

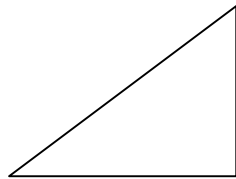
## Introduction to Trigonometry

**Definition:**      trig 'o nom 'e try      *noun* \,tri-g $\Theta$ - 'nä-m $\Theta$ -trē\  
New Latin *trigonometria*, from Greek *trigonon* + *-metria*  
Literally, “triangle measure.”

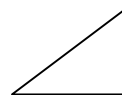
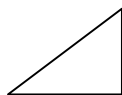
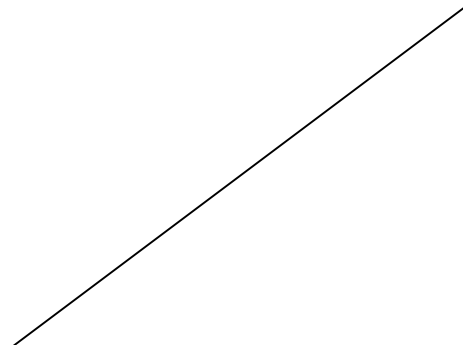
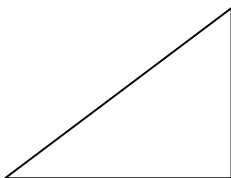
Trigonometry studies the relationship between angle and length.

Right angle triangles can illustrate the relationship between angle and length.

First, we must identify properties of a right angle triangle:



Next, we must scale a right angle triangle and identify how these properties change.



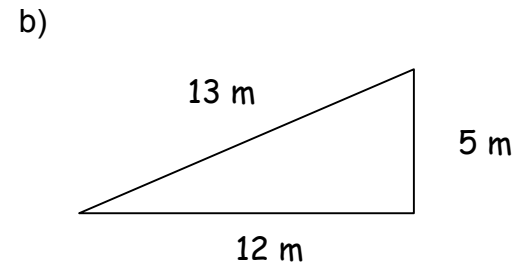
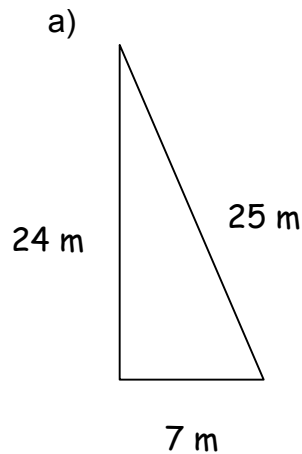
When we scale (up or down) a right angle triangle, we create a similar triangle:

- the angles do not change
- the ratios of side lengths do not change

(Because all of the side lengths are multiplied by the same factor.)

Trigonometry is fundamentally based on triangles with a hypotenuse of one unit.

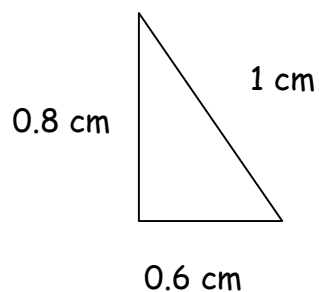
Example – Draw a unit triangle (i.e., with a hypotenuse of one unit) that is similar to each triangle below. Calculate the side lengths of each unit triangle.



Example – Draw a right angle triangle with a base of 48 units and a height of 55 units. Calculate the length of the hypotenuse, then draw a similar unit triangle and calculate the length of each side.

Eventually, it will be important to scale up a unit triangle into a larger similar triangle.

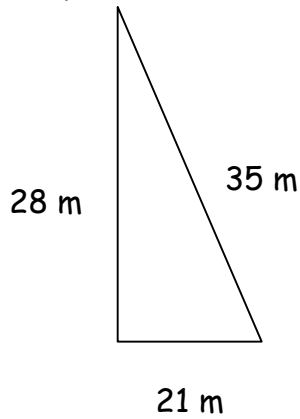
Example – Draw a similar triangle to the one below with a hypotenuse of 25 cm.



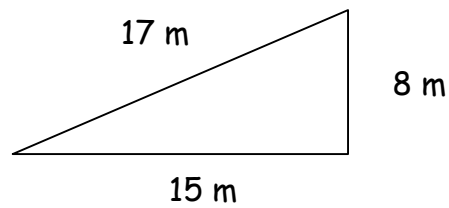
Homework – Please complete the following questions.

1. Draw a unit triangle (i.e., with a hypotenuse of one unit) that is similar to each triangle below. Calculate the side lengths of each unit triangle.

