

Make sense of problems and persevere in solving them



When presented with a problem, I can make a plan, carry out my plan, and evaluate its success.

BEFORE...

EXPLAIN the problem to myself.

- *Have I solved a problem like this before?*

ORGANIZE information...

- *What is the question I need to answer?*
- *What is given?*
- *What is not given?*
- *What are the relationships between known and unknown quantities?*
- *What tools will I use?*
- *What prior knowledge do I have to help me?*

DURING...

PERSEVERE

MONITOR my work

CHANGE my plan if it isn't working out

ASK myself, "Does this make sense?"

AFTER...

CHECK

- *Is my answer correct?*
- *How do my representations connect to my algorithms?*

EVALUATE

- *What worked?*
- *What didn't work?*
- *What other strategies were used?*
- *How was my solution similar to or different from my classmates'?*

Reason abstractly and quantitatively



I can use reasoning habits to help me contextualize and decontextualize problems.

CONTEXTUALIZE

I can take numbers and put them in a real-world context.

For example, if given

$$3 \times 2.5 = 7.5$$

I can create a context:

I walked 2.5 miles per day for 3 days. I walked a total of 7.5 miles.

DECONTEXTUALIZE

I can take numbers out of context and work mathematically with them.

For example, if given

'I walked 2.5 miles per day for 3 days.

How far did I walk?',

I can write and solve

$$3 \times 2.5 = 7.5$$

Reasoning Habits include 1) *creating an understandable representation of the problem solved*, 2) *considering the units involved*, 3) *attending to the meaning of quantities*, and 4) *using properties to help solve problems*.

Construct viable arguments and critique the reasoning of others



I can make conjectures and critique the mathematical thinking of others.

I can construct, justify, and communicate arguments by...

- ◆ considering context
- ◆ using examples and non-examples
- ◆ using objects, drawings, diagrams and actions

I can critique the reasoning of others by...

- ◆ listening
- ◆ comparing arguments
- ◆ identifying flawed logic
- ◆ asking questions to *clarify* or *improve arguments*

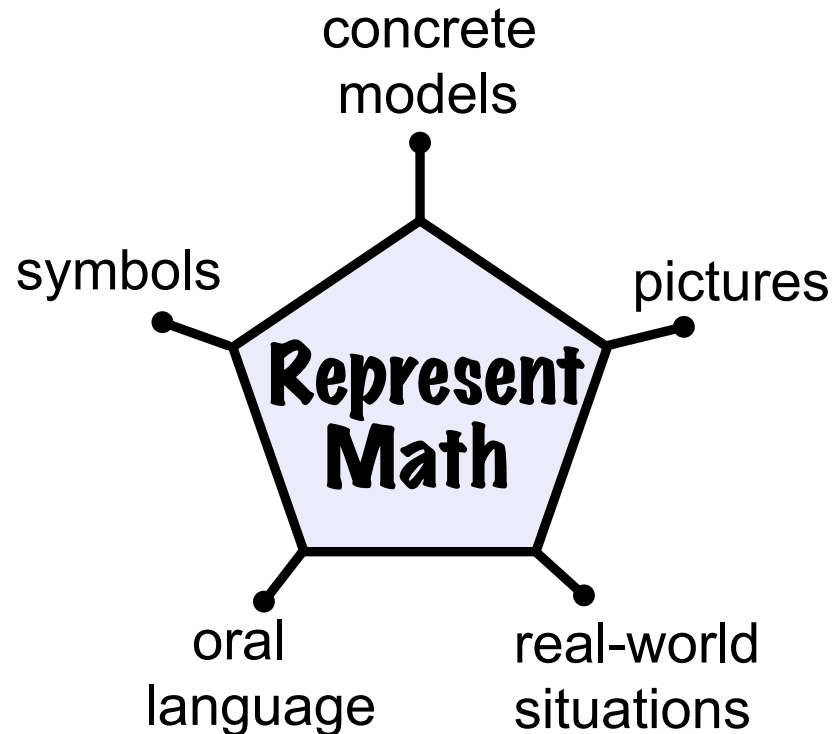
Model with mathematics



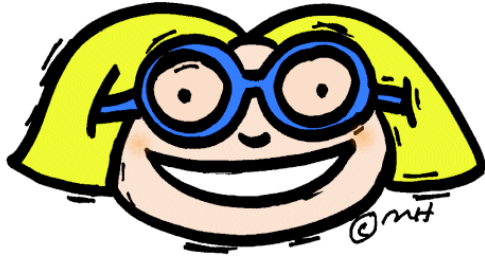
I can recognize math in everyday life and use math I know to solve everyday problems.

