

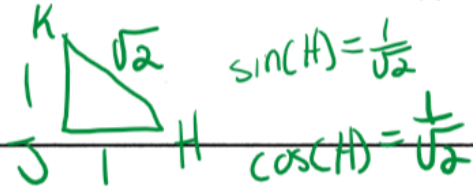
In right $\triangle HJK$, $\angle J$ is a right angle and $\tan(H) = 1$. Which statement about $\triangle HJK$ must be true?

A. $\sin(H) = \frac{1}{2}$

B. $\sin(H) = 1$

C. $\sin(H) = \cos(H)$

D. $\sin(H) = \frac{1}{\cos(H)}$



1

There is a large tree 80 feet from a house. The owners are worried that the tree might fall on their house and want to estimate the height of the tree. In the figure below, when the sun's angle of elevation is 50° , the tree casts a shadow 80 feet long. Which can be used to find the height of the tree?

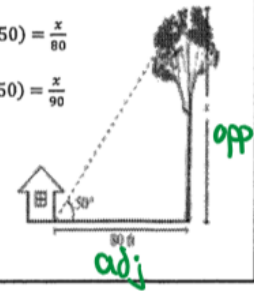
A. $\sin(50) = \frac{80}{x}$

B. $\tan(50) = \frac{x}{80}$

C. $\cos(50) = \frac{80}{x}$

D. $\sin(50) = \frac{x}{90}$

Handwritten: $\tan(50) = \frac{x}{80}$



2

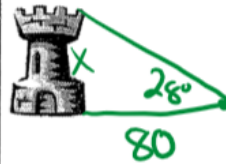
Solving Word Problems

Use the 3 ratios – sin, cos and tan to solve application problems.

Choose the easiest ratio(s) to use based on what information you are given in the problem.

3

1. From a point 80m from the base of a tower, the angle of elevation is 28° . How tall is the tower?



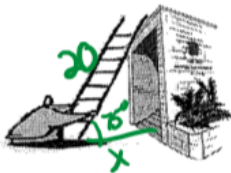
Handwritten: $\tan(28) = \frac{x}{80}$

Handwritten: $x = 80 \cdot \tan(28)$

Handwritten: $x = 42.54\text{m}$

4

2. A ladder that is 20 ft is leaning against the side of a building. If the angle formed between the ladder and ground is 75° , how far will Ms. McGinnis have to crawl to get to the front door when she falls off the ladder (assuming she falls to the base of the ladder)?



Handwritten: $\cos(75) = \frac{x}{20}$

Handwritten: $x = 5.18\text{ft}$

5

3. When the sun is 62° above the horizon, a building casts a shadow 18m long. How tall is the building?



Handwritten: $\tan(62) = \frac{x}{18}$

Handwritten: $x = 33.85\text{m}$

6

4. A kite is flying at an angle of elevation of about 55° . Ignoring the sag in the string, find the height of the kite if 85m of string have been let out. a



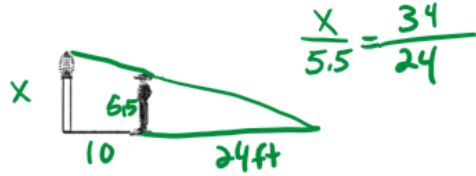
$$\sin(55) = \frac{x}{85}$$

$$x = 85 \cdot \sin(55)$$

$$x = 69.63 \text{ m}$$

7

5. A 5.50 foot person standing 10 feet from a street light casts a 24 foot shadow. What is the height of the streetlight?



$$\frac{x}{5.5} = \frac{34}{24}$$

$$24x = 187$$

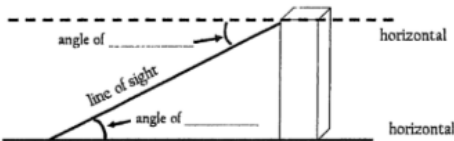
$$x = 7.79 \text{ ft}$$

8

Depression and Elevation

If a person on the ground looks up to the top of a building, the angle formed between the line of sight and the horizontal is called the angle of elevation.

If a person standing on the top of a building looks down at a car on the ground, the angle formed between the line of sight and the horizontal is called the angle of depression.



9

6. 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?



$$\tan(38) = \frac{x}{25}$$

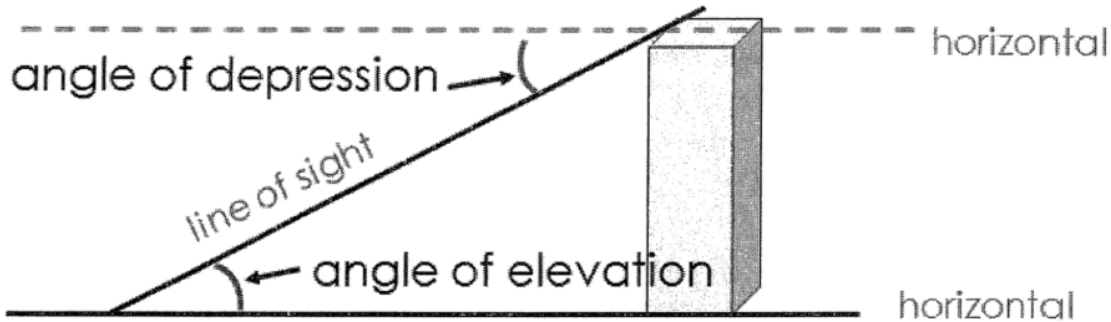
$$x = 25 \cdot \tan(38) = 19.53 \text{ m}$$

10

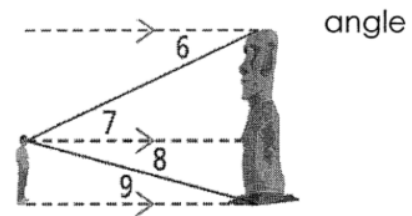
Name: _____ Date: _____

Trig Application Problems

Angle of Elevation & Angle of Depression



1. Classify each angle as an angle of elevation or of depression:



2. Over 2 miles (horizontal), a road rises 300 feet (vertical). What is the angle of elevation to the nearest degree?

3. The angle of depression from the top of a tower to a boulder on the ground is 38° . If the tower is 25 meters high, how far from the base of the tower is the boulder? Round to the nearest whole number.

4. Find the angle of elevation to the top of a tree for an observer who is 31.4 meters from the tree if the observer's eye is 1.8 meters above the ground and the tree is 23.2 meters tall. Round to the nearest degree.

5. A 75 foot building casts an 82 foot shadow. What is the angle that the sun hits the building? Round to the nearest degree.

6. A boat is sailing and spots a shipwreck 650 feet below the water. A diver jumps from the boat and swims 935 feet to reach the wreck. What is the angle of depression from the boat to the shipwreck, to the nearest degree?

7. A 5 ft tall bird watcher is standing 50 feet from the base of a large tree. The person measures the angle of elevation to a bird on top of a tree as 71.5° . How tall is the tree? Round to the nearest tenth.

8. A block slides down a 45° slope for a total of 2.8 meters. What is the change in the height of the block? Round to the nearest tenth.

9. A projectile has an initial horizontal velocity of 5 meters per second and an initial vertical velocity of 3 meters per second upwards. At what angle was the projectile fired, to the nearest degree?

10. 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 to the nearest tenth?