1. Solve, if possible, using the substitution method.
   \[ 3x + y = 4, \]
   \[ x - 5y = -6 \]
   What is the \( x \)-coordinate?
   a) \(-7\)  
   b) \(\frac{1}{7}\)  
   c) \(\frac{7}{8}\)  
   d) \(\frac{5}{17}\)

2. Solve, if possible, using the substitution method.
   \[ 3x + 5y = -15, \]
   \[ y = -x - 8 \]
   What is the \( y \)-coordinate?
   a) \(-5\)  
   b) \(\frac{2}{9}\)  
   c) \(9\)  
   d) \(\frac{9}{2}\)

3. Solve, if possible, using the elimination method.
   \[ x + 3y = 14, \]
   \[ 2x + 4y = 22 \]
   What is the \( y \)-coordinate?
   a) \(0\)  
   b) \(3\)  
   c) \(-3\)  
   d) not possible

4. Solve, if possible, using the elimination method.
   \[ 5y - 4x = 7, \]
   \[ x + 3y = \frac{3}{8} \]
   What is the \( x \)-coordinate?
   a) \(\frac{1}{2}\)  
   b) \(-\frac{9}{8}\)  
   c) \(\frac{15}{8}\)  
   d) \(-\frac{1}{8}\)

5. The perimeter of a rectangle is 10. The length of the rectangle is five less than four times the width. Find the width of the rectangle.
   a) \(4\)  
   b) \(3\)  
   c) \(6\)  
   d) \(2\)
6. Between her home mortgage, car loan, and credit card bill, Deena is $117,000 in debt. Each month, Deena’s credit card accumulates 1.5% interest, her car loan 1% interest, and her mortgage 0.8% interest. After one month, her total accumulated interest is $995. The interest on Deena’s mortgage was $680 more than the interest on her car loan. How much does she owe on her car loan?
   a) $12,000   b) $7500   c) $5000   d) $1200

7. Solve.
   \[3x - 5y + 2z = 19,\]
   \[5x + 2y - 3z = -8,\]
   \[-2x + 3y + 5z = 7\]

   What is the \(z\)-coordinate?
   a) 2   b) -7   c) 3   d) 4

8. Solve.
   \[2x + 6y + 4z = -30,\]
   \[6x + 4y + 2z = -32,\]
   \[4x + 2y + 6z = -34\]

   What is the \(y\)-coordinate?
   a) 10   b) 6   c) -2   d) -10

   \[x - 2y = 2,\]
   \[2x - z = -2,\]
   \[x - y - 2z = 4\]

   What is the \(x\)-coordinate?
   a) -2   b) -3   c) 5   d) 2
CHAPTER 8

TEST FORM H

10. Solve using matrices.
\[ 2x + 7y = 43, \]
\[ -4x + 7y = 19, \]
What is the \( y \)-coordinate?
(a) 8  (b) 5  (c) 7  (d) 3

\[ x + 2y + z = -13, \]
\[ 3x + 4y + 2z = -28, \]
\[ x + 3y + z = -17 \]
What is the \( x \)-coordinate?
(a) -5  (b) -1  (c) -4  (d) -2

12. Evaluate.
\[ \begin{bmatrix} -7 & 5 \\ -2 & 2 \end{bmatrix} \]
(a) -4  (b) 11  (c) 24  (d) 0

13. Evaluate.
\[ \begin{bmatrix} 3 & 0 & 3 \\ -2 & 1 & 4 \\ 5 & -3 & 2 \end{bmatrix} \]
(a) 45  (b) 3  (c) -20  (d) 0

\[ 4x + 3y = 3, \]
\[ 6x - 2y = 24 \]
What is the \( x \)-coordinate?
(a) -1  (b) -2  (c) 3  (d) 6
15. An electrician, a carpenter, and a plumber are hired to work on a house. The electrician earns \$20 per hour, the carpenter \$25 per hour, and the plumber \$30 per hour. On the first day on the job, the three worked a total of 23.25 hours and earned a total of \$571.25. If the electrician worked 4.75 more hours than the carpenter did, then how many hours did the plumber work?

a) 6  b) 7.25  c) 8  d) 5.75
CHAPTER 9

TEST FORM H

1. Solve: \(-0.8y < 24\).
   a) \(\{y | y > -30\}\)  
   b) \(\{y | y < 3\}\)
   c) \(\{y | y > -3\}\)
   d) \(\{y | y > 30\}\)

