Right Angled Triangles

There are some really useful properties of right angled triangles that we can use in maths, these are classified as *Pythagoras' Theorem* (Grade C) and *Trigonometry* (Grade B).

Naming the sides of your triangle

Hypotenuse (h) – This is the side that is pointed to by the right angle box

Opposite (o) – this is the side that is opposite the angle you are going to use or the one you need to find

Adjacent (a) – this is the side that is left after you have named the other two sides ☺
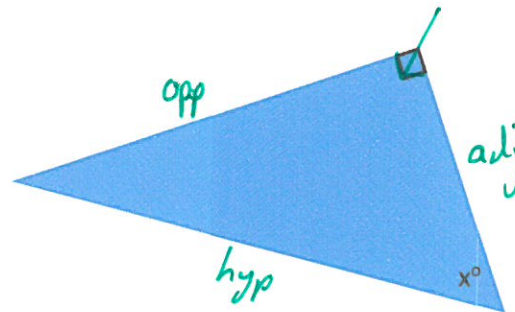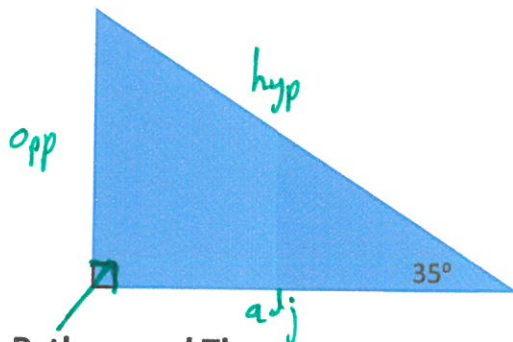
Pythagoras' Theorem

Can be used if you have been **given two sides** of a right angled triangle and you want **to find the length of the third** side. *Always do the following:*

- Square (use the x^2 button on your calculator) the sides you know
- Decide if you are trying to find the hypotenuse (longest) or one of the other sides
- If it is the **LONGEST** side then **ADD** your two squares (so the answer is bigger), if it's a **SHORTER** side then **SUBTRACT** your squares.
- To get our answer we now need to undo the squaring by square rooting (use the $\sqrt{}$ button on your calculator)
- Check if the question states how accurate to give your answer, usually 1 decimal place.

$10\text{cm}^2 = 100$

$8\text{cm}^2 = 64$

6cm
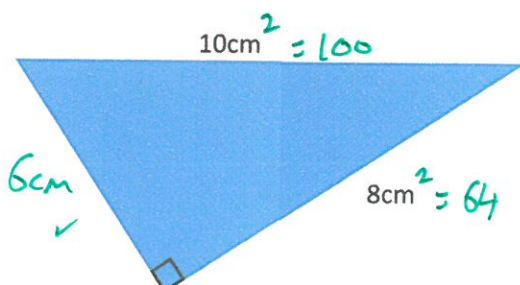
$100 - 64 = 36$

$\sqrt{36} = 6$

Trigonometry

Can be used if you **know an angle and a side** to **find another side**, or if you **know two sides** to **find an angle**.

The maths fact behind trigonometry is that for any right angled triangles that contain the same angles, the values you get when you divide their sides together is ALWAYS THE SAME regardless how big or small the triangles are.

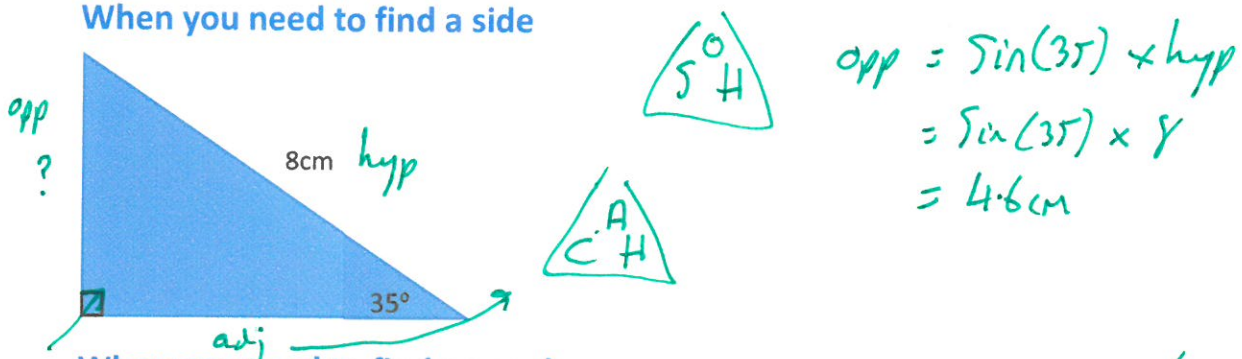You need to learn: "SOH   CAH   TOA"
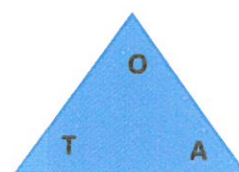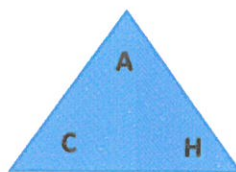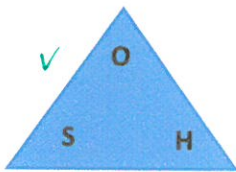
Always do the following:

- Label your sides H, O and A
- Based on what you know and what you are trying to find select the correct trig group to use in the triangles above
- Cover up what you are trying to find (if it is an angle then you cover the S, C or T)
- What letters are left will tell you the maths you need to do. So in the first triangle if you cover 'O', the maths you need will be S x H. If you cover the H, the maths you need is $\frac{O}{S}$ and if you cover the S, the maths you need is $\frac{O}{H}$

That's all the decisions taken, next you do the maths!

When you need to find a side

opp = $\text{Sin}(35) \times \text{hyp}$

= $\text{Sin}(35) \times 8$

= 4.6cm

8cm hyp

opp ?

35°

adj

When you need to find an angle

$\text{Tan}(x) = \dfrac{6}{5}$

$x = \text{Tan}^{-1}\left(\dfrac{6}{5}\right) = 50.2°$

6cm opp

5cm adj

hyp

x°