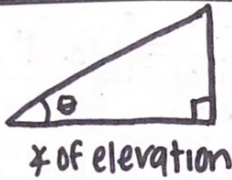
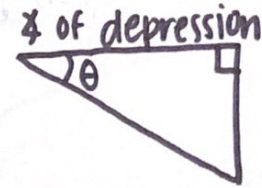
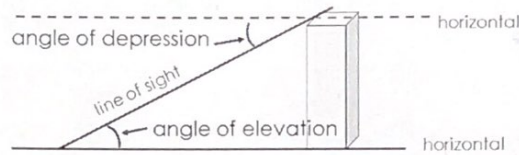


Name: _____ Date: _____

Triangle Application Problems - SOHCAHTOA



Angle of Elevation & Angle of Depression



1. A 6 ft tall bird watcher is standing 50 feet from the base of a large tree. The surveyor measures the angle of elevation to a bird on top of the tree as 71.5° . How tall is the tree?

6ft | 50ft | 6ft

$\tan 71.5^\circ = \frac{x}{50}$ $\rightarrow x = 50 \tan 71.5^\circ \approx 149.43 + 6 = 155.43 \text{ ft}$

$\rightarrow x + \rightarrow$ height of the birdwatcher

2. The angle of depression from the top of a tower to a boulder on the ground is 38° . If the tower is 25m high, how far from the base of the tower is the boulder?

25m

$\tan 38^\circ = \frac{25}{x} \rightarrow x = \frac{25}{\tan 38^\circ} = 32 \text{ m}$

3. A rocket is launched at an angle into outer space. After a minute, the rocket traveled 5 miles and had an altitude of 3.5 miles. What is the angle of elevation that the rocket was launched at?

5m | 3.5m

$\sin \theta = \frac{3.5}{5} \rightarrow \theta = \sin^{-1}\left(\frac{3.5}{5}\right) = 44.43^\circ$

4. Tom went to a park that is the shape of a square. If he runs a total of 8 miles around the park, how far would it have been if he ran diagonally across the park?

$\frac{8}{4} = 2$

Two ways to solve:

$2^2 + 2^2 = c^2$
 $8 = c^2 \rightarrow c = \sqrt{8} \approx 2.83 \text{ mi}$

$\sin 45^\circ = \frac{2}{x}$
 $x = \frac{2}{\sin 45^\circ} \approx 2.83 \text{ mi}$

5. Your car is driving up a hill that is 500 feet long at an angle of elevation of 15° . What is the vertical distance covered by your car to the nearest foot?

H 500ft

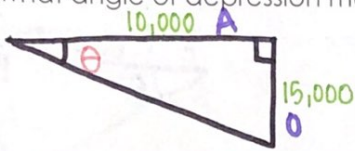
$\sin 15^\circ = \frac{x}{500} \rightarrow x = 500 \sin 15^\circ = 129.41 \text{ ft}$

6. The length of the altitude of an equilateral triangle is 9. Find the length of a side.

9

$\sin 60^\circ = \frac{9}{x} \rightarrow x = \frac{9}{\sin 60^\circ} \approx 10.39$

7. The computers on an airplane broke so the pilot has to land the plane by herself. If the plane's altitude is 15,000 feet and the plane is 10,000 feet from the beginning of the runway, what angle of depression must she take to get to the beginning of the runway?



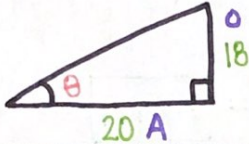
$$\tan \theta = \frac{15000}{10000} \rightarrow \theta = \tan^{-1}\left(\frac{15000}{10000}\right) = \boxed{56.31^\circ}$$

8. A construction worker leans his ladder against a building making a 60° angle with the ground. If his ladder is 20 feet long, how far away is the base of the ladder from the building?



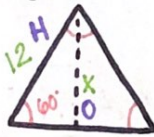
$$\cos 60^\circ = \frac{x}{20} \rightarrow x = 20 \cos 60^\circ = \boxed{10 \text{ ft}}$$

9. The bottom of a double rainbow is going over a tree that is 18 feet tall. If you're standing 20 feet from the tree, what is the angle of elevation to the bottom of the rainbow?



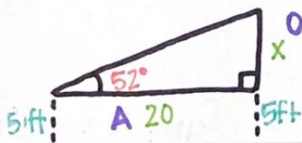
$$\tan \theta = \frac{18}{20} \rightarrow \theta = \tan^{-1}\left(\frac{18}{20}\right) = \boxed{41.99^\circ}$$

10. The outline of a teepee is shaped like an equilateral triangle. If the sticks on the side are 12 feet long, how tall is the teepee?



$$\sin 60^\circ = \frac{x}{12} \rightarrow x = 12 \sin 60^\circ \approx \boxed{10.39 \text{ ft}}$$

11. A telescope is mounted 5 ft above the ground. The telescope is tilted at a 52° angle above the horizontal to see the top of a flagpole. The two are 20 ft apart. How tall is the flagpole?



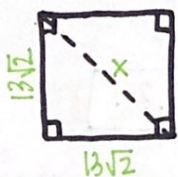
$$\tan 52^\circ = \frac{x}{20} \rightarrow x = 20 \tan 52^\circ = 25.6 \text{ ft} + 5 \text{ ft} = \boxed{30.6 \text{ ft}}$$

12. A ladder leaning against a wall makes a 60° angle with the ground. The base of the ladder is 3 m from the building. How high above the ground is the top of the ladder?



$$\tan 60^\circ = \frac{x}{3} \rightarrow 3 \tan 60^\circ = \boxed{5.2 \text{ m}}$$

13. Find the length of the diagonal of a square with a side of length $13\sqrt{2}$.



$$(13\sqrt{2})^2 + (13\sqrt{2})^2 = c^2$$

$$\sqrt{760} = \sqrt{c^2}$$

$$\boxed{c = 26}$$