

## How to measure the height of your school (or any tall tree)

**There was once a man who could tell you the height of anything: the tallest tree in the park, his best friend's house, even pyramids.**

In around 500 BC superstar Greek mathematician Thales travelled to Egypt and marvelled at the Great Pyramid. But, when he asked how tall it was, no one knew because the walls didn't go straight up. They couldn't drop a string from the top to find the height. Thales managed to measure the Great Pyramid height using similar triangles, where all the angles are the same. This means that the sides are always in the same proportion to each other. Using his method, you and your team will be able to measure the height of any building or tree. Have a go!



**"GOOD LUCK"**  
JOHNNY BALL

We'd love to see videos and pictures of how you get on.

### Thales trick:

A mathematical chap called Thales, performed maths tricks with consummate ease,

He showed how you might find a Pyramid's height, or the height of a building or tree.

He said, "Take a rod, pole or stick, quite long though it needn't be thick.

Plant it firm in flat ground, so its height above ground is one metre tall exactly.

Then wait for a nice sunny day, for as they shine down, the sun's rays,

Will cast, I'll be bound, shadows two, on the ground,

That's the stick and the building or tree.

So measure the length of them both. That's the short and the long shadow, both.

Then the stick's shadow's length, divided into the length of the shadow of the building or tree, will give the height of the thing,

Be it tree or building, in metres, as precise as can be.

### What you'll need to do:

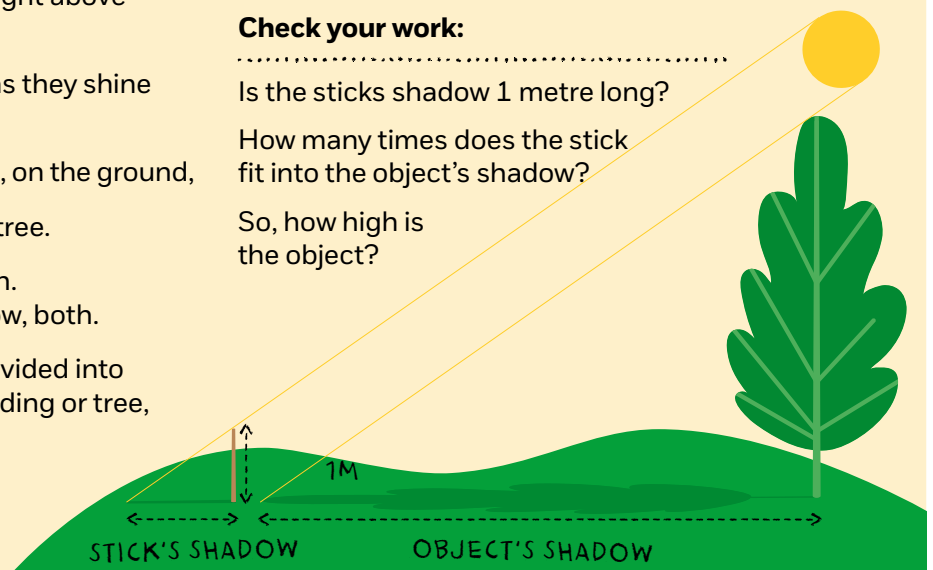
1. Plant a stick upright in the ground with its height exactly 1 metre.
2. At the same time – measure the length of the tree or building shadow, from right under its highest point
3. Immediately measure the length of the stick shadow.
4. Divide the stick shadow length into the tree shadow length – to give you the height of the tree in metres.

### Check your work:

Is the sticks shadow 1 metre long?

How many times does the stick fit into the object's shadow?

So, how high is the object?



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This is a great Maths project for primary school aged children. Complete it on or before Number Day. Share your pictures and videos with us.



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### You'll need:

- Something big to measure
- A stick that's over a metre tall
- A tape measure
- A sunny day

### How it works:

This activity uses the principle of similar triangles.

By measuring from directly under the maximum height of the tree to the end of the shadow, then dividing the stick shadow length into the tree shadow length, you get the tree's height in metres including decimal fractions.

### Breakdown of the activity:

1. Plant your stick in the ground (check it's 1 metre high)
2. On a sunny day you'll get a shadow for the stick and the tree or building
3. Measure the length of both shadows

4. Be careful to measure the tree shadow from right under the highest point, to the end of the shadow
5. Divide the stick shadows length into the building or tree shadow length
6. You'll have a measurement of the height of the tree or building, in metres and fractions of metres
7. If you repeat the exercise a month later, the sun will be at a different angle, but the result should still be exactly the same
8. You might spend some time in class, extending the idea of using similar triangles to calculate lengths

