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Quick Warm-Up: Assessing Prior Knowledge

6.1 Exponential Growth and Decay

Write as a decimal.

1. 8% _____ 2. 2.4% _____ 3. 0.01% _____

Evaluate.

4. 3^6 _____ 5. $3^4 \cdot 4^3$ _____ 6. $24 \cdot 2^3$ _____

3
5
6.
-1
-2

Lesson Quiz

6.1 Exponential Growth and Decay

Find the multiplier for each rate of exponential growth or decay.

1. 9% decay 1-.09 or .91 2. 0.25% growth 1+.0025 or 1.0025

3. In an experiment, bacteria are put into a petri dish and are allowed to grow. The number of bacteria in the dish after n hours is found to be $2000 \cdot 3^n$.

   a. How many bacteria were put into the dish at the beginning of the experiment? 2000

   b. How fast is the population of bacteria growing? Triples every hour

   c. How many bacteria are in the dish after 5 hours? 486,000

4. The population of Rochester is 17,500 and is projected to grow at a rate of 4.5% per decade.

   a. Write an expression for the projected population of Rochester after n decades. $17500(1.045)^n$

   b. Predict the population, to the nearest hundred, of Rochester after 40 years. 20,900

5. Pat bought a car for $9500. The salesperson projected that the value of the car would decline by 20% per year for the next 5 years.

   a. Write an expression for the projected value of Pat's car after n years. $9500(1-.20)^t$

   b. Predict the value, to the nearest hundred dollars, of Pat's car after 5 years. $3100

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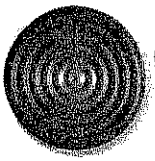


Quick Warm-Up: Assessing Prior Knowledge

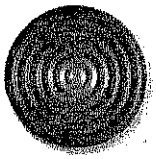
6.2 Exponential Functions

Evaluate.

1. 3^4 _____
2. 3^0 _____
3. $(-4)^2$ _____
4. 4^{-2} _____

Evaluate each expression for $x = 2$.

5. x^5 _____
6. 5^x _____
7. 5^{-x} _____
8. $\left(\frac{1}{5}\right)^x$ _____



Lesson Quiz

6.2 Exponential Functions

Tell whether each function represents exponential growth or exponential decay, and give the *y*-intercept.

1. $f(x) = 5(1.2)^x$ growth (0, 5)
2. $f(x) = 10(0.8)^x$ decay (0, 10)
3. $f(x) = 7^{-x}$ decay (0, 1)

4. Find the final amount of a $1000 investment after 9 years at 8% interest compounded annually and compounded quarterly.

$1,999 & 2039.89

5. Sam has a choice between an investment that pays 6% annual interest compounded monthly and an investment that pays 5.9% annual interest compounded daily. Which investment will earn Sam more money over the same period of time?

6% compounded monthly

6. A house was bought for $50,000 and was sold 15 years later for $95,000. Find the effective yield.

4.37%

7. Mal bought a computer for $4500. Mal sold the computer 4 years later for $1200. Use an exponential regression equation to find the percent by which the value of the computer declined per year.

28.14%

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Quick Warm-Up: Assessing Prior Knowledge

6.3 Logarithmic Functions

Find the inverse of each function.

1. $f(x) = x + 10$ _____

2. $g(x) = 3x$ _____

3. $h(x) = 5x + 3$ _____

4. $j(x) = \frac{1}{4}x + 2$ _____

Lesson Quiz

6.3 Logarithmic Functions

Write each equation in logarithmic form.

1. $5^4 = 625$ $\log_5 625 = 4$

2. $9^{\frac{1}{2}} = 3$ $\log_9 3 = \frac{1}{2}$

Write each equation in exponential form.

3. $\log_{4} \frac{1}{64} = -3$ $4^{-3} = \frac{1}{64}$

4. $\log_2 64 = 6$ $2^6 = 64$

Solve each equation for *x*. If necessary, round your answer to the nearest hundredth.

5. $10^x = 4720$ 3.67

6. $10^x = 0.01$ -2

7. $\log_g 1 = x$ 0

8. $\log_x 216 = 3$ 6

9. $\log_{64} x = \frac{1}{3}$ 4

10. $\log_2 128 = x$ 7

11. The pH of sea water is 8.5. What is the $[H^+]$ for sea water? $10^{-8.5}$

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Quick Warm-Up: Assessing Prior Knowledge

6.4 Properties of Logarithmic Functions

Simplify each expression. Assume that no variable has a value of zero.

