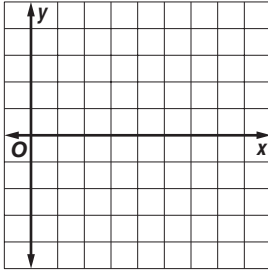


# 7-3 Skills Practice

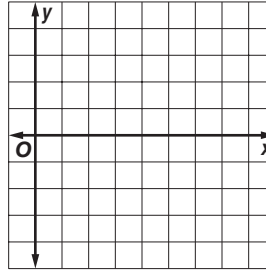
## Square Root Functions and Inequalities

Graph each function. State the domain and range of each function.

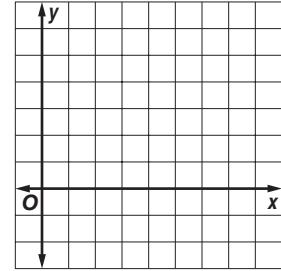
1.  $y = \sqrt{2x}$



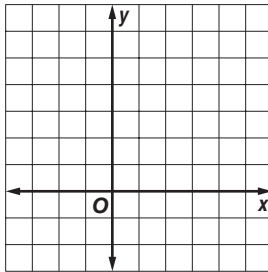
2.  $y = -\sqrt{3x}$



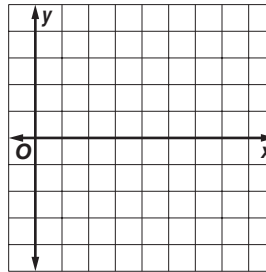
3.  $y = 2\sqrt{x}$



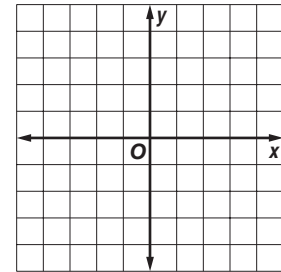
4.  $y = \sqrt{x + 3}$



5.  $y = -\sqrt{2x - 5}$



6.  $y = \sqrt{x + 4} - 2$



**7-4 Skills Practice*****n*th Roots**

Use a calculator to approximate each value to three decimal places.

1.  $\sqrt{230}$

2.  $\sqrt{38}$

3.  $-\sqrt{152}$

4.  $\sqrt{5.6}$

5.  $\sqrt[3]{88}$

6.  $\sqrt[3]{-222}$

7.  $-\sqrt[4]{0.34}$

8.  $\sqrt[5]{500}$

**Simplify.**

9.  $\pm\sqrt{81}$

10.  $\sqrt{144}$

11.  $\sqrt{(-5)^2}$

12.  $\sqrt{-5^2}$

13.  $\sqrt{0.36}$

14.  $-\sqrt{\frac{4}{9}}$

15.  $\sqrt[3]{-8}$

16.  $-\sqrt[3]{27}$

17.  $\sqrt[3]{0.064}$

18.  $\sqrt[5]{32}$

19.  $\sqrt[4]{81}$

20.  $\sqrt{y^2}$

21.  $\sqrt[3]{125s^3}$

22.  $\sqrt{64x^6}$

23.  $\sqrt[3]{-27a^6}$

24.  $\sqrt{m^8n^4}$

25.  $-\sqrt{100p^4q^2}$

26.  $\sqrt[4]{16w^4v^8}$

27.  $\sqrt{(-3c)^4}$

28.  $\sqrt{(a + b)^2}$

**7-5 Skills Practice****Operations with Radical Expressions****Simplify.**

1.  $\sqrt{24}$

2.  $\sqrt{75}$

3.  $\sqrt[3]{16}$

4.  $-\sqrt[4]{48}$

5.  $4\sqrt{50x^5}$

6.  $\sqrt[4]{64a^4b^4}$

7.  $\sqrt[3]{-\frac{1}{8}d^2f^5}$

8.  $\sqrt{\frac{25}{36}s^2t}$

9.  $-\sqrt{\frac{3}{7}}$

10.  $\sqrt[3]{\frac{2}{9}}$

11.  $\sqrt{\frac{2g^3}{5z}}$

12.  $(3\sqrt{3})(5\sqrt{3})$

13.  $(4\sqrt{12})(3\sqrt{20})$

14.  $\sqrt{2} + \sqrt{8} + \sqrt{50}$

15.  $\sqrt{12} - 2\sqrt{3} + \sqrt{108}$

16.  $8\sqrt{5} - \sqrt{45} - \sqrt{80}$

17.  $2\sqrt{48} - \sqrt{75} - \sqrt{12}$

18.  $(2 + \sqrt{3})(6 - \sqrt{2})$

19.  $(1 - \sqrt{5})(1 + \sqrt{5})$

20.  $(3 - \sqrt{7})(5 + \sqrt{2})$

21.  $(\sqrt{2} - \sqrt{6})^2$

22.  $\frac{3}{7 - \sqrt{2}}$

23.  $\frac{4}{3 + \sqrt{2}}$

24.  $\frac{5}{8 - \sqrt{6}}$

**7-6 Skills Practice*****Rational Exponents***

Write each expression in radical form.