I can...

- ◆ make assumptions and estimate to make complex problems easier
- ◆ identify important quantities and use tools to show their relationships
- ◆ evaluate my answer and make changes if needed

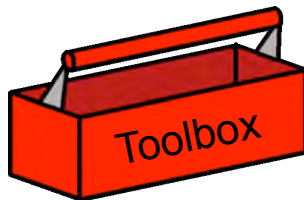


Use appropriate tools strategically

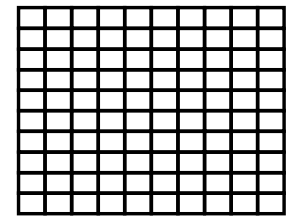
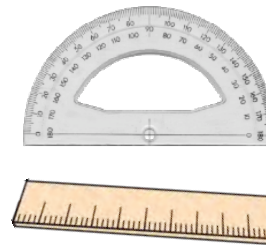


I know when to use certain tools to help me explore and deepen my math understanding.

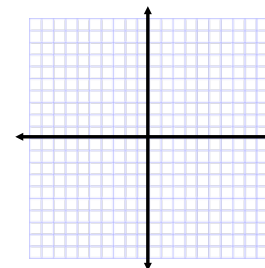
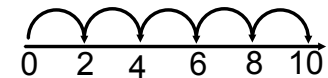
I have a math toolbox.



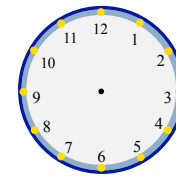
- ◆ I know HOW to use math tools.
- ◆ I know WHEN to use math tools.
- ◆ I can reason: *"Did the tool I used give me an answer that makes sense?"*



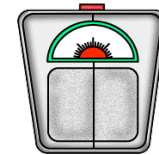
$\widehat{A\hat{B}C}$	
$\widehat{B\hat{C}A}$	
$\widehat{C\hat{A}B}$	



$$a \times b = b \times a$$



$$V = b \times h$$



Attend to precision



I can use precision when solving problems and communicating my ideas.

Problem Solving

- ◆ I can calculate accurately.
- ◆ I can calculate efficiently.
- ◆ My answer matches what the problem asked me to do – *estimate* or find an *exact answer*.

Communicating

- ◆ I can **SPEAK**, **READ**, **WRITE**, and **LISTEN** mathematically.
- ◆ I can correctly use...
 - math **symbols**
 - math **vocabulary**
 - **units of measure**

Look for and make use of structure

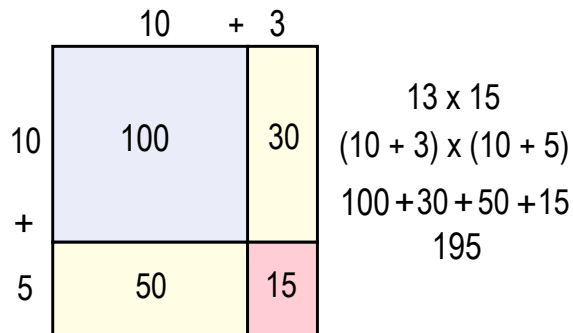


I can see and understand how numbers and spaces are organized and put together as parts and wholes.

Numbers

For Example:

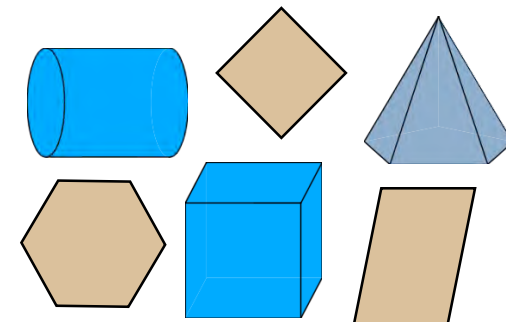
- ◆ Base 10 structure
- ◆ operations and properties
- ◆ terms, coefficients, exponents



Spaces

For Example:

- ◆ dimension
- ◆ location
- ◆ attributes
- ◆ transformation



Look for and express regularity in repeated reasoning



I can notice when calculations are repeated. Then, I can find more efficient methods and short cuts.

For example: $25 \div 11$

$$\begin{array}{r} 2.\textcolor{red}{27}\textcolor{violet}{27} \\ 11 \overline{) 25.0000} \\ \underline{-22} \\ 30 \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 30 \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 30 \end{array}$$

I am repeating this calculation.
The quotient is a repeating decimal.