1. $z^3 \cdot z^4$ _____
2. $(t^3)^4$ _____
3. $\frac{c^5}{c^2}$ _____
4. $\left(\frac{m}{n}\right)^3$ _____
5. $(ab)^6$ _____
6. $(r^2s)^4$ _____

Lesson Quiz

6.4 Properties of Logarithmic Functions

Write each expression as a single logarithm. Then simplify, if possible.

1. $\log_4 a + \log_4 bc$ $\log_4 abc$
2. $\log_6 24 + \log_6 3 - \log_6 2$ $\log_6 \frac{24 \cdot 3}{2} = \log_6 36 = 2$

Write each expression as a sum or a difference of logarithms. Then simplify, if possible.

3. $\log_5\left(\frac{m}{np}\right)$ $\log_5 m - \log_5 n - \log_5 p$
4. $\log_3(27ab)$ $\log_3 27 + \log_3 a + \log_3 b$ 3

Evaluate each expression.

5. $\log_{12} 12^8$ 8
6. $\log_2 16^6$ 24
7. $9^{\log_9 32}$ 32
8. $7^{\log_7 12} + \log_2 64$ 18

Solve for *x*.

9. $\log_8(3x - 7) = \log_8(48 - 8x)$ $x = 5$
10. $\log_7(x^2 + 6x) = \log_7(4x + 15)$ $x = 3$

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Quick Warm-Up: Assessing Prior Knowledge

6.5 Applications of Common Logarithms

Solve each equation for *x*. Round your answers to the nearest hundredth.

1. $10^x = 32$ _____

2. $10^x = 1.76$ _____

3. $10^x = \frac{1}{200}$ _____

Find the value of *v* in each equation.

4. $-3 = \log_{10} v$ _____

5. $2 = \log_v 49$ _____

6. $v = \log_{16} 4$ _____

Lesson Quiz

6.5 Applications of Common Logarithms

1. Suppose that a person is playing music at an intensity 32,000,000 times as loud as the threshold of sound. Find the relative intensity, *R*, of this music in decibels.

75

Solve each exponential equation for *x*. Round your answers to the nearest hundredth.

2. $12^x = 400$

2.41

3. $0.25^x = 10$

-1.66

4. $8^{x+5} = 120$

-2.70

5. $12 + 5(1.07^x) = 80$

38.58

Evaluate each logarithmic expression. Round your answers to the nearest hundredth.

6. $\log_{15} 200$

1.96

7. $\log_4\left(\frac{5}{2}\right)$

.66

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Quick Warm-Up: Assessing Prior Knowledge

6.6 The Natural Base, e

Evaluate log x for each value.

1. $x = 10$ _____ 2. $x = \frac{1}{10}$ _____ 3. $x = -10$ _____ 4. $x = 1$ _____

Find the final amount for each investment.

5. \$1000 earning 4% annual interest compounded annually for 10 years _____

6. \$1000 earning 4% annual interest compounded quarterly for 10 years _____

Lesson Quiz

6.6 The Natural Base, e

Evaluate $f(x) = e^x$ to the nearest thousandth for each value of x.

1. $x = 4.2$ 66,686 2. $x = -2.5$,082

Evaluate $f(x) = \ln x$ to the nearest thousandth for each value of x.

3. $x = 650$ 6.477 4. $x = 0.075$ −2.590

Simplify each expression.

5. $e^{\ln 9.5}$ 9.5 6. $\ln e^{2a}$ 2a

7. Suppose that \$500 is invested at an annual interest rate of 6.8%. Find the final amounts of the investment after 10 years for interest compounded monthly and continuously. \$985.05, \$986.94

8. How long does it take an investment to double at an annual interest rate of 9.2% compounded continuously? Round your answer to the nearest hundredth. 7.53 years

9. Bones found in an ancient cave contain 62% of their original amount of carbon-14. Use the equation $N(t) = N_0 e^{-0.00012t}$ to estimate the age of the bones. 4000 years old

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Quick Warm-Up: Assessing Prior Knowledge

6.7 Solving Equations and Modeling

Solve each equation for x. Round your answers to the nearest hundredth if necessary.

1. $\log x = 3$ _____
2. $\log x = 0.477$ _____
3. $\ln x = 0$ _____
4. $\ln x = 1.61$ _____
5. $10^x = 0.1$ _____
6. $10^x = 8$ _____
7. $e^x = 1$ _____
8. $e^x = 8$ _____

Lesson Quiz

6.7 Solving Equations and Modeling

1. On the Richter scale, the magnitude, M, of an earthquake depends on the amount of energy, E, in ergs released by the earthquake according to the formula $M = \frac{2}{3}\log\left(\frac{E}{10^{11.8}}\right)$. Find the amount of energy released by an earthquake that measures 7.6 on the Richter scale.

