

Name: Key

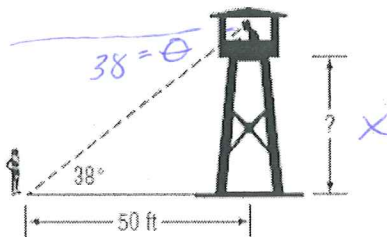
Date: _____

Hour: _____

Angle of Elevation and Depression HW

1.

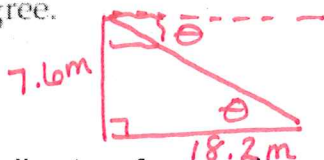
HIKING Ayana is hiking in a national park. A forest ranger is standing in a fire tower that overlooks a meadow. She sees Ayana at an angle of depression measuring 38° . If Ayana is 50 feet away from the base of the tower, which is closest to the height of the fire tower?



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

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

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.



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

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

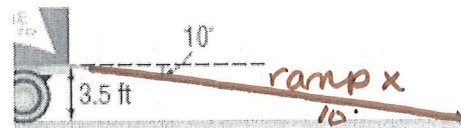
$$\theta = 22.7^\circ$$

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?

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

$$x \cdot \sin(10^\circ) = 3.5$$

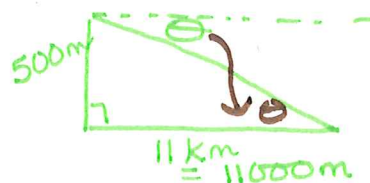
$$x = 20.16 \text{ ft}$$



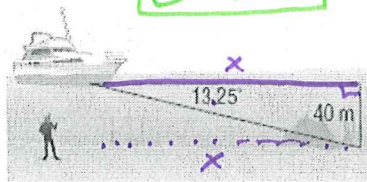
4. **AVIATION** After flying at an altitude of 500 meters, a helicopter starts to descend when its ground distance from the landing pad is 11 kilometers. What is the angle of depression for this part of the flight?

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

$$\theta = 2.6^\circ$$



5. **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?

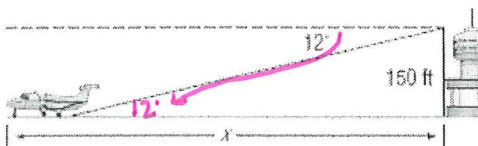


$$\tan 13.25 = \frac{40}{x}$$

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

6. **STANDARDIZED TEST EXAMPLE**

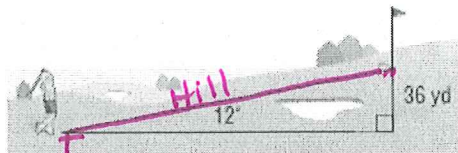
From the top of a 150-foot high tower, an air traffic controller observes an airplane on the runway. Which equation would be used to find the distance from the base of the tower to the airplane?



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

$$x \approx 705.69 \text{ ft}$$

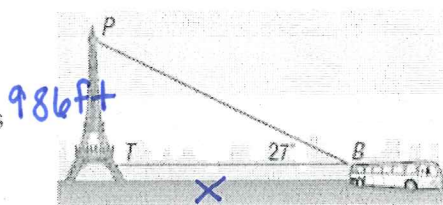
7. **GOLF** A golfer is standing at the tee, looking up to the green on a hill. If the tee is 36 yards lower than the green and the angle of elevation from the tee to the hole is 12° , find the distance from the tee to the hole.



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

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

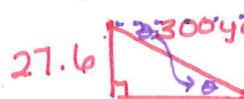
8. **TOURISM** Crystal is on a bus in France with her family. She sees the Eiffel Tower at an angle of 27° . If the tower is 986 feet tall, how far away is the bus? Round to the nearest tenth.



