

different

#47

# SVCC MATH CONTEST

## ALGEBRA I

**TIME: 50 minutes**

**50 problems**

**Directions:** Solve each problem. Then indicate the *best* answer in the appropriate space on the answer sheet. There is no penalty for guessing. Plan and use your time wisely. If you need more scrap paper, please raise your hand and the proctor will provide some more.

**PLEASE DO NOT WRITE ON THIS TEST BOOKLET.  
THANKS.**

**SOUTHWEST VIRGINIA COMMUNITY COLLEGE  
MATH CONTEST  
ALGEBRA I EXAM**

1) Simplify  $\sqrt{3} \cdot \sqrt{75}$ .

A)  $5\sqrt{3}$

B)  $5\sqrt{15}$

C) 25

D) 15

2) What is the solution to the system?

$$\begin{cases} y = \frac{1}{3}x \\ x + 3y = 24 \end{cases}$$

A) (12, 4)

B) (-4, -12)

C) (-12, -4)

D) (4, 12)

3) Which polynomial can be factored over the set of polynomials with integer coefficients?

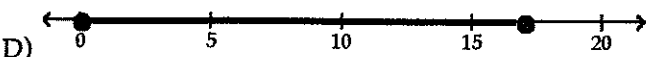
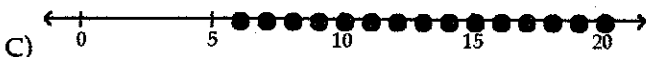
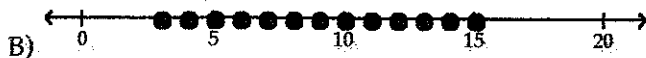
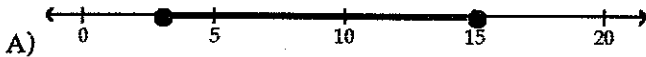
A)  $x^2 - 5x - 10$

B)  $x^2 + 5x + 10$

C)  $x^2 + 5x + 14$

D)  $x^2 + 5x - 14$

4) Dennis bought 20 pounds of fruit, including three pounds of apples. Which graph shows the total number of pounds of grapes he might have bought?



5) Simplify  $(-6y^{-4})^5$ .

A)  $\frac{7776}{y^{20}}$

B)  $-\frac{7776}{y^{20}}$

C)  $-7776y^{20}$

D)  $7776y^{20}$

6) A duplicating machine enlarges a picture 20%. If that enlarger is used 4 times, about how many times as large as the original picture will the final picture be?

A) 4.8

B) 2.1

C) 0.8

D) 5

7) Mike has saved \$89. He decides to spend \$6 per week on entertainment. Write an equation giving the amount  $y$  he has left after  $x$  weeks.

A)  $y = 89 + 6x$

B)  $y = 6 - 89x$

C)  $y = 6 + 89x$

D)  $y = 89 - 6x$

8) Solve  $x^2 - 6x - 27 = 0$ .

A)  $x = 9$  and  $x = 3$

B)  $x = -9$  and  $x = -3$

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

D)  $x = 9$  and  $x = -3$

9) Of 200 people on a jogging trail, 150 are running and the rest are walking. Which of the following is the ratio of runners to walkers?

A)  $\frac{4}{3}$

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

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

D)  $\frac{1}{3}$

10) Multiple choice Solve  $17 < 5(z + 5) + 2$ .

A)  $-2 < z$

B)  $2 < z$

C)  $3.6 < z$

D)  $-3.6 < z$

11) The path of a platform diver can be described by the equation  $y = -2x^2 + 15x + 10$ , where  $x$  is the horizontal distance in meters of the diver from the edge of the platform and  $y$  is the height of the diver in meters above the surface of the water. In horizontal distance, about how far in front of the platform will the diver enter the water?

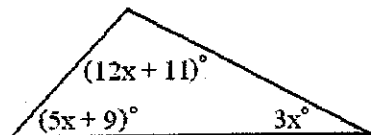
A) 15 meters

B) 8 meters

C) 5 meters

D) 2 meters

12) Find the measure of the largest angle in the triangle below.



A)  $131^\circ$

B)  $107^\circ$

C)  $24^\circ$

D)  $49^\circ$

13) Which of the following numbers is irrational?

