

Elementary Algebra Sample Questions

For each of the questions below, choose the best answer from the four choices given. You may use the paper you received as scratch paper.

19. Erica bought $3\frac{1}{2}$ yards of fabric. If she uses $\frac{2}{3}$ of the fabric to make a curtain, how much will she have left?

- A. $\frac{1}{6}$ yd.
- B. $\frac{1}{3}$ yd.
- C. $1\frac{1}{6}$ yd.
- D. $2\frac{1}{3}$ yd.

20. Jen wants to tile the floor of her kitchen. The floor is rectangular and measures 12 feet by 8 feet. If it costs \$2.50 per square foot for the materials, what is the total cost of the materials for tiling the kitchen floor?

- A. \$160
- B. \$200
- C. \$220
- D. \$240

Elementary Algebra

A total of 12 questions of three types are administered in this test.

- The first type involves operations with integers and rational numbers, and includes computation with integers and negative rationals, the use of absolute values, and ordering.
- The second type involves operations with algebraic expressions using evaluation of simple formulas and expressions, and adding and subtracting monomials and polynomials. Questions involve multiplying and dividing monomials and polynomials, the evaluation of positive rational roots and exponents, simplifying algebraic fractions, and factoring.
- The third type of question involves translating written phrases into algebraic expressions and solving equations, inequalities, word problems, linear equations and inequalities, quadratic equations (by factoring), and verbal problems presented in an algebraic context.

1. If A represents the number of apples purchased at 15 cents each, and B represents the number of bananas purchased at 10 cents each, which of the following represents the total value of the purchases in cents?

- A. $A + B$
- B. $25(A + B)$
- C. $10A + 15B$
- D. $15A + 10B$

2. $\sqrt{2} \times \sqrt{15} = ?$

- A. 17
- B. 30
- C. $\sqrt{30}$
- D. $\sqrt{17}$

3. What is the value of the expression $2x^2 + 3xy - 4y^2$ when $x = 2$ and $y = -4$?

- A. -80
- B. 80
- C. -32
- D. 32

4. In the figure below, both circles have the same center, and the radius of the larger circle is R . If the radius of the smaller circle is 3 units less than R , which of the following represents the area of the shaded region?




- A. πR^2
- B. $\pi(R - 3)^2$
- C. $\pi R^2 - \pi \times 3^2$
- D. $\pi R^2 - \pi(R - 3)^2$

5. $(3x - 2y)^2 =$

- A. $9x^2 - 4y^2$
- B. $9x^2 + 4y^2$
- C. $9x^2 + 4y^2 - 6xy$
- D. $9x^2 + 4y^2 - 12xy$

6. If $x > 2$, then $\frac{x^2 - x - 6}{x^2 - 4} =$

- A. $\frac{x - 3}{2}$
- B. $\frac{x - 3}{x - 2}$
- C. $\frac{x - 3}{x + 2}$
- D. $\frac{3}{2}$

7. $\frac{4 - (-6)}{-5} =$
- $\frac{2}{5}$
 - $-\frac{2}{5}$
 - 2
 - 2
8. If $2x - 3(x + 4) = -5$, then $x =$
- 7
 - 7
 - 17
 - 17
9. $-3(5 - 6) - 4(2 - 3) =$
- 7
 - 7
 - 1
 - 1
10. Which of the following expressions is equivalent to $20 - \frac{4}{5}x \geq 16$?
- $x \leq 5$
 - $x \geq 5$
 - $x \geq 32\frac{1}{2}$
 - $x \leq 32\frac{1}{2}$
11. Which of the following lists of numbers is ordered from least to greatest?
- $-\frac{1}{3}, -\frac{3}{5}, \frac{2}{3}, \frac{3}{5}$
 - $-\frac{3}{5}, -\frac{1}{3}, \frac{3}{5}, \frac{2}{3}$
 - $-\frac{1}{3}, -\frac{3}{5}, \frac{3}{5}, \frac{2}{3}$
 - $-\frac{3}{5}, -\frac{1}{3}, \frac{2}{3}, \frac{3}{5}$
12. If $5t + 2 = 6$, then $t =$
- 8
 - $\frac{5}{4}$
 - $\frac{4}{5}$
 - 8
13. For which of the following equations are $x = 5$ and $x = -5$ both solutions?
- $x^2 - x^2 - 5x - 25 = 0$
 - $x^2 + 25 = 0$
 - $x^2 + 10x - 25 = 0$
 - $x^2 - 25 = 0$
14. If $x \neq 0$, then $\frac{u}{x} + \frac{5u}{x} - \frac{u}{5x} =$
- $\frac{7x}{5u}$
 - $\frac{5u}{7x}$
 - $\frac{29u}{5x}$
 - $\frac{31u}{5x}$
15. 
- The solution set of which of the following inequalities is graphed on the number line above?
- $2x - 4 \geq -3$
 - $2x + 5 \leq 6$
 - $3x - 1 \leq 5$
 - $4x - 1 \geq 7$
16. $2x + 6y = 5$
 $x + 3y = 2$
- How many solutions (x, y) are there to the system of equations above?
- None
 - One
 - Two
 - More than two
17. Which of the following is a factor of both $x^2 - x - 6$ and $x^2 - 5x + 6$?
- $x - 3$
 - $x + 3$
 - $x - 2$
 - $x + 2$

