

MODELING PROBLEMS ALGEBRAICALLY 3

Name: Key

SECTION 3.3 SOLVING EQUATIONS WITH SUBTRACTION

VOCABULARY

DEFINITION	EXAMPLE
<p>Subtraction Property of Equality: If $A=B$, then $A-C = B-C$ (subtracting the same number from both sides of an equation)</p>	<p>$3 = x + 1$ $3 - 1 = x + 1 - 1$ $2 = x$</p>

Big Idea: How do we use the balance model to solve simple algebraic equations with subtraction?

This is a balance scale.



When we put a weight on one side of the scale, we must place the same weight on the other side in order for the scale to be balanced. If the scale is balanced and equal weights are added or subtracted from both sides of the scale, the scale will remain balanced.

EXAMPLE 1

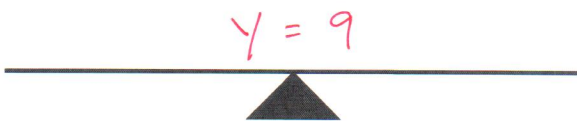
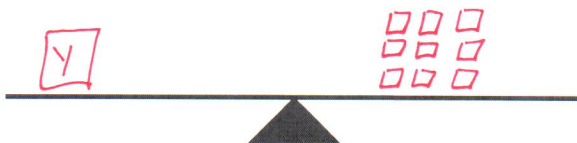
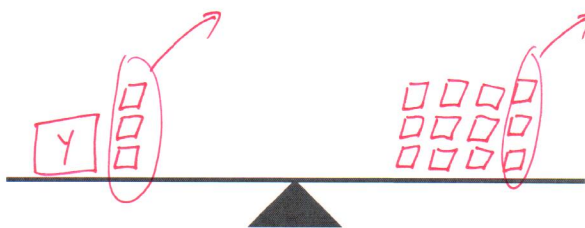
If Jeremy were three years older, he would be the same age as his twelve-year-old sister. What is Jeremy's age?

Use the four-step method similar to the one in the previous section to solve this equation.

Step 1: $y = \text{number of years old that Jeremy is}$

Step 2: $y + 3 = 12$

Step 3 (use the balance model):



Step 4: $9 + 3 = 12 \quad \checkmark$

EXAMPLE 2

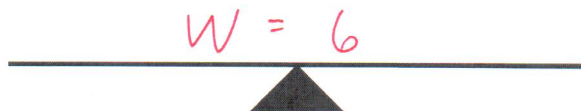
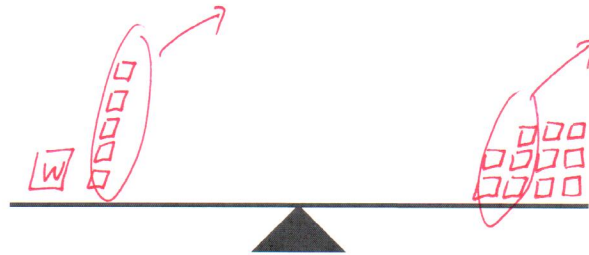
If Wesley finds 5 more marbles, he will have the same number of marbles as John. John has 11 marbles. How many marbles does Wesley have?

Use the four-step process to solve this equation.

Step 1: $W = \text{number of marbles Wesley has}$

Step 2: $W + 5 = 11$

Step 3 (use the balance model):



Step 4: $6 + 5 = 11$ ✓

EXAMPLE 3

Jeffrey checks his bank balance and finds that he has been charged a \$6 fee. His balance is now $-\$10$. What was Jeffrey's balance before the fee was assessed?

SOLUTION

Step 1: Define a variable.

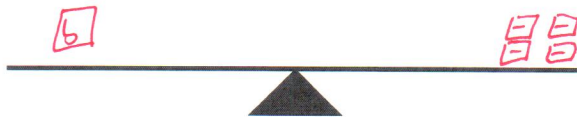
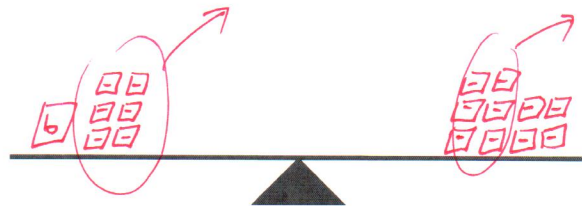
b = balance before the fee

Step 2: Translate the problem into an equation.

$$b - 6 = -10$$

Step 3: Solve the equation.

