

ALGEBRA I

- Find the next term in the sequence: 4, 9, 15, 22, 30, ...
a) 40 b) 39 c) 38 d) 31 e) 43
- Twice the sum of a number and seven is four less than the square of the number. If the number is n , then this statement would be written algebraically as
a) $2n + 7 = n^2 - 4$ b) $2(n + 7) = (n - 4)^2$ c) $2(n + 7) = n^2 - 4$
d) $2n + 7 = (n - 4)^2$ e) $2(n + 7) = 4 - n^2$
- Which property is illustrated by the equation $a(b + c) = ab + ac$
a) associative b) commutative c) identity d) distributive e) inverse
- $13 - 4^2 \div 2 - 7 \times 3^2 =$
a) -51 b) 51 c) -53 d) -43 e) -58
- If $\frac{2}{x+5} = \frac{6}{15}$, then $x =$
a) 10 b) 6 c) 0 d) 3 e) -1
- Evaluate the expression $x^3 - 3xy + y^2$ if $x = -2$ and $y = -3$.
a) -21 b) 0 c) -35 d) 4 e) -17
- Solve the following inequality: $3(x - 1) + 2x \geq 1 - 7x - 9$.
a) $(-\infty, \frac{5}{12}]$ b) $[\frac{5}{12}, \infty)$ c) $[-\frac{5}{12}, \infty)$ d) $(\frac{5}{12}, \infty)$ e) $[-\frac{12}{5}, \infty)$

8. Solve the formula $rx + t = 4$ for x .

- a) $\frac{4-t}{rx}$ b) $4 - \frac{t}{rx}$ c) $4 - t - rx$ d) $4t + rx$ e) $\frac{4-t}{r-x}$

9. Including 9.25% tax, your bill for lunch is \$9.83. Find the cost of your lunch (rounded to the nearest penny) before the tax is added.

- a) \$8.78 b) \$9.00 c) \$8.88 d) \$9.05 e) \$8.92

10. Simplify the following expression by performing the indicated operations and collecting like terms: $-3(2x^2 - 7x) - (-2x^3 - 3x^2 + 12)$.

- a) $-2x^3 - 9x^2 + 21x + 12$ b) $-x^5 + 21x - 12$ c) $20x^6 - 12$
d) $-2x^3 + 9x^2 + 13x - 21$ e) $2x^3 - 3x^2 + 21x - 12$

11. What is the slope of the line containing the points $(-7, 12)$ and $(3, -10)$?

- a) $-\frac{11}{5}$ b) $\frac{5}{11}$ c) $\frac{11}{2}$ d) $\frac{2}{11}$ e) $-\frac{5}{11}$

12. Find the equation of the line if the x-intercept is -3 and the y-intercept is 4 .

- a) $y = \frac{3}{4}x - 3$ b) $y = -\frac{3}{4}x + 3$ c) $y = \frac{4}{3}x + 4$
d) $y = -\frac{4}{3}x - 3$ e) $y = \frac{4}{3}x - 4$

13. If the equation of a line is $4x - 7y - 3 = 0$, then the equation of the line perpendicular to it and that passes through the point $(-3, -1)$ is

- a) $y = \frac{4}{7}x - \frac{19}{4}$ b) $y = -\frac{7}{4}x - \frac{25}{4}$ c) $y = -\frac{7}{4}x - \frac{17}{4}$
d) $y = -\frac{4}{7}x - \frac{19}{7}$ e) $y = -3x + \frac{17}{3}$

14. Perform the following operation: $\frac{x^2-2x-35}{2x^3-3x^2} \times \frac{4x^3-9x}{7x-49}$

a) $\frac{2x^2-15x+1}{x^2-7}$

b) $\frac{-2x^2+7x-9}{x-7}$

c) $\frac{2x^2+13x+15}{7x}$

d) $\frac{(x+5)(2x-3)}{x(2x+3)}$

e) $\frac{x(x-7)}{(2x+3)(x+5)}$

15. Find the product of all values of x for which $f(x) = \frac{x-3}{x^2-10x-24}$ is undefined.

a) -72

b) -24

c) 18

d) 24

e) 72

16. A square is cut into two equal rectangles, each with a perimeter of 24. The number of square units in the area of the square is

a) 36

b) 64

c) 100

d) 48

e) 32

17. Angles are complements if their measures add up to 90° . Let the measure of $\angle A$ be nine times that of $\angle B$ and the measure of the complement of $\angle B$ be nine times the measure of the complement of $\angle A$. Find the measure of $\angle B$.

