



# Albert Einstein High School

## Summer Task Cover Sheet



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**Honors Algebra 2 Teacher(s):** *Michael Long, Tim Miyamoto, Cynthia Reese*

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**Course:** Algebra 2 & Honors Algebra 2

- ✓ **Purpose of the Summer Assignment:** This summer packet has been designed to reflect some brand new changes in the MCPS Algebra 2 curriculum based on Common Core standards, which include different and more rigorous topics such as trigonometry.
- ✓ **Relationship between Summer Task and 1st Quarter Objectives:** This assignment is a review of skills you should have already learned. Knowing these skills will help you be successful in your Algebra 2 class.
- ✓ **Description of the Task:** You may work with a classmate or a peer however, each student must submit their own packet, and each student is responsible for understanding the material contained in the packet. Write your work on this packet, and make sure to show an appropriate amount of work for each question. If you need another sheet, you may attach it.
- ✓ **Supportive Resources:** You may use textbooks or other sources to help you complete the packet. Calculators are not necessary for any of the problems in this packet.

### **Grading:**

- ✓ **DUE DATE:** Tuesday, September 4, 2018
- ✓ **DEADLINE:** Friday, September 7, 2018
- ✓ **Grading Category:** homework for practice and preparation of instruction
- ✓ **Points:** 30 (Scored out of 100 but graded out of 30)
- ✓ **Extent to which the summer task counts towards the marking period grade:** May not account for more than 5% of a student's first quarter grade
- ✓ **Grading Criteria and Rubric:** *(can be attached as a separate sheet)* Key has the points per question

Name: \_\_\_\_\_

Albert Einstein High School Department of Mathematics

# Summer Math Packet

for students entering

## Algebra 2/Honors Algebra 2

**For the following courses: Algebra 2/Honors Algebra 2**

This packet must be completed and ready to turn in to your new math teacher on the first day of school. It will be graded and you will be tested on the material in this packet within the first two weeks of school.

Below you will find a timeline for completing the packet. There are lots of problems, but we want you to be as prepared and as ready as possible for the upcoming challenges of your new math class 😊.

You may work with a classmate or a peer. You may use textbooks or other sources to help you complete the packet, however, each student must submit their own packet, and each student is responsible for understanding the material contained in the packet. Calculators are not necessary for any of the problems in this packet. Write your work on this packet, and make sure to show an appropriate amount of work for each question. If you need another sheet, you may attach it. This assignment is a review of skills you should have already learned. Knowing these skills will help you be successful in your Algebra 2 or Honors Alg. 2 class.

\*This summer review packet has been designed to reflect some brand new changes in the MCPS Algebra 2 curriculum based on Common Core standards, which include different and more rigorous topics such as trigonometry.

### **Suggested Timeline for Completing Algebra 2/Honors Algebra 2**

*Estimated Time to Complete – 2 Hours Per Week*

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Third week of July	<b>Problems 1-6</b>
Fourth week of July	<b>Problems 7-12</b>
First week of August	<b>Problems 13-18</b>
Second week of August	<b>Problems 19-24</b>
Third week of August	<b>Problems 25-30</b>

## Formulas

*Formulas you should be familiar with.*

### Equations of Lines

Slope-Intercept Form:	$y = mx + b$
Point-Slope Form:	$y - y_1 = m(x - x_1)$
Standard Form:	$Ax + By = C$

**Exponential Function**  $y = a \cdot b^x$

**Explicit Formula for an Arithmetic Sequence:**  $f(n) = f(0) + nd$   $f(n) = f(1) + (n - 1)d$

**Explicit Formula for a Geometric Sequence:**  $f(n) = f(0) \cdot r^n$   $f(n) = f(1) \cdot r^{n-1}$

### Forms of quadratic functions

Vertex Form:	$f(x) = a(x - h)^2 + k$	<i>Axis of symmetry</i>	$x = h$
Standard Form:	$f(x) = ax^2 + bx + c$		$x = -\frac{b}{2a}$
Factored Form:	$f(x) = (x - d)(x - e)$		$x = \frac{d+e}{2}$

**Quadratic Formula:** If  $ax^2 + bx + c = 0$ , then  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .

**Zero-product property:** If  $a \cdot b = 0$ , then  $a = 0$  or  $b = 0$ .

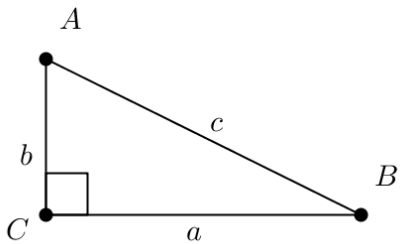
### Pythagorean Theorem:

In a triangle with sides  $a$ ,  $b$ , and longest side  $c$ , the equation  $a^2 + b^2 = c^2$  holds if and only if the triangle is a right triangle.

**Distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$ :**  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

**Slope of a line containing two points  $(x_1, y_1)$  and  $(x_2, y_2)$ :**  $\frac{y_2 - y_1}{x_2 - x_1}$

### Right triangles

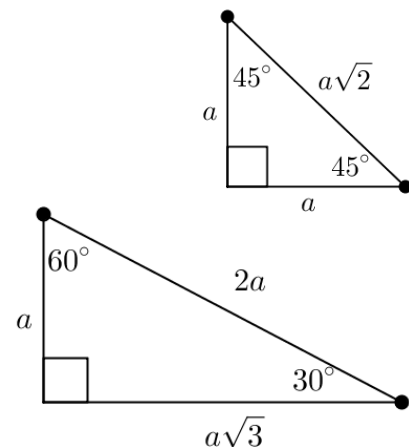


$$c^2 = a^2 + b^2$$

$$\sin A = \frac{a}{c} = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{b}{c} = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{a}{b} = \frac{\text{opposite}}{\text{adjacent}}$$



1. Gino knows that the formula for converting degrees Celsius ( $C$ ) to degrees Fahrenheit ( $F$ ) is  $F = \frac{9}{5}C + 32$ . He also knows how to transform an equation into an equivalent equation. Which of the following is correctly solved for  $C$ ?

A.  $C = \frac{5F-160}{9}$       B.  $C = 5F - \frac{160}{9}$       C.  $C = \frac{5F+160}{9}$       D.  $C = \frac{5}{9}F + 160$

2. Solve the literal equations.

(a) Solve for  $r$ :  $A = P + Prt$

(b) Solve for  $z$ :  $2x - 3z + 12 = 0$

3. Let  $a$  and  $b$  represent two numbers such that  $a > b$ . State whether each statement below is true or false. Justify your answer.

Statement	True or False?	Justification
$a + 8 > b + 8$		
$a - 7 > b - 7$		
$-7a > -7b$		
$\frac{a}{-10} < \frac{b}{-10}$		

4. Below is the solution to an inequality, represented graphically.



Which of the following inequalities has the solution graphed above?

A.  $-3x > 6$       B.  $-4x - 9 > -17$       C.  $2x + 10 \leq 14$

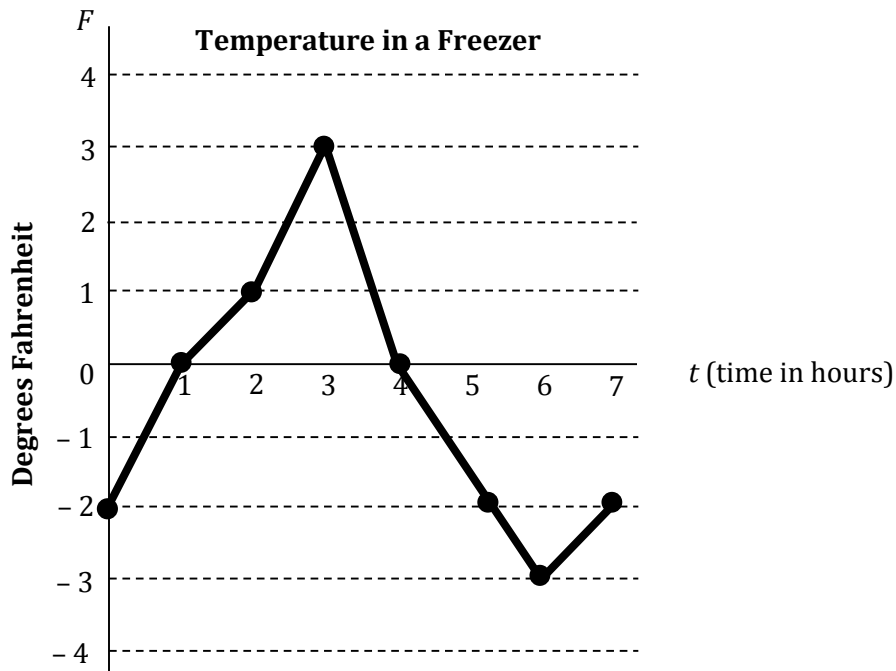
5. Solve the following exponential equations.

