Contents

Introduction to College Algebra CLEP Practice Questions

Welcome to the College Algebra CLEP Practice Questions resource, a meticulously curated collection of questions designed to prepare you for the College Algebra CLEP test. This resource is focused on rigorous, high-quality practice that mirrors the format, difficulty, and structure of the actual exam.

What is the CLEP Test?

The College-Level Examination Program (CLEP) allows students to earn college credit by demonstrating their mastery of college-level material through a standardized exam. The College Algebra CLEP test evaluates your understanding of algebraic concepts typically covered in a one-semester college algebra course.

How This Resource Helps You Prepare

This resource includes a comprehensive set of practice questions devised to align closely with the CLEP College Algebra test. These questions are not designed to teach or provide detailed explanations but are intended to offer intensive practice in authentic test conditions.

Key Features

Authentic Test-Style Questions: Practice questions are identical in format and style to those found on the actual CLEP exam.
Varied Difficulty Levels: Questions are crafted to cover a wide range of difficulty, ensuring thorough preparation.
Test-Focused Practice: Simulate real exam conditions to build confidence and improve problem-solving skills.

By engaging with these questions, you'll be able to sharpen your algebra skills, identify areas for improvement, and feel confident and prepared to succeed on the CLEP College Algebra test.

Linear Equations

1. Solve for x in the equation $2x + 5 = 17$.
    a) 5
    b) 6
    c) 7
    d) 8
2. If $3x - 4 = 2x + 6$, what is the value of x?
    a) 2
    b) 4
    c) 8
    d) 10
3. The sum of a number and 9 is 20. What is the number?
    a) 9
    b) 11
    c) 20
    d) 29
4. Solve the equation $5(x - 1) = 15$.
    a) 2
    b) 3

c) 4

d) 5

5. Find x in the equation $\frac{1}{2}x - 3 = 4$.

   a) 10

   b) 12

   c) 14

   d) 16

6. If $4x + 3 = 2x + 15$, what is the value of x?

   a) 3

   b) 6

   c) 9

   d) 12

7. Solve for x: $x + 2 = 3(x - 4)$.

   a) 3

   b) 4

   c) 5

   d) 6

8. A number is 3 more than twice another number. If their sum is 45, what is the smaller number?

   a) 14

   b) 15

   c) 16

   d) 17

9. The difference between a number and 7 is 9. Find the number.

   a) 9

   b) 16

   c) 17

   d) 18

10. Solve for x in the equation $7x - 2 = 5x + 6$.

    a) 2

    b) 3

    c) 4

    d) 5

Quadratic Equations

1. Solve the quadratic equation:

$$x^2 - 5x + 6 = 0$$

   A) $x = 1$, $x = 6$

   B) $x = 2$, $x = 3$

   C) $x = -2$, $x = -3$

   D) $x = -1$, $x = -6$

2. Solve for x:

$$2x^2 + 3x - 5 = 0$$

   A) $x = 1$, $x = -\frac{5}{2}$

   B) $x = \frac{1}{2}$, $x = -5$

   C) $x = -1$, $x = \frac{5}{2}$

   D) $x = \frac{-3 \pm \sqrt{41}}{4}$

3. Which of the following represents the vertex form of the quadratic function $f(x) = x^2 + 4x + 4$?

A) $f(x) = (x + 2)^2$

B) $f(x) = (x - 2)^2$

C) $f(x) = (x + 4)^2$

D) $f(x) = (x - 4)^2$

4. Determine the axis of symmetry for the quadratic equation:

$$y = 3x^2 - 12x + 7$$

A) $x = 2$

B) $x = -2$

C) $x = 3$

D) $x = -3$

5. If the roots of the quadratic equation $ax^2 + bx + c = 0$ are real and equal, which of the following statements is true?

A) $b^2 - 4ac > 0$

B) $b^2 - 4ac = 0$

C) $b^2 - 4ac < 0$

D) The roots are complex numbers.

6. Find the maximum or minimum value of the quadratic function

$$f(x) = -2x^2 + 4x + 1$$

A) Maximum at $x = -1$

B) Maximum at $x = 1$

C) Minimum at $x = -2$

D) Minimum at $x = 2$

7. Solve the equation by completing the square:

$$x^2 + 6x + 8 = 0$$

A) $x = -4$, $x = -2$

B) $x = -1$, $x = -7$

C) $x = 3$, $x = -9$

D) $x = 2$, $x = -8$

8. The roots of the quadratic equation $3x^2 + kx - 9 = 0$ are $\frac{1}{2}$ and 3. Find the value of k.

9. Determine the nature of the roots for the quadratic equation:

$$5x^2 + 2x + 1 = 0$$

A) Two distinct real roots

B) Exactly one real root

C) Two complex roots

D) Infinitely many roots

10. A quadratic function is given by $f(x) = 2x^2 - 8x + 6$. What is the y-intercept of this function?

11. Which quadratic equation has roots -3 and 4?

    A) $x^2 + x - 12 = 0$

    B) $x^2 - x - 12 = 0$

    C) $x^2 - x + 12 = 0$

    D) $x^2 + x + 12 = 0$

12. Solve the quadratic equation: $x^2 - 4x - 5 = 0$

Polynomial Functions

1. What is the degree of the polynomial $f(x) = 4x^5 - 3x^3 + 2x - 7$?

    A) 1

    B) 3

    C) 5

    D) 7

2. Given the polynomial $p(x) = x^4 + 2x^3 - x^2$, which of the following is a root?

    A) $x = 0$

    B) $x = 1$

    C) $x = -1$

    D) $x = 2$

3. Find the polynomial function with zeros at $x = -3$, $x = 2$, and $x = 4$.

4. If $g(x) = 2x^3 - 5x^2 + 4x - 8$, what is $g(-1)$?

5. Which polynomial is factorable?

    A) $x^2 + 4x + 7$

    B) $x^2 - 9$

    C) $x^2 + 1$

    D) $x^2 - 5x + 6$

6. Simplify the expression $(2x - 1)(3x + 4)$.

7. What is the leading coefficient of the polynomial $h(x) = -6x^2 + 3x - 1$?

    A) -6

    B) 3

    C) 1

    D) -1

8. Determine the remainder when the polynomial $f(x) = x^3 - 4x^2 + 5x - 2$ is divided by $x - 2$.

9. If $p(x) = 3x^4 - 7x^3 + 2x^2 - x + 5$, what is the coefficient of x^2?

    A) 3

    B) -7

C) 2

D) 5

10. True or False: The polynomial $x^3 + x + 1$ has a degree of 3.

Rational Equations

1. Solve the rational equation:

$$\frac{x+2}{x-1} = \frac{3}{x+1}$$

   A) $x = -2$

   B) $x = 1$

   C) $x = 3$

   D) $x = -3$

2. If $\frac{2}{x} + \frac{3}{x+4} = 1$, what is the value of x?

3. Simplify and solve for x:

$$\frac{5x}{x^2 - 4} - \frac{3}{x^2 - 4} = 0$$

4. Solve the equation:

$$\frac{1}{x} + \frac{1}{x+2} = \frac{3}{4}$$

5. The equation $\frac{4x}{x+5} = 2$ is equivalent to which of the following? Select the correct form.

   A) $4x = 2x + 10$

   B) $4x = 2x - 10$

   C) $4x + 10 = 2x$

   D) $2(x + 5) = 4$

6. Solve for x:

$$\frac{x}{x+1} = \frac{3}{5}$$

7. A rational equation is given by $\frac{3}{2x} = \frac{5}{6}$. What is the solution to this equation?

   A) $x = \frac{9}{10}$

   B) $x = \frac{5}{9}$

C) $x = \frac{5}{4}$

D) $x = \frac{9}{5}$

8. Solve the rational expression:

$$\frac{2x + 3}{x^2 - 9} = \frac{1}{x - 3}$$

9. If $\frac{4}{x-3} - \frac{2}{x+3} = 1$, find x.

10. Solve the equation:

$$\frac{x - 1}{x + 2} = \frac{3x + 1}{2x + 3}$$

11. Solve for x:

$$\frac{x + 7}{x^2 - 4x - 5} = 0$$

12. Find the solution of the equation $\frac{x+3}{x-2} = \frac{x-1}{x+4}$.

Exponential and Logarithmic Functions

1. Solve for x: $e^{2x} = 7$.

2. Evaluate the logarithm: $\log_2 16$.

   A. 2
   B. 3
   C. 4
   D. 5

3. What is the inverse of the function $f(x) = \ln(x - 1)$?

4. If $3^x = 81$, what is the value of x?

5. Simplify: $\log_{10} 1000$.

   A. 1
   B. 2
   C. 3
   D. 4

6. Solve for y: $\log(y) + \log(10) = 2$.

7. If $y = e^x$, express x in terms of y.

8. What is the solution to $\ln(x) = 2$?

9. Find x: $5^x = 25$.

10. Convert to exponential form: $\log_b(x) = y$.

11. Evaluate $\log_5(1)$.

A. 0
B. 1
C. 5
D. Undefined

12. Solve the equation: $3^{x+1} = 81$.

13. What is $\log_3(27)$?

A. 1
B. 2
C. 3
D. 4

14. Simplify: $e^{\ln(5)}$.

15. Solve for x: $\ln(3x) = 0$.

16. What is the base b if $\log_b(64) = 3$?

17. Convert the expression to a single logarithm: $\log_2(8) + \log_2(4)$.

18. If $\log_x(49) = 2$, find x.

19. Solve for x: $2^x = \frac{1}{8}$.

20. What is the value of $\log_{100}(10)$?

A. 1
B. 0.5
C. 2
D. 10

Systems of Equations

1. Solve the system of equations:
$$2x + 3y = 5$$
$$4x - y = 11$$

   a) $x = 2, y = 0$
   b) $x = 3, y = -1$
   c) $x = 1, y = 1$
   d) $x = -1, y = 3$

