

Using and transposing formulas

Monday, 14 January 2019 8:49 am

★ By the end of the lesson I would hope that you have an understanding of the concepts below which you can apply to a number of complex questions:

- Know what it means to transpose an equation
- Know how to transpose an equation

RECAP:

We have, in a previous lesson, come across this topic area.

As is normal (under the control of Barry!), you used the idea under a different name, "Solving literal equations".

Previously, I stated that solving literal equations was effecting making a different pronumeral the subject of an equation. This is what transposing an equation is. Making a different letter the subject of the formula.

Algebra, Algebra and more Algebra!

Have you noticed there is a lot of algebra in this course.

But it all seems to revolve around the same ideas of "unpacking".

Fractions throw people left, right and centre.

Once you know how to transpose formulae you really have nothing much more to worry about.

|| For example, jumping ahead ... here is how to differentiate something:

$$y = x^3$$

$$y' = 3x^2$$

$$y = x^5$$

$$y' = 5x^4$$

$$y = mx + c$$

$$c =$$

Transposing formulae

It's amazing how much Mathematics there is in the game of Soccer.

Just kicking a ball has more Maths in it than you could image.

Looking at the motion of the ball, we have the following equations of constant acceleration.

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$s = ut + \frac{1}{2}at^2$$

$$s = vt - \frac{1}{2}at^2$$

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

Then there is the time it takes for a pendulum to swing:

$$t = 2\pi \sqrt{\frac{L}{g}}$$

Each of the above can be transposed to make a different letter **the subject of the formula**.

When it wants something to be the **subject of the formula**, it's simply asking you to put the letter on it's own. Generally, this means moving it to the left hand side of the equals sign.

Example 1:

Make t the subject of the formula with $v = u + at$

$$v = u + at$$

$$v - u = at$$

$$\frac{v - u}{a} = t$$

$$t = \frac{v - u}{a}$$

Example 2:

Make u the subject of the formula with $v^2 = u^2 + 2as$

$$v^2 = u^2 + 2as$$

$$v^2 - 2as = u^2$$

$$\pm \sqrt{v^2 - 2as} = u$$

$$u = \pm \sqrt{v^2 - 2as}$$

Example 3:

Make a the subject of the formula for $s = ut + \frac{1}{2}at^2$

$$s = ut + \frac{1}{2}at^2$$

$$s - ut = \frac{1}{2}at^2$$

$$2s - 2ut = at^2$$

$$\frac{2s - 2ut}{t^2} = a$$

$$a = \frac{2(s - ut)}{t^2}$$

Example 4:

Make g the subject of the formula with $t = 2\pi\sqrt{\frac{L}{g}}$

$$t = 2\pi\sqrt{\frac{L}{g}}$$

$$\frac{t}{2\pi} = \sqrt{\frac{L}{g}}$$

$$\left(\frac{t}{2\pi}\right)^2 = \frac{L}{g}$$

$$\frac{t^2}{4\pi^2} = \frac{L}{g}$$

$$g = \frac{4\pi^2 L}{t^2}$$

Using the CAS

Good news!
We can use our trusty CAS!
How?
Use the SOLVE function.

Example 5:

Make u the subject of the formula with $v^2 = u^2 + 2as$