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

$$x = 1,935.13 \text{ ft}$$

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



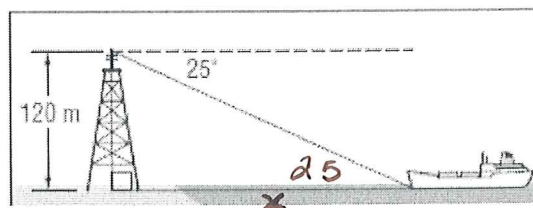
$$\sin^{-1}\left(\frac{27.6}{300}\right) = \theta$$

$$\theta = 5.28^\circ$$

10. 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?

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

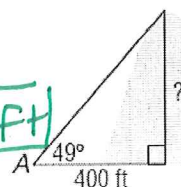
$$x = 257.34 \text{ m}$$



11. 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?

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

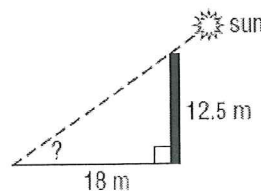
$$x \approx 460.15 \text{ ft}$$



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

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

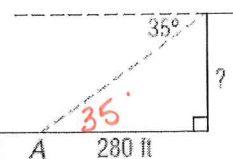
$$\theta = 37.38^\circ$$



13. 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?

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

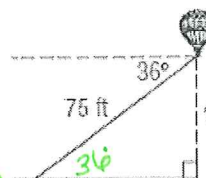
$$x = 196.06 \text{ ft}$$



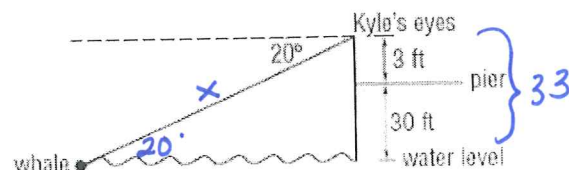
14. The angle of depression from a balloon on a 75-foot string to a person on the ground is 36° . How high is the balloon?

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

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



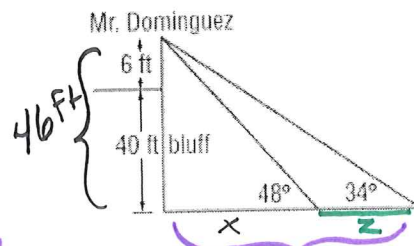
15. **INDIRECT MEASUREMENT** Kyle is at the end of a pier 30 feet above the ocean. His eye level is 3 feet above the pier. He is using binoculars to watch a whale surface. If the angle of depression of the whale is 20° , how far is the whale from Kyle's binoculars? Round to the nearest tenth foot.



$$\sin 20 = \frac{33}{x}$$

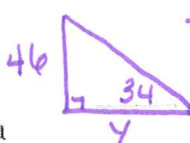
$$x \approx 96.49 \text{ ft}$$

16. **INDIRECT MEASUREMENT** Mr. Dominguez is standing on a 40-foot ocean bluff near his home. He can see his two dogs on the beach below. If his line of sight is 6 feet above the ground and the angles of depression to his dogs are 34° and 48° , how far apart are the dogs to the nearest foot?



