema que tu grupo podría haber usado para resolver este problema.

3. ¿Hay más de una solución a este problema? ¿Cómo lo sabes?

4. Describe cómo el problema cambiaría si cinco pasajeros tuvieran que compartir 4 asientos.
LESSON 22
“Real-World Reasonableness”
by Debbie Miskiewicz

CONCEPT AREA
Domain/Range/Reasonableness

GRADE LEVEL
4-6

TIME ALLOTMENT
Two 60-minute sessions

LESSON OVERVIEW
Students will recognize math in everyday situations. Students will connect reasonableness to everyday situations that they encounter.

LESSON ACTIVITIES OVERVIEW
After reading Math Curse, by Jon Scieszka and Lane Smith, students will work in pairs to write a sequel to the book using problems that they create. In the sequel, the “math curse” continues as the character in the book goes on a class field trip. Students will incorporate estimation and travel as they develop their problems and illustrate.

LEARNING OBJECTIVES
Students will be able to:
• Make a plan to solve a problem.
• Evaluate strategies to solve problems for reasonableness.
• Carry out a plan effectively to solve a problem.

MEDIA COMPONENTS
Investigate fractals, which are artwork made with mathematics at “Cool Math 4 Kids”
http://www.coolmath4kids.com/fractals.html

Create tessellations with pattern blocks
http://ejad.bestvwh.net/java/patterns/patterns_j.shtml

MATERIALS
• Math Curse, by Jon Scieszka and Lane Smith
• Colored construction paper
• Markers/crayons
• Index cards (optional)

PREP FOR TEACHERS
Teachers will need to be familiar with the book Math Curse, by Jon Scieszka and Lane Smith.

Note:
The following concepts will be covered during this lesson: time, arrays, fractions, patterns, monetary value and estimation. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY:
SETTING THE STAGE
1. Teacher and students will brainstorm and make a list of how math is used every day.
2. Students will then take the list and classify each item under a topic of mathematics (for example, geometry, fractions, arithmetic).
3. The teacher will read the book Math Curse, by Jon Scieszka and Lane Smith. Ask students to pay close attention because they will be writing the sequel to the book.
LESSON 22
“Real-World Reasonableness”
by Debbie Miskiewicz

LEARNING ACTIVITIES
1. Tell students that they will be writing the sequel to Math Curse where the character in the book wakes up the next day and still has “the curse” that makes her see mathematics in every situation. Her class will be taking an overnight field trip, and the students will be able to decide the activities of her day.


3. Brainstorm aloud some locations where the character may be going on the field trip. Choose the most popular attraction among the students as the destination for our character.

4. The task for the students is to develop one or more questions that relate to their assigned topic, incorporate estimation if possible and integrate it with the story that the class is developing as a whole. Students will have to communicate with the groups before and after them as they develop their problems. For example, if my group is assigned “2. Measurement,” then we must talk to the “1. Time” group and the “3. Months of the year” group to make sure that every part of the story makes sense. The students can refer back to the book if needed, but cannot copy verbatim.

5. Let the students know that they will be graded using the following rubric:
   - Is the problem creative and funny? (15 points)
   - Are the illustrations neat? (15 points)
   - Are their math problems correct? (40 points)
   - Does the page work well with the pages before and after it? (15 points)
   - Did they incorporate estimation? (15 points)

6. Allow students to work in their groups and with other groups to develop their rough draft of the problem and the illustration. When the groups are done, they should exchange their page with the group that is numerically ahead and behind. Students then use the rubric to grade the rough draft and give suggestions for improvement.

CULMINATING ACTIVITY
1. After all of the suggestions have been gathered for improvement, students will then create the final draft of their problem on construction paper. Make sure that students put the answers on the back of their final versions.

2. Have a representative from each group stand and hold his or her work up facing the class while the teacher reads the story aloud. Later, assign grades using the scoring rubric.

Extension:
Let students visit other math classes and read their creations.
LESSON 22
“Real-World Reasonableness”
by Debbie Miskiewicz

CROSS-CURRICULAR EXTENSIONS
Art
Allow students to do Internet research on the artistic style of collage. Allow students to share the examples they find as well as the biographies of famous artists who used the style (such as Romare Bearden). Students should use magazines to create collages of their own.

REAL-WORLD CONNECTIONS
Ask your school principal to speak to the class. Ask him/her to describe how (s)he uses math in the principal's job within the school.

ASSESSMENT
Use the “Estimation” Math Curse Scoring Rubric to assign grades to each group of students. The teacher may also want to collect the rubrics done by the students, and incorporate some of the applicable comments into the grading.

STUDENT HANDOUTS
“Estimation” Math Curse Scoring Rubric
“Estimation” Math Curse

Scoring Rubric

• Is the problem creative and funny? (15 points)
  Comments:

• Are the illustrations neat? (15 points)
  Comments:

• Are their math problems correct? (40 points)
  Comments:

• Does the page work well with the pages before and after it? (15 points)
  Comments:

• Did they incorporate estimation? (15 points)
  Comments:
LESSON 23
“Away We Go”
by Rhonda Bailey

CONCEPT AREA Domain/Range Reasonableness
GRADE LEVEL 4-6
TIME ALLOTMENT 60 minutes

LESSON OVERVIEW Students will engage in using mathematics to solve a real-life problem. Students will use estimation skills to calculate the cost of a trip to Six Flags amusement park.

LESSON ACTIVITIES OVERVIEW Students calculate the maximum and minimum amount of money they would need for a family trip to an amusement park.

LEARNING OBJECTIVES Students will be able to:
• Devise and execute a plan for problem solving.
• Estimate within a given situation.
• Discuss practical real-world problem-solving applications using mathematics.

MEDIA COMPONENTS Video: Math Can Take You Places #003 “Domain/Range/Reasonableness”
Internet: Travelocity, www.travelocity.com

MATERIALS Items from Six Flags (optional)
• Calculators
• Group activity sheet
• Group banners
• Price sheets from Travelocity.com for a trip from Portland, Oregon to DFW
• Chart paper
• Marker

PREP FOR TEACHERS • Divide students into at least four groups of three to four people.
• Closely review the assignments of each of the four groups, so that assistance can easily be offered.

Note: The concepts of range and estimation will be covered during this lesson. Students may need to review the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

INTRODUCTORY ACTIVITY: SETTING THE STAGE 1. Open the lesson by sharing this scenario with your students:
   The items you see on your desk are from Six Flags. You are going to figure out about how much money it would cost a family of seven to go to Six Flags for the entire day. Grandma and Grandpa are planning to fly in from Portland, Oregon to go to Six Flags with the family for the day; they will need round-trip tickets. The family includes you, a fourth- (fifth- or sixth-) grader, two parents, a little sister who is two years old and an older brother who is 16. About how much is it going to cost the family to go to Six Flags? Be sure to include the cost to fly the grandparents in from Portland. Use the price information you have to find a range, so we can calculate the least possible amount of money we may spend and the greatest amount we could possibly spend.
2. Let students take a few minutes to analyze the price list. Have each group write an estimate of what it thinks the total trip to Six Flags will cost, including the cost of the round-trip airline tickets for Grandma and Grandpa.

3. Start Math Can Take You Places video #003 “Domain/Range Reasonableness” after the facilitator from Six Flags Over Texas says, “… we want people to know what Six Flags is all about.” Pause when the problem text appears on screen, “… least amount of money we may spend and the greatest amount that we may spend.”

**LEARNING ACTIVITIES**

1. There are four basic parts of the trip that each group will need to calculate.
   a. Group 1 is going to calculate the least amount and the greatest amount of money the family could spend on tickets.
   b. Group 2 is going to figure out the least amount and the greatest amount of money the family could spend on food.
   c. Group 3 is going to calculate the least amount and the greatest amount of money that the family would spend on souvenirs.
   d. Group 4 needs to calculate the cost of airplane tickets for Grandma and Grandpa to fly round-trip to Dallas from Portland, Oregon.

2. Students should write up their plans and conclusions on the chart paper and be ready to share with the class. When each group is finished reporting, the entire class will work together to get a total for the least amount the family might spend on the trip and the greatest amount the family could spend.

Group assignments:

**Group 1:**
Tickets to Six Flag
Adults: $29.99
Kids under 48 inches tall: $17.99

You have coupons for $12 off adult admission that are only good if used during the week. You may or may not be able to use the coupons depending on what day your mom can get off work.

Calculate the greatest and least amounts of money the family might spend on tickets.

**Group 2:**
Food
**MENU FOR SAL’S SANDWICH SHACK**
Combo Meals (includes a regular drink and fries)
- Triple Cheesburger Meal........... $7.99
- Chicken Strip Meal.................. $6.15
- Fish Sandwich Meal................ $6.75
- Kid’s Meal.............................. $4.15 (children 12 and under)
- Salad .................................. $3.25
- Drinks.................................$1.35 (regular) $2.85 (large)
- Chips .................................. $1.00
- Ice Cream Bars........................ $1.75
Use the menu to calculate the approximate amount that the family will spend on food at Six Flags for the entire day. Include snacks and drinks. Calculate a reasonable amount that the family will spend on food, not to exceed $300. Be able to explain your answer.

Group 3:
Souvenirs/Games
PRICE LIST FOR TERRI'S TERRIFIC T-SHIRTS AND MORE
- T-Shirts.......................................................$26.15 (adults) $18.80 (kids' sizes)
- Hats...........................................................$9.35
- Mugs .........................................................$6.15
- Sunglasses...................................................$4.75
- Stuffed Animals.........................................$35.10 (large)
- Pencils.......................................................$1.89

The family does not want to spend more than $250 on souvenirs and games.

Group 4:
Airplane tickets for Grandma (60 years old) and Grandpa (65 years old)

Use the Web site Travelocity.com to calculate the most and the least amount that might be spent on the airline tickets.

CULMINATING ACTIVITY
1. All four groups will share their final results. Each group should include both minimum and maximum values as a part of its solution.

2. Let each group write its final results on the board. Ask students if they would like to modify their original estimate of the cost for the day at Six Flags. If students change their estimates, they must explain why and give evidence of their new choices.

3. Use a calculator to get the range of the least amount of money the family could spend on the entire trip as well as the most money it could spend.

4. Cue video after Sandra Daniel says, “We had about 100 million visitors to Six Flags Over Texas.” Press Play. Have students compare their findings with those on the video. Stop at “That's why we're here.”

CROSS-CURRICULAR EXTENSIONS
Science
- Research the construction of roller coasters and how it relates to physics.

Art
- Design your own perfect amusement park on construction paper using markers and household items.
LESSON 23
“Away We Go”
by Rhonda Bailey

REAL-WORLD CONNECTIONS
Take a field trip to a local amusement park. Have students complete a scavenger hunt to find the most expensive and the least expensive food items and souvenirs for each individual shop. As a group, decide which shops have the best buys for consumers.

ASSESSMENT
Informally monitor students as they solve the problem to assess understanding.

STUDENT HANDOUTS
Group Assignments sheets
Group Assignments
Park Tickets

**Group 1:**
You are going to figure out about how much money it would cost a family of seven to go to Six Flags for the entire day. The family includes you, a fourth- (fifth- or sixth-) grader, two parents, a little sister who is two years old, an older brother who is 16, and your two grandparents. Group 1 is going to calculate the least amount and the greatest amount of money the family could spend on tickets.

Tickets to Six Flag
Adults: $29.99
Kids under 48 inches tall: $17.99
Senior Citizens: $15.00 (Tuesdays only)

You have coupons for $12 off adult admission that are only good if used during the week. You may or may not be able to use the coupons depending on what day your mom can get off work. You and your older brother both earned free passes through a summer reading program that can only be used after May.

Calculate the greatest and least amounts of money the family might spend on tickets.
LESSON 23
“Away We Go”
by Rhonda Bailey

Group Assignments
Food

Group 2:
You are going to figure out about how much money it would cost a family of seven to go to Six Flags for the entire day. The family includes you, a fourth- (fifth- or sixth-) grader, two parents, a little sister who is two years old, an older brother who is 16, and your two grandparents. Group 2 is going to figure out the least amount and the greatest amount of money the family could spend on food.

MENU FOR SAL’S SANDWICH SHACK
Combo Meals (includes a regular drink and fries)
Triple Cheeseburger Meal..........................$7.99
Chicken Strip Meal.................................$6.15
Fish Sandwich Meal...............................$6.75
Kid’s Meal ............................................$4.15 (children 12 and under)

Barbecue Sandwich...............................$4.75
Catfish Fillets .......................................$5.95
Junior Burger .......................................$1.25
Salad ..................................................$3.25
Drinks ...............................................$1.35 (regular) $2.85 (large)
Chips ..................................................$1.00
Ice Cream Bars ....................................$1.75

Use the menu to calculate the approximate amount that the family will spend on food at Six Flags for the entire day. Include snacks and drinks. Calculate a reasonable amount that the family will spend on food, not to exceed $300. Be able to explain your answer.
LESSON 23
“Away We Go”
by Rhonda Bailey

Group Assignments
Souvenirs/Games

**Group 3:**
You are going to figure out about how much money it would cost a family of seven to go to Six Flags for the entire day. The family includes you, a fourth- (fifth- or sixth-) grader, two parents, a little sister who is two years old, an older brother who is 16, and your two grandparents. Group 3 is going to calculate the least amount and the greatest amount of money that the family would spend on souvenirs.

Souvenirs/Games
**PRICE LIST FOR TERRI’S TERRIFIC T-SHIRTS AND MORE**
T-Shirts ..........................................................$26.15 (adults) $18.80 (kids’ sizes)
Hats .................................................................$9.35
Mugs .................................................................$6.15
Sunglasses .......................................................$4.75
Stuffed Animals ............................................$35.10 (large)
Pencils ..............................................................$1.89

Also, each of the kids may want to buy souvenirs for one of each of their friends. Plus, Grandma and Grandpa may want to take some souvenirs home to a couple of their friends in Oregon. Mom and Dad may pass on souvenirs all together since they’ve been to the park several times.

The family does not want to spend more than $250 on souvenirs and games.
Group Assignments
Airplane Tickets

Group 4:
You are going to figure out about how much money it would cost a family of seven to go to Six Flags for the entire day. The family includes you, a fourth- (fifth- or sixth-) grader, two parents, a little sister who is two years old, an older brother who is 16, and your two grandparents. Group 4 needs to calculate the cost of airplane tickets for Grandma and Grandpa to fly round-trip to Dallas from Portland, Oregon.

Find airplane tickets for Grandma (60 years old) and Grandpa (65 years old). They plan to stay at least two days, but they may be able to stay up to five days. Your house is being renovated, so they may have to stay in a hotel during their visit. Also, Grandma and Grandpa may need to rent a car so that they can visit old friends and do some antiques shopping.

Use the Web site Travelocity.com to calculate the most and the least amount that might be spent on the airline tickets.
Asignaciones de Grupos
Boletos de Entrada al Parque

**Grupo 1:**

Tú vas a calcular cuánto dinero cuesta para llevar una familia de siete al parque de Six Flags por un día entero. En la familia incluyes tú, un estudiante de cuarto (quinto ó sexto) grado, tus padres, una hermana pequeña que tiene dos años de edad, un hermano mayor que tiene 16 años de edad, y tus dos abuelitos. Grupo 1 calculará la menor y mayor cantidad de dinero que la familia gastaría para comprar los boletos de entrada al parque.

**Boletos de entrada para Six Flags**
- Adultos: $29.99
- Niños (menos de 48 pulgadas de altura): $17.99
- Ancianos: $15.00 (los martes solamente)

Tienes cupones de $12 de rebaja para adultos que son buenos solamente durante la semana. Es posible que puedas usarlos ó no, depende del día que tu mamá pueda tomar tiempo libre de su trabajo. Tú y tu hermano mayor pueden obtener la entrada gratis por medio del programa de lectura cual se pueden usar solamente después del mes de mayo.

Calcula la menor y mayor cantidad de dinero que tu familia podría gastar en comprando los boletos.
Asignaciones de Grupos
Comida

Grupo 2:

Tú vas a calcular cuanto dinero cuesta para llevar una familia de siete al parque de Six Flags por un día entero. En la familia incluyes tú, un estudiante de cuarto (quinto ó sexto) grado, tus padres, una hermana pequeña que tiene dos años de edad, un hermano mayor que tiene 16 años de edad, y tus dos abuelitos. Grupo 2 calculará la menor y mayor cantidad de dinero que la familia gastaría para la comida.

MENÚ DE SAL’S SÁNDWICH SHACK
Platos Combinados (incluye una bebida regular y papas fritas)
Hamburguesa Triple con queso........... $7.99
Tiras de pollo ...................................... $6.15
Sándwiches de pescado...................... $6.75
Platos para niños............................... $4.15 (niños de 12 años y menores)
Sándwiches de Barbeque.................... $4.75
Filetes de pescado............................ $5.95
Hamburguesa Júnior ......................... $1.25
Ensaladas............................................. $3.25
Bebidas........................................... $1.35 (regular) $2.85 (grande)
Chips .............................................. $1.00
Barras heladas .................................... $1.75

Usa el menú para calcular la cantidad aproximada que la familia gastará en comida por todo el día en Six Flags. Incluye bocadillos y bebidas. Calcula una cantidad razonable que la familia gastará en comida sin sobrepasar los $300. Prepárate para explicar tu respuesta.
Asignaciones de Grupos
Recuerdos

Grupo 3:

Tú vas a calcular cuanto dinero cuesta para llevar una familia de siete al parque de Six Flags por un día entero. En la familia incluyes tú, un estudiante de cuarto (quinto ó sexto) grado, tus padres, una hermana pequeña que tiene dos años de edad, un hermano mayor que tiene 16 años de edad, y tus dos abuelitos. Grupo 3 calculará la menor y mayor cantidad de dinero que la familia gastaría en recuerdos.

Recuerdos y Juegos
LISTA DE PRECIOS: “TERRI’S CAMISETAS Y ALGO MÁS”
Camisetas......................................................$26.15 (para adultos) $18.80 (para niños)
Gorras/Cachuchas/Sombreros...............$9.35
Tazas...............................................................$6.15
Anteojos para el sol.................................$4.75
Animales de peluche...............................$35.10 (grandes)
Lápices.........................................................$1.89

También, cada hijo/a querrá comprarle un recuerdo a cada uno de sus amiga/os. Además, abuelito y abuelita querrán llevarse recuerdos a casa para dos amistades en Oregon. Mama y papa quizás no compraran recuerdos como ellos ya han visitado el parque varias veces.

La familia no quiere gastar más de $250 en recuerdos.
Asignaciones de Grupos
Pasajes de Avión

Grupo 4:

Tú vas a calcular cuanto dinero cuesta para llevar una familia de siete al parque de Six Flags por un día entero. En la familia incluyes tú, un estudiante de cuarto (quinto ó sexto) grado, tus padres, una hermana pequeña quien tiene dos años de edad, un hermano mayor quien tiene 16 años de edad, y tus dos abuelitos. Grupo 4 calculara el costo de los pasajes de avión de ir y vuelta desde Pórtland, Oregon a Dallas para abuelita y abuelito.

Busca pasajes de avión para abuelita (60 años de edad) y abuelito (65 años de edad). Ellos se piensan quedar por los menos dos días, pero quizás podrán quedarse hasta cinco días. Están remodernizando tu casa quizás tendrán que quedarse en un hotel durante su visita. También, tus abuelitos tendrán que rentar un carro para poder ir a visitar sus amistades viejas e ir de compras de antigüedades.

Usa la Internet: Travelocity.com para calcular la mayor o la menor cantidad de dinero que se podrá gastar en los pasajes de avión.
CONCEPT AREA  Domain/Range/Reasonableness
GRADE LEVEL  4-5
TIME ALLOTMENT  90 minutes

LESSON OVERVIEW
We use ranges to estimate all the time. The students will relate what they know about boundaries on sports courts, such as basketball or volleyball. They will project possible answers that are within a certain range, create a table, and then determine if the answers are reasonable for the questions asked. This lesson allows intermediate-aged students to explore the range of space needed for games that will be placed in a new local game room.

LESSON ACTIVITIES OVERVIEW
Students should identify tables to be used as algebraic functions to find ranges. The students will work in groups to figure out the space they will need to fit all new game equipment into the area provided at the new game center. They should be able to explain the smallest and largest numbers in their range.

LEARNING OBJECTIVES
Students will be able to:
• Identify numbers needed to calculate the ranges and determine reasonable answers using the ranges they find.
• Use the problem-solving strategy of making a table.

MEDIA COMPONENTS
Video: Math Can Take You Places #003 “Domain/Range/Reasonableness”
Internet: Six Flags Over Texas information [http://www.sixflags.com]

MATERIALS
Per class:
• 20-25 calculators
• Pictures from magazines, books or the Internet of soccer, basketball and baseball playing areas
• 20-25 dry erase boards
• Markers
• Pictures of indoor games, such as bumper cars and simulators
• Sports equipment, if available
• 4-5 sheets of chart paper for each group
• 2-5 books about basketball, volleyball, soccer and baseball from the library
• 1-3 Web sites on any sports data
• 1-2 pictures or a Web site showing Six Flags

PREP FOR TEACHERS
• Teachers need to bookmark Web sites on the computers.
• Watch Math Can Take You Places and cue the videotape.
• Gather all materials needed for each group of students’ hands-on elements of the lesson. Set up pictures and books of sports and Six Flags to get the students interested.
• Prior knowledge: The students need to have a knowledge of problem-solving strategies, such as organized lists, drawing pictures and making tables. Vocabulary: range

Note:
The concept of range will be covered during this lesson. Students may need to review
the concepts prior to beginning the activities, especially if your class includes students who are acquiring English as a second language (ESL).

1. Discuss the following with the students: Sports are played at many different levels (little league, high school and professional). Most students have watched sports at some time in their lives or played sports in a PE class at school. Each sport has boundary lines. For example, at a major league or high school baseball field, the diamond is set at a 90-ft. by 90-ft. field. A little league baseball field is set at a 60-ft. by 60-ft. field.

When you go out of bounds in most sports, there is some type of penalty. Just like at school, there is a penalty for going outside the boundary of the rules.

• In basketball and soccer, the other team gets the ball.
• In softball or baseball, you might hear the umpire say “foul ball.”
• At school, you may lose recess time or a special party privilege if you step over the boundaries.

But when you stay within these boundary lines, there is a large RANGE of possibilities. Staying within the boundaries of the rules at school allows a chance for students to win awards or special treats. When you investigate problems asking for ranges, think of the problem as discovering and determining reasonable boundary lines. You will need to use multiplication as you find the upper and lower amounts based on the fixed amount of times asked in the problem.

2. Work the following example with the students. Emphasize using the chart to make it easier to find the low and high number in the range.

Example:

If the fewest number of math problems given as homework is four and the largest number of problems that would be given number is nine, then about how many problems would be given in five nights?

<table>
<thead>
<tr>
<th>Input</th>
<th>Process (times 5 nights)</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4 * 5</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>9 * 5</td>
<td>45</td>
</tr>
</tbody>
</table>

Solution: The students could be given anywhere between 20 to 45 homework problems over five nights. It can be written mathematically as “20-45.” Explain that each boundary line is the largest or smallest possible answer for that problem, but any number in between will work.

Discussion: Ask the students to name strategies they use to solve difficult problems; i.e., problem-solving strategies, such as organizing lists, drawing pictures and making tables.

LEARNING ACTIVITIES

1. Say: “A new game center is getting ready to open. First, the owners of the game center need to determine how many of each game they can fit in the building. They must determine a range of space needed inside the building for each type of game since some require more space than others. The main games they need to situate are the following: ski simulators, bumper cars, motorcycles, basketball goals and baseball batting cages. The amount of space needed for each game is listed below. What are the possible ranges for the space needed to fit each of the games?
2. The students will work in small groups to determine the possible range of space for specific sections of the game center. Each group will be given two different games of which to find the range. Each group will be instructed to:

   a. Draw a triangle-shaped field and write a boundary on the sidelines.
   b. Work the problem out on chart paper showing the problem in a table format as in the example above.
   c. Write an equation that defines the situation.

When the groups are finished calculating, have them explain their steps, the number sentences/equations they used and what the reasonable range would be for the amount of room needed for their game.

For example: The number of ski simulators is \( y = 21x \) where \( x \) is the number of simulators. The range is \( \{1, 2, \text{ and } 3\} \). Therefore the reasonable range for this is between \((1 \cdot 21) = 21\) and \((3 \cdot 21) = 63\) sq. ft.

The chart includes the following: games, the least and greatest numbers of each game that might be put in the game room and the area needed for each one.

<table>
<thead>
<tr>
<th></th>
<th>Least #</th>
<th>Most #</th>
<th>Space needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ski simulators:</td>
<td>1</td>
<td>3</td>
<td>21 sq. ft each</td>
</tr>
<tr>
<td>Bumper cars:</td>
<td>6</td>
<td>10</td>
<td>18 sq. ft each</td>
</tr>
<tr>
<td>Motorcycles:</td>
<td>3</td>
<td>6</td>
<td>12 sq. ft each</td>
</tr>
<tr>
<td>Baseball batting cages:</td>
<td>1</td>
<td>4</td>
<td>43 sq. ft each</td>
</tr>
<tr>
<td>Basketball goals:</td>
<td>3</td>
<td>5</td>
<td>35 sq. ft each</td>
</tr>
<tr>
<td>Skee-Ball:</td>
<td>4</td>
<td>6</td>
<td>15 sq. ft each</td>
</tr>
<tr>
<td>Air hockey:</td>
<td>2</td>
<td>4</td>
<td>7 sq. ft each</td>
</tr>
<tr>
<td>Foosball:</td>
<td>2</td>
<td>7</td>
<td>6 sq. ft each</td>
</tr>
</tbody>
</table>

Groups:
- Ski Simulators/ Foosball
- Bumper cars/ Air Hockey
- Motorcycles/ Basketball Goals
- Baseball Batting Cages/ Skee-Ball

Answers:
- Ski Simulators: 21 to 63 sq. ft.
- Bumper Cars: 108 to 180 sq. ft.
- Motorcycles: 36 to 72 sq. ft.
- Baseball Batting Cages: 43 to 172 sq. ft.
- Basketball Goals: 105 to 175 sq. ft.
- Skee-Ball: 60 to 90 sq. ft.
- Air Hockey: 14 to 28 sq. ft.
- Foosball: 12 to 42 sq. ft.

**CULMINATING ACTIVITY** As a group, discuss the possible answers. Have the students write in words the steps used to calculate a range, given a set of data.
LESSON 24
“Courts and Bounds”
Yvonne Garcia

CROSS-CURRICULAR EXTENSIONS

Art
Illustrate what the game room might look like using construction paper and markers.

