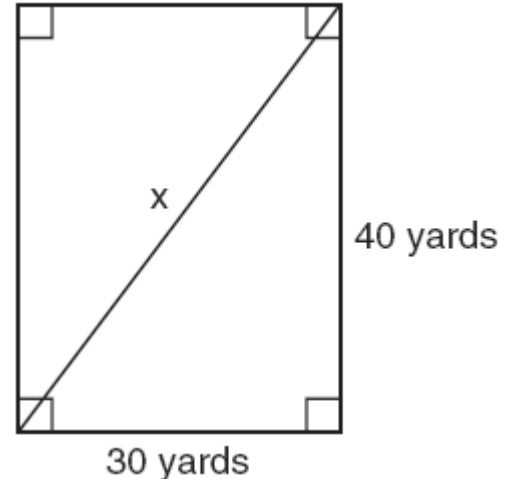


Section 8-1: The Pythagorean Theorem

1. 060009a, P.I. G.G.48
The set of integers $\{3,4,5\}$ is a Pythagorean triple. Another such set is
[A] $\{8,15,17\}$ [B] $\{6,8,12\}$
[C] $\{6,7,8\}$ [D] $\{6,12,13\}$
2. 010827a, P.I. G.G.48
Which set of numbers could be the lengths of the sides of a right triangle?
[A] $\{10,24,26\}$ [B] $\{4,7,8\}$
[C] $\{12,16,30\}$ [D] $\{3,4,6\}$
3. 010615a, P.I. G.G.48
A builder is building a rectangular deck with dimensions of 16 feet by 30 feet. To ensure that the sides form 90° angles, what should each diagonal measure?
[A] 30 ft [B] 46 ft [C] 34 ft [D] 16 ft
4. 010202a, P.I. A.A.45
If the length of the legs of a right triangle are 5 and 7, what is the length of the hypotenuse?
[A] $2\sqrt{3}$ [B] $2\sqrt{6}$
[C] $\sqrt{2}$ [D] $\sqrt{74}$
5. 060710a, P.I. A.A.45
If the length of a rectangular television screen is 20 inches and its height is 15 inches, what is the length of its diagonal, in inches?
[A] 13.2 [B] 5 [C] 25 [D] 35

6. fall0711ia, P.I. A.A.45

Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.



What is the length of the diagonal, in yards, that Tanya runs?

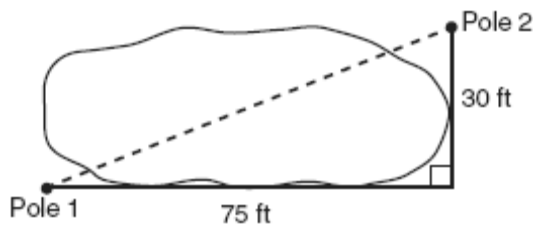
- [A] 50 [B] 70 [C] 60 [D] 80

7. 010736a, P.I. G.G.48

The perimeter of a square is 56. Express the length of a diagonal of the square in simplest radical form.

8. 010508a, P.I. A.A.45

The NuFone Communications Company must run a telephone line between two poles at opposite ends of a lake, as shown in the accompanying diagram. The length and width of the lake are 75 feet and 30 feet, respectively.

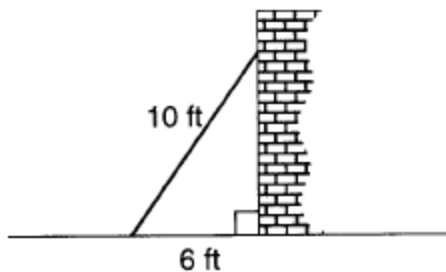


What is the distance between the two poles, to the nearest foot?

[A] 69 [B] 105 [C] 81 [D] 45

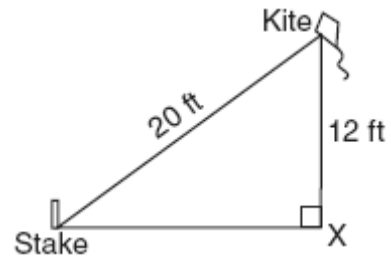
9. 010023a, P.I. A.A.45

A wall is supported by a brace 10 feet long, as shown in the diagram below. If one end of the brace is placed 6 feet from the base of the wall, how many feet up the wall does the brace reach?



