

**SVCC MATH CONTEST
ALGEBRA II**

TIME: 50 Minutes
70 Problems

DIRECTIONS: For this test, solve each problem. Then indicate the best answer in the appropriate space on the answer sheet. Plan your time wisely.

Please do not write on this test booklet.

SVCC MATH CONTEST ALGEBRA II

1. Simplify: $\sqrt{-28}$
Choose one of the following:

A) $-2\sqrt{7}$
B) $2i\sqrt{7}$
C) $-2i\sqrt{7}$
D) $-14i$
E) none of the above

2. Simplify: $\sqrt{75} - \sqrt{27} + \sqrt{243}$
Choose one of the following:

A) $11\sqrt{3}$
B) $97\sqrt{3}$
C) $17\sqrt{3}$
D) $18\sqrt{3}$
E) none of the above

3. Simplify: $\frac{26a^5b^2}{78ab^3c}$

Choose one of the following:

A) $\frac{a^5b^2}{3ab^3c}$

B) $\frac{2a^6}{6b^5c}$

C) $\frac{a^4}{3bc}$

D) $\frac{26a^5}{78bc}$

E) none of the above

4. Solve for x : $6x^2 - 5x - 6 = 0$

Choose one of the following:

A) $-6/5, 5/6$

B) $7/3, -2$

C) $-3/2, 2/3$

D) $3/2, -2/3$

E) none of the above

5. Subtract $3x^2 - 5xy + 4y^2$ from $x^2 - xy + y^2$

Choose one of the following:

A) $-2x^2 + 4xy - 3y^2$

B) $2x^2 - 4xy + 3y^2$

C) $-2x^2 - 6xy + 5y^2$

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

E) none of the above

6. Solve for x : $\frac{x-6}{7} + 4 = \frac{x-4}{3}$

Choose one of the following:

A) $47/2$

B) $1/2$

C) $-5/2$

D) $7/2$

E) none of the above

7. Solve the system:
$$\begin{cases} -x + 5y = -4 \\ 2x + 3y = -18 \end{cases}$$

Choose one of the following:

A) $(-2, 3)$

B) $(6, -2)$

C) $(-3, -2)$

D) $(-6, -2)$

E) none of the above

8. Simplify: $4^3 \cdot 4^0$
Choose one of the following:
A) 1
B) 0
C) 4^3
D) 16^3
E) none of the above
9. Factor completely: $2x(a - b) - y(a - b)$
Choose one of the following:
A) $(2x + y)(a - b)$
B) $(a - b)(2x - y)$
C) $(2x - y)(a - b)^2$
D) $(a + b)(2x - y)$
E) none of the above
10. Simplify: $-\sqrt[3]{64}$
Choose one of the following:
A) 4
B) -4
C) -8
D) not a real number
E) none of the above
11. Multiply: $(-2a^2b)(-7a^5b^2c)$
Choose one of the following:
A) $-14a^2b^2c$
B) $14a^{10}b^2c$
C) $-9a^7b^3c$
D) $14a^5b^3c$
E) none of the above

12. Solve for h: $V = \frac{1}{3} \pi r^2 h$

Choose one of the following:

A) $V - \frac{1}{3} \pi r^2$

B) $V/(3 \pi r^2)$

C) $3V/(\pi r^2)$

D) $\pi V r^2/3$

E) none of the above

13. Multiply: $a^2(3a - 5)(3a + 5)$

Choose one of the following:

A) $9a^4 + 25a^2$

B) $9a^4 - 25a^2$

C) $9a^4 - 30a^3 - 25a^2$

D) $9a^4 - 30a^3 + 25a^2$

E) none of the above

14. Find x if $2^{2x - 1} = \frac{1}{8}$.

Choose one of the following:

A) 0

B) -1

C) 2

D) -2

E) none of the above

15. Solve for x: $3x^2 - 33 = 0$

Choose one of the following:

A) -11, 11

B) -33, 33

C) $-\sqrt{11}, \sqrt{11}$

D) $-i\sqrt{11}, i\sqrt{11}$

E) none of the above

16. Simplify: $3\sqrt[3]{56} - 9\sqrt[3]{7}$

Choose one of the following:

A) $-6\sqrt[3]{49}$

B) $-3\sqrt[3]{7}$

C) $-6\sqrt[3]{7}$

D) Can't be simplified

E) none of the above

17. Solve for x: $-3(2x - 1) + 3(3x + 2) = 7$

Choose one of the following:

A) $6/5$

B) 2

C) $2/3$

D) $-2/3$

E) none of the above

18. For what values of the variable is the expression $\frac{2y - 3}{2y^2 + 5y - 12}$ undefined?

Choose one of the following:

A) 6, -2

B) -4, $3/2$

C) -4

D) never undefined

E) none of the above

19. Simplify: $\frac{(x^{-3})^2(x^4)^{-1}}{(x^3)^{-5}}$

Choose one of the following:

A) $\frac{1}{x^5}$

B) x^4

C) x^5

D) x^{39}

E) none of the above

20. If the reciprocal of 4 times a number is subtracted from the reciprocal of the number, the result is $\frac{3}{5}$. Find the number.

