Trigonometry Trees

A useful application of right-angled trigonometry is the measurement of tall objects such as trees.

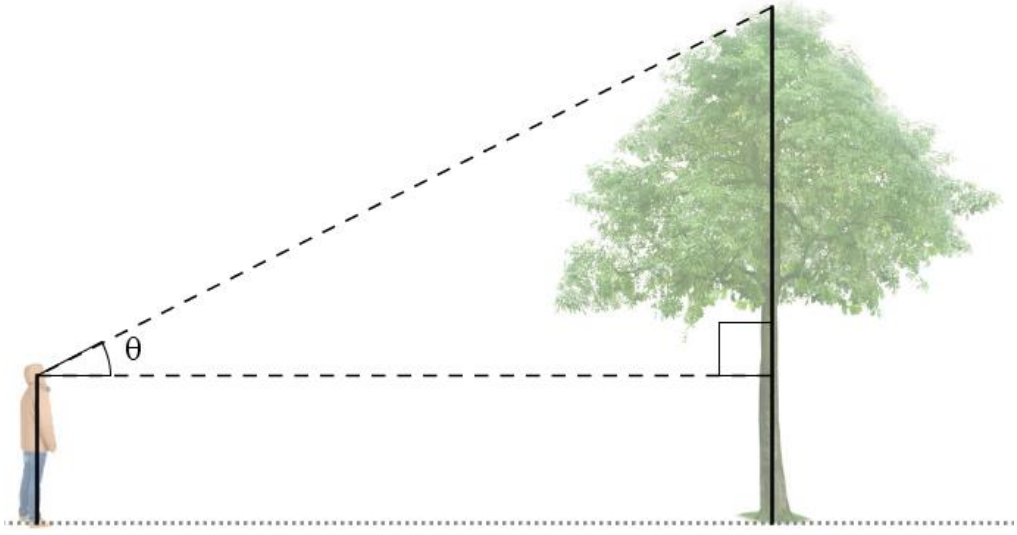
For the object you measure, take three separate sets of measurements, different distances away. This is to test the accuracy of your answers – if they are all very close there is a good chance they are also close to the real height.

Object: *(eg tree, building, …)* _____

Set	**Diagram** *Include horizontal distance and angle of elevation, as well as the height of your eye-line (eg* $1.5m$*). Use the diagram below to help you draw your own*	**Calculation** *Use right-angled trigonometry to calculate the height of the object relative to you, then add in the observer's height for maximum accuracy.*
Close **Eg** $5m$		
Medium **Eg** $10m$		
Far **Eg** $20m$		

Distances can be measured, to a reasonable degree of accuracy, using your own pace length. Make a normal stride and measure it, then pace out the distance from the tree. If you want to be more precise, use a tape measure for shorter distances, a pre-measured rope, or – if you have one lying around – a trundle-wheel.

Angles can be measured using a clinometer which makes use of gravity to find the angle between your eye line and the vertical. You can build one yourself using a small weight on a thread attached to a protractor.



Extension: The angles you measured were probably rounded to the nearest degree, and the distances to the nearest metre. By calculating the upper and lower bounds for each measurement, work out the maximum and minimum possible height of your object for each set of measurements.

Trigonometry Trees

A useful application of right-angled trigonometry is the measurement of tall objects such as trees.

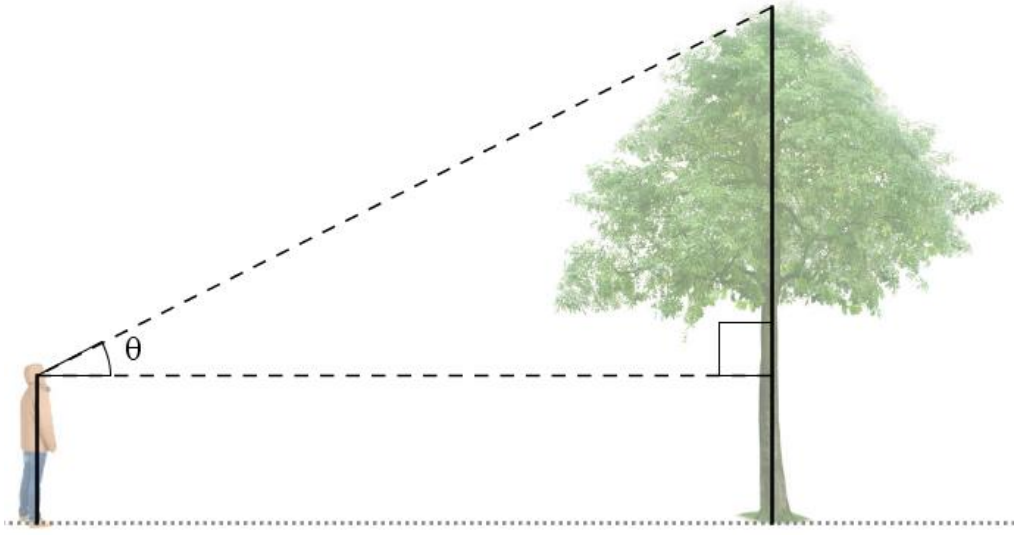
For the object you measure, take three separate sets of measurements, different distances away. This is to test the accuracy of your answers – if they are all very close there is a good chance they are also close to the real height.

Object: *(eg tree, building, …)* _____

Set	**Diagram** *Include horizontal distance and angle of elevation, as well as the height of your eye-line (eg* $1.5m$*). Use the diagram below to help you draw your own*	**Calculation** *Use right-angled trigonometry to calculate the height of the object relative to you, then add in the observer's height for maximum accuracy.*
Close **Eg** $5m$		
Medium **Eg** $10m$		
Far **Eg** $20m$		

Distances can be measured, to a reasonable degree of accuracy, using your own pace length. Make a normal stride and measure it, then pace out the distance from the tree. If you want to be more precise, use a tape measure for shorter distances, a pre-measured rope, or – if you have one lying around – a trundle-wheel.

Angles can be measured using a clinometer which makes use of gravity to find the angle between your eye line and the vertical. You can build one yourself using a small weight on a thread attached to a protractor.



Extension: The angles you measured were probably rounded to the nearest degree, and the distances to the nearest metre. By calculating the upper and lower bounds for each measurement, work out the maximum and minimum possible height of your object for each set of measurements.