(a)  $3^{x+2} = 3^7$

(b)  $25^{x+1} = 5^{x-3}$

(c)  $9^{x+2} = 27^x$

6. The graph below represents the temperature ( $F$ ) in degrees Fahrenheit inside of a freezer as a function of time. The variable  $t$  represents the time, in hours, since midnight.



(a) What is the domain of the function?

(b) What is the range of the function?

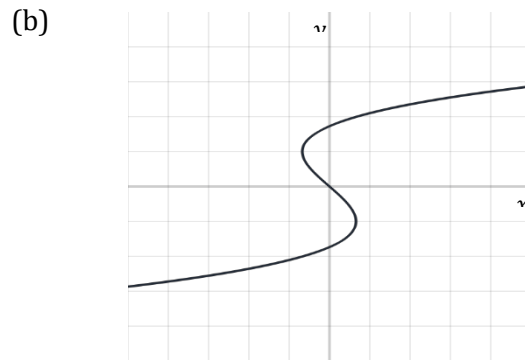
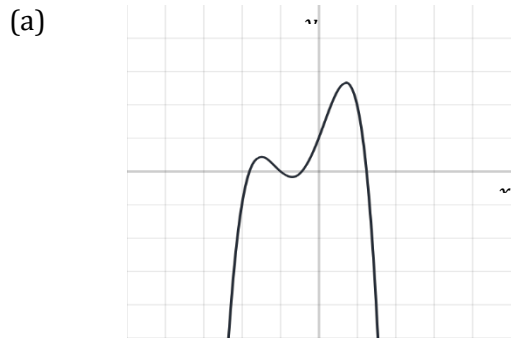
(c) What is the meaning of the  $F$ -intercept?

(d) At what time  $t$  is the minimum temperature reached?

(e) On what interval of time is the temperature decreasing?

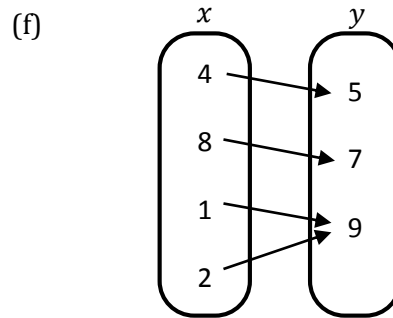
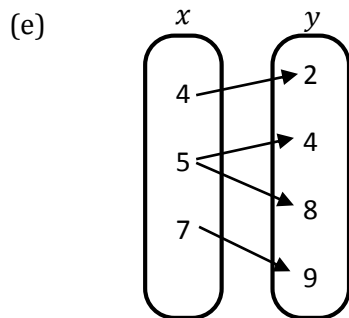
(f) What does the statement  $F(5) = -2$  represent in the context of the situation?

7. For each relation below, determine whether or not the relation represents a function. Justify your answer.



(c)  $\{(2, 7), (4, -7), (2, 12), (6, 11)\}$

(d)  $\{(4, 9), (6, 11), (11, 15), (10, 9)\}$



8. A rectangle has a length that is 6 inches longer than its width. If  $w$  represents, the width, write an expression, in terms of  $w$ , for the area of the rectangle.

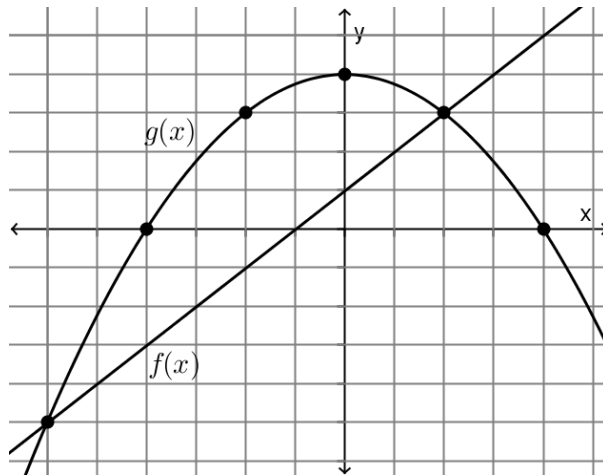
9. Fill in the number that completes the square.

