Algebra 3-2: More Properties of Addition

Warm-Up

Answer the following questions. Use past notes or your book if you need to.

1. Below are steps to simplify (59 + x) + -10. Write down the property shown in each step.

(59 + x) + -10   Given

-10 + (59 + x)   *Commutative*

(-10 + 59) + x   *Associative*

49 + x   *Simplify*

$+d$ $-.49$

2. The price of denim was \$4.66. The price rose *d* dollars, then it dropped 49 cents, and then it rose 18 cents. Write an addition expression that represents the current price of denim.

$+.18$ $4.66 + d + {}^-.49 + .18$

Additive Identity Property

When we add ___0___ to any number, the value _Stays the same_

Example: ___$4 + 0 = 4$___

$-5 + 0 = -5$

$a + 0 = a$

Property of Opposites

The opposite of a ___positive___ number is a ___negative___ number.

The opposite of a ___negative___ number is a ___positive___ number.

Therefore when we add a number and its opposite it equals ___0___.

Example: ___$5 + -5 = 0$___

$-8 + 8 = 0$

$-(-0) = 0$

Opposite of Opposite Property

-(-x) = ___X___   Example: ___$-(-9) = 9$___ $-(-b) = b$

Solving Equations x + a = b

To solve an equation in the form x + a = b, you can either ___Subtract___ a or ___add___ -a from both sides.

Example: Solve. Show your steps. x + 45 = 56

$-45 \quad -45$

$\boxed{X = 11}$

$11 + 45 = 56$

$56 = 56 \checkmark$

Example Problems

1. **Solve. Show your steps.**

$143 + y = 180$

$-143 \quad -143$

$y = 37$

$143 + 37 = 180$

$180 = 180$ ✓

$\boxed{y = 37}$

2. **Write and solve the equation to answer the question.**

$+120$ -40

After receiving orders from Captain Steve, a submarine rose 120 feet to 40 feet below sea level. At what level was the submarine before Captain Steve's orders?

Equation: $X + 120 = -40$ $X = $ level before the orders

Steps: $-120 \quad -120$

Solution: -160 $X = -160$

160 ft below sea level

3. Simplify. $-(-8) + 12$ 20

$8 + 12$