

I. Multiple Choice

- \_\_\_\_\_ 1. Which is the solution of  $x - 1 \leq 3x + 7$  ?  
 (A)  $x \leq -4$  (B)  $x \leq 4$  (C)  $x \geq -4$  (D)  $x \geq 4$
- \_\_\_\_\_ 2. If the discriminant of a quadratic equation is *zero*, then there  
 (A) are 2 imaginary roots (B) is 1 rational root  
 (C) are 2 real roots (D) is 1 imaginary root
- \_\_\_\_\_ 3. Which is a factor of  $y^2 - y - 12$ ?  
 (A)  $y - 2$  (B)  $y - 4$  (C)  $y + 6$  (D)  $y + 12$
- \_\_\_\_\_ 4. The y-intercept of  $3x + 2y = 8$  is:  
 (A) 8 (B) 4 (C) 3 (D) 2
- \_\_\_\_\_ 5. The parabola  $f(x) = x - x^2$  has its axis of symmetry at  
 (A)  $x = \frac{1}{2}$  (B)  $x = -1$  (C)  $x = 1$  (D)  $x = 0$
- \_\_\_\_\_ 6. Simplify the following expression:  $(-4a^5)^3$   
 (A)  $-4a^8$  (B)  $-4a^{15}$  (C)  $12a^8$  (D)  $-64a^{15}$
- \_\_\_\_\_ 7. A solution of the equation  $x^2 - 9 = 0$  is  
 (A) 0 (B) -1 (C) -3 (D) 9
- \_\_\_\_\_ 8. The sum of the roots of the equation  $3x^2 - 5x + 2 = 0$  is  
 (A) -5 (B) 2 (C)  $\frac{5}{3}$  (D)  $\frac{2}{3}$
- \_\_\_\_\_ 9. What is the solution of the equation  $2x^2 - 20 = 0$  ?  
 (A)  $\sqrt{5}$  and  $-\sqrt{5}$  (C)  $\sqrt{10}$  and  $-\sqrt{10}$   
 (B) 5 and -5 (D) 10 and -10
- \_\_\_\_\_ 10. Which is the equation of a line whose slope is undefined?  
 (A)  $y = x$  (B)  $y = -5$  (C)  $x = -5$  (D)  $x + y = 5$

II. Short Answer

\_\_\_\_\_ 11. The multiplicative inverse of  $3x$  is \_\_\_\_

\_\_\_\_\_ 12. Find the value of  $x$  for which the expression  $\frac{2}{x+5}$  is undefined.

\_\_\_\_\_ 13. What is the slope of a line whose equation is  $y = 7x - 5$  ?

\_\_\_\_\_ 14. Which fraction is equivalent to  $0.0909\overline{09}$  ?

\_\_\_\_\_ 15. Which property is illustrated?  $3(4 + 5) = 3(5 + 4)$

\_\_\_\_\_ 16. Use  $<$ ,  $=$ , or  $>$  to compare the numbers:  $2.5$  \_\_\_\_  $2.1$

\_\_\_\_\_ 17. Evaluate the expression  $\frac{6 + 5 \cdot 3}{6 - 4}$

\_\_\_\_\_ 18. Evaluate the expression  $2 \cdot 5^2 + 3 \cdot 4$

\_\_\_\_\_ 19. Solve for  $x$ :  $10(x - 2) = 27$

\_\_\_\_\_ 20. Solve for  $y$ :  $7y + 2(y - 8) = 20$

III. Free Response SHOW ALL WORK!

\_\_\_\_\_ 21. Solve the equation  $5x^2 - x - 1 = 0$  and leave the answer in simplest *radical* form.

\_\_\_\_\_ 22. Solve the following system of equations for  $x$ ,  $y$ , and  $z$ .

$$\begin{cases} 2x + 2y - 3z = -15 \\ 4x - y + 2z = 14 \\ x - 2y + 3z = 18 \end{cases}$$

\_\_\_\_\_ 23. Factor completely:  $ax^2 - 4a + x^2 - 4$

\_\_\_\_\_ 24. If  $s$  varies directly as  $t$  and  $s = 15$  when  $t = 25$ , find the value of  $s$  when  $t = 10$ .

