

Trigonometree!

Estimating the height of a tree

- ▶ WORK IN PAIRS
- ▶ Choose a tree near to the Goodleaf climbing tree
- ▶ You will use three different methods to work out the height of a tree!

STUDENT INTRODUCTION

- ✓ This resource applies simple trigonometry to estimate the height of a tree
- ✓ Record your answers on page 4
- ✗ For safety reasons, do not use the Goodleaf tree for these exercises

First of all, choose a tree!

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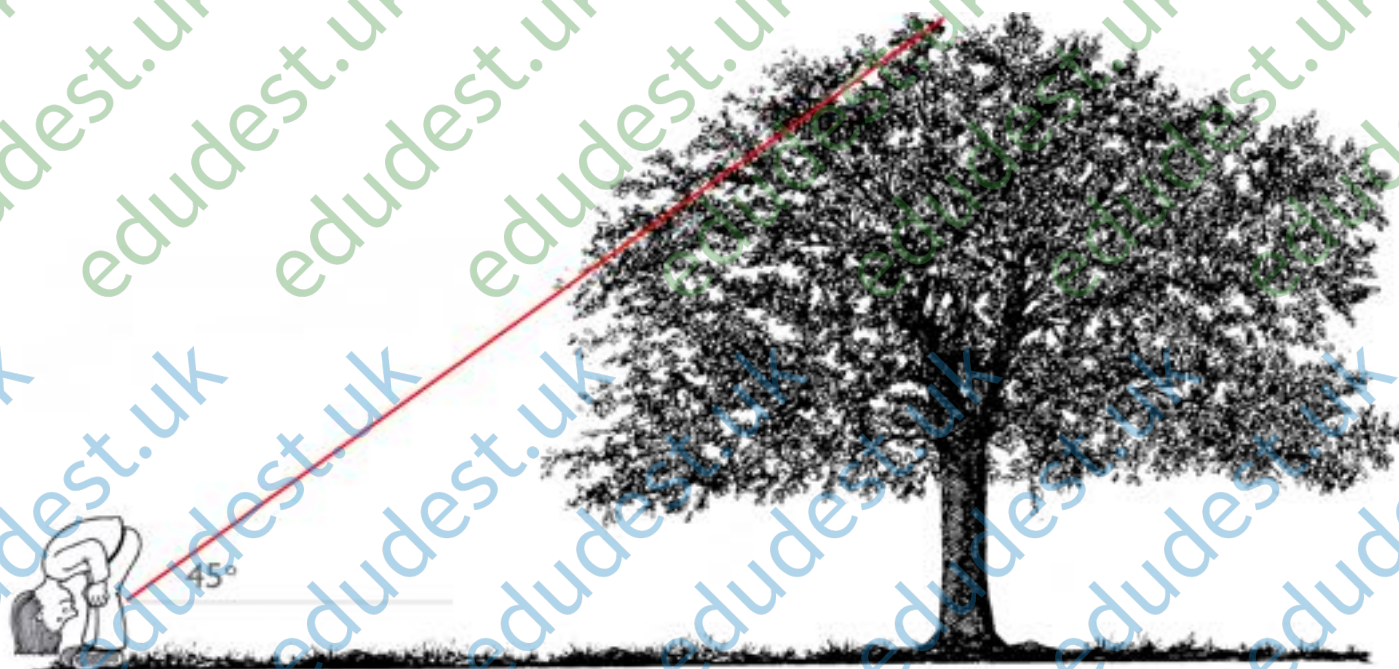
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Carry on until you can just see the top of the tree and have your partner measure the distance you have walked. This is roughly the same as the tree's height!

Now your partner can try. Take the average and record your findings.



Can you explain why this works?

What are the problems with this method?

METHOD 2

The “Stick Trick”

The “Stick Trick” is used often by lumberjacks to work out the landing position of trees they are about to fell.

Today we’re going to use an amended version of the “Stick Trick” which should be more accurate for first-timers.

First you will need to prepare a card to help with your measurements. You may already have done this in school, but if not, you will need 4 things: a piece of A4 card, a ruler, scissors, and a pen or pencil.

