

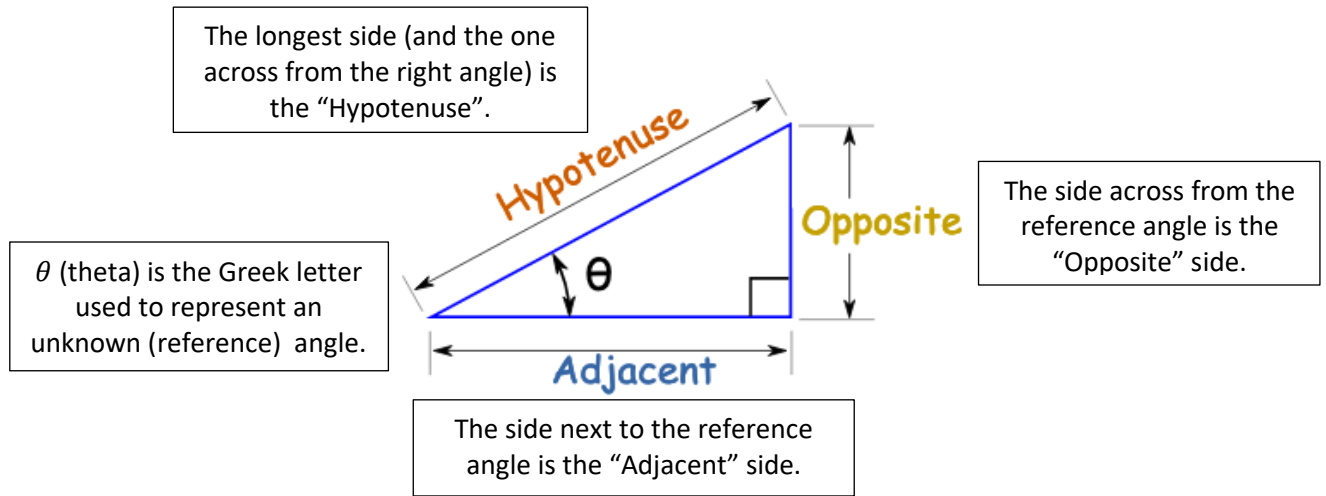
Trigonometry Review Unit (from Grade 10 SN)

When we have similar right triangles, we know:

- All the angles are the same
- The proportion of side lengths in both triangles are the same

Trigonometry (sine, cosine, and tangent) allow us to find a missing side or angle.

To label the triangles:



Sine (sin), cosine (cos), and tangent (tan) are the three **basic trigonometric functions**.

Each of these functions is the length of one side of a right triangle divided by the length of another side of the right triangle.

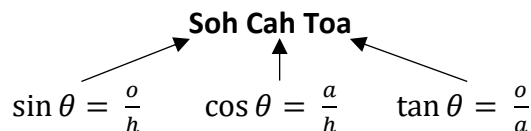
$$\sin \theta = \frac{\text{length of opposite side}}{\text{length of hypotenuse}}$$

$$\cos \theta = \frac{\text{length of adjacent side}}{\text{length of hypotenuse}}$$

$$\tan \theta = \frac{\text{length of opposite side}}{\text{length of adjacent side}}$$

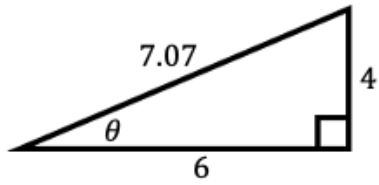
Make sure your calculator is in degree mode when using Soh Cah Toa!

To help us remember these trigonometric ratios, we can use:



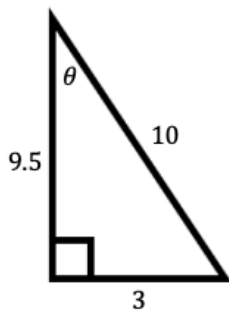
Trig Review – Basics

Ex: Given the triangle below, find $\sin \theta$, $\cos \theta$, and $\tan \theta$.



Try this question!

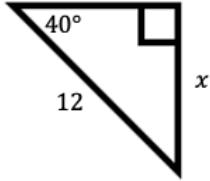
1) Given the triangle below, find $\sin \theta$, $\cos \theta$, and $\tan \theta$.



Trig Review – Finding Missing Sides

These trigonometric functions allow us to **find unknown sides** if we know one side and one angle.

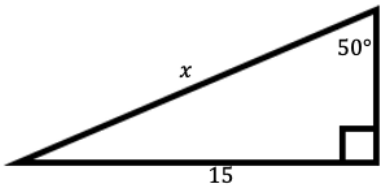
Ex: Given the triangle below, find the length of the missing side.