10. 080531a, P.I. A.A.45

The accompanying diagram shows a kite that has been secured to a stake in the ground with a 20-foot string. The kite is located 12 feet from the ground, directly over point X. What is the distance, in feet, between the stake and point X?



11. 080122a, P.I. A.A.45

How many feet from the base of a house must a 39-foot ladder be placed so that the top of the ladder will reach a point on the house 36 feet from the ground?

12. 060115a, P.I. A.A.45

A woman has a ladder that is 13 feet long. If she sets the base of the ladder on level ground 5 feet from the side of a house, how many feet above the ground will the top of the ladder be when it rests against the house?

[A] 8 [B] 9 [C] 12 [D] 11

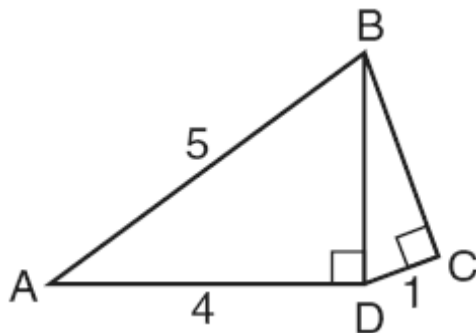
13. 080707a, P.I. A.A.45

A cable 20 feet long connects the top of a flagpole to a point on the ground that is 16 feet from the base of the pole. How tall is the flagpole?

[A] 12 ft [B] 26 ft [C] 8 ft [D] 10 ft

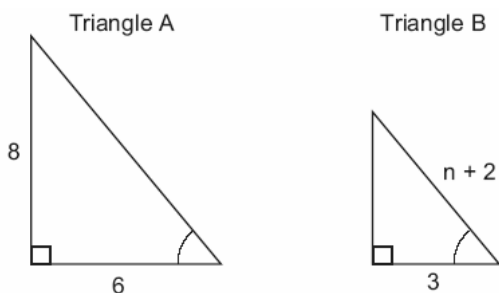
14. 080633a, P.I. A.A.45

In the accompanying diagram of right triangles ABD and DBC , $AB = 5$, $AD = 4$, and $CD = 1$. Find the length of \overline{BC} , to the nearest tenth.



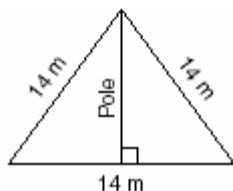
15. 060230a, P.I. G.G.48

In the accompanying diagram, triangle A is similar to triangle B. Find the value of n .



16. 080504b, P.I. G.G.48

The accompanying diagram shows two cables of equal length supporting a pole. Both cables are 14 meters long, and they are anchored to points in the ground that are 14 meters apart.

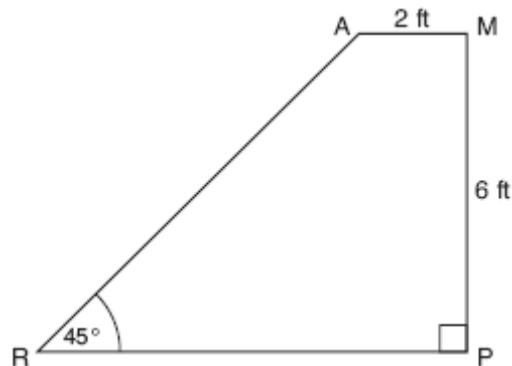


What is the exact height of the pole, in meters?

