

MODELING PROBLEMS ALGEBRAICALLY

3

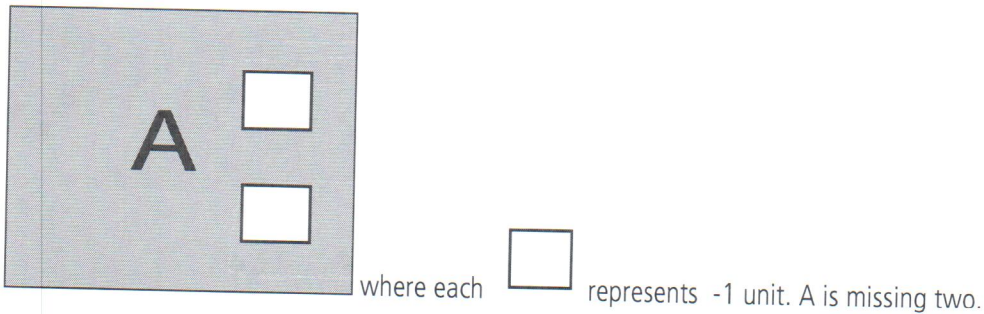
Name: Key
 SECTION 3.4 SOLVING EQUATIONS WITH ADDITION

VOCABULARY

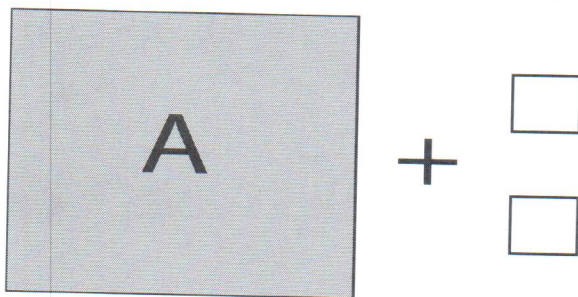
DEFINITION	EXAMPLE
Addition Property of Equality: <i>If $A = B$ then $A + C = B + C$.</i>	$3 = x - 1$ $3 + 1 = x - 1 + 1$ ↙ $4 = x$

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

Using a balance model to solve problems can be tricky. These types of problems may be solved by two methods. Method 1 involves creating "holes" in our visual model for the unknown to represent the value being subtracted. In this case $A - 2$ could be modeled like this:



Method 2 incorporates zero pairs. For this method, $A - 2$ would be modeled as



Again, the empty squares represent -1 unit. When solving equations that involve subtraction, the fact that subtracting is the same as adding the opposite is an important tool.

EXAMPLE 1

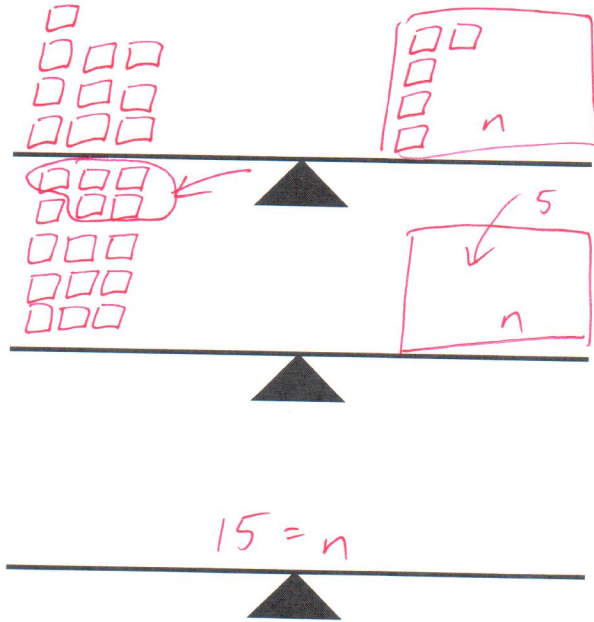
Whitney was 10 years old 5 years ago. What is Whitney's age now?

Use the four-step method to solve this equation following Method 1 (with "holes").

Step 1: $n = \text{Whitney's age now}$

Step 2: $10 = n - 5$

Step 3 (use the balance model):



Step 4:

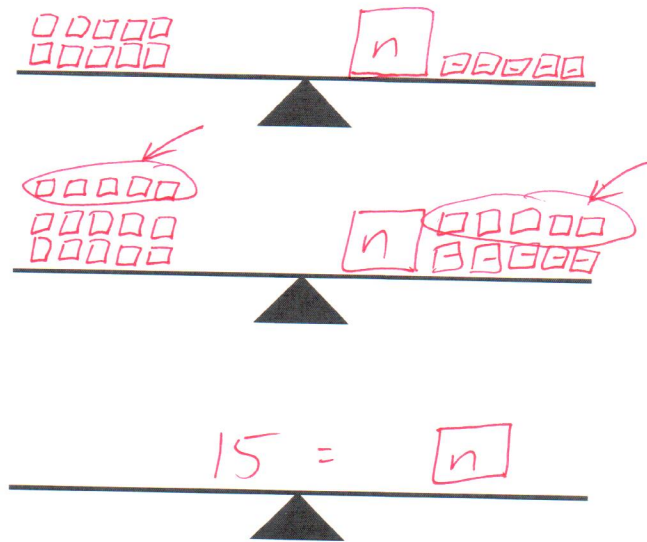
check: $10 = 15 - 5$
✓

Solve the same problem following Method 2 (adding negative chips)

Step 1: $n = \text{Whitney's age now}$

Step 2: $10 = n - 5$

Step 3 (use the balance model):



Step 4: check:
 $10 = 15 - 5$
 ✓

EXAMPLE 2

Amanda wrote a check for \$9. The balance on her checking account is now -\$2. How much money did Amanda originally have in her checking account?