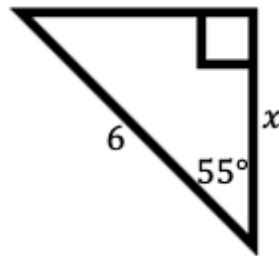
Try this question!

2) Given the triangles below, find the length of the missing side

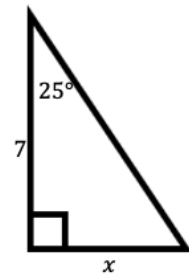
a)



b)



c)

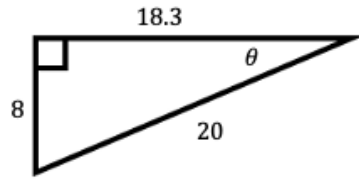


Trig Review – Finding Missing Sides

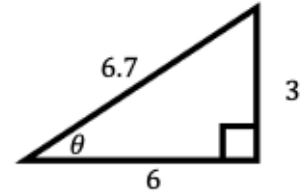
Practice Questions:

3) Given the triangles below, find $\sin \theta$, $\cos \theta$, and $\tan \theta$.

a)

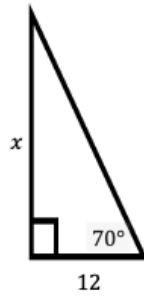


b)

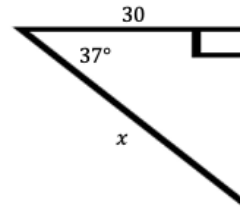


4) Given the triangles below, find the length of the missing side.

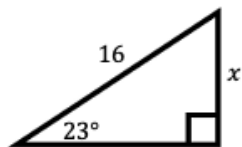
a)



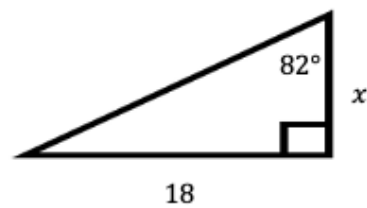
b)



c)



d)

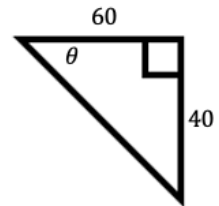
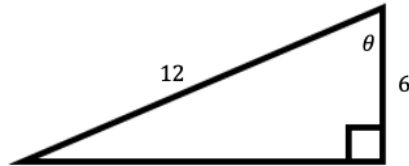
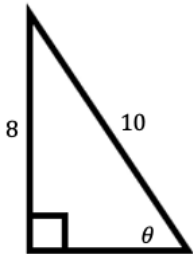


Trig Review – Finding Missing Angles

These trigonometric functions allow us to **find unknown angles** if we know two sides.

Ex: Given the triangles below, find θ .

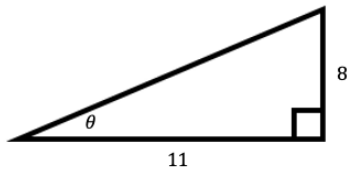
You will need to use the inverse trig functions to solve for an angle:
 \sin^{-1} , \cos^{-1} , and \tan^{-1}



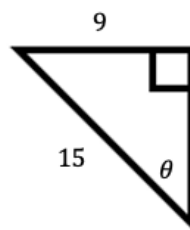
Try this question!

5) Given the triangles below, find θ .

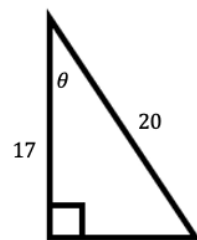
a)



b)



c)



Trig Review – Finding Missing Angles

Practice Questions:

6) Solve for x :

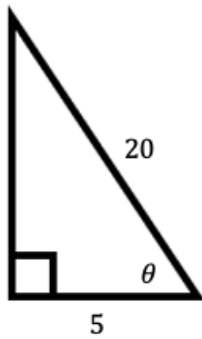
a. $\sin x = \frac{2}{3}$

b. $\cos x = 0.3$

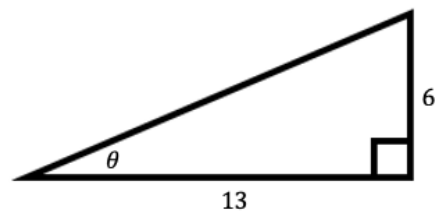
c. $\tan x = \frac{8}{7}$

7) Given the triangles below, find the measure of the missing angle.