A)  $\frac{\sqrt{8}}{\sqrt{2}}$

B)  $4\sqrt{2} \cdot \sqrt{2}$

C)  $4\sqrt{2}$

D)  $\sqrt{2} \cdot \sqrt{8}$

14) For a school fund-raiser, Holly sold 12 boxes of stationery and 10 boxes of envelopes, for a total of \$40.00. Jim sold 15 boxes of stationery and 12 boxes of envelopes, for a total of \$49.20. How much did one box of envelopes cost?

A) \$4.00

B) \$1.60

C) \$2.00

D) \$4.10

15)  $12x^2 + 17x + 6 = ?$

A)  $(12x + 1)(x + 6)$

B)  $(3x + 2)(4x + 3)$

C)  $(12x + 2)(x + 3)$

D)  $(3x - 2)(4x - 3)$

16) If  $\frac{a}{b} = \frac{c}{d}$ ,  $a \neq 0$ ,  $b \neq 0$ ,  $c \neq 0$ , and  $d \neq 0$ , which of the following is true?

A)  $\frac{a}{d} = \frac{c}{b}$

B)  $ac = bd$

C)  $\frac{a}{c} = \frac{b}{d}$

D)  $\frac{b}{a} = \frac{c}{d}$

17) When  $x$  is a large positive number, the graph of which equation rises the fastest?

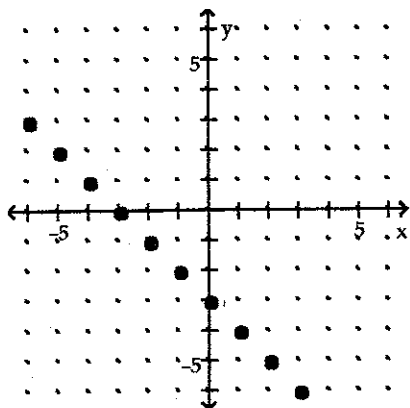
A)  $(0.5)^x = y$

B)  $2^{-x} = y$

C)  $2x = y$

D)  $2^x = y$

18) Which equation describes the points graphed below?



A)  $x + y = -3$

B)  $x - y = -3$

C)  $x - y = 3$

D)  $x + y = 3$

19) On a map,  $\frac{1}{4}$  inch represents 150 miles. If the distance between two cities is 3 inches on the map, what is the actual distance between the cities?

- A) 450 miles                      B) 900 miles                      C) 1800 miles                      D) 3600 miles

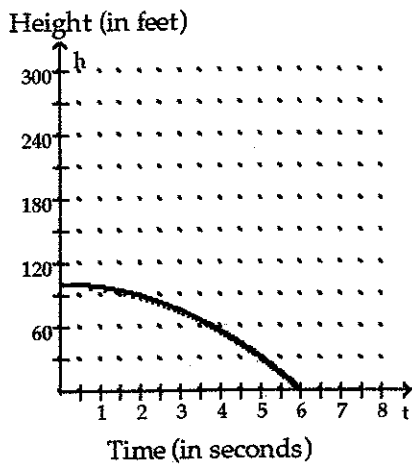
20) Solve  $\frac{18t}{7} = \frac{2t-2}{3}$ .

- A) -0.05                      B) -0.206                      C) -2.86                      D) -0.35

21) Which expression must represent a negative number if  $x$  is negative?

