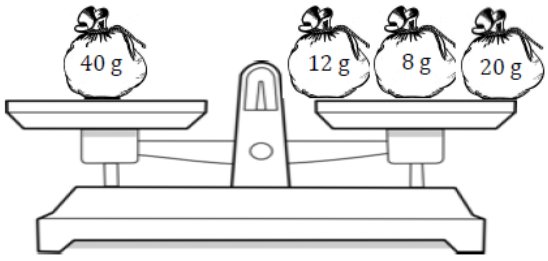
Section 6.2 – Using a Model to Solve Equations

We can also use a **balance** to model an equation.

When both sides of the balance are at the same height, they are equal.

For example:



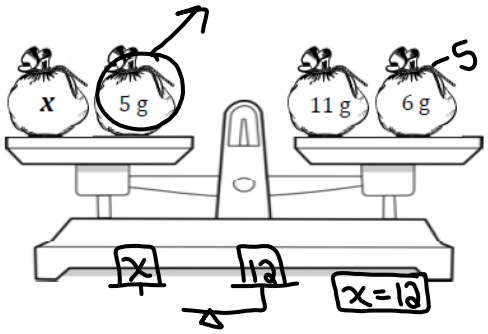
How would we represent this situation as an equation?

$40 = 12 + 8 + 20$

$40 = 40$

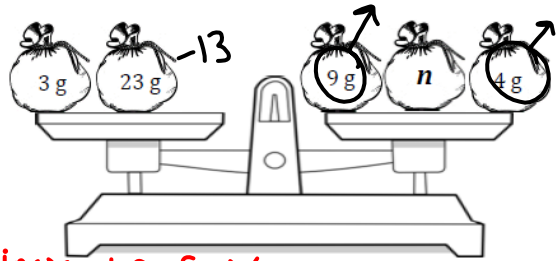
Example 1: Write an equation for each situation below and determine the missing value.

A)



① Isolate the variable "Get x all alone!"
② Preserve equality "Keep it balanced!" "Do the same thing to both sides."

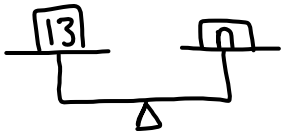
B)



incorrect $n = 5$ ✗

$3 + 23 \stackrel{?}{=} 9 + 5 + 4$

$26 \neq 18$



$n = 13$

Check:

$3 + 23 \stackrel{?}{=} 9 + 13 + 4$

$26 = 26$ ✓

When using balances, the key is to make sure that the left side of the balance is equal to the right side of the balance.

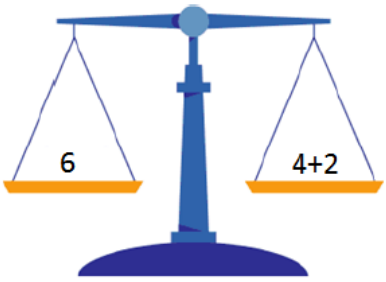
This equation is balanced – that it, the left side is equal to the right side.

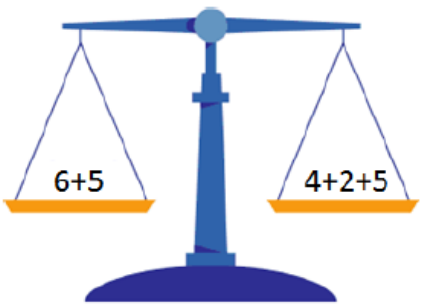
Left Side = Right Side

$4 + 1 = 5$

$5 = 5$

Consider the following. Is this balanced? Yes!





Since we must make sure we keep the left side equal to the right side, we can easily see that if we add (or subtract) something to one side, we **MUST** do the same thing to the other side to keep the balance.

Let's consider the following balance. Write the equation.

$x+3=7$

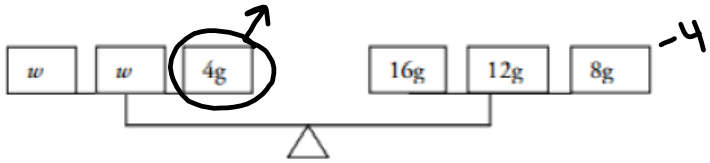
What could we do to get the value of x?

Since we must keep the equation balanced, if we remove 3 from one side we **must** remove 3 from the other side too.

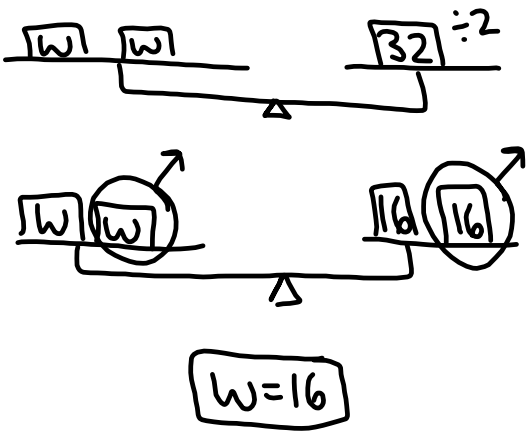
We can easily see that $x =$ 4.

Example 2: Find the value of the unknown mass and sketch the steps used.

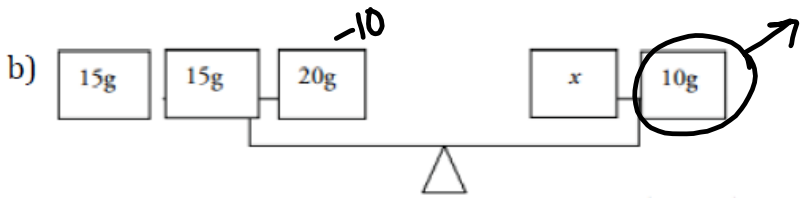
a)



28
4
32



b)

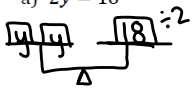


$x = 40$

Example 3: Sketch balance scales to represent each equation. Solve and verify the solution.

numerical coefficient tells us there are 2 "y"'s

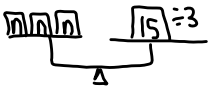
a) $2y = 18$



$y = 9$

b) $3n + 2 = 17$

means 3 sets of n



$n = 5$