Choose one of the following:

- A) $\frac{1}{5}$
- B) $\frac{4}{5}$
- C) $\frac{1}{4}$
- D) $\frac{5}{4}$
- E) none of the above

21. Evaluate: $\left(\frac{27}{125}\right)^{-\frac{2}{3}}$

Choose one of the following:

- A) $-\frac{18}{125}$
- B) $\frac{18}{65}$
- C) $\frac{25}{9}$
- D) $\frac{9}{25}$
- E) none of the above

22. Find the slope of the line whose equation is $-5x + 3y = 9$.

Choose one of the following:

- A) $\frac{5}{3}$
- B) $-\frac{5}{3}$
- C) $\frac{3}{5}$
- D) $-\frac{3}{5}$
- E) none of the above

23. If $f(x) = \sqrt{2x - 4}$, find $f(16)$.

Choose one of the following:

- A) 4
- B) no real solution
- C) 0
- D) $2\sqrt{7}$
- E) none of the above

24. If $5^{2x} = 625$, find x .

Choose one of the following:

- A) 3
- B) -1
- C) 4
- D) 2
- E) none of the above

25. Perform the indicated operations and express in lowest terms.

$$\frac{\frac{x - 2y}{4x}}{\frac{(x^2 - 2xy)}{8}}$$

Choose one of the following:

- A) $\frac{2}{x^2 - 2x}$
- B) $\frac{2}{x^2}$
- C) $2x^2$
- D) $\frac{x(x - 2y)}{2}$
- E) none of the above

26. If $\log_b 196 = 2$, find b .

Choose one of the following:

- A) 9
- B) 10
- C) 14
- D) 15
- E) none of the above

27. Solve $\begin{cases} 3x + 2y = 5 \\ y = 2x + 6 \end{cases}$; then find the sum of the x and y coordinates of the solution.

Choose one of the following:

- A) -4
- B) 3
- C) -1
- D) -3
- E) none of the above

28. Ten less than three times the square of an integer is equal to 13 times the integer. Find the integer.

Choose one of the following:

- A) 2
- B) 3
- C) 4
- D) 5
- E) none of the above

29. Evaluate $\log_{169}13$.

Choose one of the following:

- A) $-1/3$
- B) $1/2$
- C) $-1/2$
- D) 3
- E) none of the above

30. If $h(x) = 3^x - 1$, find $h(-1)$.

Choose one of the following:

- A) -4
- B) 2
- C) $-1/3$
- D) $-2/3$
- E) none of the above

31. Divide $6y^2 - 11y + 3$ by $2y - 3$.

Choose one of the following:

A) $3y - 1$

B) $3y - 10$

C) $3y + 1$

D) $3y - 10 + \frac{33}{2y - 3}$

E) none of the above

32. Find the x and y intercepts of the equation $5x - 3y + 7 = 0$.

Choose one of the following:

A) $(0, -7/3), (-7/5, 0)$

B) $(0, 7/3), (-7/5, 0)$

C) $(-7/5, 0), (7/3, 0)$

D) $(0,0), (2, 5)$

E) none of the above

33. If $g(x) = 2x^2 + 3$, find $g(x + h)$.

Choose one of the following:

A) $(2x + 2h)^2 + 3$

B) $2x^2 + 4hx + 2h^2 + 3$

C) $2x + 2h + 3$

D) $2x^3 + 2hx^2 + 3x + 3h$

E) none of the above

34. The length of a rectangle is three more than twice its width. If the area is 90 m^2 , find the dimensions of the rectangle.

