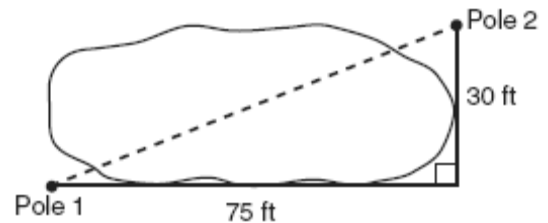


Lesson 3-9: The Pythagorean Theorem

Part 1: Solving Problems Using 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] $\{6,7,8\}$ [B] $\{6,8,12\}$
[C] $\{8,15,17\}$ [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] $\{4,7,8\}$ [B] $\{12,16,30\}$
[C] $\{3,4,6\}$ [D] $\{10,24,26\}$
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] 34 ft [C] 46 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] $\sqrt{2}$ [B] $\sqrt{74}$
[C] $2\sqrt{6}$ [D] $2\sqrt{3}$
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] 35 [B] 13.2 [C] 25 [D] 5

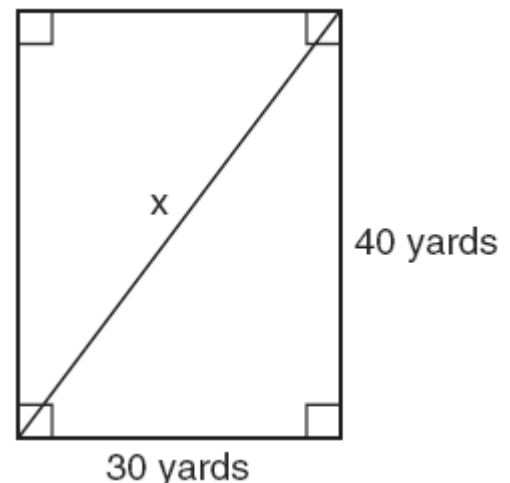
6. 010508a, P.I. A.A.45
The NuFone Communications Company must run a telephone line between two poles at opposite ends of a lake, as shown in the accompanying diagram. The length and width of the lake are 75 feet and 30 feet, respectively.



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

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

7. 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.

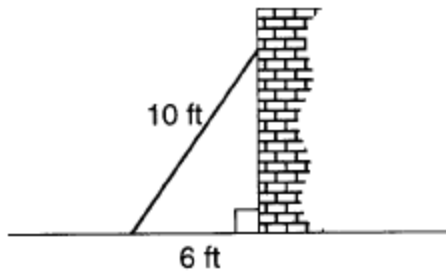


What is the length of the diagonal, in yards, that Tanya runs?

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

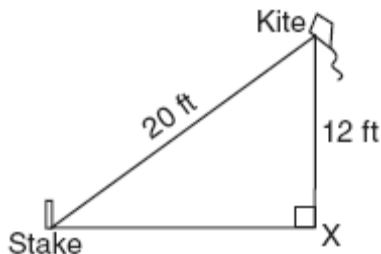
8. 010023a, P.I. A.A.45

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?



9. 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?



10. 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?

11. 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] 11 [D] 12

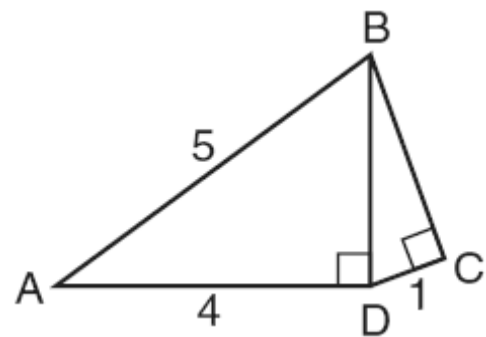
12. 080707a, P.I. A.A.45

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

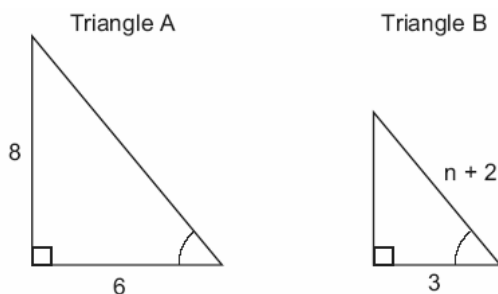
13. 080633a, P.I. A.A.45

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.



