# Using Manipulatives to Meet Common Core Math Standards

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## **Topics Covered**

- Expressions
- Distributive Property
- Combining like terms
- Fractions in expressions and equations
- Equations



## Objectives for the unit:

- Simplify expressions with like terms and fractions
- Apply the distributive property
- Solve 1 and 2-step equations
- Solve equations involving distributive property, combining like terms, and variables on both sides



## Why did we approach the unit this way?

- removing the "math-magic"
- easy entry point for all levels of students
- moving from concrete-pictorial-abstract



Concrete Level

## Model the expression with tiles

age	Algebra	Tiles: Modeling Expression
rtual Algebra Tiles oplet List	Difficulty:	Use the tiles to model the expression below:
Modeling	Easy 🔽	3
Simplifying	Drag tiles below	
xpressions	onto the work area on the right.	
) Adding Polynomials	1	
) Solving one-step	-X	
5) Solving two-step	-x <sup>2</sup> x <sup>2</sup>	
equations		
3) Multiplication	Sort Clear	
) Factoring Trinomials		
8) Completing the	New Enter	Feedback: Drag tiles onto the work area to model the



http://a4a.learnport.org/page/algebra-tiles

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## If you would like to access the online tiles

http://bit.ly/1TyCBzr

http://a4a.learnport. org/page/algebra-tiles



## Model with equations

🔛 Algebra T	SOLVE A GIVEN EQUATION
Unit Tiles	x + 2 = 2x + 1
+ -	x + 2 2x + 1
x Tiles	+ + +
x <sup>2</sup> Tiles	
+	
_	
1 Region V	
	SET SIDES EQUAL O 1-step O 2-steps O variable on both sides   CHECK SOLUTION START OVER

http://go.hrw. com/math/midma/gradeconten t/manipulatives/Algebra\_Tiles/ Algebra\_Tiles.html

http://bit.ly/1BpE3w8

## What we found at this level

- Did not attempt to combine "x" tiles with "one" tiles
- Chose appropriate inverse operations when solving equations
- Able to describe the manipulations and why they were appropriate
- Students at all levels were able to work through the problems

**Pictorial Level** 

## Examples

#### **Three-fourths of 4x-12**



-2



## Try these

• Draw and simplify

3(x+2) - x

• Draw and solve

4x + 3 = 7



3(x+a)-xX -X X X

3(x+a)-xX DD XDD 3x + 6 - x $= \lambda \chi + 6$ 



## Working in the pictorial level

- Students will want to jump to a "pattern" but they need to be able to explain "why"
- Increase in difficulty until a "math headache" is reached
- Movement toward the abstract is now demanded by the students to resolve the "math headache"



Abstract level

## Make them want to move



http://www.zmescience.com/science/math-anxiety-similarphysical-pain-43143/

## -10(x+4)+28

## 16-13x=85

5(6x-9)=2x+9

## Watch out for...

- Students trying to follow a pattern. If they do, "break" their pattern.
- Students attempting to get to this stage too quickly without understanding what is actually happening.
- Students thinking that there is a certain sequence that must be followed.



Now you get to become the student...

## Reflection

- How did you feel as the student?
- How did you see us behaving as the teacher?



# Thank you for attending our presentation!

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