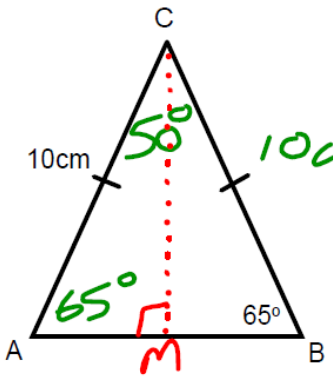
Warm Up:
What can you tell me....



Isosceles △

Equal angles are opposite the equal sides

Trigonometry in Acute Triangles

Lesson objectives

- I know how to use SOHCAHTOA to solve for a missing side
- I know how to use SOHCAHTOA to solve for a missing angle
- I know how to identify the reciprocal trigonometric ratios

1.1

Lesson objectives | Teachers' notes | Lesson notes

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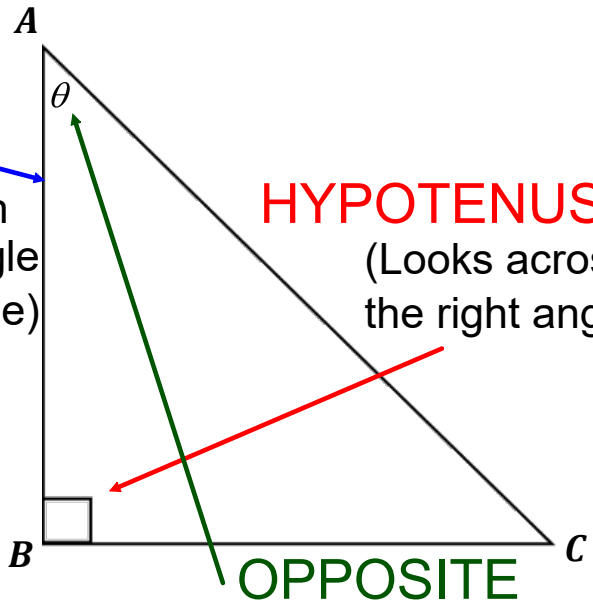
Labelling a Triangle

Given ΔABC, and using $\angle A$ as the reference angle, label the sides.



ADJACENT
(the side between the reference angle and the right angle)

HYPOTENUSE
(Looks across at the right angle)

OPPOSITE
(Looks across at the reference angle)

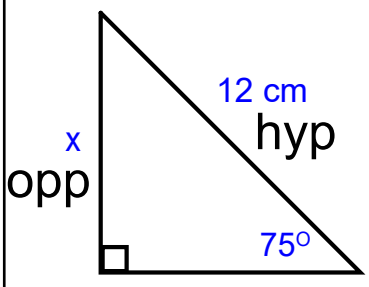
Primary Trig Ratios - SOHCAHTOA

There are three of these with the following formulas:

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

where θ is the measure of the reference angle in the question.

Example: Determine the length of the missing side



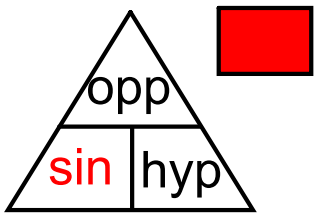
1. Label your sides
2. Fill in
   Have:
   Need:
   Use:
3. Sub and solve!

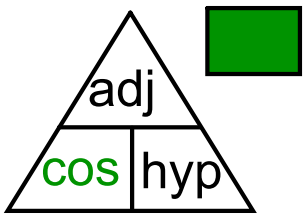
Have: angle, hyp
Need: opp
Use: $\sin\theta = \frac{opp}{hyp}$

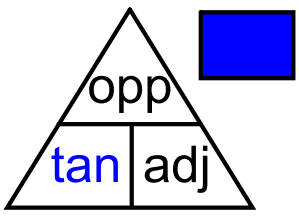
$\sin(75) = \frac{x}{12}$

$12\sin(75) = x$

11.6 cm = x





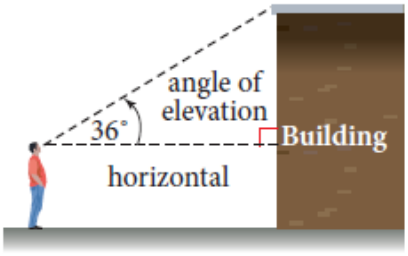


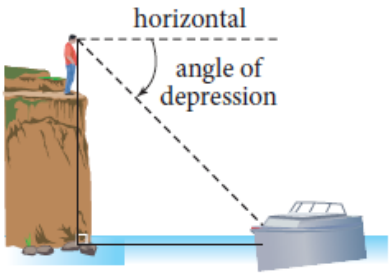
Word Problems

The key to solving word problems is to have a good diagram!

1. Sketch a diagram (include measurements)
2. Label the three sides and determine the reference angle
3. Choose the appropriate ratio using (Have/Need/Use).
4. Determine your missing information.
5. Write a concluding sentence.

When talking about angles, we need to have a reference point. Sometimes, we use an **angle of elevation (inclination)** or an **angle of depression (declination)**.

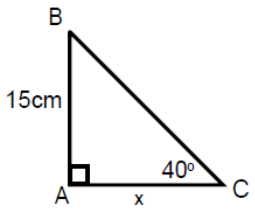




Example

Determine the missing values.

a)



Have : opp, angle

Need : adj

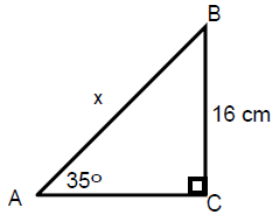
Use : $\tan\theta = \frac{opp}{adj}$

$\tan 40 = \frac{15}{x}$

$x = \frac{15}{\tan 40}$

$x = 17.9$ cm

b)



Have : opp, angle

Need : hyp

Use : $\sin\theta = \frac{opp}{hyp}$

$\sin 35 = \frac{16}{x}$

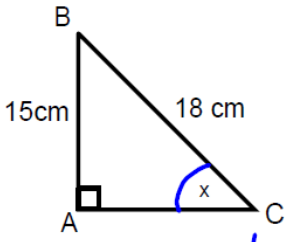
$x = \frac{16}{\sin 35}$

$x = 27.9$ cm

Example

Determine the missing values.

a)



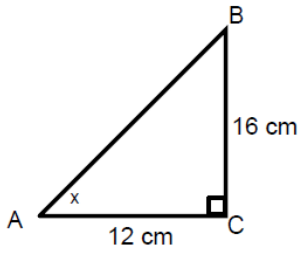
Have : opp, hyp
Need : angle
Use : $\sin\theta = \frac{opp}{hyp}$

$\sin x = \frac{15}{18}$

$x = \sin^{-1}\left(\frac{15}{18}\right)$

$x = 56.4^\circ$

b)



Have : opp, adj
Need : angle
Use : $\tan\theta = \frac{opp}{adj}$

$\tan x = \frac{16}{12}$

$x = \tan^{-1}\left(\frac{16}{12}\right)$

$x = 53.1^\circ$

Reciprocal Trigonometric Ratios

We can flip the primary trig ratios that we know to give us the reciprocal trig ratios. This is most useful in a presentation sense, but not as useful in calculations.

$$\csc\theta = \frac{1}{\sin\theta} = \frac{hyp}{opp} \qquad \sec\theta = \frac{1}{\cos\theta} = \frac{hyp}{adj} \qquad \cot\theta = \frac{1}{\tan\theta} = \frac{adj}{opp}$$

Cosecant Secant Cotangent

The **third letter** of each reciprocal ratio links to the ratio that you are flipping.