College-Level Mathematics Test

The College-Level Mathematics test measures your ability to solve problems that involve college-level mathematics concepts. There are six content areas measured on this test: (a) Algebraic Operations, (b) Solutions of Equations and Inequalities, (c) Coordinate Geometry, (d) Applications and other Algebra Topics, (e) Functions and (f) Trigonometry. The Algebraic Operations content area includes the simplification of rational algebraic expressions, factoring and expanding polynomials, and manipulating roots and exponents. The Solutions of Equations and Inequalities content area includes the solution of linear and quadratic equations and inequalities, systems of equations, and other algebraic equations. The Coordinate Geometry content area presents questions involving plane geometry, the coordinate plane, straight lines, conics, sets of points in the plane, and graphs of algebraic functions. The Functions content area includes questions involving polynomial, algebraic, exponential and logarithmic functions. The Trigonometry content area includes trigonometric functions. The Applications and other Algebra Topics content area contains complex numbers, series and sequences, determinants, permutations and combinations, factorials, and word problems. A total of 20 questions are administered on this test.

Sample Questions

For each of the questions below, choose the best answer from the four choices given. You may use the paper you received as scratch paper.

1. $2^{\frac{5}{2}} - 2^{\frac{3}{2}}$

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

B. 2

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

D. $2^{\frac{5}{3}}$

E. 2^2

18. $\frac{10x^6 + 8x^4}{2x^2} =$

A. $9x^{12}$

B. $14x^4$

C. $5x^4 + 4x^2$

D. $5x^3 + 2x^2$

19. A rectangular yard has area 96 square feet. If the width of the yard is 4 feet less than the length, what is the perimeter, in feet, of the yard?

A. 40

B. 44

C. 48

D. 52

20. On Monday, it took Helen 3 hours to do a page of science homework exercises. The next day she did the same number of exercises in 2 hours. If her average rate on Monday was p exercises per hour, what was her average rate the next day, in terms of p ?

A. $2(p + 1)$ exercises per hour

B. $3(p - 1)$ exercises per hour

C. $\frac{2}{3}p$ exercises per hour

D. $\frac{3}{2}p$ exercises per hour

2. If $a \neq b$ and $\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$, then $x =$

- A. $\frac{1}{b} - \frac{1}{a}$
- B. $b - a$
- C. $\frac{1}{ab}$
- D. $\frac{a-b}{ab}$
- E. $\frac{ab}{a-b}$

3. If $3x^2 - 2x + 7 = 0$, then $(x - \frac{1}{3})^2 =$

- A. $\frac{20}{9}$
- B. $\frac{7}{9}$
- C. $-\frac{7}{9}$
- D. $-\frac{8}{9}$
- E. $-\frac{20}{9}$

4. The graph of which of the following equations is a straight line parallel to the graph of $y = 2x$?

- A. $4x - y = 4$
- B. $2x - 2y = 2$
- C. $2x - y = 4$
- D. $2x + y = 2$
- E. $x - 2y = 4$

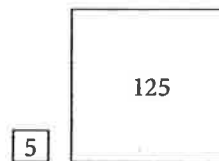
5. An equation of the line that contains the origin and the point (1, 2) is

- A. $y = 2x$
- B. $2y = x$
- C. $y = x - 1$
- D. $y = 2x + 1$
- E. $\frac{y}{2} = x - 1$

6. An apartment building contains 12 units consisting of one- and two-bedroom apartments that rent for \$360 and \$450 per month, respectively. When all units are rented, the total monthly rental is \$4,950. What is the number of two-bedroom apartments?

- A. 3
- B. 4
- C. 5
- D. 6
- E. 7

7. If the two square regions in the figures below have the respective areas indicated in square yards, how many yards of fencing are needed to enclose the two regions?