- ✓ Cut a strip of card exactly **20cm tall** and a few cm wide. Measure **2cm from the bottom** and draw a horizontal line across the width of the card. You’re now ready to work out the tree height using your new “Ratio Stick”!
- ✓ Ask your partner to stand by the tree.



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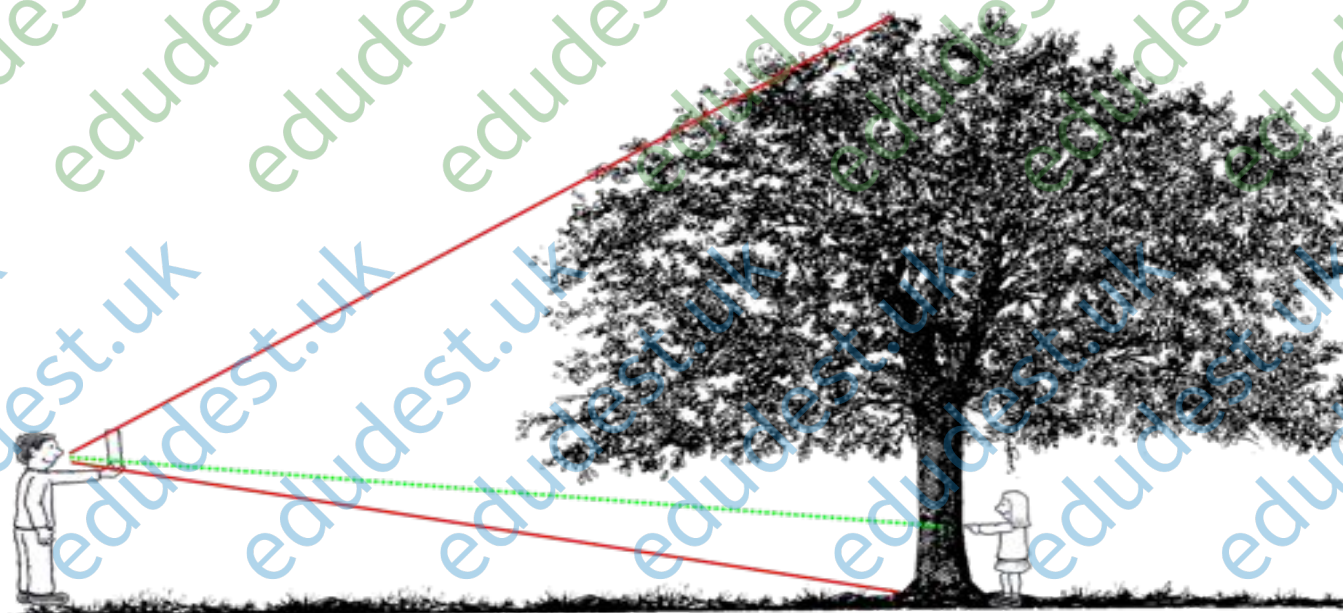
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return to the tree!

- ✓ Measure the distance from your partner’s hand to the ground.
- ✓ Multiply this measurement by 10 to work out the height of the tree!
- ✓ Swap places and do the experiment again to see if you both get the same answer! Note down your average answer.



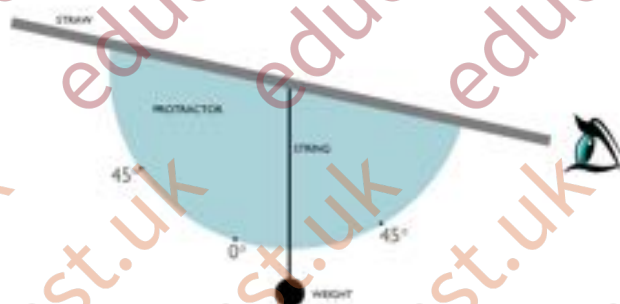
Can you work out the reasons why this calculation works?

Do you think this method is more accurate than the first, and if so, why?