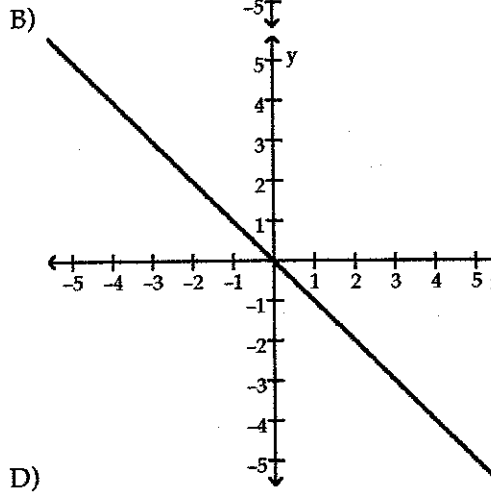
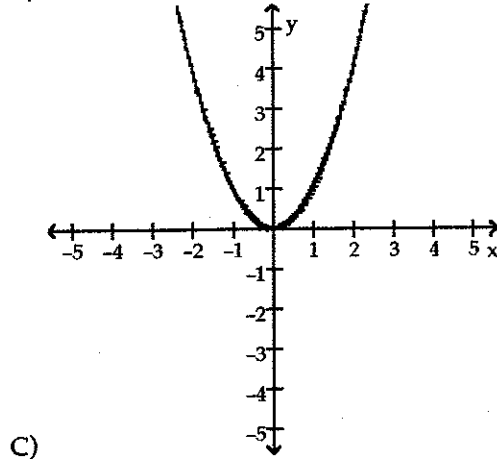
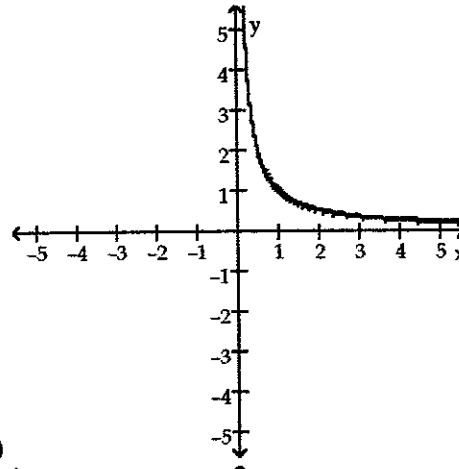
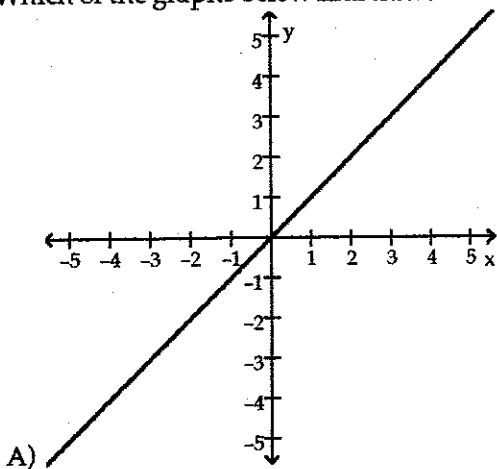
- A)  $4 + x$                       B)  $x^2$                       C)  $x^3$                       D)  $-x$

22) The graph below shows the height  $h$  of a ball in feet  $t$  seconds after being dropped from a height of 100 feet above the surface of the moon. About how many seconds after being dropped is the ball 30 feet above the ground.



- A) 2                      B) 4                      C) 5                      D) 3

23) Which of the graphs below illustrates inverse variation?



24) If  $f(x) = |x + 2|$ , then  $f(-3) = ?$ .

A) -1

B) 5

C) 1

D) -5

25) Find  $\frac{3}{2}[A]$  when  $[A] = \begin{bmatrix} 7 & 6 & -4 \\ 8 & -3 & 10 \end{bmatrix}$ .

A)  $\begin{bmatrix} 10.5 & 9 & -6 \\ 12 & -4.5 & 15 \end{bmatrix}$

B)  $\begin{bmatrix} \frac{21}{2} & 9 & 6 \\ 12 & -\frac{9}{2} & 15 \end{bmatrix}$

C)  $\begin{bmatrix} 10.5 & 6 & -4 \\ 12 & -3 & 10 \end{bmatrix}$

D)  $\begin{bmatrix} \frac{21}{2} & 9 & -8 \\ 12 & -\frac{9}{2} & 15 \end{bmatrix}$

26) Two book clubs offer discount prices. The first one has a \$12 membership fee and charges \$8 a book. The second club charges \$14 to join, plus \$7.50 for each book. How many books must you buy for the two clubs' charges to be equal?

A) 1 book

B) 4 books

C) 8 books

D) 3 books

27) What is the equation of the line parallel to  $2x - 3y = 9$  that passes through  $(-6, 1)$ ?

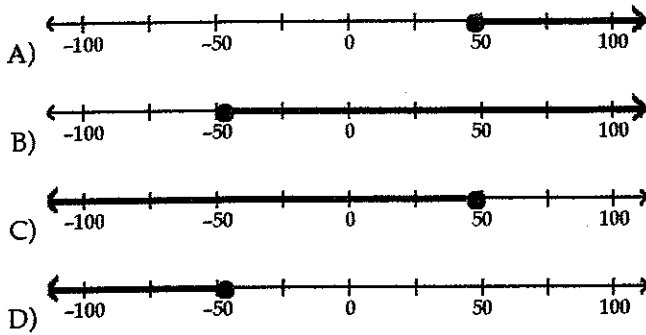
A)  $y = \frac{3}{2}x + 10$

B)  $y = \frac{2}{3}x + 5$

C)  $y = \frac{2}{3}x + 4$

D)  $y = 2x + 13$

28) Which number line below represents the graph of the solution of  $-\frac{1}{4}t \leq 12$ ?



