Setting Up Word Problems

Basic Formulas

- Circles

  The Area of a Circle: $A = \pi r^2$

  The Circumference of a Circle: $C = 2\pi r$

  The Area of a Sector: $A = \frac{1}{2} r^2 \theta$

  The Length of an Arc: $s = r\theta$

- Right Triangles

  The Pythagorean Theorem: $a^2 + b^2 = c^2$

- All Triangles

  The Law of Sines: $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

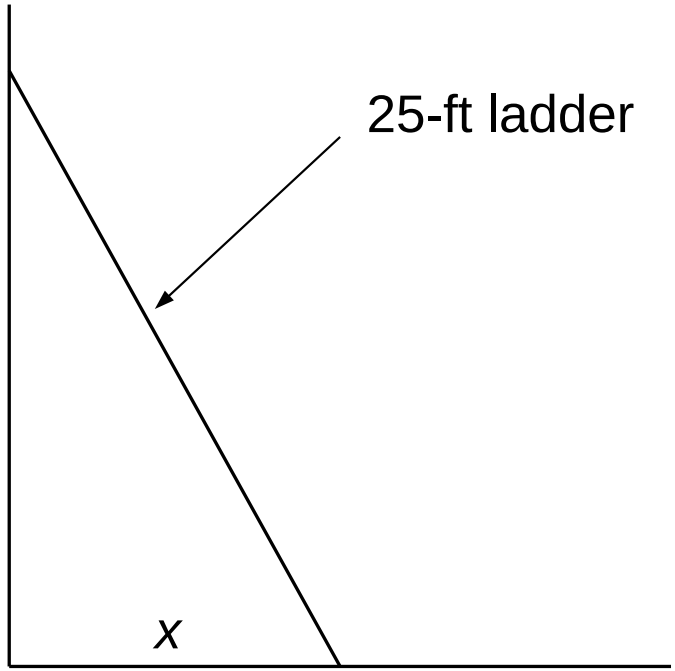
  The Law of Cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

Example 1

Example (Page 89, Exercise 62.)

A 25-foot ladder is leaning against a house. Let x be the distance between the base of the ladder and the house and let y be the distance between the top of the ladder and the ground. Write an equation relating x and y.