METHOD 3

Inclinometer

For this method, you will need: a protractor template, a 30cm piece of thin cord, a weight, a drinking straw and some sticky tape. You may have already made this in class, but if not, follow the instructions below:



1. Cut out the protractor template and tie the cord through the hole marked
2. Tie the weight to the other end of the string
3. Stick a drinking straw along the straight edge of the protractor. You have now made an *inclinometer*!

To measure:

- ✓ Holding the inclinometer with the curved edge downwards, look through the straw

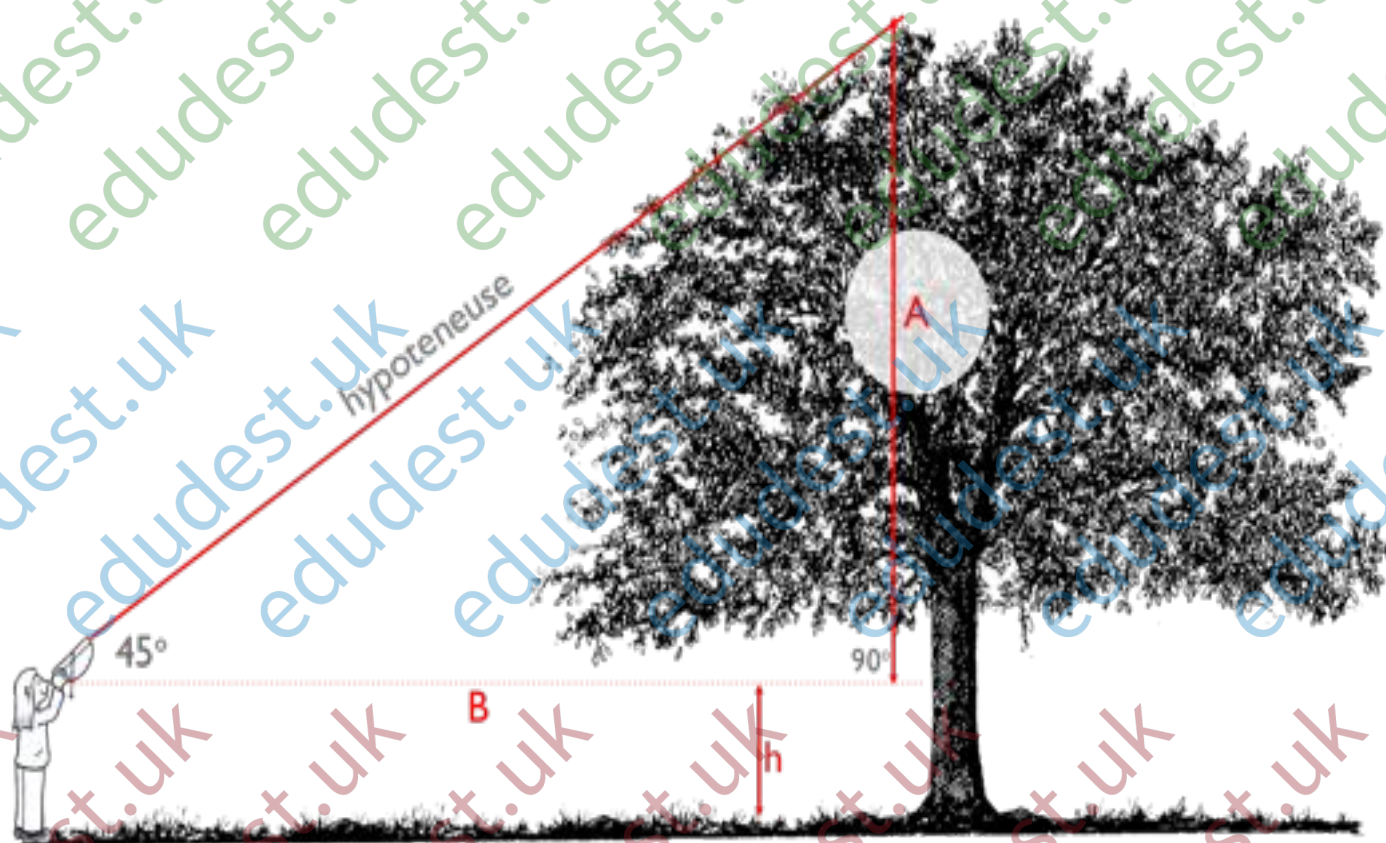
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- ✓ Measure the distance back to the tree www.edudest.uk

- ✓ **Add your own height** and you now have the height of the tree!
- ✓ Repeat the experiment, swapping places with your partner, and record your average measurement.



