

Lesson 9 – Linear Equations 2

Starter

Solve these equations:

1) $x - 6 = 12$

2) $8y = 56$

3) $6x = 17$

4) $\frac{d}{2} = 42$

5) $2f + 3f = 25$

Starter Answers

1) $x = 18$

2) $y = 7$

3) $x = \frac{17}{6}$

4) $d = 84$

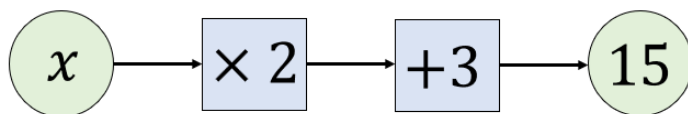
5) $f = 5$

We are now going to look at equations that require **more than one step** to solve them.

Consider the equation: $2x + 3 = 15$

In this equation, we have **two operations**, $\times 2$ and $+3$. Which order have we done these operations to x ?

Multiplication comes before **addition**, so we have done the $\times 2$ first, then the $+3$



When we work backwards using the inverse operations, we first reverse the $+3$ as this was the very last thing we did. Then we reverse the $\times 2$.

Example 1

Solve these equations:

1) $2x + 3 = 15$

$$\begin{array}{r|l} 2x + 3 = 15 \\ -3 \quad -3 \\ \hline 2x = 12 \\ \div 2 \quad \div 2 \\ \hline x = 6 \end{array}$$

2) $3x - 1 = 23$

$$\begin{array}{r|l} 3x - 1 = 23 \\ +1 \quad +1 \\ \hline 3x = 24 \\ \div 3 \quad \div 3 \\ \hline x = 8 \end{array}$$

$$3) \frac{x}{3} + 5 = 9$$

$$\begin{array}{r|l} \frac{x}{3} + 5 & = 9 \\ -5 & -5 \\ \hline \frac{x}{3} & = 4 \\ \times 3 & \times 3 \\ \hline x & = 12 \end{array}$$

$$4) 2 + 4a = 17$$

We can swap this around since addition is commutative:

$$\begin{array}{r|l} 4a + 2 & = 17 \\ -2 & -2 \\ \hline 4a & = 15 \\ \div 4 & \div 4 \\ \hline a & = \frac{15}{4} \end{array}$$

Your go

Solve these equations

$$1) 2x - 7 = 3$$

$$2) 4a + 8 = 36$$

$$3) 1 + 3b = 14$$

$$4) \frac{c}{7} - 2 = 10$$

$$5) 3x + 4x - 1 + 5 = 19$$

Answers

$$1) x = 5$$

$$2) a = 7$$

$$3) b = \frac{13}{3}$$

$$4) c = 84$$

$$5) x = \frac{15}{7}$$

Now we will look at what happens when you have a **negative** amount of x .

Example 2

Solve these equations

$$1) -3x + 4 = 19$$

$$\begin{array}{r|l} -3x + 4 & = -11 \\ +3x & +3x \\ \hline 4 & = -11 + 3x \\ +11 & +11 \\ \hline 15 & = 3x \\ \div 3 & \div 3 \\ \hline 5 & = x \\ \text{So...} & x = 5 \end{array}$$

$3x + 3x = 0$ so we can add $3x$ to both sides. This will get rid of the $-3x$ from the left-hand side and add it to the right.

This means it will now be positive.