Example 1

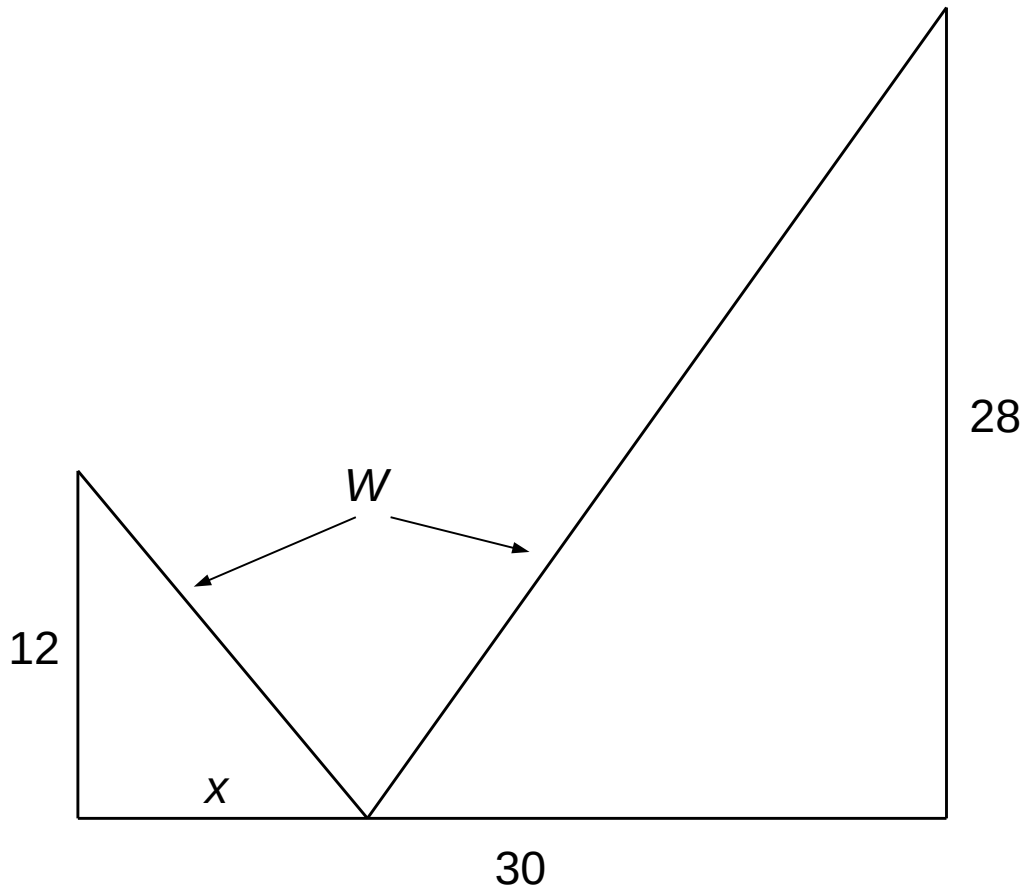


Example 2

Example (Page 221, Example 4.)

Two posts, one 12 feet high and the other 28 feet high, stand 30 feet apart. They are to be stayed by two wires, attached to a single stake, running from ground level to the top of each post. Let x be the distance between the stake and the 12-foot post and let W be the total length of wire. Write an equation relating x and W.

Example 2

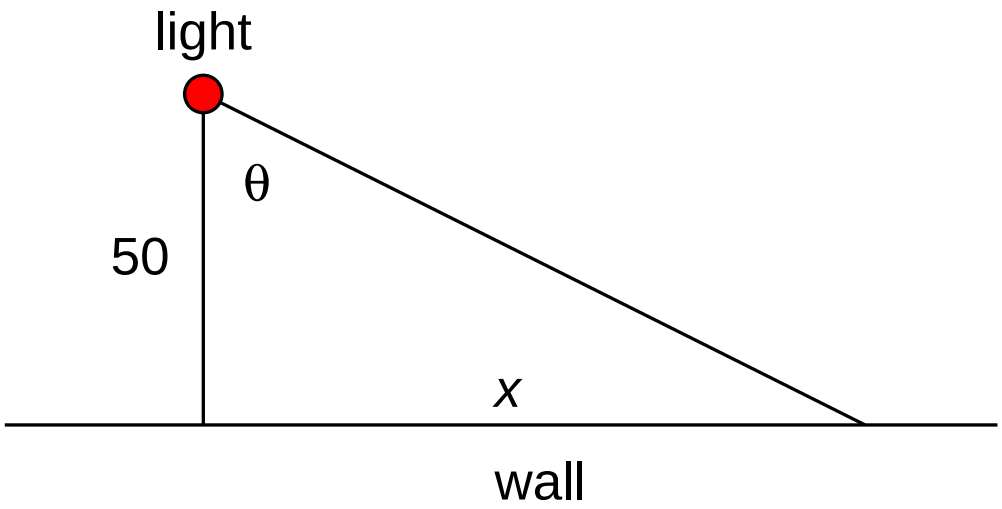


Example 3

Example (Page 89, Exercise 59.)

A patrol car is parked 50 feet from a long warehouse. Let θ be the angle between the perpendicular to the warehouse wall and the direction in which the patrol car's revolving light is shining. Let x be the distance from the point on the wall nearest the patrol car to the point on the wall where the light is shining. Write an equation relating θ and x.

