Date: _____

Ratios in Triangles

Using a ruler and a protractor, construct a triangle as follows:

1. Draw a horizontal line using a ruler. It can be any length.
2. Using the protractor, make an angle measuring 30^o at one end of the horizontal line and make a second line using the ruler (extend line as far as you can).
3. Using the protractor, make an angle measuring 90^o at the other end of the horizontal line and create the third side of the triangle using the ruler.
4. Label your triangle ABC and mark your angles.

What value should the third angle measure? _____

Why? _____

Using the ruler, measure the 3 side lengths and label your diagram.

Which side is the longest? _____

Why? _____

How could you check your measurements? _____

Complete the following table using your side measures and other data from the class.

	$\frac{BC}{AC}$	$\frac{AB}{AC}$	$\frac{BC}{AB}$
My Data			
Classmate 1			
Classmate 2			

What do you notice about the values found for each of the ratios? What does this mean?

_____

_____

In a right triangle, the ratios of side lengths depend on the angle measure not on the size of the triangle!

Trigonometry is the branch of mathematics that studies triangles and the relationships between their sides and the angles between these sides.

The word trigonometry comes from the Greek words trigonon ("triangle") and metron ("to measure").

In right triangles, trigonometry relates the measures of sides to the measure of an angle.

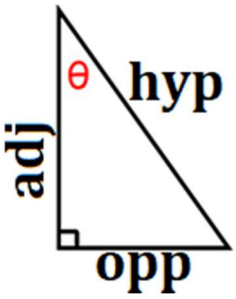
Each triangle side is given a name, relative to a given angle, as follows:

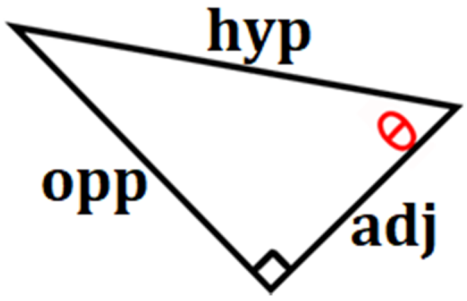
hypotenuse: The side across from the right angle (the longest side always).

opposite: The side across from a given angle θ (this side does not form the angle).

adjacent: The side that is beside a given angle θ (this side forms the angle with the hypotenuse).

θ - theta, a Greek letter, is often used to as a variable for an unknown angle measure.

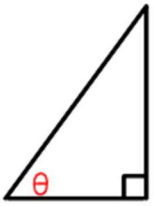




Example 1

Label the sides (opposite, adjacent, hypotenuse) for the given right triangles.

a)



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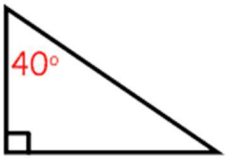

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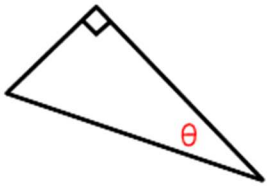

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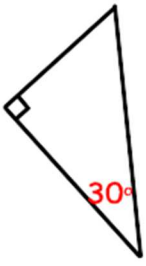

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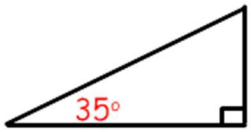

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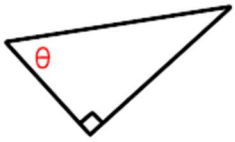

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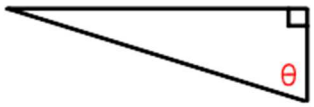
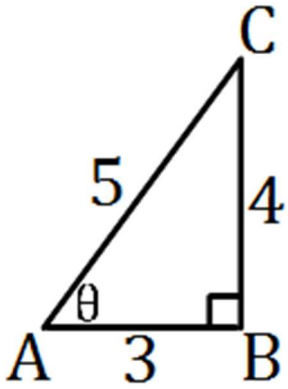
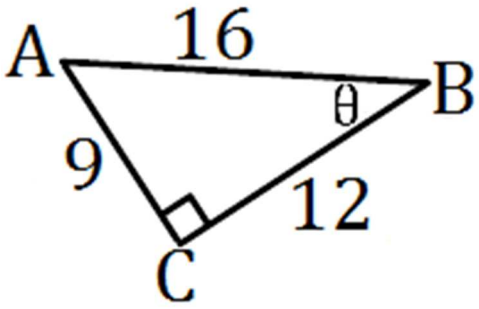


Example 2
Given triangle ABC, write the ratio comparing the length of the side opposite angle A to the length of the hypotenuse.

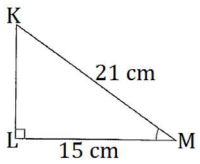


Example 3
Given triangle ABC, write the ratio comparing the length of the side adjacent angle B to the length of the hypotenuse. Then, express your ratio as a decimal.

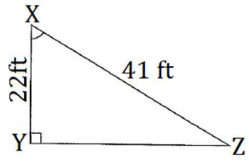


Homework

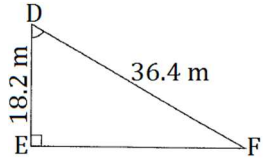
1. What is the ratio of the adjacent side to ∠M to the hypotenuse?



2. What is the ratio of the adjacent side to ∠X to the hypotenuse?



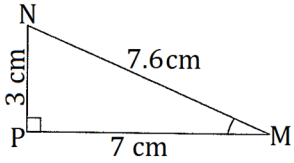
3. What is the ratio of the opposite side to ∠D to the hypotenuse?



4.

a. What is the ratio of the opposite side to ∠N to the hypotenuse?

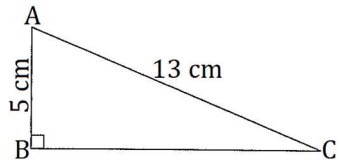
b. What is the ratio of the adjacent side to ∠N to the hypotenuse?



5.

a. What is the ratio of the opposite side to ∠C to the hypotenuse?

b. What is the ratio of the adjacent side to ∠C to the hypotenuse?



Answers

1. 0.714
2. 0.537
3. 0.866
4.
   a. 0.921
   b. 0.385
5.
   a. 0.385
   b. 0.923