2. Solve: \(-3y - 4 \geq 5\).
   a) \([3, \infty)\)  
   b) \([-3, \infty)\)  
   c) \((-\infty, -3)\)  
   d) \((-\infty, -3]\)

3. Solve: \(7a - 9 \leq -2a + 3\).
   a) \(\{a | a \leq \frac{4}{3}\}\)
   b) \(\{a | a \leq \frac{3}{4}\}\)
   c) \(\{a | a \geq \frac{4}{3}\}\)
   d) \(\{a | a \geq \frac{3}{4}\}\)

4. Solve: \(3(7 - 2x) > 3x + 5\).
   a) \((-\infty, -\frac{16}{9})\)
   b) \(\left(\frac{3}{4}, \infty\right)\)
   c) \(-\frac{4}{3}, \infty\)
   d) \(-\infty, -\frac{16}{9}\)

5. Let \(f(x) = -8x + 13\) and \(g(x) = -12x + 1\). Find all values of \(x\) for which \(f(x) > g(x)\).
   a) \(\{x | x < 1\}\)  
   b) \(\{x | x > -2\}\)
   c) \(\{x | x > -3\}\)  
   d) \(\{x | x > 3\}\)

6. Nan can rent a van for either $50 per day with unlimited mileage or $35 per day with 75 free miles and an extra charge of 20¢ for each mile over 75. For what numbers of miles traveled would the unlimited mileage plan save Nan money?
   a) at least 250  
   b) at most 350
   c) at most 150  
   d) at least 150
7. Find the intersection: \( \{4,6,8,9,10\} \cap \{0,6,8,10\} \).
   a) \{6,8,10\}  
   b) \{0,2,4,6,8,9,10\}  
   c) \{4,6\}  
   d) \{0,2,4,6\}

8. Find the domain of \( f(x) = \sqrt{4 - 2x} \).
   a) \(-\infty,-2\)  
   b) \(-\infty,2\)  
   c) \(-\infty,2\)  
   d) \([-2,\infty)\)

9. Identify the graph of the solution set for \(-1 \leq -4t - 5 < 7\).
   a)  
   b)  
   c)  
   d)  

10. Identify the graph of the solution set for \(2x - 3 < 3\) and \(x - 8 > -3\).
    a)  
    b)  
    c)  
    d)  

11. Solve \(-4x > 8\) or \(7x > 7\).
    a) \((-\infty,-2) \cup (-3,\infty)\)  
    b) \((-\infty,-2) \cup (1,\infty)\)  
    c) \((-\infty,-2) \cup (-1,\infty)\)  
    d) \((-\infty,-1) \cup (2,\infty)\)

12. Solve: \(\frac{-1}{5} < \frac{1}{10} x - 1 < \frac{1}{5}\).
    a) \(\{8 \leq x \leq 12\}\)  
    b) \([-12 \leq x < 8\}\)  
    c) \(\{8 \leq x < 12\}\)  
    d) \(\{8 < x \leq 12\}\)
13. Solve $|3x + 2| < 2$.
   a) $\left(\frac{1}{2}, \frac{5}{2}\right)$  
   b) $\left(0, \frac{3}{2}\right)$  
   c) $\left(-\frac{4}{3}, 0\right)$  
   d) $\left(\frac{1}{2}, \frac{3}{2}\right)$

14. Solve $|-4t - 6| \geq 8$.
   a) $\{t \leq -1 \text{ or } t \geq 4\}$  
   b) $\left\{t \leq \frac{-7}{2} \text{ and } t \geq \frac{1}{2}\right\}$
   c) $\left\{t \leq \frac{-7}{2} \text{ or } t \geq \frac{1}{2}\right\}$
   d) $\left\{t \leq \frac{7}{2} \text{ or } t \geq -\frac{1}{2}\right\}$

15. Solve $|3 - 5x| = -7$.
   a) $\emptyset$  
   b) $\mathbb{R}$  
   c) $\frac{-4}{5}, 2$  
   d) 2

16. Graph: $x + y \geq 6$
    $x - y \geq 4$.

   a)  
   b)  
   c)  
   d)
17. Find the maximum value of $F(x) = 2x + 3y$ subject to
   
   $x + y \leq 5$
   
   $-5 \leq x \leq 5$
   
   $0 \leq y \leq 3$
   
   a) 25 b) -10 c) -5 d) 13

Pretensions Spa makes $10 on each pedicure and $17 on each foot massage. A pedicure takes 25 minutes, a massage takes 75 minutes, and there are 10 employees who each work 6 hours per day. The spa can schedule 60 appointments per day.