29) What is the greatest common factor of  $12m^2n^2 - 20mn^3$ ?

- A)  $4mn^2$                       B)  $4m^2n^2$                       C)  $5mn$                       D)  $3mn$

30) Which of the following describes the graph of and the solution(s) to the system?

$$\begin{cases} 2x - 4y = -1 \\ x - 2y = 2 \end{cases}$$

- A) one line, infinitely many solutions                      B) two intersecting lines, solution of (2, 4)  
 C) two parallel lines, no solutions                      D) two intersecting lines, solution of (-1, 2)

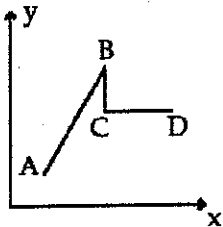
31) A square has an area of  $16x^2 + 8xy + y^2$ . What is the length of a side of the square?

- A)  $4x + y$                       B)  $x + y$                       C)  $2x + y$                       D)  $8x + y$

32) Solve the equations  $4m + 3 = -37$  and  $5n - 2 = 28$ . What is the sum of the solutions?

- A) 4                      B) -4                      C) 16                      D) -16

33) In the graph below,  $\overline{BC}$  has ...

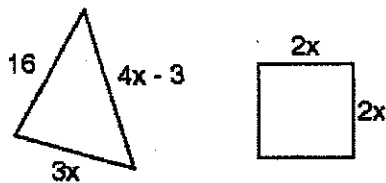


- A) a positive slope.                      B) no slope.                      C) a negative slope.                      D) a slope of zero.

34) Which property is illustrated by  $2(x + 4) = 2(4 + x)$ ?

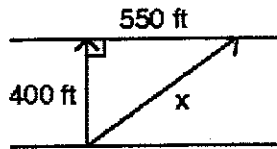
- A) Associative Property of Addition                      B) Associative Property of Multiplication  
 C) Commutative Property of Addition                      D) Distributive Property

35) If the perimeter of the triangle is equal to the perimeter of the square, then the length of a side of the square is ?



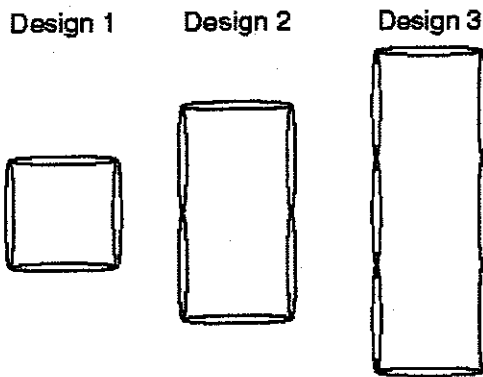
- A) 38 units                      B) 20 units                      C) 26 units                      D) 13 units

- 36) Nora rowed a canoe across a river 400 feet wide. A strong current carried her canoe 550 feet downstream as she rowed. Find  $x$ , the distance Nora actually rowed, to the nearest foot.



- A) 680 ft      B) 462,500 ft      C) 950 ft      D) 1900 ft

- 37) These designs are made with toothpicks. Which formula describes the number of toothpicks  $t$  used to make design  $n$ ?



Design Number	Number of Toothpicks
1	4
2	6
3	8

- A)  $t = n + 4$       B)  $t = 4 + 2(n - 1)$       C)  $t = 4n$       D)  $t = 2 + 4(n - 1)$

- 38) Which window on an automatic grapher shows the graph of  $y = -7x + 11$  in three quadrants?

- A)  $-10 \leq x \leq 10, -5 \leq y \leq 10$       B)  $-5 \leq x \leq 5, -10 \leq y \leq 5$   
 C)  $-10 \leq x \leq 10, -5 \leq y \leq 15$       D)  $-5 \leq x \leq 10, -5 \leq y \leq 5$

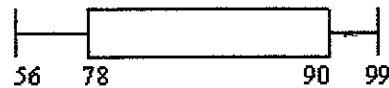
- 39) The scores for Mrs. Davis' algebra final exam are listed below:

56, 62, 68, 73, 73, 77, 78, 78, 81, 84, 84, 84, 89, 90, 90, 90, 93, 94, 95, 95, 97, 99.

