**Introduction to Trigonometry**

Definition: trig·o·nom·e·try noun \ˌtri-gə-ˈnä-mə-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.

a) b)

25 m

24 m

7 m

13 m

5 m

12 m

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.

1 cm

0.8 cm

0.6 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)

35 m

28 m

21 m

b)

8 m

15 m

17 m

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

1 cm

0.28 cm

0.96 cm

1. 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.
2. 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.
3. 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.
4. 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:

1 m

0.8 m

0.6 m

b) Divide all side lengths by 17:

1 m

0.0.4706 m

0.8824 m

1. Multiply all sides lengths by 25:

25 cm

7 cm

24 cm

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

85

0.4235

1 m

36

77

0.9059

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

125

0.352

1 m

44

117

0.936

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

64

56

1

0.875

0.4848

31

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

19.70

0.4061

1 m

8

18

0.9138