

Draw a picture to represent each situation, then use angles of elevation and depression to find the missing value.

1. At a point on the ground 50 feet from a tree, the angle of elevation to the top of the tree is 48° . Find the height of the tree.
2. A ladder is leaning against a wall. The foot of the ladder is 6.5 feet from the wall. The ladder makes an angle of 74° with the level ground. How high up the wall does the ladder reach?
3. A wooden beam 24 feet long leans against a wall and makes an angle of 71° with the ground. How high up the wall does the ladder reach?
4. A plane took off from a field and rose at an angle of 8° with the ground. As it passes over a water tower that is 2000 feet from the runway, what is its height above the ground?
5. A 20 foot ladder leans against a building and makes an angle of 74° with the ground. Find the distance between the foot of the ladder and the building.

Draw a picture to represent each situation, then use angles of elevation and depression to find the missing value.

6. A straight road to the top of a hill is 2500 feet long and makes an angle of 12° with the horizontal. Find the height of the hill.

7. Find the angle of elevation of the sun when a boy 5 feet tall casts a shadow 5 feet long.

8. Find the angle of elevation of the sun when a vertical post 15 feet tall casts a shadow 20 feet long.

9. After takeoff, a plane flies in a straight path for 4000 feet and, in doing so, gains 800 feet of altitude. Find the angle of elevation of the plane flight path.

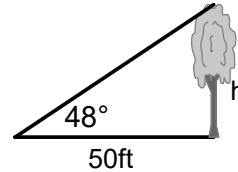
10. A 40 foot ladder which is leaning against a wall reaches a point that is 36 feet above the ground. Find the measure of the angle created between the ladder and the ground.

ANSWERS

1. At a point on the ground 50 feet from a tree, the angle of elevation to the top of the tree is 48° . Find the height of the tree.

$$\tan 48^\circ = \frac{50'}{x'}$$

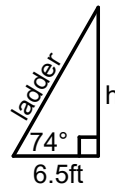
$$50' \times \tan 48^\circ = 55.5'$$



2. A ladder is leaning against a wall. The foot of the ladder is 6.5 feet from the wall. The ladder makes an angle of 74° with the level ground. How high up the wall does the ladder reach?

$$\tan 74^\circ = \frac{x'}{6.5'}$$

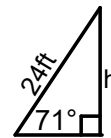
$$6.5' \times \tan 74^\circ = 22.7'$$



3. A wooden beam 24 feet long leans against a wall and makes an angle of 71° with the ground. How high up the wall does the ladder reach?

$$\sin 71^\circ = \frac{x'}{24'}$$

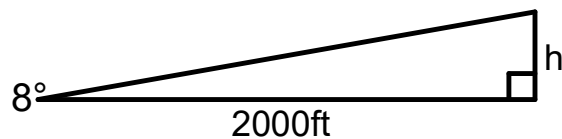
$$24' \times \sin 71^\circ = 22.7'$$



4. A plane took off from a field and rose at an angle of 8° with the ground. As it passes over a water tower that is 2000 feet from the runway, what is its height above the ground?

$$\tan 8^\circ = \frac{h'}{2000'}$$

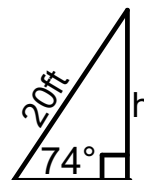
$$2000' \times \tan 8^\circ = 281.1'$$



5. A 20 foot ladder leans against a building and makes an angle of 74° with the ground. Find the distance between the foot of the ladder and the building.

$$\cos 74^\circ = \frac{x'}{20'}$$

$$20' \times \cos 74^\circ = 5.5'$$

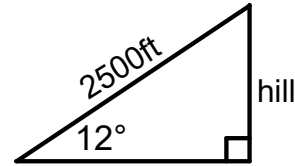


ANSWERS

6. A straight road to the top of a hill is 2500 feet long and makes an angle of 12° with the horizontal. Find the height of the hill.

$$\sin 12^\circ = \frac{\text{hill}'}{2500'}$$

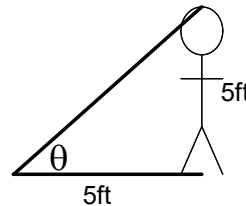
$$2500' \times \sin 12^\circ = 519.8'$$



7. **Find the angle** of elevation of the sun when a boy 5 feet tall casts a shadow 5 feet long.

$$\tan \theta = \frac{5'}{5'} = 1$$

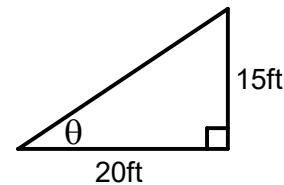
$$\tan^{-1}(1) = 45^\circ$$



8. **Find the angle** of elevation of the sun when a vertical post 15 feet tall casts a shadow 20 feet long.

$$\tan \theta = \frac{15'}{20'} = 0.75$$

$$\tan^{-1}(0.75) = 36.9^\circ$$



9. After takeoff, a plane flies in a straight path for 4000 feet and, in doing so, gains 800 feet of altitude. **Find the angle** of elevation of the plane flight path.

$$\sin \theta = \frac{800'}{4000'} = 0.2, \text{ or maybe } \tan \theta = \frac{800'}{4000'} = 0.2 \quad (\text{"straight path"})$$

$$\sin^{-1}(0.2) = 11.5^\circ$$

$$\tan^{-1}(0.2) = 11.3^\circ$$

10. A 40 foot ladder which is leaning against a wall reaches a point that is 36 feet above the ground. **Find the measure of the angle** created between the ladder and the ground.

$$\sin \theta = \frac{36'}{40'} = 0.9$$

$$\sin^{-1}(0.9) = 64.2^\circ$$