2. Which of the following is the solution to the system?
$$x + 2y = 7$$
$$3x - y = -1$$

   a) $x = 1, y = 3$
   b) $x = 0, y = 3$
   c) $x = 2, y = 2$
   d) $x = 3, y = 2$

3. Determine x and y such that:
$$5x + 4y = 3$$
$$x - 2y = 10$$

   a) $x = 2, y = -4$
   b) $x = 3, y = 2$
   c) $x = -2, y = 5$
   d) $x = -3, y = 4$

4. Find the values of x and y for the following system:
$$7x + 6y = 8$$
$$-3x + 2y = 1$$

a) $x = 1, y = 0$
b) $x = -1, y = 2$
c) $x = 0, y = 1$
d) $x = 2, y = -1$

5. Solve this system:

$$3x - y = 5$$
$$x + 4y = 13$$

a) $x = 3, y = 2$
b) $x = 4, y = 1$
c) $x = 2, y = 3$
d) $x = 5, y = -1$

6. What are the solutions for x and y?

$$2x + y = 11$$
$$x - y = 3$$

a) $x = 4, y = 2$
b) $x = 5, y = 1$
c) $x = 7, y = 4$
d) $x = 8, y = -1$

7. Solve the system:

$$x + y = 6$$
$$x - y = 4$$

a) $x = 5, y = 1$
b) $x = 6, y = 0$
c) $x = 0, y = 6$
d) $x = 3, y = 3$

8. Calculate the solution for x and y:

$$x - 3y = 3$$
$$2x + y = -4$$

a) $x = -1, y = -2$
b) $x = 1, y = -2$
c) $x = 1, y = 1$
d) $x = -2, y = 1$

9. What is the value of x and y that satisfies:

$$4x + 7y = 1$$
$$2x - 3y = 12$$

a) $x = 3, y = 1$
b) $x = 2, y = -1$
c) $x = 1, y = -1$
d) $x = 4, y = 2$

10. Solve for x and y:

$$5x + y = 14$$
$$3x - 2y = -6$$

a) $x = 2, y = 4$
b) $x = 0, y = 3$
c) $x = 3, y = 1$
d) $x = -1, y = 2$

Matrices and Determinants

1. Evaluate the determinant of the following 2×2 matrix:

$$\begin{pmatrix} 3 & 4 \\ 2 & 5 \end{pmatrix}$$

   A. 7
   B. 11
   C. 13
   D. 23

2. Given the 3×3 matrix:

$$\begin{pmatrix} 2 & 0 & 1 \\ 3 & 4 & -1 \\ 5 & 6 & 0 \end{pmatrix}$$

   Find the determinant.

3. Solve for the determinant of $\begin{pmatrix} k & 0 \\ 3 & k \end{pmatrix}$ in terms of k.

4. For which value(s) of k will the matrix $\begin{pmatrix} 2 & k \\ k & 2 \end{pmatrix}$ be singular?

5. If $A = \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 2 \\ 1 & 5 \end{pmatrix}$, calculate the determinant of $A \cdot B$.

6. What is the inverse of the matrix $\begin{pmatrix} 4 & 7 \\ 2 & 6 \end{pmatrix}$?

7. Which of the following operations would change the determinant of a matrix?

   A. Adding a scalar multiple of one row to another row.
   B. Multiplying a row by a nonzero scalar.
   C. Interchanging two rows.
   D. All of the above.

8. Find the determinant of the matrix after performing elementary row operations:

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 6 \end{pmatrix}$$

   Row 2 ← Row 2 + 3(Row 1)

9. If $C = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{pmatrix}$, calculate the determinant of C.

10. An identity matrix I of size 3×3 is defined. What is the determinant of $2I$?

Sequences and Series

1. **What is the 10th term of the arithmetic sequence where the first term is 5 and the common difference is 3?**

   A. 32
   B. 35
   C. 38
   D. 41

2. **Find the sum of the first 20 terms of the arithmetic series with a first term of 7 and a common difference of 4.**

3. **In a geometric sequence, the first term is 3 and the common ratio is 2. What is the 6th term?**

   A. 48
   B. 96
   C. 192
   D. 384

4. **Calculate the sum of the infinite geometric series with a first term of 10 and a common ratio of 0.5.**

   A. 15
   B. 20
   C. 25
   D. 30

5. **The 5th term of an arithmetic sequence is 18, and the 8th term is 30. What is the first term of the sequence?**

6. **If the sum of a finite geometric series is 62, the first term is 2, and the common ratio is 3, how many terms are in the series?**

7. **What is the value of the following series:**

$$\sum_{n=1}^{100}(2n+1)$$

8. **Find the fourth term of the sequence defined by the recursive formula $a_n = 2a_{n-1} + 3$, with $a_1 = 1$.**

9. **Determine the common ratio of a geometric sequence if the third term is 16 and the sixth term is 128.**

10. **Consider the sequence given by the explicit formula $a_n = 4n^2 - n + 6$. What is the value of the fifth term?**

11. **For the arithmetic sequence with the explicit formula $a_n = 12 + 5(n-1)$, verify if the term 57 is in the sequence, and if so, which term it is.**

12. **Evaluate the series:**
$$5 + 10 + 20 + 40 + \cdots + 640$$

13. **A sequence is defined as $b_n = 7 - 3n$. What is the sum of the first 10 terms of this sequence?**

14. **Suppose you have an arithmetic sequence where the fifth term is 22 and the twelfth term is 50. What is the sum of the first 15 terms?**

15. **How many terms are there in the sequence 3, 6, 12, ..., that ends at 192?**

A. 5
B. 6
C. 7
D. 8

Probability and Statistics

1. **A box contains 4 red, 5 blue, and 3 green balls. If one ball is drawn at random, what is the probability that it is red?**

   A. $\frac{1}{3}$

   B. $\frac{1}{4}$

   C. $\frac{1}{5}$

   D. $\frac{1}{2}$

2. **What is the probability of rolling a sum of 7 with two dice?**

   A. $\frac{1}{6}$

   B. $\frac{1}{36}$

   C. $\frac{7}{36}$

   D. $\frac{5}{36}$

3. **If a fair coin is tossed 3 times, what is the probability of getting exactly 2 heads?**

4. **A deck of cards consists of 52 cards. What is the probability of drawing an Ace or a King?**

   A. $\frac{1}{13}$

   B. $\frac{2}{13}$

   C. $\frac{1}{26}$

   D. $\frac{1}{4}$

5. **An urn contains 7 red, 3 blue, and 10 white marbles. If two marbles are drawn at random without replacement, what is the probability that both are red?**

6. **A survey shows that 60% of people like apples, 70% like oranges, and 50% like both. What percentage of people like either apples or oranges?**

7. **A class consists of 10 boys and 15 girls. A student is selected at random. What is the probability that the student is a girl?**

   A. $\frac{2}{5}$

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

   C. $\frac{1}{3}$

   D. $\frac{1}{2}$

8. **A die is rolled, what is the probability that a number greater than 4 appears?**

   A. $\frac{1}{2}$

   B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{1}{6}$

9. **The probability of winning a game is** 0.2**. What is the probability of losing the game?**

10. **In a room with 8 people, what is the probability that at least two people have the same birthday? (Assume 365 days in a year and ignore leap years.)**

11. **If the probability of rain on any given day is** $\frac{1}{4}$**, what is the probability that it rains exactly 2 days in a 5-day period?**

12. **A jar contains 10 black, 15 white, and 5 grey balls. If two balls are drawn at random with replacement, what is the probability that both are white?**

13. **The mean of a dataset is 20 and the sum of the data points is 400. How many data points are in the dataset?**

14. **If the variance of a dataset is 16, what is the standard deviation?**

A. 2

B. 4

C. 8

D. 16

15. **Which measure of central tendency is most affected by extreme values?**

A. Mean

B. Median

C. Mode

D. Range

16. **A set of exam scores is normally distributed with a mean of 70 and a standard deviation of 10. What percentage of students scored between 60 and 80?**

17. **If two events A and B are mutually exclusive, what is** $P(A \cup B)$ **if** $P(A) = 0.3$ **and** $P(B) = 0.4$**?**

18. **The probability of event A is 0.6, and event B is 0.7. Assuming A and B are independent, what is the probability of both A and B occurring?**