18. How many appointments in one day should be pedicures in order to maximize profit?
   a) 35 b) 25 c) 42 d) 18

19. What is the maximum profit?
   a) $805 b) $880 c) $948 d) $894
Assume that variables can represent any real number.

1. Simplify: \( \sqrt{245} \).
   a) \( 3\sqrt{6} \)  b) \( 5\sqrt{7} \)  c) \( 7\sqrt{3} \)  d) \( 7\sqrt{5} \)

2. Simplify: \( \sqrt[3]{\frac{64}{x^6}} \).
   a) \( -\frac{4}{x^2} \)  b) \( \frac{5}{x^3} \)  c) \( \frac{4}{x^2} \)  d) \( -\frac{3}{x^2} \)

3. Simplify: \( \sqrt{16a^2} \).
   a) \( 4a^2 \)  b) \( 3a \)  c) \( 4a \)  d) \( 2a^2 \)

4. Simplify: \( \sqrt{x^2 - 6x + 9} \).
   a) \( x - 2 \)  b) \( x + 3 \)  c) \( x + 2 \)  d) \( x - 3 \)

5. Simplify: \( \sqrt[3]{x^8y^3} \).
   a) \( y\sqrt[3]{x^2y^4} \)  b) \( \frac{x}{\sqrt[3]{x^2y^4}} \)  c) \( \frac{x^4}{\sqrt[3]{x^8y^3}} \)  d) \( x\sqrt[3]{x^4y^3} \)

6. Simplify: \( \sqrt[3]{\frac{36x^4}{49y^4}} \).
   a) \( \frac{6x^2}{y^3} \)  b) \( \frac{x^2}{7y^3} \)  c) \( \frac{6x^2}{7y^3} \)  d) \( \frac{6x}{7y^3} \)

7. Simplify: \( \sqrt[3]{6x^2\sqrt{5y}} \).
   a) \( x\sqrt[3]{30y} \)  b) \( \frac{\sqrt[3]{30x^2y}}{y} \)  c) \( \sqrt[3]{30xy} \)  d) \( \frac{\sqrt[3]{6x^2y}}{y} \)
8. Simplify: \( \frac{\sqrt[3]{x^8 y^{12}}}{\sqrt[3]{x^6 y^4}} \).
   a) \( \sqrt[3]{x^2 y^4} \)  b) \( \sqrt[3]{x^2 y^6} \)  c) \( \frac{1}{3} x^4 y^2 \)  d) \( \frac{5}{3} x^2 y^3 \)

9. Simplify: \( \frac{4}{3} \sqrt{x y^2} \sqrt{x^2 y^2} \).
   a) \( y \sqrt[6]{x^{11} y^2} \)  b) \( y \sqrt[6]{x^{10} y} \)  c) \( \sqrt[6]{x^{14} y^3} \)  d) \( \sqrt[6]{x^{10} y} \)

10. Simplify: \( \frac{\sqrt[3]{a^5}}{\sqrt[3]{a}} \).
    a) \( \frac{20}{3} a^5 \)  b) \( \frac{20}{3} a^9 \)  c) \( \frac{20}{3} a^7 \)  d) \( \sqrt[3]{a^3} \)

11. Simplify: \( 5 \sqrt[6]{x} - 11 \sqrt{6} \).
    a) \(-3 \sqrt{6} \)  b) \(3 \sqrt{6} \)  c) \(-6 \sqrt{6} \)  d) \(15 \sqrt{6} \)

12. Simplify: \( \sqrt{xy^3} + \sqrt{4x^2y} \).
    a) \( \sqrt{xy(y + x^2)} \)  b) \( \sqrt{x(y + 2x^2)} \)  c) \( \sqrt{x^2 y + 3y} \)  d) \( \sqrt{xy(y + 2x^2)} \)

13. Simplify: \( (2 + 3 \sqrt{x})(2 - 5 \sqrt{x}) \).
    a) \( 8 - \sqrt{10}x - 3x \)  b) \( 3 - 17x \)  c) \( 4 - \sqrt{x} - 15x \)  d) \( 4 - 4 \sqrt{x} - 15x \)
14. Express using radical notation: \( (3a^2b^3)^{4/5} \).
   a) \( ab^{2\sqrt[5]{81a^2b^2}} \)  
   b) \( ab^{2\sqrt[5]{81a^2b^3}} \)  
   c) \( ab^{2\sqrt[5]{81a^2b^2}} \)  
   d) \( ab^{2\sqrt[5]{5ab}} \)