1.58×10^{23}

Solve each equation for x. If necessary, round your answers to the nearest hundredth.

2. $\log_2 x + \log_2(x-2) = 3$

$x = 4$

3. $7e^{5x+3} = 4900$

$x = .71$

4. The population of Marshall County after n years can be predicted by using the function $P(n) = 52{,}000e^{0.013n}$. How long will it take for the population of Marshall County to reach 60,000?

11 years

5. The net profit of a leading computer company is modeled by $p(x) = -7.84 \ln x + 3.35$, where x is the number of years after 1990 and $p(x)$ is the net profit in billions of dollars. What is the net profit for 1995?

9.27 billion

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Chapter Assessment

Chapter 6, Form A, page 1

Write the letter that best answers the question or completes the statement.

C 1. Which of the following is not an exponential function?

a. $f(x) = 5(2.7)^x$ b. $f(n) = 125e^{0.12n}$

c. $f(x) = 7x^2$ d. $f(x) = 6.5\left(\frac{3}{4}\right)^{-x}$

D 2. Which of the following is a model for exponential decay?

a. $f(x) = 0.8(3)^x$ b. $f(x) = 10\left(\frac{1}{3}\right)^{-x}$

c. $f(x) = 5 + 3x^{-3}$ d. $f(x) = 15(0.7)^x$

B 3. The population of Starke County is 72,000 and is growing at a rate of 4.8% per decade. Which of the following is an expression for the population of Starke county after n decades?

a. $72{,}000(1.48)^n$ b. $72{,}000(1.048)^n$

c. $72{,}000(4.8)^n$ d. $72{,}000 + (4.8)^n$

C 4. Kim invests \$3000 at 7.8% annual interest compounded monthly. Find the final amount of Kim's investment after 15 years.

a. \$9557.74 b. \$9593.62 c. \$9629.45 d. \$9665.98

B 5. Jamie invests \$800 at 8.2% annual interest compounded continuously. Find the final amount of Jamie's investment after 20 years.

a. \$3869.32 b. \$4124.14 c. \$4356.63 d. \$4409.87

D 6. Which of the following is the logarithmic form of $3^5 = 243$?

a. $\log_5 243 = 3$ b. $\log_{243} 5 = 3$

c. $\log 243 = 5$ d. $\log_3 243 = 5$

D 7. Find the solution to the equation $\log_2 x = -4$.

a. $x = -8$ b. $x = -16$ c. $x = \frac{8}{3}$ d. $x = \frac{1}{16}$

A 8. Find the solution to the equation $\log_x 8 = \frac{1}{3}$.

a. $x = 512$ b. $x = 24$ c. $x = \frac{1}{8}$ d. $x = 2$

C 9. Find the value of the expression $\log_3 81 - \log_3\left(\frac{1}{9}\right)$.

a. 2 b. 3 c. 6 d. 9

B 10. Find the approximate solution to the equation $3(1.5^x) + 10 = 280$.

a. $x = 0.1$ b. $x = 11.1$ c. $x = 34.8$ d. $x = 60$

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Chapter Assessment

Chapter 6, Form A, page 2

A 11. Find the value of the expression $\log_5 125^{-3}$.

a. -9 b. -6 c. -1 d. $-\frac{3}{5}$

C 12. Find the value of the expression $e^{\ln 2.5}$.

a. 30 b. 12.2 c. 2.5 d. 0.9

B 13. Find the approximate value of the expression $\log_{16} 160$.

a. 0.54 b. 1.83 c. 2.20 d. 10

D 14. What is another way to write $4 \log_3 a + 3 \log_3(2b) - \log_3 m$?

a. $\log_3\left(\frac{4a + 6b}{m}\right)$ b. $\log_3\left(\frac{24ab}{m}\right)$

c. $\log_3\left(\frac{2a^4b^3}{m}\right)$ d. $\log_3\left(\frac{8a^4b^3}{m}\right)$

C 15. Find the solution to the equation $2 \log_a 3 + \log_a(x - 4) = \log_a(x + 8)$.

a. $x = 7.2$ b. $x = 6.4$ c. $x = 5.5$ d. $x = 4$

A 16. Find the approximate solution to the equation $8.4 = \frac{3}{4} \log\left(\frac{x}{10^{2.4}}\right)$.