Trigonometry

1. Evaluate $\sin(\frac{\pi}{6})$.

   A. $\frac{1}{2}$
   B. $\frac{\sqrt{3}}{2}$
   C. $\sqrt{2}$
   D. 1

2. What is $\cos(0)$?

   A. 0

B. 0.5
C. 1
D. Undefined

3. If $\tan(\theta) = 1$, which of the following could be θ?

A. 0
B. $\frac{\pi}{4}$
C. $\frac{\pi}{2}$
D. π

4. Solve for x: $\sin(x) = \frac{\sqrt{3}}{2}$, $0 \leq x < 2\pi$.

5. What is the exact value of $\cos(\frac{2\pi}{3})$?

A. $-\frac{1}{2}$
B. $\frac{1}{2}$
C. $-\frac{\sqrt{3}}{2}$
D. $\frac{\sqrt{3}}{2}$

6. Determine the principal value of $\arcsin(-\frac{1}{2})$.

7. Find θ if $\cos(\theta) = -\frac{\sqrt{2}}{2}$ and $0 \leq \theta \leq \pi$.

8. Evaluate $\tan(\frac{3\pi}{4})$.

9. Simplify the expression $\sin^2(x) + \cos^2(x)$.

10. If $\sec(\theta) = 2$, what is $\cos(\theta)$?

11. Which of the following is true for $\csc(\frac{\pi}{6})$?

A. $\frac{1}{2}$
B. $\sqrt{3}$
C. 2
D. Undefined

12. If $\cot(\theta) = -1$, what is a possible value of θ within 0 and 2π?

13. Solve the equation $2\sin(x) - 1 = 0$ for x in the interval $[0, 2\pi)$.

14. What is $\sin(\pi - x)$ in terms of $\sin(x)$?

15. Evaluate the expression $\cos(\pi + x)$ in terms of $\cos(x)$.

16. If $\tan(x) = \frac{3}{4}$, find $\sin(x)$ given that x is in the first quadrant.

17. Find x such that $\sin(2x) = \cos(x)$, within $0 \leq x < 2\pi$.

18. Determine the amplitude of the function $y = 3\sin(x)$.

19. Identify the period of $y = \cos(2x)$.

20. If $\sin(x) = \frac{4}{5}$ and x is in the first quadrant, find $\cos(x)$.

Complex Numbers

1. **What is the sum of** $(3 + 2i) + (4 - 5i)$**?**

A. $7 - 3i$

B. $1 + 7i$

C. $7 + 3i$

D. $7 - 7i$

2. **Multiply $(2 + 3i)(1 - 4i)$ and find the result.**

   A. $14 + 5i$

   B. $14 - 5i$

   C. $-10 + 5i$

   D. $-10 - 5i$

3. **What is the modulus of the complex number $6 - 8i$?**

   A. 2

   B. 10

   C. 20

   D. 100

4. **Divide the complex numbers $(7 + 3i)$ and $(2 - i)$ and express in standard form.**

   A. $2 + 5i$

   B. $3 - i$

   C. $1 + 4i$

   D. $3 + i$

5. **Find the conjugate of the complex number $5 - 9i$.**

   A. $5 + 9i$

   B. $-5 - 9i$

   C. $9 - 5i$

   D. $-5 + 9i$

6. **Solve the equation $z^2 + 4z + 13 = 0$ for complex numbers z.**

7. **Express $\frac{4}{3+2i}$ in the form $a + bi$.**

8. **If $z = 3 + 4i$, what is $\bar{z}$, the complex conjugate of z?**

   A. $3 - 4i$

   B. $-3 + 4i$

   C. $-3 - 4i$

   D. $3 + 4i$

9. **Which of the following represents the square of i, the imaginary unit?**

A. 1

B. i

C. -1

D. $-i$

10. **Simplify the expression $(2+i)^2$.**

A. $4 + 4i + i^2$

B. $3 + 4i$

C. $3 + 4i + i^2$

D. $4 + 4i - i^2$

11. **Add the complex numbers $(7 - 4i)$ and $(3 + 6i)$ and find the result.**

A. $10 + 2i$

B. $10 - 2i$

C. $4 + 10i$

D. $4 - 10i$

12. **What is the argument of the complex number $-3 + 3i$ when expressed in polar form?**

A. $\frac{\pi}{4}$

B. $\frac{3\pi}{4}$

C. $\frac{5\pi}{4}$

D. $\frac{7\pi}{4}$

13. **Convert the complex number $5 - 5i$ to polar form.**

14. **Find the imaginary part of $z = -2 + 7i$.**

A. -2

B. 7

C. -7

D. 2

15. **If $w = 1 - 2i$ and $z = -4 + i$, calculate wz.**

Absolute Value Inequalities

1. **Solve the inequality:** $|2x - 3| < 7$
   A. $x < 5$
   B. $-2 < x < 5$
   C. $x > 5$
   D. $x > -2$

2. **Which of the following represents the solution to** $|x + 4| > 6$?
   A. $x < -10$ or $x > 2$
   B. $x > 10$
   C. $x < 10$
   D. $4 < x < 10$

3. **Find the solution for:** $|3x + 5| \leq 11$
   A. $-4 \leq x \leq 2$
   B. $x \geq -2$
   C. $-6 < x < 6$
   D. $x \leq 6$

4. **Consider the inequality** $|x-1| \geq 4$**. Which of the following intervals represents the solution?**
   A. $x \leq -3$ or $x \geq 5$
   B. $3 < x < 5$
   C. $x = 1$
   D. $-3 < x < 5$

5. **Solve for x:** $|4x + 9| \geq 12$
   A. $x \geq 3$
   B. $x \leq -5.25$ or $x \geq 0.75$
   C. $x > 9$
   D. $x = 3$

6. **Determine the solution of the inequality:** $|5 - x| < 2$
   A. $3 < x < 7$
   B. $-2 < x < 2$
   C. $x > 3$
   D. $x < 7$

7. **Solve:** $|x + 3| \leq -8$
   A. $x > -11$
   B. $x < -3$
   C. No solution
   D. $x \leq 5$

8. **What is the range of x for which** $|2x - 8| < 10$?
   A. $x < 6$
   B. $-1 < x < 9$
   C. $x > -6$
   D. $3 < x < 8$

9. **Solve the inequality:** $|x - 7| > 4$
   A. $x < 3$ or $x > 11$
   B. $x \geq 5$
   C. $3 < x < 11$
   D. $x \leq 11$

10. **Determine x such that:** $|x/2 + 1| \geq 3$
    A. $x \leq -8$ or $x \geq 4$
    B. $-2 < x < 4$
    C. $x > 0$
    D. $x < 8$

11. **Find the solution set for:** $|x - 4| = 0$
    A. $x = 4$

B. $x = 0$

C. $x = -4$

D. No solution

12. **Solve for x:** $|3x - 2| = 7$

    A. $x = 3$

    B. $x = -5$

    C. $x = \frac{3}{2}$ or $x = -\frac{5}{3}$

    D. $x = 5$

13. **Which x satisfies** $|x + 1| \leq 4$?

    A. $x \geq 3$

    B. $x \leq 5$

    C. $-5 \leq x \leq 3$

    D. $x < -1$

14. **Solve for x:** $4|x| - 1 \geq 15$

    A. $x \geq 4$

    B. $x \leq -4$ or $x \geq 4$

    C. $x \geq -3$

    D. $x < 0$

15. **Find the values of x for:** $|2x + 3| \leq 5$

    A. $x \leq -2$

    B. $-4 \leq x \leq 1$

    C. $x \leq 3$

    D. $x = 0$

Logarithm Properties

1. Simplify the expression: $\log_2 8 + \log_2 4$.

2. Solve for x: $\log_5 x = 3$.

    a) $x = 15$

    b) $x = 25$

    c) $x = 125$

    d) $x = 625$

3. Evaluate $\log_{10} 1000$.

4. Express $\log_b(x^3)$ in terms of $\log_b(x)$.

5. If $\log_3(9) = x$, find the value of x.

    a) $x = 1$

    b) $x = 4$

    c) $x = 2$

    d) $x = 3$

6. Which of the following is equal to $\log(x) + \log(y)$?

    a) $\log(x + y)$

    b) $\log(xy)$

    c) $\log\left(\frac{x}{y}\right)$

    d) $\log(x - y)$

7. Solve the equation: $\ln(e^x) = 5$.

8. Simplify $2\log_2(6) - \log_2(3)$.

9. Which of the following is equal to $\log_a(1)$?

    a) 0

    b) 1

    c) a

    d) $\log_a(a)$

10. Express the following as a single logarithm: $4\log_b(2) - \log_b(8)$.

11. If $\log(2) = 0.3010$, what is $\log(20)$?

12. Evaluate $\log_{10}(\frac{1}{100})$.

13. Solve for x: $\log_2(3x - 1) = 4$.

14. Simplify the expression: $\log_b(x^2) - 2\log_b(x)$.

15. If $2\log(x) = 5$, find x.

16. Convert the expression $\log_c(a)\log_c(b)$ into a single logarithm.

17. What is the value of x if $2^{\log_2(x)} = 16$?

a) 4

b) 8

c) 16

d) 32

18. Simplify $\frac{1}{2}\log_y(y^4)$.

19. Rewrite $\log_{10}(25) + \log_{10}(4)$ as a single logarithm.

20. For $\log(\frac{x}{5}) = 2$, solve for x.

Exponents and Radicals

1. **Simplify the expression: $2^3 \times 2^4$.**
   A. 2^{12}
   B. 2^7
   C. 128
   D. 14
2. **Evaluate: 3^{-2}.**
   A. $\frac{1}{9}$
   B. $\frac{1}{6}$
   C. 1
   D. 9
3. **Simplify the expression: $(x^2y)^3$.**
   A. x^6y
   B. x^6y^3
   C. x^5y^3
   D. x^8y^3
4. **Multiply and simplify: $(a^3b^2)(a^4b^5)$.**
   A. a^7b^4

B. a^7b^7

C. $a^{12}b^{10}$

D. a^8b^6

5. **Rationalize the denominator:** $\frac{1}{\sqrt{5}}$.