Science
Conduct an experiment testing the temperature ranges of different liquids. For example, take the temperature of water. Then, add ice. Later, heat the water. Make a chart that lists the low and high temperatures. Test other safe liquids to see if they react in the same way.

REAL-WORLD CONNECTIONS

Students can do projects where they interview managers of businesses, such as department stores and fast-food places, to find the ranges that they use to predict how much inventory to purchase for certain holidays.

ASSESSMENT

Students will be evaluated using the “Range Assessment” handout. The solutions are listed below.
1) 144 to 270
2) 504 to 1008
3) $6 to $17
4) $10.20 to $17.10
5) 420 to 980
6) $6.80 to $11.96
7) $6 to $63.92
8) B) between 10 hours and 17 hours. The range is from 10 hours 30 minutes to 17 hours 30 minutes

STUDENT HANDOUTS

“Range Assessment”
Range Assessment

1) Bryce shoots baskets after school each day. Bryce normally shoots 30 shots a day, and at least makes 16 baskets each day. What is a reasonable range of the number of baskets Bryce will make in 9 days?

2) Jennifer is making chocolate chip cookies to bring for the school-wide end-of-the-year party. Each day she makes 3 dozen cookies. She decided that she would either bake for 2 weeks or 4 weeks. What is a reasonable range of the amounts of cookies she will make in these amounts of time?

3) Logan went to the store to buy some stickers. He saw that some fishing stickers were on sale for $1.50 a pack. But there were others that were big and had a lot of glitter and they cost $4.25 a pack. If he wanted to buy 4 packs to share with his friends at school, then what is the range of money he would need to save?

4) A new ice cream shop opened in town. Valerie was there on the first day. She wanted to buy 6 sundaes to share with friends. She saw that 1 scoop would only cost $1.70, but 3 scoops would cost $2.85. What is the range of the amount of money she will need to pay for everyone if she does not know which one they will want?

5) Every day at practice Jared throws a football. The least amount Jared has ever thrown in a practice is 30 times. The most Jared has ever thrown is 70 times. What is the most reasonable range of times he would throw in 14 days of practice?

6) Brooke wanted to give one soda to each person in her class at the Christmas party. Her mother said that she would need to know a range of the amount of money she would need to give Brooke. There were 24 students in the class. When Brooke was at the store, she saw that the generic brand was 6 for $1.70, and the name brands were 6 for $2.99. What range should she give her mom?

7) When looking on the Internet, Jared saw that posters of professional football and soccer athletes were on sale. The small ones cost $0.75 each and the large ones cost $7.99. Since he just received his birthday money, he wanted to buy 8 posters. What is the range of the amount of money he needs to have when purchasing the 8 posters?

8) Each day Shannon and her mom spend from 30 to 50 minutes making cards for Valentine’s Day. After 3 weeks, what is a reasonable total of the amount of hours they will spend making cards?

A) Between 5 hours and 9 hours 
B) Between 10 hours and 17 hours 
C) Between 500 minutes and 900 minutes 
D) Between 630 minutes and 1,050 minutes
Range Assessment
Answer Key

1. 144 to 270
2. 504 to 1008
3. $6 to $17
4. $10.20 to $17.10
5. 420 to 980
6. $6.80 to $11.96
7. $6 to $63.92
8. B) between 10 hours and 17 hours The range is from 10 hours 30 minutes to 17 hours 30 minutes
Nombre_______________________________________________     Fecha____________________

Evaluación de los Límites

1. Bryce tira al cesto después de la escuela todos los días. Normalmente, Bryce tira 30 cestos por día, y por lo menos hace 16 cestos por día. ¿Cuáles serían los límites de canastas razonables que Bryce haría en 9 días?

2. Jennifer está preparando galletitas de chocolate para llevar a la fiesta de fin de año de la escuela. Cada día prepara 3 docenas de galletitas. Ella decidió prepararlas en 2 ó 4 semanas. ¿Cuál sería la escala razonable de galletitas, para un tiempo de 2 ó 4 semanas?

3. Logan fue a la tienda para comprar figuritas adhesivas. Vio algunas de peces en oferta por $1.50 el paquete. Pero había otros que eran grandes con mucho brillo que costaban $4.25 el paquete. Si él quisiera comprar 4 paquetes para compartir con sus amigos en la escuela, cuáles serían los límites de ahorro de dinero que necesita hacer?

4. Una nueva heladería se abrió en la ciudad. Valerie estuvo allí el primer día. Quería comprar 6 helados para compartir con sus amigas. Vio que con una bola sola costaban solamente $1.70, pero con 3 bolas costaban $2.85. ¿Cuáles son los límites de dinero que ella necesitará para pagar por todos si ella no sabe lo que ellos van a elegir?

5. Todos los días de práctica Jared hace un tiro de pelota de fútbol. La menor cantidad de tiros que Jared ha hecho en una práctica es 30 veces. La mayor cantidad que Jared ha tirado es 70 veces. ¿Cuáles serían los límites de tiros razonables que tiraría en 14 días de práctica?

6. En la fiesta de Navidad, Brooke quería dar una soda a cada persona de su clase. Su mamá, para darle el dinero, le dijo que necesitaba tener una escala del dinero que necesitaría. Había 24 estudiantes en la clase. Cuando Brooke estuvo en la tienda, vio que la marca genérica costaba $1.70 por 6 botellas, y que las de nombres de marca costaban $2.99. ¿Qué límites de dinero debe darle a su mamá?

7. Cuando Jared estaba mirando en la Internet, vio que los carteles de los jugadores profesionales de fútbol americano y los atletas de fútbol Sudamericano (soccer) estaban en oferta. Los pequeños costaban $0.75 cada uno y los grandes $7.99. Como justamente había recibido dinero en su cumpleaños, quería comprar 8 carteles. ¿Cuáles son los límites de dinero que necesita tener para comprar 8 carteles?

8. Todos los días Shannon y su mamá pasan juntas de 30 a 50 minutos haciendo tarjetas para el Día de San Valentine. Después de 3 semanas, ¿cuál sería el total de horas razonable que pasarian juntas haciendo tarjetas?

   A) Entre 5 horas y 9 horas          C) Entre 500 minutos y 900 minutos
   B) Entre 10 horas y 17 horas        D) Entre 630 y 1,050 minutos
LESSON 25
“Out to Lunch”
by Sonya Cook

**CONCEPT AREA**  Domain/Range/Reasonableness

**GRADE LEVEL**  6

**TIME ALLOTMENT**  Two 60-minute sessions

**LESSON OVERVIEW**  Students will plan family outings to several local restaurants and estimate the cost of feeding families of various sizes.

**LESSON ACTIVITIES OVERVIEW**  Students will work in groups using menus from different restaurants to determine a reasonable cost for ordering an appetizer, an entrée for each adult, a kids’ meal for each child, a dessert and drinks. The groups will then compare prices of the cost of the meal with other groups.

**LEARNING OBJECTIVES**  Students will be able to:
- Demonstrate how mean, median and mode are used to describe what is “typical” in a set of data.
- Demonstrate how a reasonable total can be determined by using mean, median or mode.
- Use range to determine how much money can be saved by choosing the least expensive meal compared to the most expensive meal.

**MEDIA COMPONENTS**

- Video: *Math Can Take You Places* #005 “Patterns”
- Internet:
  - Sample restaurant menus:
    - American favorites
      - [www.chilis.com](http://www.chilis.com)
    - Mexican food
      - [www.ontheboarder.com](http://www.ontheboarder.com)
    - Italian food
      - [www.olivegarden.com](http://www.olivegarden.com)
    - Indian food
      - [www.claypit.com](http://www.claypit.com)
    - Chinese food

**MATERIALS**
- Restaurant menus
- Pencil
- Paper
- Calculators

**PREP FOR TEACHERS**
- Organize groups
- Gather menus
- Determine necessary modifications, such as omitting some items on the menus to reduce the number of choices

**Note:**
The following concepts will be covered during this lesson: *mean*, *median*, *mode* and *range*. Students may need to review the concepts prior to beginning the activities.
LESLSSON

**“Out to Lunch”**
by Sonya Cook

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

### INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Students will look at the arrangement of a menu from a restaurant and locate the appetizers, main entrées, desserts and drinks.

2. Discuss with students what a family must think about before going out to a restaurant. They should say the family must make sure it has enough money to pay for the meal.

### LEARNING ACTIVITIES

1. Students use the “Food List” handout to make a list of the prices of the appetizers and decide how to determine a “typical cost” for an appetizer. Students should use mean, median or mode to describe a “typical cost” for the appetizer.

2. Students make a list of the prices of the main entrées and decide how to determine a “typical cost” for a main entrée. Students should use mean, median or mode to describe a “typical cost” for the main entrées. Students will need to include an entrée for each adult.

3. Students will make a list of the prices of the kid’s meal to determine a “typical cost” for the kid’s meals. Students should use mean, median or mode to describe a “typical cost” for the kid’s meal. Students will need to include a kid’s meal for each child.

4. Students will make a list of the prices of the drinks to determine a “typical cost” for drinks. Students should use mean, median or mode to describe a “typical cost” for drinks. Students should include a drink for every person at the table unless it is included in the kid’s meal.

5. Students will make a list of the prices of the desserts to determine a “typical cost” for desserts. Students should use mean, median or mode to describe a “typical cost” for a dessert.

6. Students write a number sentence to show how the cost of the meal could be determined.
   - Groups share their totals and discuss which restaurant is most expensive for the family and which restaurant is least expensive, as well as how they arrived at their solutions.
   - Students write a number sentence to figure how much money would be saved by eating at the least expensive restaurant compared to the most expensive restaurant.

### CULMINATING ACTIVITY

1. Introduce the culminating activity by watching *Math Can Take You Places* video #005 “Patterns.” **Cue** the video from right before Chef Koval asks, “How much is the eight-ounce piece of beef going to cost me?” right after the blue chart leaves the screen. Ask students to listen closely to Chef Koval, and to be able to name at least one thing that he mentions that they should consider when creating a menu. **Play** the video, stopping when Chef Koval says, “Your math has to be right or you’ll be losing money.” One of the responses should refer to how expensive the ingredients are and how that would affect the cost of an entrée. If you would like, allow students to use grocery store Web sites to check the prices of key ingredients for their entrées to help determine pricing. For example, they can search by keyword on [www.albertsons.com](http://www.albertsons.com) under “Browse our online store.”
2. Students create their own restaurant menus; including appetizers, main entrées, kids’ meals, desserts and drinks. The teacher must set a maximum and minimum number of items for each category.

2. Students determine a reasonable cost for feeding families of varying sizes (seen on student handout). Students write a number sentence to determine a reasonable cost for feeding the family.

3. Students determine the most expensive and least expensive costs for feeding families of varying sizes (seen on student handout). Students write a number sentence to determine how much money they would save by ordering the least expensive meal.

**CROSS-CURRICULAR EXTENSIONS**

Social Studies
Students read Everybody Cooks Rice by Norah Dooley. Students research foods consumed in different cultures and prepare a sample menu of foods from a restaurant that serves foreign cuisine.

Language Arts
Students do recipe writing including a how-to paper on cooking their favorite meal. Students include the price of the ingredients necessary to prepare the food and determine a price they would put on the menu in a restaurant.

**REAL-WORLD CONNECTIONS**

Watch the video, Math Can Take You Places “Patterns”, featuring an interview with Chef William Koval at the Adolphus Hotel. Focus on the interview segments. As a class, list all of the different ways a chef would use mathematics.

**ASSESSMENT**

Have students use the menus they created to calculate the least and most a family of two parents and three kids could spend on a meal. Observe closely for proper use of vocabulary and strategies.

**STUDENT HANDOUTS**

- “What’s On the Menu?” worksheet
- “Food List” handout
“What’s on the Menu?”

You will create a menu for a new restaurant you are opening in town. You may want to survey friends and family members to find out what kinds of foods they enjoy eating at a restaurant. Also determine what they consider to be the “typical” price of that item. Record that information, as you will later calculate the mean, median and mode of those prices to determine what is considered the “typical” price. You can also use the Internet to research menu prices. This may help you decide what items to put on the menu of your new restaurant.

Working with your group, set up the problem by first creating a menu that includes at least four appetizers, five main entrées, three kid’s meals, four desserts and three drinks. Each menu item must reflect the price that best describes the typical cost of the item, which will be the mean, median or mode. Your group must determine the price of each item on the menu and create the menu. (Point Value – 30)

Next, your group will determine the typical cost for feeding a family of five. The family includes three adults and two children under age 12. Each person will order an entrée or kids’ meal and a drink. The table will share an appetizer and a dessert. Applying problem-solving strategies, show two different approaches to solve this problem. Include proper units and label[s?] on your solution. (Point Value – 40)

Determine the most expensive and least expensive costs for feeding this family. Write a number sentence that shows each cost. (Point Value – 20)

Determine how much money you will save by ordering the least expensive meals. Write a number sentence that shows how this can be determined. (Point Value – 10)
# Lesson 25

## “Out to Lunch”

by Sonya Cook

## Food Lists

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## Kid’s Meals

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*travelocity*
### Desserts

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## Lesson 25
“Out to Lunch”
by Sonya Cook

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Nombre__________________________________________________ Fecha____________________

“¿Qué Hay en el Menú?”

Vas a crear un menú para un restaurante nuevo que estás abriendo en la ciudad. Pregúntales a tus amigos y a miembros de tu familia qué clase de comida les gusta comer cuando van a un restaurante. También pregúntales lo que ellos consideran un precio “típico” para esas comidas. Registra la información para que más tarde calcules el promedio, la mediana y el valor más frecuente o modo de esos precios para determinar lo que se considera un precio “típico”. También puedes usar la Internet para investigar los precios de los menús. Esto te podría ayudar a decidir qué comidas poner en el menú de tu nuevo restaurante.

Trabajando con tu grupo, establece el problema creando primero un menú que incluya por lo menos cuatro aperitivos, cinco entradas principales, tres comidas para niños, cuatro postres y tres bebidas. Cada menú debe reflejar el precio que mejor se adapta al costo típico de ese producto, que serán el precio promedio, la mediana y el valor más frecuente o modo. Tu grupo debe fijar el precio para cada producto en el menú y debe crear el menú. (Valor en puntos – 30)

Luego, tu grupo debe determinar el precio típico para alimentar a una familia de cinco. La familia incluye tres adultos y dos niños menores de 12 años. Cada persona ordenará una entrada o un plato para niños y una bebida. La mesa compartirá un aperitivo y un postre. Aplicando las estrategias de resolución de problemas, muestra dos maneras diferentes de resolver este problema. Incluye etiquetas y unidades apropiados en tu solución. (Valor en puntos – 40)

Determina la manera más cara y la más barata de alimentar a esta familia. Escribe una oración numérica para mostrar cada gasto. (Valor en puntos – 20)

Determina cuánto dinero ahorrarás ordenando las comidas más baratas. Escribe una oración numérica que muestre cómo puedes determinar esto. (Valor en puntos – 10)
Listas de Comida
Aperitivos

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Lección 25
“Salir a Almorzar”
by Sonya Cook

Entradas

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*travelocity*
Comidas para Niños

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“Salir a Almorzar”  
by Sonya Cook

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LECCIÓN 25

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Math Can Take You Places

Te Lleva a Muchos Lugares

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travelocity

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KERA

UNLIMITED

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4
### Postres

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## Math Can Take You Places
### Games and Activities

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<td>6. Pop It, No Stop It</td>
<td>5-6</td>
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<td>1. Weigh Too Much</td>
<td>4-6</td>
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<td><strong>Patterns</strong></td>
<td>3. Name That Pattern</td>
<td>5-6</td>
</tr>
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<td></td>
<td>12. Travel and Patterns</td>
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<tr>
<td><strong>Problem Solving</strong></td>
<td>16. Vacationing in Texas (6th grade)</td>
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<td>17. Vacationing in Texas (5th grade)</td>
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<td>19. Vacationing in Texas (4th grade)</td>
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<td>14. Check It Out</td>
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<tr>
<td><strong>Domain/Range/Reasonableness</strong></td>
<td>18. Total Trekkers</td>
<td>4-5</td>
</tr>
<tr>
<td></td>
<td>7. The Golf Game</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>13. Estimation Math Libs</td>
<td>4-5</td>
</tr>
</tbody>
</table>
Objective: Students will estimate the weights and masses of items that will be packed for a vacation. The objective is to select items that come closest to the specified weight limit without going over.

Number of students: Students will work in groups of four.

Materials:
- Scale that measures pounds
- Scale that measures ounces
- Balance that measures grams
- Balance that measures kilograms
- Measurement Conversion Chart
- Recording sheet
- Items that would be used on a camping trip
  - Sleeping bags
  - Snack foods with the weights on the labels covered
  - Toiletries (toothbrush, toothpaste, comb/brush, blow dryer, curling irons, soap, shampoo, etc.)
  - Backpacks
  - Luggage
  - Books and magazines
  - Clothes
  - Electronics (Walkmans, DVDs/CDs, video games, etc.)
  - Other objects appropriate for vacationing

Steps:
Step 1: Your group is going on a camping trip. Your assignment is to select the necessary items that you will pack for the trip.

Step 2: Your group cannot pack more than 18 pounds per person, or a maximum of 72 pounds.

Step 3: You will start by weighing one object, such as a tube of toothpaste. Write down the mass or weight.

Step 4: Select other objects and estimate the mass or weight using your original object as a point of reference. Each person in your group can hold each object in order to help estimate the weight. Do not weigh the other objects your group has selected at this point.

Step 5: Once you have selected all of the objects for your group’s trip, your teacher will tell you the actual weights and masses of the items on your list. Record that information. The group closest to the goal weight wins.

Step 6: Students will write a summarization of this activity, explaining why they selected certain items, how much they were off in their estimates, what they learned from this experience and how they can use this experience to help estimate weights and masses in the real world.
ACTIVITY 1
Weigh Too Much

Extensions/Modifications:

- For real-world application, have students brainstorm different situations in travel where the weight of objects matters. For example, the weight of the luggage on a plane determines how high it can fly, etc.

- Allow students to weigh their own objects or weigh them as a class once the groups have chosen their items and written down their estimated mass.
Objective: Students will achieve the lowest possible score by adding the remaining numbers.

Number of players: Students can play in pairs or in groups of four.

Materials:
- A game board for each player
- Two number cubes
- Calculators
- Sets of space markers, such as beans, color counters or centimeter cubes

Steps:
Step 1: Roll one number cube to see who goes first. The player with the highest roll goes first.

Step 2: The first player rolls both number cubes. The player then has the option of either covering up each of the numbers on the dice or using the two numbers in an addition, subtraction, multiplication or division problem to create one number on the game board. The player covers the number on his/her game board.

Step 3: Play continues with the next player in a clockwise direction.

Step 4: Players continues to cover numbers for ten rounds.

Step 5: Each player adds up the uncovered numbers. The player with the lowest score is the winner.

Extensions/Modifications:
- Allow students to devise creative ways to incorporate fractions or exponents.
- Use blank number cubes to encourage students to create game boards that would allow them to play the game with three dice instead of two, adding in the use of parentheses.
<p>| | | | | |</p>
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<tr>
<td>18</td>
<td>9</td>
<td>8</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>
ACTIVITY 3
Name That Pattern

Objective: Students will determine the fraction in lowest terms that generated each set of equivalent fractions.

Number of students: Students can work in pairs or in small groups of up to two players per team.

Materials:
- Name That Pattern Fraction Card
- Name That Pattern Cover Slip
- Pencil/paper
- Timer

Steps:
Step 1: Choose a Fraction Card. Insert the strip into the Cover Sheet so that it is able to slide back and forth.

Step 2: Begin by pulling out the Fraction Card, so that only the first fraction is showing.

Step 3: Set the timer for one minute. In that amount of time, Player 1 must determine the fraction in lowest terms that generated the other equivalent fractions.

Step 4: Player 2 controls the Fraction Card. Whenever Player 1 says, “Next,” Player 2 slides the Cover Sheet to reveal the next fraction in the pattern. For each fraction in the pattern revealed, Player 1 gets one point added to his/her score.

Step 5: At the end of the minute, if Player 1 has not figured out the pattern, Player 2 reveals the answer, which is the last fraction on the card. Player 1 gets 5 points automatically, and his/her turn is over.

Step 6: Player 2 now chooses a new Fraction Card and proceeds to play as directed.

Step 7: The game ends when all of the cards have been used.

Step 8: The player with the highest score at the end of the game loses.

Extensions/Modifications:
- Players can choose fractions and create their own equivalent Fraction Cards.
- Shorten or lengthen the one-minute playing time to adjust the level of difficulty.
<table>
<thead>
<tr>
<th>Answer</th>
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<tr>
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<tr>
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<td>30</td>
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<tr>
<td>18</td>
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<td>40</td>
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<tr>
<td>8</td>
<td>12</td>
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<td>---------</td>
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</tr>
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<td>$\frac{3}{4}$</td>
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<td></td>
</tr>
<tr>
<td>$\frac{18}{24}$</td>
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</table>
ACTIVITY 4
Let’s Make Ice Cream

Objective: Students are to make an individual portion of ice cream, but the exact measurement tools will not be available to each pair. They will have to use 1/8 cup, 1/4 cup or others while they find the equivalent measures of the ingredients. Students in some pairs may be asked to increase their amounts, so that two or four servings will be made to share with other teachers and students. This is a real-world use of fractions, ratios and measurement.

Number of students: Students can work in pairs.

Materials:
• 1/2 cup half-and-half
• 1/2 teaspoon of vanilla extract or favorite flavoring
• 1 tablespoon of granulated sugar
• 4 cups of crushed ice
• 1/4 cup of rock salt
• Plastic sandwich bag that seals airtight
• Plastic quart size bag that seals airtight
• Plastic spoon (for tasting)

Steps: Students will make changes to their recipes based on the measurement tools to which they have access. They will record the changes and present them to the teacher or helper, who will assess the correctness accuracy of their recipes before mixing begins. Students will follow their correct recipe (amount of ingredients) and complete their ice cream making!

Step 1: Mix the milk, vanilla and sugar in the sandwich-size bag. Remove as much air as possible and seal tightly.
Step 2: Place sandwich bag inside the quart size bag. Fill quart-size bag with ice and sprinkle rock salt on top of the ice. Remove as much air as possible and seal tightly.
Step 3: Now shake, shake, shake for ten to 15 minutes.
Step 4: Enjoy your ice cream.

Extensions/Modifications:
• Students may bring in their favorite recipes and have the class adjust the portions or servings as needed.

• Ask the Manager at your school’s cafeteria to share recipes he or she may use to feed hundreds of students, and adjust the recipes to feed a small family.
Objective: Students will investigate perimeter and area by measuring maps. Students will record and graph data. Students will make observations about how perimeter and area change when multiplied by a scale factor.

Number of students: Students can work in pairs.

Materials:
- Recording sheet
- Large 1-inch grid paper
- Fold-up city or state maps

Steps:
Step 1: Start with the map completely folded. Measure the length and width of the map to the nearest inch and record that information on the recording sheet. Find the perimeter of the folded map. Record the perimeter of that map on the recording sheet.

Step 2: Trace the map on the 1-inch grid paper. Estimate the area of the folded map by counting the number of 1-inch squares. Record the area of the map on the recording sheet. The units for area are square inches.

Step 3: Next, unfold the map so that the length is twice as long as the original length. Then unfold the map so that the width is twice as long. Trace the map on the 1-inch grid paper.

Step 4: Now it is time to make a prediction. How long is the new perimeter? How many square inches is the new area? Write your prediction on the recording sheet. Share your predictions with at least two other students in the class.

Teacher Note: After a few minutes, have a class discussion about the predictions, allowing students to explain their reasoning.

Step 6: Find the new perimeter and area and write that information on the recording sheet.

Step 7: Unfold the map so that the new length is three times as long as the original length and the width is three times as long as the original width. Make your prediction about the new length, width, perimeter and area.

Step 8: Trace the unfolded map on the 1-inch grid paper and record the new measurements on the recording sheet.

Step 9: Can you find a pattern for each measurement? Write an explanation about how each new length, width, perimeter and area compares to the original measurements of the folded map. Discuss your ideas with two other students.

Teacher Note: Students should conclude that as the length and width change by a given scale factor, the perimeter changes by the same scale factor. However, as the length and width increase by a scale factor, the area changes by that scale factor squared or by that scale factor times itself.
ACTIVITY 5
Mapping Perimeter and Area

Let’s say the original length is 2 inches and the original width is 3 inches.

Perimeter = 2(2 inches + 3 inches)
Perimeter = 10 inches or 1(10 inches)

Area = 2 inches · 3 inches
Area = 6 square inches or $1^2 \cdot (2 \cdot 3)$

If the length and width will increase by a scale factor of 2 when the map is unfolded the first time, the new dimensions are as follows:
Length = 4 inches and the Width = 6 inches

Perimeter = 2(4 inches + 6 inches)
Perimeter = 20 inches or $2(10\text{ inches})$

Area = 4 inches · 6 inches
Area = 24 inches or $2^2 \cdot (2 \cdot 3)$

If the length and width will increase by a scale factor of 3 when the map is unfolded the first time, the new dimensions are as follows:
Length = 6 inches and the Width = 9 inches

Perimeter = 2(6 inches + 9 inches)
Perimeter = 30 inches or $3(10\text{ inches})$

Area = 6 inches · 9 inches
Area = 54 inches or $3^2 \cdot (2 \cdot 3)$

Extensions/Modifications:
To clarify the scale factor, have students create charts that list the length, width, perimeter and area of the map at the different stages.
**ACTIVITY 6**  
**Pop It, Now Stop It!**

**Objective:** Students will practice estimating volume in cubic units.

**Number of students:** Students can work in groups of four.

**Materials:**
- 75 linking centimeter cubes per group (Number can vary.)
- Pencil/paper
- 1 file folder per group
- Chart paper (optional)

**Steps:**

**Step 1:** The teacher should divide the students into groups, and assign each group a name.

**Step 2:** Each group gets 75 centimeter cubes in a container.

**Step 3:** When the teacher says, “Pop it!” the groups will have 5 minutes to use the cubes they have to create a geometric solid figure using as many of the 75 cubes as they would like.

**Step 4:** When time is up, the teacher says, “Pop it, now stop it!” The groups must then quietly put any leftover cubes out of view behind the erected file folder.

**Step 5:** Each group then chooses a “Host” to walk around and display its figure, so that all of the groups can see it clearly. The role of “Host” should rotate throughout the groups.