a. 3.98×10^{13} b. 5.01×10^{8}

c. $1.12 \times 10^{3.4}$ d. $6.3 \times 10^{2.4}$

B 17. Find the solution to the equation $\ln(x^2 + 3x) - \ln 10 = 0$.

a. $x = 5$ or $x = -2$ b. $x = -5$ or $x = 2$

c. $x = 5$ d. $x = 2$

D 18. The amount of a pollutant, measured in parts per million, in Pine Lake can be modeled by the function $A(t) = 14e^{-0.16t}$, where t is the number of years since a program to clean up the lake began. Approximately how long will it take for the amount of the pollutant in Pine Lake to reach 7 parts per million?

a. 83.51 years b. 12.52 years c. 7.85 years d. 4.33 years

C 19. The number of industrial jobs in Fulton County is decreasing by 9% per year. If there are 12,600 industrial jobs in Fulton County this year, estimate the number of industrial jobs, to the nearest hundred, in 10 years.

a. 29,800 b. 11,300 c. 4900 d. 1300

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Quick Warm-Up: Assessing Prior Knowledge

8.1 Inverse, Joint, and Combined Variation

The variable y varies directly as x. Find the constant of variation, k, and write an equation of direct variation that relates the two variables.

1. $y = -6$ when $x = 3$ _____

2. $y = 3$ when $x = -6$ _____

3. $y = 3.75$ when $x = 0.3$ _____

The variable a varies directly as b.

4. If a is 36 when b is -9, find a when b is 12. _____

5. If a is 36 when b is -9, find b when a is 12. _____

Lesson Quiz

8.1 Inverse, Joint, and Combined Variation

1. The variable y varies inversely as x, and $y = 80$ when $x = 25$.
   a. Find the constant of variation, and write an equation for the relationship. $k = 2000$
   b. Find y when $x = 40$. $y = \frac{2000}{x}$ $y = 50$

2. The variable y varies jointly as x and z, and $y = 50$ when $x = 20$ and $z = 5$.
   a. Find the constant of variation, and write an equation for the relationship. $k = .5$ $y = .5xz$
   b. Find y when $x = 30$ and $z = 12$. $y = 180$

3. The variable y varies jointly as x and z and inversely as w. When $y = 120$, $x = 15$, $z = 16$, and $w = 3$.
   a. Find the constant of variation, and write an equation for the relationship. $k = 1.5$ $y = \frac{1.5xz}{w}$
   b. Find y when $x = 24$, $z = 20$, and $w = 8$. $y = 90$

4. A bicycle's pedal gear has 48 teeth and rotates at 50 revolutions per minute. A chain links the pedal gear to a rear-wheel gear that has 20 teeth. How fast is the rear-wheel gear rotating? 120 rpm

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Quick Warm-Up: Assessing Prior Knowledge

8.2 Rational Functions and Their Graphs

Solve each equation.

1. $x + 5 = 0$ _____
2. $5x = 0$ _____
3. $5x + 2 = 0$ _____
4. $x^2 - 5x = 0$ _____
5. $x^2 - 5x - 14 = 0$ _____
6. $x^3 + 3x^2 - 54x = 0$ _____
7. $-1 + 2x - x^2 = 0$ _____

Lesson Quiz

8.2 Rational Functions and Their Graphs

1. a. Find the domain of $f(x) = \frac{x+1}{x^2+3x-10}$. $D = \{x : x \neq 2, -5\}$

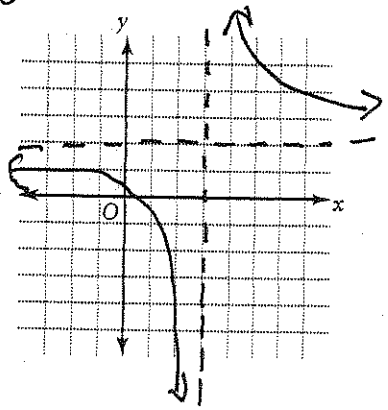
   b. Find equations of all the vertical asymptotes of the graph of f. $x = 2$ and $x = -5$

Find the equations of all the horizontal asymptotes of the graph of each function.

2. $f(x) = \frac{x+3}{x^2+1}$ $y = 0$

3. $g(x) = \frac{3x^3 - 8}{5x - 6x^3}$ $y = -\frac{1}{2}$

4. Sketch the graph of $f(x) = \frac{2x}{x-3}$ showing all asymptotes. Write equations for the asymptotes. $x = 3$ $y = 2$



5. Where does the hole in the graph of $f(x) = \frac{(x+2)(x-5)}{(x+3)(x-5)(x-2)}$ occur? hole at $x = 5$

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Quick Warm-Up: Assessing Prior Knowledge

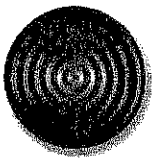
8.3 Multiplying and Dividing Rational Expressions

Evaluate.

