Math Workshop

Cambridge School Volunteers
Monday, October 28, 2019
**Do Now**

On the index card at your table write down your name and one or more questions you want answered today.
**Goals**

- To gain an understanding of the CPSD Middle school math curriculum/program.
- To build a toolbox of strategies for working with middle school scholars in math.
- To answer any questions you have about your tutoring so far this year.
Agenda

- Math Warm-Up
- Curriculum Overview
- Tutoring Resources
- Looking at Student Work
- Questions
Warm Up: Notice/Wonder

I am going to put up a mathematical representation.

Your job is come up with something you notice or something you wonder (a question you have) about the representation.
## Warm Up: Notice/Wonder

<table>
<thead>
<tr>
<th>number of cases they order</th>
<th>number of rolls of paper towels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
</tr>
</tbody>
</table>

“I notice…”

“I wonder…”
Warm Up: Share

“I notice…” “I wonder…”

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Warm Up: Notice/Wonder

What did I as the facilitator do during the talk?

How did you feel as the participant?
**Two simple Questions:**
- **What do you notice?**
- **What do you wonder?**

Why:

- To lower the barriers to entry to the problem
- To make sense of the context of the problem
- To make sense of mathematics (patterns, relationships, etc.)
- To help students connect to what they already know
Warm Up: Notice/Wonder

Your job as a tutor is NOT to tell students how to do something, but facilitate their best work and thinking.

Students bring a lot to the table, you sometimes just need to facilitate their thinking by wondering and noticing together.
What is your job as a tutor?

Work through problems with students.

Help students come to their own better understanding.

- exploring together vs. telling

You do not need to know the answer
Resource Packet

1. Tutor Prompts
2. Unit Overviews for each grade
3. Directions for Access to Curriculum
4. Math warm-ups/thinking tasks
5. Tape Diagrams/Number Lines
6. MCAS and PARCC reference sheets
How might this help you work with your student?
Illustrative Math: CPS Primary Middle School Resource

- Being used at all upper schools
- Available Online (see resource packet)
- Family Materials
  - Gives a quick overview of what students are learning
  - Provides some samples you can try together
This week, your student is learning to describe increases and decreases as a percentage of the starting amount. For example, two different school clubs can gain the same number of students, but have different percent increases.

The cooking club had 50 students. Then they gained 6 students.

This is a 12% increase, because \(6 \div 50 = 0.12\).

They now have 56 students, which is 112% of the starting amount.

\[1.12 \cdot 50 = 56\]

The computer club had 8 students. Then they gained 6 students.

This is a 75% increase, because \(6 \div 8 = 0.75\).

They now have 14 students, which is 175% of the starting amount.

\[1.75 \cdot 8 = 14\]
Here is a task to try with your student:

The photography club had 20 students. Then the number of students increased by 35%. How many students are in the photography club now?

Solution:

27 students. Possible strategies:

- The club gained 7 new students, because $0.35 \cdot 20 = 7$. The club now has 27 students, because $20 + 7 = 27$.

- The club now has 135% as many students as they started with, because $100 + 35 = 135$. That means they have 27 students, because $1.35 \cdot 20 = 27$. 
Other Resources

1. Aspen – students can log in to find missing homework assignments
2. Teachers’ Google Classrooms
3. Homework planners/binders
6th Grade Math: Critical Areas

1. connecting ratio and rate to whole number multiplication and division, and using concepts of ratio and rate to solve problems;

2. completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers;

3. writing, interpreting, and using expressions and equations; and

4. developing understanding of statistical thinking.
# 6th Grade Math: Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>Area and Surface Area</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Introducing Ratios</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Unit Rates and Percentages</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Dividing Fractions</td>
</tr>
<tr>
<td>Unit 5</td>
<td>Arithmetic in Base Ten</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Expressions and Equations</td>
</tr>
<tr>
<td>Unit 7</td>
<td>Rational Numbers</td>
</tr>
<tr>
<td>Unit 8</td>
<td>Data Sets and Distributions</td>
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</tbody>
</table>

Approximately where 6th grade classes are now
7th Grade Math: Critical Areas

1. developing understanding of and applying proportional relationships;

2. developing understanding of operations with rational numbers and working with expressions and linear equations;

3. solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and

4. drawing inferences about populations based on samples.
## 7th Grade Enhanced Math: Units