1.  $3^{\frac{1}{6}}$

2.  $8^{\frac{1}{5}}$

3.  $12^{\frac{2}{3}}$

4.  $(s^3)^{\frac{3}{5}}$

Write each radical using rational exponents.

5.  $\sqrt{51}$

6.  $\sqrt[3]{37}$

7.  $\sqrt[4]{15^3}$

8.  $\sqrt[3]{6xy^2}$

Evaluate each expression.

9.  $32^{\frac{1}{5}}$

10.  $81^{\frac{1}{4}}$

11.  $27^{-\frac{1}{3}}$

12.  $4^{-\frac{1}{2}}$

13.  $16^{\frac{3}{2}}$

14.  $(-243)^{\frac{4}{5}}$

15.  $27^{\frac{1}{3}} \cdot 27^{\frac{5}{3}}$

16.  $\left(\frac{4}{9}\right)^{\frac{3}{2}}$

Simplify each expression.

17.  $c^{\frac{12}{5}} \cdot c^{\frac{3}{5}}$

18.  $m^{\frac{2}{9}} \cdot m^{\frac{16}{9}}$

19.  $\left(q^{\frac{1}{2}}\right)^3$

20.  $p^{-\frac{1}{5}}$

21.  $x^{-\frac{6}{11}}$

22.  $\frac{x^{\frac{2}{3}}}{x^{\frac{1}{4}}}$

23.  $\frac{y^{-\frac{1}{2}}}{y^{\frac{1}{4}}}$

24.  $\frac{n^{\frac{1}{3}}}{n^{\frac{1}{6}} \cdot n^{\frac{1}{2}}}$

25.  $\sqrt[12]{64}$

26.  $\sqrt[8]{49a^8b^2}$

**7-7****Skills Practice*****Solving Radical Equations and Inequalities***

Solve each equation or inequality.

1.  $\sqrt{x} = 5$

2.  $\sqrt{x} + 3 = 7$

3.  $5\sqrt{j} = 1$

4.  $v^{\frac{1}{2}} + 1 = 0$

5.  $18 - 3y^{\frac{1}{2}} = 25$

6.  $\sqrt[3]{2w} = 4$

7.  $\sqrt{b - 5} = 4$

8.  $\sqrt{3n + 1} = 5$

9.  $\sqrt[3]{3r - 6} = 3$

10.  $2 + \sqrt{3p + 7} = 6$

11.  $\sqrt{k - 4} - 1 = 5$

12.  $(2d + 3)^{\frac{1}{3}} = 2$

13.  $(t - 3)^{\frac{1}{3}} = 2$

14.  $4 - (1 - 7u)^{\frac{1}{3}} = 0$

15.  $\sqrt{3z - 2} = \sqrt{z - 4}$

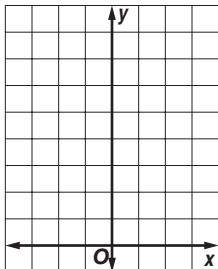
16.  $\sqrt{g + 1} = \sqrt{2g - 7}$

17.  $\sqrt{x - 1} = 4\sqrt{x + 1}$

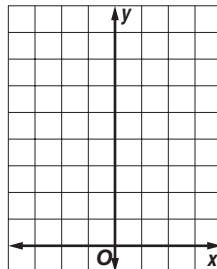
**9-1 Skills Practice****Exponential Functions**

Sketch the graph of each function. Then state the function's domain and range.

1.  $y = 3(2)^x$



2.  $y = 2\left(\frac{1}{2}\right)^x$



Determine whether each function represents exponential *growth* or *decay*.

3.  $y = 3(6)^x$

4.  $y = 2\left(\frac{9}{10}\right)^x$

5.  $y = 10^{-x}$

6.  $y = 2(2.5)^x$

Write an exponential function whose graph passes through the given points.

7. (0, 1) and (-1, 3)

8. (0, 4) and (1, 12)

9. (0, 3) and (-1, 6)

10. (0, 5) and (1, 15)

11. (0, 0.1) and (1, 0.5)

12. (0, 0.2) and (1, 1.6)

Simplify each expression.

13.  $(3^{\sqrt{3}})^{\sqrt{3}}$

14.  $(x^{\sqrt{2}})^{\sqrt{7}}$

15.  $5^{2\sqrt{3}} \cdot 5^{4\sqrt{3}}$

16.  $x^{3\pi} \div x^{\pi}$

Solve each equation or inequality. Check your solution.

