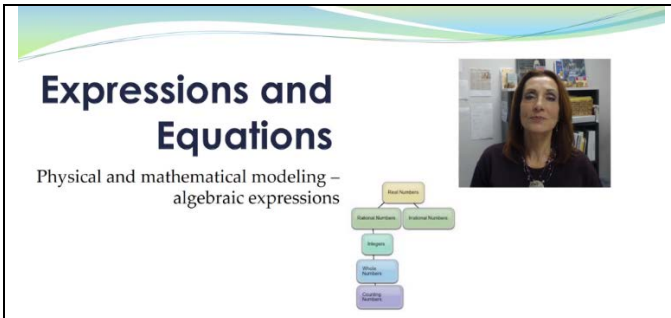
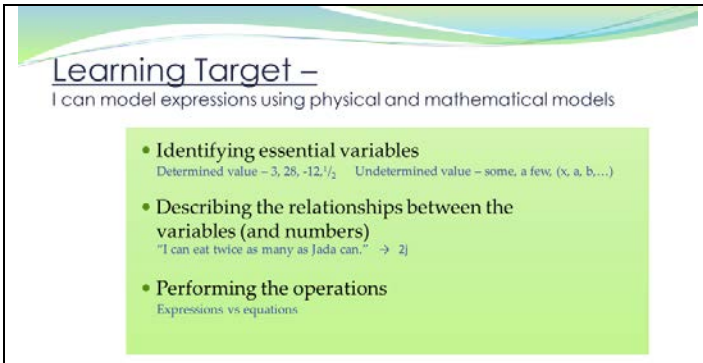
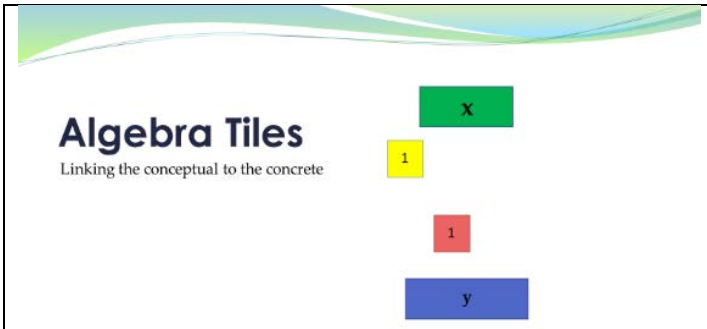
Introduction



Handouts:

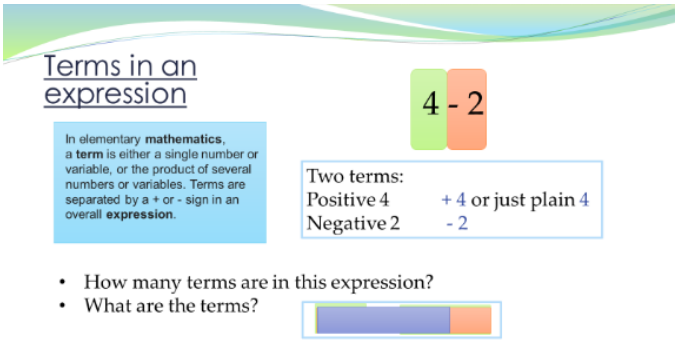
- Set of paper algebra tiles, cut out (Positive-Blue, Green and Yellow; Negative-Red)
- T-Chart template
- Paper to write on





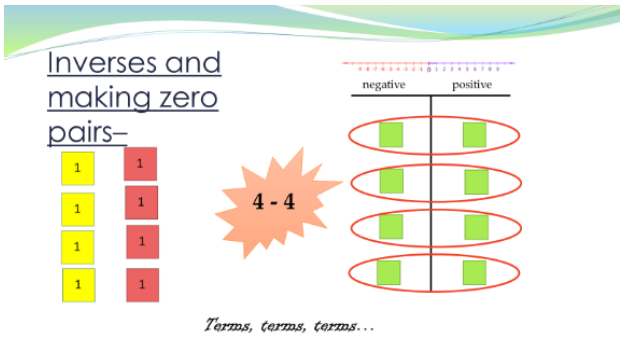
Linking the conceptual to the concrete.

