

Trigonometric Ratios

*** Must have calculator in DEGREE mode ***

The diagram shows a right-angled triangle with a vertical left side, a horizontal bottom side, and a hypotenuse connecting them. A right-angle symbol is at the bottom-right vertex. A reference angle, labeled θ , is shown at the bottom-left vertex, measured from the bottom side to the hypotenuse. Three question marks are placed on the sides: one on the left vertical side, one on the bottom horizontal side, and one on the hypotenuse.

Primary Trigonometric Ratios

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

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

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

Memory Aid: "SOH CAH TOA"

Reciprocal Trigonometric Ratios

$$\csc \theta = \frac{\text{hypotenuse}}{\text{opposite}}$$

$$\sec \theta = \frac{\text{hypotenuse}}{\text{adjacent}}$$

$$\cot \theta = \frac{\text{adjacent}}{\text{opposite}}$$

Notice that these ratios are each the reciprocal of one of the primary trig ratios

Summary

Primary Ratios

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

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

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

Reciprocal Ratios

$$\csc \theta = \frac{\text{hyp}}{\text{opp}}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}}$$

Reciprocal ratios are not found on a calculator....we must learn how to use the reciprocal function on our calculator.

Reciprocal Functions $\rightarrow x^{-1}$ or $1/x$

Inverse Trigonometric Functions
(Arc Trig Functions)



Trigonometric Functions

Evaluate each of the following:

$$\sin 78^\circ = \underline{0.9781}$$



$\sin(78)$

$$\cos \theta = 0.6469$$

$$\theta = \underline{50^\circ}$$



$$\cot 118^\circ = \underline{\quad}$$

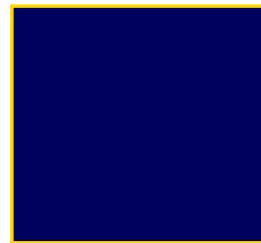


$\tan(118)$

$$\sec \theta = 3.2361$$

$$\theta = \underline{72^\circ}$$

$$\cot 48^\circ = \underline{0.9004}$$



$$\sec 130^\circ = \underline{-1.5557}$$

$$\csc 76^\circ = \underline{1.0306}$$

$$\sec \theta = \underline{-1.4382} \quad \csc \theta = \underline{1.7847}$$

$$\theta = \underline{134^\circ}$$

$$\theta = \underline{34^\circ}$$

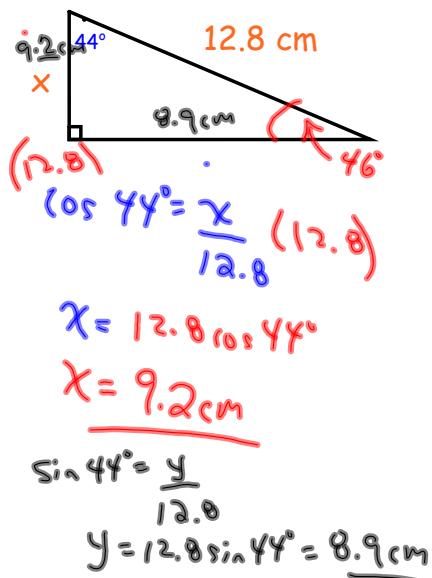
$$\csc \theta = \underline{4.8722}$$

$$\theta = \underline{78^\circ}$$

$$\cot \theta = \underline{-0.5382}$$

$$\theta = \underline{-62^\circ}$$

EXAMPLE - Finding an unknown side



$\sin 23^\circ = \frac{y}{8}$

$y = 8 \sin 23^\circ$

$y = 20.5$

$\csc 23^\circ = \frac{y}{8}$

$y = 23 \csc 23^\circ$

EXAMPLE - Finding an unknown angle

$\tan \theta = \frac{18.1}{14.3}$

$\theta = \tan^{-1} \left(\frac{18.1}{14.3} \right)$

$\theta = 52^\circ$

EXAMPLE - Solve the triangle (find ALL sides and angles)

$\cos A = \frac{15}{39}$

$A = \cos^{-1} \left(\frac{15}{39} \right)$

$A = 67^\circ$

$\therefore G = 23^\circ$

$\alpha^2 = 39^2 - 15^2$

$\alpha^2 = 1296$

$\alpha = 36 \text{ mm}$

$l = 17.8$

$b = 14.6$

$B = 55^\circ$

HOMEWORK...

Worksheet - Primary Trig Ratios.doc

Attachments

[Worksheet - Primary Trig Ratios.doc](#)