**Step 6:** As a team’s “Host” walks around, the other teams should work together to try to estimate the volume of the figure to the nearest cubic centimeter.

**Step 7:** The team that comes the closest wins a point. The score should be tracked on the board or on chart paper.

**Step 8:** Then, the next team sends its “Host” around with its figure. The other teams make an estimate and the team that gets closest wins a point.

**Step 9:** Repeat the process any number of times. The team with the most points wins.
ACTIVITY 7
The Golf Game

Objective: The students’ goal is to make their way down a fairway without overshooting the greens.

Number of students: Students can play in pairs or in groups of four.

Materials:
• Spinner
• Map of the golf course
• Score card
• Each player needs nine game pieces (centimeter cubes) of the same color.
• Paper and pencil

Steps:
Step 1: Spin the spinner. The person with the highest number goes first. Each player should have a score card.

Step 2: Look at the description of the first hole. How far is it to the flag? You will have a maximum of four strokes to reach the hole.

Step 3: Spin the spinner and record this number on the recording sheet.

Step 4: Choose a club. This can be any factor between 1 and 9. Once you choose a club, you can not change that number.

Step 5: Multiply the number of your club by your spin; this is the total distance of your first drive. Record that product or distance on your score card. Play continues with the golfer sitting to your left. That person will spin, choose a club and record the distance of his or her first drive (product) on his or her score card.

Step 6: On your next stroke, spin, choose a club and find the product. Add that product to the total on your first turn. Record this total under the column that says “Total after second stroke.” Play continues with each golfer.

Step 7: The golfer who is closest to the flag after four strokes or fewer, without going over, wins the hole. Place your game marker on that green to show that you won that hole. The person who wins the most holes wins the game.

Example:
• The first player rolled a 6.
• He chose a 9 iron to use.
• $6 \times 9 = 54$ yards. He recorded 54 yards on his recording sheet.
• Player 2 goes. Play continues until someone reaches or is closest to the green, without going over.

Extensions/Modifications:
Teachers or students can create their own spinners with larger or smaller numbers, decimals, or fractions.
**RULES:**

1. Spin the spinner. The person with the highest number goes first. Each player should have a scorecard.
2. Look at the scorecard. How far is it to the hole? For example, the first hole is 157 yards away. You will have a maximum of four strokes to reach each of the holes.
3. Spin the spinner and record the number on scratch paper.
4. Choose a club. This can be any factor between 1 and 9.
   Once you choose, you cannot change that number.
5. Multiply your club by your spin; this is the total distance of your first drive. Record that distance (product) on your scorecard.
   Play continues with the golfer sitting on your left. That person will spin, choose a club, and record the distance (product) of his or her first drive on their scorecard.
6. On your next stroke, spin, choose a club and find the product. Add that product to the total on your first turn. Record this total under the column that says "Total after second stroke." Play continues with each golfer.
7. The golfer who is closest to the flag after four strokes or fewer, without going over, wins the hole. Place your game marker on that green to show that you won that hole. The person with the most holes wins the game.
## The Golf Game

<table>
<thead>
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<th>Hole</th>
<th>Distance (yards)</th>
<th>Total after Drive 1</th>
<th>Total after Stroke 2</th>
<th>Total after Stroke 3</th>
<th>Total after Stroke 4</th>
<th>Did you win this hole? Yes or No</th>
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<tbody>
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The Golf Game

Spinner

The Golf Game

Game Pieces
THE GOLF GAME

MAKE YOUR OWN SPINNER

THE GOLF GAME
Objective: The student will assemble a three-piece puzzle, matching the equivalent forms of rational numbers.

Materials:
- Timer
- Puzzle pieces

Number of students: Students can work in pairs.

Steps:
The teacher should make a copy of the puzzle pieces before they are cut out to use as the key.

Step 1: The teacher passes out the timer and puzzle pieces. Students decide which player will begin as the timekeeper and who will assemble the puzzle.

Step 2: The players choose one of the six sets and spread each of the 12 pieces out separately face up. Shuffle the puzzle pieces around on the playing area.

Step 2: Ready, set, go. The player tries to place puzzle pieces into sets of three, matching the equivalent decimal, fraction and percent forms of the number. For example, \( \frac{1}{2} \) would equal .5 and 50%.

Step 3: The timekeeper keeps time to see how long it takes the player to put all 12 pieces together into their matching sets of three. Each player should track his or her own score on scratch paper.

Step 5: The two students then switch roles.

Step 6: Play begins again, with the roles switched, using one of the different sets.

Step 7: The student with the best total time at the conclusion of play is the winner. Students can play as many or as few rounds as time permits.

Extensions and Modifications:
- Have students create pictorial representations of the puzzles they generate, and produce a chart.
- For early or struggling learners, limit the number of puzzle pieces the students are required to use. For example, remove the percent pieces from each set to make the puzzles easier.
- For advanced learners, the students could match the three equivalent sets, then have to place them in order from greatest to least or least to greatest.
<table>
<thead>
<tr>
<th>Set 3</th>
<th>Set 3</th>
<th>Set 4</th>
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<td>(\frac{7}{50})</td>
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</tbody>
</table>
ACTIVITY 9
Equivalency Sentence Match

Objective: Students will match word problems to equation strips. Students will then solve the equation for the missing quantity that makes the equation true.

Number of students: Students work in pairs, or four students work in pairs of two.

Materials:
- Equivalency Sentence Match word problem cards
- Two identical stacks of laminated equation strips with one stack labeled “Blue” and the other stack labeled “Red”
- White board markers
- Pencil and scratch paper

Steps: One team will get the Blue stack of equation strips and the other team will get the Red stack.

Step 1: The word problem cards should be shuffled and placed face up in the center of the table.

Step 2: Each team’s equation cards will be stacked in front of them face up.

Step 3: The first player will select a word problem card; all players must be able to see and read the card.

Step 4: The team members will pick up an equation strip and look to see if it matches the situation on the word problem card. If not, they will place it face down, creating a separate stack.

Step 5: The first team to identify the correct equation card and fill in the solution wins the word problem card.

Step 6: The team with the most word problem cards at the end wins the game.

Extensions/Modifications:
- Allow students to create their own word problem cards and equations strips.
### Equivalency Sentence Match

<table>
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<tr>
<th>288 - 288 = 57</th>
<th>288 - 288 = 57</th>
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</thead>
<tbody>
<tr>
<td>57 + 57 = 345</td>
<td>345 + 57 = 345</td>
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<tr>
<td>231 + ________ = 288</td>
<td>231 + ________ = 288</td>
</tr>
<tr>
<td>288 - 57 = _______</td>
<td>288 - 57 = _______</td>
</tr>
<tr>
<td>345 + ________ = 633</td>
<td>345 + ________ = 633</td>
</tr>
<tr>
<td>_______ - 288 = 345</td>
<td>_______ - 288 = 345</td>
</tr>
<tr>
<td>345 - _______ = 288</td>
<td>345 - _______ = 288</td>
</tr>
<tr>
<td>288 + 432 = _______</td>
<td>288 + 432 = _______</td>
</tr>
<tr>
<td>_______ - 432 = 288</td>
<td>_______ - 432 = 288</td>
</tr>
<tr>
<td>432 - 144 = _______</td>
<td>432 - 144 = _______</td>
</tr>
</tbody>
</table>
# Equivalency Sentence Match

<table>
<thead>
<tr>
<th>Equation 1</th>
<th>Equation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>432 - _____ = 144</td>
<td>432 - _____ = 144</td>
</tr>
<tr>
<td>432 = _____ + 144</td>
<td>432 = _____ + 144</td>
</tr>
<tr>
<td>345 = 402 - _____</td>
<td>345 = 402 - _____</td>
</tr>
<tr>
<td>_____ + 57 = 402</td>
<td>_____ + 57 = 402</td>
</tr>
<tr>
<td>_____ - 57 = 288</td>
<td>_____ - 57 = 288</td>
</tr>
<tr>
<td>633 = _____ + 144 + 144</td>
<td>633 = _____ + 144 + 144</td>
</tr>
<tr>
<td>_____ = 633 + 345</td>
<td>_____ = 633 + 345</td>
</tr>
<tr>
<td>1,035 = _____ + 57</td>
<td>1,035 = _____ + 57</td>
</tr>
<tr>
<td>_____ - 978 = 57</td>
<td>_____ - 978 = 57</td>
</tr>
<tr>
<td>690 = 1,035 - _____</td>
<td>690 = 1,035 - _____</td>
</tr>
</tbody>
</table>
The Mitchells have only 57 miles to drive before they get home. They have already driven 288 miles today. How far away were they from home when the trip started?

Taryn is only $57 short of her goal of saving $345 for her class trip to the Grand Canyon. How much money has she saved for the trip so far?

The box Kalen is packing has a weight limit of 288 pounds. The scale says that he has already packed 231 pounds. How far off is he from the weight limit?

Ahmed raised $288 in pledges for the bike-a-thon. So far he has collected $57 from his mom and dad. The amount that Ahmed still has to collect is _________.

The dance committee sold a total of 633 tickets. 345 of those tickets were sold to students throughout the week. How many tickets were sold at the door?

The members of the Mendez family are on vacation. Their odometer reads that they have driven 288 miles. They just passed a road marker that said their destination was 345 miles away. How far will they travel?

Ian had 345 feet of tubing before he started working on a project for his grandmother. There is now 288 feet of tubing remaining. How much tubing did he use on the project?

Billy is traveling by train to see his uncle. The first city where he stopped was 288 miles away from his home. His uncle lives another 432 miles away. How far is Billy’s home from his uncle’s home?

Jesse’s class collected 432 cans for the holiday charity project. His class collected 288 fewer cans than Mrs. Ortega’s class. How many cans did Mrs. Ortega’s class collect?
Amber is reading a novel that is 432 pages long. She read 144 pages waiting for her flight and on her flight from Portland, Oregon to Dallas, Texas. How many more pages does Amber have left to read?

When the cruise ship docked in Jamaica, 432 people left the ship to explore the island. If 144 passengers have returned to the ship, how many passengers are still exploring the island?

Gayle and Trisha are running the balloon booth at the school picnic. They purchased 432 balloons and so far have inflated 144 balloons. How many balloons still need to be inflated?

Hawthorne Elementary was having a jellybean guessing contest. Jason’s guess was short by 57 jellybeans. There were actually 402 jellybeans in the jar. What was Jason’s guess?

Each year, Caton’s aunt volunteers to work a bicycle marathon for a needy cause. The marathon is a total of 402 miles. After the first day, the riders still have 345 miles to go. How far have they gone so far?

Taylor still has 288 pages to read before she can write her book report. If she read 57 pages today, how many pages long is the book?

Mr. Chang is fencing in a rectangular pen for his pets. The width of the pen is 144 feet. Mr. Chang has 633 feet of fencing. How much fencing is left if he cuts the wire that will be used for both widths of the pen?

Randi saved $633 from her first paycheck and $345 from her second paycheck. How much money has Randi saved so far if she has not made any withdrawals from her account?

Grandpa Dave said that the trip to the family reunion would be a total of 1,035 miles. But so far, the family had gone only 57 miles. How much further does the family have to drive to get to the family reunion?
Connor's committee counted 978 students that passed through the gates at the football pep rally. The attendance office said that 57 were on a field trip that day. How many students attend Connor's school?

The rail system ticket machines showed that 1,035 tickets were sold today. Of those tickets, 690 were sold before 12:00 pm. How many tickets were sold in the afternoon?
1. _____ - 288 = 57; 345
2. _____ + 57 = 345; 288
3. 231 + _____ = 288; 57
4. 288 - 57 = _____; 231
5. 345 + _____ = 633; 288
6. _____ - 288 = 345; 633
7. 345 - _____ = 288; 57
8. 288 + 432 = _____; 720
9. _____ - 432 = 288; 720
10. 432 - 144 = _____; 288
11. 432 - _____ = 144; 288
12. 432 = _____ + 144; 288
13. 345 = 402 - _____; 57
14. _____ + 57 = 402; 345
15. _____ - 57 = 288; 345
16. 633 = _____ + 144 + 144; 345
17. _____ = 633 + 345; 978
18. 1,035 = _____ + 57; 978
19. _____ - 978 = 57; 1,035
20. 690 = 1,035 - _____; 345
Objective: Students will find and justify how they determined equivalent forms of fractions.

Number of students: Students can start by working in pairs against another team and then go to one-on-one competition.

Prior Knowledge: Students must know how to make equivalent fractions using common denominators.

Materials:
- 40 Matchmaker cards (per group) **Note: Shaded regions represent the fractional part of the whole.**
- Scratch paper
- Pencil

Steps:
Be sure to make a copy of the Matchmaker cards before cutting them apart to use as a key. There are four cards in each row that all equal the same fraction and can be paired during play. There are ten rows.

Step 1: Shuffle the cards and place them one by one face up in 10 columns and 4 rows. Decide which player or team will go first.

Step 2: The first player chooses two cards that they think match. In order to keep the cards, they must prove how their match is equivalent (for example, by reducing the fractions). If the group agrees that they are equivalent, then the player keeps those two cards. If the group disagrees and can prove that the cards do not match, the cards must be returned to their original position. Play begins again with the next person.

Step 3: Play continues until all cards are paired.

Step 4: Players will receive a point for each pair that they have. If they have all four equivalent forms of a fraction, they receive two extra points. The player or team with the most points wins.

Extensions/Modifications:
- Have students play with the cards face down to add more complexity.
- At the end of the game, have students reduce the fractions or convert the fractions into decimals or percents.
<table>
<thead>
<tr>
<th>Fraction</th>
<th>Diagram 1</th>
<th>Fraction</th>
<th>Diagram 2</th>
<th>Fraction</th>
<th>Diagram 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{4}{7}$</td>
<td>![Grid 1]</td>
<td>$\frac{8}{14}$</td>
<td>![Grid 2]</td>
<td>$2 \frac{5}{8}$</td>
<td>![Grid 3]</td>
</tr>
<tr>
<td>$\frac{21}{8}$</td>
<td>![Pattern 1]</td>
<td>$\frac{42}{16}$</td>
<td>![Grid 4]</td>
<td>$\frac{14}{35}$</td>
<td>![Grid 5]</td>
</tr>
<tr>
<td>$\frac{3}{10}$</td>
<td>![Pattern 2]</td>
<td>$\frac{21}{70}$</td>
<td>![Grid 6]</td>
<td>$\frac{2}{8}$</td>
<td>![Grid 7]</td>
</tr>
<tr>
<td>$\frac{9}{36}$</td>
<td>![Grid 8]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 11
Cover Up!

Objective: Given a perimeter, students will create rectangles that will maximize the area to cover the most square-units on the game board. The goal is that students will discover a generalization for maximizing area given a certain perimeter. Secondly, students should recognize the perimeter formula of a rectangle as they work backwards from a given perimeter toward finding the length and the width.

Number of Students: Students can work in pairs or in two teams.

Materials:
• Two Cover Up game boards (one per person or team)
• Cover Up spinners or two blank number cubes marked with the numbers 2, 4, 6, 8, 10 and 12
• Cover Up game pieces or colored tiles

Steps:
Step 1: The first player will spin one spinner to see who goes first. The player with the highest number will go first.

Step 2: The player going first spins both spinners. Add the two numbers to get the perimeter. Record this perimeter on your score card. Use this perimeter to create a rectangle. Sketch the rectangle in the space marked “Sketch” on your score card. It is possible for a player to spin the same two numbers.

Step 3: Make sure that your perimeter is correct and record the area of the rectangle you created on your score card. Cover the spaces on your game board that match the sketch of the rectangle.

Step 4: The game will continue until the game board is filled or no other moves are possible.

Step 5: Each player totals the area on his or her score card or counts the number of game pieces on the game board. The student who covered the greatest area is the winner.

Extensions/Modifications:
• To add length to the game or to incorporate larger numbers, use sheets of one-inch grid paper for the playing areas and one-inch tiles to cover up the area.
• Use blank number cubes to allow students to use larger numbers.
**COVER UP!**
Team 1 Game Board

www.mathcantakeyouplaces.org
COVER UP!

Team 2 Game Board

www.mathcantakeyouplaces.org
<table>
<thead>
<tr>
<th>Numbers</th>
<th>Perimeter (Units)</th>
<th>Length</th>
<th>Width</th>
<th>Sketch</th>
<th>Area (Units²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 8</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>![Sketch]</td>
<td>2x3=6</td>
</tr>
</tbody>
</table>
COVER UP!

Extra Spinner
Objective: Students will use complete patterns represented by the average speeds of various modes of transportation. The students will complete a table and create a linear graph to represent the rate of travel for each mode of transportation. Students should recognize that the average speed is repeated as a pattern and that a relationship exists between the input values (which are the hours traveled) and the output values (which are the distances traveled).

Number of students: Students can work in pairs.

Materials:
- Student pages
- 1” graph paper
- Meter sticks
- Markers or colored pencils

Steps:
Step 1: Students will use the given speed of each vehicle and complete the pattern in each table.

Step 2: Students will write a sentence for each pattern that states the relationship between the speed and the distance traveled.

Step 3: Students will create a linear graph with the data for each mode of transportation on separate graphs. Possibly assign one mode of transportation to each group to graph.

Step 4: Once students have completed the assignment, they should answer the following questions.

1. If a vehicle were traveling at 90 miles per hour, how far would that vehicle have traveled after three hours? How do you know? (Answer: 270 miles at the end of the third mile; student explanations will vary)

2. Imagine that you were traveling. After six hours, you had traveled 420 miles, and after seven hours you had traveled 490 miles. What mode of transportation were you using? (Answer: You are riding a motorcycle.)

3. If a bus was 240 miles away from its destination and arrives at its destination in four hours, how fast was the bus traveling? (Answer: 60 m.p.h.)
# ACTIVITY 12
## Travel and Patterns

**Can Take You Places**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Hours</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
</tr>
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<tbody>
<tr>
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<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Knots</td>
<td>35</td>
<td>105</td>
<td></td>
<td></td>
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<tr>
<td>Jet</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Miles</td>
<td>525</td>
<td>1050</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Bus</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Miles</td>
<td>65</td>
<td>130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cruise Ship</td>
<td></td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Knots</td>
<td>54</td>
<td>108</td>
<td>162</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Miles</td>
<td>12</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Miles</td>
<td>70</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train</td>
<td></td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Miles</td>
<td>45</td>
<td>90</td>
<td>135</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample Graph
Race Car Travel

Distance (miles)

Time (hours)

0 1 2 3 4 5 6 7

0 100 200 300 400 500 600 700 800 900

0 1 2 3 4 5 6 7

ACTIVITY 12
Travel and Patterns
Objective: Students use estimation skills in problem-solving situations.

Number of students: Students work in groups of two.

Materials:
- Estimation Math Libs sheets (and answers)
- Pencil/paper
- Internet to research missing data

Steps:
Step 1: Each player chooses an Estimation Math Lib and does not show it to the other player.

Step 2: Player 1 starts by asking Player 2 the questions in parentheses on the Math Lib and writes the responses in the blanks.

Step 3: Player 2 then asks Player 1 the questions in parentheses on the Math Lib he/she chose and writes the responses in the blanks.

Step 4: When both Math Libs are done, each player reads them aloud. Then, each player works the word problem he/she created.

Step 5: Players choose another Math Lib each and start the process again. When all the Math Libs have been worked, players use the answer sheet to check their work.

Extensions/Modifications:
Students can work in pairs or individually to write their own Math Libs problems and exchange them with class members.
A) A ________ brought two packages of _________.

(1. a job or career) (2. thing)

on the train. Each package contained 72 _________. Which is the best

(2. thing)

describe for the total number of _________. that _________.

(same as #2) (same as #1)

brought on the train?

a. 70 b. 190 c. 140 d. 200
ACTIVITY 13
Estimation Math Libs

B) ___________ lives in ___________, and likes to drive

(1. your name) (2. name of a city)

to ___________ every Saturday and Sunday. ___________ is

(3. name of another city) (same as #3)

about ______ miles away. If ___________ drives to and from

(distance) (same as #1)

___________ both days, about how many total miles

(same as #3)

were driven going to and from the two cities?
ACTIVITY 13
Estimation Math Libs

C) ___________ is a travel agent. ___________ is planning a 4-day

(1. name) (same as #1)

vacation package to ___________ for a family of _________. Each roundtrip

(2. destination) (3. number of people)

airline ticket costs _________ and the hotel costs $_______________. Admission

(cost of tickets) (cost per night per person)

into ______________________________ cost __________ per person.

(theme park or other attraction) (admission per person)

Excluding the costs of food and other expenses, about how much will the vacation
package cost?
ACTIVITY 13
Estimation Math Libs

D) _______ watches _______ people board the railway system in 20 minutes.
   (1. name)   (2. number greater than 30)

   The railway system runs ______________ each day. Find
   (3. number of hours)

   the best estimate of the total number of people who ride the railway

   Monday through Friday.
ACTIVITY 13
Estimation Math Libs

E) ___________ and her friend ___________ really enjoy playing

(1. girl’s name) (2. another girl’s name)

___________ for the _________________. The table below

(3. a sport) (4. name of a sports team)

ds how the number of points each of the girls scored for the first three games.

Point Totals for the First Three Games

<table>
<thead>
<tr>
<th>(Girl #1)</th>
<th>(Girl #2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>22</td>
<td>4</td>
</tr>
</tbody>
</table>

About how many total points did both girls score during the first three games?

a. 70  b. 85  c. 100  d. 90
ACTIVITY 13
Estimation Math Libs

F) ________________________’s __________________ class is taking a field trip to
   (1. teacher’s name)       (2. subject at school)

________________________. It costs $7.15 for each student to go on the trip. If there
   (3. someplace fun)

are 58 students going, about how much total money will ____________
   (same as #1)

need to collect for the field trip?

   a. $330       b. $420       c. $510       d. $600
Objective: Students will use problem-solving and estimation skills to solve real-world problems involving addition and subtraction.

Number of students: Group size will vary.

Materials:
- Check It Out game cards
- Check It Out checkbook registry
- 1 number cube
- Calculator

Steps:
Students should imagine that they are keeping a journal of their summer spending activities, which include a family vacation. Each player begins with $500 that he or she has saved to spend while on vacation. Players keep track of their funds using a checkbook registry. To simplify the checkbook registry, students can estimate withdrawals and deposits to the nearest dollar, if needed.

Step 1: Shuffle the Check It Out game cards and place them face down on the table. Players should have their own Check It Out checkbook registry to keep track of the money. Players will roll the number cube to determine who goes first. The player with the highest roll will go first. Play proceeds in a clockwise direction.

Step 2: Player 1 begins the game by drawing a card from the pile and reading it aloud. Then, the player estimates the amounts found on the card. If the activity involves spending money, the player must write the amount spent in the “withdrawal” column and subtract that amount from the total. Then write the amount of money that is left in the “balance” column. If the activity involves receiving money, the player will record that amount in the “deposits/credit” column and add that amount to the total. Then, write the amount of money that is left in the “balance” column. Players should do their math computation on scratch paper.

Step 3: You have the option of passing or “skipping” a card that is drawn twice during the game. If your balance is running low, you can roll the number cube and multiply that number by 10 and add that amount to your account. For example, you roll a 2, then you would add 2 x 10 or $20.00 to your account. You will have only three opportunities to roll during the entire game.

Step 4: After ten turns, students should exchange registers and check the balance on the checkbook register. The player with the most money left wins the game.
Extensions/Modifications:

- For more advanced students, give them the opportunity to work with negative numbers by continuing play even when students overdraw their accounts. Charge the player a $20.00 fee each time they spend funds that they do not have in their account. The player must calculate the new balance.

- The teacher can give the students more or less money at the beginning of the game to make the computations harder or easier. For example, have the students begin with $1,000 a piece instead of $500.

- The calculator can be used either during the game with each player or only at the end to check the computations.
You pay $18.74 for snacks and magazines for the airplane ride. You receive your weekly allowance of $15.00. You do extra chores and earn an additional $23.00. You rent scuba diving gear for one day. The cost including tax is $88.54.

One round-trip airplane ticket costs $284.90. Your dad covers $225.00 of the ticket cost and you pay the rest. Your family's luggage is lost during the trip. The airline company gives you $258.33 to replace your belongings. Your brother borrows $25.00 to enter a surfing contest. He pays you back later that day and also gives you one-fourth of his $150.00 prize money.

Your little sister wants to have her hair braided, so you let her borrow $48.00 for the braiding and $8.50 for the beads that will be used in her hair. Pay the player sitting to your right the $74.00 you borrowed two months ago. The hotel gift shop gives you a $51.82 refund for a broken souvenir.
You withdraw $112.00. Later that day you receive your weekly allowance of $15.00 and save it to make sure you have money left after the trip.

Margie, your favorite cousin, asks you to bring her a souvenir. You buy her a hat that costs $13.50 and a pen and pencil set that costs $8.95.

While on vacation, you ride the rail train four times downtown. The roundtrip train tickets cost $2.50 each.

Before you leave for vacation, your neighbor asks you to pet sit their dog while they are on a family trip. You earn $45.00.

The Leftside Boys’ concert tickets were sold at a discount, so they cost $52.00, instead of $65.00. You purchase one for the Thursday night show.

You win $45.00 in a limbo contest and $95.00 in a miniature golf contest.

You buy your teacher a gift that costs $26.44, which includes tax.

Your grandparents gave you $85.00 to spend on your vacation.

You purchase souvenir coffee mugs for four of your grandparents. The mugs cost $7.50 each.
Your cousin John gives you $39.00 to bring back a souvenir shell collection. You pay $32.59 for your cousin John's shell collection. He said that you could keep the change from the $39.00.

Give your friend sitting to your left $58.00 to go on a guided tour of the town.

Your Dad gives you your weekly allowance of $15.00. But it was $3.75 short because earlier in the week you got an advance from your parents.

The player to your right gives you a $55.00 birthday gift.

You receive your weekly allowance of $15.00.

You ordered room service and your parents make you pay up. Your bill is $22.90.

You give your little brother $6.50 for helping you find your lost camera.

The player to your left pays you back the $135.00 he borrowed a week ago.
You rent a Jet Ski for the day. It cost $74.00.

You get your picture taken with a whale at the amusement park. The photo costs $8.50.

The player sitting to your right pays your $26.58 bill at Sam's Seafood Restaurant. You leave a generous tip of $4.75.

You cover the admissions cost to the ball game for you and a friend. Each ticket cost $23.75.

You send 18 postcards to your classmates back home. Each postcard costs 85 cents each.

You receive your weekly allowance of $15.00. You also washed your mother's car and she gave you an extra $7.50.

