Name:

Rearranging equations!

Foundation	Higher
Solve for x: 2x + 5 = 17	Make r the subject of the equation: V = $\frac{4}{3}\pi r^3$
Rearrange the equation below to solve for y. 4y - 9 = 7	Make w the subject: $\frac{5-q}{w}$ = 5-a
Simplify the expression: 3(a + 2b) - 5a	Rearrange for r: P= πr + 2r + 2a
Solve for x in the equation: 3(x - 4) = 21	Make m the subject of the formula: 2(2p + m) = 3 – 5m
Rearrange the equation below to solve for z: $\frac{2}{3z}$ = 10	Rearrange for t: Y = $\frac{2pt}{p-t}$

Solutions!

Foundation

Solve for x:

$2x + 5 = 17$

First, move over the 5 to the right-hand side.

You must **subtract** 5 from both sides as you need to do the **opposite operation** to move it to the other side. Since its +5, the opposite sign will give you -5 (to both sides). This will end up eliminating the +5 from the right side.

$2x + 5 - (5) = 17 - (5)$

$2x = 17 - 5$

$2x = 12$

Finally, divide by 2 both sides.

Therefore $x=6$

Higher

Make r the subject of the equation:

$$V = \frac{4}{3}\pi r^3$$

Firstly, we want to isolate r^3 by itself. To do this, have a look at the steps below:

1) Multiply both sides by 3
2) Divide both sides by 4.
3) Divide by π on both sides.
4) The take the cube root of both sides.

$$v \times 3 = 4\pi r^3$$

$$\frac{v \times 3}{4} = \pi r^3$$

$$r^3 = \frac{3v}{4\pi}$$

$$r = \sqrt[3]{\frac{3v}{4\pi}}$$

Rearrange the equation below to solve for y.

$$4y - 9 = 7$$

First, move over the (-9) to the right-hand side.

You must **add** +9 to **both sides** as you need to do the **opposite operation** to move it to the other side. Since its -9, the opposite sign will give you +9. This will end up eliminating the -9 from the right side.

$$4y - 9 + 9 = 7 + 9$$

$$4y = 7 + 9$$

$$4y = 16$$

Finally, divide by 2 both sides.

$$y = 4$$

Make w the subject:

$$\frac{5-q}{w} = 5\text{-}a$$

There are 2 ways to do this:

Method 1:

Start with multiplying both sides by w.

$$\frac{5-q}{w} \times w = (5-a) \times w$$

$$5 - q = w(5 - a)$$

$$w = \frac{5-q}{5-a}$$

Method 2:

Flip the fraction. Make sure you always do it to both sides.

$$\frac{w}{5-q} = \frac{1}{5-a}$$

$$w = \frac{5-q}{5-a}$$

As you can see, method 2 is slightly faster but always check both ways to see if you end up with the same answer. This ensures that you're not making mistakes to gain the highest possible marks.

Simplify the expression:

3(a + 2b) - 5a

First, **expand** the bracket.

3a + 6ab – 5a

Then, Collect **like terms.**

6ab – 2a

Finally, **factorise** out a common term. In this case **2a** is common to both so we can write the top as:

2a (3b -1)

Rearrange for r:

P= πr + 2r + 2a

Start by moving 2a to the left-hand side.

P – 2a = πr + 2r

Then factorise.

$P - 2a = r(\pi + 2)$

The divide by (π + 2)

$$r = \frac{P - 2a}{\pi + 2}$$

Solve for x in the equation:

3(x - 4) = 21

First, **expand** the bracket.

3x – 12 = 21

Then, move the -12 to the right-hand side by adding +12 to both sides.

3x – 12 +12 = 21 +12

3x = 21 + 12

3x = 33

Finally divide by 3

x=11

Make m the subject of the formula:

2(2p + m) = 3 – 5m

Start off with expanding the brackets.

4p + 2m = 3 – 5m

Then collect like terms.

4p + 2m + 5m = 3

7m = 3 – 4p

Finally divide by 7

$$m = \frac{3-4p}{7}$$

Rearrange the equation below to solve for z:

$\frac{2}{3z} = 10$

There are 2 ways to do this:

Method 1:

The left-hand side is being divided by 3z. So, to move this we must do multiply both sides by 3z to get rid of it from the left side (opposite operation). This will eliminate the 3z from the left.

$$\frac{2}{3z} \times 3z = 10 \times 3z$$

$$2 = 10 \times 3z$$
$$2 = 30z$$

Finally divide by 30 and simplify.

$$30z = 2$$
$$z = \frac{2}{30} = \frac{1(2)}{15(2)}$$
$$z = \frac{1}{15}$$

Method 2

You can put z on the top of the fraction on the left side by flipping both sides of the equation.

$$\frac{3z}{2} = \frac{1}{10}$$

Then simply multiply both sides by 2 and divide by 3.

$$\frac{3z}{2} \times 2 = \frac{1}{10} \times 2$$
$$3z = \frac{2}{10}$$
$$z = \frac{2}{10} \div 3$$
$$z = \frac{2}{10} \times \frac{1}{3} = \frac{1}{15}$$

Rearrange for p:

Y = $\frac{2pt}{p-t}$

Start of with multiplying both sides of the equation by (p-t).

$$y(p - t) = 2pt$$

Then Expand the brackets.

$$yp - yt = 2pt$$

Put any terms with p on one side and the rest on the other. Use these steps:

1) Subtract $\boldsymbol{2pt}$ from both sides.
2) Then add $\boldsymbol{yt}$ to both sides.

You should end up with the equation below.

$$yp - 2pt = yt$$

Factorise

$$p(y - 2t) = yt$$

Finally, divide by (y-2t)

$$p = \frac{yt}{y - 2t}$$