1. $\frac{2}{3} \cdot \frac{3}{7}$ _____ 2. $\frac{3}{4} \cdot \frac{8}{15}$ _____ 3. $\frac{4}{9} \div \frac{5}{12}$ _____ 4. $\frac{9}{10} \div \frac{3}{10}$ _____

Factor each expression.

5. $x^2 - 81$ _____ 6. $x^2 - 16x - 36$ _____



Lesson Quiz

8.3 Multiplying and Dividing Rational Expressions

Simplify each expression.

1. $\frac{x^2 - 49}{x^2 - 5x - 14}$ $\frac{x+7}{x+2}$

2. $\frac{21x^2}{10} \cdot \frac{4}{x^4} \cdot \frac{5x^5}{7}$ $6x^3$

3. $\frac{x-1}{x^3(x+3)} \cdot \frac{x(x+3)}{(x+2)(x-1)}$ $\frac{1}{x^2(x+2)}$

4. $\frac{x^2 + 3x}{x^2 - 6x + 8} \cdot \frac{x^2 - 7x + 12}{x^2 - 9}$ $\frac{x}{x-2}$

5. $\frac{8x^3}{x^2(x-2)} \div \frac{5x}{3(x-2)}$ $\frac{24}{5}$

6. $\frac{x^2 + 4x - 5}{x^3} \div \frac{x^2 + 7x + 10}{x^3 + 2x^2}$ $\frac{x-1}{x}$

7. $\frac{\frac{x^2 - 16}{x+3}}{\frac{x-4}{x^2 + 6x + 9}}$ $(x+4)(x+3)$

8. $\frac{\frac{x^2 + 6xy + 5y^2}{x^2 + 4xy + 4y^2}}{\frac{x+y}{x+2y}}$ $\frac{x+5y}{x+2y}$

9. $\frac{x^2 - 1}{x^2 + 2x + 1} \cdot \frac{1+x}{1-x}$ -1

10. $\frac{x^3 - 6x^2 + 8x}{x^2 - 8x + 16} \div \frac{2x - 4}{10x^2 - 40x}$ $5x^2$

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Quick Warm-Up: Assessing Prior Knowledge

8.4 Adding and Subtracting Rational Expressions

Simplify.

1. $-\frac{5}{8} - \left(-\frac{1}{8}\right)$ _____

2. $-\frac{2}{3} + \frac{1}{9}$ _____

3. $\frac{1}{x} + \frac{1}{x}$ _____

4. $\frac{1}{2n} + \frac{1}{2n}$ _____

5. $\frac{1}{a} + \frac{1}{b}$ _____

6. $\frac{x}{y} + \frac{x}{y}$ _____

Lesson Quiz

8.4 Adding and Subtracting Rational Expressions

Simplify each expression. Write your answer in simplest form.

1. $\frac{3x-7}{3x+5} + \frac{4x-3}{3x+5}$ $\frac{7x-10}{3x+5}$

2. $\frac{3x}{x-4} - \frac{12}{x-4}$ 3

3. $\frac{3}{x+3} + \frac{2}{x}$ $\frac{5x+6}{x(x+3)}$

4. $\frac{7}{x+3} - \frac{x-9}{x^2+5x+6}$ $\frac{6x+23}{(x+2)(x+3)}$

5. $\frac{3x}{x+5} + \frac{5x}{2x-3}$ $\frac{x(11x+16)}{(x+5)(2x-3)}$

6. $\frac{2}{1+\frac{1}{x}} + \frac{3}{1-\frac{1}{x}}$ $\frac{x(5x+1)}{(x-1)(x+1)}$

7. $\frac{3x+1}{x-2} - \frac{4x+1}{x-3}$ $\frac{-(x^2+x+1)}{x^2-5x+6}$

8. $\frac{x}{x-y} - \frac{2x}{x+y} - \frac{2xy}{x^2-y^2}$ $\frac{-x}{x+y}$

9. $\frac{\frac{1}{x-y}-1}{2-\frac{x}{x-y}}$ $\frac{1-x+y}{x-2y}$

10. $\frac{1}{\frac{1}{x}+\frac{1}{y}+\frac{1}{z}}$ $\frac{xyz}{yz+xz+xy}$

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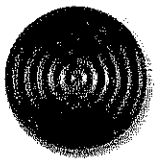
Quick Warm-Up: Assessing Prior Knowledge

8.5 Solving Rational Equations and Inequalities

Solve.