   A. $\frac{\sqrt{5}}{5}$

   B. $5\sqrt{5}$

   C. $\sqrt{5}$

   D. $\frac{1}{5\sqrt{5}}$

6. **Simplify:** $16^{\frac{3}{4}}$.

   A. 4

   B. 8

   C. 16

   D. 64

7. **Evaluate:** $\left(\frac{27}{8}\right)^{-2/3}$.

   A. $\frac{9}{4}$

   B. $\frac{16}{9}$

   C. $\frac{4}{9}$

   D. $\frac{2}{3}$

8. **Solve for** x: $5^{2x} = 125$.

   A. $\frac{3}{2}$

   B. 2

   C. $\frac{5}{2}$

   D. 3

9. **Express in simplest radical form:** $\sqrt{50}$.

   A. $5\sqrt{2}$

   B. $10\sqrt{5}$

   C. $25\sqrt{2}$

   D. $\sqrt{5}$

10. **Simplify:** $\frac{1}{x^{-3}}$.

   A. x^3

   B. x^{-3}

   C. $\frac{1}{x^3}$

   D. x

11. **Multiply:** $(3x^{-2}y^3)(2x^4y^{-1})$.

   A. $6x^2y^2$

   B. $6x^6y^2$

   C. $6x^2y^6$

   D. $6x^5y^5$

12. **Express as a single power of** x: $x^4 \cdot x^{-7}$.

   A. x^{-3}

   B. x^3

   C. x^{-28}

   D. x^{11}

13. **Simplify the expression:** $\sqrt{x^8}$.

   A. x^4

   B. x^8

   C. x^2

   D. $4x$

14. **Divide and simplify:** $\frac{a^8b^{-3}}{a^{-2}b^4}$.

   A. $a^{10}b^{-7}$

   B. a^6b^7

   C. $a^{-10}b^{-7}$

   D. $a^{10}b^7$

15. **Convert the radical to an exponent form:** $\sqrt[3]{64}$.

    A. $64^{\frac{1}{3}}$

    B. 4

    C. $2^{4/3}$

    D. 8

16. **Simplify the expression:** $\left(\frac{x^3}{y^{-2}}\right)^{-1}$.

    A. $\frac{y^2}{x^3}$

    B. $\frac{x^{-3}}{y^2}$

    C. $\frac{y^{-2}}{x^{-3}}$

    D. $\frac{x^3}{y^2}$

17. **Rewrite in radical notation:** $x^{1/5}$.

    A. $\sqrt[5]{x}$

    B. $\sqrt{x}$

    C. x^5

    D. $\sqrt[10]{x}$

18. **Solve:** $16^{x/2} = \frac{1}{4}$.

    A. -1

    B. -2

    C. 1

    D. 2

19. **Evaluate:** $(125x^3)^{1/3}$.

    A. $5x$

    B. $5x^{1/3}$

    C. $25x$

    D. $15x^{1/3}$

20. **Simplify the expression:** $\frac{4x^{1/2}}{2x^{1/4}}$.

    A. $x^{1/4}$

    B. $2x^{1/4}$

    C. $2x^{1/2}$

    D. $2x^{3/4}$

Linear Inequalities

1. Solve the inequality: $2x - 5 > 3$.

    A. $x > 4$

    B. $x > 1$

    C. $x < 1$

    D. $x < 4$

2. Find the solution set for $3x + 7 < 2x - 5$.

    A. $x < -12$

    B. $x > -12$

    C. $x < 12$

    D. $x > 12$

3. Which of the following best represents the inequality $-4x$, ≤ 16?

    A. $x \geq -4$

    B. $x \leq -4$

    C. $x \geq 4$

    D. $x \leq 4$

4. Determine the solution of $x/3 + 2 > 5$.

   A. $x > 9$
   B. $x < 9$
   C. $x > 3$
   D. $x < 3$

5. Solve the inequality $5x - 7 \geq 2x + 8$.

   A. $x \geq 5$
   B. $x \leq 5$
   C. $x \geq -5$
   D. $x \leq -5$

6. Which of the following solutions satisfies $7 - 2x > 3$?

   A. $x < 2$
   B. $x > 2$
   C. $x < -2$
   D. $x > -2$

7. What is the solution to the inequality $3(x - 4) \leq 2(x + 1)$?

   A. $x \leq 10$
   B. $x \geq 10$
   C. $x \leq -10$
   D. $x \geq -10$

8. Solve the compound inequality $-3 < 2x - 1 \leq 5$.

9. Which inequality represents the set of all x such that $4(x - 3) \geq 12$?

   A. $x \geq 6$
   B. $x \leq 6$
   C. $x \geq 3$
   D. $x \leq 3$

10. Determine x for the inequality $\frac{x+2}{3} < 1$.

Quadratic Inequalities

1. **Solve the inequality: $x^2 - 4x - 5 < 0$.**
   A. $x > 5$ or $x < -1$
   B. $-1 < x < 5$
   C. $x > 0$
   D. $x < 3$
2. **Which of the following intervals represents the solution to the inequality $x^2 + 3x - 10 \geq 0$?**
   A. $(-\infty, -5] \cup [2, \infty)$
   B. $(-5, 2)$
   C. $(-\infty, -2) \cup (5, \infty)$
   D. $(-\infty, \infty)$
3. **Solve the inequality: $2x^2 - 8x \leq 0$.**
   A. $x \leq 4$
   B. $x(x - 4) \leq 0$
   C. $0 \leq x \leq 4$
   D. $x \geq 0$
4. **What is the solution set for $3x^2 + 12x + 9 > 0$?**
   A. $x < -3$ or $x > -1$
   B. $x > 0$ and $x < 3$

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C. $x < 3$ or $x > 5$

D. $x < -1$

5. **Determine the values of x that satisfy $x^2 - 9x + 14 \geq 0$.**

   A. $(infty, 2] \cup [7, \infty)$

   B. $(infty, 2) \cup (7, \infty)$

   C. $[2, 7]$

   D. $(2, 7)$

6. **Solve: $(x - 1)(x + 2) < 0$.**

   A. $x < -2$ or $x > 1$

   B. $-2 < x < 1$

   C. $x < 1$

   D. $x > -2$

7. **If $x^2 - 6x + 9 \leq 0$, what are the possible values of x?**

   A. $x = 3$

   B. $x \leq 3$

   C. $x \geq 3$

   D. $x < 3$

   $textorx > 3$

8. **Find the solution set of $x^2 + 2x - 8 > 0$.**

   A. $x < -4$ or $x > 2$

   B. $-4 < x < 2$

   C. $x > -2$ and $x < 4$

   D. $x < 0$ or $x > 3$

9. **Which values satisfy $x^2 - x - 12 < 0$?**

   A. $x < -3$

   B. $-3 < x < 4$

   C. $x > 4$

   D. $x < 0$

   $textandx > 3$

10. **Solve for $x : 4x^2 + 4x \leq 3$.**

    A. $x \leq -\frac{3}{2}$

    B. $x \geq \frac{1}{2}$

    C. $-\frac{3}{2} \leq x \leq \frac{1}{2}$

    D. $x \geq 0$

11. **Find the intervals where $x^2 - 2x - 15 \geq 0$.**

    A. $[5, \infty)$

    B. $(-\infty, -3] \cup [5, \infty)$

    C. $(-\infty, 5]$

    D. $(-3, 5)$

12. **Solve: $x^2 + x - 6 < 0$.**

    A. $-3 < x < 2$

    B. $x < -3$ or $x > 2$

    C. $x > -2$ and $x < 3$

    D. $x = 0$

13. **If $(x + 3)^2 > 16$, what is the solution set for x?**

    A. $x < -7$ or $x > 1$

    B. $-7 < x < 1$

    C. $x > 4$ or $x < -4$

    D. $x \leq -3$ and $x \leq 3$

14. **Determine the solution to the inequality $9 - 3x^2 < 0$.**

    A. $x < -3$ or $x > 3$

    B. $-3 < x < 3$

    C. $x = 0$

    D. $x > 0$

15. **Solve $x^2 - 5x + 6 \geq 0$.**
    A. $(infty, 2] \cup [3, \infty)$
    B. $x < -2$ or $x > 3$
    C. $[2, 3]$
    D. $x < 3$ and $x < 5$

