Lesson 5.3

Angles of Elevation/Depression—You learned about these in Math 2!

Remember:



* Angles of elevation and angles of depression MUST BE MEASURED FROM HORIZONTALS!!!!!!!
* When asked to find distance between two objects, one in the air and one on the ground, find the straight line distance (hypotenuse) unless otherwise indicated in the reading.

Examples

1. A person two meters tall stands five meters from a building. The angle of elevation from where the

 person stands to the top of the building is 75$°$. Find the height of the building.

 $tan75°=\frac{x}{5}$

 $5tan75°$=x

 $x≈18.66$

 Height of building: 18.66+2=20.66m

2. Use example 1 to calculate the line of sight.

 Find y: $cos75°=\frac{5}{y}$

 $y≈19.3m$

3. A 98-ft extension ladder rests on top of a hook and ladder truck with its base 11 ft from the ground.

 When the angle of elevation of the ladder is 73$°$, how high up the building will it reach?

 $sin73°=\frac{x}{98}$

 $x≈93.72$

 Answer: 93.72+11$≈104.72 ft off the ground$

4. Determine the altitude of an airplane if the if the angle of depression to the runway is 40$°$ when the

 plane is 12 miles from the runway.

 $sin40°=\frac{x}{12} , x≈7.71 miles$

 Distance between any 2 objects is straight line,

 Unless told otherwise in the problem

5. A stranded boater tries to gain the attention of a rescue helicopter 300 ft away. If the helicopter is

 hovering at 70 ft, what is the angle of depression to the boater?

 $sinθ=\frac{70}{300}$

 $θ=sin^{-1}\frac{70}{300}$

6. From the deck of a boat, the angle of elevation to the top of an offshore oil rig is found to be

 31$°30'$. The top of the rig is 127 m above the level of the platform on which it stands. (Assume

 the head of the person doing the sighting is level with the base of the oil rig). What is the distance

 between the base of the oil rig and the boat?

 $tan31°30^{'}=\frac{127}{x}$

 $x≈207.2 m$

Pre Calculus Name

Elevation/Depression Angles

HW

Find angles to the nearest minute and sides to the nearest tenth

1. A vertical pole 6 feet tall casts a shadow that is 55 inches long. What is the angle of elevation to the sun? $tanθ=\frac{72}{55}$

 $θ=52°37'$

2. A man at the top of a watchtower knows that his eye is 85ft above the ground. On the level plane supporting the tower there is a rock known to be 500ft from the base of the tower. Find the angle of depression to the rock from the top of the tower.

 $tanθ=\frac{85}{100}$

 $θ≈9°39'$

3. What is the angle of elevation of the moon if a seven foot tall creature that walks in the night casts a shadow that is 45ft long?

 $tanθ=\frac{7}{45}$

 $θ≈8°51'$

4. A robin sits on a tree branch 27ft above the ground. It sees a worm on the ground and swoops down for a snack. The angle of depression from the perch to the worm is $20°$. How long is the robin’s flight?

 $sin20°=\frac{27}{x}$

 $x≈78.9 ft$

5. A radar operator on a ship at sea detects an airplane that is 6100 meters away at an altitude of 1100 meters. What is the angle of elevation from the ship to the plane?

 $sinθ=\frac{1100}{6100}$

 $θ≈10°23'$

6. A tree is 18ft from a house. From the top of the tree, the angle of depression to the base of the house is $41°$, and the angle of elevation to the top of the house is $26°$. Find the height of the house.

 $tan26°=\frac{x}{18} , x=18tan26°$

 $tan41°=\frac{y}{18}, y=18tan41°$

 Height of the house would be x+y

 $18tan26°+18tan41°$

 24.4 ft