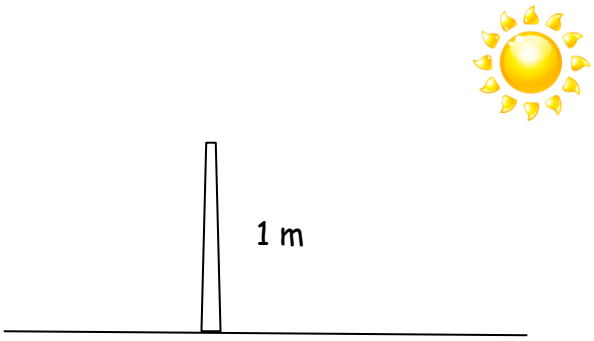
Trigonometry in everyday life

Activity 1 Measuring Shadows

In an open area of her garden, Miss Tickle wants to make a type of sun dial as a decorative feature.

She puts in place a pole of 1 m high. If the sun is at an angle of 60° to the horizon, and it's morning. We measure the sun's angle from the centre of the sun and we imagine slicing a vertical plane that contains the sun and the pole, and that passes centrally through both.

- draw what this means on the diagram below.
- How long would the shadow of the pole be? (Our measurements will only estimates in this question. Can you explain why?)



Investigate :

- Work out the lengths of the shadow of the pole for different angles of the sun to the horizon, from early in the morning till noon.
- Make a table with your measurements.
- What about the afternoon shadows? Do some calculations.

When would the shadow be longest?
When would it be shortest?

How would you convert the shadow lengths into hours? Work out the hours and put them in your table. You may need to make some assumptions about the time of sunrise and sun set.

Activity 2 Walking - Duke of Edinburgh Bronze Award

Students undertaking the Duke of Edinburgh bronze award have to undertake a 15 mile walk from Badbury Clump to their school in Fairford. Fairford is on a bearing of 150 ° from Badbury but the route following this bearing is overgrown and impassable.

One pair of students decide to set off at a bearing of 170° from Badbury. They plan to divide their walk into two equal parts, having a short rest when they are half way to Fairford.

- Draw a diagram of their walk.
- How far do they walk before they have a rest?
- What's their total distance walked?

Another pair of students misread their compass. They set off heading due south from Badbury. After about 4 hours, they have a rest and check their bearings and realise their error. They then decide to head due East towards Fairford.

- Draw a diagram of their walk.
- How far have did they walk before they realised their mistake?
- What distance did they walk in total?

Investigate other routes that could be taken, and how far would each be, using different bearings? You may know the sine rule or cosine rules to find these distances. If not, try making accurate drawings to estimate the distances. What's the shortest route? How do you know it's the shortest?

Activity 3 Ladders

As a summer job you are helping your Dad paint the front of your house. You need to buy a ladder that will reach to the top of the wall, but you don't need to reach the roof.

Your house is 3 m high to the top of the wall.

Investigate :

- If the ladder needs to be at incline of between 40° and 55° with the horizon, how tall does this mean the ladder has to be? Give the possible range of values.
- If you place the ladder at various distances from the house - 1m, 1.2 m, 1.5m, etc how tall does the ladder need to be?

Which of these methods would be easier to put into practice? Explain why.

If your house was 3.5 m high, how does this change your calculations? Use other heights to see how the calculations change.

Ladders come in sizes 2.5m, 3m, 3.6m, 4.1m, 5m, 6.1m, etc.

- Which ladder will you buy? How do you decide? In pairs, set some guidelines for your Dad. Prepare a "handy hints" guide for any householder.