Functions and Graphs

1. **Which of the following is the graph of the function $f(x) = x^2 - 4x + 3$?**
   A. Parabola opening upwards, vertex at (2, -1)
   B. Parabola opening downwards, vertex at (2, -1)
   C. Parabola opening upwards, vertex at (-2, 1)
   D. Parabola opening upwards, vertex at (1, 0)
2. **If $g(x) = \frac{1}{x-2}$, which of the following best describes the graph of $g(x)$?**
   A. Hyperbola with vertical asymptote $x = 2$
   B. Hyperbola with vertical asymptote $x = -2$
   C. Parabola with vertical asymptote $x = 2$
   D. Line with no asymptotes
3. **Find the x-intercepts of the function $h(x) = 2x^2 - 8x + 6$.**
   A. $x = 1$ and $x = 3$
   B. $x = 2$ and $x = 1$
   C. $x = 3$ and $x = -1$
   D. $x = 2$ and $x = 0$
4. **Which of the following functions has an axis of symmetry at $x = 4$?**
   A. $f(x) = (x - 4)^2 + 3$
   B. $g(x) = x^2 + 8x - 4$
   C. $h(x) = 2(x + 4)^2 - 5$
   D. $j(x) = -3(x - 4)^2 + 2$
5. **The graph of $f(x) = x^2 + 6x + 9$ is translated 3 units down. What is the new equation of the function?**
   A. $f(x) = x^2 + 6x + 6$
   B. $f(x) = x^2 + 6x + 12$
   C. $f(x) = x^2 + 6x + 9$
   D. $f(x) = x^2 + 6x + 15$
6. **Which of the following is the parent function of the function $f(x) = -2(x - 1)^2 + 4$?**
   A. $g(x) = x^2$
   B. $g(x) = -x^2$
   C. $g(x) = (x - 1)^2$
   D. $g(x) = -x^2 + 4$
7. **Identify the range of the function $k(x) = \sqrt{x + 3}$.**
   A. $y \geq 0$
   B. $y \geq -3$
   C. $y \leq 0$
   D. $y \geq 3$
8. **Find the inverse of the function $f(x) = 3x - 7$.**
   A. $f^{-1}(x) = \frac{x+7}{3}$
   B. $f^{-1}(x) = \frac{x-7}{3}$
   C. $f^{-1}(x) = \frac{3}{x-7}$
   D. $f^{-1}(x) = \frac{3}{x+7}$
9. **The function $f(x) = 2x - 5$ is reflected over the x-axis. What is the equation of the new function?**
   A. $f(x) = -2x - 5$
   B. $f(x) = 2x + 5$

C. $f(x) = -2x + 5$
D. $f(x) = 2x - 5$

10. **If $y = |x - 3|$, what is the graph of y if it is shifted left by 3 units?**
    A. $y = |x|$
    B. $y = |x - 6|$
    C. $y = |x + 3|$
    D. $y = |x - 0|$

11. **Evaluate the composition $f(g(x))$ if $f(x) = x^2 + 1$ and $g(x) = 3x - 2$ for $x = 0$.**
    A. 7
    B. 10
    C. 15
    D. 13

12. **What is the domain of the function $f(x) = \frac{1}{x^2 - 1}$?**
    A. All real numbers except $x = 1$
    B. All real numbers except $x = -1, 1$
    C. All real numbers except $x = 0$
    D. All real numbers except $x = -1$

13. **Which of the following transformations will shift the graph of $y = x^2$ vertically by 4 units?**
    A. $y = x^2 + 4$
    B. $y = x^2 - 4$
    C. $y = (x - 4)^2$
    D. $y = (x + 4)^2$

14. **Given $f(x) = x^3$, which statement is true about its graph?**
    A. The graph is symmetrical about the x-axis
    B. The graph is symmetrical about the origin
    C. The graph is symmetrical about the y-axis
    D. The graph is not symmetrical

15. **Find the vertex of the function $f(x) = 4x^2 - 16x + 13$.**
    A. (2, -3)
    B. (2, -5)
    C. (4, -6)
    D. (4, 16)

Composition and Inverse Functions

1. **If $f(x) = 3x + 2$ and $g(x) = x^2$, what is $(f \circ g)(x)$?**

    A. $3x^2 + 2$
    B. $3(x^2) + 2$
    C. $(3x + 2)^2$
    D. $(3(x + 2))^2$

2. **Given $f(x) = \sqrt{x - 1}$, find $(f \circ f)(x)$.**

3. **If $f(x) = 2x - 5$ and $g(x) = \frac{x+5}{2}$, what is $(f \circ g)(x)$?**

    A. x
    B. $2x$
    C. $x + 10$
    D. $x - 5$

4. **Find the inverse of the function $f(x) = \frac{x-3}{4}$.**

5. **If $f(x) = x^3$ and $g(x) = \sqrt[3]{x}$, verify $f(g(x))$.**

    A. x
    B. x^3

C. $x^{1/3}$

D. $3x$

6. **Determine the inverse of $f(x) = x^2 + 5$ for $x \geq 0$.**

7. **Let $f(x) = \frac{1}{x}$ and $g(x) = x - 2$. Find $(g \circ f)(x)$.**

   A. $\frac{1}{x} - 2$

   B. $\frac{1}{x-2}$

   C. $\frac{1}{x} + 2$

   D. $\frac{1}{x+2}$

8. **Verify whether $h(x) = 2x + 1$ and $k(x) = \frac{x-1}{2}$ are inverses.**

   A. $h(k(x)) = x$

   B. $k(h(x)) = x$

   C. Both $h(k(x)) = x$ and $k(h(x)) = x$

   D. Neither are true

9. **If $f(x) = \frac{2x+3}{x-1}$, what is the expression for the inverse of $f(x)$?**

10. **Given $f(x) = ax + b$ and $g(x) = cx + d$, find $(g \circ f)(x)$.**

    A. $acx + ad + b$

    B. $acx + b + d$

    C. $(ax + b)(cx + d)$

    D. $c(ax + b) + d$

11. **Find the inverse function of $f(x) = \frac{3x+2}{x-4}$.**

12. **Determine $(f \circ f^{-1})(x)$ if $f(x) = \frac{5x-7}{2}$.**

13. **What is the domain of $f(x) = \frac{3x+1}{x^2-4}$?**

    A. $x \neq \pm 2$

    B. $x \neq 2$

    C. $x \geq 2$

    D. All real numbers

14. **If $f(x) = \frac{1}{x}$ and $g(x) = 2x + 3$, what is $(f \circ g)(x)$?**

    A. $\frac{1}{2x+3}$

    B. $2x + \frac{1}{3}$

    C. $\frac{x+3}{2}$

    D. $\frac{2}{x} + 3$

15. **Verify if the function $f(x) = 4x + 7$ has an inverse.**

Rational Expressions

1. **Simplify the rational expression:**
$$\frac{6x^2 - 12x}{3x}$$

   a) $2x - 4$

   b) $2x - 2$

   c) $2x$

   d) $2x - 3$

2. **If $f(x) = \frac{x^2-1}{x-1}$, what is the simplified form of $f(x)$ for $x \neq 1$?**

   a) $x + 1$

b) $x - 1$

c) $x^2 - 2x + 1$

d) x

3. **Simplify the complex fraction:**

$$\frac{\frac{2}{x} + \frac{3}{y}}{\frac{1}{x^2} - \frac{1}{y^2}}$$

a) $\frac{2xy + 3x}{y - x}$

b) $\frac{2y + 3x^2}{y + x}$

c) $\frac{2xy + 3y^2}{x - y}$

d) $\frac{2x + 3y}{x + y}$

4. **Find the excluded values for the rational expression:**

$$\frac{x^2 + 5x + 6}{x^2 - 4}$$

a) $x \neq 0, x \neq -2$

b) $x \neq 2, x \neq -2$

c) $x \neq 3, x \neq -2$

d) $x \neq 2, x \neq -3$

5. **Solve the equation:**

$$\frac{2x}{x + 3} = \frac{3x}{x + 5}$$

a) $x = 0, x = -15$

b) $x = 0, x = 15$

c) $x = 0, x = -5$

d) $x = 0$

6. **Which of the following is equivalent to:**

$$\frac{x^2 - 9}{x^2 - 6x + 9}$$

a) $x + 3$

b) $x - 3$

c) $\frac{x+3}{x-3}$

d) $\frac{x-3}{x-3}$

7. **Simplify the rational expression:**

$$\frac{5x^3 - 10x^2}{5x^2}$$

a) $x - 2$

b) $x + 2$

c) $5x - 2$

d) $x^2 - 2$

8. **If** $g(x) = \frac{2x+4}{x^2-4}$, **what values of** x **must be excluded from the domain of** $g(x)$?