(□ means a negative unit.)



$$b = -4$$

Step 4: Check the solution.

$$(-4) - 6 = -10 \checkmark$$

PRACTICE EXERCISES

Show all 4 steps and use the balance scale model if needed

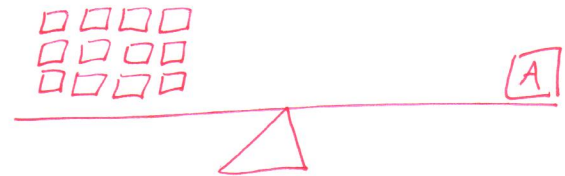
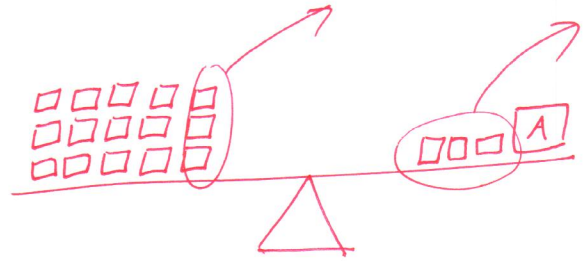
1. $15 = 3 + A$

Step 3:
 $15 - 3 = 3 - 3 + A$

$12 = 0 + A$

$A = 12$

Step 4:
 check: $15 = 3 + 12$ ✓



2. $x + 10 = -8$

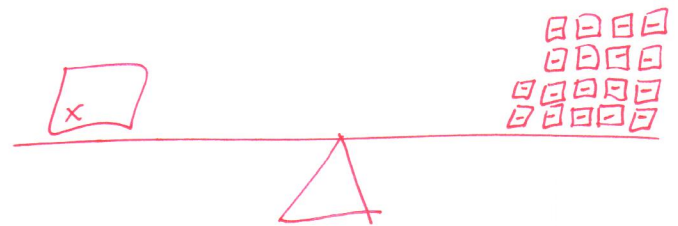
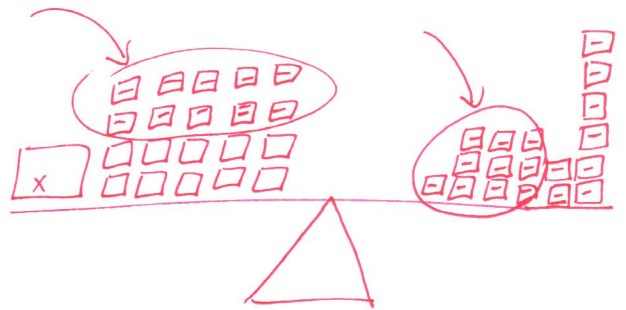
Step 3: $x + 10 + (10) = -8 + (10)$

$x + 0 = -18$

$x = -18$

Step 4: check:

$-18 + 10 = -8$ ✓



$x = -18$

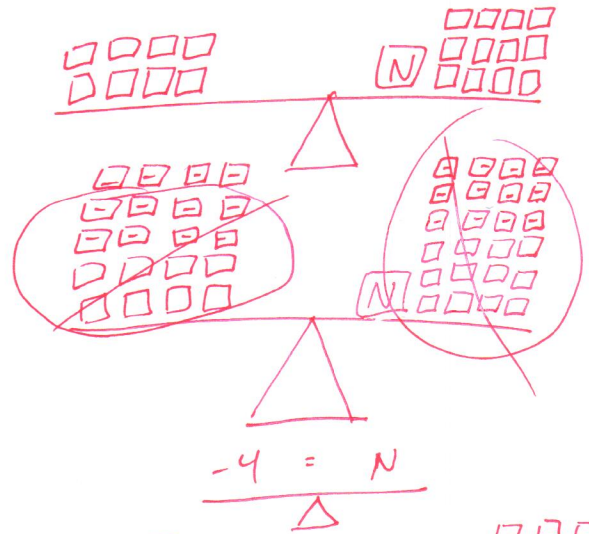
3. $8 = N + 12$

Step 3: $8 + (-12) = N + 12 + (-12)$

$-4 = N$

Step 4:
check:

$8 = -4 + 12 \checkmark$



4. $y + (-3) = 9$

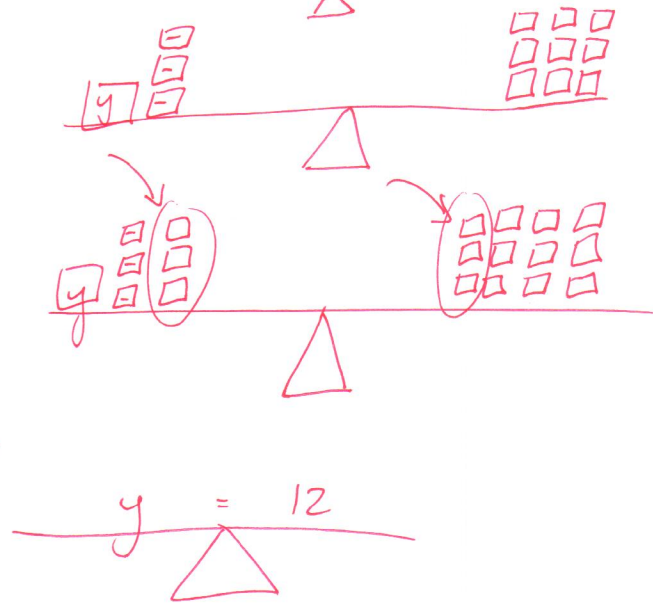
Step 3: $y + (-3) - (-3) = 9 - (-3)$

$y - 3 + 3 = 9 + 3$

$y + 0 = 12$

$y = 12$

Step 4: check: $12 + (-3) = 9 \checkmark$



SUMMARY (What I learned today)
