

12-18-17

Aim: SWBAT translate phrases into equations.

HW: Packet Pages 9 - 12

Quiz tomorrow

Do Now: Packet Page 12 # 7 - 12

## Homework - Identities and Contradictions

- An Identity - An equation that is true for ALL values of the unknown. It has an infinite number of solutions
- A Contradiction - An equation that has NO solution

Solve each equation algebraically. If you get one solution, check your answer using a 3-Step Check. If the equation is an Identity or a Contradiction you must explain what that means in terms of the solution.

1)  $3(y+4) = y+1+2y$

$$\begin{array}{r} 3y+12 = 3y+1 \\ -3y \quad -3y \\ \hline 12 \neq 1 \end{array}$$

Contradiction, no solutions.

2)  $25x - 3(8x - 4) = 16x - 4$

$$\begin{array}{r} 25x - 24x + 12 = 16x - 4 \\ x + 12 = 16x - 4 \\ -x \quad -x \\ \hline 12 = 15x - 4 \\ +4 \quad +4 \\ \hline 16 = 15x \\ \frac{16}{15} = \frac{15x}{15} \\ \frac{16}{15} = x \end{array}$$

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

$$\begin{array}{r} 4y - 36 = 3y + 12 \\ -3y \quad -3y \\ \hline y - 36 = 12 \\ +36 \quad +36 \\ \hline y = 48 \end{array}$$

3)  $6x - 2x = 4(x+1)$

$$\begin{array}{r} 4x = 4x + 4 \\ -4x \quad -4x \\ \hline 0 \neq 4 \end{array}$$

Contradiction, no solutions

5)  $2x - 4(x+2) = -2x - 8$

$$\begin{array}{r} 2x - 4x - 8 = -2x - 8 \\ -2x - 8 = -2x - 8 \\ +2x \quad +2x \\ \hline -8 = -8 \end{array}$$

Identity, infinite solutions

6)  $4(x+5) - 5(2x-1) = x - 24$

$$\begin{array}{r} 4x + 20 - 10x + 5 = x - 24 \\ -6x + 25 = x - 24 \\ +6x \quad +6x \\ \hline 25 = 7x - 24 \\ +24 \quad +24 \\ \hline 49 = 7x \\ \frac{49}{7} = \frac{7x}{7} \\ 7 = x \end{array}$$

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$$7 = x$$

Pg. 27 checks

$$\begin{aligned} \textcircled{2} \quad 25x - 3(8x - 4) &= 16x - 4 \\ 25\left(\frac{16}{15}\right) - 3\left(8\left(\frac{16}{15}\right) - 4\right) &\stackrel{?}{=} 16\left(\frac{16}{15}\right) - 4 \\ \frac{80}{3} - 3\left(\frac{128}{15} - 4\right) &\stackrel{?}{=} \frac{256}{15} - 4 \\ \frac{80}{3} - 3\left(\frac{68}{15}\right) &\stackrel{?}{=} \frac{196}{15} \\ \frac{80}{3} - \frac{68}{5} &\stackrel{?}{=} \frac{196}{15} \\ \frac{196}{15} &= \frac{196}{15} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad 4(x+5) - 5(2x-1) &= x-24 \\ 4(7+5) - 5(2 \cdot 7 - 1) &\stackrel{?}{=} 7-24 \\ 4(12) - 5(14-1) &\stackrel{?}{=} 7-24 \\ 48 - 5(13) &\stackrel{?}{=} -17 \\ 48 - 65 &\stackrel{?}{=} -17 \\ -17 &= -17 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad 4(y-a) &= 3(y+4) \\ 4(48-9) &\stackrel{?}{=} 3(48+4) \\ 4(39) &\stackrel{?}{=} 3(52) \\ 156 &= 156 \end{aligned}$$

5)  $\frac{n-6}{-5} = 3$

6)  $-4(x+3) = 48$

Directions: Solve each equation algebraically for the variable indicated.

7) Solve for a:  $a - 7 = b$

$$\begin{array}{r} +7 \quad +7 \\ \hline a = b + 7 \end{array}$$

8) Solve for t:  $\frac{d}{r} = \frac{t}{r}$

$$\frac{d}{r} = t$$

9) Solve for x:  $\frac{x}{y} = a \cdot y$

$$x = ay$$

10) Solve for r:  $I = Prt$

$$\frac{I}{Pt} = r$$

11) Solve for m:  $3n + 4m = 9$

$$\begin{array}{r} -3n \quad -3n \\ \hline 4m = -3n + 9 \\ \frac{4m}{4} = \frac{-3n + 9}{4} \\ m = \frac{-3n + 9}{4} \end{array}$$

12) Solve for x:  $4x - 3y = 2$

$$\begin{array}{r} +3y \quad +3y \\ \hline 4x = 3y + 2 \\ \frac{4x}{4} = \frac{3y + 2}{4} \\ x = \frac{3y + 2}{4} \end{array}$$

Ex  $\frac{3m}{3} = \frac{-3n + 9}{3}$

$$m = -n + 3$$

Notes.

