

Copy the outcome in your scribbler then **read** the achievement indicators.

**PR2: Model and solve problems using linear equations of the form:**

$$ax = b; \frac{x}{a} = b, a \neq 0; ax + b = c; \frac{x}{a} + b = c, a \neq 0; a(x + b) = c$$

**concretely, pictorially and symbolically, where  $a$ ,  $b$  and  $c$  are integers.**

### ACHIEVEMENT INDICATORS

- Model a given problem with a linear equation and solve the equation using concrete models, e.g., counters, integer tiles.
- Verify the solution to a given linear equation using a variety of methods, including concrete materials, diagrams and substitution. Draw a visual representation of the steps used to solve a given linear equation and record each step symbolically.
- Solve a given linear equation symbolically.
- Identify and correct an error in a given incorrect solution of a linear equation.
- Apply the distributive property to solve a given linear equation, e.g.,  $2(x + 3) = 5$ ;  $2x + 6 = 5$ ;...
- Solve a given problem using a linear equation and record the process.

## Activating Prior Knowledge:

Each variable (letter) represents an unknown.

a)  $a - 3 = 6$

b)  $4 + b = 11$

c)  $5c = 3$

d)  $\frac{d}{7} = 3$

e)  $e + 8 = 17$

f)  $-5 + f = 3$

g)  $45 = 3g$

h)  $8 = \frac{h}{6}$

**Solve** each equation in your scribbler. **Verify** the solution each time. ✓

Example:  $6a = 18$

Step 1 : Divide both sides by 6.

$$\begin{array}{r} \cancel{6}a = \cancel{18} \\ \cancel{6} \quad 6 \\ a = 3 \end{array}$$

Step 2: Verify your solution.

$$\begin{array}{l} 6 \times 3 = 18 \\ 18 = 18 \end{array}$$



# Solving Equations Using Models

1. Read pages 318 to 323 taking notes as needed.
2. **Watch** the following videos for more examples:

[https://www.youtube.com/watch?v=8jKB8QW\\_K4](https://www.youtube.com/watch?v=8jKB8QW_K4)

<https://www.youtube.com/watch?v=TdbLcZEN5B4>



# Activating Prior Learning

## Preserving Equality (to copy)

## Quick Review

When we solve an equation using algebra, we must preserve the equality.  
Whatever we do to one side of an equation, we must do to the other side too.

We can:

- Add the same number to both sides
- Subtract the same number from both sides
- Multiply both sides by the same number
- Divide both sides by the same number

Example

a) Describe the operation you would perform to isolate the variable in each equation.

b) Solve the equation. Verify the solution.

i)  $x + 7 = 9$

ii)  $3x = 3$

Solution

i) a) To isolate  $x$ , subtract 7 from both sides of the equation.

b)  $x + 7 - 7 = 9 - 7$

$$x = 2$$

Check: Substitute  $x = 2$  back into the original equation  $x + 7 = 9$

$$\text{Left side} = x + 7$$

$$= 2 + 7$$

$$= 9$$

$$\text{Right side} = 9$$

Since the left side equals the right side, the solution is correct.

ii) a) To isolate  $x$ , divide both sides of the equation by 3.

b)  $\frac{3x}{3} = \frac{3}{3}$

$$=$$

$$x = 12$$

Check: Substitute  $x = 12$  back into the original equation  $3x = 36$

$$\text{Left side} = 3x$$

$$= 3(12)$$

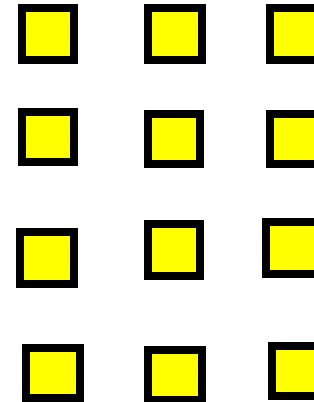
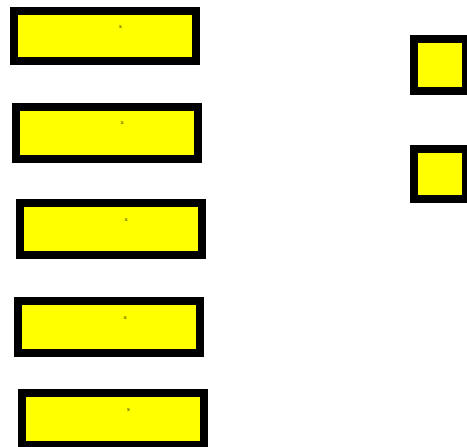
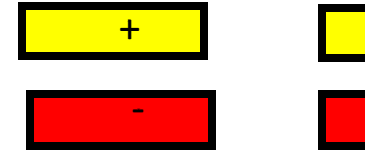
$$= 36$$

$$\text{Right side} = 36$$

Since the left side equals the right side, the solution is correct.