Review Prerequisite Skills for Students to Work with Algebraic Equations, Using Algebra Tiles



First Prerequisite

- Term
- Expression = terms separated by a + or – sign
- Students need to determine:
  - How many terms are in an expression?
  - What are the terms?



Second Prerequisite

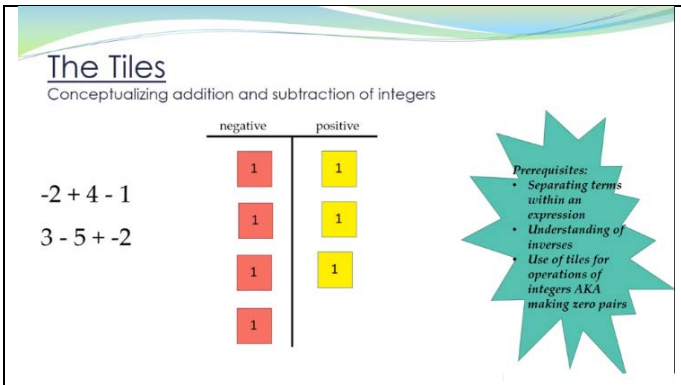
- Use the red tiles for the negative
- Inverse operations are opposite operations
- Zero Pair: use one-to-one correspondence to find pairs that equal zero. Take each zero pair off

Third Prerequisite

- The relationship of negatives, parentheses and inverses
- The key is to work from the inside of the parentheses to the outside

ACTIVITY 1 - Understanding relationship of negatives, parentheses and inverses

4
-(4)
-(-4)
-(-(4))

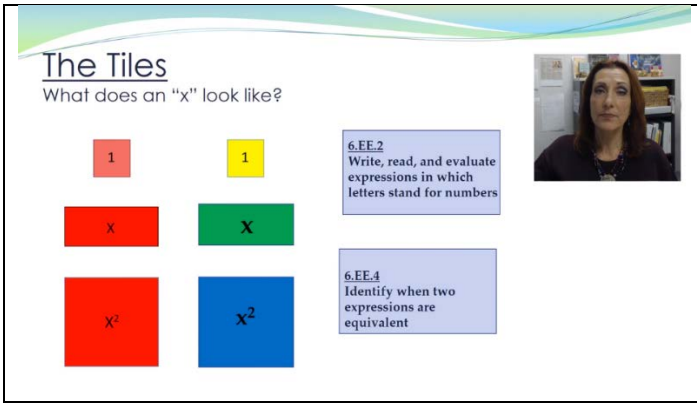


ACTIVITY 2 – Conceptualizing addition and subtraction of Integers

- Model the expression with the tiles
- Then use the t chart and the concept of zero pairs to demonstrate simplifying and creating an equivalent expression

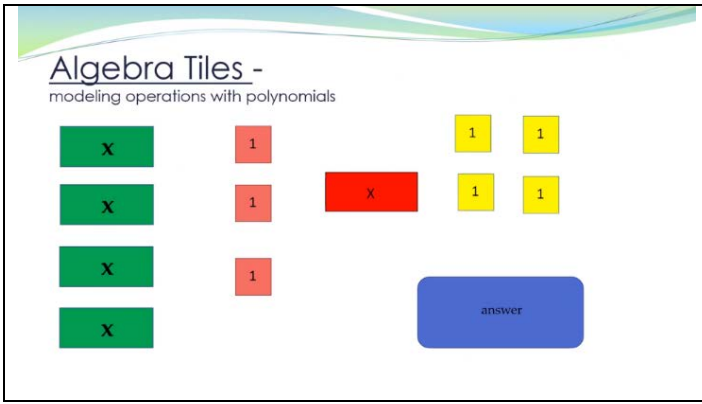
(use the red tiles for negative)

