

7.2

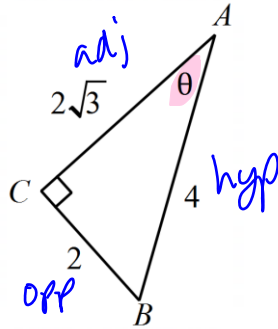
Date: 1/19/24

Objective: I can use trig ratios to solve for missing angles or sides of a right triangle.

Review: **SOH CAH TOA** is a helpful mnemonic for remembering the definitions of the trigonometric functions sine, cosine and tangent. Fill in the blanks below.

Do you remember **SOH CAH TOA**?: $\sin \theta = \frac{o}{h}$ $\cos \theta = \frac{a}{h}$ $\tan \theta = \frac{o}{a}$

Review:



ratio

$$\sin \theta = \frac{2}{4} = \frac{1}{2}$$

$$\cos \theta = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$

$$\tan \theta = \frac{2}{2\sqrt{3}} = \frac{1}{\sqrt{3}} \text{ or } \frac{\sqrt{3}}{3}$$

$$\csc \theta = \frac{2}{1} = 2$$

$$\sec \theta = \frac{2}{\sqrt{3}} \text{ or } \frac{2\sqrt{3}}{3}$$

$$\cot \theta = \frac{\sqrt{3}}{1} = \sqrt{3}$$

Use your calculator to find the value of the trig functions (make sure it is in degree mode).

The reciprocal trig functions $\csc \theta$, $\sec \theta$, and $\cot \theta$ as:

$$\csc \theta = \frac{1}{\sin \theta} \quad \sec \theta = \frac{1}{\cos \theta} \quad \cot \theta = \frac{1}{\tan \theta}$$

**Use the reciprocal functions to evaluate cosecant, secant and cotangent on a calculator.

Examples: Round your answers to the nearest ten-thousandth. 10,000

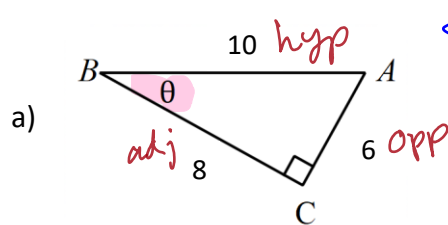
a) $\sin 41^\circ \approx 0.6561$

b) $\cos 76^\circ \approx 0.2419$

c) $\sec 23^\circ \approx 1.0864$

d) $\cot 92^\circ \approx -0.349$

Example: Use an inverse trigonometric ratio to find the indicated angle. Round to the nearest tenth.

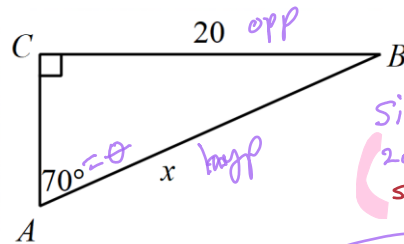


$$\cos \theta = \frac{4}{5}$$

$$\cos^{-1} \frac{4}{5} = \theta \approx 36.9^\circ$$

☆ only do inverse (sin, cos, tan) if wanting to find angle!

Example: Use a trigonometric ratio to find the indicated side. Round to the nearest tenth.



$$\sin 70^\circ = \frac{20}{x}$$

$$\frac{20}{\sin 70^\circ} = \frac{x}{20}$$

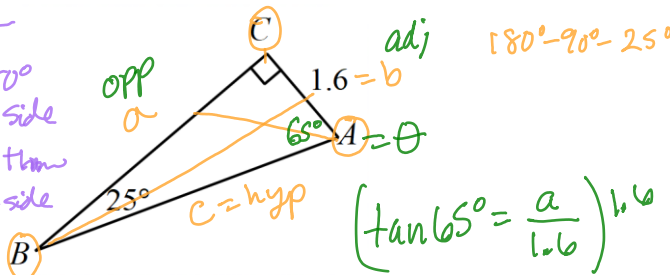
$$x \approx 21.3$$

Example: Use right triangle trigonometry to find all the missing parts of the right triangle.

if have 2 angles

a)