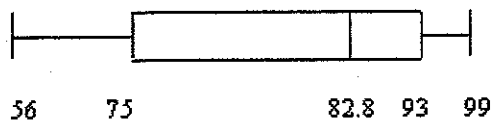
Which box-and-whiskers plot below matches this data?



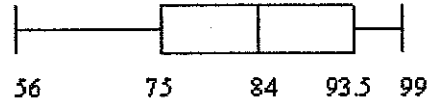
A)



B)



C)

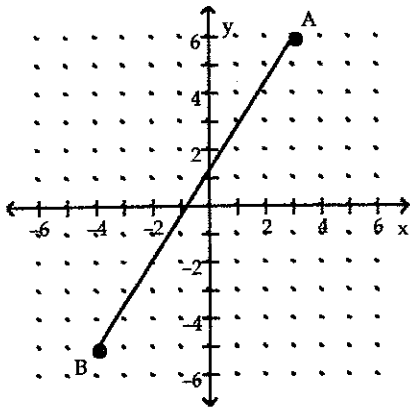


D)

- 40) What is the slope of the line through  $(1, 3)$  and  $(2, -4)$ ?

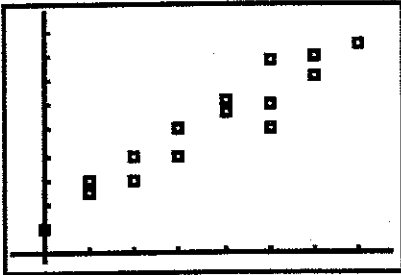
- A)  $-\frac{1}{7}$       B)  $-\frac{1}{3}$       C)  $-1$       D)  $-7$

41) What is the length of AB in the graph below?



- A)  $5\sqrt{17}$       B)  $17\sqrt{5}$       C)  $\sqrt{2}$       D)  $\sqrt{170}$

42) Which line is the best-fitting line for the scatter plot below? The scale on the x and y axes is 1 unit.



- A)  $y = \frac{3}{4}x + 3$       B)  $y = -x + 1$       C)  $y = 2x + 1$       D)  $y = x + 1.5$

43) What is the domain of the function  $y = \sqrt{3x}$ ?

- A) the set of all real numbers      B) the set of all real numbers except 0  
 C) the set of all real numbers except -3      D) the set of all nonnegative real numbers

44) The volume of a rectangular prism is represented by the expression  $6x^3 + 7x^2 - x - 2$ . The length is  $2x - 1$ . Find expressions to represent the width and height of the prism.

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

45) Which does not equal the others?

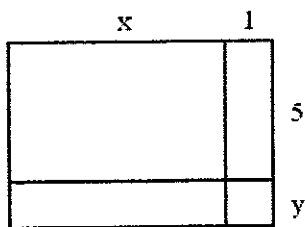
- A)  $y + (-x)$       B)  $x + (-y)$       C)  $x - y$       D)  $-y + x$

46) If  $b \neq 0$ , which exponents or powers property is not written correctly?

- A)  $b^m \cdot b^n = b^{mn}$       B)  $b^0 = 1$       C)  $\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$       D)  $\frac{1}{b^n} = b^{-n}$



47) Which polynomial expresses the area of the largest rectangle below?



A)  $xy + 5x + y + 5$

B)  $xy + 5$

C)  $x + y + 6$

D)  $2x + 2y + 12$

48) The formula  $V = \frac{1}{3}\pi r^2 h$  gives the volume of a cone with height  $h$  and a base of radius  $r$ . What is the formula

solved for  $h$ ?

A)  $h = \frac{3V}{\pi r^2}$

B)  $h = \frac{V}{3\pi r^2}$

C)  $h = \frac{V\pi}{3r^2}$

D)  $h = \frac{V\pi r^2}{3}$

49) What is the solution to  $9r = 5r - 2(2 + 3r)$ ?

A)  $r = -\frac{2}{5}$

B)  $r = -4$

C)  $r = -\frac{1}{2}$

D)  $r = -2$

50) What is an equation for the line in standard form through the points  $(3, 0)$  and  $(-2, 3)$ ?

A)  $-3x - 5y = 9$

B)  $5x + 3y = 9$

C)  $3x + 5y = 9$

D)  $3x - 5y = -9$