(a)  $x^2 + 6x + \underline{\hspace{2cm}}$

(b)  $x^2 - 12x + \underline{\hspace{2cm}}$

(c)  $x^2 + 7x + \underline{\hspace{2cm}}$

10. The graph of two functions,  $f(x)$  and  $g(x)$ , are shown below.



For each problem, write the correct symbol,  $<$ ,  $=$ , or  $>$  in the box between the two statements.

- (a)  $f(2)$    $g(-2)$
- (b) The  $x$ -intercept of  $f(x)$   The  $y$ -intercept of  $g(x)$
- (c)  $f(1) \cdot f(3)$    $g(-2) + g(2)$

Sketch the graph of the function, then give the information requested.

11.  $f(x) = -x^2 + 4x + 5$

Vertex:

Line of Symmetry:

$x$ -intercepts:

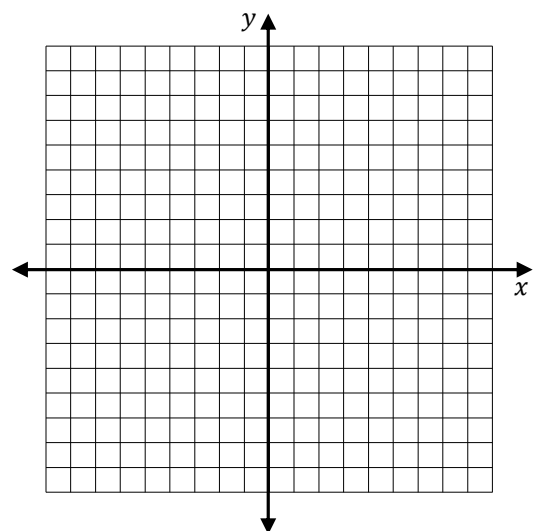
$y$ -intercept:

Domain:

Range:

Interval on which  $f(x)$  is increasing:

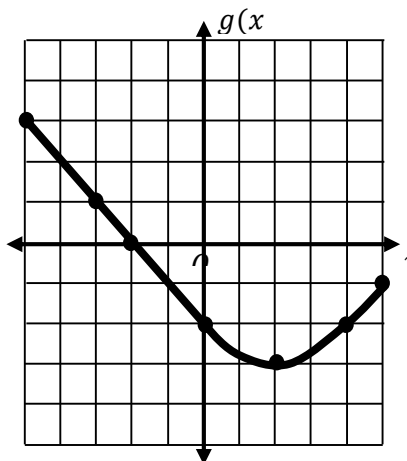
Interval on which  $f(x)$  is decreasing:



12. Find the slope of the line that passes through  $(-5,1)$  and  $(7, -3)$ .

13. Two functions,  $f(x)$  and  $g(x)$  are represented below.

$x$	$f(x)$
-8	5
-6	6
-3	9
0	8
1	2
4	0
7	-10



Compare the statements below in columns A and B. In the empty space at the end of each row in the table, write the column letter (A or B) of the expression that has the **greater** value. If both expressions are equal, write =.

	Column A	Column B	Which is greater (or are they equal)?
(a)	$f(1)$	$g(-3)$	
(b)	The maximum value of $f(x)$	The $x$ -intercept of $g(x)$	
(c)	$\frac{f(0) - f(4)}{4}$	$g(2) \cdot g(4)$	
(d)	The value of $x$ that makes $f(x) = 0$	$g(-5) + g(-3)$	
(e)	$a + b, f(a) = 5$ and $f(b) = -10$	$g(4)$	