15. Express using exponential notation: \( \sqrt[3]{3x^2y} \).
   a) \( (3x^2y)^{1/3} \)  
   b) \( (3xy^2)^{1/3} \)  
   c) \( (7xy^3)^{1/2} \)  
   d) \( (7xy^3)^{1/2} \)

16. If \( f(x) = \sqrt{24 + 6x} \), determine the domain of \( f \).
   a) \( [-3, \infty) \)  
   b) \( [-4, \infty) \)  
   c) \( (-\infty, 3] \)  
   d) \( (-\infty, -4] \)

17. If \( f(x) = x^2 \), find \( f(3 + \sqrt{2}) \).
   a) \( 7 - 6\sqrt{3} \)  
   b) \( 5 - 6\sqrt{7} \)  
   c) \( 11 + 6\sqrt{2} \)  
   d) \( 7 + 6\sqrt{2} \)

18. Rationalize the denominator: \( \frac{\sqrt{3}}{7 + \sqrt{5}} \).
   a) \( \frac{7\sqrt{5} + \sqrt{15}}{19} \)  
   b) \( \frac{7\sqrt{5} - \sqrt{15}}{44} \)  
   c) \( \frac{5\sqrt{5} - \sqrt{30}}{19} \)  
   d) \( \frac{5\sqrt{3} + \sqrt{30}}{42} \)

19. Solve: \( x = \sqrt{5x - 21} + 3 \).
   a) 5, 6  
   b) 5  
   c) 6  
   d) 2
PRACTICE TEST 4

CHAPTER 10

TEST FORM H

| ANSWERS | 20. A housefly crosses diagonally from one corner of a 0.8 m by 0.5 m television screen to the far corner. How far does the fly walk? Give an approximate answer to three decimal places.
  | a) 1.012 m  | b) 2.876 m  | c) 0.943 m  | d) 0.765 m  |
|---------|-------------|-------------|-------------|-------------|
| 21.     | Express in terms of \( i \) and simplify: \( \sqrt{-80} \).
  | a) \( 4i\sqrt{5} \)  | b) \( -2i\sqrt{5} \)  | c) \( i\sqrt{5} \)  | d) \( 2i\sqrt{5} \)  |
| 22.     | Subtract: \( (4 - i) - (7 - 5i) \).
  | a) \( -3 - 6i \)  | b) \( -3 - 4i \)  | c) \( 3 + 4i \)  | d) \( -3 + 4i \)  |
| 23.     | Multiply: \( \sqrt{-100}\sqrt{-9} \).
  | a) \( -40 \)  | b) \( -60 \)  | c) \( -30 \)  | d) \( -20 \)  |
| 24.     | Multiply. Write the answer in the form \( a + bi \). \( (3 + 7i)^2 \)
  | a) \( -40 - 42i \)  | b) \( -40 + 42i \)  | c) \( -40 + 58i \)  | d) \( -21 + 20i \)  |
| 25.     | Divide and simplify to the form \( a + bi \). \( \frac{7 - 3i}{5 + 4i} \)
  | a) \( \frac{23 - 43}{41} - \frac{43}{41}i \)  | b) \( \frac{23 + 43}{13} + \frac{43}{13}i \)  | c) \( \frac{19 - 22}{13} - \frac{22}{13}i \)  | d) \( \frac{19 + 22}{41} + \frac{22}{41}i \)  |

Find the volume and surface area of each object shown. Round answers to the nearest tenth.

1. A box that is 5 cm by 9 cm by 4 cm.
   Volume = _________________
   Surface area = _________________

2. \( \sigma = 16 \text{ ft} \)
   Volume = _________________
   Surface area = _________________

3. \( h = 12 \text{ in} \)
   Volume = _________________
   Surface area = _________________

4. Hint: use the Pythagorean Theorem to find the height of the triangular faces.
   Volume = _________________
   Surface area = _________________
Use trigonometric formulas to solve. Give exact answers. Leave in fraction form.

