

# 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*

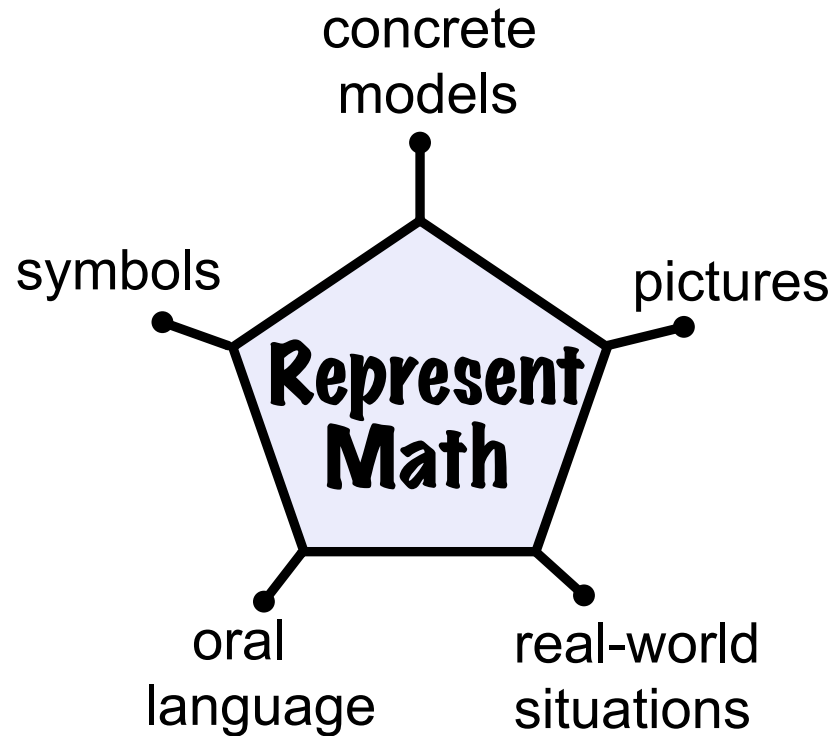
# Model with mathematics



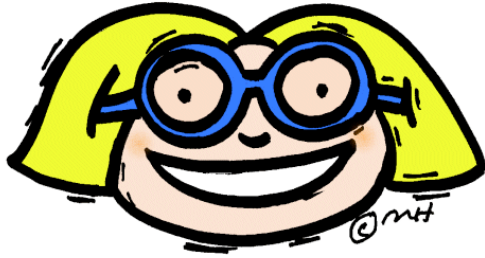
***I can recognize math in everyday life and use math I know to solve everyday problems.***

**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

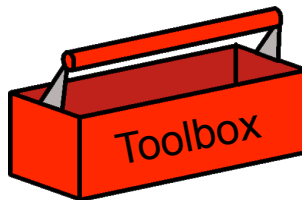


# Use appropriate tools strategically

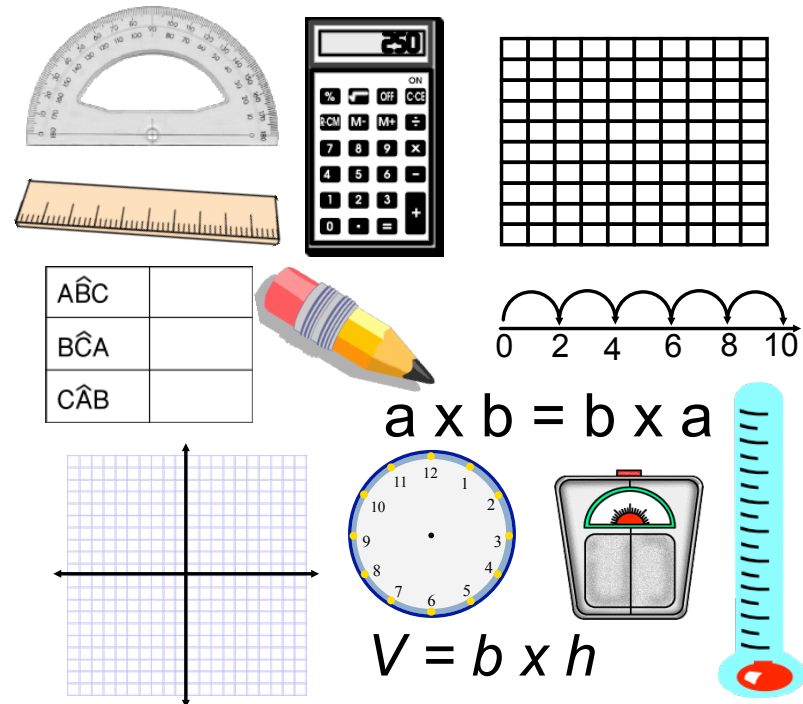


***I know when to use certain tools to help me explore and deepen my math understanding.***

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?*"



# 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

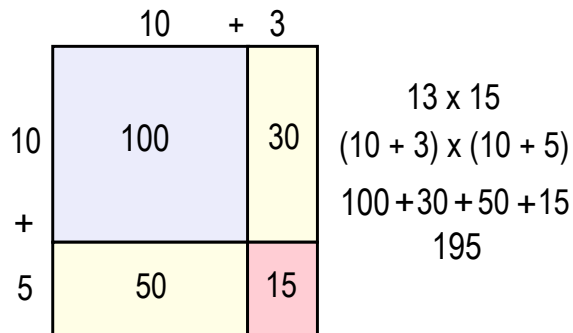


***I can see and understand how numbers and spaces are organized and put together as parts and wholes.***

## Numbers

For Example:

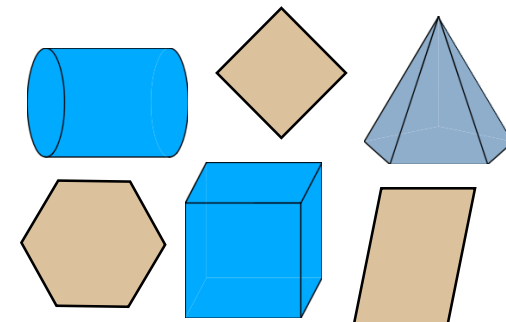
- ◆ Base 10 structure
- ◆ operations and properties
- ◆ terms, coefficients, exponents



## 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:  $25 \div 11$

$$\begin{array}{r} 2.\textcolor{red}{27}\textcolor{violet}{27} \\ 11 \overline{) 25.0000} \\ \underline{-22} \phantom{0000} \\ 30 \phantom{000} \\ \underline{-22} \phantom{00} \\ 80 \phantom{0} \\ \underline{-77} \\ 30 \phantom{0} \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 30 \end{array}$$

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