17.  $3^x > 9$

18.  $2^{2x+3} = 32$

19.  $49^x \leq \frac{1}{7}$

20.  $4^{3x-2} = 16$

21.  $3^{2x+5} = 27^x$

22.  $27^x = 3^{2x+3}$

**9-2 Skills Practice****Logarithms and Logarithmic Functions****Write each equation in logarithmic form.**

1.  $2^3 = 8$

2.  $3^2 = 9$

3.  $8^{-2} = \frac{1}{64}$

4.  $\left(\frac{1}{3}\right)^2 = \frac{1}{9}$

**Write each equation in exponential form.**

5.  $\log_3 243 = 5$

6.  $\log_4 64 = 3$

7.  $\log_9 3 = \frac{1}{2}$

8.  $\log_5 \frac{1}{25} = -2$

**Evaluate each expression.**

9.  $\log_5 25$

10.  $\log_9 3$

11.  $\log_{10} 1000$

12.  $\log_{125} 5$

13.  $\log_4 \frac{1}{64}$

14.  $\log_5 \frac{1}{625}$

15.  $\log_8 8^3$

16.  $\log_{27} \frac{1}{3}$

**Solve each equation or inequality. Check your solutions.**

17.  $\log_3 x = 5$

18.  $\log_2 x = 3$

19.  $\log_4 y < 0$

20.  $\log_{\frac{1}{4}} x = 3$

21.  $\log_2 n > -2$

22.  $\log_b 3 = \frac{1}{2}$

23.  $\log_6 (4x + 12) = 2$

24.  $\log_2 (4x - 4) > 5$

25.  $\log_3 (x + 2) = \log_3 (3x)$

26.  $\log_6 (3y - 5) \geq \log_6 (2y + 3)$

**9-3****Skills Practice*****Properties of Logarithms***

Use  $\log_2 3 \approx 1.5850$  and  $\log_2 5 \approx 2.3219$  to approximate the value of each expression.

1.  $\log_2 25$

2.  $\log_2 27$

3.  $\log_2 \frac{3}{5}$

4.  $\log_2 \frac{5}{3}$

5.  $\log_2 15$

6.  $\log_2 45$

7.  $\log_2 75$

8.  $\log_2 0.6$

9.  $\log_2 \frac{1}{3}$

10.  $\log_2 \frac{9}{5}$

Solve each equation. Check your solutions.

11.  $\log_{10} 27 = 3 \log_{10} x$

12.  $3 \log_7 4 = 2 \log_7 b$

13.  $\log_4 5 + \log_4 x = \log_4 60$

14.  $\log_6 2c + \log_6 8 = \log_6 80$

15.  $\log_5 y - \log_5 8 = \log_5 1$

16.  $\log_2 q - \log_2 3 = \log_2 7$

17.  $\log_9 4 + 2 \log_9 5 = \log_9 w$

18.  $3 \log_8 2 - \log_8 4 = \log_8 b$

19.  $\log_{10} x + \log_{10} (3x - 5) = \log_{10} 2$

20.  $\log_4 x + \log_4 (2x - 3) = \log_4 2$

21.  $\log_3 d + \log_3 3 = 3$

22.  $\log_{10} y - \log_{10} (2 - y) = 0$

23.  $\log_2 s + 2 \log_2 5 = 0$

24.  $\log_2 (x + 4) - \log_2 (x - 3) = 3$

25.  $\log_4 (n + 1) - \log_4 (n - 2) = 1$

26.  $\log_5 10 + \log_5 12 = 3 \log_5 2 + \log_5 a$



**9-4 Skills Practice****Common Logarithms**

Use a calculator to evaluate each expression to four decimal places.

1.  $\log 6$

2.  $\log 15$

3.  $\log 1.1$

4.  $\log 0.3$

Solve each equation or inequality. Round to four decimal places.

9.  $3^x > 243$

10.  $16^v \leq \frac{1}{4}$

11.  $8^p = 50$

12.  $7^y = 15$

13.  $5^{3b} = 106$

14.  $4^{5k} = 37$

15.  $12^{7p} = 120$

16.  $9^{2m} = 27$

17.  $3^r - 5 = 4.1$

18.  $8^y + 4 > 15$

19.  $7.6^{d+3} = 57.2$

20.  $0.5^{t-8} = 16.3$

21.  $42^{x^2} = 84$

22.  $5^{x^2+1} = 10$

Express each logarithm in terms of common logarithms. Then approximate its value to four decimal places.

23.  $\log_3 7$

24.  $\log_5 66$

25.  $\log_2 35$

26.  $\log_6 10$

**9-5 Skills Practice*****Base e and Natural Logarithms***

Use a calculator to evaluate each expression to four decimal places.

1.  $e^3$

2.  $e^{-2}$

3.  $\ln 2$

4.  $\ln 0.09$

Write an equivalent exponential or logarithmic equation.

5.  $e^x = 3$

6.  $e^4 = 8x$

7.  $\ln 15 = x$

8.  $\ln x \approx 0.6931$

Evaluate each expression.

9.  $e^{\ln 3}$

10.  $e^{\ln 2x}$

11.  $\ln e^{-2.5}$

12.  $\ln e^y$

Solve each equation or inequality.

13.  $e^x \geq 5$

14.  $e^x < 3.2$

15.  $2e^x - 1 = 11$

16.  $5e^x + 3 = 18$

17.  $e^{3x} = 30$

18.  $e^{-4x} > 10$

19.  $e^{5x} + 4 > 34$

20.  $1 - 2e^{2x} = -19$

21.  $\ln 3x = 2$

22.  $\ln 8x = 3$

23.  $\ln(x - 2) = 2$

24.  $\ln(x + 3) = 1$

25.  $\ln(x + 3) = 4$

26.  $\ln x + \ln 2x = 2$