\_\_\_\_\_ 25. Factor completely:  $9x^3 - x$

\_\_\_\_\_ 26. The area of a rectangle is 48 square meters. Its length is 13 meters more than its width. Determine the dimensions of the rectangle. You must solve this by factoring to receive full credit.

\_\_\_\_\_ 27. Solve the following system of equations:

$$\begin{cases} 2x - 5y = 18 \\ x + 3y = -2 \end{cases}$$

\_\_\_\_\_ 28. Factor completely:  $2x^3 + x^2 - 6x$

\_\_\_\_\_ 29. If the line  $y = kx - 2$  has an x-intercept of 2, what is the value of k?

\_\_\_\_\_ 30. Write the equation of the line which is parallel to  $y = -6x + 7$  and passes through the origin.

#### IV. Multiple Choice

\_\_\_\_\_ 31. If  $f(x) = |2x - 6|$ , then  $f(1) =$   
(A) 4      (B) 8      (C) -8      (D) -4

\_\_\_\_\_ 32. What is the equation of the straight line that passes through the points (-2, 5) and (-6, -3)?  
(A)  $2x + 7 = 0$                       (C)  $x - 2y = -12$   
(D)  $5x + 2y = 0$                       (B)  $2x - y = -9$

- \_\_\_\_\_ 33. Which is true for the domain of the function  $y = \frac{x^2 - 9}{x - 4}$  ?
- (A)  $x \neq -2$     (B)  $x \neq 2$     (C)  $x \neq 0$     (D)  $x \neq 4$
- \_\_\_\_\_ 34. Which is an equation of the axis of symmetry of the parabola whose equation is  $y = -x^2 + 6x + 4$  ?
- (A)  $x = \frac{1}{12}$     (B)  $x = -2$     (C)  $x = 3$     (D)  $x = -3$
- \_\_\_\_\_ 35. . The solution of the equation  $|y - 5| = 2$  is
- (A)  $y = 7$     (B)  $y = 3$     (C)  $y = 7$  and  $y = -7$     (D)  $y = 7$  and  $y = 3$
- \_\_\_\_\_ 36. In the system of equations,
- $$\begin{aligned} kx + y &= 7 \text{ and} \\ 2x - y &= 3, \end{aligned}$$
- there is **no** solution when  $k$  is equal to
- (A) 5    (B) 2    (C) -2    (D) -5
- \_\_\_\_\_ 37. A root of the equation  $x^4 - 3x^2 - 4 = 0$  is
- (A) -1    (B) -4    (C) 0    (D) -2
- \_\_\_\_\_ 38. The perimeter of a square is represented by  $p$ . What is the area of this square in terms of  $p$ ?
- (A)  $\frac{p^2}{4}$     (B)  $\frac{p^2}{16}$     (C)  $4p^2$     (D)  $2p^2$
- \_\_\_\_\_ 39. Which value of  $x$  satisfies the inequality  $|x| + 2 < 5$  ?
- (A) -5    (B) -3    (C) -2    (D) 4

\_\_\_\_\_ 40. What is the solution of the inequality  $3x + 1 \geq 11 - 2x$  ?  
(A)  $x \geq 2$       (B)  $x \leq -2$       (C)  $x \geq -2$       (D)  $x > 0$

\_\_\_\_\_ 41. Which represents the solution of the inequality  $|2x - 1| < 9$  ?  
(A)  $-4 < x < 5$       (C)  $x < 5$   
(B)  $x < -4$  or  $x > 5$       (D)  $x < -4$

\_\_\_\_\_ 42. Which of the following is **not** a function?  
(A)  $\{(1, 2), (-2, 2), (3, 3)\}$   
(B)  $\{(1, 2), (-2, 6), (3, 3)\}$   
(C)  $\{(2, 2), (2, 3), (4, 3)\}$   
(D)  $\{(1, 3), (2, 3), (4, 3)\}$

\_\_\_\_\_ 43. If  $f(x) = -3x + 1$  and  $g(x) = 2x^2$ , which is the function  $(f \circ g)(x)$ ?  
(A)  $(-3x+1)(2x^2)$       (B)  $-6x^2 + 1$   
(C)  $2(-3x+1)^2$       (D)  $-2(1-3x)^2$