Choose one of the following:

A) 5 m, 18 m

B) 4 m, 11 m

C) 6 m, 15 m

D) 8 m, 19 m

E) none of the above

35. Solve the following system. If a unique solution does not exist, tell whether the system is dependent or inconsistent.

$$\begin{cases} 2x + 6y = -3 \\ x = -3y + 4 \end{cases}$$

Choose one of the following:

- A) (8, -3)
 - B) (8, -4/3)
 - C) Inconsistent
 - D) Dependent
 - E) none of the above
36. What number must be added to make a perfect trinomial square?

$$x^2 - \frac{2}{3}x + \underline{\hspace{2cm}}$$

Choose one of the following:

- A) 1/36
 - B) 3/2
 - C) 4/9
 - D) 1/9
 - E) none of the above
37. Find the slope of the line determined by the points (-7, -3) and (1, -11).
- Choose one of the following:
- A) 7/4
 - B) -1
 - C) -7/3
 - D) undefined
 - E) none of the above

38. The graph of $\frac{x^2}{9} - \frac{y^2}{16} = 1$ is:

Choose one of the following:

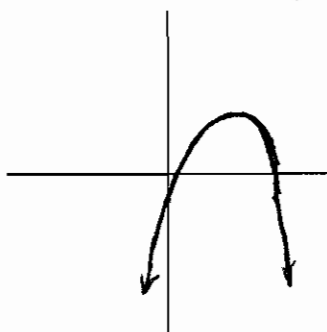
- A) a circle
- B) a parabola
- C) an ellipse
- D) a hyperbola
- E) none of the above

39. The graph of $x^2 - 6x + y^2 + 8y - 4 = 0$ is:
Choose one of the following:
A) a circle
B) a parabola
C) an ellipse
D) a hyperbola
E) none of the above
40. Find the center and radius of the circle, $x^2 + 6x + y^2 = 16$.
Choose one of the following:
A) C(3,0), $r = 5$
B) C(-3,0), $r = 5$
C) C(3,0), $r = 4$
D) C(-3,0), $r = 4$
E) none of the above
41. Solve the equation, $2x^2 - 5x = 3$.
Choose one of the following:
A) $-1/2, 3$
B) $1/2, -3$
C) $1/3, -2$
D) $-1/3, 2$
E) none of the above
42. Perform the indicated operation and simplify: $\frac{4-i}{3-2i}$
Choose one of the following:
A) $\frac{4}{3} + \frac{1}{2}i$
B) $\frac{14}{13} + \frac{5}{13}i$
C) $\frac{24}{5} + i$
D) $2 + i$
E) none of the above

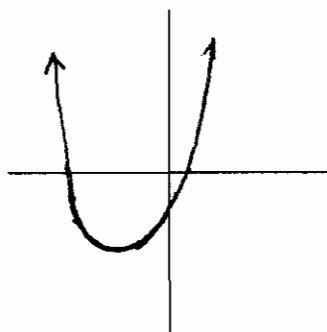
43. The graph of $y = -x^2 - 4x - 1$ is:

Choose one of the following:

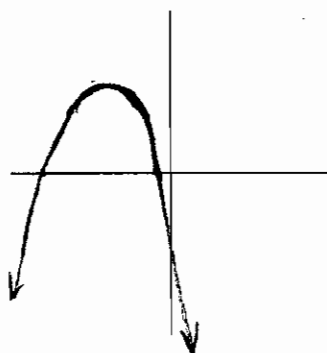
A)



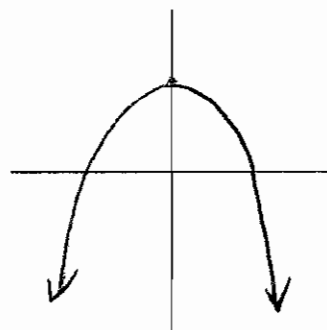
B)



C)



D)



E) none of the above

44. $\log \frac{x^2}{y^3} = ?$

Choose one of the following:

A) $3 \log y - 2 \log x$

B) $2 \log x + \frac{1}{3} \log y$

C) $2 \log x - 3 \log y$

D) $\frac{3}{2}(\log x - \log y)$

E) none of the above

45. If $f(x) = x^2 - 4x + 5$ and $g(x) = x + 2$, find $f(g(x))$.

Choose one of the following:

A) $x^3 - 2x^2 - 3x + 10$

B) $x^2 + 1$

C) $x^2 - 4x + 7$

D) $x^2 - 3x + 7$

E) none of the above

46. The solution set for $x^2 - 4 \leq 0$ is:

Choose one of the following:

A) $x \leq -2$

B) $x \geq 2$

C) $x \leq -2$ or $x \geq 2$

D) $x \leq 2$

E) none of the above

47. The product $(3x^3 - 4)^2$ is:

Choose one of the following:

A) $9x^6 - 24x^3 + 16$

B) $9x^9 - 16$

C) $9x^6 - 12x^3 - 16$

D) $9x^6 - 12x^3 + 16$

E) none of the above

48. Solve $x^3 + 5x^2 = 6x$. The sum of the solutions is:
Choose one of the following:
- A) 0
 - B) -5
 - C) 5
 - D) 30
 - E) none of the above
49. Find the domain of $y = \sqrt{2x - 3}$.
Choose one of the following:
- A) $\left\{x \mid x \geq \frac{3}{2}\right\}$
 - B) $\{x \mid x \geq 3\}$
 - C) $\left\{x \mid x \geq \frac{2}{3}\right\}$
 - D) $\{x \mid x \text{ is a real number}\}$
 - E) none of the above
50. A line passing through $(2, -3)$ and $(5, y)$ is parallel to a line with slope 3. What is the value of y .
Choose one of the following:
- A) 3
 - B) -2
 - C) 12
 - D) 6
 - E) none of the above
51. Perform the indicated operation and simplify: $2i(3 - 4i)$.
Choose one of the following:
- A) $-6 + 8i$
 - B) $6 - 8i$
 - C) $8 + 6i$
 - D) $-8 + 6i$
 - E) none of the above

52. Find the solution to the following system of equations:

$$\begin{cases} x + y + z = -3 \\ 2x - y + 2z = -3 \\ x - 4y + z = 2 \end{cases}$$

Choose one of the following:

- A) $(-4, 0, 1)$
- B) $(3, -1, -5)$
- C) $(-5, -1, 3)$
- D) $(0, 1, 6)$
- E) none of the above

53. Solve: $\frac{9x-2}{5} - \frac{8x-7}{6} = \frac{1}{6}$

Choose one of the following:

- A) -4
- B) $-9/7$
- C) $26/7$
- D) $-59/3$
- E) none of the above

54. Find the solution set to $\frac{x-2}{3} - \frac{x+1}{2} \leq \frac{-1}{6}$

Choose one of the following:

- A) $-6 \leq x \leq 0$
- B) $6 \leq x$
- C) $-6 \leq x$
- D) $x \leq -6$
- E) none of the above

55. Simplify: $\left(\frac{x^{-4}y^7}{x^0y^{-3}}\right)^{-3}$

Choose one of the following:

A) $\frac{x^{12}}{y^{30}}$

B) $\frac{x^{15}}{y^{30}}$

C) $\frac{x^4}{y^{10}}$

D) $\frac{x}{y^{10}}$

E) none of the above

56. Solve: $\sqrt{2x + 1} - 7 = -x$

Choose one of the following:

A) 12

B) -3

C) 4, 12

D) 4

E) none of the above

57. $(5 - 2i)(5 + 2i) = ?$

Choose one of the following:

A) $25 - 4i$

B) 29

C) 25

D) $25 + 4i$

E) none of the above

58. Find the distance between the points $(-3, 4)$ and $(5, -1)$.

Choose one of the following:

A) $\sqrt{13}$

B) $\sqrt{29}$

C) $\sqrt{89}$

D) $\sqrt{101}$

E) none of the above

59. The augmented matrix for the system $\begin{cases} 5x - y = 4 \\ y + 2x = 3 \end{cases}$ is:

Choose one of the following:

A) $\left[\begin{array}{cc|c} 5 & -1 & 4 \\ 1 & 2 & 3 \end{array} \right]$

B) $\left[\begin{array}{cc|c} 5 & -1 & 4 \\ 2 & 1 & 3 \end{array} \right]$

C) $\left[\begin{array}{cc|c} 5 & 1 & 3 \\ -1 & 2 & 4 \end{array} \right]$

D) $\left[\begin{array}{cc|c} 1 & 2 & 3 \\ 0 & -11 & -11 \end{array} \right]$

E) none of the above

60. Two gourmet coffees sell for \$4.50 and \$7.00 per pound. The owner wishes to mix these coffees to make 100 pounds of a coffee that will sell for \$6.20 per pound. How much of the more expensive coffee is required?

Choose one of the following:

A) 68

B) 60

C) 50

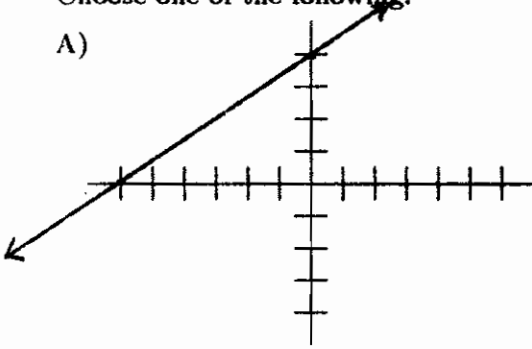
D) 42

E) none of the above

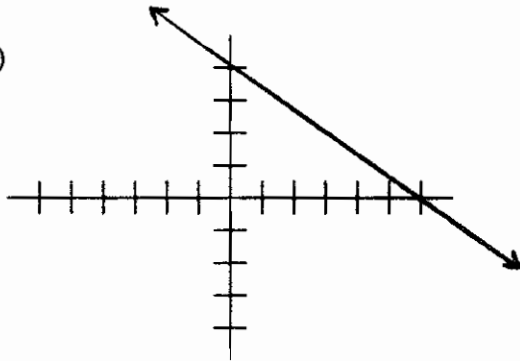
61. The graph of $-2x + 3y = 12$ is:

Choose one of the following:

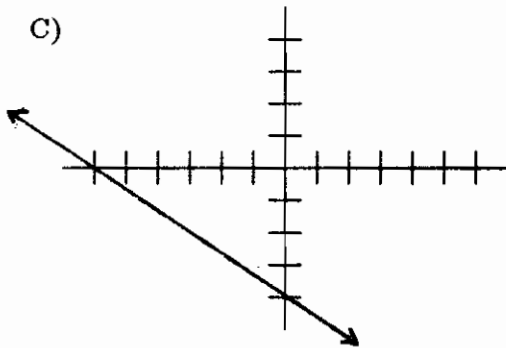
A)



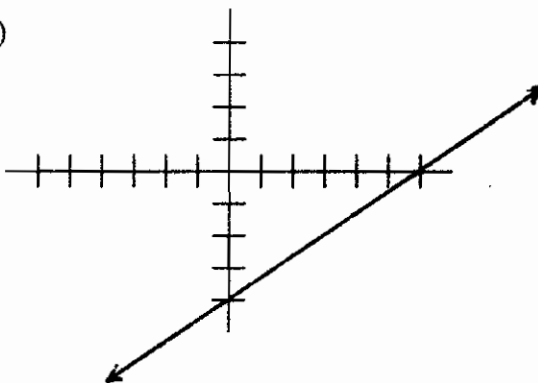
B)



C)



D)



E) none of the above

62. Solve for x : $12^x - 2 = \frac{1}{144}$.
Choose one of the following:
- A) 0
 - B) 3
 - C) $1/2$
 - D) 2
 - E) none of the above
63. Solve for x : $2ax - 2ab = 3x - 3b$.
Choose one of the following:
- A) $2ab - 3b$
 - B) b
 - C) $6ab^2$
 - D) $2ab + 3b$
 - E) none of the above
64. Give the domain of the function: $y = \frac{1}{x^2 + 81}$.
Choose one of the following:
- A) $\{x \mid x \neq \pm 9\}$
 - B) $\{x \mid x \geq 9\}$
 - C) $\{x \mid x < -9 \text{ or } x > 9\}$
 - D) $\{x \mid x \text{ is a real number}\}$
 - E) none of the above
65. If $f(x) = 2x^2 - 1$ and $g(x) = x + 3$, find $f(g(-3))$.
Choose one of the following:
- A) 20
 - B) 17
 - C) 0
 - D) -1
 - E) none of the above

66. Write the inverse relation of the function $3x - 5y = 7$.

Choose one of the following:

A) $5y - 3x = 7$

B) $y = \frac{3}{5}x + 7$

C) $y = \frac{5}{3}x + 7$

D) $y = \frac{5}{3}x + \frac{7}{3}$

E) none of the above

67. $\log_3 \sqrt[3]{x^4} = ?$

Choose one of the following:

A) $12 \log x$

B) $\frac{4}{3} \log_3 x$

C) $\frac{1}{3} \log_4 x$

D) $3 \log x + 4 \log x$

E) none of the above

68. Given that $\log 2 = 0.301$ and $\log 3 = 0.477$, find $\log \frac{1}{8}$.

Choose one of the following:

A) -1.341

B) 0.903

C) 1.341

D) -0.903

E) none of the above

69. Find the x intercepts of the parabola $y = 2x^2 - 11x + 12$.

Choose one of the following:

A) $\frac{3}{2}$ and -4

B) $\frac{3}{2}$ and 4

C) -4 and -3

D) -3 and $\frac{3}{2}$

E) none of the above

70. Write the equation of the line through the points $(-7, -3)$ and $(-2, 1)$.

Choose one of the following:

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

B) $y = \frac{4}{5}x - \frac{3}{5}$

C) $y = \frac{4}{5}x + \frac{13}{5}$

D) $y = -\frac{4}{5}x - \frac{3}{5}$

E) none of the above