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>Scale Drawings &amp; Proportional Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 2</td>
<td>Measuring Circles</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Proportional Relationships</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Rational Number Arithmetic</td>
</tr>
<tr>
<td>Unit 5</td>
<td>Expressions, Equations and Inequalities</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Angles, Triangles and Prisms</td>
</tr>
<tr>
<td>Unit 7</td>
<td>Probability and Sampling</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit 8</th>
<th>Rigid Transformations and Congruence</th>
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</thead>
<tbody>
<tr>
<td>Unit 9</td>
<td>Dilations and Similarity</td>
</tr>
<tr>
<td>Unit 10</td>
<td>Linear Relationships</td>
</tr>
<tr>
<td>Unit 11</td>
<td>Exponents and Scientific Notation</td>
</tr>
</tbody>
</table>

*Approximately where 7th grade classes are now*
8th Grade Math: Critical Areas

1. Formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations;

2. Grasping the concept of a function and using functions to describe quantitative relationships;

3. Analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean theorem.
# 8th Grade Math: Units

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>Rigid Transformations and Congruence</th>
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</thead>
<tbody>
<tr>
<td>Unit 2</td>
<td>Dilations and Similarity</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Linear Relationships</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Linear Equations and Linear Systems</td>
</tr>
<tr>
<td>Unit 5</td>
<td>Functions and Volume</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Associations in Data</td>
</tr>
<tr>
<td>Unit 7</td>
<td>Exponents and Scientific Notation</td>
</tr>
<tr>
<td>Unit 8</td>
<td>Pythagorean Theorem and Irrational Numbers</td>
</tr>
</tbody>
</table>

Approximately where 8th grade classes are now
Ways to Support Student Habits

Highlighting and Underlining

Three-Read’s Organizer
Ways to Support Student Habits

<table>
<thead>
<tr>
<th>1&lt;sup&gt;st&lt;/sup&gt; Read</th>
<th>This problem is about:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Read</td>
<td>The question this problem is asking is (In your own words):</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Read</td>
<td>The facts in the problem that are important for solving the problem are:</td>
</tr>
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<td></td>
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</table>
Ways to Support learning Through MODELS

Models

- Tape Diagrams
- Number Lines
- Linking Sheets
Tape Diagrams (Bar Models) for Reasoning

Whole

parts
6th Grade: Ratios

The ratio of students wearing sneakers to those wearing boots is 5 to 6. If there are 33 students in the class, and all of them are wearing either sneakers or boots, how many of them are wearing sneakers?
The number of fish in a lake decreased by 25% between last year and this year. Last year there were 60 fish in the lake. What is the population this year?
Mai made 50 flyers for five volunteers in her club to hang up around school. She gave 5 flyers to the first volunteer, 18 flyers to the second volunteer, and divided the remaining flyers equally among the three remaining volunteers.
You Try: With your group

- Decide how many parts you need and divide up the bar
- Label the whole if you know it
- Label the parts if you know them
- Solve the problem
Number Lines for Reasoning
6th Grade: Rational Numbers

Put the following number in order:

-1.5, 0.5, 1, -2.5
Put the following number in order:

-1.5, 0.5, 1, -2.5
7th Grade: Operations with Rational Numbers

\[-2 + 4\]
7th Grade: Operations with Rational Numbers

\[-2 + 4\]
-5(3)
7th Grade: Operations with Rational Numbers

\[-5(3)\]
8th Grade: Irrational Numbers

Which of the following numbers are greater than 6 and less than 8? Explain how you know.

- $\sqrt{7}$
- $\sqrt{60}$
- $\sqrt{80}$
Which of the following numbers are greater than 6 and less than 8? Explain how you know.

- $\sqrt{7}$
- $\sqrt{60}$
- $\sqrt{80}$
Algebra Tiles for Expressions and Equations

With Expressions you can:

● Simplify
● Expand
● Factor
Algebra Tiles for Expressions and Equations

With Expressions you can:

● Simplify: $3x + x + 4$
Algebra Tiles for Expressions and Equations

With Expressions you can:

- **Simplify**: $3x + x + 4$
With Expressions you can:

- Expand: $2(3x + 1)$
With Expressions you can:

- Expand: $2(3x + 1)$

![Diagram of algebra tiles representing the expansion of $2(3x + 1)$]
Algebra Tiles for Expressions and Equations

With Expressions you can:

- Factor: $8x + 6$
Algebra Tiles for Expressions and Equations

With Expressions you can:

- Factor: $8x + 6$

```
  x   x   1   1
x   x   1   1
x   x   1   1
x   x   1   1
```
Algebra Tiles for Expressions and Equations

With Equations you solve for x

\[3x + 2 = 11\]
Algebra Tiles for Expressions and Equations

With Equations you solve for $x$

$$3x + 2 = 11$$
Linking Sheet: Multiple Representations

Each group has a table, graph, equation or words.

With your group, complete the rest of the link sheet.
Different representations of linear equations may stick better with different students.
Conclusion

1. Final Questions

1. Any new insights