9 Chapter Review

Dynamic Solutions available at *BigIdeasMath.com*

9.1 Properties of Radicals *(pp. 479–488)*

a. Simplify $\sqrt[3]{27x^{10}}$.

$\sqrt[3]{27x^{10}} = \sqrt[3]{27 \cdot x^9 \cdot x}$ Factor using the greatest perfect cube factors.

$= \sqrt[3]{27} \cdot \sqrt[3]{x^9} \cdot \sqrt[3]{x}$ Product Property of Cube Roots

$= 3x^3\sqrt[3]{x}$ Simplify.

b. Simplify $\dfrac{12}{3 + \sqrt{5}}$.

$\dfrac{12}{3 + \sqrt{5}} = \dfrac{12}{3 + \sqrt{5}} \cdot \dfrac{3 - \sqrt{5}}{3 - \sqrt{5}}$ The conjugate of $3 + \sqrt{5}$ is $3 - \sqrt{5}$.

$= \dfrac{12(3 - \sqrt{5})}{3^2 - (\sqrt{5})^2}$ Sum and difference pattern

$= \dfrac{36 - 12\sqrt{5}}{4}$ Simplify.

$= 9 - 3\sqrt{5}$ Simplify.

Simplify the expression.

1. $\sqrt{72p^7}$ **2.** $\sqrt{\dfrac{45}{7y}}$ **3.** $\sqrt[3]{\dfrac{125x^{11}}{4}}$ **4.** $\dfrac{8}{\sqrt{6} + 2}$

5. $4\sqrt{3} + 5\sqrt{12}$ **6.** $15\sqrt[3]{2} - 2\sqrt[3]{54}$ **7.** $(3\sqrt{7} + 5)^2$ **8.** $\sqrt{6}(\sqrt{18} + \sqrt{8})$

9.2 Solving Quadratic Equations by Graphing *(pp. 489–496)*

Solve $x^2 + 3x = 4$ by graphing.

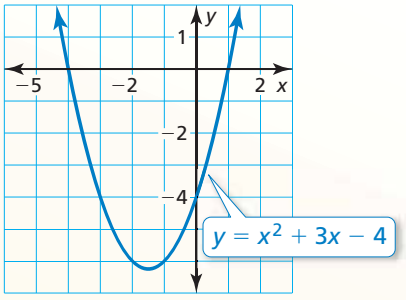
Step 1 Write the equation in standard form.

$x^2 + 3x = 4$ Write original equation.

$x^2 + 3x - 4 = 0$ Subtract 4 from each side.

Step 2 Graph the related function $y = x^2 + 3x - 4$.

Step 3 Find the x-intercepts. The x-intercepts are -4 and 1.



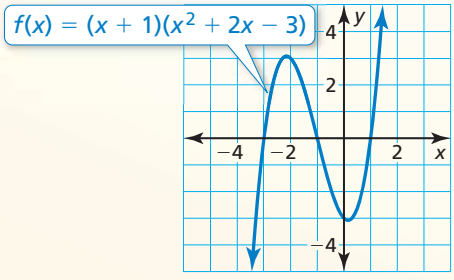
▶ So, the solutions are $x = -4$ and $x = 1$.

Solve the equation by graphing.

9. $x^2 - 9x + 18 = 0$ **10.** $x^2 - 2x = -4$

11. $-8x - 16 = x^2$

12. The graph of $f(x) = (x + 1)(x^2 + 2x - 3)$ is shown. Find the zeros of f.

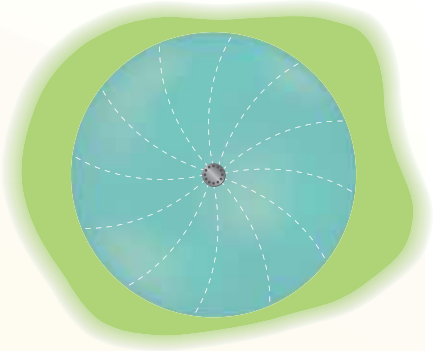


13. Graph $f(x) = x^2 + 2x - 5$. Approximate the zeros of f to the nearest tenth.

9.3 Solving Quadratic Equations Using Square Roots *(pp. 497–502)*

A sprinkler sprays water that covers a circular region of 90π square feet. Find the diameter of the circle.

Write an equation using the formula for the area of a circle.



$$A = \pi r^2 \qquad \text{Write the formula.}$$
$$90\pi = \pi r^2 \qquad \text{Substitute } 90\pi \text{ for } A.$$
$$90 = r^2 \qquad \text{Divide each side by } \pi.$$
$$\pm\sqrt{90} = r \qquad \text{Take the square root of each side.}$$
$$\pm 3\sqrt{10} = r \qquad \text{Simplify.}$$

A diameter cannot be negative, so use the positive square root. The diameter is twice the radius. So, the diameter is $6\sqrt{10}$.

▶ The diameter of the circle is $6\sqrt{10} \approx 19$ feet.

Solve the equation using square roots. Round your solutions to the nearest hundredth, if necessary.

14. $x^2 + 5 = 17$ **15.** $x^2 - 14 = -14$ **16.** $(x + 2)^2 = 64$

17. $4x^2 + 25 = -75$ **18.** $(x - 1)^2 = 0$ **19.** $19 = 30 - 5x^2$

9.4 Solving Quadratic Equations by Completing the Square *(pp. 505–514)*

Solve $x^2 - 6x + 4 = 11$ by completing the square.

$$x^2 - 6x + 4 = 11 \qquad \text{Write the equation.}$$
$$x^2 - 6x = 7 \qquad \text{Subtract 4 from each side.}$$
$$x^2 - 6x + (-3)^2 = 7 + (-3)^2 \qquad \text{Complete the square by adding } \left(\tfrac{-6}{2}\right)^2, \text{ or } (-3)^2, \text{ to each side.}$$
$$(x - 3)^2 = 16 \qquad \text{Write the left side as the square of a binomial.}$$
$$x - 3 = \pm 4 \qquad \text{Take the square root of each side.}$$
$$x = 3 \pm 4 \qquad \text{Add 3 to each side.}$$

▶ The solutions are $x = 3 + 4 = 7$ and $x = 3 - 4 = -1$.

Solve the equation by completing the square. Round your solutions to the nearest hundredth, if necessary.

20. $x^2 + 6x - 40 = 0$ **21.** $x^2 + 2x + 5 = 4$ **22.** $2x^2 - 4x = 10$

Determine whether the quadratic function has a maximum or minimum value. Then find the value.

23. $y = -x^2 + 6x - 1$ **24.** $f(x) = x^2 + 4x + 11$ **25.** $y = 3x^2 - 24x + 15$

26. The width w of a credit card is 3 centimeters shorter than the length ℓ. The area is 46.75 square centimeters. Find the perimeter.