

# Increasing Engagement using Manipulatives

Elementary (part 1): 1:15 – 2:25 (Lynn Smith - JCPS)  
Middle/High (part 2): 2:40 – 3:50 (Tim Truitt - JCPS)

# Using the Area Model in Middle School with CSA Strategies

- *From base-10 blocks to algebra tiles:*
  1. Evaluate  $86 + 45$  using base-10 blocks
  2. Evaluate  $.86 + .45$  using base-10 blocks
  3. Simplify  $(8x + 6) + (4x + 5)$  with algebra tiles
- In what ways might base-10 blocks be:
  1. similar to algebra tiles?
  2. different from algebra tiles?

# Using the Area Model in Middle School with CSA Strategies

- What does division mean  $\left(\frac{m}{n}\right)$ :
  1. How many groups of size  $n$  from  $m$ ?
  2. How many out of  $m$  in each of  $n$  groups?
- Fractions:  $\frac{3}{5} \div \frac{1}{2}$
- Decimals:  $\frac{1.3}{0.3}$

# Using the Area Model in Middle School with CSA Strategies

- *Solving Linear Equations (6<sup>th</sup>) using algebra tiles and fraction bars:*

1.  $x - \frac{2}{3} = \frac{3}{4}$

2.  $x + \frac{2}{3} = \frac{3}{4}$

3.  $3x = 12$

4.  $\frac{2}{3}x = \frac{1}{2}$

# Using the Area Model in Middle School with CSA Strategies

- *Solving Linear Equations (7<sup>th</sup>) using algebra tiles and base-10 blocks:*

1.  $3x - 5.3 = 4.9$

2.  $-2x + 5.3 = -4.9$

3.  $-1.5x - 7 = -2$

# Using the Area Model in Middle School with CSA Strategies

- *Solving Linear Equations (8<sup>th</sup>) using algebra tiles:*

1.  $-3(x + 4) = 2x + 13$

2.  $2(x - 3) = 4x - 12$

# Using the Area Model in High School with CSA Strategies

- In what ways might a square be better than a rectangle?
  1. What are the dimensions of a rectangle whose area is 36 square units?
  2. What are the dimensions of a square whose area is 36 square units?

# Using the Area Model in High School with CSA Strategies

- Rewrite the following expressions in factored form using algebra tiles or a semi-concrete illustration:

1.  $x^2 - 6x + 9$

2.  $x^2 + 4x + 3$

3.  $x^2 - \frac{2}{3}x + \frac{1}{9}$



# Using the Area Model in High School with CSA Strategies

Solve the following equations using algebra tiles or a semi-concrete illustration:

1.  $x^2 + 7x + 8 = 2$

2.  $x^2 - 6x - 1 = -10$

3.  $x^2 - 4x + 5 = 0$

# Using the Area Model in High School with CSA Strategies

Identify key features of each conic section and sketch a picture of the figure:

1.  $x^2 + 6x + y^2 - 4y = 12$

2.  $x^2 - 2x + 4y^2 + 8y = -1$