Unit 7.1 Trigonometric Functions
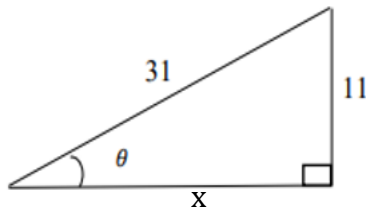
1. Solve for the unknowns in the given triangles
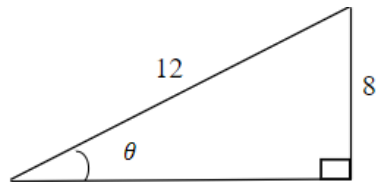   a.

    θ= _____   r = _____

    b.

    θ= _____   x = _____

    c.

    θ= _____

d.

15

θ

10

θ= _____
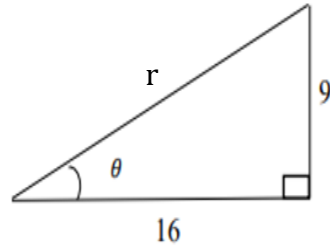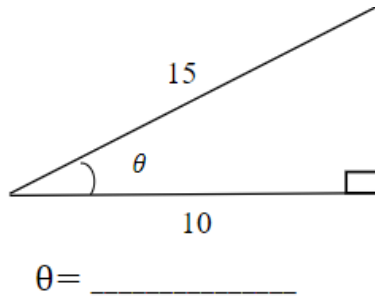
2. With the given values, find the unknowns in the right triangle

φ

c, r

b, y

θ

a, x
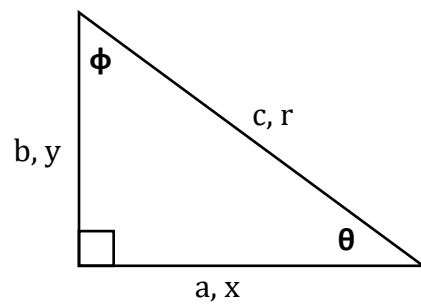
  a. $a = 48, b = 12, \theta = 76°$, find c and φ

  b. $\phi = 40°$, find θ
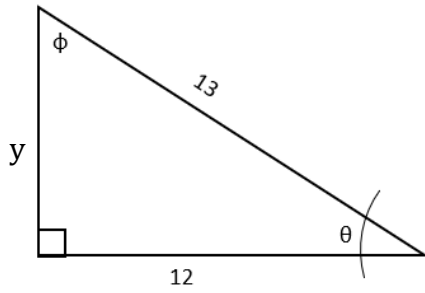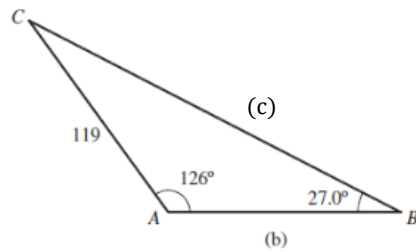
  c. $y = 110$, $r = 117$ and $\phi = 70°$, find x and θ
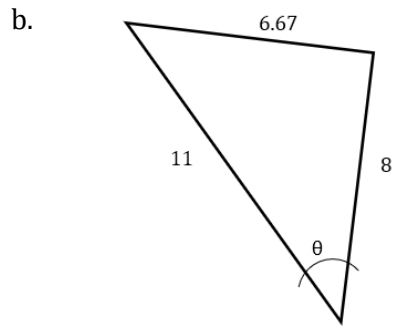
3. Solve for the unknowns in the triangle

φ = _____   θ = _____   y = _____

4. In the figures below, solve for the requested unknowns in the non-right triangles
   a.

C = _____   b = _____   c = _____

b.

6.67

11

8

θ
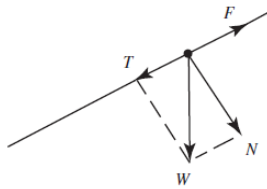
θ = _____

5. A sled whose weight W is 386 lbs is on an icy incline making an angle of 27.4º with the horizontal, See Fig. below. Find (a) the normal component N and (b) the tangential component T of the sled's weight. (c) What force F parallel to the incline is needed to keep the sled from sliding down the hill? (hint: F=T)
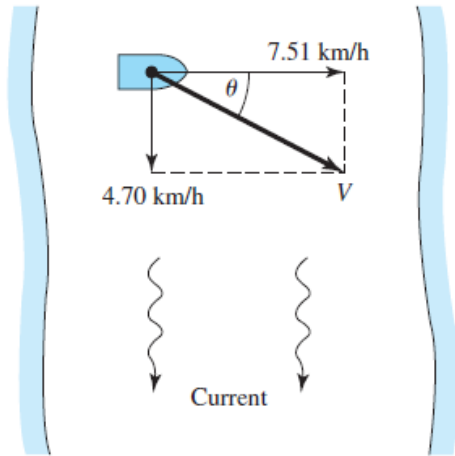

W = 386 lb

27.4°

(a)

F

T

N

W
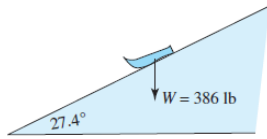
(b)

6. A river flows at the rate of 4.70 km/h. A rower, who can travel 7.51 km/h in still water, heads directly across the current. That is, the boat remains pointed perpendicular to the current while being carried downstream by it. Find the actual rate and direction of travel of the boat. The figure below will help you answer this question.

7. An instrument plane flies north at the rate of 650kn, and a hurricane hunter flies east at 1100kn. If both planes start from the same place at the same time, how far apart will they be in 2 hours? (One knot equals one nautical mile per hour)

8. The top of an antenna tower is 40 m above the ground. The tower is to be guyed at a point 6 m below it's top to a point on the ground 18 m from the base of the tower. What is the length of the guy wire?

9. A solar panel installer is working on a solar array for a customer. He knows that the panels need to be at an angle of 42° (parallel to the ground) for optimal efficiency. The panels are 66 inches lengthwise (hypotenuse). At what length does the back bracket for the panels need to be at to get the 42° angle?

10. A vector has a magnitude of 154 and makes an angle of 48.70 with the horizontal. Find the vector's horizontal and vertical components.

11. Convert the following

   a. $\dfrac{5\pi}{6}$ rad → degrees

   b. $\dfrac{2\pi}{9}$ rad → degrees

   c. 210° → radians

   d. 150° → radians