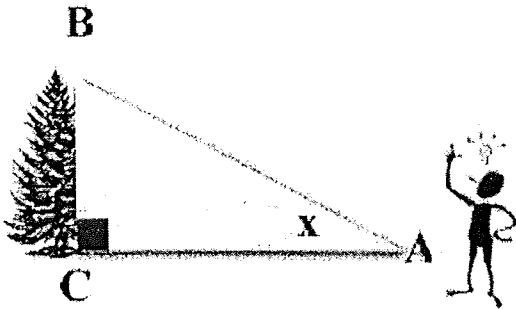


have student write their own defn ↓

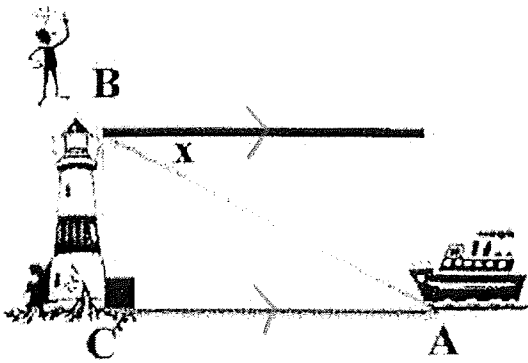
Angle of Elevation



angle above the horizontal line

ex) looking up from ground level toward the top of a tree

Angle of Depression

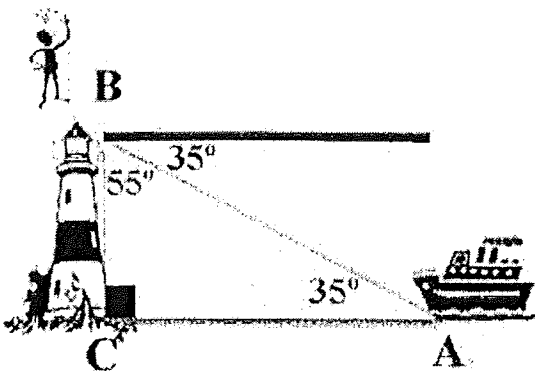


angle below the horizontal line

ex) looking out of the top of a lighthouse at a boat below

As seen in the diagram above, the dark black horizontal line is parallel to side CA of triangle ABC. This forms two alternate interior angles which are equal in measure. This tells us what?

angles of elevation and depression are congruent



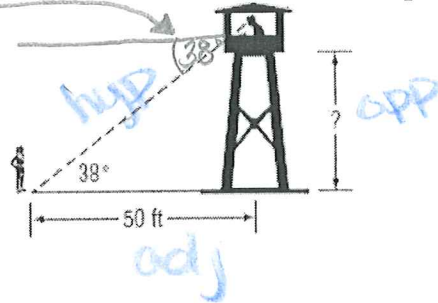
There are two possible ways to use our **angle of depression** to obtain an angle **INSIDE** the triangle.

- Why is the adjacent angle 55° ?
 $B + C$ are consec. int ($=180$)
 $\angle C = 90 \therefore \angle B = 90 - 35 = 55^\circ$
- Why is angle A 35° ?
 b/c $\angle B \cong \angle A$

In Class Practice- Notes Angle of Elevation and Depression

1.

HIKING Ayana is hiking in a national park. A forest ranger is standing in a fire tower that overlooks a meadow. She sees Ayana at an **angle of depression** measuring 38° . If Ayana is 50 feet away from the base of the tower, which is closest to the height of the fire tower?



