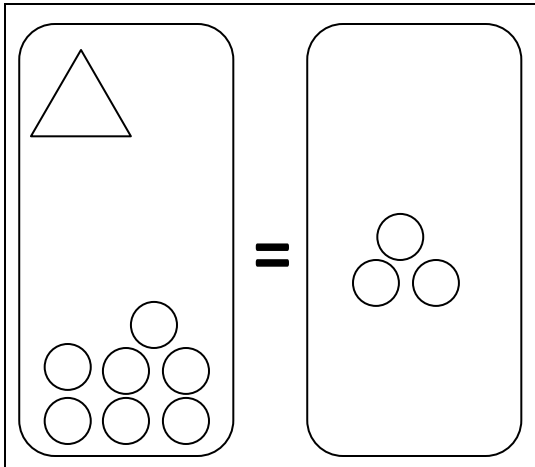


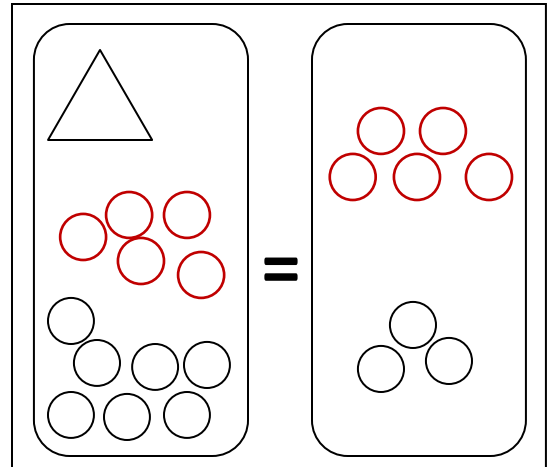
## Introduction to Equations

### Anticipatory set:

Do these two images represent equivalent equation?



$$y + 7 = 3$$



$$y + 7 + 5 = 5 + 3$$

Yes, when you add counters to both sides, the result is an equivalent equation, as shown above.

### Standards:

**2.0** Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.

**3.0** Students solve equations and inequalities involving absolute values.

**4.0** Students simplify expressions before solving linear equations and inequalities in one variable, such as  $3(2x-5) + 4(x-2) = 12$ .

### Objectives:

1. To solve equations by using addition and subtraction.

### Input:

You will learn how to solve equations by using addition and subtraction. In order to do so, it is necessary to know about some important properties such as the following,

**Addition property of equality:** for any numbers  $a, b, c$ , if  $a = b$ , then  $a + c = b + c$ .

Note that  $c$  can be positive, negative or even 0.

For example,  $18 + 5 = 18 + 5$  or  $18 + (-5) = 18 + (-5)$

Generally, when the same numbers are added to both sides of an equation, then the result is an **equivalent equation**.

What does it mean to solve an equation?

To solve an equation means to isolate the variable having a coefficient of 1 on one side of the equation. You can do this by using the addition property.

For example,

Solve  $23 + t = -16$

$$23 + t = -16$$

$$23 + t + (-23) = -16 + (-23) \quad \text{Add } -23 \text{ to each side.}$$

$$t + 0 = -39 \qquad \text{The sum of } 23 \text{ and } -23 \text{ is } 0$$

$$t = -39$$

To check that  $-39$  is the solution, substitute  $-39$  for  $t$  in the original equation.

**Check:**  $23 + t = -16$

$$23 + \overset{?}{(-39)} = -16$$

$$-16 = -16 \quad \checkmark$$

**Guided practice:**

Now, I'm going to divide you into 4 groups of 5 by numbering. Then, each group will be given a tray, and each tray will be divided into two parts. The line will represent the equal sign. You will also be given a small basket and 10 apples. A basket and 7 apples will go on left part of the tray, and the remaining apples will go on the right side of the tray. You then will be given 5 oranges. Your job is to add these oranges in to these two parts in which they will remain equivalent. Work on this activity until I let you know when to stop. After that each group will have a speaker who will give their result to the remaining groups in which other groups will decide if that specific group got correct number of oranges.

Solution: there should be either 2 oranges on each side or 1 orange on each side since we should have same number of oranges added to both parts to have an equivalent relationship.

To learn about subtracting a number rather than adding, we need to know about subtraction property of equality.

**Subtraction property of equality:** for any numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $a - c = b - c$ .

Let's do an example,

Solve  $190 - x = 215$ .

$$190 - x = 215$$

$$190 - x - 190 = 215 - 190 \quad \text{subtract 190 from both sides.}$$

$$-x = 25 \quad \text{the opposite of } x \text{ is } 25$$

$$-x = -25$$

$$\text{Check: } 190 - x = 215$$

$$190 - (-25) \stackrel{?}{=} 215$$

$$190 + 25 \stackrel{?}{=} 215$$

$$215 = 215 \quad \checkmark$$

The solution is  $-25$ .

### **Guided practice:**

You can repeat the tray and apple activity with the difference of this time we don't need the oranges. With only apples and in the tray, try to take away some number of apples where we still will have equivalent equations.

Solution:

We can take 1, 2, or 3. We cannot exceed 3 since on the right side of the tray we only have 3 apples.

### **Independent practice:**

On page 148, do problems 14, 16 and 24.

On page 149, do problems 41, 43, and 50.

Homework will be collected tomorrow. If you were unable to do the even numbered problems, work on the odd numbered problem previous to each even numbered problem assigned since they are very similar and have answer in the back of the book.

**Closure:**

Today you reviewed some of previous materials such as checking if the value is a solution of our equations. We also learned to solve equations by using addition and subtraction.

**Reflection:**