

# Lesson 8 – Linear Equations 1

## Starter

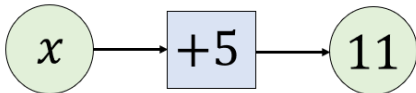
- 1) I am thinking of a number. I multiply it by 3. My answer is 27. What was my number?
- 2) I am thinking of a number. I subtract 2 and divide by 7. I get an answer of 6. What was my number?
- 3) I am thinking of a number. I square it. I get an answer of 81. What was my number?

## Starter Answers

- 1) 9      2) 44      3) 9

Consider the equation  $x + 5 = 11$

This means we start with an unknown number,  $x$ , we add 5 and we get an answer of 11. We can think of this like a **number machine**.



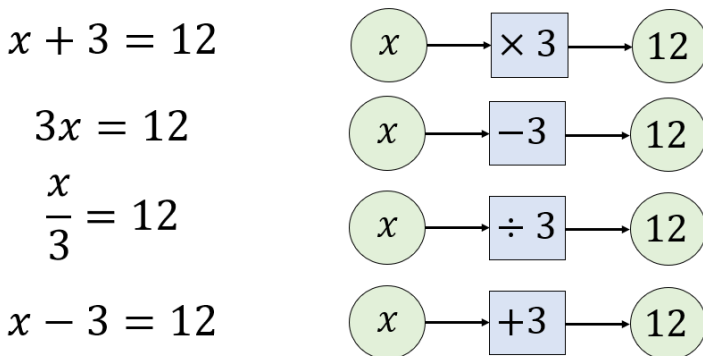
If we want to find what the value of  $x$  is, this is called **solving the equation**.

In this case,  $x = 6$  since  $6 + 5 = 11$ .

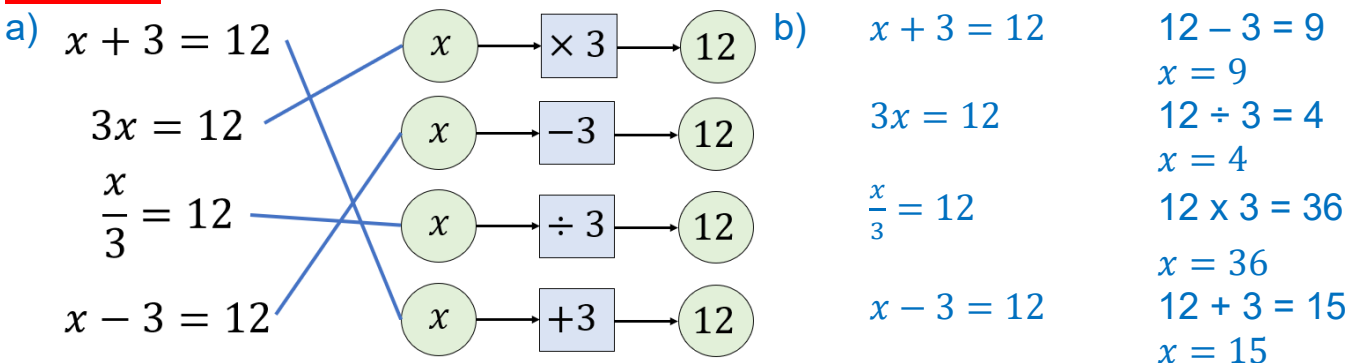
To find  $x$ , we could also do the **inverse operation** to work backwards. The inverse of  $+5$  is  $-5$ , so we could do  $11 - 5 = 6$ .

## Example 1

- 1) Match the equations to the number machines
- 2) What would  $x$  be in each equation?



## Answers



Now let's look at how to set out our answers without the help of a number machine.

### **Example 2**

Solve each of these equations:

1)  $x + 7 = 11$

First write out the equation, using a line to separate the two sides of the equation:

$$\begin{array}{r|l} x + 7 = 11 & \\ -7 & -7 \\ \hline x = 4 & \end{array}$$

The inverse operation of +7 is -7

Since the equation is balanced, and the left side is equal to the right, if we -7 from the left, we must -7 from the right as well.

2)  $3a = 18$

$$\begin{array}{r|l} 3a = 18 & \\ \div 3 & \div 3 \\ \hline a = 6 & \end{array}$$

$3a$  means  $3 \times a$

The inverse operation of  $\times 3$  is  $\div 3$

3)  $\frac{y}{4} = 20$

$$\begin{array}{r|l} \frac{y}{4} = 20 & \\ \times 4 & \times 4 \\ \hline y = 100 & \end{array}$$

$\frac{y}{4}$  means  $y \div 4$

The inverse operation of  $\div 4$  is  $\times 4$

4)  $b - 2 = 11$

$$\begin{array}{r|l} b - 2 = 11 & \\ +2 & +2 \\ \hline b = 13 & \end{array}$$

The inverse operation of  $-2$  is  $+2$

You won't always get whole numbers as your answers.

### **Example 2**

Solve these equations:

1)  $5x = 19$

$$\begin{array}{r|l} 5x = 19 & \\ \div 5 & \div 5 \\ \hline x = \frac{19}{5} & \end{array}$$

We don't need to work this out as a decimal. We can just write it as  $\frac{19}{5}$  because this means  $19 \div 5$ .

$$2) x - 3 = 10.5$$

$$\begin{array}{r|l} x - 3 = & 10.5 \\ +3 & +3 \\ \hline x = & 13.5 \end{array}$$

### **Your go**

Solve these equations:

1)  $6a = 42$

2)  $b - 4 = 17$

3)  $\frac{c}{3} = 19$

4)  $d + 2 = 9$

5)  $f + f + f = 16$

### **Answers**

1)  $a = 7$

2)  $b = 21$

3)  $c = 57$

4)  $d = 7$

5) Simplify the left hand side first to get  $3f = 16$

Then solve to get  $f = \frac{16}{3}$