- [A] $7\sqrt{3}$ [B] 14 [C] 7 [D] $7\sqrt{2}$

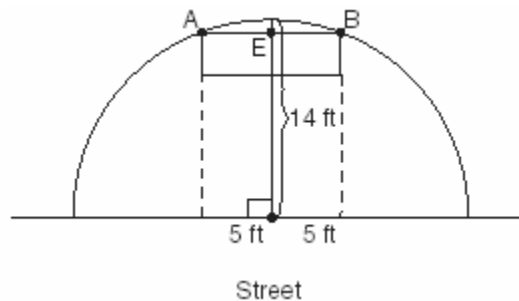
17. 080726b, P.I. G.G.48

The accompanying diagram shows ramp \overline{RA} leading to level platform \overline{AM} , forming an angle of 45° with level ground. If platform \overline{AM} measures 2 feet and is 6 feet above the ground, explain why the exact length of ramp \overline{RA} is $6\sqrt{2}$ feet.



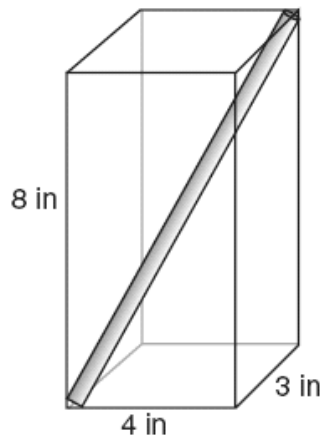
18. 080124b P.I. G.G.48

The accompanying diagram shows a semicircular arch over a street that has a radius of 14 feet. A banner is attached to the arch at points A and B, such that $AE = EB = 5$ feet. How many feet above the ground are these points of attachment for the banner?



19. 060334a, G.G.48

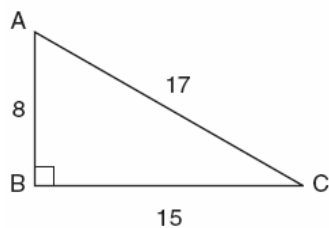
A straw is placed into a rectangular box that is 3 inches by 4 inches by 8 inches, as shown in the accompanying diagram. If the straw fits exactly into the box diagonally from the bottom left front corner to the top right back corner, how long is the straw, to the *nearest tenth of an inch*?



Section 8-2: The Tangent Ratio

20. 010316a, P.I. A.A.42

In the accompanying diagram of right triangle ABC , $AB = 8$, $BC = 15$, $AC = 17$, and $m\angle ABC = 90^\circ$.



What is $\tan \angle C$?

- [A] $\frac{15}{17}$ [B] $\frac{8}{17}$ [C] $\frac{17}{15}$ [D] $\frac{8}{15}$

Section 8-4: The Sine and Cosine Ratios

The Sine Ratio

21. fall0721ia, P.I. A.A.42

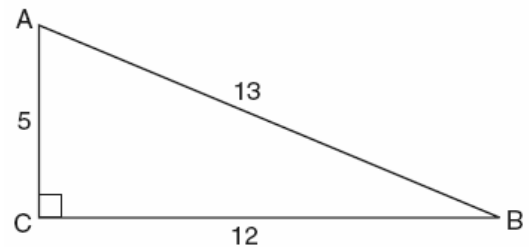
In triangle MCT , the measure of $\angle T = 90^\circ$, $MC = 85$ cm, $CT = 84$ cm, and $TM = 13$ cm. Which ratio represents the sine of $\angle C$?

- [A] $\frac{13}{85}$ [B] $\frac{84}{85}$ [C] $\frac{13}{84}$ [D] $\frac{84}{13}$

The Cosine Ratio

22. 080414a, P.I. A.A.42

Which ratio represents $\cos A$ in the accompanying diagram of $\triangle ABC$?



- [A] $\frac{12}{13}$ [B] $\frac{13}{5}$ [C] $\frac{12}{5}$ [D] $\frac{5}{13}$

Section 8-6: Solving Problems Using Trigonometric Ratios

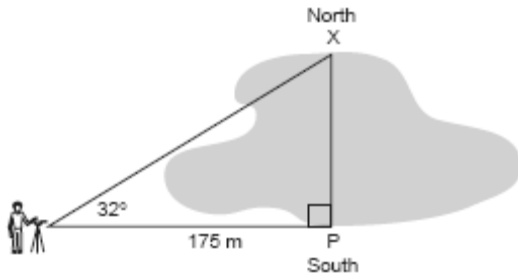
23. 060419a, P.I. A.A.44

The angle of elevation from a point 25 feet from the base of a tree on level ground to the top of the tree is 30° . Which equation can be used to find the height of the tree?

