

Looking Ahead

Your review of the Pythagorean Theorem will be helpful in determining the equation for a circle given its center and a point on the circle. Recall that all the points on a circle lie at a specific distance from its center. This distance is the radius r of the circle.

Example Preview

Find the standard form of the equation for the circle with the following properties.

Center $(11,2)$, passes through $(2,-10)$

Solution

The standard form of the equation for a circle is

$$(x - h)^2 + (y - k)^2 = r^2$$

where the center is (h,k) and the radius has length r . Since every point on a circle is the same distance r from the circle's center, we can conclude that the radius r equals the distance from the center, $(11,2)$, to the point given in the problem, $(2,-10)$. We use the distance formula to find this value.

$$\begin{aligned} r &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(2 - (11))^2 + (-10 - (2))^2} \\ &= \sqrt{81 + 144} \\ &= 15 \end{aligned}$$

Now we substitute this and the values given in the problem and simplify to obtain the following equation.

$$\begin{aligned} (x - 11)^2 + (y - 2)^2 &= (15)^2 \\ (x - 11)^2 + (y - 2)^2 &= 225 \end{aligned}$$

2.R.2 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- 49 is a perfect square.
- In the expression $\sqrt{81}$, the number 9 is the radicand.

3. The Pythagorean Theorem can be used to find the length of the longest side of a right triangle if the lengths of the two legs are known.
4. The Pythagorean Theorem works for any type of triangle.

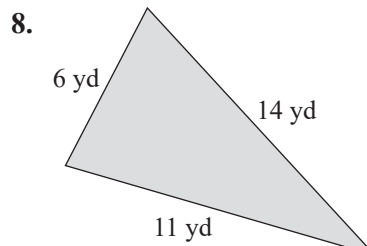
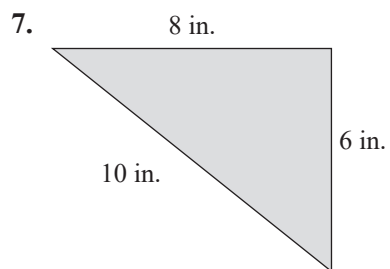
Practice

Evaluate each expression.

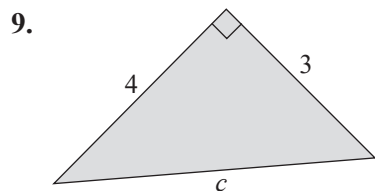
5. $\sqrt{36}$

6. $\sqrt{225}$

Use the Pythagorean Theorem to determine whether or not each triangle is a right triangle.



Find the hypotenuse for each right triangle accurate to the nearest hundredth.

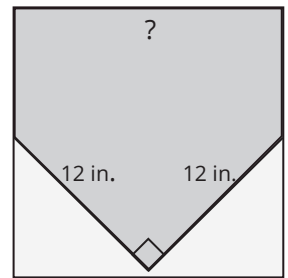


Applications

Solve.

10. **Safety:** The base of a fire engine ladder is 30 feet from a building and reaches to a third floor window 50 feet above ground level. Find the length of the ladder to the nearest hundredth of a foot.

11. **Baseball:** The shape of home plate in the game of baseball can be created by cutting off two triangular pieces at the corners of a square, as shown in the figure. If each of the triangular pieces has a hypotenuse of 12 inches and legs of equal length, what is the length of one side of the original square, to the nearest tenth of an inch?



Writing & Thinking

12. Explain the connection between a perfect square and its square root. Give an example.