1. $-6 < 8c$ _____
2. $-2r \geq 15$ _____
3. $x^2 + 5x - 36 = 0$ _____
4. $3x^2 - 4 = x$ _____
5. $\frac{16}{5} = \frac{m}{3}$ _____
6. $\frac{15}{g} = \frac{2.5}{4}$ _____
7. $\frac{5}{4} = \frac{3}{2a}$ _____
8. $\frac{1}{x} + \frac{1}{2x} = \frac{1}{3}$ _____



Lesson Quiz

8.5 Solving Rational Equations and Inequalities

1. Sam is taking a trip that consists of 192 miles on highways and 48 miles in towns. Sam is able to drive twice as fast on the highway as in towns. Write a rational function to represent the total time, T, in hours that Sam needs to complete the trip in terms of his speed in towns, x, in miles per hour.

$T(x) = \frac{48}{x} + \frac{192}{2x}$

Solve each equation or inequality. Check your answers.

2. $\frac{x+3}{8} = \frac{3x-5}{4}$ $x = 2.6$
3. $\frac{2}{x-2} + \frac{x}{x+4} = \frac{24}{x^2+2x-8}$ $x = 4$
4. $\frac{3x}{x-2} > 6$ $-2 < x < 4$
5. $\frac{x-2}{x+2} < \frac{x}{x-2}$ $-2 < x < \frac{2}{3}$ or $x > 2$
6. $\frac{3x+1}{2} - \frac{3x-4}{3} = \frac{3x+1}{4}$ $x = \frac{19}{3}$
7. $\frac{x-1}{2} - \frac{3x-4}{2} = \frac{5x-3}{8}$ $x = \frac{15}{13}$
8. $\frac{x-2}{x+2} < 3$ $x > -2$ or $x < -4$
9. $\frac{2x}{x+2} - \frac{x}{x-3} < \frac{9}{x^2-x-6}$ $-2 < x < -1$ or $3 < x < 9$

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Quick Warm-Up: Assessing Prior Knowledge

8.6 Radical Expressions and Radical Functions

Identify each transformation of the parent function $f(x) = x^2$.

1. $f(x) = x^2 + 5$ _____
2. $f(x) = (x + 5)^2$ _____
3. $f(x) = 5x^2$ _____
4. $f(x) = -5x^2$ _____
5. $f(x) = (5x)^2$ _____
6. $f(x) = \left(\frac{1}{5}x\right)^2$ _____

Lesson Quiz

8.6 Radical Expressions and Radical Functions

1. Find the domain of $f(x) = \sqrt{3x + 6}$. $D = \{x : x \geq -2$

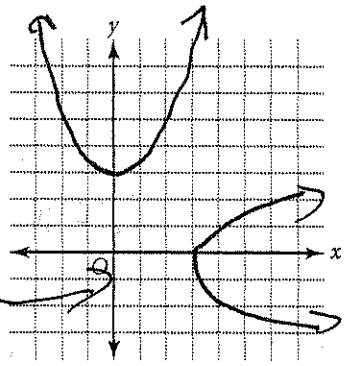
For each function, describe the transformations applied to $f(x) = \sqrt{x}$.

2. $f(x) = 3\sqrt{x - 4} - 2$

3. $g(x) = \sqrt{2x + 6} + 5$

4. Find the inverse of $y = x^2 + 3$. Then graph the function and its inverse on the same set of axes.

$y = \pm\sqrt{x - 3}$



Evaluate each expression. Give exact answers.

5. $12 - 4\sqrt[3]{125}$ -8

6. $-3\left(\sqrt[3]{-27}\right)^2 + 10$ -17

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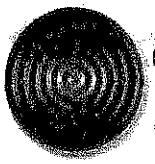


Quick Warm-Up: Assessing Prior Knowledge

8.7 Simplifying Radical Expressions

Evaluate each expression.

1. $36^{\frac{1}{2}}$ _____

2. $-125^{\frac{2}{3}}$ _____

Simplify each expression.

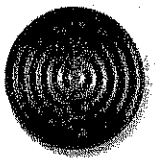
3. $(ab^4)(a^2b)$ _____

4. $(m^2n)^3$ _____

5. $\frac{r^2s^3}{r^5s}$ _____

6. $\left(\frac{cd^2}{c^4d^3}\right)^2$ _____

7. $(2x - 1)(3x + 2)$ _____



Lesson Quiz

8.7 Simplifying Radical Expressions

Simplify each expression.

