AT Quick Guide

Math Manipulatives

Each elementary school in MCPS received one Math manipulative set per every 60 students at the start of the 2011-2012 school year. This quick guide illustrates the individual components of the math kit with some suggested uses and thinking prompts.

- Manipulatives help students learn through concrete hands on experimentation with tools representing math concepts.
- They can be used as instructional models and for guided practice for individual students in guided math groups.
- It is suggested that the manipulatives are available as an option for students during every appropriate lesson, as students may improve their learning by providing choice of materials to support learning.

Individual Components of Each Math Kit

Weighted Numbers







360 ° Angle View



Suggested uses: (Curriculum connections)

Students can first experiment with balance scales Students experiment with weighted numbers on each side of the balance to determine numerical value.

Description: Numbers have relative weights so that they add up to their value. They support the transition from adding with objects to adding with symbols.

Thinking Prompts:

(Grade levels)

How does the balance work?

Are there any other ways to make it balance?

What have you already tried?

Online equivalent tool: <u>http://nrich.maths.org/4726</u>

MSDE Accommodation decision:

Not allowed as an accommodation on the MSA. This is can be used during instruction only.

Description: This angle view with color contrast provides a more concrete representation of the size of an angle. It also eliminates the need to rotate the angle or protractor. The red color makes it clear which part of the angle is being measured. **Suggested uses**:

- Students use the angle view to more accurately measure the intended angle.
- Students match the sides of the angle with the rays representing the angle.
- Students learn they are measuring the distance between two rays

Thinking Prompts:

Find angles in your environment, measure and rate them from largest to smallest Does the size of the ray have any relationship to the size of the angle? **MSDE Accommodation decision:**

Acceptable as a 2-J: Calculation Accommodation (Manipulative)

Rev. 11/12

Base ten clear blocks



Description: Transparent flats, longs and ones blocks. The 100 chart is visible through the blocks. Blocks come in both red and blue.

Suggested uses:

- They Can be composed and decomposed, making the equivalencies more concrete
- They fit a standard centimeter graph paper so that paper problems can be devised and students can use the blocks to solve them.
- They can also be used for measuring length and area
- They can be used to represent place value and to group 100s, 10s, and 1s
- In higher elementary grades they can be used to determine Lowest Common Denominator

Thinking prompts:

- Can you add and subtract two and three digit numbers?
- How can you use the blocks to determine more/less than or equal values?

MSDE Accommodation decision:

Acceptable as a 2-J: Calculation Accommodation (Manipulative)

Description: This is a line that represents the 24 hour clock – a full day. It allows students to solve problems of elapsed time even if they are unable to calculate, through moving the pointers along the hour and minute markers on the time line. **Suggested uses**

- Represent the beginning time and ending time on the number line
- Determine elapsed time from the start to the end of an activity.

Thinking prompts

- How is an elapsed time line like a clock?
- Relate times on a clock to times on an elapsed number line **MSDE Accommodation decision**

Acceptable as a 2-J: Calculation Accommodation (Manipulative

Fraction Rings

Description: Plastic measurement circles used with fraction circles to represent equivalencies among fractions, minutes, percentages, decimals, and degrees (e.g. 1/4, 15 minutes, 25%, 0.25, 90 degrees)

Suggested use

Provides a concrete visual representation of value of the following measurements:

- Fraction
- Time
- Percentage
- Decimal
- Degree

Thinking prompts

How can you relate/compare one measurement to another, e.g how is 15 minutes like 25%?

MSDE Accommodation decision

Not allowed as an accommodation on the MSA. This can be used during instruction only.

Elapsed Time Line



Expanded Fraction Pattern Blocks set



Description: This expanded set of pattern block allows teachers to represent more and smaller fractions. It contains the usual blocks and a double helix, a chevron and blocks representing ¼ and 1/12 of a helix. **Suggested use**

- Provides a concrete representation of the relationships between shapes, area, and parts of an area.
- Illustrates how individual shapes can combine to make other shapes.

Thinking prompts

- Using one specific shape first add other shapes to make a rectangle, pyramid etc.
- What is the least amount of shapes that can be combined to make a rectangle, pyramid etc.

MSDE Accommodation decision

Acceptable as a 2-J: Calculation Accommodation (Manipulative)

Geared Math Clocks



Description

The hands on this clock move in the same fashion as an analog clock. As the minute hand moves around the clock for 60 minutes the hour hand moves one hour. **Suggested use**

- This clock allows students to see how the progression of time and the movement of the clock's hands are related.
- Allows students to calculate problems of elapsed time where a calculator could not.

Thinking prompts

- How is a clock like an elapsed time line?
- Relate times on a clock to times on an elapsed number line.

MSDE Accommodation decision:

Acceptable as a 2-J: Calculation Accommodation (Manipulative)

Note: These devices/tools can be used instructionally for all students, regardless of MSDE approval as a accommodation. However, during county or state tests they can only be used by students with IEPs that document the use of the 2-J (calculation devices) as an accommodation.

Tip: Divide the contents of each math kit to assemble grade appropriate kits