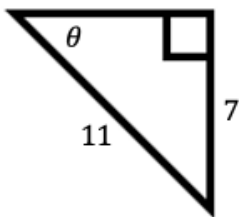
a)



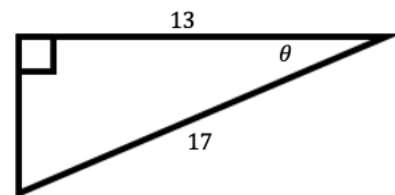
b)



c)



d)

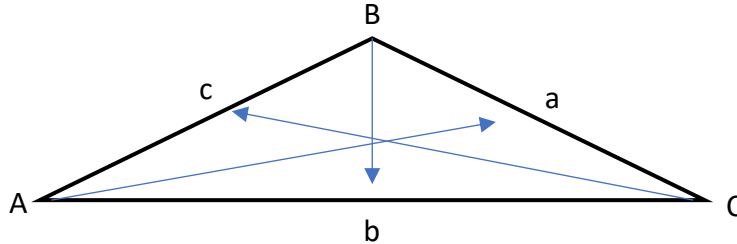


Trig Review – Sine Law

The basic trig functions are great for finding missing sides and angles of right triangles. For all other triangles, we can find missing sides and angles using **sine law** and **cosine law**.

To label triangles:

- Each angle is assigned a capital letter (ex: A, B, and C)
- The side across from an angle is assigned the corresponding lower case letter (ex: a, b, c)



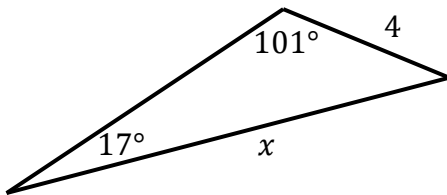
The ratios of side length and the sine of the corresponding angle are equal for all sides/angles within a triangle.

Sine Law

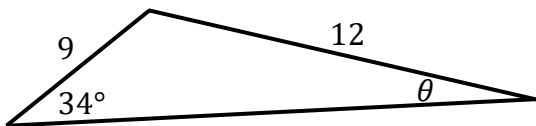
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

We can use Sine law to find missing sides and angles for any triangle so long as we know one angle/side pair and one other piece of information (side or angle).

Ex: Find the missing side length, x .

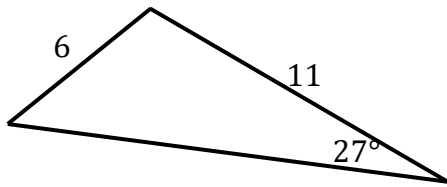


Ex: Find the missing angle, θ .



Trig Review – Sine Law

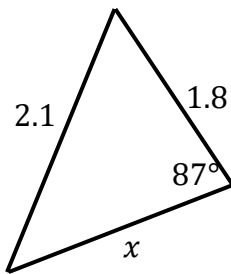
Ex: Find all missing sides and angles



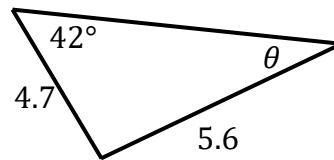
Try this question!

8)

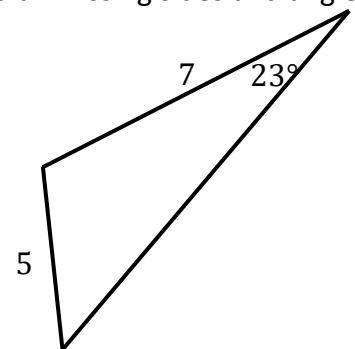
a) Find the missing side length



b) Find the missing angle

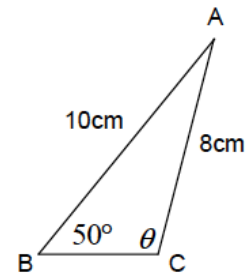
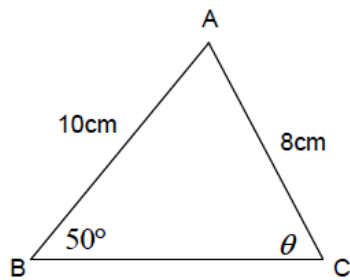


c) Find all missing sides and angles



Trig Review – Sine Law

Look at these two different triangles, which have the same given measurements, and find the missing angle:

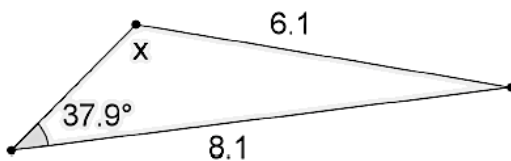


When we are using Sine Law to find a missing angle, the result will always give us the acute angle, because $\sin \theta = \sin(180 - \theta)$.