- 1) subtr from 180
- 2) trig to find side
- 3) trig or Pythag thm to find 3rd side



$$180^\circ - 90^\circ - 25^\circ$$

$$\left(\tan 65^\circ = \frac{a}{1.6} \right) \cdot 1.6$$

$$m\angle A = 65^\circ \quad a = 3.4$$

$$m\angle B = 25^\circ \quad b = 1.6$$

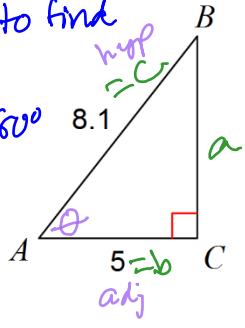
$$m\angle C = 90^\circ \quad c = 3.8$$

$$\cos 65^\circ = \frac{1.6}{h}$$

$$1.6 \left(\frac{1}{\cos 65^\circ} = \frac{h}{1.6} \right)$$

if have 2 sides

- ① pythag thm
- ② inverse trig to find angle b)
- ③ sublt from 180°



$$a^2 + 5^2 = 8.1^2$$

$$\frac{a^2 + 25}{-25} = \frac{65.61}{-25}$$

$$\sqrt{a^2} = \sqrt{40.61}$$

$$\cos \theta = \frac{5}{8.1}$$

$$\cos^{-1} \frac{5}{8.1} = \theta$$

$$180^\circ - 90^\circ - 51.9^\circ$$

$$m\angle A = \underline{51.9^\circ} \quad a = \underline{6.4}$$

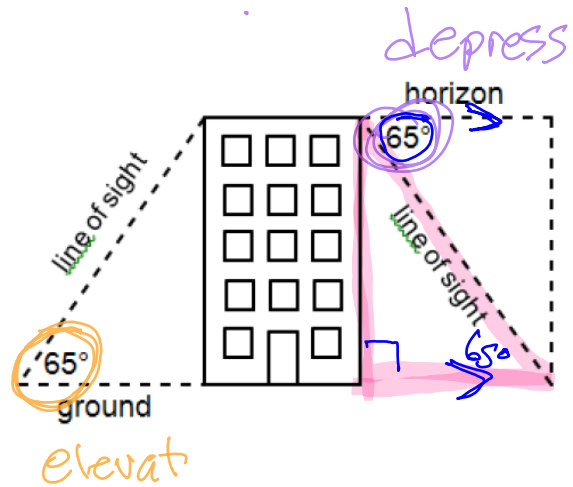
$$m\angle B = \underline{38.1^\circ} \quad b = \underline{5}$$

$$m\angle C = \underline{90^\circ} \quad c = \underline{8.1}$$

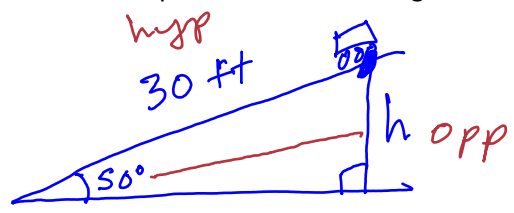
Applications of Trigonometry-

Angle of elevation- is the angle made with the ground and your line of sight to an object above you.

Angle of depression- is the angle from the horizon and your line of sight to an object below you.



a) A truck traveled up a ramp 30 feet. The angle of elevation from the level ground to the top of the ramp is 50°. Find the height at which the truck stopped.



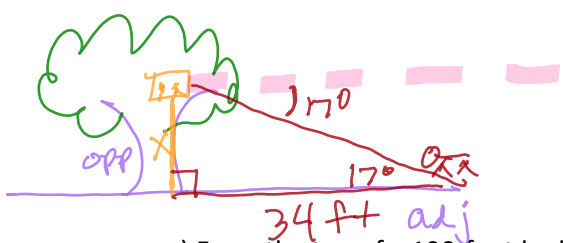
height of ramp = h

$$\left(\sin 50^\circ = \frac{h}{30} \right) 30$$

$$h \approx 23.0 \text{ ft}$$

b) The Sandlot boys are sitting in the treehouse looking at The Beast. The angle of depression from their line of sight to The Beast is 17°. If The Beast is standing 34 feet away from the base of the treehouse, how tall is the treehouse? Round to the nearest tenth.

height of treehouse = x



$$\left(\tan 17^\circ = \frac{x}{34} \right) 34$$

$$x \approx 10.4 \text{ ft.}$$

c) From the top of a 100-foot lookout tower, a forest ranger spots a fire at a 25° angle of depression. How far was the fire from the base of the lookout tower?