Your rent a motor scooter so you can explore a nearby village. Your rental fees total $43.57, which includes tax.

You earn $65.00 to cover the cost of concert tickets.

You earned extra money for your vacation by doing yard work for four of your neighbors. You earn a total of $107.50.
Before you leave on your vacation, Aunt Angie gives you $45.00 for your birthday. You also receive $38.00 from your Uncle David.

You spend $53.68 on games and $25.40 on food at the amusement park.

When you get back home, you pay your little sister $11.50 to clean your room.

You just HAVE to buy the latest Jazzy Joe CD to listen to on the airplane. The CD costs $17.28 including tax.

You find a wallet and return it to the hotel manager, who returns it to the owner. The owner is impressed with your honesty and gives you the $64.00 that was in the wallet as a reward!

You, your brother and sister split the cost of a Jet Ski for the day. The one-day rental costs $87.95, which includes tax.

You buy two souvenir t-shirts for Aunt Laura and Uncle Jesse. The t-shirts costs $16.50 apiece.

You started to go bungee jumping but changed your mind at the last minute. You get a refund of $25.00.

The $45.00 deposit is due for your class field trip to Washington D.C. Mom makes you pay for it out of your money.
Objective: Students will solve measurement problems, including conversion problems. Students will answer measurement conversion questions to cover spaces on their World Traveler Bingo cards.

Number of students: Entire class will play, or students can play in pairs.

Materials:
- World Traveler Bingo game cards
- Beans for use as markers to cover Bingo card spaces
- Calculators

Steps:
Step 1: Write these numbers on the board or overhead.

```
10,800  6,756  13,215
34,300  46,000  4,092
1,400  5,100  38,544
5,760  6,000  49,740
5,328  66,000  3,384
53,900  312  1,032
```

Step 2: Students will choose random numbers from the list to write in the blank squares of their game card. Remind students to mark one square as the free space on their card.

Step 3: The teacher will read a question or place the question on the overhead projector for all students to see.

Step 4: Students will calculate the answer and cover the space on their Bingo card.

Step 5: The first person to cover spaces horizontally, vertically or diagonally calls out “Bingo.” The numbers on the student’s card will be checked to confirm that he/she is the winner.

Extensions/Modifications:
- Teachers could assign the problem questions in advance and play the bingo game to check their answers.
- Teachers also may need to provide conversion charts and allow students to use the calculator.
ACTIVITY 16
Vacationing in Texas Grade 6

**Objective:** Students will plan a vacation, visiting at least six cities, towns, parks and other attractions in Texas.
- The group will have a budget of $1,500 to spend for the entire trip.
- They must document the costs of gasoline at $1.50 per gallon. The car has a 15-gallon tank and gets 23 miles to the gallon.
- Hotel rates should be included.
- Prices of meals, as well as admission charges to museums, parks, or other attractions for each person, must be included.
- Students must calculate driving times between each city, assuming an average speed of 70 miles per hour.
- Students will complete a Travel Log, which will include how funds were spent.
- Students will also write a story detailing the places they visited and give an oral presentation incorporating technology.

**Number of students:** Students can work in groups of three.

**Materials:**
- Texas State Travel Guide
- Internet
- Maps of Texas
- Chart paper
- Markers or colored pencils
- Travel and expense logs

**Steps:** This interdisciplinary lesson will take two to three days and involves mathematics, social studies and language arts.

**Step 1:** Students will have one week to travel, so they must plan a travel route, taking into consideration the time it takes to travel between cities or parks.

**Step 2:** Students will include the number of hours they spent visiting each attraction. They must include three meals each day and 6 to 8 hours of sleep. Each student will complete the Travel Log, which details the 24 hours of each day and an Expense Report detailing how the group’s $1,500 was spent.

**Step 3:** The group can choose to begin the trip in any city in Texas. Students must return to the city of origin before the end of the seventh day. Students can use the Internet or resources such as Triple A (AAA) or other travel guides to obtain hotel rates.

**Step 4:** Students will trace the map of Texas onto the chart paper and use markers and/or colored pencils to show the route traveled.

**Step 5:** The group members will write a story about their vacation in Texas, discussing the places they visited and their activities.

**Step 6:** The group will give an oral presentation of its vacation in Texas and incorporate technology into the presentation. Students may want to include pictures of the places they visited. The Internet is one resource for pictures or students can create their own.

**Note:** The teacher has the option of choosing a city of origin for each group.
Extensions/Modifications:
- The teacher could limit the number of days or offer them some of the figures up front to simplify the game (i.e., total cost of gas or food).
- For follow-up, students could use newspaper ads to create a food budget for a month for families of different sizes.
## Vacationing in Texas Grade 6
### Travel and Expense Log

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Objective: Students will plan a vacation visiting at least four cities, towns, parks and other attractions in Texas.
- The group will have a budget of $1,200 to spend for the entire trip. The students must document the prices of meals for each person, as well as admission charges to museums, parks or other attractions for each person. Use the travel guide or Internet to find this information.
- Students must calculate driving times between each location if traveling at an average speed of 70 miles per hour.
- One tank of gasoline will cost $22.50 and the car will travel 345 miles on one tank of gas.
- Hotels/motels will cost $85.00 per night for the group.
- Students will complete a travel and expense log.
- The group will write a story detailing the places visited.

Number of students: Students can work in groups of three or four.

Materials:
- Texas State Travel Guide
- Internet
- Maps of Texas
- Chart paper
- Markers or colored pencils
- Travel and expense logs
- Calculator

Steps: This interdisciplinary activity will take two to three days and involves mathematics, social studies and language arts.

Step 1: Students will have five days to travel, so they must plan a travel route taking into consideration the time it takes to travel between cities or parks.

Step 2: Students will include the number of hours they spent visiting each attraction. They must include three 1-hour meals each day and between 6 and 8 hours of sleep. Each student will complete the Travel Log which details the 24 hours of each day and an Expense Report detailing how their $1,200 was spent.

Step 3: Students can choose to begin their trip in any city in Texas. Students must return to the city where the trip originated before the end of the fifth day.

Step 4: Trace the map of Texas onto the chart paper and use markers and/or colored pencil to show the route traveled. The group will write a story about their vacation in Texas, discussing the places they visited. Students may want to include pictures of the places they visited. The Internet is one resource for pictures.

Step 5: The group will give an oral presentation about their vacation in Texas.

Note: The teacher has the option of choosing a city for each group to begin their journey.
ACTIVITY 17
Vacationing in Texas Grade 5

Extensions/Modifications:
- The teacher could limit the number of days or offer them some of the figures up front to simplify the game (i.e., total cost of gas or food).
- For follow-up, students could use newspaper ads to create a food budget for a month for families of different sizes.
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<td>6:00 A.M.</td>
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</tbody>
</table>
**Objective:** Students will use **front-end** estimation to compute solutions to problems using the operations of addition, subtraction, multiplication and division. **Students can use mental mathematics or pencil and paper.** Students’ solutions should be close to the solutions on the answer cards.

**Number of students:** Students will work in groups of four.

**Materials:**
- Total Trekkers game board
- Operation spinner
- 2 numerical spinners
- Total Trekkers game pieces

**Steps:**

**Step 1:** Students will use Spinner #1 and spin to see who goes first. The student with the highest number will go first. All students will place their pawns on the game board at the space marked “Start.”

**Step 2:** The student going first will spin the first numerical spinner and keep that number. This number can be used as the first or second number in the computation. For example, the first number could be used as a dividend or a divisor.

**Step 3:** The student will then spin the second numerical spinner and keep that number.

**Step 4:** The student will spin the operations spinner and use this operation to compute the answer using the two numbers. The key here is that students must use estimation skills before they complete the computations mentally (or on scratch paper).

**Step 5:** Students use the chart below to determine how many spaces to move on the game board. That student will then move his/her game piece that number of spaces.

<table>
<thead>
<tr>
<th>If your total is…</th>
<th>Then move…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 400</td>
<td>5 spaces</td>
</tr>
<tr>
<td>Between 400-7,999</td>
<td>10 spaces</td>
</tr>
<tr>
<td>8,000 or more</td>
<td>15 spaces</td>
</tr>
</tbody>
</table>

**Step 6:** The first person to travel across the U.S.A. game board to the finish line is the winner.

**Extensions/Modifications:**
Allow students to use calculators.
Total Trekkers
Numerical Spinners

Total Trekkers
24  31  46  89  53  18  77  62

Total Trekkers
415 742 608 879 984 847 783 521

Numerical Spinner
Numerical Spinner
Total Trekkers

Operation Spinner & Game Piece Pawns

Cut out the four pawns and fold in half on solid line

Operation Spinner

add

subtract

multiply

divide

Total Trekkers
Objective: Students will plan a vacation visiting at least 2 cities, towns, parks, or other attractions in Texas. Students are to complete a travel log and write a story detailing the places they visited. The group will also present an oral presentation of their vacation in Texas.

Number of students: Students can work in groups of three.

Materials:
- Texas State Travel Guide
- Internet
- Maps of Texas
- Chart paper
- Markers or colored pencils
- Travel and expense logs
- Calculator

Steps: This interdisciplinary activity will take two to three days and involves mathematics, social studies and language arts.

Step 1: Students will have four days to travel, so they must plan a travel route taking into consideration the time it takes to travel between cities or parks. Students can use the map or the distance chart from the Texas State Travel Guide to find the number of miles between locations. They will use the calculator to divide that distance by a rate of seventy miles per hour to find the time it takes to travel between locations.

Step 2: Students will include the number of hours they spent visiting each attraction. They must include three 1-hour meals each day and between 6 and 8 hours of sleep. Each student will complete the Travel Log which details the 24 hours of each day.

Step 3: Students can choose to begin their trip in any city in Texas. Students must return to the city where the trip originated before the end of the fourth day.

Step 4: Trace the map of Texas onto the chart paper and use markers and/or colored pencil to show the route traveled.

Step 5: The group will write a story about their vacation in Texas, discussing the places they visited. Students may want to include pictures of the places they visited. The Internet is one resource for pictures.

Step 6: The group will give an oral presentation of their vacation in Texas.

Note: The teacher has the option of choosing a city for each group to begin their journey.

Extensions/Modifications:
- The teacher could limit the number of days or offer them some of the figures up front to simplify the game (i.e., total cost of gas or food).
- For follow-up, students could use newspaper ads to create a food budget for a month for families of different sizes.
<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 A. M.</td>
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<td>8:00 A. M.</td>
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<td>9:00 A. M.</td>
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<td>10:00 A. M.</td>
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<tr>
<td>11:00 A. M.</td>
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<td>12:00 P. M.</td>
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<td>6:00 A.M.</td>
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<tr>
<td>Time</td>
<td>Day 3</td>
<td>Day 4</td>
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# Math Can Take You Places

**Questions**
(There are English versions and Spanish versions)

<table>
<thead>
<tr>
<th>Concept Area</th>
<th>Title</th>
<th>Grade Level</th>
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<tbody>
<tr>
<td><strong>Equivalency</strong></td>
<td>Adding and Subtracting to Solve Problems</td>
<td>4</td>
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<tr>
<td></td>
<td>Adding and Subtracting to Solve Problems Spanish</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Representing Products and Factors with Models</td>
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<td>Representing Products and Factors with Models Spanish</td>
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<tr>
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<td>Adding and Subtracting to Solve Problems Involving Whole Numbers and Decimals</td>
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<td>Adding and Subtracting to Solve Problems Involving Whole Numbers and Decimals Spanish</td>
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<td></td>
<td>Using Number Sentences to Represent Real-Life Situations</td>
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<td>Using Number Sentences to Represent Real-Life Situations Spanish</td>
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</tr>
<tr>
<td></td>
<td>Finding Equivalent Forms of Rational Numbers</td>
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<td>Finding Equivalent Forms of Rational Numbers Spanish</td>
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<td></td>
<td>Using Letters to Represent an Unknown</td>
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<td>Using Letters to Represent an Unknown Spanish</td>
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<td></td>
<td>Measuring Volume</td>
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<td>Measuring Volume Spanish</td>
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<tr>
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<td>Applying Measurement Concepts</td>
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<td></td>
<td>Applying Measurement Concepts Spanish</td>
<td>5</td>
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<td></td>
<td>Describing Numerical Relationships Between Units of Measure</td>
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</tr>
<tr>
<td></td>
<td>Describing Numerical Relationships Between Units of Measure Spanish</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Using Formulas to Represent Geometric Relationships</td>
<td>6</td>
</tr>
<tr>
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<td>Using Formulas to Represent Geometric Relationships Spanish</td>
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<td></td>
<td>Using Appropriate Tools to Solve Problems Involving Measurement</td>
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<td>Using Appropriate Tools to Solve Problems Involving Measurement Spanish</td>
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| **Patterns** | Using Organizational Structures to Describe Patterns and Relationships  
Using Organizational Structures to Describe Patterns and Relationships Spanish | 4 |
| --- | --- | --- |
| Using Lists, Tables, and Diagrams to Find Patterns  
Using Lists, Tables, and Diagrams to Find Patterns Spanish | 5 |
| Using Ratios  
Using Ratios Spanish | 6 |
| Using Tables and Symbols to Represent Proportional Relationships  
Using Tables and Symbols to Represent Proportional Relationships Spanish | 6 |
| **Problem Solving** | Identifying Math in Everyday Situations  
Identifying Math in Everyday Situations Spanish | 4 |
| Using Problem-Solving Models  
Using Problem-Solving Models Spanish | 4 |
| Selecting a Problem-Solving Strategy  
Selecting a Problem-Solving Strategy Spanish | 4 |
| Selecting a Problem-Solving Strategy  
Selecting a Problem-Solving Strategy Spanish | 5 |
| Solve Real-Life Problems Involving Fractions  
Solve Real-Life Problems Involving Fractions Spanish | 6 |
| **Reasonableness** | Estimating to Determine Reasonable Results  
Estimating to Determine Reasonable Results Spanish | 4 |
| Estimating to Determine Reasonable Results  
Estimating to Determine Reasonable Results Spanish | 2 |
| Estimating to Find Reasonable Answers to Problems  
Estimating to Find Reasonable Answers to Problems Spanish | 6 |
| Solving Problems Connected to Everyday Experiences  
Solving Problems Connected to Everyday Experiences Spanish | 6 |
1. Kara and Jordan were counting the number of tickets that were sold at the baseball game. Kara counted 73 tickets and Jordan counted 54 tickets. Which equation best describes the total number of tickets?
   A. 73 - ____ = 127
   B. 54 - ____ = 127
   C. 127 - ____ = 54
   D. 127 + ____ = 73

2. Jamal was measuring the perimeter of a rectangular table to purchase the correct size tablecloth. Which equation best describes the 20-foot perimeter of the table?
   A. 20 ft. = 3 ft. + _____ + 8 ft. + 8 ft.
   B. 20 ft. - 4 ft. - 7 ft. - _____ = 4 ft.
   C. 4 ft. + 4 ft. = 20 ft. - 8 ft. - _____
   D. 20 ft = _____ ft + 6 ft + 4 ft + 4 ft.

3. Viviana is reading a book that is 325 pages long, and she must be finished by Friday. It is Monday, and she has read 173 pages. Which sentence best describes the number of pages she must read to finish the book by Friday?
   A. 325 = 173 + ____
   B. 25 = 173 - ____
   C. 173 = 325 + ____
   D. 173 = 173 - ____
PRACTICE QUESTIONS
ADDING AND SUBTRACTING
TO SOLVE PROBLEMS

Answer Key:
1. C
2. D
3. A
1. Karen y Jordán estaban contando el número de boletos que se vendieron en el juego de béisbol. Karen contó 73 boletos y Jordán contó 54 boletos. ¿Cuál ecuación describe mejor el número total de boletos que se vendieron?

A. 73 - _____ = 129.
B. 54 x _____ = 129.
C. 129 - _____ = 54.
D. 120 + _____ = 73.

2. Jaime estaba midiendo el perímetro de una mesa rectangular para comprar un mantel del tamaño correcto. ¿Cuál ecuación describe mejor el perímetro de la mesa cual mide 20 pies?

A. 20 pies = 3 pies + _____ + 8 pies + 8 pies.
B. 20 pies - 4 pies - 7 pies - _____ =4 pies.
C. 4 pies + 4 pies = 20 pies - 8 pies - _____.
D. 20 pies - 6 pies _____ = 4 pies + 4 pies.

3. Bibiana está leyendo un libro de 325 páginas y debe terminarlo el viernes. Es lunes, ella ya ha leído 173 páginas del libro. ¿Cuál oración describe mejor el número de páginas que tiene que leer para terminar el libro el viernes?

A. 325 + 173 = 51 + _____ + 49.
B. 325 = 173 + 51 + 49 + _____.
C. 173 = 325 + _____.
PRACTICE QUESTIONS
ADDING AND SUBTRACTING
TO SOLVE PROBLEMS

Answers:
1. C
2. D
3. A
1. Which number sentence represents 64 pencils shared between 8 friends?
   A. $64 \times 8 = 8$
   B. $8 \div 64 = 8$
   C. $64 \div 8 = 8$
   D. $64 + 8 = 8$

2. Javier has tennis balls in the cans pictured below. Which number sentence best represents the total number of tennis balls?

   A. $3 + 6 = 9$
   B. $6 \times 6 = 36$
   C. $18 \div 3 = 6$
   D. $6 + 6 = 1$
3. Which number sentence does not have 8 as a solution?

A. $9 \times \_ = 72$
B. $15 - 7 = \_ $
C. $8 \times \_ = 16$
D. $56 \div \_ = 7$

4. Jessica is trying to determine the area of a room that will be carpeted. She knows that each tile on the floor measures 1 square foot and that the shaded region represents the part of the room that will be carpeted.

```
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36
```

Which number sentence describes the area of the room that will be carpeted?

A. $108 \text{ ft.}^2 - 72 \text{ ft.}^2$
B. $42 \text{ ft.}^2 + 30 \text{ ft.}^2$
C. $72 \text{ ft.}^2 + 36 \text{ ft.}^2$
D. $108 \text{ ft.}^2 - 36 \text{ ft.}^2$
5. Dominique was ordering the following regular polygons based on their perimeters: a triangle, octagon, pentagon, hexagon, and a square. If the sides of each polygon measure 3 inches, how would Dominique order the polygons from the greatest perimeter to the polygon with the smallest perimeter?

A. Triangle, square, hexagon, pentagon, octagon
B. Hexagon, octagon, pentagon, square, triangle
C. Octagon, pentagon, hexagon, square, triangle
D. Octagon, hexagon, pentagon, square, triangle
Answers:
1. C
2. C
3. C
4. D
5. D
1. ¿Cuál oración numérica representa 64 lápices compartidos entre 8 amigos?

   A. $64 \times = 8$
   B. $8 \div = 64$
   C. $64 \div = 8$
   D. $64 + = 8$

2. Javier tiene pelotas de tenis en botes cuales son estos aquí abajo. ¿Cuál oración numérica mejor representa el número total de pelotas de tenis que están en los botes?

   A. $3 + 6 = 9$
   B. $6 \times 6 = 36$
   C. $18 \div 3 = 6$
   D. $6 + 6 = 1$
3. ¿Cuál oración numérica **NO** contiene 8 como solución?

   A. $9 \times \_ = 72$
   B. $15 - 7 = \_ $
   C. $8 \times \_ = 16$
   D. $56 \div \_ = 7$

4. Jessica está tratando de determinar el área de un cuarto cual tiene azulejo. Ella sabe que cada azulejo mide 1 pie cuadrado y la región sombreada representa la parte del cuarto donde le pondrá azulejo.

   ¿Cuál oración numérica describe el área del cuarto donde le pondrá azulejo?

   A. $108 \text{ ft.}^2 - 72 \text{ ft.}^2$
   B. $42 \text{ ft.}^2 + 30 \text{ ft.}^2$
   C. $72 \text{ ft.}^2 + 36 \text{ ft.}^2$
   D. $108 \text{ ft.}^2 - 36 \text{ ft.}^2$
5. Dominico estaba acomodando los siguientes polígonos regulares según sus perímetros: un triangulo, un octágon, un pentágon, un hexágono, y un cuadrado. ¿Si lo lados de cada polígono miden 3 pulgadas, como podría Dominico ordenar los polígonos con el perímetro mayor al perímetro menor?

A. Triangulo, cuadrado, hexágono, pentágon, octágon
B. Hexágono, octágono, pentágono, cuadrado, triangulo
C. Octágono, pentágono, hexágono, cuadrado, triangulo
D. Octágono, hexágono, pentágono, cuadrado, triangulo
PRACTICE QUESTIONS
REPRESENTING PRODUCTS AND FACTORS WITH MODELS

Respuestas:

1. C
2. C
3. C
4. D
5. D
1. The table below shows the amount of rainfall, in inches, over a period of seven days.

<table>
<thead>
<tr>
<th>Day</th>
<th>Rainfall (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.04</td>
</tr>
<tr>
<td>2</td>
<td>0.70</td>
</tr>
<tr>
<td>3</td>
<td>0.34</td>
</tr>
<tr>
<td>4</td>
<td>1.57</td>
</tr>
<tr>
<td>5</td>
<td>1.52</td>
</tr>
<tr>
<td>6</td>
<td>1.21</td>
</tr>
<tr>
<td>7</td>
<td>0.75</td>
</tr>
</tbody>
</table>

How many more inches of rain fell during the odd-numbered days than on the even-numbered days?

A. 1.17 inches  
B. 0.17 inches  
C. 1.70 inches  
D. 7.13 inches

2. Ms. Coleman’s annual salary is $53,820.00. She earns an additional $12,540.00 per year. She spends $5,300.00 on medical and life insurance. Write an equation that shows the amount of money Ms. Coleman has after spending the $5,300.00 on insurance?

3. Monica’s soccer team had a fundraiser. The goal was to raise $1,500.00. So far, the team members have raised $378.75 from selling candles and $203.50 from car washes. What would the soccer team do to determine the amount of money it still needs to raise to reach its goal?

A. Add $378.75 and $203.50 and add the total to $582.25.  
B. Subtract $378.75 from $1,500.00.  
C. Add $917.75 to $203.50 and subtract the total from $1,500.00.  
D. Subtract the total of $378.75 and $203.50 from $1,500.00.
PRACTICE QUESTIONS
ADDING AND SUBTRACTING
TO SOLVE PROBLEMS
INVOLVING WHOLE NUMBERS
AND DECIMALS

Answers:
1. B
2. Leave as an open-ended question. Solution will vary.
   \((53,820 + 12,540) - 5,300 = 61,060\)
3. D
1. La tabla de abajo indica la cantidad de lluvia, en pulgadas, que ha caído dentro de un periodo de 7 días.

<table>
<thead>
<tr>
<th>Día</th>
<th>Lluvia (pulgadas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.04</td>
</tr>
<tr>
<td>2</td>
<td>0.70</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>1.57</td>
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<tr>
<td>5</td>
<td>1.52</td>
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<tr>
<td>6</td>
<td>1.21</td>
</tr>
<tr>
<td>7</td>
<td>0.75</td>
</tr>
</tbody>
</table>

¿Cuántas pulgadas más de lluvia ha caído durante los días impares que en los días pares?

A. 1.17 pulgadas  
B. 0.17 pulgadas  
C. 1.70 pulgadas  
D. 7.13 pulgadas

2. El salario anual de la Sra. Coleman es $53,820.00. Ellas gana $12,540.00 adicionales por año. La Sra. Coleman gasta $5,300.00 en seguro de medico y vida. Escriba una ecuación que demuestre la cantidad de dinero que la Sra. Coleman tiene después que paga el seguro de medico y vida. Deja como pregunta abierta. Las soluciones pueden variar.

\[
(53,820 + 12,540) - 5,300.00 = 61,060
\]

3. El equipo de fútbol de Mónica tuvo un carnaval. La meta fue para conseguir $1,500.00. Hasta hoy han conseguido $378.75 en ventas de velas y $203.50 en lavar carros. ¿Qué tendrá que hacer el equipo de fútbol para determinar la cantidad de dinero que les falta para alcanzar la meta?

A. Sumar $378.75 y $203.50 y sumar el total a $582.25.  
B. Restar $378.75 de $1,500.00.  
C. Sumar $917.75 a $203.50 y restar el total de $1,500.00.  
D. Restar el total de $378.75 y $203.50 de $1,500.00.
PRACTICE QUESTIONS
ADDING AND SUBTRACTING
TO SOLVE PROBLEMS
INVOLVING WHOLE NUMBERS
AND DECIMALS

Respuestas:

A. B

B. Leave as an open-ended question. Solution will vary.
   
   ($53,820 + 12,540) - $5,300 = $61,060

C. H
1. Shelly’s family is going to the amusement park this weekend, and her parents need to make sure that everyone going has a ticket. Shelly, her Mom, Dad, grandmother, and Shelly’s best friend, Beth, will all be going to the park. Tickets are $14.25 for students and $22.50 for adults. Which number sentence can be used to find out how much money Shelly’s parents will need to buy the amusement park tickets?

   A. $(2 \times 14.25) + (3 \times 22.50) = 86.00$
   B. $(2 \times 22.50) - (3 \times 14.25) = 2.25$
   C. $(22.50 - 14.25) \times 5 = 41.25$
   D. $(22.50 + 14.25) \times 5 = 183.75$

2. Miguel saved up $35 to spend on a present for his Dad’s birthday. He bought him a new baseball cap that cost $12.64 and a matching t-shirt that cost $17.28. Which number sentence can be used to find how much money Miguel had left after buying the presents?

   A. $35 - (17.28 - 12.64) = 30.36$
   B. $35 - (17.28 + 12.64) = 5.08$
   C. $35 + (17.28 - 12.64) = 39.64$
   D. $35 - (12.64 \div 2) = 9.72$
PRACTICE QUESTIONS
USING NUMBER
SENTENCES TO REPRESENT
REAL-LIFE SITUATIONS

Answers:
1. A
2. B
PRACTICE QUESTIONS
USING NUMBER
SENTENCES TO REPRESENT
REAL-LIFE SITUATIONS

1. La familia de Shelly van a ir al parque de diversiones este fin de semana y sus padres necesitan asegurarse de que todos los que van a ir tienen un boleto. Las siguientes personas van a ir: Shelly, su mamá, su papá, su abuelita, y Beth, la amiga de Shelly. Los boletos para los estudiantes cuestan: $14.25 y para los adultos cuestan: $22.00. ¿Cuál oración numérica se puede usar para encontrar cuanto dinero necesitaran los padres de Shelly para comprar los boletos del parque de diversiones?