Therefore, when the diagram suggests the missing angle is obtuse, you will have to determine the obtuse angle from the given acute angle by calculating: $180^\circ - \text{acute angle}$

Try this question!

9) Determine the measurement of the missing angle.

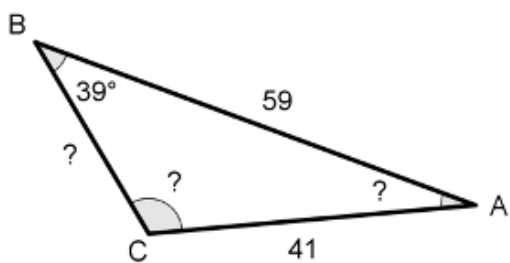


Trig Review – Sine Law

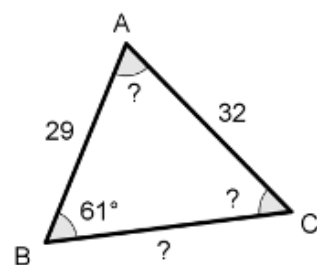
Practice Questions

10) Find all missing measures

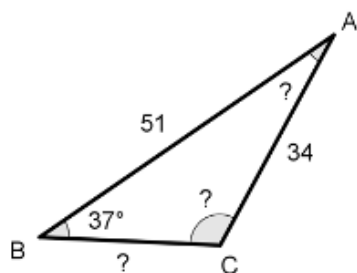
A)



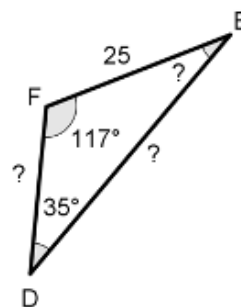
B)



C)



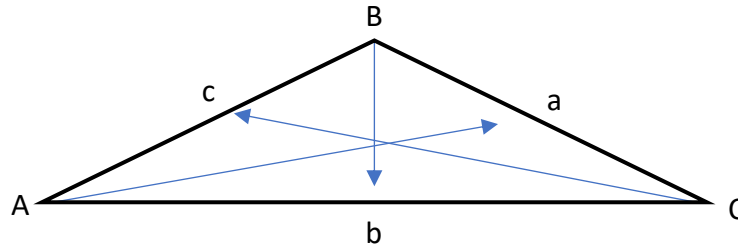
D)



Trig Review – Cosine Law

Sometimes we won't have a right triangle and we won't be given enough information to solve using Sine Law. When that happens, we can use **Cosine Law**.

Remember our labeled triangle:



Cosine Law

$$c^2 = a^2 + b^2 - 2ab \cos C$$

Use when finding
missing side

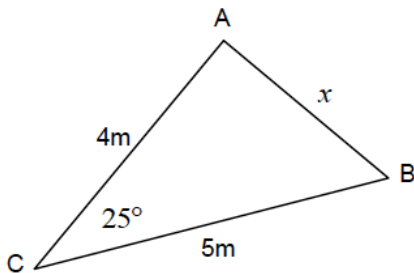
or

$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

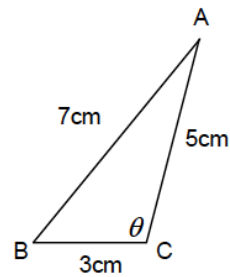
Use when finding
missing angle

Ex:

Solve for the missing side



Solve for the missing angle

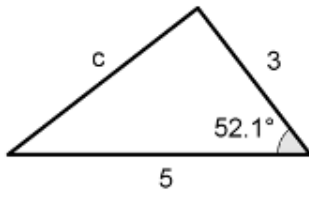


Trig Review – Cosine Law

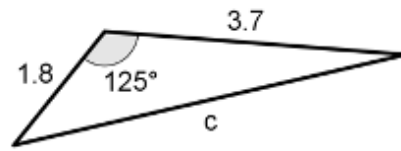
Practice Questions

11) Find the missing measure

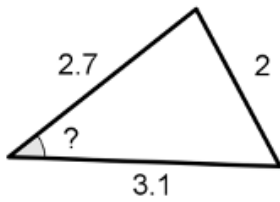
a)



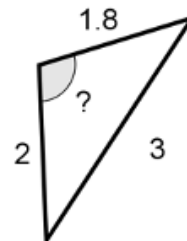
b)



c)