14. Match the following graphs to its corresponding equation.

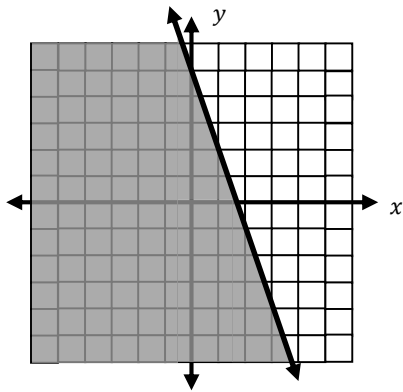
1)  $y > -3x + 5$

2)  $y < -3x + 5$

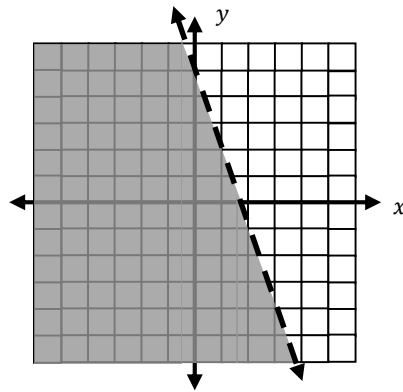
3)  $y \geq -3x + 5$

4)  $y \leq -3x + 5$

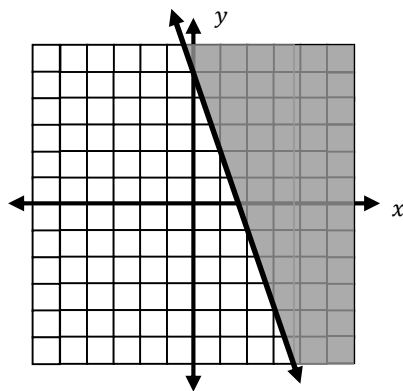
A.



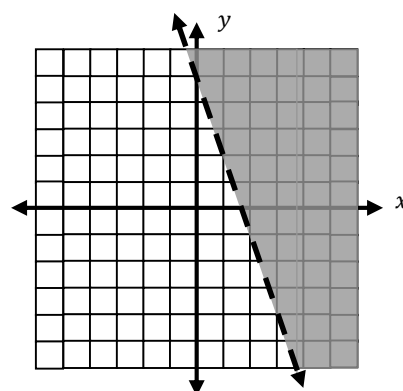
B.



C.

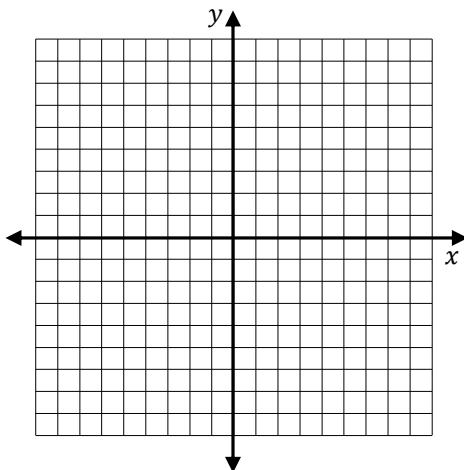


D.

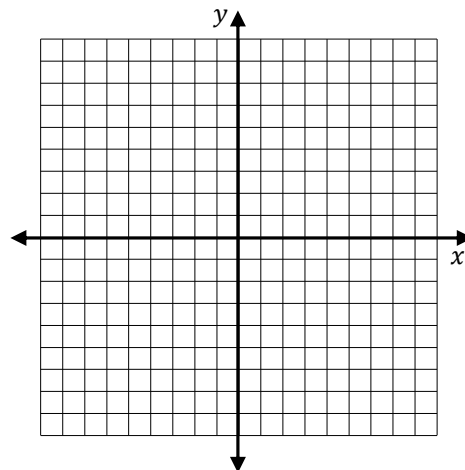


15. Graph the lines. Accurately plot and label at least 3 points on each graph.

(a)  $y = 3x + 1$



(b)  $3x + 2y = 6$



For items **16 and 17**, a function of time is given. In each item, determine the average rate of change on the given interval. *Give the units for your answer.*

16.