- [A] $\tan 30^\circ = \frac{x}{25}$ [B] $\sin 30^\circ = \frac{x}{25}$
[C] $30^2 + 25^2 = x^2$ [D] $\cos 30^\circ = \frac{x}{25}$

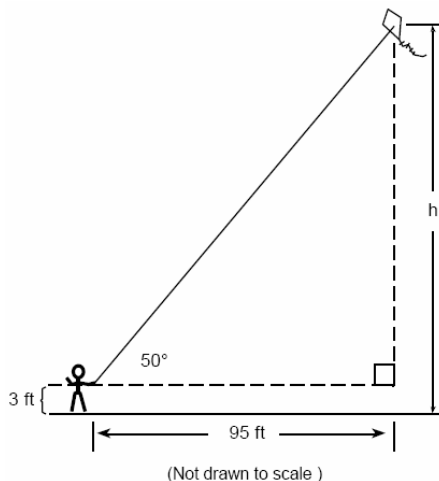
24. 060030a, P.I. A.A.44

A surveyor needs to determine the distance across the pond shown in the accompanying diagram. She determines that the distance from her position to point P on the south shore of the pond is 175 meters and the angle from her position to point X on the north shore is 32° . Determine the distance, PX , across the pond, rounded to the *nearest meter*.



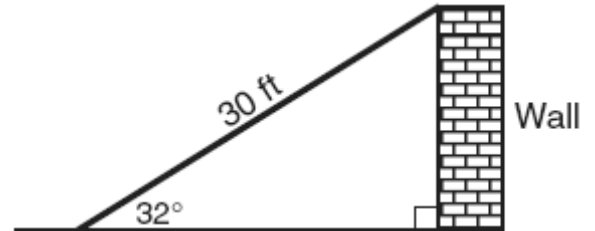
25. 069934a, P.I. A.A.44

Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is 50° , find the height, h , of his kite, to the *nearest foot*.



26. 080724a, P.I. A.A.44

The accompanying diagram shows a ramp 30 feet long leaning against a wall at a construction site.

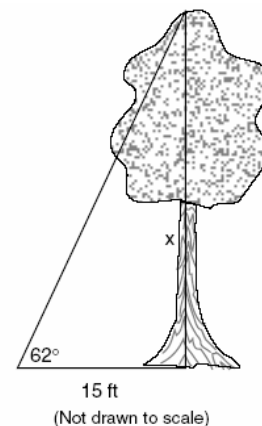


If the ramp forms an angle of 32° with the ground, how high above the ground, to the *nearest tenth*, is the top of the ramp?

- [A] 18.7 ft [B] 15.9 ft
[C] 56.6 ft [D] 25.4 ft

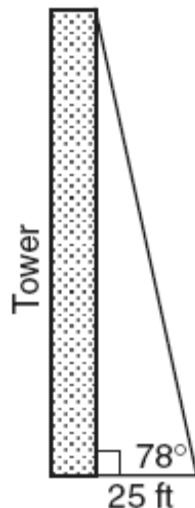
27. 010135a, P.I. A.A.44

Find, to the *nearest tenth of a foot*, the height of the tree represented in the accompanying diagram.



28. 010735a, P.I. A.A.44

From a point on level ground 25 feet from the base of a tower, the angle of elevation to the top of the tower is 78° , as shown in the accompanying diagram. Find the height of the tower, to the *nearest tenth of a foot*.



29. 010531a, P.I. A.A.44

In the accompanying diagram, a ladder leaning against a building makes an angle of 58° with level ground. If the distance from the foot of the ladder to the building is 6 feet, find, to the *nearest foot*, how far up the building the ladder will reach.