   A. \((2 \times 14.25) + (3 \times 22.50) = 96.00\)
   B. \((2 \times 22.50) - (3 \times 14.25) = 2.25\).
   C. \((22.50 - 14.25) \times 5 = 41.25\).
   D. \((22.50 + 14.25) \times 5 = 183.75\).

2. Miguel ahorró $35 para comprarle un regalo a su padre en su cumpleaños. El le compró una cachucha de béisbol cual costó $12.64 y una camisa que le combinaba cual costó $17.28. ¿Cuál oración numérica describe se puede usar para calcular cuanto dinero le quedó después que Miguel compró estos regalos?

   A. \(35 - (17.28 - 12.64) = 30.36\)
   B. \(35 - (17.28 + 12.64) = 5.08\)
   C. \(35 + (17.28 - 12.64) = 39.64\)
   D. \(35 - (12.64 ÷ 2) = 9.72\)
PRACTICE QUESTIONS
USING NUMBER
SENTENCES TO REPRESENT
REAL-LIFE SITUATIONS

Answers:
1. A
2. B
1. Jacqueline and her mom are shopping for shoes. The store has a special on shoes. When you buy 2 pairs at the regular price, you get \( \frac{1}{3} \) off the next pair. What percentage of the regular price did Jacqueline have to pay on the third pair of shoes?

A. \( 2 \frac{1}{3} \% \)
B. \( 33 \frac{1}{3} \% \)
C. \( 66 \frac{2}{3} \% \)
D. \( 67 \frac{2}{3} \% \)

2. Corina bought 2 large pepperoni pizzas. Each pizza had 8 slices. She gave \( \frac{1}{4} \) of the pizzas to Marcus and \( \frac{3}{8} \) of the pizzas to Jamal. If Corina ate 2 slices of pizza, how many slices of pizza are left?

A. 3 slices
B. 4 slices
C. 6 slices
D. 8 slices
3. Jose, Brandi, Ahmed, and Claire are lifeguards. They are training in a pool that is 25 meters long. Swimming the length of the pool down and back is one lap. Brandi swam 8 laps. Jose swam half as many laps as Brandi. Ahmed swam 75% of the laps that Brandi swam, and Claire swam one-fourth of the laps that Brandi swam. How many total meters did the lifeguards swim?

A. 800 meters  
B. 900 meters  
C. 1000 meters  
D. 1200 meters
PRACTICE QUESTIONS
FINDING EQUIVALENT
FORMS OF RATIONAL NUMBERS

Answers:
1. C
2. B
3. C
1. Jacqueline y su mamá salieron de compras para comprar zapatos. La tienda tiene un especial en los zapatos. Cuando compras 2 pares a precio regular, te dan $\frac{1}{3}$ de descuento en el tercer par. ¿Cuál porcentaje tuvo que pagar Jacqueline en el tercer par de zapatos?

A. $2 \frac{1}{3}$ %

B. $33 \frac{1}{3}$ %

C. $66 \frac{2}{3}$ %

D. $67 \frac{2}{3}$ %

2. Corina compró 2 pizzas grandes de pepperoni. Cada pizza tiene 8 pedazos. Ella le dio $\frac{1}{4}$ de la pizza a Marcos y $\frac{3}{8}$ de la pizza a Jaime. ¿Si Corina se comió 2 pedazos de pizza, cuántos pedazos de pizza quedaron?

A. 3 pedazos

B. 4 pedazos

C. 6 pedazos

D. 8 pedazos
3. José, Brandan, Armando, y Clara son salvavidas en una piscina. Ellos están entrenando en la piscina cual mide 25 metros de largo. Nadar lo largo de la piscina de un extremo al otro lado una vuelta. Brandan nadó 8 vueltas, José nadó la mitad de lo que nadó Brandan. Armando nadó el 75% de vueltas de lo que Brandan nadó y Clara nadó un cuarto de las vueltas que Brandan nadó. ¿Cuántos metros nadaron los salvavidas?

A. 800 metros
B. 900 metros
C. 1000 metros
D. 1200 metros
PRACTICE QUESTIONS
FINDING EQUIVALENT FORMS OF RATIONAL NUMBERS

Answers:
1. C
2. B
3. C
1. Kibbe needs exact change for the vending machine. The item he would like to purchase costs $0.65. Kibbe has three coins, but is one coin short of having the exact change. Which equation best describes the value of the coin, c, that Kibbe still needs in order to have exact change for the vending machine?

   A. $0.65 = $0.75 - c
   B. $c = $0.65 - $0.50
   C. $c = $1.00 - $0.65
   D. $0.65 = $0.60 + c

1. Jamila is looking back over her basketball stats for the season. She has a range of 16 points between her highest score, h, and her lowest score, l, for the season. Which equation best describes Jamila’s high score, h, for the season?

   A. $h = l + 16$
   B. $16 + h = l$
   C. $h = 16 - l$
   D. $h = l - 16$

3. Drew kept a record of the number of volunteers who worked Saturday and Sunday at the Special Olympics. The final count for the number of volunteers was 341. There were a total of 107 volunteers on the first day. Which equation best describes the number of volunteers, v, that worked on the second day?

   A. $v = 341 + 107$
   B. $v + 341 = 107$
   C. $107 = 341 - v$
   D. $v - 107 = 341$
PRACTICE QUESTIONS
USING LETTERS TO REPRESENT AN UNKNOWN

Answer:
1. D
2. A
3. C
1. Karen necesita cambio exacto para la maquina de dulces. El dulce que el quiere comprar cuesta $0.65. Kibbe tiene tres monedas, pero le falta una moneda para tener el cambio exacto. ¿Cuál ecuación describe mejor el valor de la moneda, c, que todavía necesita Kibbe para tener el cambio exacto para la maquina de dulces?

   A. $0.65 = 0.75 - c$
   B. $c = 0.65 - 0.50$
   C. $c = 1.00 - 0.65$
   D. $0.65 = 0.60 + c$

2. Camila esta repasando sus estadísticas de baloncesto de esta temporada. Ella tiene un rango de 16 puntos entre su puntuación más alta, h, y su puntuación mas baja, l, de esta temporada. ¿Cuál ecuación describe mejor la puntuación más alta, h, de Camila de esta temporada?

   A. $h = l + 16$
   B. $16 + h = l$
   C. $h = 16 - l$
   D. $h = l - 16$

3. David mantuvo datos del número de voluntarios quienes trabajaron durante el sábado y domingo en las Olimpiadas Especiales. El total final de voluntarios fue 341. Hubo un total de 107 voluntarios el primer día. ¿Cuál ecuación describe mejor el número de voluntarios, v, que trabajaron en el segundo día?

   A. $v = 341 + 107$
   B. $v + 341 = 107$
   C. $107 = 341 - v$
   D. $v - 107 = 341$
PRACTICE QUESTIONS
USING LETTERS TO REPRESENT AN UNKNOWN

Answer:
1. D
2. A
3. C
1. The weight of a suitcase is most likely to be which of the following?
   
   A. 50 ounces  
   B. 10 pounds  
   C. 5 gallons  
   D. 50 pints  

2. Boeing 777 jet liner is a very large airplane. Look at the diagram below; the overall length is missing from the diagram.

   Based on this diagram, what is the approximate length of the Boeing 777?

   A. 150 feet  
   B. 186 feet  
   C. 209 feet  
   D. 286 feet
3. Davis and Tai are filling each classmate’s water bottle before they leave for the class camping trip. What is a reasonable estimate of the volume of the bottle?

A. 1.5 liter
B. 15 milliliters
C. 1.5 ounces
D. 15 quarts
Answers:
1. B
2. C
3. A
PRACTICE QUESTIONS
ESTIMATING AND MEASURING WEIGHT AND LENGTH

1. ¿El peso de una maleta es más bien como cuál de las siguientes medidas?
   A. 50 onzas
   B. 10 libras
   C. 5 galones
   D. 50 pintas

2. Un Boeing 777 es un avión muy grande. Examina en el diagrama que sigue; la medida de largo del avión está incompleta.

   143 ft. 7 inches
   84 ft. 11 inches

¿Basado en este diagrama, cuál es la medida de largo del avión Boeing 777?
   A. 150 pies
   B. 186 pies
   C. 209 pies
   D. 286 pies
3. David y Tai están llenando las botellas con agua de cada compañero de clase antes de que se vayan a un viaje de campamento. ¿Cuál es una estimación razonable del volumen de una botella de agua?

A. 1.5 litros  
B. 15 mililitros  
C. 1.5 onzas  
D. 15 cuartos
PRACTICE QUESTIONS
ESTIMATING AND MEASURING
WEIGHT AND LENGTH

Answers:
1. B
2. C
3. A
1. Brandon and Jorge left Jorge’s home at 10:45 A.M. to ride their bikes to the public pool 10 blocks away. It took them 15 minutes to get to the pool. The boys promised their mothers that they would be back at Jorge’s home by 1:00 P.M. for lunch. What is the latest time that they could leave the pool and be home in time for lunch?
   A. 12:30 P.M.
   B. 1:00 A.M.
   C. 12:45 A.M.
   D. 12:45 P.M.

2. Jasmine got a new star rubber stamp. She wanted to personalize all of her papers to make stationery. Use a ruler to measure the star below. How many stars could she put point to point across the top of her paper if the paper measures 6 inches across the top.

3. The perimeter of the regular pentagon is how many centimeters less than the rhombus?
   A. 10 centimeters
   B. 5 centimeters
   C. 25 centimeters
   D. 40 centimeters
4. Jalen and Sarah were having a disagreement about the following math problem:

Sarah said that the area of a square with sides measuring 6 inches long is greater than the area of a rectangle that measures 5 inches by 7 inches. Jalen disagrees with Sarah. Who is correct?

A. Jalen is right because both areas are 24 square inches.
B. Sarah is correct because the square has an area of 36 square inches and the rectangle has an area of 35 square inches.
C. Jalen is correct, because the area of the square is 24 square inches and the area of the rectangle is 35 square inches.
D. Sarah is correct because the area of the square is 24 square inches and the area of the rectangle is 12 square inches.

5. Measure the lengths of the sides of the rectangle to the nearest centimeter and find its perimeter and area.
PRACTICE QUESTIONS
MEASURING TO
SOLVE PROBLEMS

Answers:
1. D
2. The star should measure $1 \frac{1}{2}$ inches across; so 4 stars will fit across the paper. Leave this answer as an open response.
3. A
4. B
5. Open-ended, because measures may vary after copies are made. But most students should have similar answers.
PRACTICE QUESTIONS
MEASURING TO
SOLVE PROBLEMS

1. Brandan y Jorge salieron de la casa de Jorge a las 10:45 A.M. en bicicleta hacia la piscina pública que está 10 cuadras de allí. Tomaron 15 minutos en llegar a la piscina. Los niños le prometieron a sus madres que regresarían a la casa de Jorge a la 1:00 P.M. para comer. ¿Cuál es la hora más tarde que podrían salir de la piscina y llegar a casa a tiempo para la comida?

   A. 12:30 P.M.
   B. 1:00 A.M.
   C. 12:45 A.M.
   D. 12:45 P.M.

2. Jasmine tiene una estampilla de estrella. Quiere personalizar sus hojas de papel. Usa una regla para medir la estrella que está abajo. ¿Cuántas estrellas podrá poner de punta a punta a través de una hoja de papel, si el papel mide 6 pulgadas en la parte de arriba?

   *La estrella debe medir 1 ½ pulgadas a través del papel; entonces 4 estrellas pueden caber en cada hoja de papel. Deja esta contestación como respuesta abierta.*

3. ¿El perímetro de un hexágono regular es cuantos centímetros menos que el rombo?

   A. 10 centímetros
   B. 15 centímetros
   C. 25 centímetros
   D. 40 centímetros
4. Elena y Sara tienen un desacuerdo del siguiente problema de matemáticas:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 pulgadas</td>
<td>5 pulgadas</td>
</tr>
<tr>
<td>7 pulgadas</td>
<td></td>
</tr>
</tbody>
</table>

Sara dice que el área de un cuadrado con lados midiendo 6 pulgadas de largo es más grande que el área de un rectángulo que mide 5 pulgadas por 7 pulgadas. Elena está en desacuerdo con Sara. ¿Quién está correcta?

A. Elena está correcta, porque ambos áreas son 24 pulgadas cuadradas.

B. Sara está correcta, porque el cuadrado tiene un área de 36 pulgadas cuadradas y el rectángulo tiene un área de 35 pulgadas cuadradas.

C. Elena está correcta, porque el área del cuadrado es 24 pulgadas cuadradas y el área del rectángulo es 35 pulgadas cuadradas.

D. Sara está correcta, porque el área del cuadrado es 24 pulgadas cuadradas y el área del rectángulo es 12 pulgadas cuadradas.

5. Mide los lados del rectángulo al centímetro más cercano y encuentra su perímetro y área. Esta es una pregunta, porque las medidas pueden variar después de que hagan copias para los estudiantes; pero la mayoría de los estudiantes tendrán respuestas similares.
PRACTICE QUESTIONS
MEASURING TO
SOLVE PROBLEMS

Answers:
1. D
2. The star should measure $1 \frac{1}{2}$ inches across; so 4 stars will fit across the paper. Leave this answer as an open response.
3. A
4. B
5. Open-ended, because measures may vary after copies are made. But most students should have similar answers.
1. Examine the cube and rectangular prism below. The volume of the cube is one cubic unit, with the length, width and height all equal to one unit. The rectangular prism has a height of 3 cubic units, a length of 5 cubic units and a width of 2 cubic units. About how many cubes would it take to fill the entire volume of the rectangular prism?

| A. 40 cubes |
| B. 30 cubes |
| C. 20 cubes |
| D. 10 cubes |
Answer:
1. B
1. Examine el cubo y el prisma rectangular aquí. El volumen de este cubo es una unidad cúbica, y lo largo, ancho y altura equivalen a una unidad cúbica. El prisma rectangular tiene una altura de 3 unidades cúbicas, lo largo mide 5 unidades cúbicas, y lo ancho de 2 unidades cúbicas. ¿Más o menos cuantos cubos se llevaría para llenar el volumen del prisma rectangular?

A. 40 unidades cúbicas
B. 30 unidades cúbicas
C. 20 unidades cúbicas
D. 10 unidades cúbicas
Answer:
1. B
PRACTICE QUESTIONS
APPLYING
MEASUREMENT CONCEPTS

Parul is looking for a picture to fit onto the front page of the school newsletter she is writing. She needs a picture that has an area of about 40 centimeters to place above her article. Use a ruler to help estimate the length and the width of each picture, and then calculate the area of each one. Which picture has an area that is closest to 40 centimeters?

Write your answer. __________
Answer:
1. B
I. Patricia está buscando por un retrato que quepa en la hoja delantera del periódico de la escuela, cual ella escribe. Ella necesita un retrato que tenga el área de más o menos 40 centímetros para pegarlo al lado de arriba del artículo. Usa una regla para ayudarte a estimar lo largo y lo ancho de cada retrato, y luego calcula el área de cada uno. ¿Cuál retrato tiene el área que es más cercano a 40 centímetros?

Escribe tu respuesta: __________
Answer:
1. B
PRACTICE QUESTIONS
DESCRIBING NUMERICAL
RELATIONSHIPS BETWEEN
UNITS OF MEASURE

1. This frog weighs 6,000 milligrams. How much does the frog weigh in grams?
   A. 600 g
   B. 60 g
   C. 6 g
   D. 60 g

2. Maria’s little sister is 4 years old. How many days old is she?
   A. 1,271 days
   B. 1,440 days
   C. 2,345 days
   D. 2,496 days

3. Which measurement is not equivalent to 60 inches?
   A. 1 2/3 yards
   B. 5 feet
   C. 1 yard, 24 inches
   D. 6 feet
PRACTICE QUESTIONS
DESCRIBING NUMERICAL RELATIONSHIPS BETWEEN UNITS OF MEASURE

Answers:
1. C
2. B
3. D
PRACTICE QUESTIONS
DESCRIBING NUMERICAL RELATIONSHIPS BETWEEN UNITS OF MEASURE

1. Esta rana pesa 6,000 miligramos. ¿Cuánto pesa esta rana en gramos?
   A. 600 g
   B. 60 g
   C. 6 g
   D. .60 g

2. La hermanita de María tiene 4 años de edad. ¿Cuántos días son en relación a la edad que ella tiene?
   A. 1,271 días
   B. 1,440 días
   C. 2,345 días
   D. 2,496 días

3. ¿Cuál medida NO es equivalente a 60 pulgadas?
   A. 1 2/3 yardas
   B. 5 pies
   C. 1 yarda, 24 pulgadas
   D. 6 pies

**travelocity**
PRACTICE QUESTIONS
DESCRIBING NUMERICAL RELATIONSHIPS BETWEEN UNITS OF MEASURE

Respuestas:
1. C
2. B
3. D
PRACTICE QUESTIONS
USING FORMULAS TO REPRESENT GEOMETRIC RELATIONSHIPS

I. Which equation best describes the data in the table below?

<table>
<thead>
<tr>
<th>Side Length (p)</th>
<th>Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
</tr>
</tbody>
</table>

A. \( A = 2p \)
B. \( A = 4p \)
C. \( A = p^2 \)
D. \( A = 2(l + w) \)
2. Find the difference in area between the two rectangles below.

\[ x \times 2 \]

\[ 2x \times 4 \]

A. \(2x + 4\)
B. \(6x\)
C. \(x + 2\)
D. \(2x\)
3. Which statement would not be true about the rectangular prism below?

![Rectangular prism diagram]

A. The area of the front face is half of the area of the right face.
B. The perimeter of the bottom is the same as the perimeter of the right face.
C. The area of the top face is twice the area of the front face.
D. The perimeter of the front face is twice as long as the perimeter of the right face.
PRACTICE QUESTIONS
USING FORMULAS TO REPRESENT GEOMETRIC RELATIONSHIPS

Answers:
1. C
2. B
3. D
1. ¿Cuál ecuación describe mejor los datos en la tabla de abajo?

<table>
<thead>
<tr>
<th>Lado, largo</th>
<th>Área (pulgadas$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>p</td>
<td></td>
</tr>
</tbody>
</table>

A. $A = 2p$
B. $A = 4p$
C. $A = p^2$
D. $A = 2(l + w)$
2. Encuentra la diferencia del área entre los dos rectángulos de abajo.

\[
\begin{align*}
\text{A. } & 2x + 4 \\
\text{B. } & 6x \\
\text{C. } & x + 2 \\
\text{D. } & 2x
\end{align*}
\]
3. ¿Cuál oración **NO** sería cierto de esta prisma rectangular?

A. El área de la cara al lado de frente es la mitad del área de la cara al lado derecho.
B. El perímetro de la cara de abajo es igual que el perímetro de la cara al lado derecho.
C. El área de la cara de arriba es dos veces el área de la cara al lado de frente.
D. El perímetro de la cara al lado de frente es dos veces de largo que el perímetro de la cara al lado derecho.
PRACTICE QUESTIONS
USING FORMULAS TO REPRESENT
GEOMETRIC RELATIONSHIPS

Answers:
1. C
2. B
3. D
1. Sabrina is pasting a decorative border on 3 walls in her kitchen. One roll of border will cover 72 inches. The sketch shows the length of one of the walls in the kitchen.

If all three walls are the same length, how many rolls of border will Sabrina need to purchase to cover all three walls?

A. 3 rolls  
B. 4 rolls  
C. 5 rolls  
D. 6 rolls

2. The top of a box measures 6 inches long and the width is $\frac{2}{3}$ the measure of the length. What is the area of the box top?
Answers:
1. C
2. This is an open response item. The solution is 24 square inches.
1. Sabrina está pegando un papel decorativo en 3 paredes de su cocina. Un rollo de papel decorativo cubre 72 pulgadas. La gráfica de abajo muestra lo largo que mide una de las paredes en la cocina.

¿Si las tres paredes miden igual de largo, cuántos rollos de papel decorativo irá a tener que comprar Sabrina para cubrir las 3 paredes?

   A. 3 rollos
   B. 4 rollos
   C. 5 rollos
   D. 6 rollos

2. Lo de arriba de una caja mide 6 pulgadas de largo y de ancho mide $\frac{2}{3}$ de lo que mide de largo. ¿Cuál es la área de lo de arriba de la caja?
Answers
1. C
2. Esta es una respuesta abierta. La solución es 24 pulgadas cuadradas
1. The fourth graders at Willingham Elementary are planning a trip to the Alamo in San Antonio, Texas. They are keeping record of the number of students who have turned in their money for the trip.

<table>
<thead>
<tr>
<th>Number of Students who have turned in money</th>
<th>5</th>
<th>9</th>
<th>13</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Amount of Money Collected (dollars)</td>
<td>40</td>
<td>72</td>
<td>104</td>
<td></td>
</tr>
</tbody>
</table>

Which expression shows how to find the amount of money turned in by a total of 17 students?

A. $17 + 4$
B. $17 \times 4$
C. $17 \times 8$
D. $104 + 17$
2. A movie production company is filming a video of a 4th grade class. The students are going to build towers using cubes. Their teacher is keeping track of the number of cubes that each student receives to complete the activity. If she has passed out a total of 56 cubes, how will you find the total number of students who have cubes?

<table>
<thead>
<tr>
<th>Total number of students with cubes</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of cubes that have been passed out</td>
<td>7</td>
<td>21</td>
<td>35</td>
<td>56</td>
</tr>
</tbody>
</table>

A. Add 2 to 5.
B. Divide 56 by 7.
C. Add 14 to 35.
D. Multiply 56 times 8.
3. If the pattern in the table continues, which phrase best describes how to find the missing value?

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Distance Traveled (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>600</td>
</tr>
<tr>
<td>3</td>
<td>900</td>
</tr>
<tr>
<td>4</td>
<td>?</td>
</tr>
</tbody>
</table>

A. Multiply the number of hours by 400.
B. Divide the distance traveled by 300.
C. Add the distance traveled in 2 hours to the distance traveled in 3 hours.
D. Add the distance traveled in 1 hour to the distance traveled in 3 hours.
PRACTICE QUESTIONS
USING ORGANIZATIONAL STRUCTURES TO DESCRIBE PATTERNS AND RELATIONSHIPS

Answer:
1. C
2. B
3. D
1. Los estudiantes del cuarto grado de la escuela Willingham Elementary están planificando un viaje para visitar el Álamo en San Antonio, Texas. Ellos están tomando apuntes del número de alumnos que han entregado su dinero para el viaje.

<table>
<thead>
<tr>
<th>Numero de Estudiantes Que Han Entregado el Dinero</th>
<th>5</th>
<th>9</th>
<th>13</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total de Dinero Coleccionado (dólares)</td>
<td>40</td>
<td>72</td>
<td>104</td>
<td></td>
</tr>
</tbody>
</table>

¿Cuál expresión numérica indica cómo encontrar la cantidad total de dinero que se ha entregado de 17 estudiantes?

A. $17 + 4$
B. $17 \times 4$
C. $17 \times 8$
D. $104 + 17$
2. Una compañía productora de películas está filmando un video de una clase del cuarto grado. Los estudiantes van a construir torres utilizando cubos. Su maestra anotó el número de cubos que cada estudiante recibió para hacer la actividad. Si ella repartió 56 cubos en total, ¿cómo encuentras el número en total de los estudiantes que recibieron cubos?

<table>
<thead>
<tr>
<th>Número Total de Estudiantes Con Cubos</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Número Total de Cubos Que Se Han Repartido</td>
<td>7</td>
<td>21</td>
<td>35</td>
<td>56</td>
</tr>
</tbody>
</table>

A. Sumar 2 a 5  
B. Dividir 56 por 7  
C. Sumar 14 a 35  
D. Multiplicar 56 por 8
3. Si el patrón en esta tabla continua, cuál frase describe mejor cómo encontrar el valor que falta?

<table>
<thead>
<tr>
<th>Tiempo (Horas)</th>
<th>Distancia Viajada (millas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>600</td>
</tr>
<tr>
<td>3</td>
<td>900</td>
</tr>
<tr>
<td>4</td>
<td>?</td>
</tr>
</tbody>
</table>

A. Multiplicar el número de horas por 400
B. Dividir la distancia viajada por 300
C. Sumar la distancia viajada en 2 horas y la distancia viajada en 3 horas
D. Sumar la distancia viajada en 1 hora y la distancia viajada en 3 horas
PRACTICE QUESTIONS
USING ORGANIZATIONAL
STRUCTURES TO DESCRIBE
PATTERNS AND RELATIONSHIPS

Respuestas:
1. C
2. B
3. D
1. Look closely at the pattern of numbers listed below.

11, 18, 25, 32, 39…. 

Which of the following numbers will fit the pattern if it continues?

A. 54  
B. 57  
C. 60  
D. 66

2. Candace and Mitchell were volunteers at the school fair where they collected tickets at the ring-toss booth. They recorded the following information about the number of people who played the ring-toss game and the number of tickets that were collected.

<table>
<thead>
<tr>
<th>Time</th>
<th>Number of People</th>
<th>Number of Tickets Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>24</td>
<td>72</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>32</td>
<td>96</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>33</td>
<td>99</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>25</td>
<td>75</td>
</tr>
</tbody>
</table>

Which statement best describes how to determine the number of tickets each person needed to play the ring-toss game?

A. Multiply the number of tickets collected by 3 to determine the number of people who played the ring-toss game.  
B. Divide the number of people by the number of tickets that were collected.  
C. Multiply the number of people by 4 to determine the number of tickets.  
D. Divide the number of tickets collected by the number of people.
3. Carrie was playing a video game entitled “Forest Frenzy.” In the game, each nut she collected for the squirrel family was worth a certain number of points. Look at the chart below.

<table>
<thead>
<tr>
<th>Number of nuts collected</th>
<th>Number of points earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>250</td>
</tr>
<tr>
<td>4</td>
<td>500</td>
</tr>
<tr>
<td>6</td>
<td>750</td>
</tr>
<tr>
<td>8</td>
<td>1,000</td>
</tr>
</tbody>
</table>

How many points would Carrie earn if she collected 12 nuts?

A. 1,250
B. 1,500
C. 1,750
D. 2,000
PRACTICE QUESTIONS USING LISTS, TABLES, AND DIAGRAMS TO FIND PATTERNS

Answer:

1. C
2. D
3. B
1. Fíjate bien en el patron de números indicados aquí abajo.

   \[11, 18, 25, 32, 39, \ldots\]

¿Cuál de los siguientes números concuerda en el patron si se continúa?

A. 54  
B. 57  
C. 60  
D. 66  

2. Cándase y Michelle estaban de voluntarias en la feria de la escuela donde recogieron boletos de un puesto de juegos. Ellas anotaron la siguiente información del número de personas quienes jugaron en el juego y el número de boletos que se recogió.

