Revision topic: Trigonometric Functions

Objectives:

- ◇ Learn about names of sides of right-angled triangles, Pythagoras' theorem, and the definitions of sin, cos and tan of angles
- ◇ Solve real world problems using trigonometry

Key points:

Try to get comfortable with knowing when to use sin, cos and tan to work out angles or side lengths in diagrams with right-angled triangles. The famous **SOH-CAH-TOA** acronym is useful for this.

Try lots of examples to get practice and comfortable in knowing when to use sin or cos or tan.

Also try and develop a good understanding of what the sin and cos curves look like. Remember sin starts at 0 and moves upwards, and cos starts at 1 and moves downwards. Both functions take 360° to do a full cycle, before they repeat forever. There are useful acronyms for this too like CAST.

For most angles the value of sin **and** cos **can only be evaluated with a calculator**. But for certain specific angles the values of sin and cos are fairly nice, these are 0°, 30°, 45°, 60°, 90° and all angles that are multiples of 90° away from these. Examples include:

$$\sin(30^\circ) = \cos(60^\circ) = 1/2, \quad \cos(30^\circ) = \sin(60^\circ) = \frac{\sqrt{3}}{2} \approx 0.866$$

Once you understand the curves you can work out values like $\sin(120^\circ)$. You'll know that sin after 90° is a mirror image of the behaviour until 90° so you will know that $\sin(120^\circ) = \sin(60^\circ)$ because 120 is 30 after 90, whereas 60 was 30 before 90, i.e.

$$\sin(120^\circ) = \sin(60^\circ) = \frac{\sqrt{3}}{2}, \quad \text{indeed } \sin(90^\circ + x) = \sin(90^\circ - x) \text{ for any } x!$$

In more advanced maths we use **radians** rather than **degrees** to measure angles. This is just a change of units, like using metres rather than feet for lengths. The conversion is that there are 2π radians in a full circle (360°). For example, 60° is $1/6$th of 360°, so 60° in radians is $1/6$th of 2π, i.e. $2\pi/6 = \pi/3$ radians. It's also fine to just multiply by $2\pi/360$ to convert degrees to radians.

Recommended links:

Highly recommended: HELM notes (introduction to right-angled triangles), HELM notes (introduction to radians, and sketching functions)