5. Find the trigonometric ratios:

\[ \sin A = \frac{9}{15} \]

\[ \cos A = \frac{12}{15} \]

\[ \tan A = \frac{9}{12} \]

6. Use your knowledge of special triangles to find the following. Give exact answers, do not use a calculator:

\[ \sin 30^\circ = \frac{1}{2} \]

\[ \cos 30^\circ = \frac{\sqrt{3}}{2} \]

\[ \sin 45^\circ = \frac{\sqrt{2}}{2} \]

7. Find the length of \( x \) and \( y \):

\[ x = \frac{40}{\sin 30^\circ} \]

\[ y = \frac{40}{\cos 30^\circ} \]

8. Find the measure of the indicated angles:

a)

b)
Answers:

1. a) \(180 \text{ cm}^3\)
b) \(202 \text{ cm}^2\)

2. a) \(\approx 2143.6 \text{ ft}^3\)
b) \(\approx 804.2 \text{ ft}^2\)

3. a) \(\approx 75.4 \text{ ft}^3\)
b) \(\approx 100.5 \text{ ft}^2\)

4. a) \(400 \text{ in}^3\)
b) \(360 \text{ in}^2\)

5. \(
\begin{align*}
\sin A &= \frac{9}{15} \\
\cos A &= \frac{12}{15} \\
\tan A &= \frac{9}{12}
\end{align*}
\)

6. \(
\begin{align*}
\sin 30^\circ &= \frac{1}{2} \\
\cos 30^\circ &= \frac{\sqrt{3}}{2} \\
\sin 45^\circ &= \frac{\sqrt{2}}{2}
\end{align*}
\)

7. \(x = \frac{52.2}{30.6}\)

8. a) \(37^\circ\)
b) \(50^\circ\)
PRACTICE TEST 5

CHAPTER 11

TEST FORM H

NAME______________________________

CLASS____SCORE____GRADE____

1. Solve: \(3x^2 - 11 = 0\).
   a) \(\pm \sqrt{\frac{11}{5}}\)  
   b) \(\pm \sqrt{\frac{11}{3}}\)  
   c) \(\pm 2\)  
   d) \(\pm \sqrt{\frac{8}{3}}\)

2. Solve: \(5x(x-5) - 2x(x+4) = -90\).
   a) 5.18  
   b) 5.10  
   c) 5.6  
   d) 4.5

3. Solve: \(x^2 + 4x + 1 = 0\).
   a) \(2 \pm \sqrt{3}\)  
   b) \(2 \pm \sqrt{2}\)  
   c) \(-2 \pm \sqrt{2}\)  
   d) \(-2 \pm \sqrt{3}\)

4. Solve: \(x + 5 = x^2\).
   a) \(\frac{1 \pm \sqrt{21}}{2}\)  
   b) \(\frac{1 \pm \sqrt{29}}{2}\)  
   c) \(\frac{5 \pm \sqrt{21}}{2}\)  
   d) \(\frac{5 \pm \sqrt{29}}{2}\)

5. Solve: \(x^{-2} - x^{-1} = \frac{5}{4}\).
   a) \(\frac{4 \pm \sqrt{39}}{5}\)  
   b) \(\frac{5 \pm \sqrt{29}}{2}\)  
   c) \(\frac{-3 \pm \sqrt{39}}{5}\)  
   d) \(\frac{-2 \pm 2\sqrt{6}}{5}\)

6. Solve: \(x^2 + 5x = 1\). Use a calculator to approximate the solutions with rational numbers.
   a) 0.65331193, 7.65331193
   b) -5.1925824, 0.1925824
   c) -0.1925824, 5.65331193
   d) -7.65331193, 0.65331193
TEST FORM H

ANSWERS

7. Let $f(x) = 12x^2 + 7x - 10$. Find $x$ such that $f(x) = 0$.
   
   a) $-\frac{4}{5}, \frac{5}{3}$   b) $-\frac{5}{4}, \frac{2}{3}$   c) $-\frac{2}{5}, \frac{5}{3}$   d) $-\frac{5}{3}, \frac{2}{3}$

8. Complete the square: $x^2 - 12x$. Which of the following is the correct perfect-square trinomial?
   
   a) $x^2 + 22x + 121$   b) $x^2 - 10x + 25$
   c) $x^2 - 20x + 44$   d) $x^2 - 12x + 36$

9. The Mad River flows at a rate of 3 km/h. In order for a boat to travel 78.2 km upriver and then return in a total of 8 hr, how fast must the boat travel in still water?
   
