

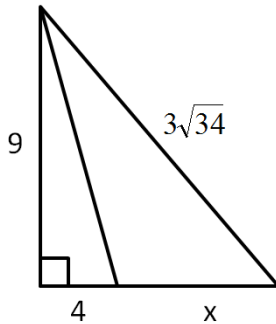
Algebra I

- For $3x - 2y = 6$, what is the slope of the line?
a) 3 b) -2 c) $\frac{2}{3}$ d) $\frac{3}{2}$ e) $-\frac{3}{2}$
- Which property is illustrated by the equation $a + b = b + a$?
a) associative b) commutative c) distributive d) identity e) inverse
- What is the slope of the line containing the points (1, 6) and (1, -3)?
a) -9 b) 0 c) undefined d) 3 e) 1
- A speed boat traveled 157 miles per hour to one port. On the return trip the boat traveled 171 miles per hour. Find the average speed to the nearest mile per hour for the round trip.
a) 162 mph b) 163 mph c) 164 mph d) 165 mph e) 166 mph
- If Isaac Newton's apple orchard needs to use a fertilizer that is 90% water, and it has 30 gallons of a solution which is 50% water, how much water should be added?
a) 30 gallons b) 120 gallons c) 15 gallons d) 100 gallons e) 150 gallons
- At R. Lomas Academy, there are 18 students in the Drama Club, 22 students in the Science Club, and 24 students in the Math Club. Of these students, there are 2 in Math and Science Clubs but not Drama. There are 5 students in Math and Drama Clubs but not Science. There are 6 students in Drama and Science Clubs but not Math. If only 3 students are in all three clubs, how many students are in at least one club?
a) 64 b) 45 c) 29 d) 16 e) none of these
- Solve for x: $2^{x^2+x} = 64$ The sum of the solutions is
a) 1 b) -3 c) 5 d) 2 e) -1
- One number is eight less than three times another number. The sum of the numbers is thirty-six. Find the numbers.
a) 5,31 b) -24, 60 c) 15, 26 d) -14, 50 e) 11, 25
- One of the roots of $x^2 - 4x - 60 = 0$ is 10. What is the other root?
a) 10 b) -10 c) 6 d) -5 e) -6
- Suppose $f(x)$ is a linear function and $f(-3) = 5$ and $f(1) = -2$. If $g(x)$ is a linear function whose graph is perpendicular to the graph of $f(x)$, what is the slope of $g(x)$?
a) $-\frac{7}{4}$ b) $-\frac{3}{2}$ c) $-\frac{2}{3}$ d) $\frac{2}{3}$ e) $\frac{4}{7}$

11. A math class containing 46 students was divided into 2 sections. One section had 2 more students than the other. How many students did the larger class have?

- a) 24 b) 23 c) 46 d) 21 e) 35

12. Find the value of the length x in the figure below. (not drawn to scale):



- a) 11 b) 19 c) -19 d) 14 e) $\sqrt{210}$

13. Given the equations $y = x^2 + 3x + 6$ and $3x + y = -2$, what is one point that satisfies both equations?

- a) (1, -5) b) (0, 6) c) (-2, 8) d) (-4, 10) e) (1, 10)

14. Let $(\sqrt[3]{7})^{-x} = \left(\frac{1}{7}\right)^{x+2}$. Solve for x .

- a) 3 b) -3 c) 7 d) -7 e) $\frac{1}{3}$

15. The diagonal of a square is $3\sqrt{2}$ inches. What is the area of the square in in^2 ?

- a) 12 b) 9 c) 18 d) $6\sqrt{2}$ e) $9\sqrt{2}$

16. For which of the following values of x is $\frac{x-9}{x^2-x-6}$ undefined?

- a) -3 b) 2 c) 3 d) 4 e) 9

17. If you flip a fair coin 4 times where the result is heads (H) or tails (T) on each flip, what is the probability that the result is HHHH on the four flips?

- a) 2 b) 4 c) $\frac{1}{8}$ d) $\frac{1}{16}$ e) $\frac{1}{2}$

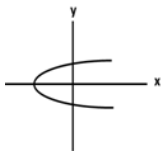
18. If the parabola $y = -2x^2 + 4x + 5$ is shifted 3 units down and 4 units right, what are the coordinates of the new vertex?

- a) (4, 6) b) (5, 4) c) (-3, 4) d) (5, 3) e) (3, 5)