<table>
<thead>
<tr>
<th>Hora</th>
<th>Número de Personas</th>
<th>Número de Boletos Recogidos</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>24</td>
<td>72</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>32</td>
<td>96</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>33</td>
<td>99</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>25</td>
<td>75</td>
</tr>
</tbody>
</table>

¿Cuál oración describe mejor como determinar el número de boletos que cada persona necesitó para jugar el juego?

A. Multiplicar el número de boletos que recogieron por 3 para determinar el número de personas quienes participaron en el juego.

B. Dividir el número de personas por el número de boletos que se recogieron.

C. Multiplicar el número de personas por 4 para determinar el número de boletos.

D. Dividir el número de boletos que recogieron por el número de personas.
1. Carolina estaba jugando con un video llamado “Locura en el Bosque”. En el juego, cada nuez que ella junta para la familia de ardillas tiene un cierto valor en número de puntos. Fíjate en la tabla de abajo.

<table>
<thead>
<tr>
<th>Número de Nueces Que Juntó</th>
<th>Número de Puntos Que Se Ganó</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>250</td>
</tr>
<tr>
<td>4</td>
<td>500</td>
</tr>
<tr>
<td>6</td>
<td>750</td>
</tr>
<tr>
<td>8</td>
<td>1,000</td>
</tr>
</tbody>
</table>

¿Cuántos puntos juntaría si Carolina junta 12 nueces?

A. 1,250
B. 1,500
C. 1,750
D. 2,000
PRACTICE QUESTIONS
USING LISTS, TABLES, AND DIAGRAMS TO FIND PATTERNS

Respuestas:

1. C
2. D
3. B
PRACTICE QUESTIONS
USING RATIOS

1. All of the students in Mrs. Johnson’s class measured their heights in centimeters. When the students graphed the data, every 10 centimeters of their actual height was equal to 1 centimeter on the graph paper. One student is about 150 centimeters tall. Which fraction best describes the ratio of the student’s actual height to the number of centimeters representing the student’s height on the graph?

A. \( \frac{15}{150} \)
B. \( \frac{150}{15} \)
C. \( \frac{150}{10} \)
D. \( \frac{15}{1} \)

2. Students in Mr. Mendoza’s mathematics class are studying similar figures. Look at the diagram comparing \( \triangle ABC \) to \( \triangle RST \).

What is the ratio of the perimeter of \( \triangle ABC \) to \( \triangle RST \)?

A. \( \frac{10}{90} \)
B. \( \frac{90}{30} \)
C. \( \frac{1}{3} \)
D. \( \frac{1}{9} \)
PRACTICE QUESTIONS
USING RATIOS

Answer:
1. B
2. C
PRACTICE QUESTIONS
USING RATIOS

Can Take You Places

1. Todos los estudiantes en la clase de la Sra. Johnson midieron sus alturas en centímetros. Cuando los estudiantes anotaron los datos en papel de grafica, cada 10 centímetros de la altura actual equivalía a 1 centímetro en el papel de graficas. Uno de los estudiantes mide más ó menos 150 centímetros de alto. ¿Cuál fracción describe mejor la razón de la altura actual del estudiante al número de centímetros representando la altura del estudiante en el papel de grafica?

A. \( \frac{15}{150} \)
B. \( \frac{150}{15} \)
C. \( \frac{150}{10} \)
D. \( \frac{15}{1} \)

2. Los estudiantes del la clase de matemáticas del Sr. Mendoza están estudiando figuras similares. Examina los diagramas que comparan ABC a RST.

¿Cuál es la razón del perímetro de ABC a RST?

A. \( \frac{10}{90} \)
B. \( \frac{90}{30} \)
C. \( \frac{1}{3} \)
D. \( \frac{1}{9} \)
Answer:
1. B
2. C
PRACTICE QUESTIONS
USING TABLES AND SYMBOLS
TO REPRESENT PROPORTIONAL
RELATIONSHIPS

1. Stuart is buying CDs. The table shows the number of CDs and their total cost.

<table>
<thead>
<tr>
<th>Number of CDs, c</th>
<th>Total Cost, d (dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$35.00</td>
</tr>
<tr>
<td>3</td>
<td>$52.50</td>
</tr>
<tr>
<td>4</td>
<td>$70.00</td>
</tr>
<tr>
<td>5</td>
<td>$87.50</td>
</tr>
</tbody>
</table>

Which expression best represents the total cost, d, in terms of the number of CDs, c?

A. 15d
B. 5/35c
C. 17.5d
D. 17.5c

2. The table below shows the bases and the volumes of a set of rectangular prisms.

<table>
<thead>
<tr>
<th>Base, b</th>
<th>Volume, v</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>48</td>
</tr>
</tbody>
</table>

Which expression best represents the volume of each rectangular prism, v, in terms of the height and base, b?

A. 4v
B. \( \frac{v}{4} \)
C. 4b
D. \( \frac{b}{4} \)
3. Look at the measurement data in the table below.

<table>
<thead>
<tr>
<th>Original measurement, $x$</th>
<th>New measurement, $y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Which expression best describes this measurement conversion?

A. $x = \frac{1}{3} y$

B. $y = \frac{1}{3} x$

C. $y = 3x$

D. $x = 3y$
PRACTICE QUESTIONS
USING TABLES AND SYMBOLS
TO REPRESENT PROPORTIONAL
RELATIONSHIPS

Answers:
1. D
2. C
3. B
PRACTICE QUESTIONS
USING TABLES AND SYMBOLS
TO REPRESENT PROPORTIONAL RELATIONSHIPS

1. Samuel está comprando discos compactos. La tabla de abajo indica el número de discos compactos y el costo total.

<table>
<thead>
<tr>
<th>Número de Discos Compactos, c</th>
<th>Costo Total, d (dólares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$35.00</td>
</tr>
<tr>
<td>3</td>
<td>$52.50</td>
</tr>
<tr>
<td>4</td>
<td>$70.00</td>
</tr>
<tr>
<td>5</td>
<td>$87.50</td>
</tr>
</tbody>
</table>

¿Cuál expresión representa mejor el costo total, d, en relación con el número de discos compactos, c?

A. 15d  
B. 5/35c  
C. 17.5d  
D. 17.5c

2. La tabla de abajo demuestra la base y el volumen de un grupo de prismas rectangulares.

<table>
<thead>
<tr>
<th>Base, b</th>
<th>Volumen, v</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>48</td>
</tr>
</tbody>
</table>

¿Cuál expresión numérica representa mejor el volumen de este grupo de prismas rectangulares, v, en relación con la altura y base, b?

A. 4v  
B. \( \frac{v}{4} \)  
C. 4b  
D. \( \frac{b}{4} \)
3. Mira los datos de medición en la tabla de abajo.

<table>
<thead>
<tr>
<th>Medición Original, x</th>
<th>Medición Nueva, y</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

¿Cuál ecuación describe mejor esta conversión de medidas?

A. $x = \frac{1}{3} y$

B. $y = \frac{1}{3} x$

C. $y = 3x$

D. $x = 3y$
PRACTICE QUESTIONS
USING TABLES AND SYMBOLS
TO REPRESENT PROPORTIONAL RELATIONSHIPS

Respuestas:

1. D  
2. C  
3. B
1. Mateo has $120.00 to buy school clothes. Using the price list, which of the following combinations of clothes can he purchase? He must choose at least one of each item.

<table>
<thead>
<tr>
<th>Toro Mart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shirts $20.00</td>
</tr>
<tr>
<td>Blue Jeans $25.00</td>
</tr>
<tr>
<td>Shoes $30.00</td>
</tr>
</tbody>
</table>

A. 3 Shirts, 1 pair of jeans, 2 pairs of shoes  
B. 2 Shirts, 2 pairs of jeans, 2 pairs of shoes  
C. 2 Shirts, 2 pairs of jeans, 1 pair of shoes  
D. 3 Shirts, 2 pairs of jeans, 2 pairs of shoes

2. Jasmine has $32.00 in her piggy bank. She is given a weekly allowance. She puts half of that into her piggy bank each week. What information is needed to determine the amount of money Jasmine will have in her piggy bank in twelve weeks?

A. The cost of the piggy bank  
B. The amount of her allowance  
C. The amount of the item she is saving for  
D. Which day of the week she receives her allowance

3. Alma's dad drives to work every Monday through Friday. Alma and her father live 32 miles from his job. Which equation shows how to determine the total miles he will drive to work in one week?

A. Total miles = 32 miles + 32 miles + 32 miles + 32 miles + 32 miles  
B. Total miles = 32 miles \( \times \) 5 days  
C. Total miles = 32 miles – 5 days  
D. Total miles = 5 days \( \times \) 2 trips per day \( \times \) 32 miles per trip
PRACTICE QUESTIONS
IDENTIFYING MATH IN EVERY DAY SITUATIONS

Answers:
1. C
2. B
3. D
1. Mateo tiene $120.00 para comprarse ropa nueva para la escuela. ¿Usando la tabla siguiente que indica la lista de precios, cuales combinaciones de ropa puede comprarse? El debe escoger por lo menos uno de cada artículo de ropa.

<table>
<thead>
<tr>
<th>Tienda: El Toro</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Camisa</td>
<td>$20.00</td>
</tr>
<tr>
<td>Pantalón</td>
<td>$25.00</td>
</tr>
<tr>
<td>Zapatos</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

A. 3 camisas, 1 par de pantalones, 2 pares de zapatos  
B. 2 camisas, 2 pares de pantalones, 2 pares de zapatos  
C. 2 camisas, 2 pares de pantalones, 1 par de zapatos  
D. 3 camisas, 2 pares de pantalones, 2 pares de zapatos

2. Jazmín tiene $32.00 en su alcancía. A ella le pagan cada semana y ahorrará la mitad en su alcancía. ¿Qué información es necesario para determinar la cantidad de dinero que Jazmín tendrá alzado en su alcancía dentro de 12 semanas?

A. El costo de su alcancía.  
B. La cantidad que le pagan.  
C. El costo del artículo para cual ella está ahorrando.  
D. El día de la semana cuando ella recibe su pago.

3. El papá de Alma maneja su carro al trabajo de lunes a viernes. El maneja 32 millas en cada ida y cada vuelta. ¿Cuál ecuación indica como determinar el número total de millas que el papá de Alma maneja a su trabajo en 1 semana?

A. Total de millas = 32 millas + 32 millas + 32 millas + 32 millas + 32 millas.  
B. Total de millas = 32 millas x 5 días.  
C. Total de millas = 32 millas – 5 días.  
D. Total de millas = 5 días x 2 viajes por día x 32 millas por viaje.
PRACTICE QUESTIONS
IDENTIFYING MATH IN EVERY DAY SITUATIONS

Answers:
1. C
2. B
3. D
1. Joshua went school shopping and spent $150.00 on clothes and shoes. He bought shoes for $48.00, 2 shirts for $18.00 each, and three pairs of pants. If all three pairs of pants were the same price, what was the cost of each pair of pants?

   A. $12.00
   B. $22.00
   C. $66.00
   D. $84.00

2. Nia rides her bike to school 5 days a week; she rides a total of 10 miles for the week. What would Nia do to determine the number of miles she would ride in 7 days?

   A. Subtract 5 from 10 and multiply the result by 7.
   B. Divide 10 by 5 and multiply the result by 7.
   C. Multiply 10 by 5 and multiply the result by 7.
   D. Add 5 and 7 and multiply the result by 10.

3. Taylor is saving for a game cartridge for her handheld video game. The cost of the game is $49.99. Each week she receives $2.50 for her allowance. If she doesn’t spend any of her allowance, how many weeks will it take her to save enough money to purchase the cartridge?

   A. 5 weeks
   B. 10 weeks
   C. 20 weeks
   D. 50 weeks
PRACTICE QUESTIONS USING PROBLEM-SOLVING MODELS

Answers:
1. B
2. B
3. C
1. Josué fue de a la tienda para comprarse ropa para la escuela y gastó $150.00 en ropa y zapatos. Él se compró zapatos por $48.00, 2 camisas por $18.00 cada una, y 3 pares de pantalones. ¿Si los 3 pares de pantalones fueron del mismo precio, cuál fue el costo de cada par de pantalones?

   A. $12.00  
   B. $22.00  
   C. $66.00  
   D. $84.00  

2. Nia va a la escuela en su bicicleta los 5 días de la semana. Ella hace un total de 10 millas por semana en su bicicleta. ¿Qué tendrá que hacer Nia para determinar el número total de las millas que haría en 7 días?

   A. Restar 5 del 10 y multiplicar el resultado por 7.  
   B. Dividir 10 por 5 y multiplicar el resultado por 7.  
   C. Multiplicar 10 por 5 y multiplicar el resultado por 7.  
   D. Sumar 5 y 7 y multiplicar el resultado por 10.  

3. Taylor está ahorrando para comprar un cartucho para su juego de video. El cartucho cuesta $49.99. Cada semana él recibe $2.50. ¿Si él no gasta el dinero que recibe, cuantas semanas se llevará para que el ahorre suficiente dinero para comprar el cartucho?

   A. 5 semanas  
   B. 10 semanas  
   C. 20 semanas  
   D. 50 semanas  

PRACTICE QUESTIONS USING PROBLEM-SOLVING MODELS

Answers:
1. B
2. B
3. C
1. Look at the table of data below.

<table>
<thead>
<tr>
<th></th>
<th>1 + 4 + 5</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 + 4 + 5</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>3 + 4 + 5</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>4 + 4 + 5</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>5 + 4 + 5</td>
<td>25</td>
</tr>
</tbody>
</table>

Which situation best matches the table of data?

A. Four students each had a certain number of pencils.
B. No matter how many students get cookies, there will be an extra five cookies left over.
C. Each day, Monday through Friday, the school bell rang at 4:05 PM.
D. Movie rentals were $4.00 each with a $5.00 discount.

2. A train leaves Pleasantville and arrives at Bonner Town at 10:00 AM. It leaves Bonner Town and arrives in Falls City at 12:05 PM. What else do you need to know in order to determine the train’s total travel time from Pleasantville to Falls City?

A. The time the train will arrive back in Pleasantville.
B. The amount of time it takes to travel from Falls City back to Bonner Town.
C. The time the train will leave Falls City headed back to Pleasantville.
D. The time the train left Pleasantville.
3. Jacob’s teacher said that she was thinking of a certain number. She said that if she starts with the number and multiplies by 8 and then subtracts 3, she gets 21. Jacob knew that in order to find the answer, he would have to go backwards, starting from 21. Which sentence best describes how Jacob came up with the right answer?

A. Start at 21 and subtract 3 and multiply that total by 8 to find the missing number.
B. Start at 21, add 3 and divide that total by 8 to find the missing number.
C. Start at 21, subtract 3 and divide that total by 8 to find the missing number.
D. Start at 21, divide by 3 and multiply that total by 8 to find the missing number.
PRACTICE QUESTIONS
SELECTING A
PROBLEM-SOLVING STRATEGY

Answers:
1. B
2. D
3. B
1. Mira la tabla con datos:

<table>
<thead>
<tr>
<th>1</th>
<th>1 \times 4 + 5</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 \times 4 + 5</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>3 \times 4 + 5</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>4 \times 4 + 5</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>5 \times 4 + 5</td>
<td>25</td>
</tr>
</tbody>
</table>

¿Cuál ejemplo describe mejor la tabla de datos?

A. Cuatro estudiantes cada uno tenía cierto número de lápices.
B. Los estudiantes tenían cuatro galletas cada uno y había 5 galletas sobradas.
C. Cada día, lunes a viernes, la campana de la escuela sonaba a las 4:05 P.M.
D. Rentas de video de películas eran $4.00 cada una con un descuento de $5.00.

2. El tren sale de Pleasantville y llega a Bonner Town a las 10:00 A.M.; sale de Bonner Town y llega a Falls City a las 12:05 P.M. ¿Qué mas tienes que saber para determinar el tiempo total que el tren se toma en viajar de Pleasantville a Falls City?

A. La hora cuando regresa el tren de Pleasantville.
B. El tiempo que se toma para viajar de regreso de Falls City a Bonner Town.
C. La hora que el tren saldrá de Falls City hacia el regreso a Pleasantville.
D. La hora cuando el tren salió de Pleasantville.
3. La maestra de Jacobo dijo que estaba pensando en un cierto número. Ella dijo que si ella empieza con ese número y multiplica por 8 y luego resta 3, ella obtiene 21. Jacobo sabía que para encontrar la respuesta, tenía que regresarse empezando con 21. ¿Cuál estrategia describe mejor como Jacobo consiguió la respuesta correcta?

A. Empezar con 21 y restar 3 y multiplicar ese total por 8 para encontrar el número ausente.

B. Empezar con 21, sumar 3 y multiplicar ese total por 8 para encontrar el número ausente.

C. Empezar con 21, restar 3 y dividir ese total por 8 para encontrar el número ausente.

D. Empezar con 21, dividir por 3 y multiplicar ese total por 8 para encontrar el número ausente.
PRACTICE QUESTIONS
SELECTING A PROBLEM-SOLVING STRATEGY

Answers:
1. B
2. D
3. B
1. Tickets to a local high school basketball game cost $3.00 for students, $5.00 for teachers and $7.00 for everyone else who wants to purchase a ticket. At the first game, there were 334 students, 87 teachers and 453 parents who bought tickets. What could possibly be the first step to calculate how much money the school made from all the ticket sales from the first game?

   A. Multiply $3.00 by $5.00
   B. Multiply 334 by $7.00
   C. Multiply $3.00 by 334
   D. Multiply 453 by 87

2. Dorian and Khalim have a total of 45 different CDs between the two of them. Dorian has 3 more than one third of the total number of CDs. How many CDs does Khalim have?

   A. 20
   B. 27
   C. 30
   D. 35
PRACTICE QUESTIONS
SELECTING A PROBLEM-SOLVING STRATEGY

Answers:
1. C
2. B
1. Los boletos para un juego de baloncesto de la preparatoria local cuestan $3.00 por estudiante, $5.00 por maestro, y $7.00 por todo otro adulto quien quiera comprar un boleto. En el primer juego, hubieron 334 estudiantes, 87 maestros, y 453 adultos quienes compraron boletos. ¿Cuál sería el primer paso para calcular cuanto dinero hizo la escuela de las ventas de boletos de ese primer juego?

   A. Multiplicar $3.00 por $5.00
   B. Multiplicar 334 por $7.00
   C. Multiplicar $3.00 por 334
   D. Multiplicar 453 por 87

2. Dora y Karen, entre las dos, tienen un total de 45 diferentes discos compactos. Dora tiene 3 más que un tercio del número total de discos compactos. ¿Cuántos discos compactos tiene Karen?

   A. 20
   B. 27
   C. 30
   D. 35
PRACTICE QUESTIONS
SELECTING A PROBLEM-SOLVING STRATEGY

Answers:
1. C
2. B
1. Kevin and his sister participated in a bike-a-thon. They raised a total of $360.00. Kevin collected \( \frac{1}{3} \) of the money and his sister collected \( \frac{1}{2} \) of the money. Their parents contributed the remainder of the $360.00. How much money did their parents contribute?

A. $60.00  
B. $80.00  
C. $90.00  
D. $100.00

2. Selena drives to school Monday and Tuesday. The amount of gas in the tank on Monday morning is shown on the gas gauge below. If she uses \( \frac{1}{8} \) of a tank of gas each day, how much gas is left in the tank?

A. \( \frac{1}{4} \) of the tank  
B. \( \frac{3}{8} \) of the tank  
C. \( \frac{5}{8} \) of the tank  
D. \( \frac{3}{4} \) of the tank
3. Edgar wants a new bike. His dad will pay for $\frac{3}{8}$ of the cost of the bike and his uncle will pay for $\frac{1}{4}$ of the cost. What fractional part of the cost is Edgar responsible for paying?

A. $\frac{1}{3}$ of the cost  
B. $\frac{1}{4}$ of the cost 
C. $\frac{5}{8}$ of the cost  
D. $\frac{3}{8}$ of the cost
Answers:
1. A
2. C
3. D
1. Kevin y su hermana participaron en una maratón de bicicleta. Ellos consiguieron un total de $360.00. Kevin consiguió $\frac{1}{3}$ del dinero y su hermana consiguió $\frac{1}{2}$ del dinero. Sus padres contribuyeron con el resto del los $360.00. ¿Qué cantidad de dinero contribuyeron sus padres?

   A. $60.00  
   B. $80.00  
   C. $90.00  
   D. $100.00

2. Selena manejó en su carro para la escuela el lunes y martes. El lunes por la mañana, la cantidad en el tanque de gasolina está demostrada en la grafica de abajo. ¡Si ella usó $\frac{1}{8}$ del tanque de gasolina cada día, cuanta gasolina le quedó en el tanque después de los dos días?

   A. $\frac{1}{4}$ de tanque de gasolina  
   B. $\frac{3}{8}$ de tanque de gasolina  
   C. $\frac{5}{8}$ de tanque de gasolina  
   D. $\frac{3}{4}$ de tanque de gasolina
3. Edgar quiere una nueva bicicleta. Su papá le pagará \( \frac{3}{8} \) del costo de la bicicleta y su tío le pagará \( \frac{1}{4} \) del costo. ¿Cuál es la fracción del costo que a Edgar le corresponde pagar?

A. \( \frac{1}{3} \) del costo

B. \( \frac{1}{4} \) del costo

C. \( \frac{5}{8} \) del costo

D. \( \frac{3}{8} \) del costo
PRACTICE QUESTIONS
SOLVE REAL-LIFE
PROBLEMS INVOLVING FRACTIONS

Answers:
1. A
2. C
3. D
1. The Nguyen family took a trip on an Alaskan railroad to see Mt. McKinley, the highest mountain in the United States. They traveled 128 miles from Seward to Anchorage and 264 miles from Anchorage to Denali National Park.

After their visit to Mt. McKinley, they returned to Seward. Which is the best estimate of the total number of miles the Nguyen family traveled on the train?

A. 390 miles  
B. 520 miles  
C. 650 miles  
D. 780 miles
2. Maricela’s school had a fundraiser for a trip to Carlsbad Caverns, New Mexico. The school was selling candles at $4.50 a piece. If Maricela sold 39 candles, about how much money did she raise for the school?

A. $45  
B. $160  
C. $200  
D. $390

3. Ian borrowed $330 from his brother, Caton. Ian agreed to pay Caton back in weekly installments over a six-week period. About how much will Ian pay back to Caton each week?

A. $33  
B. $50  
C. $60  
D. $90

4. Jordan needs to estimate the total number of people that attended this year’s sporting events. Using the information in the table below, what was the estimated total that Jordan found?

<table>
<thead>
<tr>
<th>Sporting Event</th>
<th>Soccer</th>
<th>Baseball</th>
<th>Football</th>
<th>Softball</th>
<th>Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of People Attending</td>
<td>3,345</td>
<td>4,789</td>
<td>8,430</td>
<td>2,899</td>
<td>7,682</td>
</tr>
</tbody>
</table>

A. 25,000  
B. 27,000  
C. 29,000  
D. 30,000
5. Amber and her mother were shopping for CDs. She told her mother that she knew the estimated total would be less than $150. The CDs cost $14.95 each, and they purchased 8 CDs. How did Amber come to her conclusion about the estimated price of the CDs?

A. Amber estimated $14.00 for the $14.95 CDs and multiplied by 8 CDs.
B. Amber estimated this amount because she had bought CDs at this store before.
C. Amber estimated $15.00 for the $14.95 CDs, estimated 10 for the number of CDs, which was actually 8, and then multiplied $15.00 by 10.
D. Amber estimated $10.00 for the $14.95 CDs and estimated 10 for the number of CDs, which was actually 8, and multiplied $10.00 by 10.

6. Ahmed and his family went on a trip to St. Thomas in the U.S. Virgin Islands. The cost of the trip was $3,144.00 for the entire family. If the family spent an additional $356 on new clothes for the vacation as well as bought $176 worth of souvenirs while in St. Thomas, about how much did the family spend in total for the vacation?

A. $3,100
B. $3,500
C. $3,700
D. $3,900
PRACTICE QUESTIONS
ESTIMATING TO DETERMINE REASONABLE RESULTS

Answers:
1. D
2. C
3. B
4. B
5. C
6. C
1. La familia Navarro tomaron un viaje por tren a Alaska para visitar la Sierra McKinley, la sierra más alta en los Estados Unidos. Ellos viajaron 128 millas desde Seward hasta Anchorage y 264 millas desde Anchorage hasta Denali National Park.

Después de su viaje a Sierra McKinley, ellos regresaron a Seward. ¿Cuál es la mejor estimación del número total de millas que la familia Navarro viajó por tren?

   A. 390 millas
   B. 520 millas
   C. 650 millas
   D. 780 millas
2. La escuela de Marisela necesita conseguir fondos para tomar un viaje a las Cavernas Carlsbad en Nuevo México. La escuela está vendiendo velas a $4.50 cada una. Si Marisela vende 39 velas, más o menos cuanto dinero juntará para la escuela?

A. $45
B. $160
C. $200
D. $390

3. Iván le pidió prestado a su hermano, Carlos, $330. Iván prometió pagarle el dinero a Carlos en pagos semanales dentro de un periodo de seis semanas. ¿Cuánto le irá a pagar Iván a Carlos cada semana?

A. $33
B. $50
C. $60
D. $90

4. Jordán necesita hacer una estimación del número total de personas que presenciaron en los eventos deportivos este año. ¿Usando la información en esta tabla de abajo, cuál fue el total estimado que Jordán calculó?

<table>
<thead>
<tr>
<th>Evento Deportivo</th>
<th>Fútbol</th>
<th>Béisbol</th>
<th>Fútbol Americano</th>
<th>Baloncesto</th>
<th>Tenis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numero Total de Personas Presente</td>
<td>3,345</td>
<td>4,789</td>
<td>8,430</td>
<td>2,899</td>
<td>7,682</td>
</tr>
</tbody>
</table>

A. 25,000
B. 27,000
C. 29,000
D. 30,000
5. Amber y su madre fueron de compras por unos discos compactos. Ella le dijo a su madre que ella sabía que el total estimado sería menos que $150. Los discos compactos cuestan $14.95 cada uno y compraron 8 discos compactos. ¿Cómo llegó Amber a la conclusión del precio estimado de los discos compactos?

A. Amber estimó $14.95 a $14.00 y multiplicó por 8 discos compactos.

B. Amber estimó esta cantidad porque ella había comprado discos compactos antes en esta tienda.

C. Amber estimó $15.00 por el precio de $14.95 de los discos compactos, estimó 10 por el número de los discos compactos, cuy en realidad fueron 8, y luego multiplicó $15.00 por 10.