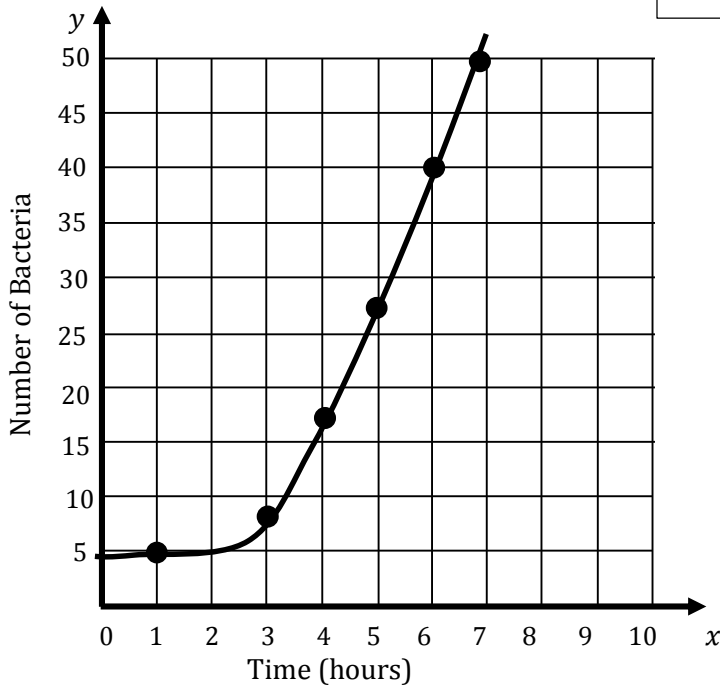
Time (seconds)	Distance (feet)
0	0
1	5
2	20
3	45
4	80
5	125

Average speed on the interval

$$2 \leq t \leq 5:$$

Units:

17.



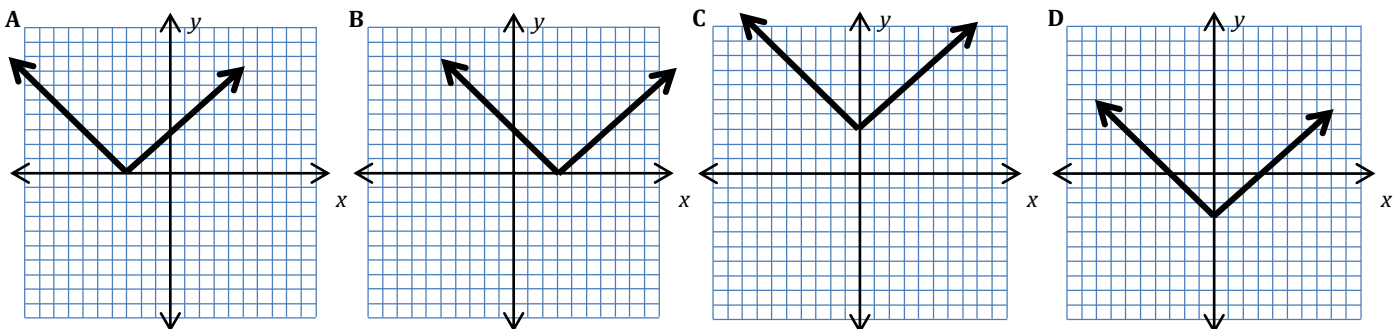
Average rate of bacteria growth on the interval  $1 \leq t \leq 6$ .

Units:

18. The following questions explore the relationship between  $y = f(x)$  and  $y = af(x - h) + k$ , and the effect of  $a$ ,  $h$ , and  $k$  in transforming the function  $f(x)$ .

a. Which of the following graphs represents the function  $f(x) = |x + 3|$ ? \_\_\_\_\_

b. Which one represents  $f(x) = |x| + 3$ ? \_\_\_\_\_



19. Solve the following linear equations.

(a)  $-4(3 - x) = 2(x - 6)$

(b)  $2(4x + 6) + 8 = 6x$

(c)  $7x = 4x - 2$

(d)  $7x + 19 = 55 - 2x$

20. Find the  $x$ -intercept and the  $y$ -intercept of the line  $3x - 4y = -48$ .

21. Find an equation of the line with slope  $3/5$  and  $y$ -intercept of  $-4$ .

22. Find an equation of the line that passes through the points  $(1,2)$  and  $(3, -4)$ .

23. Compute the value of each of the following.

(a) Evaluate  $y = 3x^2 - 5$  if  $x = 4$ .

(b) Evaluate  $y = 4x^3 + 1$  if  $x = -3$ .

(c) Evaluate  $f(x) = -x^2 - 14x$  when  $x = 2$ .