30. 080536a, P.I. A.A.44

A tree casts a shadow that is 20 feet long. The angle of elevation from the end of the shadow to the top of the tree is 66° . Determine the height of the tree, to the *nearest foot*.

31. 010235a, P.I. A.A.44

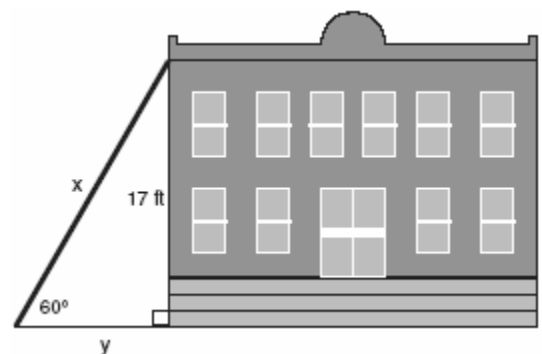
Draw and label a diagram of the path of an airplane climbing at an angle of 11° with the ground. Find, to the *nearest foot*, the ground distance the airplane has traveled when it has attained an altitude of 400 feet.

32. 080033a, P.I. A.A.44

A 10-foot ladder is to be placed against the side of a building. The base of the ladder must be placed at an angle of 72° with the level ground for a secure footing. Find, to the *nearest inch*, how far the base of the ladder should be from the side of the building and how far up the side of the building the ladder will reach.

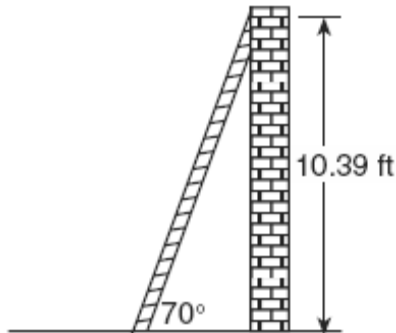
33. 080231a, P.I. A.A.44

In the accompanying diagram, x represents the length of a ladder that is leaning against a wall of a building, and y represents the distance from the foot of the ladder to the base of the wall. The ladder makes a 60° angle with the ground and reaches a point on the wall 17 feet above the ground. Find the number of feet in x and y .



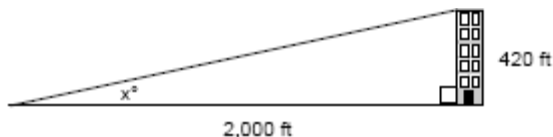
34. 010638a, P.I. A.A.44

As shown in the accompanying diagram, a ladder is leaning against a vertical wall, making an angle of 70° with the ground and reaching a height of 10.39 feet on the wall. Find, to the *nearest foot*, the length of the ladder. Find, to the *nearest foot*, the distance from the base of the ladder to the wall.



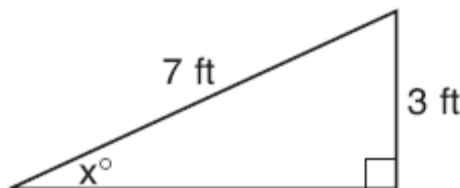
35. 089927a, P.I. A.A.43

A person standing on level ground is 2,000 feet away from the foot of a 420-foot-tall building, as shown in the accompanying diagram. To the *nearest degree*, what is the value of x ?



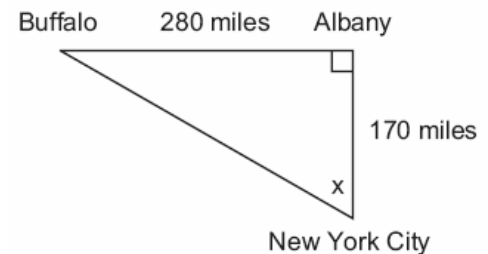
36. 060735a, P.I. A.A.43

Ron and Francine are building a ramp for performing skateboard stunts, as shown in the accompanying diagram. The ramp is 7 feet long and 3 feet high. What is the measure of the angle, x , that the ramp makes with the ground, to the *nearest tenth of a degree*?