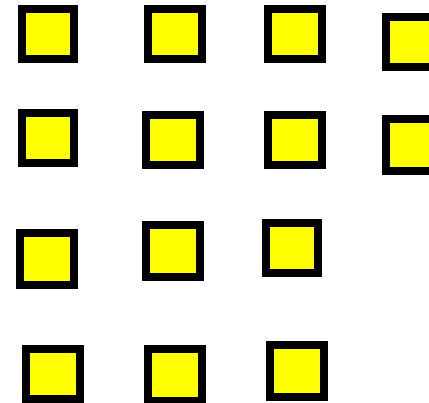
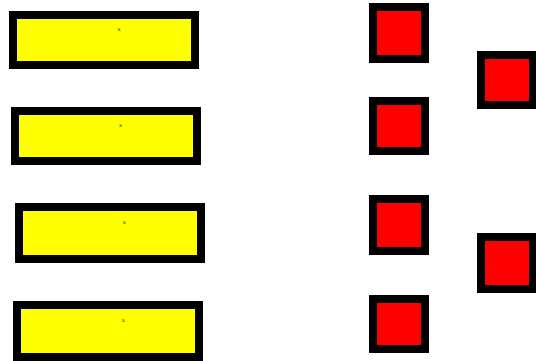
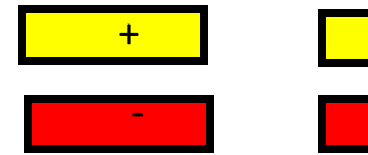
**Copy** and **solve** the equations on the on slides 5-8 using **algebra tiles** in your scribbler.  
**Remember** to use the previous examples to help and always **verify** your solutions.

$$5a + 2 = 12$$



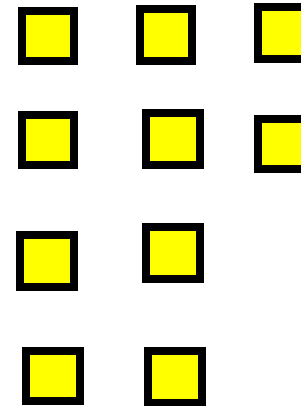
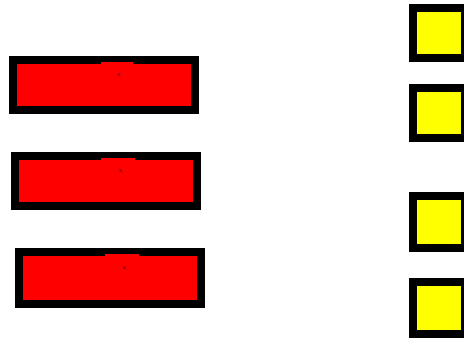
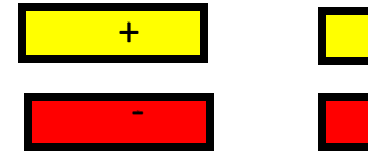
Answer:  
 $a = 2$

$$4a - 6 = 14$$



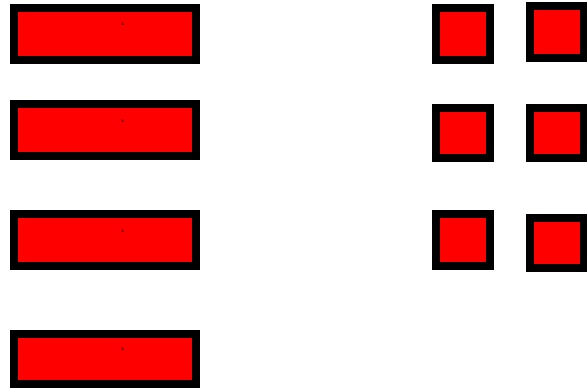
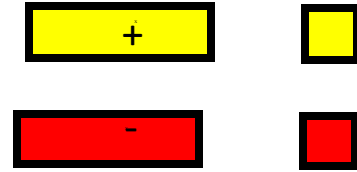
Answer:  
 $a = 5$