   a) 16.5 km/h   b) 10 km/h   c) 20 km/h   d) 13 km/h

10. Sabine and Hercule can assemble a table in 45 minutes. Working alone, it takes Hercule 48 minutes longer than Sabine to put this table together. How long would it take for Sabine to assemble the table by herself?

   a) 72 minutes   b) 27 minutes
   c) 48 minutes   d) 2 hours

11. Determine the type of number that the solutions of $x^2 + 5x + 3 = 0$ will be.

   a) no solution   b) complex
   c) rational   d) irrational

12. Which of the following quadratic equations has $-4$ and $\frac{3}{4}$ as solutions?

   a) $x^2 + \frac{13}{4}x - 3$   b) $x^2 + \frac{30}{7}x - \frac{25}{7}$
   c) $x^2 + \frac{30}{7}x + \frac{25}{7}$   d) $x^2 - \frac{13}{4}x + 3$
13. Which of the following points is an x-intercept of the graph of 
\[ f(x) = (x^2 + 2x)^2 - 11(x^2 + 2x) + 24 \] 
a) (4,0)  b) (-6,0)  c) (6,0)  d) (-4,0)

14. Graph \(2x^2 + 3x + 1\).

15. What is the y-intercept of \(f(x) = x^2 + x - 12\)?
   a) (0,12)  b) (-72,0)  c) (0,-12)  d) (0,-72)

16. Solve \(w = \frac{va}{r^2 + a^2}\) for \(a\).
   a) \(a = \frac{\sqrt{wr^2}}{v}\)
   b) \(a = \frac{\sqrt{w(r^2 + v^2)}}{v}\)
   c) \(a = \frac{v \pm \sqrt{v^2 - 4w^2r^2}}{2w}\)
   d) \(a = \frac{v \pm \sqrt{v^2 + 4w^2r^2}}{w}\)
17. Rosie’s Palm Pirates, a manufacturer of electronic organizers, estimates that when $x$ hundred Palm Pirates are made, the average cost per unit is given by $C(x) = 0.4x^2 - 3.68x + 9.524$, where $C$ is in hundreds of dollars. What is the minimum cost per unit?
   a) $106$  b) $98$  c) $10.60$  d) $0.98$

18. Find the quadratic function that fits the data points $(−2,0), (1,0), (2,3)$.
   a) $\frac{3}{4}x^2 + \frac{3}{4}x - \frac{3}{2}$
   b) $\frac{1}{4}x^2 - \frac{1}{2}x - \frac{3}{4}$
   c) $\frac{1}{4}x^2 + \frac{1}{2}x + \frac{3}{4}$
   d) $-\frac{3}{4}x^2 + \frac{3}{4}x + \frac{3}{2}$
1. Find \((f \circ g)(x)\) if \(f(x) = -x + x^2\) and \(g(x) = 2x - 3\).
   a) \(-4x^2 - 15x - 12\)  
   b) \(3x^2 - 3x - 2\)  
   c) \(-9x^2 - 15x - 6\)  
   d) \(4x^2 - 14x + 12\)

2. Find a formula for the inverse of \(g(x) = \left(\frac{x - 5}{2}\right)^2\).
   a) \(g^{-1}(x) = 2\sqrt{x + 5}\)  
   b) \(g^{-1}(x) = 2\sqrt[3]{2x + 1}\)  
   c) \(g^{-1}(x) = 3\sqrt[3]{2x - 1}\)  
   d) \(g^{-1}(x) = 3\sqrt{x - 5}\)

3. Which graph represents \(f(x) = \left(\frac{3}{2}\right)^x - \frac{9}{2}\)?
   a)  
   b)  
   c)  
   d) 

4. Simplify \(\log_2 64\).
   a) 6  
   b) 3  
   c) 5  
   d) 2
<table>
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<th>ANSWERS</th>
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| 5. Convert to a logarithmic equation: $4^{-2} = \frac{1}{16}$.
  a) $\log_6 \frac{1}{16} = -3$
  b) $\log_e \frac{1}{216} = -3$
  c) $\log_4 \frac{1}{16} = -2$
  d) $\log_4 \frac{1}{216} = -2$

| 6. Convert to a logarithmic equation: $196^{1/2} = 14$
  a) $\log_{196} 14 = \frac{1}{2}$
  b) $\log_{289} 14 = \frac{1}{2}$
  c) $\log_{289} 17 = \frac{1}{2}$
  d) $\log_{196} 17 = \frac{1}{2}$

