Today's lesson is Solving Addition Equations. We will learn about inverse operations, and the subtraction property of equality.

Please gather your clicker, your notebook, and your pencil
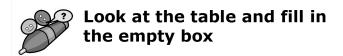
Get ready for the warm-up questions.

True or False?
5 + 14 = 14 + 5

(A) True

(B) False

Solve: g ÷ 4 = 2

Text in your response now please.

Look at the table and fill in the empty box

X	x + 6
1	7
4	

2-4 Solving Addition Equations

What You'll Learn

To use subtraction to solve equations

🔊 **New Vocabulary** inverse operations, Subtraction Property of Equality

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6.EE.5, 6.EE.6, 6.EE.7

Why Learn This?

As living things grow, their height and weight change. You can use an equation to find the change.

In the equation $x + 4 = 38$, 4 is added to a variable. To solve the equation, you need to get the variable alone on one side of the equal sign.

To get the variable alone, you *undo* the operation. You undo adding 4 by subtracting 4. Operations that undo each other are **inverse operations.**

1 Solve $x + 4 = 38$.

Get x alone on one side of the equation.

$$x + 4 = 38$$
$$x + 4 - 4 = 38 - 4 \quad \leftarrow \text{Subtract 4 from each side to undo the addition and get } x \text{ by itself.}$$
$$x = 34 \quad \leftarrow \text{Simplify.}$$

Check $\quad x + 4 = 38 \quad \leftarrow$ Check your solution in the original equation.

$$34 + 4 \overset{?}{=} 38 \quad \leftarrow \text{Substitute 34 for } x.$$
$$38 = 38 \; \checkmark$$

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1 EXAMPLE Solve $h + 9 = 14$.

Get h alone on one side of the equation.

$$\begin{aligned} h + 9 &= 14 \\ -9 \quad & \quad -9 \end{aligned} \quad \longleftarrow \text{Subtract 9 from each side to undo the addition and get } h \text{ by itself.}$$

$$h = 5 \quad \longleftarrow \text{Simplify.}$$

Check $\quad h + 9 = 14 \quad \longleftarrow$ Check your solution in the original equation.

$$5 + 9 \overset{?}{=} 14 \quad \longleftarrow \text{Substitute 5 for } h.$$
$$14 = 14 \; \checkmark$$

Solve: w + 4.3 = 9.1

(A) 13.4

(B) 5.2

(C) 4.7

(D) 4.8

When you solve problems using equations, drawing a diagram may help. The model indicates that the whole = part + part.

Whole	
Part	Part

EXAMPLE Application: Cats

2 When a kitten was brought home it weighed 15 ounces. After two years, the kitten had grown into a cat weighing 120 ounces. How many ounces did the cat gain?

Weight after 2 years	
Original weight	Ounces gained

Let g = the number of ounces gained.

120	
15	g

The equation $15 + g = 120$ models this situation.

$$15 + g = 120$$
$$15 + g - 15 = 120 - 15 \quad \leftarrow \text{Subtract 15 from each side to undo the addition.}$$
$$g = 105 \quad \leftarrow \text{Simplify.}$$

The cat gained 105 ounces.

2 **EXAMPLE** Today Anna discovered that she is 4 in. taller than she was last year at this time. Anna's height today is 51 in. What was Anna's height last year at this time?

height today	
height last year	inches gained

Let h = Anna's height last year.

51	
h	4

The equation $h + 4 = 51$ models this situation.

$$h + 4 = 51 \quad \longleftarrow \text{Subtract 4 from each side to undo the addition}$$
$$\underline{-4 \quad -4}$$
$$h = 47 \quad \longleftarrow \text{Simplify.}$$

Anna was 47 inches tall.

A cat has gained 1.8 pounds in a year. It now weighs 11.6 pounds. How much did it weigh at its check-up last year?

(A) 8.8 pounds

(B) 9.8 pounds

(C) 13.4 pounds

(D) 9.6 pounds

When you use inverse operations to solve equations, you are using a mathematical property. The property you use in this lesson is called the **Subtraction Property of Equality.**

KEY CONCEPTS **Subtraction Property of Equality**

If you subtract the same value from each side of an equation, the two sides remain equal.

Arithmetic $2 \cdot 3 = 6$, so $2 \cdot 3 - 4 = 6 - 4$.

Algebra If $a = b$, then $a - c = b - c$.

Check Your Understanding

1. **Vocabulary** What is the inverse operation of adding 6?

2. **Open-Ended** Write a real-world problem that can be represented using this model.

8	
n	3

Solve each equation.

3. $d + 3 = 21$

21	
d	3

4. $k + 5.1 = 7.4$

7.4	
k	5.1

5. $x + 4.3 = 7$

7	
x	4.3

You can power down your clickers.

There is an assignment worksheet for tomorrow.

You can put your clickers away.

Name _____ Class _____ Date _____

Practice 2-4

Solve each equation. Check the solution. Remember, you can draw a diagram to help you solve an equation.

1. $38 + b = 42$

_____

2. $n + 14 = 73$

_____

3. $12.4 = 9 + t$

_____

4. $m + 7.3 = 9.1$

_____

Write and solve an equation. Then check each solution.

5. The height of the male giraffe in one zoo is 17.3 feet. The male is 3.2 feet taller than the female giraffe. How tall is the female giraffe?

_____
_____
_____

6. The top three best-selling record albums of all time are Michael Jackson's *Thriller* (24 million copies), Fleetwood Mac's *Rumours* (17 million copies), and Boston's *Boston* (*b* million copies). The three albums sold a combined total of 56 million copies. How many copies of *Boston* were sold?

_____
_____
_____

Solve each equation. Then check the solution.

7. $a + 22 = 120$

_____

8. $10 = e + 2.7$

_____