Use the four-step method to solve this equation (use either approach).

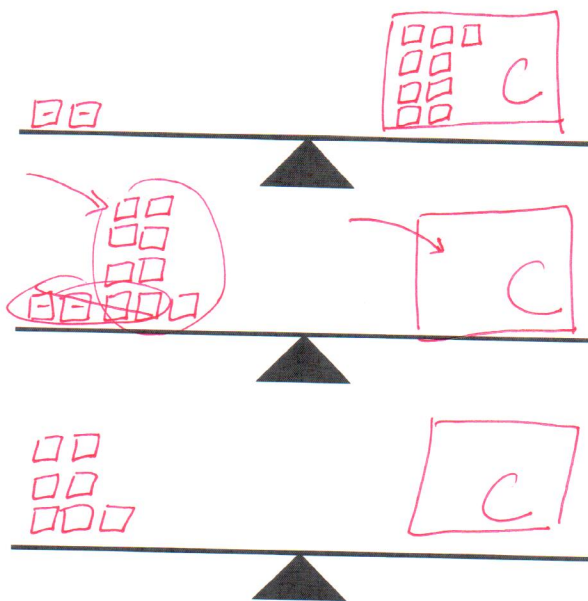
Step 1:

C = original amount in the checking account

Step 2:

$$C - 9 = -2$$

Step 3 (use the balance model):



Step 4:

$$7 = C$$

check:

$$7 - 9 = -2 \checkmark$$

EXAMPLE 3

The temperature rises 4°C to -7°C when the sun comes out. What was the original temperature?

SOLUTION

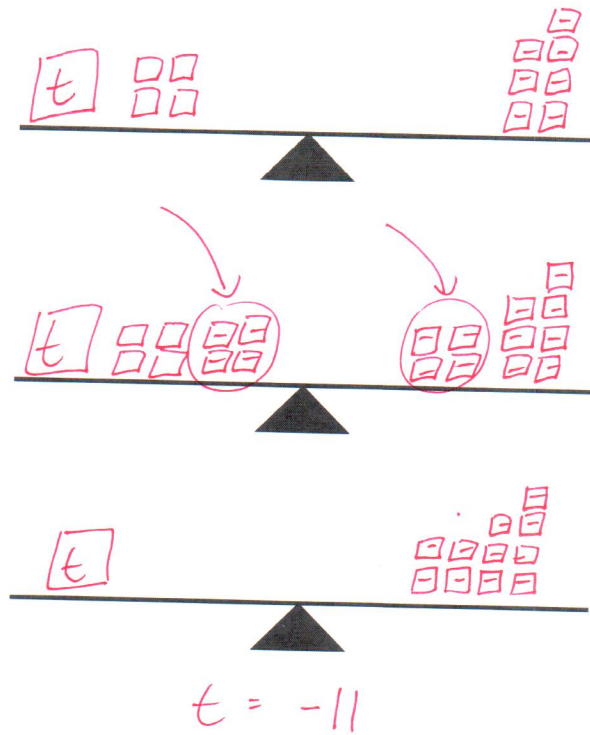
Step 1: Define a variable.

$t = \text{original temperature}$

Step 2: Translate the problem into an equation.

$$t + 4 = -7$$

Step 3: Solve the equation.

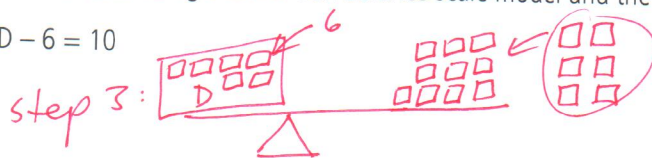


Step 4: check:
 $-11 + 4 = -7$
 ✓

PRACTICE EXERCISES:

Solve for the variable using the addition balance scale model and the four-step method.

1. $D - 6 = 10$

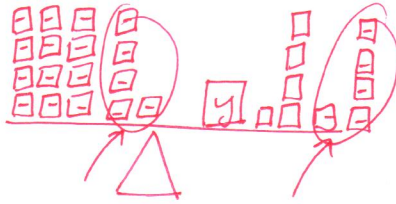


$D = 16$

Step 4:
 check:
 $16 - 6 = 10$
 ✓

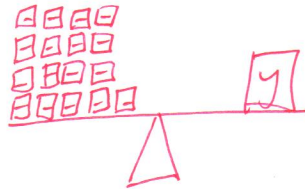
2. $-12 = y + 5$

step 3:



step 4:
check:

$-12 = -17 + 5$
✓



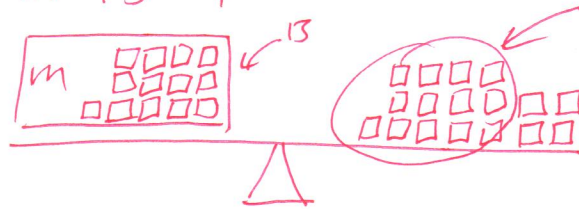
$-17 = y$

3. After spending \$13 at the candy store, Terry has \$4 left. How much money did he start with?

step 1: $m =$ money Terry started with

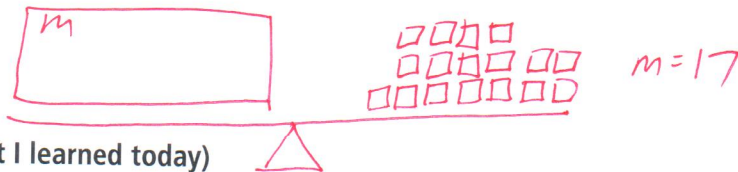
step 2: $m - 13 = 4$

step 3:



step 4:
check:

$17 - 13 = 4$
✓



SUMMARY (What I learned today)