$$-3b + 4 = 10$$



Answer:  
 $b = -2$

$$-4a - 6 = 2$$



Answer:  
 $a = -2$



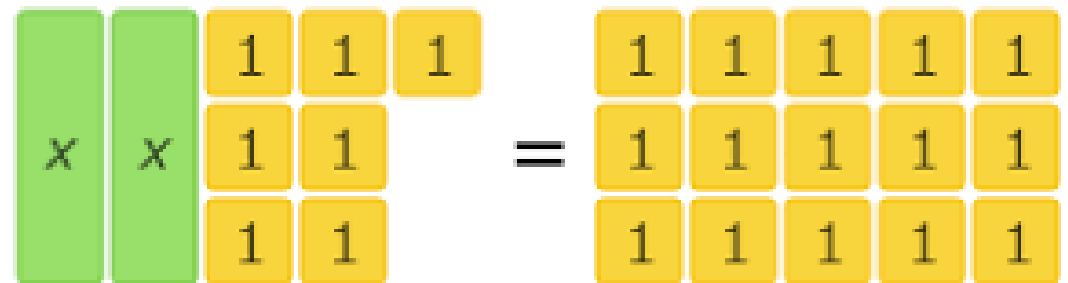
## PRACTICE ...

1. **Complete** questions 5 and 6 on page 324 (draw the models to solve).

**Reminder:** Your answers are found at the back of math book. Please check to see if you are correct.

2. **Worksheet 6.1** – Solving Equations Using Models (pages 138-141 in the Practice and Homework Book)

Use algebra tiles to solve  $2x + 7 = 15$ .



$x =$

Journal Question PR 2 # 1

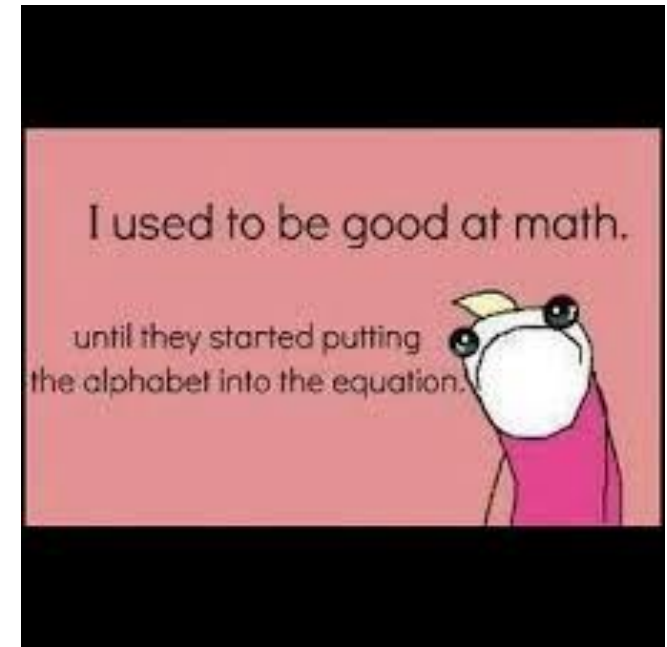
# Solving Equations Using Algebra

1) **Watch** the following video for an example:

[https://www.youtube.com/watch?v=G6fPIVeS -A](https://www.youtube.com/watch?v=G6fPIVeS-A)

2) **Copy** the examples on slides 12-14 in your scribbler.

\*Be sure to **read** through each example carefully.



Examples : (to copy #1,#2, #3. #4,# 5 from slides 4,5,6)

# 1:  $ax = b$

$4x = 20$  Which number is multiplied by 4 to get 20?

divide each side by 4 to isolate x

$$\frac{4x}{4} = \frac{20}{4}$$

$$x = 5$$

Verify:  $4(5) = 20$

$$20 = 20$$



#2:  $\frac{x}{a} = b$

a

$\frac{x}{4} = 7$

Which number is divided by 4 to get 7 ?