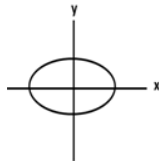
19. In a drawer, there are 4 red socks, 6 blue socks, 10 green socks, and 9 purple socks. What is the probability a sock pulled out at random will be a color with "u" in its name?
- a) $\frac{15}{29}$ b) $\frac{3}{5}$ c) $\frac{2}{3}$ d) $\frac{1}{9}$ e) $\frac{1}{6}$
20. What is the domain of the function $\frac{4x+5}{\sqrt{3-5x}}$?
- a) $\left(\frac{3}{5}, \infty\right)$ b) $\left(-\frac{5}{3}, \infty\right)$ c) $\left(-\infty, \frac{3}{5}\right)$ d) $\left(-\infty, -\frac{3}{5}\right)$ e) $\left(-\infty, \frac{5}{3}\right]$
21. If $f(x) = x + 3$ and $g(x) = x - 10$, then $f(g(x)) = ?$
- a) $x^2 - 7x - 30$ b) $x - 7$ c) $x - 13$ d) $2x - 7$ e) -7
22. The length of a rectangular garden is 7 yd more than the width of x yd. If the area is 48 square yards, which equation could be used to find the dimensions of the garden?
- a) $x^2 - 7x + 48 = 0$ b) $x^2 + 7x + 48 = 0$ c) $x^2 + 7x - 48 = 0$ d) $x^2 - 7x - 48 = 0$
e) $(x + 7)48 = 0$
23. Joshua currently has an average (mean) of 85% after 4 tests. He wants an average of 90% after he takes his fifth exam. What score does he need on the fifth exam in order to have a 90% average?
- a) 90% b) 95% c) 110% d) 100% e) 115%
24. If $f(x) = -x^2 + 5x - 7$, then find $f(x+h) - f(x) = ?$
- a) $-2xh - h^2$ b) $-h^2 + 5h$ c) $-2xh + h$ d) $-2xh - h^2 + 5h$ e) $2xh - h$
25. The x-coordinate of the solution to system of equations $\frac{1}{3}x + \frac{1}{6}y = -1$ and $\frac{1}{4}x + \frac{1}{8}y = 0$ is
- a) 3 b) -6 c) **1** d) **1** e) There is no solution

26. Which of the following graphs represents a function?

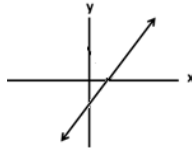
a)



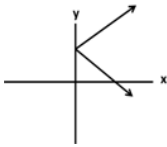
b)



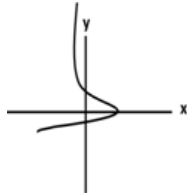
c)



d)



e)



27. If $0 < x < y < 1$ and $m = xy$, which of the following could be true?

a) $m \leq 0$

b) $m > x$

c) $m < x$

d) $m > y$

e) $m > 1$

28. If the x-intercept is three times the y-intercept and the line passes through the point $(-6, 4)$, then the equation of the line is:

a) $x + 3y = -6$

b) $x - 3y = -6$

c) $3x - y = 6$

d) $x - 3y = 6$

e) $x + 3y = 6$

29. In a right triangle, one leg is twice as long as the other leg. Let x represent the length of the shorter leg. What is the length of the hypotenuse?

a) $5x^2$

b) $\sqrt{3}x$

c) $2x$

d) $3x$

e) $\sqrt{5}x$

30. The least common multiple of $x^4 - 4x^2$ and $x^3 - 2x^2$ is:

a) $x^2(x-2)$

b) $x^2(x-2)(x+2)$

c) $x^2(x-2)^2$

d) $x^2(x-2)^2(x+2)$

e) $x^2(x+2)$

31. Two of the roots of $x^3 + 3x^2 - 4x - 12 = 0$ are 2 and -2. What is the third root?

a) -3

b) 0

c) 3

d) 5

e) There are only 2 roots

32. A sequence is defined recursively as $a_1 = 4$, $a_n = \frac{1}{2}a_{n-1} + 3$. The 5th term of this sequence is:

a) 5

b) 9

c) $\frac{11}{2}$

d) $\frac{23}{4}$

e) $\frac{47}{8}$

33. Bacteria in a lab multiply exponentially. If the number of bacteria doubles every 10 minutes, and you started with one bacteria, how long would it take to have more than 10,000 bacteria?
- a) 14 min. b) 1 hr, 45 min c) 2 hr, 20 min d) 6 hr e) 50 min
34. If $x = -4$ and $y = 2$, then $4x^2y^{-3}$ is:
- a) 8 b) $\frac{1}{8}$ c) -8 d) $-\frac{1}{8}$ e) 64
35. Simplify: $\frac{x^2-36}{x^3-3x^2-54x} \div \frac{x^2-4x-12}{x^2-9x}$
- a) $\frac{1}{x+2}$ b) $\frac{1}{x-6}$ c) x d) $\frac{1}{x-9}$ e) $\frac{x-9}{x+6}$
36. If y is 2 when x is 7 and y varies inversely as x , what is y when x is 4?
- a) 14 b) $\frac{7}{2}$ c) 56 d) $\frac{2}{7}$ e) 28
37. Leonard needs to borrow \$4000. He will pay 7% annual simple interest over the life of the loan. How long did it take him to pay back the loan if he paid a total of \$5960?
- a) 3 years b) 10 years c) 5 years d) 7 years e) 9 years
38. Which expression below is equivalent to $\frac{4-\sqrt{6}}{5}$?
- a) $\frac{2}{4+\sqrt{6}}$ b) $\frac{2}{4-\sqrt{6}}$ c) $\frac{22}{4+\sqrt{6}}$ d) $\frac{22}{4-\sqrt{6}}$ e) $\frac{4}{5\sqrt{6}}$
39. What is the equation of the perpendicular bisector of the line segment joining (2, 3) and (4, -5)?
- a) $y = \frac{1}{4}x - \frac{7}{4}$ b) $y = \frac{1}{4}x - 4$ c) $y = \frac{1}{4}x + \frac{5}{2}$ d) $y = -4x - 13$ e) $y = -4x - 4$
40. If $x^2 - y^2 = 20$ and $x - y = -10$, then $x + y =$
- a) -6 b) -2 c) 4 d) 2 e) 8