a) $x \neq 2, x \neq -2$

b) $x \neq 0, x \neq 4$

c) $x \neq -2, x \neq 4$

d) $x \neq 2, x \neq 0$

9. **Simplify:**

$$\frac{x^2 - 4x + 4}{x^2 - 4}$$

a) $\frac{x-2}{x+2}$

b) $\frac{x-2}{x-2}$

c) $x - 2$

d) $\frac{x+2}{x-2}$

10. **Determine the values for which the expression is undefined:**

$$\frac{x^2 + x - 6}{x^2 - x - 12}$$

a) $x = -3, x = 4$

b) $x = 3, x = -4$

c) $x = 2, x = -6$

d) $x = 3, x = -3$

Polynomial Division

1. **Divide:** $\frac{x^3 + 3x^2 - 4x + 5}{x-1}$

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

   B. $x^2 + 2x + 1$

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

   D. $x^2 + 3x - 1 + \frac{6}{x-1}$

2. **Divide:** $\frac{2x^4 - 3x^2 + x - 2}{x+2}$

3. **What is the remainder when $2x^3 - x^2 + 4x - 5$ is divided by $x - 3$?**

   A. 15

   B. 10

   C. 5

   D. -5

4. **Divide:** $\frac{4x^3 + 0x^2 - 5x + 3}{2x-1}$

   A. $2x^2 + \frac{x-3}{2x-1}$

   B. $2x^2 + x - 2 + \frac{5}{2x-1}$

   C. $2x^2 + \frac{x+3}{2x-1}$

   D. $2x^2 + x - 2$

5. **If the polynomial $p(x) = x^3 - 6x^2 + 11x - 6$ is divided by $x - 2$, find the remainder.**

6. **Find:** $\frac{x^4 + x^3 - 2x + 1}{x+1}$

   A. $x^3 - x^2 + x - 1 + \frac{2}{x+1}$

   B. $x^3 + x^2 + x - 2 + \frac{3}{x+1}$

   C. $x^3 + x^2 - 2$

   D. $x^3 - x^2 + x - 2 + \frac{3}{x+1}$

7. **Solve:** $\frac{x^5 - x^4 - x^2 + 1}{x^2 - 1}$

8. **What is the quotient of $\frac{3x^3 + 6x^2 - 9x}{3x}$?**

   A. $x^2 + 2x - 3$

   B. $x^2 + 2x + 3$

   C. $x^2 + x - 3$

   D. $x^2 - x - 3$

9. **When $x^6 + 2x^5 - x^4 + x^3 - 6x + 3$ is divided by $x^2 + 1$, find the quotient.**

10. **Divide the polynomial $2x^3 - 5x^2 + 4x - 1$ by $x - 1$. Initially, compute the remainder.**

11. **Calculate:** $\frac{5x^4 - x^3 + x - 8}{x^2 + 2}$

12. **When $x^4 - x^2 + 3x - 4$ is divided by $x + 3$, find the quotient and remainder.**

13. **What is the result of the division $\frac{9x^3 - 3x^2 + 6x - 12}{3x + 1}$?**

A. $3x^2 - 2x + 2$
B. $3x^2 - x + 3$
C. $3x^2 - x - 3$
D. $3x^2 + x + 4$

Binomial Theorem

1. **Expand the expression using the Binomial Theorem:**

$$(x + 3)^4$$

A. $x^4 + 12x^3 + 36x^2 + 81x + 81$
B. $x^4 + 12x^3 + 54x^2 + 108x + 81$
C. $x^4 + 9x^3 + 27x^2 + 54x + 81$
D. $x^4 + 18x^3 + 54x^2 + 81x + 81$

2. **What is the third term in the expansion of**

$$(2y - 1)^5$$

using the Binomial Theorem?

A. $-40y^3$
B. $40y^3$
C. $-160y^3$
D. $160y^3$

3. **Using the Binomial Theorem, find the coefficient of x^5 in the expansion of**

$$(3x - 2)^7$$

.

A. 6720
B. 3360
C. -3360
D. -6720

4. **Express**

$$(a + b)^6$$

using the Binomial Theorem. What is the fifth term of the expansion?

A. $15a^2b^4$
B. $6a^2b^4$
C. $20a^2b^4$
D. $40a^2b^4$

5. **Determine the middle term of the expansion of**

$$(x - 3y)^8$$

using the Binomial Theorem.

6. **Calculate the coefficient of x^8 in the expansion of**

$$(2x + 1)^{10}$$

.

7. **For the binomial**

$$(3s - 2t)^5$$

, **find the coefficient of the term s^3t^2 in the expansion.**

    A. -120
    B. 120
    C. -240
    D. 240

8. **If**

$$(x + y)^{10}$$

is expanded, how many terms will the expansion contain?

    A. 10
    B. 11
    C. 12
    D. 9

9. **Using the Binomial Theorem, find the sum of the coefficients in the expansion of**

$$(x - 2)^7$$

.

10. **In the expansion of**

$$(5p + 4q)^6$$

, **what is the fourth term?**

A. $80p^3q^3$
B. $320p^3q^3$
C. $400p^3q^3$
D. $960p^3q^3$

11. **Find the 7th term in the expansion of**

$$(x + 2)^{10}$$

using the Binomial Theorem.

12. **Determine the coefficient of r^{11} in the expansion of**

$$(1 + r)^{20}$$

using the Binomial Theorem.

Factorization Methods

1. **Factor the expression completely: $x^2 - 9x + 20$**

    A. $(x - 4)(x - 5)$
    B. $(x + 4)(x + 5)$
    C. $(x + 5)(x - 4)$
    D. $(x - 4)(x + 5)$

2. **Factor the polynomial $x^3 - 27$.**

3. **Which of the following is a factor of $2x^2 + 7x + 3$?**

   A. $(2x + 1)$
   B. $(x + 3)$
   C. $(2x - 3)$
   D. $(x - 2)$

4. **Factor $4x^2 - 25$ completely.**

5. **What is the factorization of $x^2 + 6x + 9$?**

   A. $(x + 3)^2$
   B. $(x + 3)(x - 3)$
   C. $(x + 9)$
   D. $(x - 3)^2$

6. **Factor the trinomial completely: $6x^2 + 11x + 4$.**

7. **Which of the following expressions is equivalent to $x^3 + 2x^2 - x - 2$ when factored completely?**

   A. $(x^2 + 1)(x + 2)$
   B. $(x + 2)(x^2 - 1)$
   C. $(x + 2)(x - 1)^2$
   D. $(x - 1)(x + 2)(x + 1)$

8. **If one of the factors of $2x^3 - 3x^2 - 8x + 12$ is $(x - 2)$, what is the other factor?**

9. **Factor the expression $x^2 - 4x + 4$.**

   A. $(x - 2)^2$
   B. $(x + 2)^2$
   C. $(x - 4)(x - 1)$
   D. $(x - 2)(x + 2)$

10. **What is the complete factorization of $x^4 - 1$?**

11. **Factor completely: $3x^2 - 12x + 12$.**

12. **Factor the polynomial: $x^2 - 5x - 14$.**

A. $(x + 2)(x - 7)$
B. $(x - 2)(x + 7)$
C. $(x + 7)(x - 2)$
D. $(x - 7)(x + 2)$

13. **Which of the following is the factorization of $4x^2 - x - 15$?**

A. $(2x + 3)(2x - 5)$
B. $(4x + 5)(x - 3)$
C. $(2x - 3)(x + 5)$
D. $(4x - 3)(x + 5)$

14. **Factor $x^2 - 2x - 15$ completely.**

15. **What is the factorization of the expression $9x^2 - 1$?**

A. $(3x + 1)^2$
B. $(3x - 1)(3x + 1)$
C. $(3x - 1)^2$
D. $(3x + 1)(3x - 1)$

Synthetic Division

1. Use synthetic division to divide the polynomial $2x^3 - 3x^2 + 4x - 5$ by $x - 2$. What is the remainder?

   A. 1

   B. 3

   C. 5

   D. 7

2. Perform synthetic division on $x^3 + 2x^2 - x + 3$ by $x + 1$. What is the resulting polynomial?

3. If you divide $3x^3 - 5x^2 + 2x - 8$ by $x - 3$ using synthetic division, what is the remainder?

4. What is the quotient when $4x^3 - x^2 - 12x + 9$ is divided by $x - 1$ using synthetic division?

   A. $4x^2 + 3x - 9$

   B. $4x^2 - 3x + 9$

   C. $4x^2 - x + 2$

   D. $4x^2 - x - 3$

5. Using synthetic division, determine if $x = 2$ is a root of the polynomial $x^3 - 4x^2 + 6x - 8$.

6. Divide $5x^4 - 3x^3 + 0x^2 + 2x - 1$ by $x - 2$ using synthetic division and identify the remainder.

7. Perform synthetic division on $2x^4 + 3x^2 - 5x + 1$ by $x - 1$. What is the quotient?

8. What is the remainder when $6x^3 + 2x^2 - 9x + 5$ is divided by $x + 3$ using synthetic division?

   A. -58

   B. 58

   C. -48

   D. 48

9. Use synthetic division to verify if $x + 2$ is a factor of the polynomial $x^4 + 4x^3 + x + 2$.

10. Divide $x^4 - 2x^3 + 3x - 4$ by $x - 1$ using synthetic division. What polynomial results?

11. Determine the remainder when $7x^3 - 6x^2 + x + 8$ is divided by $x - 1$.

12. If $x = -1$ is substituted into the polynomial $2x^3 - 5x^2 + 4x - 1$, would synthetic division show $x + 1$ as a factor? Verify using synthetic division.