D. Amber estimó $10.00 por el precio de $14.95 de los discos compactos y estimó 10 por el número de los discos compactos cuy en realidad fueron 8, y multiplicó $10.00 por 10.

6. Armando y su familia se fueron de viaje a Santo Tomás en las islas vírgenes de los Estados Unidos. El costo total de este viaje fue $3,144.00 por toda la familia entera. Si la familia gastó $356 adicionales en ropa nueva para el viaje y compró $175 de recuerdos mientras estaban en Santo Tomás. ¿Cómo cuánto gastó la familia en total en este viaje?

A. $3,100
B. $3,500
C. $3,700
D. $3,900
PRACTICE QUESTIONS
ESTIMATING TO DETERMINE REASONABLE RESULTS

Respuestas:
1. D
2. C
3. B
4. B
5. C
6. C
1. Lorissa plans to attend four different summer camps. The first two summer camps cost $289.00 each. Green Oaks summer camp costs $228 and Volleyball camp costs $343.00. About how much will she have to pay for all four camps?
   A. $500.00
   B. $700.00
   C. $800.00
   D. $1100.00

2. Cathy and her four sisters have decided to purchase a computer system for $989.00. Which equation shows about how much each sister will have to put in for the system if they all want to pay about the same amount?
   A. $1,000.00 · 5.
   B. $1,000.00 · 4.
   C. $1,000.00 ÷ 5.
   D. $1,000.00 ÷ 4.

3. There are a total of 4,187 fifth graders in the Fort Worth School System. If there are 23 elementary schools, which number sentence shows the approximate number of fifth graders at each school?
   A. 20 schools · 150 students per school
   B. 20 schools · 200 students per school
   C. 250 students per school ÷ 20 schools
   D. 20 students per school ÷ 20 schools
4. The table below shows the number of gallons of triple chocolate ice cream the Tasty Ice Cream shop bought for the first four weeks of summer.

<table>
<thead>
<tr>
<th>Week</th>
<th>Number of Gallons Bought</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>479</td>
</tr>
<tr>
<td>2</td>
<td>503</td>
</tr>
<tr>
<td>3</td>
<td>641</td>
</tr>
<tr>
<td>4</td>
<td>798</td>
</tr>
</tbody>
</table>

About how many ice cream gallons were bought for the first 4 weeks of summer?

A. 2,200  
B. 2,400  
C. 2,600  
D. 2,800  

5. The Success Academy Elementary School 6th-grade class is selling cookies to raise money for a field trip. The students began the sale with 1,025 packages of cookies. They sold 423 packages this week and 271 packages the week before. About how many packages of cookies do they have left to sell?

A. 300  
B. 400  
C. 500  
D. 600
PRACTICE QUESTIONS
ESTIMATING TO DETERMINE REASONABLE RESULTS

Answers:
1. D
2. C
3. B
4. B
5. A
1. Larissa está planeando atender cuatro diferentes campamentos de verano. Dos de estos campamentos cuestan $289.00 cada uno. El campamento Encinos Verdes cuesta $228 y el campamento Voleibol cuesta $343.00. ¿Más o menos cuanto tendrá que pagar Larissa por los cuatro campamentos?

A. $500.00  
B. $700.00  
C. $800.00  
D. $1100.00

2. Catia y sus cuatro hermanas han decidido en comprar un sistema de computadora por $989.00. ¿Cuál ecuación demuestra más o menos la cantidad que cada hermana tendrá que contribuir para el sistema de computadora?

A. $1,000.00 x 5  
B. $1,000.00 x 4  
C. $1,000.00 ÷ 5  
D. $1,000.00 ÷ 4

3. Hay un total de 4,187 estudiantes del quinto grado en el distrito escolar de Fort Worth. ¿Si hay 23 escuelas primarias, cual oración numérica demuestra aproximadamente el número de estudiantes del quinto grado en cada escuela primaria?

A. 20 escuelas x 150 estudiantes por escuela  
B. 20 escuelas x 200 estudiantes por escuela  
C. 150 estudiantes por escuela ÷ 20 escuelas  
D. 20 estudiantes por escuela ÷ 20 escuelas
4. The table below shows the number of gallons of triple chocolate ice cream the Tasty Ice Cream shop bought for the first four weeks of summer.

<table>
<thead>
<tr>
<th>Week</th>
<th>Number of Gallons Bought</th>
</tr>
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<tr>
<td>1</td>
<td>479</td>
</tr>
<tr>
<td>2</td>
<td>503</td>
</tr>
<tr>
<td>3</td>
<td>641</td>
</tr>
<tr>
<td>4</td>
<td>798</td>
</tr>
</tbody>
</table>

About how many ice cream gallons were bought for the first 4 weeks of summer?

A. 2,200
B. 2,400
C. 2,600
D. 2,800

5. The Success Academy Elementary School 6th grade class is selling cookies to raise money for a field trip. The students began the sale with 1,025 packages of cookies. They sold 423 packages this week and 271 packages the week before. About how many packages of cookies do they have left to sell?

A. 300
B. 400
C. 500
D. 600
PRACTICE QUESTIONS
ESTIMATING TO DETERMINE REASONABLE RESULTS

Answers:
1. D
2. C
3. B
4. B
5. A
1. Kenyon works at a candy store. The last four customers who came to the store all purchased trail mix. The first customer purchased 2.73 pounds of trail mix, the second customer purchased 5.08 pounds, and the third and fourth customers both purchased 4.25 pounds apiece. What is the best estimate of the total amount of trail mix that the four customers purchased?

   A. 12 pounds
   B. 14 pounds
   C. 16 pounds
   D. 18 pounds

2. Alex and four of his friends went to the movies. The total cost of the movie tickets was $37.50. Approximately how much was the cost of one movie ticket?

   A. $10.00
   B. $9.00
   C. $8.00
   D. $6.00

3. Breanna kept a log of the amount of time she practiced her bass clarinet. The number of minutes she practiced last week is in the table below.

<table>
<thead>
<tr>
<th>Day</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (minutes)</td>
<td>53</td>
<td>27</td>
<td>61</td>
<td>34</td>
<td>0</td>
<td>58</td>
</tr>
</tbody>
</table>

   Approximately how much time did Breanna spend practicing last week?

   A. Less than 3 hours
   B. Between 3 and 4 hours
   C. Between 4 and 5 hours
   D. More than 5 hours
PRACTICE QUESTIONS
ESTIMATING TO FIND REASONABLE ANSWERS TO PROBLEMS

Answers:
1. C
2. C
3. B
PRACTICE QUESTIONS
ESTIMATING TO FIND REASONABLE ANSWERS TO PROBLEMS

1. Carlos trabaja en una tienda de dulces. Los últimos cuatro clientes todos compraron dulces de chocolate. El primer cliente compró 2.73 libras de chocolates, el segundo cliente compró 5.08 libras, y el tercer y cuarto cliente ambos compraron 4.25 libras. ¿Cuál es la mejor estimación de la cantidad total de dulces de chocolates que se compró entre los cuatro clientes?

A. 12 libras
B. 14 libras
C. 16 libras
D. 18 libras

2. Alejandro y cuatro de sus amigos fueron al cine. El costo total de los boletos del cine fue $37.50. ¿Aproximadamente cuál fue el costo de un boleto?

A. $10.00
B. $9.00
C. $8.00
D. $6.00

3. Breana hizo unos apuntes en su diario de la cantidad de tiempo que ella practicó su clarinete. El número de minutos que ella practicó la semana pasada están en la tabla de abajo.

<table>
<thead>
<tr>
<th>Día</th>
<th>lunes</th>
<th>martes</th>
<th>miércoles</th>
<th>jueves</th>
<th>viernes</th>
<th>sábado</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hora</td>
<td>53</td>
<td>27</td>
<td>61</td>
<td>34</td>
<td>0</td>
<td>58</td>
</tr>
</tbody>
</table>

¿Aproximadamente cuánto tiempo practicó Breana la semana pasada?

A. Menos que 3 horas
B. Entre 3 y 4 horas
C. Entre 4 y 5 horas
D. Más que 5 horas
PRACTICE QUESTIONS
ESTIMATING TO FIND
REASONABLE ANSWERS
TO PROBLEMS

Answers:
1. C
2. C
3. B
1. Shanté is totaling the number of donations she collected for the school walk-a-thon. She knows that 12 people donated $8.00 each and 17 people donated $15.00 each. What process can Shanté use to quickly find the total she collected in donations?

   A. Multiply $8.00 by 17 and $15.00 by 12. Add the two totals.
   B. Multiply $15.00 by 8 and $8.00 by 12. Add the two totals.
   C. Multiply $8.00 by 12 and $15.00 by 17. Add the two totals.
   D. Multiply $15.00 by 8 and $12.00 by 17. Add the two totals.

2. Look at the diagram of the parallelogram.

   What process best describes how to find the measurement of angle D?

   A. Multiply 43° by 2 and subtract from 360°
   B. Multiply 43° by 2 and subtract from 180°
   C. Subtract 43° from 180°
   D. Subtract 43° from 90°
Answers:

1. C
2. C
1. Sasha está calculando el número total de las donaciones que ella consiguió en la caminata que tuvieron en la escuela. Ella sabe que 12 personas donaron $8.00 cada una y 17 personas donaron $15.00 cada una. ¿Cuál proceso podría usar Sasha para rápidamente obtener el total de las donaciones que ella consiguió?

   A. Multiplicar $8.00 por 17 y $15.00 por 12. Sumar los dos resultados.
   B. Multiplicar $15.00 por 8 y $8.00 por 12. Sumar los dos resultados.
   C. Multiplicar $8.00 por 12 y $15.00 por 17. Sumar los dos resultados.
   D. Multiplicar $15.00 por 8 y $12.00 por 17. Sumar los dos resultados.

2. Mira el diagrama de un paralelogramo.

¿Cuál proceso describe mejor la manera de calcular la medida del ángulo D?

   A. Multiplicar 43° por 2 y restarle a 360°
   B. Multiplicar 43° por 2 y restarle a 180°
   C. Restar 43° a 180°
   D. Restar 43° a 90°
PRACTICE QUESTIONS
SOLVING PROBLEMS
CONNECTED TO
EVERYDAY EXPERIENCES

Respuestas:
1. C
2. C
ESL STRATEGIES FOR TEACHING MATHEMATICS

- Allow students to verbalize/restate the steps to solve a given mathematical problem after you have demonstrated the problem-solving strategy or operation.
- Allow additional time for students to respond to an oral question or to turn in assignments.
- Teach from the concrete to the pictorial to the abstract.
- Give students fewer problems to solve during any given assignment.
- Use manipulatives in the classroom on a daily basis; for example: when first introducing a new concept or operation.
- As part of your daily instruction, use graphic organizers to introduce, reflect and reinforce mathematical concepts and vocabulary. Examples include concept circles, verbal and visual word association, Frayer Model, word mapping, etc.
- Maintain a mathematical word wall.
- Be cognizant that students have different learning styles, abilities and varying intelligence.
- Speak at a slower pace; students may be at different language levels.
- When using jargon and idioms, explain these to second-language students. Otherwise, they may take the messages literally and the messages may not make sense.
- Have students write in their math journals to reflect upon what they’ve learned recently or upon concepts that need to be clarified.
- Use calculators, computers and the Internet to supplement learning.
- Maintain a reference library of books and resources in the students’ native language to aid in the translation of mathematical concepts, terms, etc.
- Be aware that other countries and cultures have different methods of solving mathematical problems.
- Identify the mathematics terminology that has a special meaning beyond everyday English. Examples include such words as “difference.”

Resources:
The CALLA Handbook, Implementing the Cognitive Academic Language Learning Approach, by Anna Uhl Chamot and J. Michael O’Malley
A Mathematical Problem: How Do We Teach Mathematics to LEP Elementary Students? The Journal of Educational Issues of Language Minority Students, v13; p1-12, Spring 1994
Clare Heidema/RMC Research; heidema@mcdenver.com
GLOSSARY

Area (A):
The measure, in space units, of the interior region of a two-dimensional figure or the surface of a three-dimensional figure.

Arrays:
An arrangement of objects in equal rows.

Average (mean):
The sum of a set of numbers divided by the number of numbers in the set. The mean is often referred to as the average.

Circumference (C):
The distance around a circle.

Customary Units of Measure:
A system of measurement used in the United States which includes measurement of length, weight, and temperature.

Decimal Number:
A number written using base ten and containing a decimal point.

Diameter:
A chord or line segment that passes through the center of a circle and which has two endpoints on the circle.

Equivalency:
Equivalent: Having the same value, but expressed in a different form. For example, a fraction and a decimal may represent the same value but be expressed in a different form.

Equivalent Fractions: Fractions that have different denominators but have the same value.
Estimation (strategies):

Estimate: To find a number close to an exact amount. An estimate tells about how much or about how many. It is not an exact answer. It is a ballpark figure when you cannot calculate exactly.

(1) Look at the answers to the question and decide whether you need to round. If you need to round, look at your answers to find out what place value they rounded. Round the numbers first, then add or subtract. Change the numbers in the problem and write the rounded number above them.

(2) Rounding is one estimation skill. Decide what place value you need to round to. Look at the digit to the right of the place value to be rounded and circle it. If the number is five or more, increase the circled number by 1 and the numbers to the right become zeros. If the number is less than five, leave the circled number as is and the other numbers to the right become zeros.

(3) Compatible Numbers: A pair of numbers that is easy to work with that can be added, subtracted, multiplied, or divided with ease. Examples might be numbers close to a multiple of 10, 100 or 1,000.

(4) Front-end Estimation: Estimating sums or differences using just the front digits. For example, when you estimate the sums of 137, 29, and 233: 137 becomes 130, 29 becomes 20, 233 becomes 230. The sum is 130 + 20 + 230 = 380.

OR: If one estimates the difference between 15.4 and 9.3, 15.4 becomes 15.0 and 9.3 becomes 9.0. Therefore, 15.0 - 9.0 = 6.0.

(5) Estimating with Fractions: Using benchmarks – or numbers – that are easy to work with. Common benchmarks for estimating with fractions are 0, ½, and 1. Use a number line or a picture to help you decide which fraction is closest to 0, ½ or 1.
Fact Families:
Number sentences that relate addition and subtraction or multiplication and division. Each number sentence in the fact family has the same numbers. For example: \(11 + 2 = 13, 2 + 11 = 13, 13 – 2 = 11, \) and \(13 – 11 = 2.\)

Fraction:
A way of representing part of a whole or part of a group by telling the number of equal parts in the whole and the number of those parts you are describing.

Height (h):
(1) The length of a perpendicular from a vertex to the opposite side of a plane figure. (2) The length of a perpendicular from the vertex to the base of a pyramid or a cone. (3) The length of a perpendicular between the bases of a prism or cylinder.

Length (l):
The distance along a line or figure from one point to another.

Median:
When the numbers are arranged from least to greatest, the middle number of a set of numbers, or the mean of two middle numbers when the set has two middle numbers.

Metric System:
A system of measurement based on tens.

Mode:
The number that appears most frequently in a set of numbers. There may be one, more than one, or no mode.

Patterns:
A number, order of, or form that that repeats and is predictable.
GLOSSARY

Perimeter (P):
The distance around a figure.

Proportion:
An equation showing two equivalent ratios.

Radius (r):
The line segment from the center of a circle to any point on the circle.

Range:
The difference between the greatest and the least value in a set of data.

Ratio:
A comparison of two numbers or measures of like units using division. Ratios can be expressed as fractions, decimals, percents or words.

Scale:
(1) The ratio of length used in a drawing, map or model to its length in reality.
(2) A system of marks at fixed intervals used in measurement or graphing. (3) An instrument used for weighing.

Volume (V):
The number of cubic units it takes to fill a solid.

Weight:
A measure of the heaviness of an object.

Width (w):
One dimension of a two-or three-dimensional figure.

Resource:
*Math to Know, A Mathematics Handbook* by Mary C. Cavanagh, a Great Source Publication

travelocity
<table>
<thead>
<tr>
<th>Series</th>
<th>Title</th>
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<td>Using Manipulatives</td>
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<td>3</td>
<td>Mathematics in Everyday Life</td>
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<td>4</td>
<td>Thinking Algebraically</td>
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<tr>
<td>5</td>
<td>Incorporating the Internet</td>
</tr>
</tbody>
</table>
Navigating the PDF Slideshow

Open PDF file in Adobe Acrobat.

Adobe Acrobat Reader necessary to view the slideshows.

Go to “View” in the Menu Bar and select “Full Screen.”

The slide will fill the screen.

To advance from slide to slide:
Press Enter or the Right Arrow key or Down Arrow key on the keyboard.

If it is necessary to move back a slide:
Press Shift-Enter or the Left Arrow key or Up Arrow key.

Press the Esc key to exit the slide show.
The Math Can Take You Places "Using Manipulatives" training is designed to be approximately one hour long. The length can vary according to time constraints and participation.

To begin and end the session, use your own icebreaker/introductory/conclusion activity or choose one from the Math Can Take You Places Icebreaker/Introductory/Conclusion Ideas list. You may also want to begin the sessions by sharing an overview of the Math Can Take You Places curriculum toolkit.

► Materials

- Post-it® notes (3 inch x 3 inch)
- Two sheets of chart paper
- Markers
- Note cards
- A copy of the Using Manipulatives "Video Focus Questions" handout for each participant
- A copy of the Using Manipulatives "Walk-About" handout for each participant
- A copy of the Using Manipulatives "Creative Uses for Everyday Objects" handout for each participant
- Math Can Take You Places Professional Development Series "Using Manipulatives" video

Optional

- PDF slideshow “Using Manipulatives in the Mathematics Classroom”
- Prize for the winner of the “Walk-About” activity if you choose to do the game option
- Actual everyday materials for the participants to see and touch during Group Activity 2
 Preparation

• Gather the two sheets of chart paper.
• Label one of the sheets of chart paper “Successes Using Manipulatives.” Label the other sheet “Challenges Using Manipulatives.”
• Make copies of the three handouts listed above.
• Collect the materials needed for the optional activities listed above if you choose.

 Introductions/Icebreaker (5-6 minutes) Slide 2

 Session Goals (2 minutes) Slide 3

• Investigate the use of manipulatives to teach mathematics.
• Provide tips for instruction/facilitation.
• Plan effective lessons incorporating manipulatives.
• Share professional expertise.

 Focus Statement/Question Group Activity (15 minutes) Slide 4

Say to the group, "Think of a time you used manipulatives to teach a mathematics concept. What made the lesson successful? What made it challenging?"

Ask the participants to list one idea per Post-it® note. Allow the participants to post their thoughts and review the other responses as they go. After everyone’s responses are up, elaborate and discuss the most interesting thoughts if time permits.

 Video Focus (10 minutes) Slide 5

Give each participant the Using Manipulatives "Video Focus Questions" handout.

Say, "Listen for the following ideas presented in the video. How does the teacher prepare his students to work with manipulatives?"
How does he check for effectiveness of using the manipulatives? What everyday items can you use as manipulatives to teach mathematics? What are some classroom management tips the video discusses?”


Discuss ideas that come from working through the handout.

**Tips for Using Manipulatives** (5 minutes) Slide 6

Briefly review tips for using manipulatives from the video.

- Students should work in small groups.
- Be patient. The room may not be quiet.
- Help students to realize that math is a process.
- Work from the concrete to give students a working mental picture of concepts.

**Group Activity 1 “Walk-About”** (10 minutes) Slide 7

1. Give each participant the “Using Manipulatives Walk-About” handout.
2. Each participant will work to complete their own grid by circulating within the large group, asking the other participants to offer a new tip or implementation strategy for working with manipulatives using the questions on the grid as a guide. Ask participants to have the person who offered the new tip write his or her initials in the square. (Optional: Turn this activity into a game by offering a prize for the person who has all of his or her squares initialed first.)
3. Ask for volunteers to share the most useful tip they received.

**Group Activity 2 “Creative Uses for Everyday Objects”** (10 minutes) Slide 8

1. Give each participant the “Using Manipulatives Creative Uses for Everyday Objects” handout.
2. Ask participants to work in pairs or small groups of 3 to 5 to come up with creative ways to use the objects listed in
the mathematics classroom. Have them discuss how each object would be useful for a particular math topic and how the students would use the object.

3. Allow the groups to discuss other objects that they have used that were not listed on the handout. Ask for volunteers to share their favorite creative math-related use for an everyday object.

▶ **Closure** (5 minutes) Slide 9

Give each person a note card.

Say, "Without listing your name on the card, respond to the following questions.
What new information did you learn today?
What questions or concerns about using manipulatives do you have?"

Collect the cards. Shuffle them and pull out a few to share aloud. Discuss possible solutions to the questions as a group.

▶ **Evaluation** (Optional)
Using Manipulatives
Video Focus Questions

1. As you watch the *Math Can Take You Places™* Professional Development Series "Using Manipulatives" video, think about the following questions:

- How does the teacher prepare the students to work with manipulatives?

- How does the teacher check for the effectiveness of using the manipulatives to teach the concept?

- What everyday objects can you use as manipulatives to teach mathematics?

2. Discuss how the following tips might affect your classroom practice and students’ learning.

- Students should work in small groups.

- Be patient. The room may not be quiet.

- Help students to realize that math is a process.

- Work from the concrete to give students a working mental picture of concepts.
Using Manipulatives
Walk-About

Circulate the grid to discuss each of the ideas. Ask a colleague to offer a new tip or implementation strategy for working with manipulatives. Have them initial the space and move to discuss another topic with another colleague. Continue circulating until all spaces are initialed.

<table>
<thead>
<tr>
<th>What tips do you have on transitioning students from seatwork to working in small groups?</th>
<th>How do you prepare the manipulatives that students will use during the lesson/activity?</th>
<th>Tip:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip:</td>
<td>How do you ensure the students have learned the mathematics?</td>
<td>How do you monitor students’ use of the manipulatives?</td>
</tr>
<tr>
<td>How does working with manipulatives give students a working mental picture of mathematics?</td>
<td>Tip:</td>
<td>How do you transition the learning from the concrete to the abstract?</td>
</tr>
<tr>
<td>How do you clarify the steps and processes students will use with the manipulatives?</td>
<td>What techniques do you use to quiet the room during the activity?</td>
<td>Tip:</td>
</tr>
</tbody>
</table>
Using Manipulatives
Creative Uses for Everyday Objects

1. What are some creative ways that you could use the following objects while teaching a 4th-6th grade mathematics lesson?

   - Yarn
   - Paper plates
   - Sand
   - Measuring cups/spoons
   - Empty cartons
   - Canned foods
   - Balls of various sizes
   - Boxes of various sizes
   - Beans/peas/pasta
   - Marbles

2. List some other everyday object that could be incorporated into the mathematics classroom. Give ideas for how they would be utilized.
Professional Development Series

Using Manipulatives in the Mathematics Classroom

Can Take You Places
Ice Breaker Activity
Effectively Using Manipulatives

Session Goals

▶ Investigate the instructional benefits to students of using manipulatives to teach mathematics.
▶ Working collaboratively, design a lesson in which students will use manipulatives to clarify a mathematics concept.
▶ Explore implementation and facilitation strategies for incorporating manipulatives into mathematics lessons.
▶ Share professional expertise.
Reflect on a time you taught a lesson using manipulatives to clarify a mathematics concept.

▶ What are two things that made the instruction successful?

▶ What are two things that made the instruction a challenge?
Video Presentation

As you watch the video, make note of the following ideas:

- How does the teacher prepare the students to work with manipulatives?
- How does the teacher check for effectiveness of using the manipulatives to teach the concept?
- What everyday objects can you use as manipulatives to teach mathematics?
Classroom Management Tips

Discuss how the following advice might affect classroom practice and students’ learning.

- Students should work in small groups.
- Be patient. The room may not be quiet.
- Help students to realize that math is a process.
- Work from the concrete to give students a working mental picture of concepts.
Implementation Strategies

Working with colleagues, investigate classroom implementation strategies for teaching with manipulatives.

Examples:

- How do you monitor students’ uses of manipulatives?
- How do you transition the learning from the concrete to abstract?
Creative Uses for Everyday Objects

- Work with your group to develop a list of creative ways to use everyday objects as manipulatives.

- Write your favorite suggestions on paper and be prepared to share.
Closing Activity

Using Manipulatives in the Mathematics Classroom 9
Certificate of Achievement

Participant’s Name

Has Successfully Completed

Math Can Take You Places
Professional Development Series

Using Manipulatives

Location: ____________________________

Trainer: ____________________________

Length of Training: ____________________________

Date: ____________________________
Series 2
Incorporating Video

The *Math Can Take You Places* “Incorporating Video” training is designed to be approximately one hour long. The length can vary according to time constraints and participation.

To begin and end the session, use your own icebreaker/introductory/conclusion activity or choose one from the *Math Can Take You Places* Icebreaker/Introductory/Conclusion Ideas list. You may also want to begin the session by sharing an overview of the *Math Can Take You Places* curriculum toolkit.

► Materials

- Sheet of chart paper
- Markers
- Copies of the Incorporating Video “Educational Video Is Our Friend,” “Video Focus,” and “Planning a Lesson” handouts
- *Math Can Take You Places* Student Video #5: “What’s Cooking?” (Patterns)
- Optional: PDF slideshow “Incorporating Video in the Classroom”

► Preparation

- List these five concerns on a piece of chart paper before the training begins:
  Concerns when using video in the classroom:
  1. Not enough time to prepare
  2. Stigma/bias from administrators and parents
  3. Lack of equipment
4. Lack of training
5. Lack of quality materials available to show

- Make copies of the handouts.
- Prepare the DVD player and monitor.

► Introductions/Icebreaker (5-6 minutes) Slide 2

► Session Goals (2 minutes) Slide 3

- Investigate the use of video in the mathematics classroom.
- Explore tips for using video in the classroom.
- Plan a lesson for a video-based mathematics topic.
- Share professional expertise.

► Focus Statement/Question (2 minutes) Slide 4

Ask the participants the following questions:
“How might using video in the mathematics classroom enhance instruction?”
“What two questions do you have about using video to enhance mathematics instruction?”

► Video Focus (10 minutes) Slide 5

Give each participant the Incorporating Video “Video Focus Questions” handout.

Say, “Listen for the following ideas presented in the video. How does the teacher prepare the students prior to showing them the video? How did the teacher make sure that the students understood the mathematics concepts highlighted in the video? What are some advantages of using video as a part of classroom instruction?”