The Tiles: Using Variables



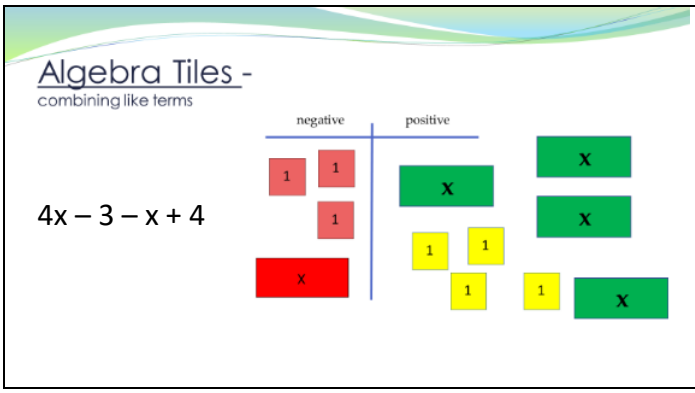
What does an "x" look like?

- Variables are formally introduced in Grade 6
- Standard 6.EE.2 – Write, read and evaluate expressions in which letters stand for numbers
- Standard 6.EE.4 – Identify when two expressions are equivalent



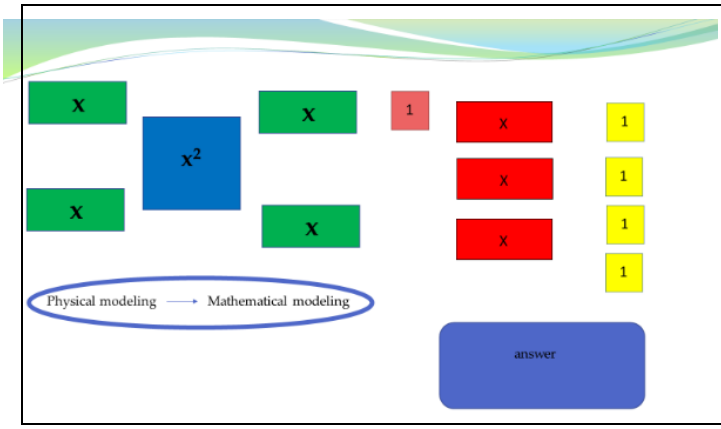
ACTIVITY 3: Modeling operations and polynomials

- Participants lay out the same tiles as shown in the video
- Write the algebraic expression these represent using symbolic notation



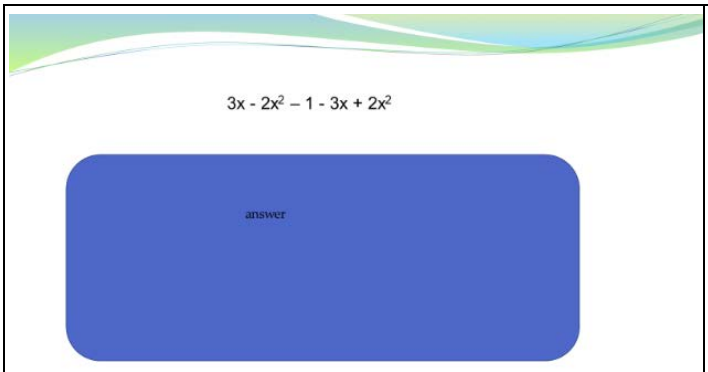
ACTIVITY 4: Modeling operations and polynomials with a T-Chart

- Use the same tiles from Activity 3 and place them on a T-Chart
- Find and remove zero pairs to simplify



ACTIVITY 5: Physical Model to Mathematical Model

- Find the mathematical model based on the physical model on the video
- Is there a simplified form?