13. Use synthetic division to find the result when $3x^3 + x^2 - 12x + 4$ is divided by $x - 4$.

14. Perform synthetic division to determine the quotient of $x^3 - 3x^2 + 5x - 7$ divided by $x - 2$. What is the quotient?

15. Through synthetic division, find the remainder when $2x^3 - x^2 - 2x + 1$ is divided by $x + 1$.

Complex Conjugates

1. Find the conjugate of the complex number $3 + 4i$.

A. $3 - 4i$

B. $-3 + 4i$

C. $3 + 4i$

D. $-3 - 4i$

2. **What is the product of the complex number $5 + 6i$ and its conjugate?**

    A. -61

    B. -11

    C. 11

    D. 61

3. **If $z = 2 - 3i$, what is the complex conjugate of z?**

    A. $2 + 3i$

    B. $-2 - 3i$

    C. $-2 + 3i$

    D. $2 - 3i$

4. **Compute the conjugate of the complex number $-7 - 9i$.**

    A. $-7 + 9i$

    B. $7 - 9i$

    C. $-7 - 9i$

    D. $7 + 9i$

5. **Express $**

    rac{2}{1 + i}$ in the form $a + bi$ by using the conjugate of the denominator.

6. **Find the conjugate of the complex number $-5 + 2i$.**

    A. $5 - 2i$

    B. $-5 + 2i$

    C. $5 + 2i$

    D. $-5 - 2i$

7. **If a complex number is written as $a + bi$, what is the form of its complex conjugate?**

    A. $a - bi$

    B. $-a + bi$

    C. $a + bi$

D. $-a - bi$

8. **If $w = 4i$, what is the conjugate of w?**

   A. $-4i$

   B. $4i$

   C. $4 - i$

   D. $4 + i$

9. **Which of the following complex numbers is equal to its conjugate?**

   A. 7

   B. $5i$

   C. $3 + 2i$

   D. $0 + 9i$

10. **What is the result of multiplying $(6 - 2i)$ by its conjugate?**

    A. $36 + 4i$

    B. $36 - 12i$

    C. 40

    D. $40 - 12i$

11. **Determine the product of a complex number $3 - 7i$ and its conjugate.**

12. **Find the conjugate of 9.**

    A. 9

    B. -9

    C. $9i$

    D. $-9i$

13. **Simplify the expression $(1 + 2i)(1 - 2i)$.**

    A. $5i$

    B. 5

    C. -5

    D. $-5i$

Graphing Polynomials

1. **Which of the following best describes the graph of the polynomial $P(x) = x^3 - 6x^2 + 9x$?**

   A. A line

B. A parabola

C. A cubic curve with a local maximum and minimum

D. A straight line through the origin

2. **Consider the polynomial $f(x) = (x-2)^2(x+3)$. How many x-intercepts does the graph of this polynomial have?**

   A. 1

   B. 2

   C. 3

   D. None

3. **The graph of which of the following polynomials has a turning point?**

   A. $y = x^2 - 4x + 4$

   B. $y = x + 4$

   C. $y = x^3 - 3x + 1$

   D. $y = 6x - 5$

4. **Identify the end behavior of the polynomial $P(x) = -2x^4 + x^3 - 5x + 7$.**

   A. Both ends up

   B. Both ends down

   C. Left end up, right end down

   D. Left end down, right end up

5. **Which of the following could be the degree of a polynomial with exactly four turning points?**

   A. 2

   B. 3

   C. 4

   D. 5

6. **Given the polynomial $y = x^3 - 3x^2 - 4x + 12$, what is the y-intercept?**

7. **If a polynomial $f(x)$ is even, which of the following must be true about its graph?**

   A. Symmetrical about the x-axis

   B. Symmetrical about the y-axis

   C. Symmetrical about the origin

   D. No symmetry

8. **The graph of the polynomial $y = x^4 - 4x^2$ intersects the x-axis at which points?**

   A. $x = 0, x = 2, x = -2$

   B. $x = 0, x = -2$

   C. $x = 0, x = 2$

   D. $x = 0$

9. **Which polynomial has a graph that does not touch or cross the x-axis?**

   A. $f(x) = x^2 + 1$

   B. $g(x) = x(x-3)$

   C. $h(x) = x^3 + x$

   D. $j(x) = (x-2)^2$

10. **Given $p(x) = 2(x-1)(x+2)^2$, how many distinct real roots does the graph have?**

A. 1

B. 2

C. 3

D. None

11. **Which of the following polynomials has an odd degree?**

A. $y = x^3 - x^2 + x - 1$
B. $y = x^2(x - 2)(x + 1)$
C. $y = (x - 1)(x + 2)^2$
D. $y = x^4 + x^2 - 6$

12. **For the polynomial function $f(x) = -3x^5 + x - 2$, what is the end behavior of the graph?**

A. Rises to the left, falls to the right
B. Falls to the left, rises to the right
C. Falls to the left and right
D. Rises to the left and right

13. **How many local extrema are possible for the polynomial $g(x) = 6x^5 - 2x^3 + x - 4$?**

A. 2
B. 3
C. 4
D. 5

14. **What is the leading coefficient of the polynomial $h(x) = -4x^6 + 9x^5 - x + 12$?**

15. **Determine the degree of the polynomial $P(x) = (x^3 - x^2 + 2)^2$.**

Conic Sections

1. **Identify the conic section represented by the equation: $4x^2 + 9y^2 = 36$.**

   A. Circle
   B. Ellipse
   C. Parabola
   D. Hyperbola

2. **Which conic section is described by the equation: $x^2 - 4y^2 = 16$?**

   A. Ellipse
   B. Hyperbola
   C. Circle
   D. Parabola

3. **Find the center and radius of the circle given by the equation $(x + 3)^2 + (y - 4)^2 = 49$.**

4. **What is the equation of a parabola with vertex at $(0, 0)$ and focus at $(0, 3)$?**

5. **Given the equation of an ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$, determine the lengths of the major and minor axes.**

6. **Which of the following equations represents a hyperbola?**

   A. $\frac{x^2}{9} + \frac{y^2}{4} = 1$
   B. $\frac{x^2}{16} - \frac{y^2}{4} = 1$
   C. $(x - 2)^2 + (y + 3)^2 = 16$
   D. $3x^2 + 4y^2 = 12$

7. **Determine the vertices of the ellipse given by the equation $9x^2 + 4y^2 = 36$.**

8. **Convert the standard form of the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$ to its general form.**

9. **Find the equation of a circle with a diameter that has endpoints at $(2, -3)$ and $(8, 5)$.**

10. **What is the eccentricity of the hyperbola defined by the equation $4x^2 - 25y^2 = 100$?**

11. **Which equation represents a parabola with a focus at $(4,0)$ and directrix $x = -4$?**

A. $y^2 = 16x$
B. $(x-4)^2 = 8y$
C. $(y-2)^2 = 16(x-2)$
D. $x^2 = 8y$

12. **For the hyperbola $\frac{(x-5)^2}{9} - \frac{(y+2)^2}{4} = 1$, determine the center and the length of the transverse axis.**

13. **If the equation of a parabola is $y = 2x^2 + 4x + 1$, what are the coordinates of its vertex?**

14. **Evaluate the latus rectum of the parabola given by the equation $4x^2 = 9y$.**

15. **Find the foci of the ellipse described by the equation $\frac{x^2}{49} + \frac{y^2}{25} = 1$.**

Parabolas and Hyperbolas

1. **Identify the vertex of the parabola given by the equation $y = 2(x-3)^2 + 4$.**

   A. (3, 4)
   B. (-3, 4)
   C. (3, -4)
   D. (-3, -4)

2. **What is the equation of a parabola with a vertex at (2, -1) and a focus at (2, 1)?**

3. **Determine the equation of a hyperbola centered at the origin with a transverse axis of length 8 and a conjugate axis of length 6.**

   A. $\frac{x^2}{16} - \frac{y^2}{9} = 1$
   B. $\frac{x^2}{64} - \frac{y^2}{36} = 1$
   C. $\frac{x^2}{36} - \frac{y^2}{16} = 1$
   D. $\frac{x^2}{9} - \frac{y^2}{16} = 1$

4. **The equation $4x^2 - y^2 = 16$ represents a hyperbola. What are the lengths of its transverse and conjugate axes?**

5. **Find the vertices of a hyperbola given by $\frac{(x-2)^2}{36} - \frac{(y+3)^2}{16} = 1$.**

   A. (2, 3) and (2, -9)
   B. (-4, -3) and (8, -3)
   C. (8, -3) and (8, 3)
   D. (2, 0) and (2, -6)

6. **What is the eccentricity of the hyperbola defined by $9y^2 - 4x^2 = 36$?**

7. **Which of the following is the equation of a parabola that opens downward and has a vertex at (-5, 2)?**

   A. $y = -(x+5)^2 + 2$
   B. $y = (x+5)^2 - 2$
   C. $y = -2(x+5)^2 + 2$
   D. $y = 2(x-5)^2 - 2$

8. **The equation $x^2 + 4y^2 - 8x + 16y = 0$ is a conic section. Identify the type of conic section and its center.**