Example 3

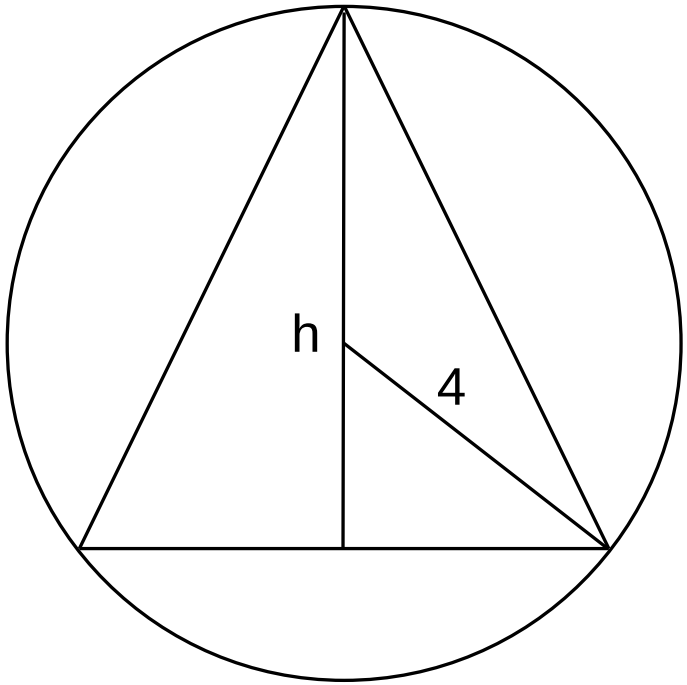


Example 4

Example (Page 224, Exercise 26.)

An isosceles triangle is inscribed in a circle of radius 4. Let h be the height of the triangle. Express the area of the triangle in terms of the h.

Example 4

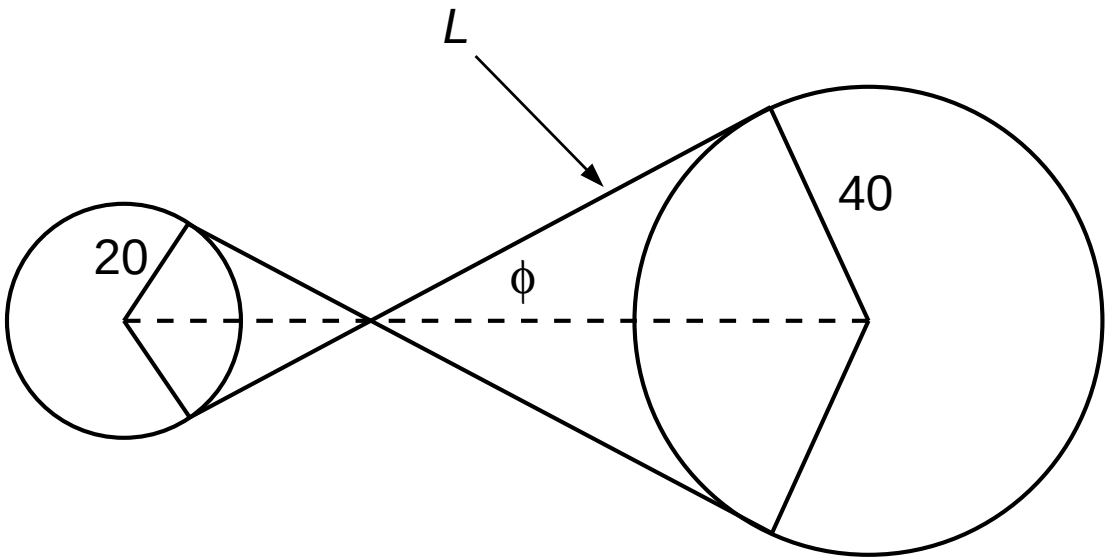


Example 5

Example (Page 90, Exercise 66.)

A crossed belt connects a 20-cm pulley on an electric motor with a 40-cm pulley on a saw arbor. (See figure on p. 90.) Let ϕ be the angle between the belt and the line connecting the centers of the pulleys. Let L be the total length of the belt. Write a formula expressing L as a function of ϕ.

Example 5



Example 6

Example (Page 224, Exercise 26.)

An isosceles triangle is inscribed in a circle of radius 4. Let α be half the top angle (not a base angle). Express the area of the triangle in terms of α.

Example 6