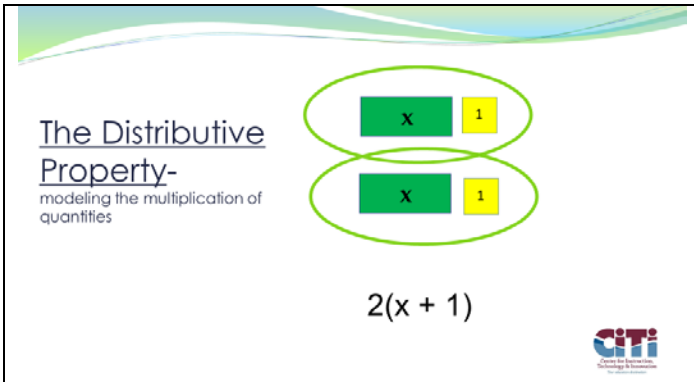


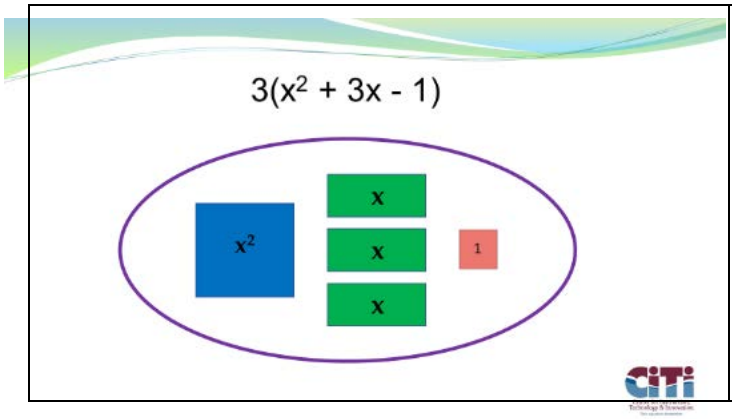
ACTIVITY 6: Mathematical Model to Physical Model

- Use tiles to build a physical model of the mathematical expression

$3x - 2x^2 - 1 - 3x + 2x^2$

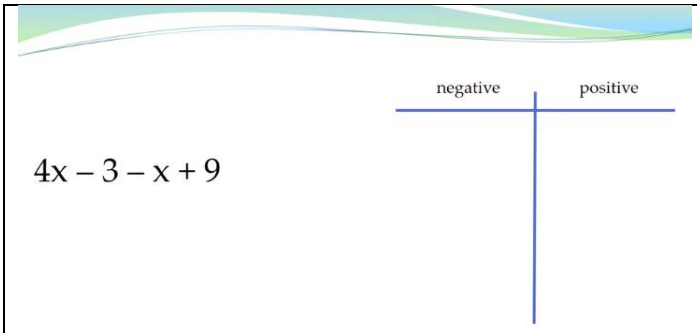
The Distributive Property



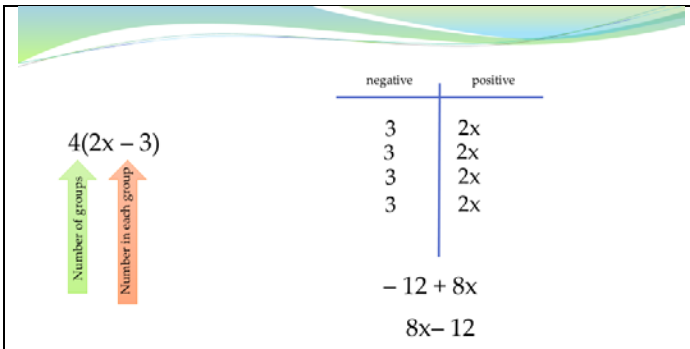


ACTIVITY 7 – Modeling the multiplication of quantities

- Model the expression with tiles
  - The video shows the tiles needed to represent the quantity inside the parentheses
- Write the simplified expression



DEMONSTRATION – Using T-Charts to build relational understanding



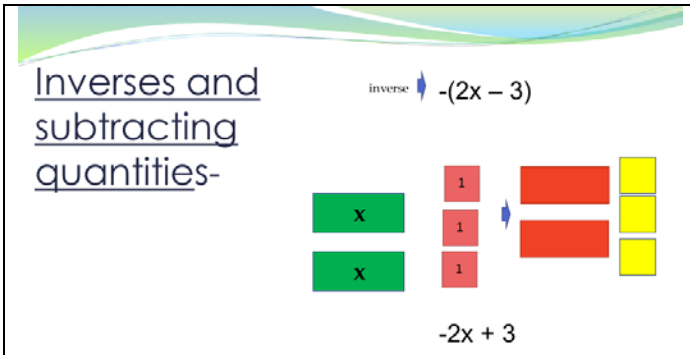
DEMONSTRATION – Using T-Charts with the Distributive Property

