

# Unit 6: MATHS

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March 2018

## Basic Algebra

Under this very broad subheading, I will give some examples of how to rearrange mathematical statements, that you can use to simplify expressions and solve equations for unknowns.

### Simplifying

We can collect like terms in equations to make them simpler to express.

$$4x + 2y - 8x + y$$

Here, 2 terms,  $4x$  and  $-8x$ , are a product of  $x$ . Together they are equal to  $(4 - 8)x = -4x$ . If we do the same for the  $y$  terms and take the sum the result we get a totally simplified expression,  $3y - 4x$ .

$$\frac{4x}{y} + \frac{3x}{2} - \frac{2y}{2} + 2x$$

Here we can have 3 factor that we cannot simplify,  $x$ ,  $y$  and  $x/y$ . Using the same method as above, we take the 2  $x$  terms and substitute them for their the sum of the two.

$$\frac{3x}{2} + 2x = \frac{3x}{2} + \frac{4x}{2} = \frac{7x}{2}$$

Now to simplify  $2y/2$ :

$$\frac{2y}{2} = \frac{2}{2} \times y = 1 \times y = y$$

So, the simplified expression:

$$\frac{4x}{y} + \frac{7x}{2} - y$$

## Trigonometry

Trigonometry encompasses the studies of ratios including side lengths and angles of triangles. I will cover how to solve a triangle side or angle using trigonometry.

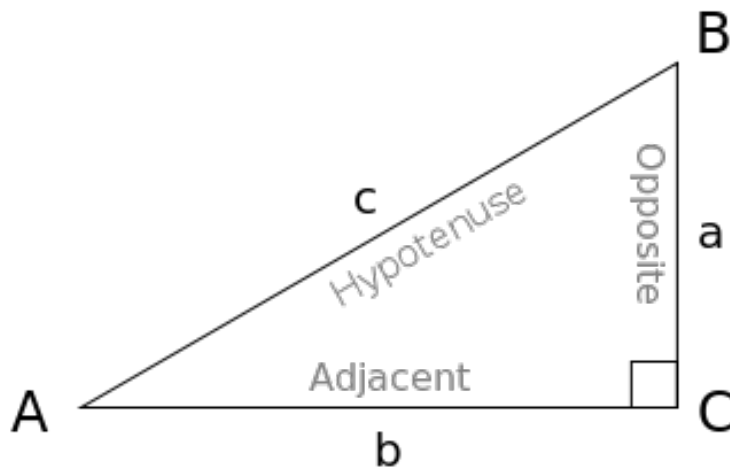


Figure 1: trig triangle

There is two trig equations we will be using: the Sine rule and Pythagorus's equation.

### The Sine Rule

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

### Pythagorus

$$a^2 + b^2 = c^2$$

**Matrices**

$$\begin{pmatrix} 4 & 2 \\ 3 & 5 \end{pmatrix} \times \begin{pmatrix} 2 & 6 \\ 1 & 8 \end{pmatrix}$$

**Vectors**

**Applied Mechanics**

**SUVAT**