| 7. Convert to an exponential equation: $m = \log_8 81$.
  a) $8^m = 64$  b) $9^m = 81$  c) $9^m = 64$  d) $8^m = 81$

| 8. Convert to an exponential equation: $\log_{16} 256 = 2$.
  a) $2^4 = 16$  b) $27^2 = 16$
  c) $3^3 = 27$  d) $16^2 = 256$

| 9. Express in terms of logs of $a$, $b$, and $c$: $\log \frac{a^2 b}{c^{1/3}}$.
  a) $2 \log a + \log b - 3 \log c$
  b) $\log a + \frac{1}{2} \log b - \frac{1}{3} \log c$
  c) $\log a + 2 \log b - \frac{1}{3} \log c$
  d) $2 \log a + \log b - \frac{1}{3} \log c$

| 10. Express as a single logarithm: $4 \log_e x - 3 \log_e z$.
  a) $\log_e \frac{x^4}{z^3}$  b) $\log_e \frac{x^{3/4}}{z^{1/3}}$
  c) $\log_e \frac{x^2}{z^3}$  d) $\log_e \frac{x^2}{z^{1/2}}$

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### CHAPTER 12

**TEST FORM H**

<table>
<thead>
<tr>
<th>11. Simplify: $\log_u u$.</th>
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<tbody>
<tr>
<td>a) $w$</td>
</tr>
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<table>
<thead>
<tr>
<th>12. Simplify: $\log_t t^{0.1}$.</th>
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<tbody>
<tr>
<td>a) $0.1$</td>
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<thead>
<tr>
<th>13. Simplify: $\log_n 1$.</th>
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<tbody>
<tr>
<td>a) $0$</td>
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<thead>
<tr>
<th>14. Given $\log_4 4 = 1.386$, $\log_e 5 = 1.609$, and $\log_e 6 = 1.792$, find $\log_{10} 100$.</th>
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</thead>
<tbody>
<tr>
<td>a) $4.604$</td>
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<thead>
<tr>
<th>15. What is the range of $f(x) = e^x + 3$?</th>
</tr>
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<tbody>
<tr>
<td>a) $(3, \infty)$</td>
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</table>

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<thead>
<tr>
<th>16. What is the domain of $g(x) = \ln(x - 2)$?</th>
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</thead>
<tbody>
<tr>
<td>a) $(-2, 2)$</td>
</tr>
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<table>
<thead>
<tr>
<th>17. Solve: $4^x = \frac{1}{256}$.</th>
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<tbody>
<tr>
<td>a) $4$</td>
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</table>

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<thead>
<tr>
<th>18. Solve $\log_5 16 = 2$.</th>
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<tbody>
<tr>
<td>a) $16$</td>
</tr>
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</table>

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<thead>
<tr>
<th>19. Solve: $\log_{32} x = \frac{1}{2}$.</th>
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<tbody>
<tr>
<td>a) $9$</td>
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</tbody>
</table>

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## ANSWERS

20. Solve: $4^x = 2.4$. Give exact answer in terms of common logarithms.

   a) $\frac{\log 2.3}{\log 5}$  
   b) $\frac{\log 2.4}{\log 4}$  
   c) $\frac{\log 4}{\log 2.4}$  
   d) $\frac{\log 5}{\log 2.3}$

21. Solve and give answer to the nearest ten-thousandth: $\ln x = \frac{13}{8}$.

   a) 5.0789  
   b) 6.5208  
   c) 6.5272  
   d) 5.0784

22. Solve: $\log(x - 6) + \log(x + 3) = \log 10$.

   a) 2  
   b) 4  
   c) 5  
   d) 7

23. The population in India in 2000 was 1.014 billion, and was growing exponentially by 1.58% per year. When will India’s population reach 1.5 billion?

   a) 2017  
   b) 2025  
   c) 2031  
   d) 2022

24. How old is an animal bone that has lost 22% of its carbon-14? (Use $P(t) = P_0e^{-0.000121t}$.)

   a) 1860 yrs  
   b) 2070 yrs  
   c) 3080 yrs  
   d) 4290 yrs

25. An investment with interest compounded continuously doubled itself in 10 yrs. What is the interest rate?

   a) 6.93%  
   b) 4.32%  
   c) 8.66%  
   d) 7.25%
CHAPTER 13

TEST FORM H

Find the distance between each pair of points.