$$\tan 48 = \frac{46}{x}$$

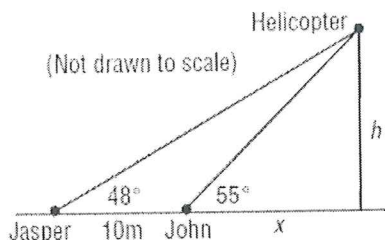
$$x \approx 41 \text{ ft}$$



$$\tan 34 = \frac{46}{y}$$

$$y \approx 68 \text{ ft}$$

17. Jermaine and John are watching a helicopter hover above the ground.



Have students use 2 expressions

$$\textcircled{1} \quad h = \tan 48 \cdot (x + 10)$$

$$\textcircled{2} \quad \tan 55 = \frac{h}{x} \quad \therefore h = x \tan 55$$

$$\therefore h = (x + 10) \tan 48 \quad h = h \checkmark$$

$$(x + 10) \tan 48 = x \tan 55$$

$$x \tan 48 + 11.106 = x \tan 55$$

$$-x \tan 48$$

$$11.106 = 0.318x$$

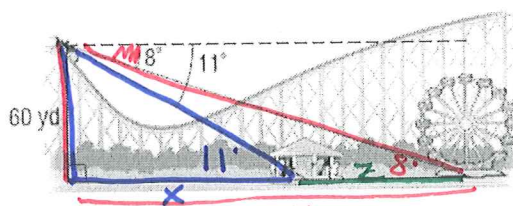
$$x \approx 34.9 \text{ m}$$

$$Z = 308.67 - 426.92$$

Duh! :)

$$Z = 118.25 \text{ yds}$$

18. **AMUSEMENT PARKS** From the top of a roller coaster, 60 yards above the ground, a rider looks down and sees the merry-go-round and the Ferris wheel. If the angles of depression are 11° and 8° , respectively, how far apart are the merry-go-round and Ferris wheel?



$$\tan 11 = \frac{60}{x} \quad x = 308.67 \text{ yds}$$

$$\tan 8 = \frac{60}{y} \quad y = 426.92 \text{ yds}$$

19. A ski run is 1000 yards long with a vertical drop of 208 yards. Find the angle of depression from the top of the ski run to the bottom.



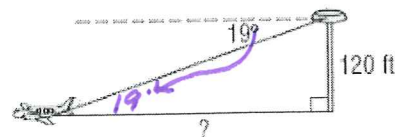
$$\sin \theta = \frac{208}{1000}$$

$$\theta = \sin^{-1}\left(\frac{208}{1000}\right)$$

$$\theta \approx 12^\circ$$

#18 + 16 are great test + Quiz questions!

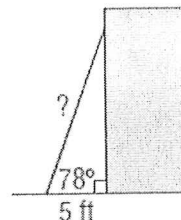
- 20 From the top of a 120-foot-high tower, an air traffic controller observes an airplane on the runway at an angle of depression of 19° . How far from the base of the tower is the airplane?



$$\tan 19 = \frac{120}{x}$$

$$x \approx 348.51 \text{ ft}$$

- 21 A ladder leaning against a building makes an angle of 78° with the ground. The foot of the ladder is 5 feet from the building. How long is the ladder?

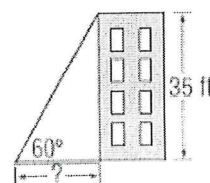


$$\cos 78 = \frac{5}{x}$$

$$x \approx 24.05 \text{ ft}$$

Finally a cosine question :

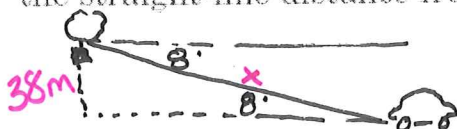
- 22 **SHADOWS** Suppose the sun casts a shadow off a 35-foot building. If the angle of elevation to the sun is 60° , how long is the shadow to the nearest tenth of a foot?



$$\tan 60 = \frac{35}{x}$$

$$x \approx 20.21 \text{ ft}$$

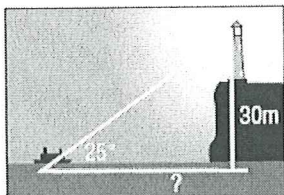
23. **BALLOONING** From her position in a hot-air balloon, Angie can see her car parked in a field. If the angle of depression is 8° and Angie is 38 meters above the ground, what is the straight-line distance from Angie to her car? Round to the nearest whole meter.



$$\sin 8 = \frac{38}{x}$$

$$x \approx 273.04 \text{ m}$$

24. **LIGHTHOUSES** Sailors on a ship at sea spot the light from a lighthouse. The angle of elevation to the light is 25° .



The light of the lighthouse is 30 meters above sea level. How far from the shore is the ship? Round your answer to the nearest meter.

$$\tan 25 = \frac{30}{x}$$

$$x \approx 64.34 \text{ m}$$