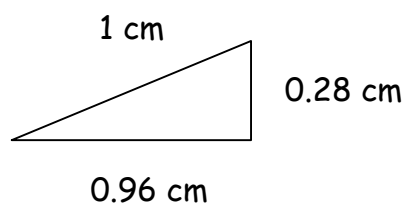
a)



b)



2. Draw a similar triangle to the one below with a hypotenuse of 25 cm.



3. Draw a right angle triangle with a base of 77 units and a height of 36 units. Calculate the length of the hypotenuse, then draw a similar unit triangle and calculate the length of each side.

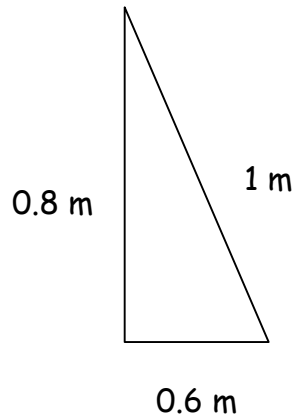
4. Draw a right angle triangle with a base of 117 units and a height of 44 units. Calculate the length of the hypotenuse, then draw a similar unit triangle and calculate the length of each side.

5. Draw a right angle triangle with a base of 31 units and a height of 56 units. Calculate the length of the hypotenuse, then draw a similar unit triangle and calculate the length of each side.

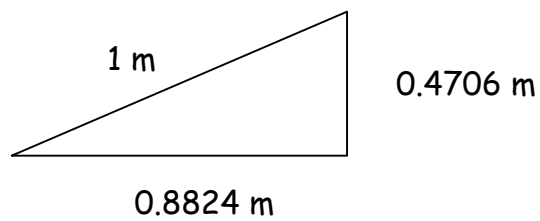
6. Draw a right angle triangle with a base of 18 units and a height of 8 units. Calculate the length of the hypotenuse, then draw a similar unit triangle and calculate the length of each side.

Answers:

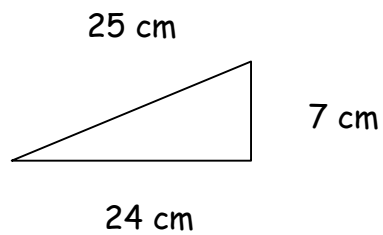
1. a) Divide all side lengths by 35:



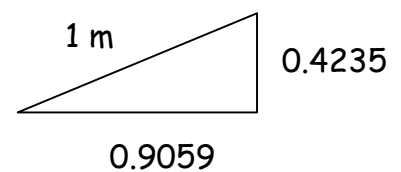
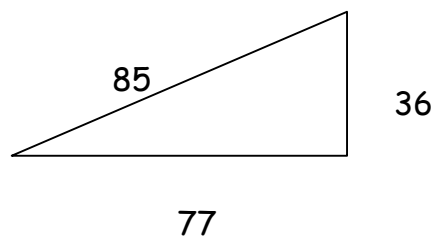
- b) Divide all side lengths by 17:



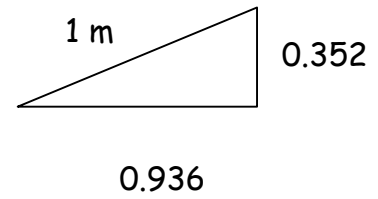
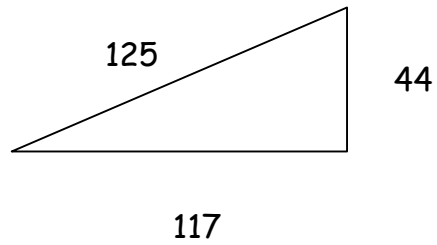
2. Multiply all sides lengths by 25:



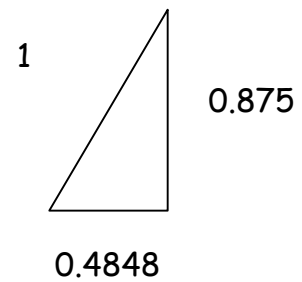
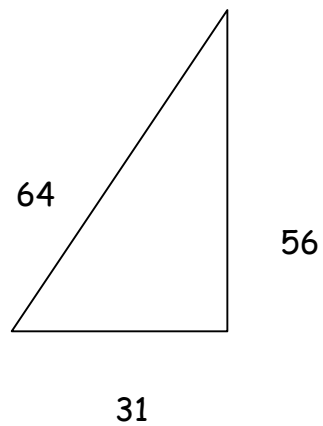
3. Calculate the hypotenuse, then divide all sides by it:



4. Calculate the hypotenuse, then divide all sides by it:



5. Calculate the hypotenuse, then divide all sides by it:



6. Calculate the hypotenuse, then divide all sides by it:

