**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U1 CW #6** Translating and Writing Equations

Last class we reviewed how to translate numbers and words into algebraic expressions. Today we will go one step further and write and solve equations from words and real-life situations.

Derek and his friends went trick-or-treating. The next day, they got together and counted their candy. Derek had twice as much candy as Nick. Stephen had 10 more pieces than Derek. The following model and expression represent the amount of candy the boys have together:

*c*

*c*

*c*

*c*

*c*

+10

$$c+2c+(2c+10)$$

Show on the model and the expression which pieces represent the amount of candy each of the boys has.

What if we also knew that together the boys have 230 pieces of candy? Let’s look at a model for this:

230

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*c*

*c*

*c*

*c*

*c*

+10

**“is equal to”**

$c+2c+(2c+10)$ and 230 are both linear expressions that represent the amount of candy the boys have together. When we set two expressions equal to each other, we create an equation. An **equation** is a statement that two linear expressions are equal to each other. Using the candy example, we can create the following equation:

$c+2c+\left(2c+10\right)=$$230$

**Expression 2**

**Expression 1**

* 1. What does *c* represent in the context? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Solve the equation showing all steps.
	3. How many pieces of candy do each of the boys have? Show our work.

We know a **solution** to an equation is a number that makes the equation true when substituted for the unknown. In the example above, the solution is 44.

* 1. What does the solution mean in this context (story)?
	2. Verify that when you substitute 44 in for *c* the equation is true.

 Remember, verify means checking to be sure your answer is correct.

It is important to note that when we create an equation, the two expressions on either side of the equal sign might be true for 1) **one value of *x*** (as we saw in the candy example above), 2) **no values of *x*** (there is not a number that can be substituted for the variable to make the equation true), or 3) **all values of *x*** (every number we substitute in for the variable will make the equation true). In the first term we will only study equations that have one solution.

Here is a graphic with key words you might see to signal we are working with equations.



**Directions**: Write an algebraic equation from each verbal phrase. Let x be “a number”.

|  |  |  |
| --- | --- | --- |
| 1. Sixteen increased by a number is twenty-seven.
 | 1. Fourteen divided by a number is two.
 | 1. The product of five and a number is thirty-four.
 |
| 1. Seven less than a number equals negative four.
 | 1. Eight times a number makes sixty four.
 | 1. Two less than three times a number has the same value as 12.
 |
| 1. Eight minus four is a number.
 | 1. Three times a number minus two equates to twice the number plus three.
 | 1. Twelve times a number minus 3 results in one hundred seventeen.
 |

**Directions**: Write an algebraic equation from each real-life situation.

1. Mrs. Hancock videos all the students in her A2 class into three equal groups. There are six students in each group. Write an equation to represent all the students in A2.
2. Mateo’s dog weighs 30 pounds. His dog weighs 20 more pounds than his cat. Write an equation to represent the weight of his cat.
3. The length of a rectangle is twice it’s width. The area of the rectangle is 24. What is the equation that will represent the area of the rectangle? (Hint: A=l•w)

Let’s try one with a little more detail.

1. Use the story below about Chloe and her friends to answer the questions that follow.

**Story**

Going on a Picnic:

Cost of a sandwich: 6x

**Chloe and her friends are going on a picnic. A sandwich is 6 times the cost of a cookie. A bag of chips is one and a half times the cost of a cookie. A soda is twice the cost of a cookie.**

Cost of a bag of chips: 1.5x

Cost of a cookie: x

Cost of a soda: 2x

* 1. Chloe and her friends buy 2 sandwiches, 3 bags of chips, 4 cookies, and 2 sodas. They spend a total of $12.25. Use this information and the expressions above to write an equation representing this situation.
	2. Solve your equation to determine the cost of each item. Show your work.

**Sandwich:** \_\_\_\_\_\_\_\_**Bag of chips:** \_\_\_\_\_\_\_\_**Cookie:** \_\_\_\_\_\_\_\_**Soda:\_\_\_\_\_\_\_\_\_**