When the angle is 45 degrees, $A = B$. The height of the tree overall is $A + h$ (your height).

YOUR RESULTS

Method	Tree Height Estimate (metres)
Method One - Simple Trigonometry	
Method Two - The "Stick Trick"	
Method Three - Inclinator	



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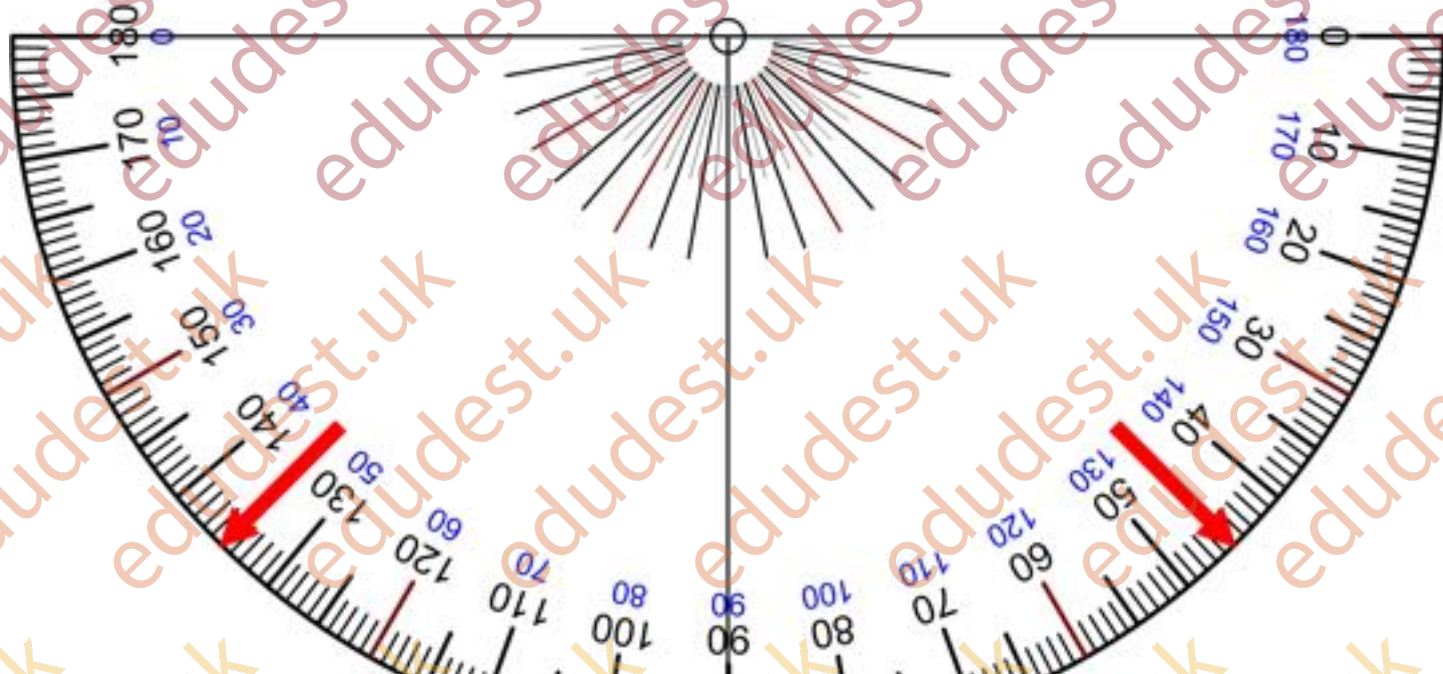
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Why are the results different for each method?

If you still have time, why not try out your new skills on a different tree?





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Cut it out or leave it square - it doesn't affect the test or result.

Half way along the straight edge, carefully punch a hole as marked for the cord.