9. **Convert the equation of the parabola $y = 3x^2 - 6x + 5$ into vertex form.**

10. **A hyperbola has the equation $x^2 - \frac{y^2}{16} = 1$. Find the distance between its foci.**

Ellipses and Circles

1. **What is the standard form equation of a circle with its center at (3, -2) and radius 5?**

   A. $(x-3)^2 + (y+2)^2 = 5$
   B. $(x-3)^2 + (y+2)^2 = 25$
   C. $(x+3)^2 + (y-2)^2 = 25$
   D. $(x+3)^2 + (y-2)^2 = 5$

2. **If the equation of a circle is $x^2 + y^2 + 6x - 4y + 9 = 0$, what is the center and radius of the circle?**

   A. Center: $(-3, 2)$; Radius: 2
   B. Center: $(3, -2)$; Radius: 4
   C. Center: $(-3, 2)$; Radius: 4
   D. Center: $(3, -2)$; Radius: 2

3. **Determine the equation of the ellipse with vertices at $(ext{-}4, 0)$ and $(4, 0)$ and co-vertices at $(0, ext{-}2)$ and $(0, 2)$.**

   A. $\frac{x^2}{16} + \frac{y^2}{4} = 1$
   B. $\frac{x^2}{4} + \frac{y^2}{16} = 1$
   C. $\frac{x^2}{8} + \frac{y^2}{4} = 1$
   D. $\frac{x^2}{16} + \frac{y^2}{8} = 1$

4. **What is the equation of a circle with diameter endpoints at $(1, 5)$ and $(7, 11)$?**

   A. $(x-4)^2 + (y-8)^2 = 18$
   B. $(x-4)^2 + (y-8)^2 = 36$
   C. $(x-3)^2 + (y-6)^2 = 18$
   D. $(x-4)^2 + (y-6)^2 = 18$

5. **Which of the following is the equation of a circle centered at the origin with a radius of 10?**

   A. $x^2 + y^2 = 5$
   B. $x^2 + y^2 = 100$
   C. $(x-10)^2 + (y-10)^2 = 1$
   D. $x^2 - y^2 = 100$

6. **Given the ellipse equation $9x^2 + 16y^2 = 144$, what are the lengths of the major and minor axes?**

   A. Major: 8, Minor: 6
   B. Major: 6, Minor: 8
   C. Major: 10, Minor: 8
   D. Major: 8, Minor: 10

7. **If a circle has the equation $(x+2)^2 + (y-3)^2 = 49$, what are the coordinates of the center and the length of the radius?**

   A. Center: $(2, -3)$; Radius: 7
   B. Center: $(-2, 3)$; Radius: 49
   C. Center: $(-2, 3)$; Radius: 7
   D. Center: $(2, 3)$; Radius: 7

8. **Find the eccentricity of an ellipse given by the equation $4x^2 + 9y^2 = 36$.**

A. $\frac{1}{2}$

B. $\frac{2}{3}$

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

D. $\frac{\sqrt{5}}{2}$

9. **Convert the equation $x^2 + y^2 - 4x + 6y - 23 = 0$ to standard form. What are the center and radius of the circle?**

10. **An ellipse has a center at $(0,0)$, a semi-major axis of length 5 along the x-axis, and a semi-minor axis of length 3. What is its equation?**

A. $\frac{x^2}{25} + \frac{y^2}{9} = 1$

B. $\frac{x^2}{9} + \frac{y^2}{25} = 1$

C. $\frac{x^2}{5} + \frac{y^2}{3} = 1$

D. $\frac{x^2}{3} + \frac{y^2}{5} = 1$

Transformations of Functions

1. Which of the following transformations will shift the graph of $y = f(x)$ up by 3 units?
   a) $y = f(x) + 3$
   b) $y = f(x) - 3$
   c) $y = f(x + 3)$
   d) $y = f(x - 3)$
2. The graph of $y = f(x - 2)$ represents which transformation of $y = f(x)$?
   a) Shift 2 units left
   b) Shift 2 units right
   c) Reflection over the x-axis
   d) Reflection over the y-axis
3. How will the graph of $y = 2f(x)$ differ from the graph of $y = f(x)$?
   a) Shifted up by 2 units
   b) Compressed vertically by a factor of 2
   c) Stretched vertically by a factor of 2
   d) Reflected over the x-axis
4. The equation $y = f(x) - 5$ will result in which transformation of the graph of $y = f(x)$?
   a) Shift down by 5 units
   b) Shift up by 5 units
   c) Shift right by 5 units
   d) Shift left by 5 units
5. What transformation occurs for the graph of $y = f(3x)$ compared to the graph of $y = f(x)$?
   a) Vertical stretch by a factor of 3
   b) Vertical compression by a factor of 3
   c) Horizontal stretch by a factor of 3
   d) Horizontal compression by a factor of 3
6. Describe the transformation of the graph $y = -f(x)$.
   a) Vertical reflection
   b) Horizontal reflection
   c) Shift left by 1 unit
   d) Shift right by 1 unit
7. If the function $y = f(x)$ is transformed to $y = f(x) + 7$, what transformation occurs?
   a) The graph is shifted 7 units up
   b) The graph is shifted 7 units down
   c) The graph is shifted 7 units to the right
   d) The graph is shifted 7 units to the left

8. The transformation $y = \frac{1}{2}f(x)$ results in which of the following changes?
   a) Vertical stretch by a factor of $\frac{1}{2}$
   b) Vertical compression by a factor of $\frac{1}{2}$
   c) Horizontal stretch by a factor of $\frac{1}{2}$
   d) Horizontal compression by a factor of $\frac{1}{2}$
9. What transformation is represented by $y = f(-x)$ for a given function $y = f(x)$?
   a) Shift left by 2 units
   b) Shift right by 2 units
   c) Reflection over the x-axis
   d) Reflection over the y-axis
10. How does the graph of $y = f(x + 4)$ compare to the graph of $y = f(x)$?
    a) Shift up by 4 units
    b) Shift down by 4 units
    c) Shift left by 4 units
    d) Shift right by 4 units
11. Which transformation will result in a graph that is a vertical stretch by a factor of 3?
    a) $y = 3f(x)$
    b) $y = f(3x)$
    c) $y = \frac{1}{3}f(x)$
    d) $y = f(x) + 3$
12. What is the effect of the transformation $y = f(x) - c$ for a constant $c > 0$ on the graph of $y = f(x)$?
    a) Shift up by c units
    b) Shift down by c units
    c) Shift left by c units
    d) Shift right by c units

Piecewise Functions

1. **Evaluate the function $f(x)$ at $x = 2$, where**

$$f(x) = \begin{cases} x^2 & \text{if } x < 0 \\ 3x + 1 & \text{if } 0 \le x \le 2 \\ x - 4 & \text{if } x > 2 \end{cases}$$

   A. 5
   B. 7
   C. 9
   D. 10

2. **Which of the following defines a piecewise function**

   A. $f(x) = 3x + 2$
   B. $f(x) = |x|$
   C. $f(x) = \begin{cases} 2x & \text{if } x \le 5 \\ x^2 & \text{if } x > 5 \end{cases}$
   D. $f(x) = \frac{x}{x-1}$

3. **Determine the value of $f(-1)$ given**

$$f(x) = \begin{cases} x + 2 & \text{if } x \le -1 \\ -x^2 & \text{if } x > -1 \end{cases}$$

4. **What is $g(3)$ if**

$$g(x) = \begin{cases} -2x + 1 & \text{if } x < 0 \\ x^2 - 4 & \text{if } 0 \le x < 5 \\ 3x + 2 & \text{if } x \ge 5 \end{cases}$$

5. **For what values of x is $h(x)$ undefined if**

$$h(x) = \begin{cases} \frac{1}{x+2} & \text{if } x \ne -2 \\ 5 & \text{if } x = -2 \end{cases}$$

A. $x = 2$
B. $x = -2$
C. $x = 0$
D. $x = $ no value, it is always defined

6. **Find the limit as x approaches 0 from the left of $f(x)$, where**

$$f(x) = \begin{cases} 3x^2 & \text{if } x \le 0 \\ 2x + 1 & \text{if } x > 0 \end{cases}$$

7. **Evaluate the function $f(x)$ at $x = -3$, where**

$$f(x) = \begin{cases} 4x + 6 & \text{if } x < 0 \\ x^2 & \text{if } 0 \le x \le 5 \end{cases}$$

8. **Determine the expression for $f(x)$ on the interval $x > 0$, where**

$$f(x) = \begin{cases} 3 - 4x & \text{if } x \le 0 \\ 2x^2 + 1 & \text{if } x > 0 \end{cases}$$

9. **Identify the range of the function $f(x)$ given by**

$$f(x) = \begin{cases} -x & \text{if } x < -1 \\ x^2 - 1 & \text{if } x \ge -1 \end{cases}$$

A. $(-\infty, 1]$
B. $[0, \infty)$
C. $(-\infty, \infty)$
D. $(-1, \infty)$

10. **Compute $f(0)$ if**

$$f(x) = \begin{cases} 2x + 3 & \text{if } x < 0 \\ x^2 - x & \text{if } x \ge 0 \end{cases}$$