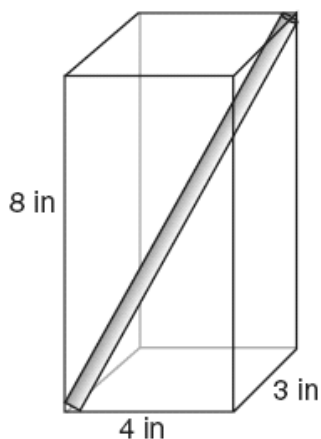
14. 060230a, P.I. G.G.48

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



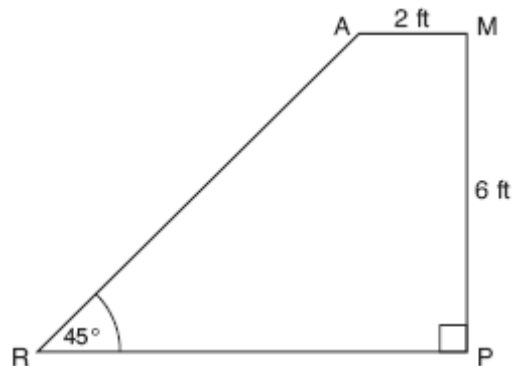
15. 060334a, G.G.48

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*?



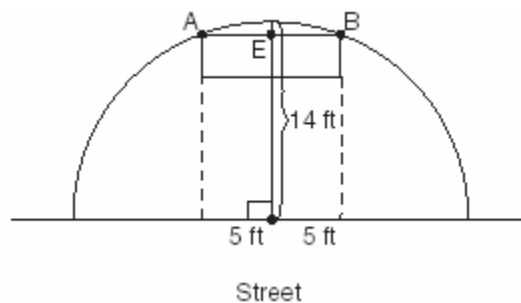
16. 080726b, P.I. G.G.48

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.



17. 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?



[1] C

[2] D

[3] B

[4] B

[5] C

[6] C

[7] D

[2] 8 and the use of trigonometry, the Pythagorean theorem, or Pythagorean triple is shown.

[1] The Pythagorean theorem or trigonometry is used, but a computational mistake is made or substitution is incorrect, such as

$$6^2 = 10^2 + x^2.$$

[1] 8 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[2] 16, and appropriate work is shown, such as the Pythagorean theorem, the Pythagorean triple, or trigonometry.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

or [1] 16, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[9] incorrect procedure.

[2] 15, and appropriate work is shown, such as using the Pythagorean theorem, Pythagorean triples, or trigonometric functions.

[1] The data are substituted incorrectly, but an appropriate answer is found and is rounded correctly.

or [1] Appropriate work is shown, but one or more computational errors are made.

or [1] 15, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[10] incorrect procedure.

[11] D

[12] C

[2] 2.8, and appropriate work is shown, such as $3^2 = 1^2 + (BC)^2$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The length of \overline{BD} is found to be 3, but no further correct work is shown.

or [1] 2.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[13] incorrect procedure.

[3] 3, and appropriate work is shown, such as using a 3:4:5 right triangle, correct proportions, or the Pythagorean theorem with a proportion.

[2] Appropriate work is shown, and the value of the side is determined to be 5, but $n = 3$ is not found.

[1] A correct proportion is set up, but no answer or an incorrect answer is found.

or [1] 3, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

- [4] 9.4, and appropriate work is shown, such as the use of the Pythagorean theorem.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but more than one computational or rounding error is made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An incorrect diagonal of the base is found, but an appropriate solution is found.
or [2] Only the diagonal of the base is found correctly, but appropriate work is shown, such as $3^2 + 4^2 = d^2$ or use of 3–4–5 right triangles.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The Pythagorean theorem is used to find the length of the straw, but the appropriate legs are not used.
or [1] 9.4, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [15]

- [2] An appropriate explanation is written, such as defining special isosceles right triangles, or appropriate work is shown, such as using legs of six and finding the hypotenuse.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [16]

- [2] $\sqrt{171}$ or 13 or 13.1 or 13.08 or an equivalent answer, and appropriate work is shown, such as the use of the equation of a circle ($x^2 + y^2 = r^2$) or the Pythagorean theorem.
[1] Appropriate work is shown, but one computational error is made.
or [1] Incorrect analysis is shown, such as $x = 5$ and $y = 14$, but the work is concluded appropriately.
or [1] A correct answer is found, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [17]