a) 6°

b) 8°

c) 9°

d) 10°

e) 7°

18. A concert promoter needs to make \$44,250 from the sale of 1,150 tickets. The promoter charges \$30 for balcony seats and \$45 for seats on the floor. How many tickets of each type must be sold to yield the \$44,250?

a) 600 balcony, 550 floor

b) 550 balcony, 600 floor

c) 400 balcony, 750 floor

d) 651 balcony, 499 floor

e) 500 balcony, 650 floor

19. Wholesalers' willingness to sell micro-widgets is given by the supply function $p = 50.25 + 0.85q$ and retailers' willingness to buy the micro-widgets is given by $p = 422.25 - 0.70q$, where p is the price of the micro-widget in dollars and q is the number of micro-widgets. What price will give market equilibrium (where the supply is equal to the demand to buy) for the micro-widgets?

a) \$219.19

b) \$254.25

c) \$212.41

d) \$209.75

e) \$211.11

20. The sum of a woman's age and her son's age is 86 years. Last year, the mother was twice as old as the son. Find the present age of each.

- a) woman 53, son 33 b) woman 55, son 31 c) woman 57, son 29
d) woman 58, son 28 e) woman 56, son 30

21. One of the roots of the equation $x^2 - 11x + 28 = 0$ is 7. What is the other root?

- a) -11 b) -4 c) 4 d) -7 e) 11

22. If the diagonal of a square is 6 inches, how many inches are in the perimeter of the square?

- a) $12\sqrt{2}$ b) 24 c) 17.5 d) $\frac{12}{\sqrt{2}}$ e) $24\sqrt{2}$

23. Find the coordinates of the vertex of the parabola represented by the equation

$$y = x^2 - 8x + 21.$$

- a) (-8, 21) b) (-4, 5) c) (4, -5) d) (5, -4) e) (4, 5)

24. Factor $10x^3 - 25x^2 - 35x$ completely.

- a) $5(2x^2 - 1)(x + 7)$ b) $5x(2x - 1)(x + 7)$ c) $5x(2x - 7)(x + 1)$
d) $5x(x - 1)(2x + 7)$ e) $5x(2x^2 - 5x - 7)$

25. If the ordered pair (3, 4) satisfies the inequality $5x + k \geq 2y$, then which of the following must be true?

- a) $k \geq -7$ b) $k \leq -7$ c) $k = 7$ d) $k \geq 23$ e) $k = -23$

26. Simplify: $(a - b)^2 - (b + a)^2$

- a) $-4ab$ b) 0 c) $2a^2 - 4ab$ d) $4ba$ e) $4a^2 - 4b^2$

27. The data in the table below models a linear function. Find the values of a , b , and c .

x	-4	-2	b	5	7
$f(x)$	a	4	3.5	0.5	c

- a) $a = 2, b = 1, c = -0.5$ b) $a = 5, b = -1, c = -0.5$ c) $a = 4, b = -2, c = 1$
d) $a = 0, b = -1, c = 2$ e) $a = 4, b = -1, c = 2$

28. One leg of a right triangle is 3 inches longer than the other leg. If the area enclosed by this triangle is 54 square inches, what is the length of the hypotenuse (in inches)?

- a) 14 b) 12 c) 225 d) 15 e) 16

29. Which of the following is true?

- a) $3^{-2} > 2^{-3}$ b) $(-3)^5 = 3^{-5}$ c) $4^3 \cdot 4^{-3} > 3^4 \cdot 3^{-4}$
d) $4^{-3} > 4^{-2}$ e) $2^{-3} > 2^{-4}$

30. Solve the following equation for x . $\frac{x}{x-2} - x = 1 + \frac{2}{x-2}$.

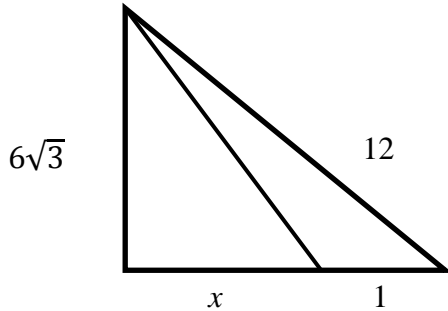
- a) $x = 2$ b) $x = -1$ c) $x = 0$ d) $x = -2$ e) $x = 1$