4 (2x – 3)

Number of groups: (4)

Number in each group: (2x – 3)

Inverses and Subtracting Quantities



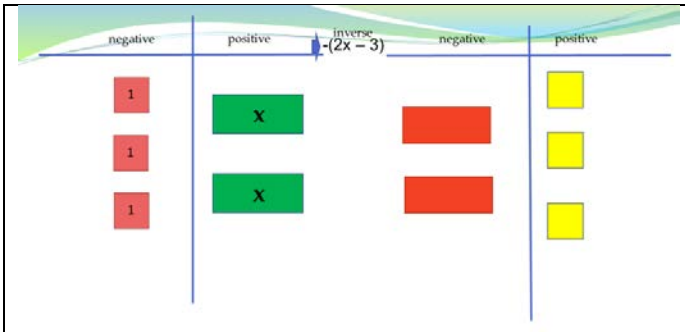
Process (just using tiles)

- Model the quantity inside the parentheses (2x - 3)

Distribute the "-"/inverse by using the tiles to model the quantities changing from negative to positive; or from positive to negative; by changing the colors of the tiles.

- (2) green x's change to (2) red x's
- (3) red 1's change to (3) yellow 1's

- -(2x – 3) simplifies to -2x +3

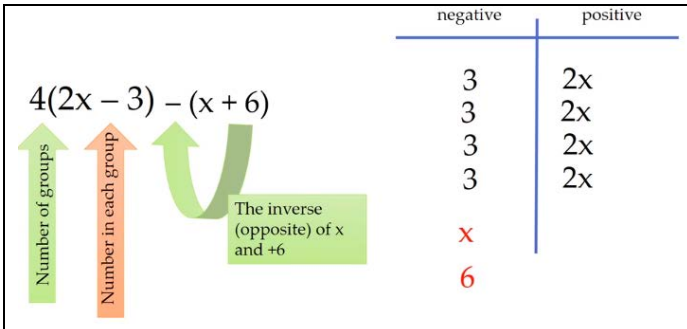


Process (using tiles and a t-chart)

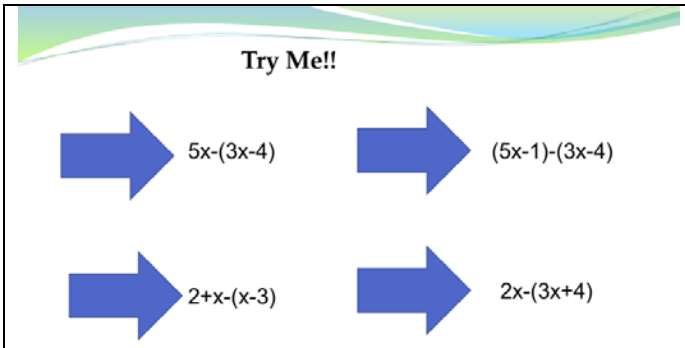
- Model the quantity inside the parentheses (2x-3)

Distribute the "-"/inverse by modeling how the tile colors change and MOVE from negative side to the positive side; or from the positive side to the negative side of the T-chart

Summary and Closing



Demonstration – Putting it all together



Activity 8 (optional)
Using T-charts to simplify algebraic expressions

5x - (3x - 4)

(5x - 1) - (3x - 4)

2 + x - (x - 3)

2x – (3x + 4)

Tutorials and Virtual Tiles

Algebra for All – Algebra Tile Applet
http://a4a.learnport.org/page/algebra-tiles

- Users can download this Algebra Tie Applet, save to a flash drive to use off-line

Math Bits – Working with Algebra Tiles
https://mathbits.com/MathBits/AlgebraTiles/AlgebraTiles/AlgebraTiles.html