1. $\sqrt{81x^4y^9z^2}$ $9x^2y^4z\sqrt{y}$

2. $\sqrt[3]{-125x^9y^8z^4}$ $-5x^3y^2z\sqrt[3]{y^2z}$

Simplify each expression. Assume that the value of each variable is positive.

3. $(20x^3y)^{\frac{1}{2}}\sqrt{5x^4y}$ $10x^3y\sqrt{x}$

4. $\frac{12\sqrt[3]{24x^8y^6}}{3(3x^2y^2)^{\frac{1}{3}}}$ $8x^2y\sqrt[3]{y}$

5. $\left(10 + \sqrt{20}\right) - \left(4 - \sqrt{45}\right)$ $6 + 5\sqrt{5}$

6. $\left(5 + 3\sqrt{7}\right)\left(-4 + 5\sqrt{7}\right)$ $85 + 13\sqrt{7}$

Write each expression with a rational denominator.

7. $\frac{3}{\sqrt{5}}$ $\frac{3\sqrt{5}}{5}$

8. $\frac{4}{2 - \sqrt{6}}$ $-4 - 2\sqrt{6}$

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Quick Warm-Up: Assessing Prior Knowledge

8.8 Solving Radical Equations and Inequalities

Solve.

1. $2(a + 9) = 10$

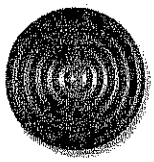
2. $6 - t = t - 3$

3. $y^2 + 4y = 0$

4. $m^2 - 2m - 15 = 0$

5. $x^2 + 2x = 4x + 7$

6. $\frac{2}{x-1} + \frac{x}{x+1} = \frac{4}{x^2-1}$



Lesson Quiz

8.8 Solving Radical Equations and Inequalities

Solve each equation for *x*. Check your solutions.

1. $5\sqrt{x - 12} = 30$ $x = 48$

2. $\sqrt[3]{5x + 12} = \sqrt[3]{3x + 18}$ $x = 3$

3. $\sqrt{3x + 1} + 1 = x$ $x = 5$

4. $\sqrt{2x + 3} = \sqrt{x + 1} + 1$ $x = 3$ or $x = -1$

5. $\sqrt{4x^2 - 1} = 2x + 3$ $x = -\frac{5}{6}$

6. $\sqrt{x + 4} + \sqrt{x - 4} = 4$ $x = 5$

Solve each inequality for *x*. Check your solutions.

7. $5 \leq \sqrt{4x - 3}$ $x \geq 7$

8. $2\sqrt[3]{4x - 3} > x$ $x < -6$ or $.76 < x < 5.24$

9. $6 - \sqrt{2x + 1} < 3$ $x > 4$

10. $\sqrt{x + 9} - \sqrt{x} > \sqrt{3}$ $0 < x < 3$

11. $\sqrt{x - 5} - \sqrt{x + 7} \leq 4$ $x \geq 5$

12. $\sqrt{x + 5} + \sqrt{x + 10} > 2$ $x \geq -5$

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Chapter Assessment

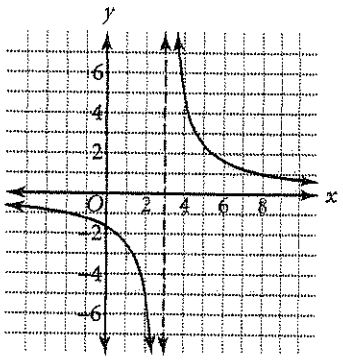
Chapter 8, Form A, page 1

Write the letter that best answers the question or completes the statement.

D 1. If y varies jointly as x and z and $y = 144$ when $x = 8$ and $z = 4$, then find the constant of variation.

a. $k = 22.5$ b. $k = 18$ c. $k = 12$ d. $k = 4.5$

C 2. Which function is graphed at right?



a. $f(x) = \frac{5x}{x-3}$

b. $f(x) = \frac{5x}{x+3}$

c. $f(x) = \frac{5}{x-3}$

d. $f(x) = \frac{5}{x+3}$

B 3. Where does the hole in the graph of $f(x) = \frac{x^2 - 2x - 3}{x^2 + 2x - 15}$ occur?

a. $x = -1$ b. $x = 3$ c. $x = -5$ d. $x = 15$

D 4. Find the equation of the horizontal asymptote of $f(x) = \frac{3 + 2x^2 + 5x^3}{3x^3 - 8x}$.