An **equation** is a mathematical sentence that contains an equal sign (=).

An **algebraic equation** is an equation that contains at least one variable.

**When translating equations into mathematical equations . . .**

- Identify the key words
- Translated in the exact order they are read
- \* • Switch the order when you read: "less than", "more than", "fewer than", "subtracted from" and "taken away from" (\*\* Notice that "than" and "from" are the key words here!)
- Place parentheses around sums and differences
- Equations will contain one or more operations +, -, or ÷ (use a fraction bar to translate division) and an equal sign.
- The word "is" usually suggests need for an equal sign.

**\*\*ALWAYS DEFINE A VARIABLE (LET STATEMENT) IF A VARIABLE IS NOT GIVEN\*\***

Write an algebraic equation to represent each of the following.

1. The difference of six times a number, x and 9 is -3. 
$$\underline{(6x - 9) = -3}$$
2. Eleven less than the quotient of y and 2 is 4. 
$$\underline{\frac{y}{2} - 11 = 4}$$
3. The product of six and a number, y, is 48. 
$$\underline{6y = 48}$$
4. Twelve subtracted from n is twice n. 
$$\underline{n - 12 = 2n}$$
5. Eight is one-half x decreased by seven. 
$$\underline{8 = \frac{1}{2}x - 7}$$
- \*6. Five times the sum of m and twelve is six. 
$$\underline{5(m + 12) = 6}$$

**Define a variable, then write an algebraic equation to represent each situation.**

7. Nicholas has 28 coins in his collection. That is 5 more than his brother Sam has in his collection. Write an equation that represents the number of coins, c, that Sam has.

Let c = # of coins that Sam has

Equation:  $28 = c + 5$

Now solve your equation to find out how many coins Sam has.

8. Mr. Edwards purchased 3 bags of potatoes. He bought 36 potatoes in all. Each bag contains the same number of potatoes. Write an equation that represents this situation.

Let  $x$  = # of potatoes

$$\frac{36}{3} \quad 36 \div 3$$

Equation:  $3x = 36$

Each bag contains the same number of potatoes. Now solve your equation to find the number of potatoes in each bag.

$$\begin{array}{r} 3x = 36 \\ \underline{3} \quad \underline{3} \\ x = 12 \end{array}$$

### You Try!

9. Phoebe is 3 years less than half her brother's age. Phoebe is 13 years old. Her brother is  $b$  years old. Write an equation that could be used to find her brother's age.

Let  $b$  = the age of Phoebe's brother

Equation:  $\frac{b}{2} - 3 = 13$

- \* 10. Nigel went to an ice rink and paid \$5 admission plus an additional \$2.50 per hour to rent skates. The total cost was \$15. Write an equation that represents  $h$ , the number of hours for which Nigel rented skates.

Let  $h$  = # of hours

Equation:  $5 + 2.50h = 15$

### Homework - Translating Equations & Solving Two Step Equations

Write an algebraic expression or equation to represent each of the following. Remember to read the words carefully to decide if it is an expression or an equation.

- 1) The product of seven and  $y$  is sixteen. \_\_\_\_\_
- 2) Four times a number increased by eight \_\_\_\_\_
- 3) Sixteen less than a number,  $x$  is 3 more than  $y$ . \_\_\_\_\_
- 4) Ten decreased by  $x$  is fifteen decreased by  $n$ . \_\_\_\_\_
- 5) Fifty is twelve subtracted from  $x$ . \_\_\_\_\_
- 6) Twice the sum of  $x$  and  $y$  is three times  $z$ . \_\_\_\_\_

- 7) Sixteen is the product of eight and y. \_\_\_\_\_
- 8) Twice the difference of x and three is nine. \_\_\_\_\_
- 9) The quotient of eleven and v is seven minus x. \_\_\_\_\_
- 10) Five times the difference of nine and x \_\_\_\_\_

**Define a variable, then write an equation using your variable to represent the situation.**

- 11) Three times a number decreased by five is fifty.  
Let \_\_\_\_\_ = \_\_\_\_\_ Equation: \_\_\_\_\_
- 12) Mark spent \$15 at the state fair, the admission fee is \$5 and the rides cost \$2 each. Write an equation that could be used to find the number of rides Mark went on.  
Let \_\_\_\_\_ = \_\_\_\_\_ Equation: \_\_\_\_\_
- 13) Lou has 36 rocks in his collection. He separated them into equal piles of 12 rocks each. Write an equation that could be used to find out how many piles Lou has.  
Let \_\_\_\_\_ = \_\_\_\_\_ Equation: \_\_\_\_\_

**Now solve your equation to find out how many piles of rocks Lou made.**

**Directions: Solve each equation algebraically. Check #1 and #5.**

1)  $2y - 7 = -29$

2)  $3 - 4y = 19$

3)  $\frac{x}{-2} + 4 = -10$

4)  $p - 7p = 78$