24. Perform the following operations. Answers should be in simplest form. Radicals should NOT be changed to decimals.

(a)  $(-3a^2 + 4a - 7) + (2a^2 - 7a + 8)$

(b)  $(39x^4 - 4x^3 + 2x^2 - x - 7) - (13x^4 + 3x^3 - 2x^2 - x + 8)$

(c)  $(y + 7)(y - 3)$

(d)  $(x + 12)(x - 12)$

(e)  $(p - 2)(3p + 2)$

(f)  $(6m - 5)^2$

(g)  $(3t - 5)(3t + 5)$

(h)  $(2x - 3)(3x^2 + x - 1)$

(i)  $z^2 \cdot z^4$

(j)  $x^{15}/x^5$

(k)  $(11x)^2$

(l)  $(s^3)^2$

(m)  $\left(\frac{2y^3}{3x^2}\right)^3$

(n)  $(5x^2y^4)(3x^4y^3)$

(o)  $\sqrt{50}$

(p)  $\sqrt{100}$

(q)  $\sqrt{32}$

(r)  $3\sqrt{20}$

(s)  $\sqrt{14}\sqrt{7}$

(t)  $\sqrt{\frac{32}{25}}$

25. Completely factor each of the following.

(a)  $5x^2 - 20x$

(b)  $x^2 - 49$

(c)  $x^2 - x - 72$

(d)  $3x^2 - 5x - 2$

(e)  $x^2 - 8x + 16$

(f)  $x^2 + 10x - 24$

(g)  $81x^2 - 1$

(h)  $10x^2 - 7x - 12$

26. Solve using factoring, completing the square, or the quadratic formula.

(a)  $(2x + 1)(x + 3) = 0$

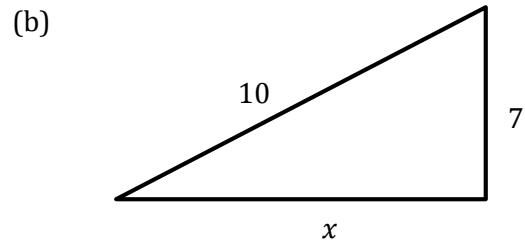
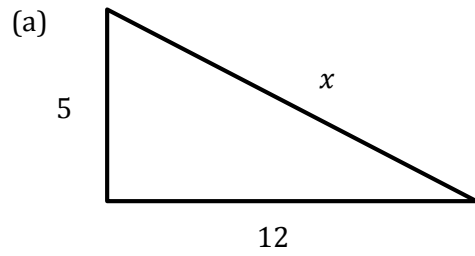
(b)  $x^2 + 7x - 8 = 0$

(c)  $4x^2 - 24x = 0$

(d)  $2x^2 - 3x - 2 = 0$

(e)  $(x + 5)^2 = 64$

27. For the items below, determine the side of the right triangle marked  $x$ .



28. The lengths of the three sides of a triangle are given. Determine whether the triangle is a right triangle.

(a) Lengths are 12, 16, and 30.

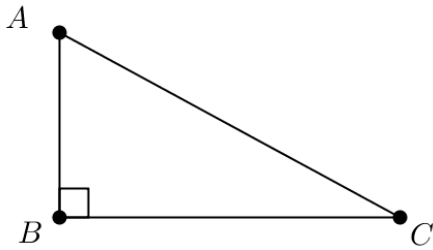
(b) Lengths are 2, 3, and 4.

29. Find the distance between the pair of points.

(a)  $(7, -2)$  and  $(-6, 3)$ .

(b)  $(-6, 3)$  and  $(2, 9)$

30. Given right  $\triangle ABC$ , use the item bank to identify the following. Items may be used more than once.



Item Bank					
$\angle A$	$\angle B$	$\angle C$	$\overline{AB}$	$\overline{BC}$	$\overline{AC}$
$\frac{BC}{AC}$	$\frac{BC}{AB}$	$\frac{AB}{BC}$	$\frac{AB}{AC}$	$\frac{AC}{BC}$	$\frac{AC}{AB}$

(a) Leg opposite  $\angle A$

(g) Cosine ratio of  $\angle C$

(b) Leg opposite  $\angle C$

(h) Tangent ratio of  $\angle C$

(c) Sine Ratio of  $\angle A$

(i) The angle whose Sine ratio is  $\frac{BC}{AC}$ .

(d) Cosine of ratio  $\angle A$

(j) The angle whose Tangent ratio is  $\frac{AB}{BC}$

(e) Tangent ratio of  $\angle A$

(k) Hypotenuse

(f) Sine ratio of  $\angle C$