- A. $4\sqrt{130}$
- B. $20\sqrt{10}$
- C. $24\sqrt{5}$
- D. 100
- E. $104\sqrt{5}$

8. If $\log_{10} x = 3$, then $x =$

- A. 3^{10}
- B. 1,000
- C. 30
- D. $\frac{10}{3}$
- E. $\frac{3}{10}$

9. If $f(x) = 2x + 1$ and $g(x) = \frac{x-1}{2}$, then $f(g(x)) =$

- A. x
- B. $\frac{x-1}{4x+2}$
- C. $\frac{4x+2}{x-1}$
- D. $\frac{5x+1}{2}$
- E. $\frac{(2x+1)(x-1)}{2}$

10. If θ is an acute angle and $\sin \theta = \frac{1}{2}$, then $\cos \theta =$

- A. -1
- B. 0
- C. $\frac{1}{2}$
- D. $\frac{\sqrt{3}}{2}$
- E. 2

11. $5y(2y - 3) + (2y - 3) =$

- A. $(5y + 1)(2y + 3)$
- B. $(5y + 1)(2y - 3)$
- C. $(5y - 1)(2y + 3)$
- D. $(5y - 1)(2y - 3)$
- E. $10y(2y - 3)$

12. For what real numbers x is $x^2 - 6x + 9$ negative?

- A. $-3 < x < 3$
- B. $x < -3$ or $x > 3$
- C. $x = -3$ or $x = 3$
- D. $0 < x < 6$
- E. For no real numbers x

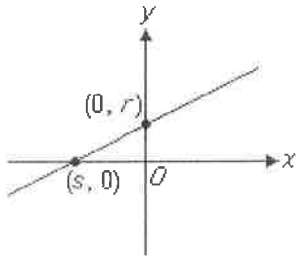
13. A root of $x^2 - 5x - 1 = 0$ is

- A. $\frac{1 - \sqrt{29}}{2}$
- B. $\frac{5 - \sqrt{17}}{2}$
- C. $\frac{1 + \sqrt{29}}{2}$
- D. $\frac{5 + \sqrt{17}}{2}$
- E. $\frac{5 + \sqrt{29}}{2}$

14. In the xy -plane, the graph of $y = x^2$ and the circle with center $(0,1)$ and radius 3 have how many points of intersection?

- A. None
- B. One
- C. Two
- D. Three
- E. More than three

15.



If an equation of the linear function in the figure above is $y = mx + b$, then $m =$

- A. $-\frac{r}{s}$
- B. $\frac{r}{s}$
- C. rs
- D. r
- E. $-s$

16. One ordering of the letters T, U, V and W from left to right is $UTVW$. What is the total number of orderings of these letters from left to right, including $UTVW$?

- A. 8
- B. 12
- C. 16
- D. 20
- E. 24

17. If $f(x) = \frac{3x-1}{2}$ and f^{-1} is the inverse of f , what is the value of $f^{-1}(3)$?

- A. $\frac{1}{3}$
- B. $\frac{2}{3}$
- C. 1
- D. 2
- E. $\frac{7}{3}$

18. The sequence $\{a_n\}$ is defined by $a_0 = 1$ and

$a_{n+1} = 2a_n + 2$ for $n = 0, 1, 2, \dots$. What is the value of a_3 ?

- A. 8
- B. 10
- C. 16
- D. 20
- E. 22

19. From 5 employees at a company, a group of 3 employees will be chosen to work on a project. How many different groups of 3 employees can be chosen?

- A. 3
- B. 5
- C. 6
- D. 10
- E. 15

20. If $f(x) = \left(\frac{1}{3}\right)^x$ and $a < b$, which of the following must be true?

- A. $f(a) + f(b) = 3$
- B. $f(a) + \frac{1}{3} = f(b)$
- C. $f(a) = f(b)$
- D. $f(a) < f(b)$
- E. $f(a) > f(b)$

ELEMENTARY ALGEBRA

QUESTION NUMBER	CORRECT ANSWER
1	D
2	C
3	A
4	D
5	D
6	B
7	D
8	B
9	B
10	A
11	B
12	C
13	D
14	C
15	C
16	A
17	A
18	C
19	A
20	D

COLLEGE-LEVEL MATHEMATICS

QUESTION NUMBER	CORRECT ANSWER
1	C
2	E
3	E
4	C
5	A
6	E
7	C
8	B
9	A
10	D
11	B
12	E
13	E
14	C
15	A
16	E
17	E
18	E
19	D
20	E