- **Tips for Using Video in the Classroom** (2 minutes)  
  *Slide 6*

  Distribute and discuss the handout “Educational Video Is Our Friend” and review tips presented in the video.

- **Group Activity 1** (15 minutes)  
  *Slide 7*

  1. Show your participants the list of common concerns regarding using video in the classroom. Allow them to add a few more concerns if time permits.
  2. Divide the participants into small groups of 3 to 5 participants. Ask the groups to offer one tip or suggestion related to each of the concerns listed.
  3. Give each group five minutes to gather all ideas.
  4. Wrap-up the activity by coming back together as a large group. One individual from each group should share that group’s best tip(s).

- **Group Activity 2** (20 minutes)  
  *Slide 8*

  1. Divide the large group back into their groups of 3 to 5 participants. Give each participant the Incorporating Video “Planning a Lesson” handout.
  2. Say, “Now, we’re going to practice developing questions and encouraging student participation with video. We’re going to watch the *Math Can Take You Places* Student Video on Patterns. Then, you’re going to work in your groups to discuss the following questions:
    a. What question or statement will you pose to get students thinking about the mathematics topic in the video?
    b. How will you determine starting and stopping points for the video instruction?
    c. What mathematics questions do you want to pose between sections of the video?”

  3. Show the *Math Can Take You Places* Student Video #5 “What's Cooking?” (Patterns), featuring Chef William Koval from the Adolphus Hotel. Give teachers an opportunity to formulate ideas about how they would present this video to their class using the three questions above as a guideline.
  4. Bring the large group back together. Allow groups to share their responses.
**Closure (15 minutes) Slide 9**

Participant groups will work together to create a commercial to convince co-workers to use video in the classroom. They will incorporate their own ideas or new ideas that they learned in the video. Give groups about 7 to 8 minutes to prepare and then begin with group presentations.

**Evaluation (Optional)**
As you watch the video, make note of the following ideas:

1. How does the teacher prepare the students prior to showing them the video?

________________________________________________________________________

________________________________________________________________________

2. How did the teacher make sure that the students understood the mathematics concepts highlighted in the video?

________________________________________________________________________

________________________________________________________________________

3. What are some advantages of using video as a part of classroom instruction?

________________________________________________________________________

________________________________________________________________________
Incorporating Video
Planning a Lesson

After viewing the Math Can Take You Places™ Student Video, discuss the following questions with your group:

1. What question or statement will you pose to get students thinking about the mathematics topic in the video?

2. How will you decide on starting and stopping points for the video instruction?

3. What mathematics questions do you want to pose between sections of the video?
Repeat after me…

“Educational Video Is Our Friend”

Teachers make the most of classroom viewing by:

- Planning ahead to consider instructional goals.
- Previewing the program.
- Determining the setting and length of the video.
- Setting clear expectations for students (passive vs. active viewing).
- Encouraging student participation.
  - Don’t turn off the lights!
  - Set the context before viewing.
  - Pause during the program to ask key questions and flag priority topics.
  - Consider a second viewing or circulate video for home viewing.
- Connecting post-viewing activities to hands-on or real-world experiences.

Impact on Student Learning:

- Television’s use of sound and imagery supports learning better than either mode alone, thus facilitating learning among a more diverse group of students based upon their different types of intelligences. Children’s viewing of educational television has been shown to result in significant and lasting learning gains, as well as improved cognitive performance later in their education.

- Research indicates that students’ comprehension of television programming is affected by what they expect to get out of it. Thus, educators may be able to influence students’ processing of information to acquire new information more effectively.

- Adult mediation has been found to be a key factor in the educational effectiveness of television for children.

- Video should be integrated with other materials, such as teacher guides and accompanying Web sites.

Professional Development Series

Incorporating Video in the Classroom

Can Take You Places
Ice Breaker Activity
Session Goals

► Investigate the use of video in the mathematics classroom.

► Explore tips for using video in the classroom.

► Plan a lesson for a video-based mathematics topic.

► Share professional expertise.
How might using video in the mathematics classroom enhance instruction?

What two questions or concerns do you have about incorporating video into mathematics instruction?
Video in the Classroom Presentation

As you watch the video, make notes:

► How does the teacher prepare the students prior to showing them the video?

► How did the teacher make sure that the students understood the mathematics concepts highlighted in the video?

► What are some advantages of using video as a part of classroom instruction?
Five Tips for Effective Use of Video

1. **PLAN**
2. **PREVIEW**
3. give a **PURPOSE**
4. encourage **PARTICIPATION**
5. **POST-VIEWING** activities
Implementation Strategies

Troubleshooting

- Look at the list of common concerns.
- Take turns offering one tip or implementation strategy as a response to the concerns.
- Be prepared to share your group’s “Greatest Tip” for incorporating video in the classroom.
Planning a Lesson

After viewing the *Math Can Take You Places* video, your group will respond to the following questions:

1. What questions or statements will you pose to get students thinking about the mathematics topic in the video?

2. How will you determine starting and stopping points for the video instruction?

3. What mathematics questions do you want to pose between sections of the video?
We will now have a commercial break from our sponsor...
Certificate of Achievement

Participant’s Name

Has Successfully Completed

Math Can Take You Places
Professional Development Series

Incorporating Video

Location

Trainer

Length of Training

Date
Series 3
Mathematics in Everyday Life

The Math Can Take You Places “Mathematics in Everyday Life” training is designed to be approximately one hour in length. The length can vary according to time constraints and participation.

To begin and end the session, use your own icebreaker/introductory/conclusion activity or choose one from the Math Can Take You Places Icebreaker/Introductory/Conclusion Ideas list. You may also want to begin the sessions by sharing an overview of the Math Can Take You Places curriculum toolkit.

Materials

• Copies of the state or national mathematics standards (one per group depending on the focus grade levels of the training; possibly ask participants to bring their own copies)
• Markers
• Chart paper (one page per group)
• Copies of the Mathematics in Everyday Life “Focus Questions” handout
• Copies of the Mathematics in Everyday Life “Conceptual Highlights” handout
• Copies of the Mathematics in Everyday Life “Implementation Strategies” handout
• Math Can Take You Places Professional Development Series “Mathematics in Everyday Life” video
• Optional: PDF slideshow “Mathematics in Everyday Life”

Preparation

• Gather the materials listed above.
• Make copies of the three handouts needed.
• Prepare to play the video.
• Ask participants in advance to bring copies of the state standards to use during the training.

► **Introductions/Icebreaker** (5-6 minutes) Slide 2

► **Session Goals** (2 minutes) Slide 3

• Investigate how real-life mathematics can enhance instruction and student learning.
• Explore lesson planning tips for incorporating real-life mathematics and establishing relevance.
• Share professional expertise.

► **Focus Statement/Question** (5 minutes) Slide 4

Ask the participants the following questions:

*If you were to ask your students, “What is the purpose of learning mathematics?” What do you think they would say? How does establishing relevance enhance instruction in the mathematics classroom?*

► **Video Focus** (5 minutes) Slide 5

Say, “We are going to watch a short video that highlights ways to emphasize everyday applications of math with students. As you watch, think of ways you already make these types of connections in your lessons.”

Show the *Math Can Take You Places* Professional Development Series “Mathematics in Everyday Life” video.

► **Group Activity 1 “Conceptual Highlights”** (10 minutes) Slide 6

1. Divide the participants into small groups of 3 to 5, by grade level if possible. If the participants are mostly administrators, allow the group to choose a grade level to focus on for the activity.
2. Assign one of the math concepts mentioned in the video to each grade level group. The concepts are listed below and on the “Conceptual Highlights” handout.

- Computation and Estimation
- Measurement and Geometry
- Statistics and Data Analysis
- Proportions and Reasonableness
- Problem Solving and Using Mathematical Tools

3. Ask the groups to briefly review the math standards to see how each of these concepts looks at their assigned grade level. Then, ask them to list general ideas they already have about how to connect these concepts to the students’ everyday lives.

Group Activity 2 “Implementation Strategies”

(20 minutes) Slide 7

1. Allow each group to choose one of the “Conceptual Highlights” topics to use as their focus area for this activity. Make sure that a group covers each of the concepts.

2. Each group will generate a list of lesson planning ideas, using the tips given in the “Mathematics in Everyday Life” video as a guide. Under each of the tips, the group will write a creative suggestion for how to implement the suggestions, focusing on their concept area. The tips are listed below and on the “Implementation Strategies” handout:

- Establish a purpose for each concept students will learn.
- Help students recognize mathematics in their real life.
- Bring in speakers or create mentoring opportunities so students can see math in action.
- Use math to introduce students to a variety of career possibilities.
- Introduce new math concepts by posing a problem related to a real real-life situation.

3. When all the groups are finished, ask a group representative to write their best responses for each of the tips on chart paper and select a spokesperson to present their ideas to the large group.

4. Bring the large group back together. Allow the presenters to share their responses.
**Closure (5 minutes)**

Display the last slide or write the following question on a piece of chart paper. Ask participants to brainstorm:

“How can we, as a mathematics department or team, ensure that students at our school are learning that mathematics is an important part of everyday life?”

Ask for a few volunteers to share their responses.

---

**Evaluation (Optional)**
Mathematics in Everyday Life
Focus Questions

If you were to ask your students, “What is the purpose of learning mathematics?”, what are some of the responses you think they might offer?

How does establishing relevance enhance instruction in the mathematics classroom?
How do you emphasize real-life application of the following concepts for your grade level?

- Computation and Estimation

- Measurement and Geometry

- Statistics and Data Analysis

- Proportions

- Reasonableness

- Problem Solving and Using Mathematical Tools
Mathematics in Everyday Life

Implementation Strategies

- Have a group discussion about how your assigned topic is addressed at your grade level, i.e. 5th grade T.E.K.S. on computation and estimation.

- Generate a list of ideas for activities which apply the Implementation Strategies suggested in the video *Mathematics in Everyday Life*. Activities may include:

  1. Establishing a purpose for each mathematics concept students will learn.

  2. Helping students to recognize mathematics in real life.

  3. Inviting speakers and/or creating mentoring opportunities so students can see mathematics in action.

  4. Using mathematics to introduce students to a variety of career possibilities.

  5. Introducing new mathematics concepts by posing a problem related to a real-life situation.
Professional Development Series

Mathematics in Everyday Life

Can Take You Places
Ice Breaker Activity
Session Goals

▸ Participate in collegial discussions that emphasize connecting mathematics instruction to real-life situations.

▸ Investigate practical ways to ensure that students are receiving a variety of experiences related to mathematics in real life.

▸ Work collaboratively to design an age-appropriate mathematics lesson focusing on a real-life topic.

▸ Share professional expertise.
Questions

What are some of the responses you would expect from your students if you asked them this question: “What is the purpose of learning mathematics?”

How does establishing relevance enhance instruction in the mathematics classroom?
Video Focus

At the conclusion of the video, be prepared to discuss with your grade level, the Implementation Strategies/Tips from the video Mathematics in Everyday Life.
Real-life Application and Instruction

Conceptual Highlights
- Computation and Estimation
- Measurement and Geometry
- Data Analysis and Representation
- Proportions
- Reasonableness
- Problem Solving and Using Mathematical Tools
Implementation Strategies

- Establish a purpose for each concept students will learn.
- Help students recognize mathematics in real life.
- Bring in speakers or create mentoring opportunities so students can see math in action.
- Use math to introduce students to a variety of career possibilities.
- Introduce new math concepts by posing a problem related to a real-life situation.
Closing Activity

Think about the following question

How can we as a mathematics department or team ensure that students at our school are learning that mathematics is an important part of everyday life?
Certificate of Achievement

Participant’s Name

Has Successfully Completed

Math Can Take You Places
Professional Development Series

Mathematics in Everyday Life

Location

Trainer

Length of Training

Date
Series 4
Thinking Algebraically

The Math Can Take You Places “Thinking Algebraically” training is designed to be approximately one hour in length. The length can vary according to time constraints and participation.

To begin and end the session, use your own icebreaker/introductory/conclusion activity or choose one from the Math Can Take You Places Icebreaker/Introductory/Conclusion Ideas list. You may also want to begin the session by sharing an overview of the Math Can Take You Places curriculum toolkit.

► Materials

- Math Can Take You Places Professional Development Series “Emphasizing Algebraic Thinking” video
- A copy of the Thinking Algebraically “Algebra Autobiography,” “Video Reflections,” “Planning a Lesson,” “Working at Home” and “Closing Activity” handouts for each participant
- Optional: PDF slideshow “Thinking Algebraically”

► Preparation

Make copies of the handouts listed above.

► Introductions/Icebreaker (5-6 minutes) Slide 2
**Session Goals** (2 minutes) *Slide 3*

- Establish that algebraic thinking is a strand of mathematics that begins before formal instruction in Algebra I.
- Investigate connections between different forms of algebraic representations, such as models, symbols, tables, graphs and verbal expressions.
- Discuss tips for lesson planning,
- Share professional expertise.

**Focus Statement/Question – Algebra Autobiography** (15 minutes) *Slides 4 and 5*

Say to the group, “Think back to your days as a student in an algebra class. Please write a brief description of your experiences on the ‘Algebra Autobiography’ sheet.” Allow about 2 minutes for this part of the activity.

Next, have participants at each table share what they have written. Allow about 3-4 minutes. Have someone record similarities and differences in their stories. Ask for volunteers to share their thoughts with the group. Have one person from each table share with the larger group.

**Opening Discussion** (8 minutes) *Slide 6*

Say to the participants, “How would you explain to the parent or guardian of an elementary school student that their child is learning algebra?” Allow volunteers to share their ideas with the group.

**Activity 1 Video Focus/Reflections** (20 minutes) *Slide 7*

1. Hand out the “Video Reflections” sheet and ask the participants to think through and answer the questions as they watch the video. Show the *Math Can Take You Places* Professional Development Series “Emphasizing Algebraic Thinking” video.

2. Review the tips that are highlighted in the video:
   - Build tables to record data.
   - Allow students to describe the process aloud.
   - Develop number sentences using variables.
3. Participants will complete the three sections of the observation sheet during and after the video.
• How does my current instruction encourage students to think algebraically about patterns? (Sample answer: *Multiples of a number are derived by using a constant factor; this idea leads to the concept of a constant, as rate of change, in algebra.* )
• How does my current instruction encourage students to think algebraically about numbers? (Sample answer: *Multiplication and division are inverse operations; we use inverse operations in algebra to solve equations.* )
• How does my current instruction encourage students to think algebraically about writing and solving equations with unknowns? (Sample answer: *Students write equations to represent a situation in a word problem.* )

► Activity 2 Planning a Lesson/ Working at Home
(20 minutes) Slides 8 and 9

1. Hand out the “Planning a Lesson” and “Working at Home” sheets.
2. Ask each group to develop a lesson plan idea focusing on algebraic thinking, which centers on a school-related event. For example, student lunches in the cafeteria cost $1.30, juice is $0.50 extra. You could organize the data in a table to illustrate the pattern or you could give students partial information in the table and have them derive the missing information.
3. Then, ask them to create a list of tips and activities for parents/guardians, related to algebraic thinking that students can do at home. The home activities do not have to relate directly to their lesson plan idea.
4. Ask each group to share its best ideas with the rest of the groups.

► Closure (5 minutes) Slide 10

Allow participants to work individually to complete the “Closing Activity” sheet. Ask for a few volunteers to share their responses.

► Evaluation (Optional)
What do you remember about learning algebra? Write a mini-autobiography describing your experiences; afterward, record similarities and differences between individual accounts.

Reflecting on your experiences learning algebra, how do your experiences compare or how do you think they will compare to your students’ instructional experiences in algebra?

Adapted from Arlene Hambrick, Ph.D, National-Louis University, Chicago, IL, 2005 NCSM Conference, Anaheim, CA.
Thinking Algebraically

Video Reflection

How does my current instruction encourage students to think algebraically about patterns?

How does my current instruction encourage students to think algebraically about numbers?

How does my current instruction encourage students to think algebraically about writing and solving equations with unknowns?
Thinking Algebraically
Planning a Lesson

Working with your group, brainstorm a lesson plan focusing on algebraic thinking. Center the lesson on a school-related event. For example, student lunches in the cafeteria cost $1.30, juice is $0.50 extra. The data could be organized in a table to show the pattern or give students partial data in the table and have them derive the missing data.
Create a list of tips and activities that students can do at home to help build algebraic thinking skills.
Thinking Algebraically
Closing Activity

Complete each section as it relates to today’s session.

• This session validated my previous thoughts about…

• New information that I learned today was…

• I would still like more information about…
Thinking Algebraically

Can Take You Places

Professional Development Series
Ice Breaker Activity
Session Goals

► Establish that algebraic thinking is a strand of mathematics that begins before formal instruction in Algebra I.

► Investigate connections between different algebraic representations, such as models, symbols, tables, graphs and verbal expressions.

► Collaboratively investigate a lesson topic.

► Share professional expertise.
Algebra Autobiography

1. Write a mini-autobiography describing your experiences with learning algebra.

2. Each group member will share his or her story until everyone has had a chance to speak.

3. Record similarities and differences in your stories.
Now and Then

Reflecting on your experiences learning algebra, how do you think it compares – or will compare – to your students’ instructional experiences in algebra?
Given current reforms in mathematics education, it is necessary to communicate to parents/guardians changes that have occurred in mathematics content and pedagogy.

How would you explain to the parent of an elementary student that their child is learning algebra?
Thinking Algebraically Video Presentation

After watching the video, reflect on the following questions:

- How does my current instruction encourage students to think algebraically about patterns?
- How does my current instruction encourage students to think algebraically about numbers?
- How does my current instruction encourage students to think algebraically about writing and solving equations with unknowns?
Planning a Lesson

Develop a lesson plan focusing on algebraic thinking. Center the lesson around a school related activity.
Thinking Algebraically Working at Home

Create a list of tips and activities that students can do at home to help build algebraic thinking skills.
Closing Activity

- This session validated my previous thoughts about...
- New information that I learned today was...
- I would still like more information about...
Certificate of Achievement

Participant’s Name

Has Successfully Completed

Math Can Take You Places Professional Development Series

Thinking Algebraically

Location

Trainer

Length of Training

Date
Incorporating the Internet

The Math Can Take You Places “Incorporating the Internet” training is designed to be approximately one hour in length. The length can vary according to time constraints and participation. Since the training focuses on Internet resources, it would be best if conducted in an area where the participants can get online.

To begin and end the session, use your own icebreaker/introductory/conclusion activity or choose one from the Math Can Take You Places Icebreaker/Introductory/Conclusion Ideas list. You may also want to begin the session by sharing an overview of the Math Can Take You Places curriculum toolkit.

**Materials**

- A copy of the Incorporating the Internet “Concentric Circles,” “Planning a Lesson,” “Components of a Good Lesson Plan,” “Planning the Lesson: Things to Consider” and “Recommended Internet Resources” for each participant
- Math Can Take You Places Professional Development Series "Incorporating the Internet” video
- Optional: PDF slideshow “Incorporating the Internet”

**Preparation**

- Possibly preview a few of the Web sites listed on the “Recommended Internet Resources” sheet to become familiar with their content.
- Reserve an area with sufficient computer access to accommodate your participants if possible.
- Make copies of the handouts listed above.
- Ask the participants in advance if they would bring copies of the state standards to use during the training.
**Introductions/Icebreaker** (5-6 minutes) *Slide 2*

**Session Goals** (2 minutes) *Slide 3*
- Establish how using the Internet can enhance mathematics instruction.
- Discuss tips for incorporating the Internet in the classroom.
- Create a lesson plan incorporating the Internet as a resource.
- Share professional expertise.

**Video Focus/Questions** (8 minutes) *Slide 4*
Say, “We are going to watch a short video on how to incorporate the Internet. After viewing the video, we will discuss some of the benefits of using the Internet mentioned in the video.”

Show the *Math Can Take You Places* Professional Development Series “Incorporating the Internet” video.

**Tips for incorporating the Internet** (5 minutes) *Slide 5*
- Incorporate Web sites pertaining to travel, weather, shopping, and state facts to extend learning.
- Rotate groups of students if the number of computers is limited.
- Be prepared with alternate activities to keep students on task.
- Allow ample time for students to complete Internet assignments.
- Use the Internet to excite students beyond the textbook.

**Activity 1 Concentric Circles** (15 minutes) *Slide 6*
1. Have two sets of chairs arranged so that the inner circle has chairs facing outward.
2. Situate chairs in an outer circle, so that each participant would be seated directly across from someone in the inner circle.
3. Hand out the “Concentric Circles” sheet.
4. Explain to the participants that they will share responses for one of the questions listed with the person sitting across from them for one minute. When time is up, the participants sitting in the outer circle will rotate counterclockwise when given the signal from the facilitator.
5. Continue this process until the moving participants are back to their original chairs.
6. Ask for volunteers to share one new tip they learned from their colleagues.

► Activity 2 Planning a Lesson (20 minutes) Slides 7 and 8

1. Each group will be assigned a mathematics topic: number concepts, patterns and algebraic thinking, measurement, probability and data analysis and geometry. Each group may want to use its list of state standards to choose one particular focus objective.
2. Each group will draft an original lesson idea that incorporates the use of Internet resources. Pass out the “Components of a Good Lesson Plan” and “Planning the Lesson: Things to Consider” sheets for the groups to use as resources.
3. Give the groups 12-15 minutes to prepare before asking them to share their ideas with the whole group.

► Closure (5 minutes) Slides 9 and 10

Hand out the “Recommended Internet Resources” sheet. Give the participants the opportunity to use the Internet to check out some of the new sites they have learned about during the training session.

► Evaluation (Optional)
Incorporating the Internet
Concentric Circles

☐ My favorite mathematics Internet resource is _______________________________ because ________________________________________________________________.

☐ How does using the Internet promote equity and diversity in mathematics instruction? ________________________________________________________

☐ I know my students benefit from using the Internet as a resource in mathematics class because __________________________________________________________.

☐ A tip I would give to parents or guardians about using the Internet to support mathematics concept development at home is ____________________________________________________________

☐ When my students are working on the Internet, a classroom management strategy I use or would like to use is ______________________________________________________________.

☐ One tip I want to share about planning an effective lesson using the Internet as a resource is ____________________________________________________________

☐ How do I prepare students for the learning objective and what will be expected of them in using the Internet as a resource? ________________________________________________________________

☐ How does using the Internet as an instructional tool promote depth and complexity in instruction? ________________________________________________________________
Incorporating the Internet

Components of a Good Internet Lesson Plan

Lesson title reflects lesson concept:

Lesson is appropriate based on grade level standards:

Learning objectives/goals and criteria for success are clearly communicated to students:
(Objective/goals, what are the Big Ideas in the lesson?)

The criteria, explaining what students should know and be able to do, should be based on the grade-level standards: Limit criteria checklist to no more than four statements.

First statement: _______________________________________________________

Second statement: _____________________________________________________

Third statement: ______________________________________________________

Fourth statement: _____________________________________________________

Materials:

Approximate Teaching Time:

Set the stage for the lesson or background information, introductory questions:

Lesson Procedure/Steps:

Include scaffolding lessons in the lesson plan: These are questions that you would ask students during instruction, should they need assistance or clarification.

URLs to be used for the lesson:

Lesson Summary Questions:

Lesson extension:
Incorporating the Internet
Planning the Lesson: Things to Consider

1. Are the learning objectives clearly stated?
   - Does the lesson address the different learning styles of students (Spec. Ed., ESL, ELL, etc.)?
   - What are the prerequisite skills for this lesson?
   - How can I make sure that the mathematics in this lesson is made clear and students see the relevance of the lesson?

2. Designing the Lesson
   - Is there a lesson available that a colleague is already using? Can that lesson be modified or adapted to meet the criteria of my grade-level standards?
   - How will students use this knowledge to solve an authentic problem?
   - Does the lesson promote Higher Order Thinking Skills? (Refer to Bloom’s Taxonomy.)
   - How are students to demonstrate their learning?
   - Have I investigated and bookmarked the sites for this lesson?

3. Post-lesson checklist
   a. Were there any surprises? Disappointments?
   b. Does the students’ work demonstrate that the mathematics objective for the lesson was reached?
   c. Did some new learning goals emerge during instruction?
   d. Did the students’ work demonstrate that they meet the criteria, which were based on the grade-level TEKS?
   e. Upon evaluating the students’ work, what modification will I make to the lesson to move students towards successfully meeting the criteria?
   f. What instructional strategies were most effective? Which were not?
   g. What will I change next time to make the lesson more effective?
Here are a few recommended Internet resources for mathematics instruction. What are some of your favorite Web sites?

http://www.kera.org
http://www.pbs.org
http://pbskids.org/
http://www.nctm.org
http://www.kids.gov/
http://mathforum.org/library/
http://education.ti.com
http://mathtekstoolkit.org
http://www.coolmath4kids.com/
http://www.howstuffworks.com/
http://tea.state.tx.us
http://thegateway.org

Others


Professional Development Series

Incorporating the Internet
Ice Breaker Activity

Incorporating the Internet 2
Session Goals

- Establish how using the Internet can enhance mathematics instruction.

- Discuss tips for integrating the Internet into lesson plans.

- Create a lesson using the suggested components of a good Internet lesson.

- Share professional expertise.
Focus Question

How can using the Internet as a resource provide equity and enhance mathematics instruction?
Video Presentation

While watching the video make note of at least three new ideas suggested by the presenters.

1. ____________________________
2. ____________________________
3. ____________________________
Video Debrief Activity

- If you are sitting in the inner circle, you will remain stationary.
- If you are sitting in the outer circle, you will be a “mover.”
Planning a Good Internet Lesson

- Working with your colleagues, use the suggested components of a “Good Internet Lesson Plan” to design a lesson.

- Make sure that the learning objective is clarified, so that students know the goal.
Planning a Good Internet Lesson (continued)

- After lesson implementation, evaluate the effectiveness of the lesson using the suggested questions.

- After the lesson is taught, get back together with your colleagues and reflect on how you would modify the next Internet lesson, based on the evaluation of this lesson.
Closing Activity

Check out these Web sites and share a few others with your colleagues.

www.kera.org
www.pbs.org
www.pbskids.org
www.nctm.org
www.kids.gov
www.mathforum.org/library
www.education.ti.com
Closing Activity
(continued)

Check out these Web sites and share a few others with your colleagues.

www.mathtekstoolkit.org
www.coolmath4kids.com
www.howstuffworks.com
www.tea.state.tx.us
www.ed.gov/teachers/landing.jhtml?src=fp
www.thegateway.org
Certificate of Achievement

Participant's Name

Has Successfully Completed

Math Can Take You Places
Professional Development Series

Incorporating the Internet

Location

Trainer

Length of Training

Date