

Trigonometry: "measure of triangles"

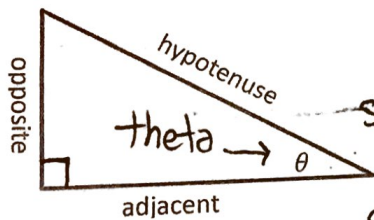
In geometry, Trig refers to trigonometric ratios (sine, cosine, tangent)

Trig ratios: relationship between the sides and angles of right triangles

Sine ratio:  $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$

Cosine ratio:  $\cos \theta = \frac{\text{ADJACENT}}{\text{Hypotenuse}}$

Tangent ratio:  $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$



SOH CAH TOA

$$\sin \theta = \frac{\text{OPP}}{\text{HYP}} \quad \cos \theta = \frac{\text{ADJ}}{\text{HYP}} \quad \tan \theta = \frac{\text{OPP}}{\text{ADJ}}$$

Steps to solve for X

- ① Label sides Hyp, OPP, ADJ
- ② Decide which Trig ratio to use
- ③ Set up the equation

In the equation:

- When X is the numerator (top), multiply

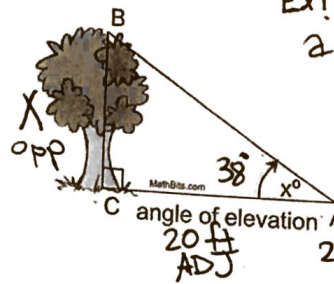
- When X is the denominator (bottom), divide

- ④ Solve for X

Angle of elevation: upward angle from the horizon line (usually the ground)

It is always INSIDE the triangle

Keywords: elevate, to lift up, or raise up



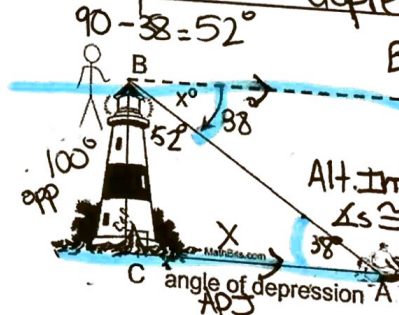
Ex! A person is 20 ft from a tree, looks up to the top of the tree with an angle of elevation of  $38^\circ$ . How tall is the tree?

$$20 \cdot (\tan 38^\circ) = \frac{X}{20} \cdot 20$$

$$X = 20 \cdot \tan 38^\circ \approx \boxed{15.63 \text{ ft}}$$

Angle of depression: a downward angle made from a horizontal line parallel to the ground. It is always on the outside of the triangle.

Keywords - depress, push down



Ex! A person at the top of a lighthouse looks out at a boat with an angle of depression of  $38^\circ$ . If the lighthouse is 100 ft tall, how far is the boat?

$$\tan 38^\circ = \frac{100}{X}$$

$$X (\tan 38^\circ) = \frac{100}{\tan 38^\circ} = \boxed{127.99 \text{ ft}}$$