37. 060231a, P.I. A.A.43, G.G.48

As seen in the accompanying diagram, a person can travel from New York City to Buffalo by going north 170 miles to Albany and then west 280 miles to Buffalo.

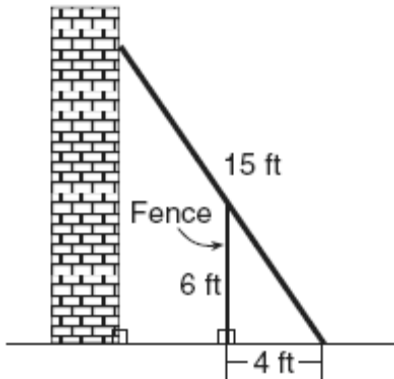


a If an engineer wants to design a highway to connect New York City directly to Buffalo, at what angle, x , would she need to build the highway? Find the angle to the *nearest degree*.

b To the *nearest mile*, how many miles would be saved by traveling directly from New York City to Buffalo rather than by traveling first to Albany and then to Buffalo?

38. 010438a, P.I. A.A.43

In the accompanying diagram, the base of a 15-foot ladder rests on the ground 4 feet from a 6-foot fence.

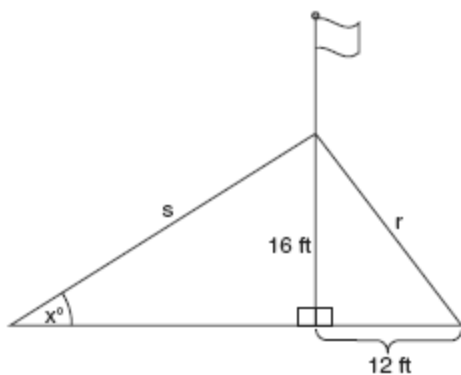


a If the ladder touches the top of the fence and the side of a building, what angle, to the nearest degree, does the ladder make with the ground?

b Using the angle found in part *a*, determine how far the top of the ladder reaches up the side of the building, to the nearest foot.

39. 060539a, P.I. A.A.43

The accompanying diagram shows a flagpole that stands on level ground. Two cables, r and s , are attached to the pole at a point 16 feet above the ground. The combined length of the two cables is 50 feet. If cable r is attached to the ground 12 feet from the base of the pole, what is the measure of the angle, x , to the nearest degree, that cable s makes with the ground?



40. 080133a, P.I. A.A.44

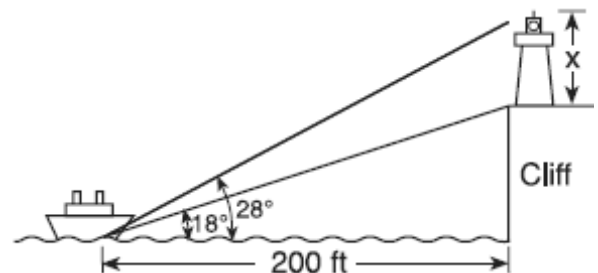
A ship on the ocean surface detects a sunken ship on the ocean floor at an angle of depression of 50° . The distance between the ship on the surface and the sunken ship on the ocean floor is 200 meters. If the ocean floor is level in this area, how far above the ocean floor, to the nearest meter, is the ship on the surface?

41. 060639a, P.I. A.A.44

A person measures the angle of depression from the top of a wall to a point on the ground. The point is located on level ground 62 feet from the base of the wall and the angle of depression is 52° . How high is the wall, to the nearest tenth of a foot?

42. 010838a, P.I. A.A.44

A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28° . What is the height of the lighthouse, x , to the nearest tenth of a foot?



43. 080108b, P.I. A.A.44

At Mogul's Ski Resort, the beginner's slope is inclined at an angle of 12.3° , while the advanced slope is inclined at an angle of 26.4° . If Rudy skis 1,000 meters down the advanced slope while Valerie skis the same distance on the beginner's slope, how much longer was the horizontal distance that Valerie covered?

[A] 895.7 m

[B] 977.0 m

[C] 81.3 m

[D] 231.6 m