

Lesson 1.1 Trigonometry Ratios in Right Triangles

Goal: Find the measure of sides and angles in right triangles using trigonometry ratios

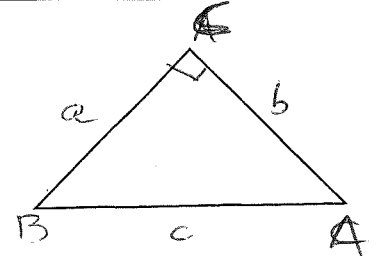
RECALL: → Right triangles have a 90° angle

→ The sum of all angles equal 180°

→ Capital letters = Angles Lower case letters = Sides

→ Angles are ACROSS from their corresponding side

→ If two sides are known use Pythagorean theorem ($a^2 + b^2 = c^2$) to find the third side



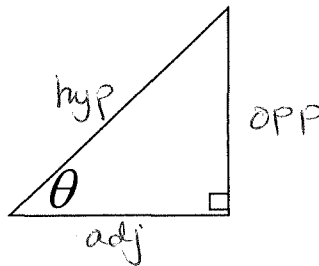
Three Primary Trigonometric Ratios:

SOH CAH TOA

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

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

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

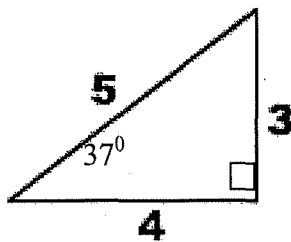


Can only be used for
RIGHT TRIANGLES

Put your calculator in
DEGREE mode

Example 1:

a) State the 3 primary trig ratios for the following triangle

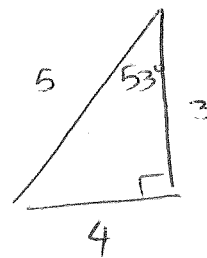


$$\sin(37^\circ) = \frac{3}{5}$$

$$\cos(37^\circ) = \frac{4}{5}$$

$$\tan(37^\circ) = \frac{3}{4}$$

b) Find the trig ratios for the other acute angle. What is the measure of that angle?



$$\sin 53^\circ = \frac{4}{5}$$

$$\cos 53^\circ = \frac{3}{5}$$

$$\tan 53^\circ = \frac{4}{3}$$

Example 2: Evaluate using your calculator. Round to 3 decimal places.

a) $\sin 30^\circ = 0.500$ b) $\cos 45^\circ = 0.707$ c) $\tan 60^\circ = 1.732$

Example 3: Solve for the unknown angle θ . Round your answers to 1 decimal place.

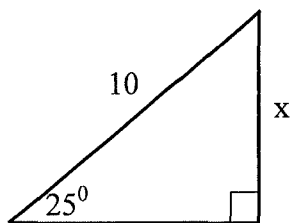
$$\sin \theta = 0.707 \quad \cos \theta = 0.139 \quad \tan \theta = \frac{6}{7}$$

$$\sin^{-1}(0.707) = 45.0^\circ$$

$$\cos^{-1}(0.139) = 82.0^\circ$$

$$\tan^{-1}(6/7) = 40.6^\circ$$

Example 4: Find the length of side x .

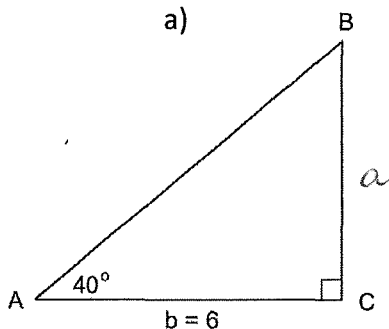


$$\tan 25 = \frac{x}{10}$$

$$x = (10)(\tan 25)$$

$$\hat{=} 4.7$$

Example 6: Solve the triangle (find the lengths of all sides and measures of all angles).



$$\angle B = 180 - 90 - 40$$

$$= 50^\circ$$

$$\tan 40 = \frac{a}{6}$$

$$a = (6)(\tan 40)$$

$$= 5$$

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

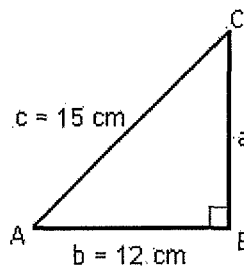
$$5^2 + 6^2 = c^2$$

$$c^2 = 25 + 36$$

$$c^2 = 61$$

$$c = \sqrt{61} \hat{=} 7.8$$

Example 5: Find the measure of angle A.



$$a^2 = c^2 - b^2$$

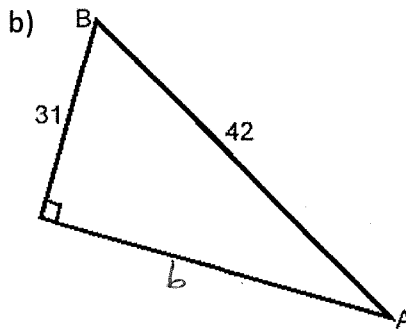
$$a^2 = 15^2 - 12^2$$

$$a^2 = 225 - 144$$

$$a^2 = 81$$

$$a = \sqrt{81}$$

$$= 9 \text{ cm}$$



$$b^2 = c^2 - a^2$$

$$b^2 = 42^2 - 31^2$$

$$b^2 = 803$$

$$b = \sqrt{803}$$

$$\hat{=} 28.3$$

$$\tan A = \frac{31}{28.3}$$

$$\angle A = \tan^{-1}\left(\frac{31}{28.3}\right)$$

$$= 48^\circ$$

$$\angle B = 180 - 90 - 48$$

$$= 42^\circ$$

Seatwork/Homework: p. 8 #3, 4, 5, 6