\_\_\_\_\_ 44. The product of a  $2 \times 3$  matrix and a  $3 \times 2$  matrix is  
(A) a  $2 \times 2$  matrix      (B) a  $3 \times 3$  matrix      (C) a  $2 \times 3$  matrix  
(D) Can not be done

\_\_\_\_\_ 45. The identity matrix for a  $2 \times 2$  matrix is:

A.  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$       B.  $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$       C.  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$       D.  $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

\_\_\_\_\_ 46. Which of the following could be used to find  $x$  in this system?  $\begin{cases} 3x + 8y = 13 \\ 5x - 3y = 11 \end{cases}$

A.  $\begin{array}{r} \left| \begin{array}{cc} 3 & 8 \\ 5 & -3 \end{array} \right| \\ \hline \left| \begin{array}{cc} 13 & 8 \\ 11 & -3 \end{array} \right| \end{array}$       B.  $\begin{array}{r} \left| \begin{array}{cc} 3 & 8 \\ 5 & -3 \end{array} \right| \\ \hline \left| \begin{array}{cc} 3 & 13 \\ 5 & 11 \end{array} \right| \end{array}$       C.  $\begin{array}{r} \left| \begin{array}{cc} 3 & 13 \\ 5 & 11 \end{array} \right| \\ \hline \left| \begin{array}{cc} 3 & 8 \\ 5 & -3 \end{array} \right| \end{array}$       D.  $\begin{array}{r} \left| \begin{array}{cc} 13 & 8 \\ 11 & -3 \end{array} \right| \\ \hline \left| \begin{array}{cc} 3 & 8 \\ 5 & -3 \end{array} \right| \end{array}$

\_\_\_\_\_ 47. Evaluate the determinant:  $\begin{vmatrix} 3 & -7 \\ -4 & 9 \end{vmatrix} =$   
(A) 23      (B) -1      (C) 1      (D) 55

\_\_\_\_\_ 48. Write in simplest radical form:  $\sqrt{96} =$

A)  $6\sqrt{2}$       B)  $4\sqrt{6}$       C)  $6\sqrt{6}$       D)  $4\sqrt{3}$

\_\_\_\_\_ 49. What must be added to  $x^2 + 10x$  to complete the square?  
A) 5      B) 25      C) 50      D) 100

\_\_\_\_\_ 50. Determine the values of a, b, and c for the quadratic equation  
 $3x^2 - 5x + 6 = 0$

A)	a = 3	b = -5	c = 6
B)	a = 3	b = -5	c = 0
C)	a = 3	b = -5	c = -6
D)	a = 1	b = 5	c = 6

#### V. Free Response

\_\_\_\_\_ 51. What is the equation for the **inverse** of the function  $y = -4x + 2$  ?

\_\_\_\_\_ 52. Given  $f(x) = 3x$  and  $g(x) = x - 4$ , Determine  $f(x) - g(x)$ .

\_\_\_\_\_ 53. Solve the following system by matrices (but not with the calculator).  
You must show all work.

$$\begin{cases} 4x - 3y = 14 \\ 3x + y = 4 \end{cases}$$

- \_\_\_\_\_ 54. Determine the inverse matrix of:  $\begin{bmatrix} 6 & 5 \\ -4 & -3 \end{bmatrix}$
- \_\_\_\_\_ 55. Add the following:  $(3w^3 - w^2 + 4 - w) + (4w^2 - 2w^3 + 4w + 7)$
- \_\_\_\_\_ 56. Multiply the following:  $(3a^2 + 2a - 1)(a - 7)$
- \_\_\_\_\_ 57. Write a function of the form  $g(x) = (x - h)^2 + k$  whose graph represents a translation of the graph of  $f(x) = x^2$  three units to the left and five units down.
- \_\_\_\_\_ 58. Solve by factoring:  $3x^2 - 18x + 27 = 0$
- \_\_\_\_\_ 59. Write a quadratic equation that has the solutions  $x = -2$  and  $x = 6$ .
- \_\_\_\_\_ 60. Solve the equation  $x^2 + 4x + 2 = 7$  by completing the square.