

### Section 7.3

1. The path of a projectile fired at an inclination  $\theta$  to the horizontal with initial speed  $v_0$  is a parabola. The range  $R$  of the projectile, that is, the horizontal distance that the projectile travels,

is found by using the formula  $R = \frac{2v_0^2 \sin \theta \cos \theta}{g}$  where  $g \approx 32.2 \text{ ft./sec./sec.} \approx 9.8$

meters/sec./sec. is the acceleration due to gravity. The maximum height  $H$  of the projectile is

$H = \frac{v_0^2 \sin^2 \theta}{2g}$ . If the projectile is fired at an angle of  $40^\circ$  to the horizontal with an initial speed

of 300 meters/sec., find  $R$  and  $H$ , rounded to 2 decimal places.

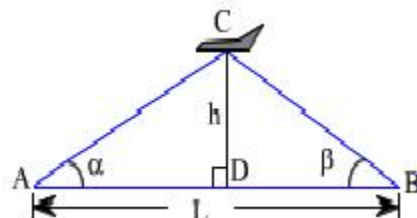
2. The tallest building in the world (as of January 2007) is the Taipei Financial Center in Taiwan. To measure its height, you walk 100 meters from its base, look up at the top of the building and measure the angle of elevation to be  $78.86^\circ$ . Find the height of the tower, rounded to the nearest meter.

### Section 9.1

3. A security camera in a bank is mounted on a wall 10 feet above the floor. What angle of depression, rounded to one decimal place, should be used if the camera is to be directed to a spot 5.5 feet above the floor and 15 feet from the wall?

### Section 9.2

4. An aircraft is spotted by two observers who are  $L = 1200$  feet apart. As the airplane passes over the line joining them, each observer takes a sighting of the angle of elevation to the plane, as indicated in the figure. If  $\alpha = 32^\circ$  and  $\beta = 39^\circ$ , how high is the airplane? Round off your final answer to 2 decimal places.

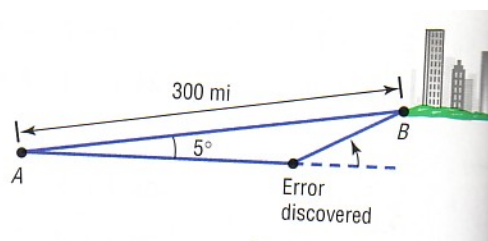


### Section 9.3

5. Two cities A and B are 300 miles apart. In flying from city A to city B, a pilot inadvertently took a course that was  $5^\circ$  in error.

a) If the error was discovered after flying 10 minutes at a constant speed of 420 miles/hour, through what angle should the pilot turn to correct the course? Round off to 2 decimal places.

b) What new constant speed should be maintained so that no time is lost due to the error? Assume that the speed would have been a constant 420 miles/hour if no error had occurred and round off your final answer to the nearest whole number.



### Section 11.2

6. A bridge is built in the shape of a parabolic arch. The bridge has a span of 70 feet and a maximum height of 22 feet. Find the height of the arch at a distance of 10 feet from the center. Round off your final answer to one decimal place.