31. Simplify: $\left(\frac{4a^4b^{-5}}{2c^{-1}}\right)^{-2}$

- a) $\frac{b^{10}}{4a^8c^2}$ b) $\frac{2a^4c}{b^{10}}$ c) $\frac{a^6}{4b^{10}c^{10}}$ d) $\frac{8b^{10}}{a^8c^2}$ e) $\frac{4a^8c^2}{b^{10}}$

32. An investigation of a number of car accidents revealed the following information: 17 accidents involved alcohol and excessive speed, 23 accidents involved alcohol, 12 accidents involved excessive speed but not alcohol, and 15 of the accidents involved neither alcohol nor excessive speed. How many accidents were investigated?
- a) 39 b) 50 c) 67 d) 47 e) 52

33. Find x in the right triangle (not drawn to scale):



- a) $x = -7$ b) $x = 6$ c) $x = 6\sqrt{5}$ d) $x = 5$ e) $x = 13$
34. Solve for x : $27^{5x} = \frac{9^{3x}}{3}$
- a) $x = -\frac{1}{11}$ b) $x = 3$ c) $x = -9$ d) $x = -\frac{1}{9}$ e) $x = \frac{1}{3}$
35. Starting at 12 noon, water is pumped into a tank at a rate of 3 gallons per minute. At the same time, the tank is drained at the rate of 20 gallons per hour. At 3 p.m., the tank contains 600 gallons of water. How many gallons of water were in the tank initially at 12 noon?
- a) 90 b) 270 c) 120 d) 300 e) 105
36. The parabola $y = x^2 - 2x - 8$ is shifted 3 units up and 4 units right. What is the new y-intercept?
- a) -2 b) 17 c) 12 d) -6 e) 19

37. If $x^2 + 3x = 28$, then the set of possible values for $x + 2$ is

- a) $\{9, -2\}$ b) $\{-5, 6\}$ c) $\{-6, 4\}$ d) $\{3, -8\}$ e) $\{8, 4\}$

38. Simplify: $\sqrt{\frac{x^2}{25} - \frac{x^2}{36}}$

- a) $\frac{11x}{30}$ b) $\frac{x}{15}$ c) $\frac{x\sqrt{2}}{15}$ d) $\frac{x\sqrt{11}}{15}$ e) $\frac{x\sqrt{11}}{30}$

39. If $16 = 2^{x-1}$ and $y^{-3} = \frac{1}{27}$, then $-2x^y$ will be

- a) 250 b) -125 c) -250 d) 125 e) 216

40. Caleb has a jar containing 10 red marbles, 5 purple marbles, 12 black marbles, and 8 yellow marbles. What is the probability of drawing a black marble followed by a purple marble?

- a) $\frac{12}{119}$ b) $\frac{6}{119}$ c) $\frac{583}{1190}$ d) $\frac{17}{69}$ e) $\frac{276}{595}$

ALGEBRA I (Alternate Problems)

- The equation $x^3 + x^3 = x^4$ is
 - true for all real numbers
 - false for all real numbers
 - true for exactly one real number
 - true for exactly two real numbers
 - true for exactly three real numbers
- The remainder when $f(x) = (3x - 5)^{37} + 5x - 9$ is divided by $x - 2$ is:
 - 10
 - greater than 10
 - 0
 - 2
 - greater than 2
- The coordinates of P and Q are $(-4, 6)$ and $(6, -2)$ respectively. Which of the following are the coordinates of a point R that is on PQ and such that $PR = \frac{1}{4}PQ$?
 - $(-\frac{3}{2}, 4)$
 - $(\frac{3}{2}, 1)$
 - $(4, -\frac{1}{2})$
 - $(\frac{7}{2}, 0)$
 - $(-\frac{3}{2}, -\frac{1}{2})$
- If $x^2 - y^2 = 20$ and $x - y = -10$, then $x + y =$
 - 6
 - 2
 - 4
 - 10
 - 8
- What is the least number of terms that must be added in an arithmetic sequence whose first term is 78 and whose common difference is -4 to obtain a sum of 702?
 - 40
 - 27
 - 15
 - 13
 - 22

Answer Key

1. B
2. C
3. D
4. E
5. C
6. E
7. C
8. A
9. B
10. E
11. A
12. C
13. B
14. C
15. B
16. B
17. C
18. E
19. B
20. C
21. C
22. A
23. E
24. C
25. A
26. A
27. B
28. D
29. E
30. C

31. A
32. B
33. D
34. D
35. C
36. E
37. B
38. E
39. C
40. B

Alternate Problems

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