Power of 9 – Mathematics
Trigonometry

Watch this tutorial on YouTube:  http://www.youtube.com/watch?v=Jsiy4TxglME&feature=related
Beware that there are other similarly named videos on YouTube which aren’t as good.

Remember, as per the diagram above, that:

- We are only dealing with RIGHT ANGLED TRIANGLES
- The hypotenuse is always the side opposite the right angle
- The adjacent side is always on the side adjoining the angle that we are dealing with
- The opposite side is always on the side opposite to, and NOT adjoining the angle that we are dealing with

Exercise 1:
Label the opposite, adjacent and hypotenuse relating to the below triangles:

Exercise 2:
Remember the SOH CAH TOA mnemonic. State which of the three rules you would use (sine, cosine or tangent), if you were to solve a problem with each of the triangles listed below:
Problem solving with trigonometry:

Exercise 3:

Find length of sides a and b in the above triangle:

To solve side “a”, the two sides that we are dealing with are the ____________ and the ____________, therefore we need to use the ____________ rule.

Using Windows Calculator, (set to scientific mode), enter “20”, then press the relevant button, (sin, cos or tan). Write your answer to two decimal places: ____________

This tells you the length of the short side (“a”), compared to the other side, which is the ____________. How many metres long is side a? ____________

To solve side “b”, the two sides that we are dealing with are the ____________ and the ____________, therefore we need to use the ____________ rule.

Using Windows Calculator, (set to scientific mode), enter “20”, then press the relevant button, (sin, cos or tan). Write your answer to two decimal places: ____________

This tells you the length of the short side (“b”), compared to the other side, which is the ____________. How many metres long is side a? ____________

To solve side “b”, the two sides that we are dealing with are the ____________ and the ____________, therefore we need to use the ____________ rule.

Using Windows Calculator, (set to scientific mode), enter “20”, then press the relevant button, (sin, cos or tan). Write your answer to two decimal places: ____________

This tells you the length of the short side (“b”), compared to the other side, which is the ____________. How many metres long is side a? ____________

To solve side “b”, the two sides that we are dealing with are the ____________ and the ____________, therefore we need to use the ____________ rule.

Using Windows Calculator, (set to scientific mode), enter “23.7”, then press the relevant button, (sin, cos or tan). Write your answer to two decimal places: ____________

This tells you the proportion of side “b”, compared to the other side. Press the reciprocal button (marked “1/x”) to get the proportion of the long side compared to the known side (7.2m). Multiply your answer by 7.2 How many metres long is side b? ____________
Exercise 4 – A real life example:

Below is a section of a nautical chart, the same as sailors use.

You are at sea. It is dark. Your batteries are flat, so your GPS and chart plotter don’t work. Isn’t it great that you’re well prepared, and have your sextant and knowledge from listening sooooo carefully to Mr Brown’s amazing trig lesson?

You see a comforting looking flash of a lighthouse, which you recognise as the Tasman Island light, (as it flashes every 7.5 seconds, as per the description on the chart. Your compass tells you that you are directly east of the light.

You use your sextant (check them out on YouTube) and gauge that the light is at an elevation of 9.5 degrees from your position.

The chart tells you that the lighthouse is 906 feet above sea level.

Use the example from the page above to calculate how many feet you are from the lighthouse.

How many metres are you from the lighthouse?
Exercise 5:

We can also use trigonometry to calculate angles if we know the length of two sides.

For the example above, we know the _______________ and _______________ sides, so we will use the _______________ function.

Enter 7.5 / 11 into your calculator. The answer, to two decimal places, is ________________.

Press the Inv button on the calculator, then the sin button, (which has now changed to sin^{-1}).

How many degrees, to two decimal places, is angle “z”? ________________