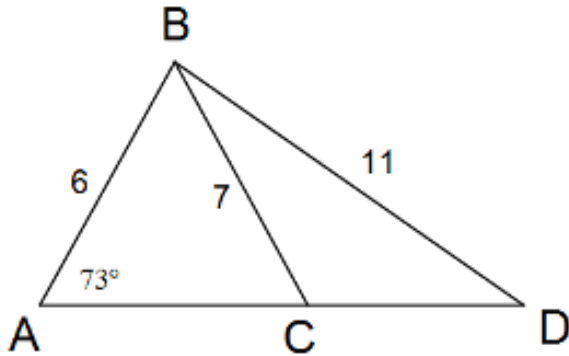
d)



Trig Review – Questions with Multiple Steps

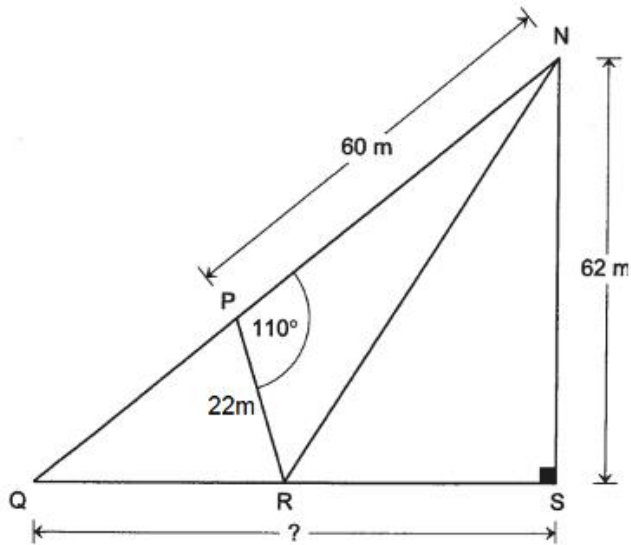
Often you will need to repeatedly use the basic trig ratios, Sine Law, and/or Cosine Law in order to answer a question:

Ex: Find the measure of angle DBC.



Try this question!

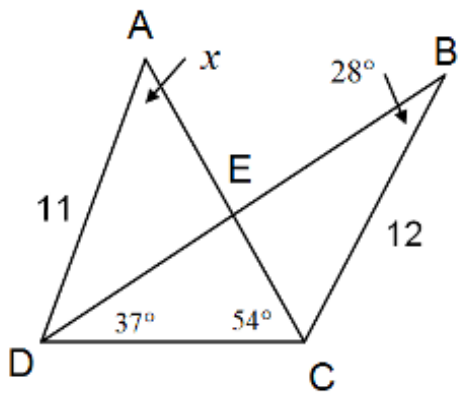
12) Find the measure of line segment QS



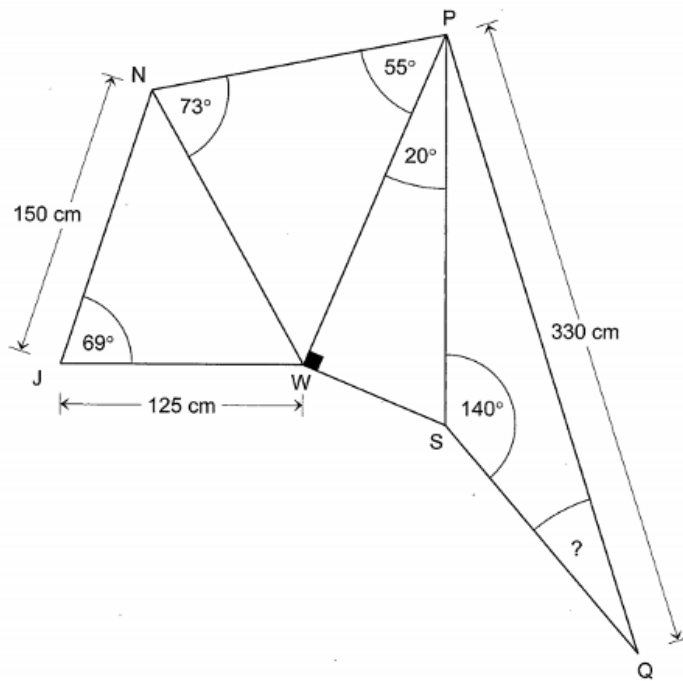
Trig Review – Questions with Multiple Steps

Practice Questions

13) Find the value of angle x



14)



Trig Review – Questions with Multiple Steps

11) a) $c = 3.9461$ b) $c = 4.9568$ c) $? = 39.5922^\circ$ d) $? = 104.1464^\circ$

12) $\overline{QS} = 63.3679 \text{ m}$

13) $x = 43.5115^\circ$

14) $? = 22.3461^\circ$