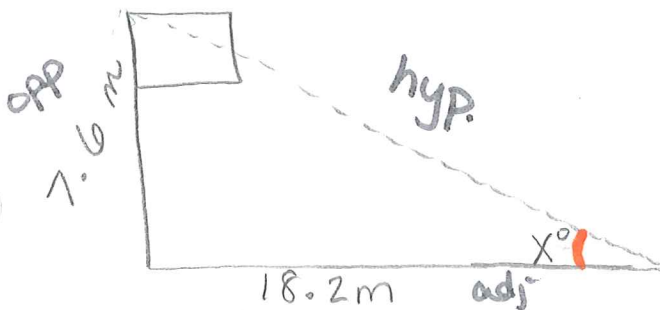
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$50 \cdot \tan 38 = \frac{x}{50} \cdot 50$$

$$x = 50 \tan 38$$

$$x = 39.06 \text{ ft}$$

2. **SHADOWS** Find the **angle of elevation** of the Sun when a 7.6-meter flagpole casts a 18.2-meter shadow. Round to the nearest tenth of a degree.



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

$$\tan x = \frac{7.6}{18.2}$$

$$x = \tan^{-1}\left(\frac{7.6}{18.2}\right) = 22.66^\circ$$

$$x = 22.7^\circ$$

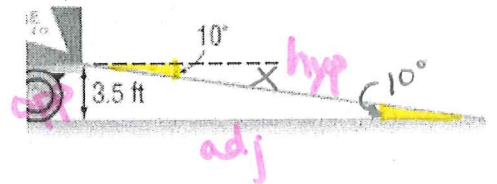
3. The tailgate of a moving van is 3.5 feet above the ground. A loading ramp is attached to the rear of the van at an incline of 10° . What is the length of the ramp?

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

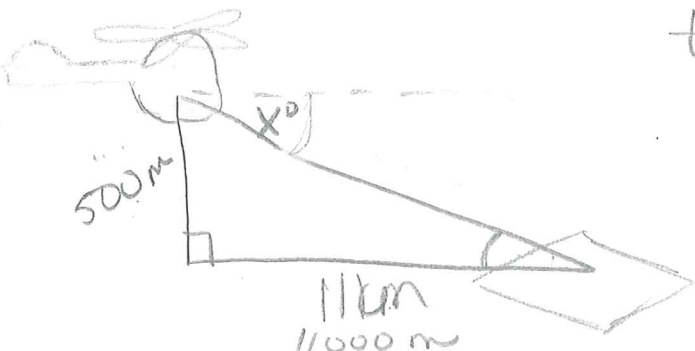
$$x \cdot \sin 10 = \frac{3.5}{x} \cdot x$$

$$\frac{x \sin 10}{\sin 10} = \frac{3.5}{\sin 10}$$

$$x = 20.16 \text{ ft}$$



4. **AVIATION** After flying at an altitude of 500 meters, a helicopter starts to descend when its ground distance from the landing pad is 11 kilometers. What is the **angle of depression** for this part of the flight?



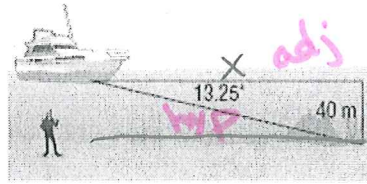
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan x = \frac{500}{11000}$$

$$x = \tan^{-1}\left(\frac{500}{11000}\right) \quad x =$$

Angle of Elevation and Depression HW#1

1. **OCEAN ARCHAEOLOGY** A salvage ship uses sonar to determine the **angle of depression** to a wreck on the ocean floor that is 40 meters below the surface. How far must a diver, lowered from the salvage ship, walk along the ocean floor to reach the wreck?



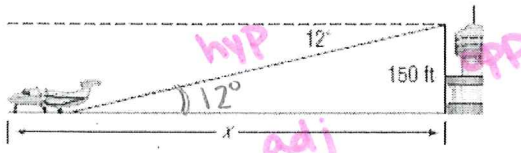
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 13.25 = \frac{40}{x}$$

$$\frac{x \tan 13.25 = 40}{\tan 13.25} = \frac{40}{\tan 13.25}$$

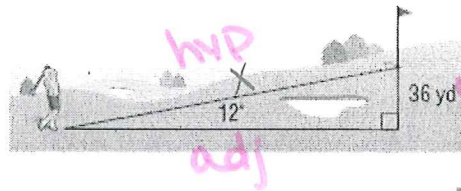
$$x = 169.87 \text{ m}$$

2. **STANDARDIZED TEST EXAMPLE** From the top of a 150-foot high tower, an air traffic controller observes an airplane on the runway. Which equation would be used to find the distance from the base of the tower to the airplane?



$$\tan 12 = \frac{150}{x}$$

3. **GOLF** A golfer is standing at the tee, looking up to the green on a hill. If the tee is 36 yards lower than the green and the **angle of elevation** from the tee to the hole is 12° , find the distance from the tee to the hole.