1. $(7,-3)$ and $(-7,1)$
   a) $16\sqrt{17}$  b) $2\sqrt{109}$  c) $6\sqrt{5}$  d) $2\sqrt{53}$

2. $(1,-a)$ and $(-1,a)$
   a) $2\sqrt{1+a^2}$  b) $2\sqrt{a}$  c) $\sqrt{2a}$  d) $2\sqrt{4+a^2}$

Find the midpoint of the segment with the given endpoints.

3. $(8,-2)$ and $(-8,1)$
   a) $(0,-0.5)$  b) $(-1,0)$  c) $(0.5,-1.5)$  d) $(0,-1)$

4. $(5,-a)$ and $(-1,a)$
   a) $(0,a)$  b) $(2,0)$  c) $(0,2)$  d) $(0,0)$

Find the center and the radius of each circle.

5. $(x+7)^2 + (y-6)^2 = 16$
   a) $(-7,7)$; 3  b) $(7,-6)$; 4  c) $(7,-7)$; 3  d) $(-7,6)$; 4

6. $x^2 + y^2 + 8x - 4y + 2 = 0$
   a) $(4,1)$; 4  b) $(-4,2)$; $3\sqrt{2}$  c) $(4,-2)$; $3\sqrt{2}$  d) $(4,-1)$; 4

ANSWERS

1. 

2. 

3. 

4. 

5. 

6. 

Classify the equation as a circle, an ellipse, a parabola, or a hyperbola.

7. \( x^2 + y^2 + 6x + 4y + 4 = 0 \)
   a) ellipse  b) parabola  c) circle  d) hyperbola

8. \( y = x^2 + 6x + 6 \)
   a) ellipse  b) circle  c) hyperbola  d) parabola

9. Which is the graph of \( \frac{y^2}{4} - \frac{x^2}{9} = 1 \)?
   a)  
   b)  
   c)  
   d)
10. Which is the graph of \(25x^2 + 4y^2 = 100\)?

   a) \[
   \begin{array}{c}
   \begin{array}{c}
   y \\
   \hline
   -5 & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 \\
   \end{array}
   \end{array}
   \]

   b) \[
   \begin{array}{c}
   \begin{array}{c}
   y \\
   \hline
   -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 \\
   \end{array}
   \end{array}
   \]

   c) \[
   \begin{array}{c}
   \begin{array}{c}
   y \\
   \hline
   -5 & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 \\
   \end{array}
   \end{array}
   \]

   d) \[
   \begin{array}{c}
   \begin{array}{c}
   y \\
   \hline
   -5 & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 \\
   \end{array}
   \end{array}
   \]

11. Which equation corresponds to the graph at right?

   a) \[
   \frac{y^2}{16} - \frac{x^2}{4} = 1
   \]

   b) \[
   \frac{x^2}{4} - \frac{y^2}{16} = 1
   \]

   c) \(xy = -4\)

   d) \(xy = -13\)
12. Which equation corresponds to the graph at right?

a) \( y = x^2 - 3x \)  
   b) \( y = x^2 + 3x \)  
   c) \( x = -y^2 - 3y \)  
   d) \( x = -y^2 + 3y \)

13. Find one solution to the system \( \frac{x^2}{16} + \frac{y^2}{4} = 1, \)
    \( 2x + 4y = 8. \)

a) \((2,0)\)  
   b) \((0,4)\)  
   c) \((0,5)\)  
   d) \((4,0)\)

14. Find one solution to the system \( x^2 + y^2 = 9, \)
    \( \frac{x^2}{9} - \frac{y^2}{2} = 1. \)

a) \((2,0)\)  
   b) \((0,3)\)  
   c) \((0,-2)\)  
   d) \((-3,0)\)
15. A rectangle with diagonal of length $\sqrt{65}$ has an area of 28. Find the dimensions of the rectangle.
   a) 7 by 4    b) 24 by 3    c) 7 by 2    d) 12 by 3

16. Two squares are such that the sum of their areas is 12 $m^2$ and the difference of their areas is 4 $m^2$. Find the length of a side of each square.
   a) $\sqrt{5}$ m, $\sqrt{2}$ m     b) $\sqrt{2}$ m, 5 m
   c) $2\sqrt{2}$ m, 2 m     d) $2\sqrt{5}$ m, $2\sqrt{2}$ m

17. A rectangle has a diagonal of length 29 m and a perimeter of 82 m. Find the larger dimension of the rectangle.
   a) 20 m     b) 12 m     c) 21 m     d) 9 m

Chapter 13, Test Form H