

More problems for section 4.11 of *Essentials of Precalculus with Calculus Previews* by Zill and Dewar, 6e.

1. A ladder 10m long leans against a vertical wall. Find the distance from the base of the ladder to the wall if the ladder makes an angle of  $62^\circ$  with the ground.
2. Suppose the ladder in Problem 1 makes an angle of  $72^\circ$  with the ground. How high above the ground is the top of the ladder?
3. A wire runs from the top of a vertical telephone pole to a point on the ground 7.2m from the base of the pole. Find the height of the pole if the wire makes an angle of  $68^\circ$  with the ground.
4. How long a shadow does a 6ft. tall man cast when the angle of elevation of the sun is  $35^\circ$ ?
5. A photographer climbs up a tree in order to see Melania Trump. If the camera is 20m above the ground and the angle of depression of the camera is  $22^\circ$ , how far is the photographer from the first lady?
6. See Problem 5. Secret service agents standing beside Melania Trump run to the photographer's tree and shake it vigorously. How far did they have to run?
7. An airplane traveling 15 m/sec at altitude 500 m will pass directly over an observer on the ground. In how many seconds will this take place if the angle of elevation from the observer to the plane is currently  $15^\circ$ ?
8. A spotlight focuses on a point on stage. If the angle of depression of the spotlight is  $52^\circ$ , and the distance from the light to point on stage is 20m, how much higher than the stage is the spotlight?
9. Standing on a ladder so that my eye is 3m above the ground and 4m away from my house and looking to the highest point of my house, the angle of elevation of my sight is  $40^\circ$ . How tall is my house?
10. My neighbor is standing on a ladder 6m away from his house, looking to the highest point of his house, and the angle of elevation of his sight is  $50^\circ$ . When he looks down the the lowest point of his house, the angle of depression of his sight is  $17^\circ$ 
  - a. How high is his eye above ground?
  - b. How tall is his house?
11. A searchlight pointed straight up at a cloud overhead illuminates a small spot on the cloud. When an observer 300m from the searchlight looks up at the illuminated spot on the cloud, the angle of elevation of her line of sight is  $81^\circ$ . How high is the cloud?

Answer these story problems in degrees.
12. A 10m ladder leans against a wall. The top of the ladder is 8.2m above the ground.
  - a. What angle does the ladder make with the ground?
  - b. What angle does the ladder make with the wall?
13. A wire runs from the top of a 18m vertical telephone pole to a point on the ground 7m from the base of the pole. What angle does the wire make with the pole?
14. A 25m wire runs from the top of a 20m vertical telephone pole to a point on the ground some distance from the base of the pole. What angle does the wire make with the ground?
15. What is the angle of elevation of the sun if a 6ft man casts a 10.5ft shadow?
16. An observer in hot air balloon at altitude 300m looks down and sees his own house. What is the observer's angle of depression when he's 525m away from his house?

17. A convenience store security camera mounted on wall is focused on the cashier. If the camera is mounted to a point 2.5m higher than the cashier and if the cashier stands on a point 6m from the wall, find the angle of depression of the camera.

18. A 7ft basketball player stands at a point 20ft from the point on the floor directly beneath the basket. What is the angle of elevation of the player's line of sight when he looks at the basket if the basket is 10ft above the floor?

19. An observer on top of a skyscraper 250m above ground sees King Kong at the top of the Empire State Building. If the Empire State Building is 381m high and the distance between it and the observer's building is 500m, what is the angle of elevation from the observer to King Kong?

#### Answers

1. 4.694m 2. 9.510m 3. 17.820m 4. 8.568ft 5. 53.389m 6. 49.501m 7. 124.4sec 8. 15.760m 9. 6.356m 10a. 1.834m  
10b. 8.984m 11. 1894.125m 12a.  $55.084^\circ$  12b.  $34.915^\circ$  13.  $21.250^\circ$  14.  $53.130^\circ$  15.  $29.744^\circ$  16.  $34.849^\circ$  17.  $22.618^\circ$   
18.  $8.530^\circ$  19.  $14.681^\circ$