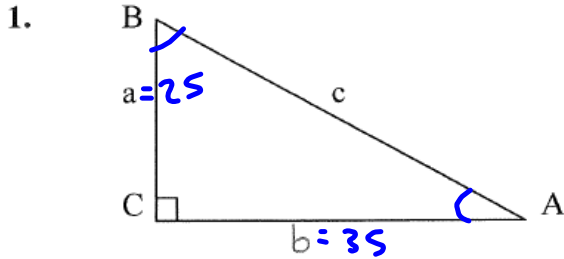


Name \_\_\_\_\_

Date \_\_\_\_\_

# Practice 7.9: Trig Applications



Solve the right triangles

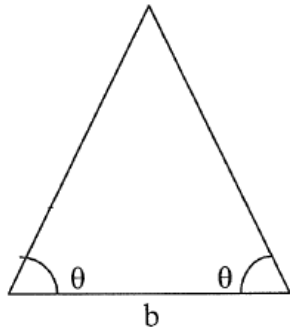
a.  $A = 20^\circ, b = 10$

b.  $a = 25, b = 35$

c.  $B = 71^\circ, b = 24$

$\tan \theta = \frac{25}{35}$   
 $A: \tan^{-1}\left(\frac{25}{35}\right) = \theta = 35.5^\circ$   
 $B: 54.5^\circ$

2.



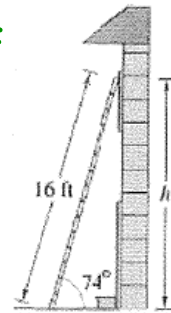
Find the altitude of the isosceles triangle

a.  $\theta = 52^\circ, b = 4\text{cm}$

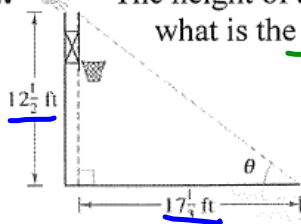
b.  $\theta = 18^\circ, b = 10\text{m}$

$\tan 18^\circ = \frac{a}{5}$   
 $5 \tan 18^\circ = a$

3. A 16ft ladder leans against the side of a house. Find how high on the house the ladder will reach if the angle of elevation is  $74^\circ$ .



4. The height of a basketball backboard is  $12\frac{1}{2}\text{ft}$ . If you are  $17\frac{1}{3}\text{ft}$  away, what is the angle of elevation from the ground to the top of the backboard?



$\tan \theta = \left(\frac{12.5}{17.33}\right) \quad \tan^{-1}\left(\frac{12.5}{17.33}\right) = \theta$

5. A sign on a roadway on top of a mountain says that for the next <sup>10</sup> miles the grade is  $12.5^\circ$ . Find the change in elevation for a car descending.

6. An airplane flying at 550mph has a bearing of N 52° E. After flying for 1½ hours, how far north and how far east has the plane flown?

$550 \cdot 1.5 = 825 \text{ mi}$   
 $\cos 52^\circ = \frac{x}{825}$   
 $825 \cos 52^\circ = x$   
 $825 \sin 52^\circ = y$

7. A ship is 45 miles east and 30 miles south of port. If the captain wants to sail directly to port, what bearing should be taken?

N 56.3° W

$\tan \theta = \frac{45}{30}$   
 $\tan^{-1}\left(\frac{45}{30}\right) = \theta$   
 $\theta = 56.3^\circ$

8. For the simple harmonic motion described by the following functions, find (1) the maximum displacement, (2) the period, and (3) the frequency.

a.  $d = 4\cos 8\pi t$

b.  $d = \frac{1}{2}\cos 20\pi t$   
 $\text{max} = 1$   
 $\text{per} = \frac{2\pi}{\omega} = \frac{2\pi}{20\pi} = \frac{1}{10}$   
 $\text{freq} = \frac{\omega}{2\pi} = \frac{20\pi}{2\pi} = 10$

c.  $d = \frac{1}{16}\sin 120\pi t$

d.  $d = \frac{1}{64}\sin 792\pi t$

9. A buoy oscillates in simple harmonic motion as waves go past. At a given time it is noted that the buoy moves a total of 3.5ft from its high point to its low point, and it returns to its high point every 10 seconds. Write an equation that describes the motion of the buoy?

$d = \frac{a}{2} \sin(\omega t)$   
 $1.75$   
 $\frac{\pi}{5}$

$\text{Per} = 10 = \frac{2\pi}{\omega}$   
 $\omega = \frac{2\pi}{10} = \frac{\pi}{5}$   
 $d = 1.75\cos \frac{\pi}{5}t$

10. A piston used to crush wheat in flour making moves up and down in simple harmonic motion. The piston moves a total of 1½ cm from top to bottom and completes 15 cycles every second. If the process starts with the piston in the middle, write an equation for the motion of the piston.

$1.5$   
 $1.5$   
 $2 \text{ sec}$

$d = 0.75 \sin 30\pi t$

$\text{freq} = \frac{\omega}{2\pi} = 15$   
 $\omega = 15 \cdot 2\pi = 30\pi$

11. The Ferris wheel at the Rose festival fun park has a diameter of 40m. If a person riding it starts at the bottom and it takes 300 seconds for a complete revolution, what is the formula for a rider's simple harmonic motion? (hint – draw a picture)