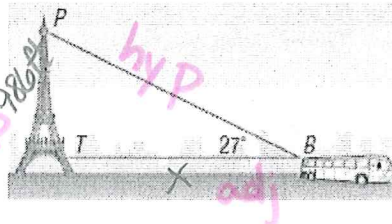


$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 12 = \frac{36}{x}$$

$$x = 173.15 \text{ yds}$$

4. **TOURISM** Crystal is on a bus in France with her family. She sees the Eiffel Tower at an angle of 27° . If the tower is 986 feet tall, how far away is the bus? Round to the nearest tenth.



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

$$\tan 27 = \frac{986}{x}$$

$$x = 1935.13 \text{ ft}$$

5. **SLEDDING** A sledding run is 300 yards long with a vertical drop of 27.6 yards. Find the **angle of depression** of the run.

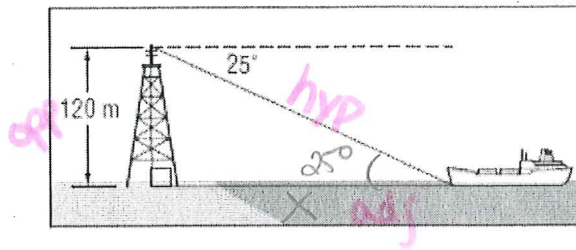


6. The top of a signal tower is 120 meters above sea level. The angle of depression for the top of the tower to a passing ship is 25° . What is the distance from the foot of the tower to the ship?

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

$$\tan 25 = \frac{120}{x}$$

$$x = 257.34 \text{ m}$$

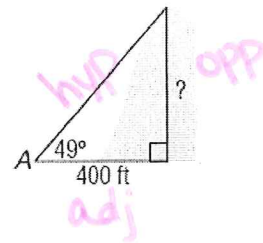


7. The angle of elevation from point A to the top of a hill is 49° . If point A is 400 feet from the base of the hill, how high is the hill?

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

$$\tan 49 = \frac{x}{400}$$

$$x = 460.15 \text{ ft}$$



8. Find the angle of elevation of the sun when a 12.5-meter-tall telephone pole casts an 18-meter-long shadow.

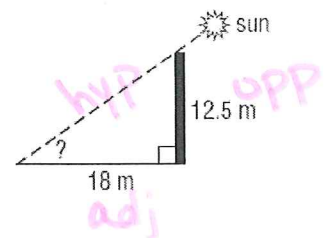
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{12.5}{18}$$

$$\theta = \tan^{-1}\left(\frac{12.5}{18}\right)$$

$$= 57.38$$

$$= 57^\circ$$

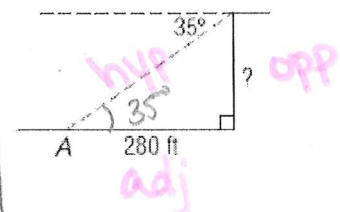


9. The angle of depression from the top of a sheer cliff to point A on the ground is 35° . If point A is 280 feet from the base of the cliff, how tall is the cliff?

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

$$\tan 35 = \frac{x}{280}$$

$$x = 196.06 \text{ ft}$$



10. The angle of depression from a balloon on a 75-foot string to a person on the ground is 36° . How high is the balloon?

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

$$\sin 36 = \frac{x}{75}$$

$$x = 44.08 \text{ ft}$$