$4 \times \frac{x}{4} = 7 \times 4$  so multiply each side by 4

~~$\frac{4x}{4} = 28$~~

~~4~~

$x = 7$

Verify:  $\frac{(28)}{4} = 7$

4

$7 = 7$



#3:  $aX + b = c$

$$5X + 3 = 23 \quad \text{remove 3 on each side}$$

$$5X + 3 - 3 = 23 - 3$$

$$5X = 20 \quad \text{isolate X by dividing by 5}$$

$$\frac{5X}{5} = \frac{20}{5}$$

$$X = 4$$

$$X = 4$$

$$\text{Verify: } 5(4) + 3 = 23$$

$$20 + 3 = 23$$

$$23 = 23$$



#4:  $\frac{X}{a} + b = c$

$$\frac{X}{3} + 8 = 13 \quad \text{remove 8 on each side}$$

a

3

$$\frac{X}{3} + 8 - 8 = 13 - 8$$

$a \neq 0$

3

$$\frac{X}{3} = 5 \quad \text{multiply each side by 3}$$

3

$$\cancel{3} \times \frac{X}{\cancel{3}} = 5 \times 3$$

3

$$X = 15$$

$$\text{Verify: } \frac{(15)}{3} + 8 = 13$$

3

$$5 + 8 = 13$$

$$13 = 13$$



# 5:  $a(X + b) = c$  (distributive property: \*same as  $aX + ab = c$ )

$$4(X + 8) = 40 \quad \text{divide each side by 4}$$

$$\frac{4(X + 8)}{4} = \frac{40}{4}$$

$$X + 8 = 10 \quad \text{subtract 8 on each side}$$

$$X + 8 - 8 = 10 - 8$$

$$X = 2$$

\* same as  $4X + 4(8) = 40$

$$4X + 32 = 40 \quad \text{remove 32 on each side}$$

$$4X + 32 - 32 = 40 - 32$$

$$4X = 8 \quad \text{divide each side by 4}$$

$$\frac{4X}{4} = \frac{8}{4}$$

$$X = 2$$

Verify:  $4(2 + 8) = 40$

$$4(10) = 40$$

$$40 = 40$$



# Solving Equations Using Algebra

1) **Read** examples on page 328 to 330.

2) **Complete** practice questions on page 331 # 6, 7, 8, and 11.

Don't forget to do all the verifications.



3) **Worksheet 6.2** – Solving Equations Using Algebra (pages 142-143 in the Practice and Homework Book)

$$\begin{aligned}2x + 5 &= 21 \\2x + 5 - 5 &= 21 - 5 \\2x &= 16 \\\frac{2x}{2} &= \frac{16}{2} \\x &= 8\end{aligned}$$

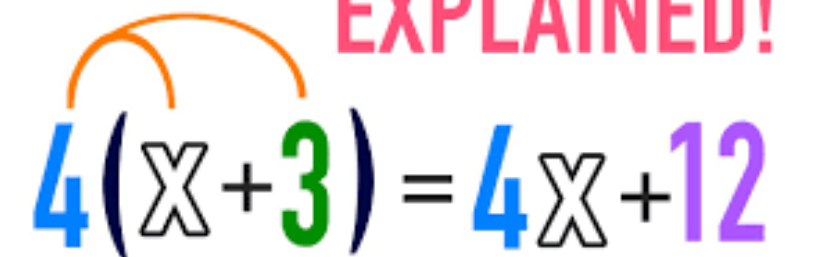
Journal Question PR 2 # 2



# Models for Distributive Property

- 1) **Read** pages 338 to 341.
- 2) **Copy** 1 example of each model being used to solve the distributive problems (one example using the algebra tiles and the other example using the diagram).
- 3) **Complete** questions #4, 12 and 16 on pages 342 and 343.

**DISTRIBUTIVE PROPERTY  
EXPLAINED!**


$$4(x+3) = 4x+12$$

# Solving Equations with Distributive Property

1) **Read** pages 345-346 and **copy** Example 2.

2) **Watch** the following video for another example:

<https://www.youtube.com/watch?v=IkM-Wozf7Jk>

3) **Complete** questions # 4, 5, 13 on pages 347-348.



4) **Worksheet 6.5** – Solving Equations Involving the Distributive Property (pages 150-151 in the Practice and Homework Book)

Example:  $3x + 2(2x - 1) = 33$

1. Use Distributive Property

$$3x + 4x - 2 = 33$$

2. Combine Like terms

$$7x - 2 = 33$$
$$\begin{array}{r} +2 \\ \hline 7x = 35 \end{array}$$

3. Use Inverse Operations

$$\begin{array}{r} \cancel{7}x = \cancel{7}35 \\ \hline x = 5 \end{array}$$

The final result  $x = 5$  is highlighted in a red box.

Journal Question PR 2 # 3