a. $y = 0$ b. $y = \frac{5}{8}$ c. $y = 1$ d. $y = \frac{5}{3}$

D 5. Which of the following is the simplest form of $\frac{5x}{x^4} \cdot \frac{4x^5}{8x^2} \cdot \frac{x^6}{2}$?

a. $4x^2$ b. $\frac{5x^2}{4}$ c. $\frac{5x^5}{4}$ d. $\frac{5x^6}{4}$

A 6. Which of the following is the simplest form of $\frac{x^2 + 2x}{x^2 - 9} \div \frac{x^2}{x^2 + 5x + 6}$?

a. $\frac{(x+2)^2}{x(x-3)}$ b. $\frac{x^3}{(x-3)(x+3)^2}$

c. $\frac{10x + 6}{-9}$ d. $-\frac{4}{3}$

B 7. Write $\frac{5}{\sqrt{7} + 2}$ with a rational denominator.

a. $\frac{5\sqrt{7}}{9}$ b. $\frac{5\sqrt{7} - 10}{3}$ c. $\frac{5\sqrt{7} + 10}{3}$ d. $\frac{5\sqrt{7} - 10}{9}$

B 8. If y varies inversely as x and $y = 12$ when $x = 3$, find x when $y = 18$.

a. $x = 1.5$ b. $x = 2$ c. $x = 36$ d. $x = 45$

C 9. Which of the following is the simplest form of $\sqrt[3]{-64x^5y^{12}}$?

a. $-4x^2y^4$ b. $-4|x|y^4\sqrt[3]{x}$ c. $-4xy^4\sqrt[3]{x^2}$ d. $-4xy^3\sqrt[3]{2xy}$

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Chapter Assessment

Chapter 8, Form A, page 2

B 10. Which of the following is the simplest form of $\frac{5}{x+2} - \frac{8}{x+4}$?

a. $\frac{-3x+36}{x^2+6x+8}$ b. $\frac{-3x+4}{x^2+6x+8}$ c. $\frac{-5}{x+4}$ d. $\frac{-3x+4}{x^2+8}$

D 11. If the value of each variable is positive, then which of the following is the simplest form of $\frac{(36x^7y^9)^{\frac{1}{2}}}{\sqrt{2x^2y^3}}$?

a. $18x^5y^6$ b. $3x^2y\sqrt{xy}$ c. $3x^4y^2\sqrt{2xy}$ d. $3x^2y^3\sqrt{2x}$

A 12. Multiply $(3+\sqrt{6})(4-2\sqrt{6})$.

a. $-2\sqrt{6}$ b. $12-2\sqrt{12}$ c. $24-2\sqrt{6}$ d. 0

C 13. Which of the following is the domain of $f(x) = \sqrt{x^2-4}$?

a. $x \geq 4$ b. $-2 \leq x \leq 2$ c. $x \leq -2$ *or* $x \geq 2$ d. $x \leq 2$

B 14. Which transformation was not applied to $f(x) = \sqrt{x}$ to obtain $f(x) = -3\sqrt{2(x+3)}$?

a. reflection across the x-axis b. vertical translation of 3 units up

c. vertical stretch by a factor of 3 d. horizontal compression by a factor of $\frac{1}{2}$

A 15. Which of the following is the solution to the equation $\frac{x+3}{x} - \frac{7}{x+2} = \frac{14}{x^2+2x}$?

a. $x = 4$ b. $x = -10$ c. $x = 4$ or $x = -2$ d. $x = -10$ or $x = 2$

A 16. Which of the following is the solution to the equation $\sqrt{x+17}+3 = x$?

a. $x = 8$ b. $x = -17$ c. $x = 3$ or $x = -17$ d. $x = 8$ or $x = -1$

A 17. Which of the following is the solution to the inequality $\frac{15}{x+4} > 3$?

a. $-4 < x < 1$ b. $x < -4$ c. $x > 1$ *or* $x < -4$ d. $x > 1$

D 18. Which of the following is the solution to the inequality $4 < \sqrt{2x+6}$?

a. $-3 < x < 5$ b. $x < -3$ c. $x < -3$ *or* $x > 5$ d. $x > 5$

B 19. If a motorcycle driver travels 40 miles at m miles per hour and then 50 miles at $m + 10$ miles per hour, find the average speed, $s(m)$.

a. $s(m) = \frac{40}{m} + \frac{50}{m+10}$ b. $s(m) = \frac{9m^2+90m}{9m+40}$

c. $s(m) = \frac{8100m+3600}{m^2+10m}$ d. $s(m) = \frac{90}{m^2+10m}$