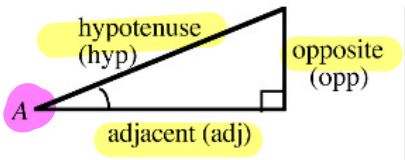
Trigonometry - Sine and Cosine Laws Lesson #1:
Review of Right Triangle Trigonometry

Ratios of Sides in a Right Triangle

When solving problems in right triangle trigonometry we need to be given a right angle, a side length, and one other angle or side.

Note the following points emphasized in the right triangle diagrams below.

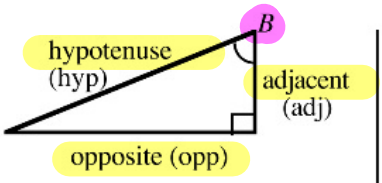
- The opposite and adjacent sides can switch depending on the angle being used.
- The Pythagorean Theorem can be used if two sides of the triangle are known and the third side is required.



$$\sin A = \frac{\text{opp}}{\text{hyp}}$$

$$\cos A = \frac{\text{adj}}{\text{hyp}}$$

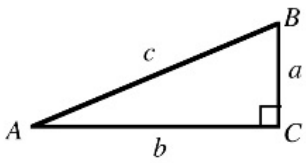
$$\tan A = \frac{\text{opp}}{\text{adj}}$$



$$\sin B = \frac{\text{opp}}{\text{hyp}}$$

$$\cos B = \frac{\text{adj}}{\text{hyp}}$$

$$\tan B = \frac{\text{opp}}{\text{adj}}$$

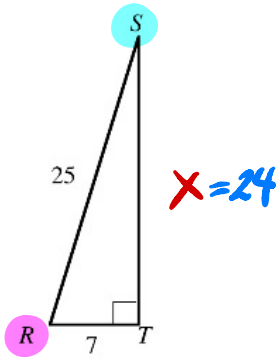


$$a^2 + b^2 = c^2$$

Pythagoras

SOH CAH TOA

Consider the following triangle.



a) Use the Pythagorean Theorem to calculate the length of ST.

$25^2 = 7^2 + x^2$

$25^2 - 7^2 = x^2$

$\sqrt{576} = x$

$24 = x$

$x = 24$

b) State, as rational numbers, the values of the following trigonometric ratios.

$\sin R = \frac{24}{25}$ $\quad \cos R = \frac{7}{25}$ $\quad \tan R = \frac{24}{7}$

$\sin S = \frac{7}{25}$ $\quad \cos S = \frac{24}{25}$ $\quad \tan S = \frac{7}{24}$

c) Comment on any relationships you see from your answers in b).

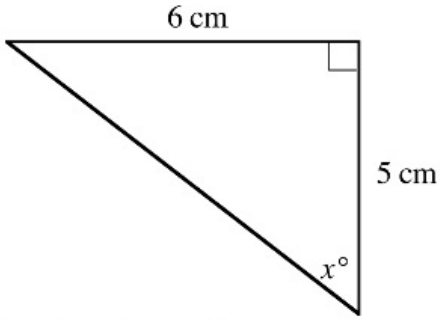
$\sin R = \cos S$ $\quad \sin S = \cos R$

$\tan S$ is the reciprocal of $\tan R$

Calculating Angles in Right Triangles

Complete the following example to review how to calculate an angle measure using SOHCAHTOA.

In the diagram we are required to determine the measure of the angle marked $x°$ to the nearest degree.



Relative to the angle $x°$, the OPPOSITE side is 6 and the ADJACENT side is 5 so we use the TANGENT ratio.

We write $\tan x° = \frac{6}{5} = 1.2$.

If $\tan x° = 1.2$, the measure of the angle $x°$ can be determined by using the inverse tangent function $\tan^{-1}$.

If $\tan x° = 1.2$, then $\tan^{-1}(1.2) = x$.

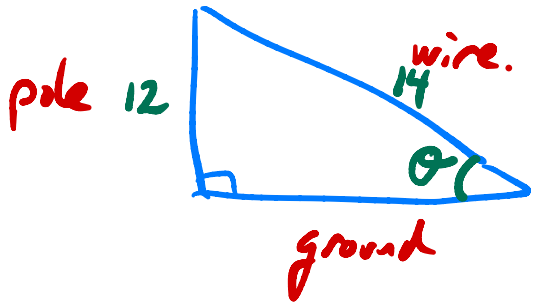
On a calculator, access the inverse tangent function by pressing [2] [ ].

Use your calculator to complete the solution.

$\tan x° = 1.2$ so $x°$ = _____ (to the nearest degree).

A telephone pole is 12 metres high and is supported by a wire, 14 metres long, fixed to the top of the pole and to the ground.

Draw a sketch to illustrate the information and calculate, to the nearest degree, the angle between the wire and the ground.



$\sin\theta = \frac{12}{14}$

$\sin^{-1}\left(\frac{12}{14}\right) \doteq 59°$

#1-6