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.

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

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

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

3.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.)

1. 49 is a perfect square.

2. 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

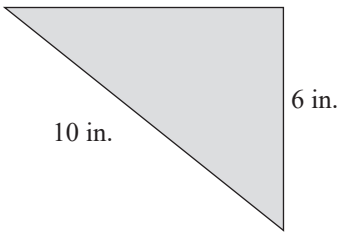
Evaluate each expression.

5. $\sqrt{36}$

6. $\sqrt{225}$

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

7.



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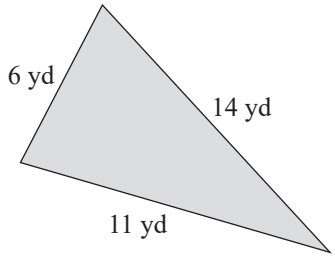
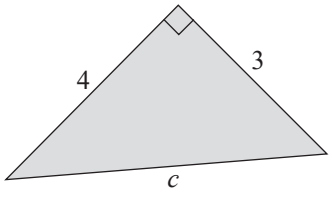


Find the hypotenuse for each right triangle accurate to the nearest hundredth.

9.

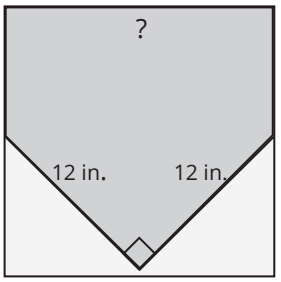


Applications

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.