

**BROWNSVILLE CITY MATH MEET  
JAMES PACE HIGH SCHOOL**

**MAY 8, 2008**



**ALGEBRA II**

NAME \_\_\_\_\_

SCHOOL \_\_\_\_\_

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## ALGEBRA II TEST

1. Perform the indicated operation:  $(8x^4 - 16x^3 + 18x^2 - 12x + 15) \div (4x^2 + 3)$

A.  $2x^2 - 5x + 2 + \frac{4}{4x^2 + 3}$

B.  $2x^2 - 5x - 2 + \frac{3}{4x^2 + 3}$

C.  $2x^2 - 4x + 3 + \frac{6}{4x^2 + 3}$

D.  $2x^2 - 4x + 2 + \frac{3}{4x^2 + 3}$

2. Perform the indicated operation:  $\frac{2x^2 - 7x - 4}{16x^2 - 49} * \frac{4x^2 + 5x - 21}{x^2 - x - 12}$

A.  $\frac{x+1}{2x+7}$

B.  $\frac{2x-1}{4x-5}$

C.  $\frac{2x+1}{2x-3}$

D.  $\frac{2x+1}{4x+7}$

3. Perform the indicated operation and simplify:  $\frac{5}{\sqrt{27}} - \frac{2}{\sqrt{27}} + \frac{3}{\sqrt{27}}$

A.  $\frac{2\sqrt{3}}{3}$

B.  $\frac{3\sqrt{2}}{2}$

C.  $\frac{4\sqrt{3}}{3}$

D.  $\frac{5\sqrt{2}}{2}$

4. Anoa bought two plots of land for a total of \$120,000. When she sold the first plot, she made a profit of 8%. When she sold the second plot, she lost 3%. If her total profit is \$4,320, how much did she pay for the second plot of land?

A. \$36,000

B. \$48,000

C. \$72,000

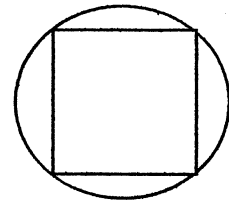
D. \$42,000

5. Simplify  $\frac{12 + \sqrt{-24}}{14}$  in simplest form.

- A.  $\frac{6}{7} - \frac{\sqrt{6}}{7}i$
- B.  $\frac{2}{7} + \frac{\sqrt{3}}{7}$
- C.  $\frac{6}{7} + \frac{\sqrt{6}}{7}i$
- D.  $\frac{2}{7} - \frac{\sqrt{3}}{7}i$

6. A square lawn has an area  $400 \text{ ft}^2$ . A sprinkler placed at the center of the lawn sprays water in a circular pattern that just covers the lawn as shown in the figure. What is the radius of the circle?

- A.  $5\sqrt{3}$  ft.
- B.  $5\sqrt{2}$  ft.
- C.  $8\sqrt{3}$  ft.
- D.  $10\sqrt{2}$  ft.



7. If  $(x-2)^2 + 6(x-2) = 16$ , then what would be the product of its roots?

- A. - 24
- B. 32
- C. 20
- D. - 16

8. If  $\sqrt{9x+6} = 3x+2$ , then what would be the value of  $3x$ ?

- A. - 1, 2
- B. 1, 2
- C. - 2, 1
- D. - 3, 4

9. Solve  $15x^2 - 6 \leq x$  writing the solution in interval notation.

- A.  $(-\infty, -\frac{3}{5}) \cup (\frac{2}{3}, \infty)$
- B.  $[\frac{-3}{5}, \frac{2}{3}]$
- C.  $(-\infty, -\frac{3}{5}] \cup [\frac{2}{3}, \infty)$
- D.  $(\frac{-3}{5}, \frac{2}{3})$

10. Solve  $|5x - 2| > 23$  writing the solution in interval notation.

- A.  $(-\infty, \frac{-21}{5}) \cup (5, \infty)$
- B.  $(\frac{-21}{5}, 5)$
- C.  $[\frac{-21}{5}, 5]$
- D.  $(-\infty, \frac{-21}{5}] \cup [5, \infty)$

11. If  $f(x) = 2x + 5$  and  $g(x) = 4x + 3$ , find  $(f \circ g)(a - 2)$ .
- A.  $5a - 6$   
B.  $8a - 5$   
C.  $5a + 3$   
D.  $8a + 4$
12. Find the equation of the line passing through  $(5, -3)$  and perpendicular to  $7x - 3y - 10 = 0$ .
- A.  $7x - 3y = 44$   
B.  $3x - 7y = 35$   
C.  $3x + 7y = -6$   
D.  $7x + 3y = 26$
13. Decide whether  $2x^2 + 7y = 3$  is symmetric with respect to the
- A.  $x$  - axis  
B.  $y$  - axis  
C. origin  
D. none of these
14. What is the maximum number of negative real zeros for  $f(x) = 8x^4 + 7x^3 - 8x^2 + 3x - 1$ ?
- A. 1  
B. 2  
C. 3  
D. 4
15. What is the Least Upper Bound for the zeros of  $f(x) = 2x^4 - 7x^3 - 2x^2 - 3x + 2$ ?
- A. 2  
B. 3  
C. 4  
D. 5
16. Which equation is a vertical asymptote of  $\frac{10x^2 + x - 2}{8x^2 + 14x - 15}$ ?
- A.  $x = \frac{3}{4}$   
B.  $x = \frac{5}{4}$   
C.  $x = \frac{5}{2}$   
D.  $x = \frac{3}{5}$
17. Which equation is the inverse of  $8x - 3y + 4 = 0$ ?
- A.  $y = -\frac{8}{3}x - \frac{1}{2}$   
B.  $y = \frac{8}{3}x + \frac{4}{3}$   
C.  $y = -\frac{3}{8}x - \frac{1}{2}$   
D.  $y = \frac{3}{8}x - \frac{1}{2}$

18. The force of the wind blowing on a vertical surface varies jointly as the area of the surface and the square of the velocity. If a wind of 30 mph exerts a force of 54 lbs on a surface of  $\frac{1}{4}$  ft<sup>2</sup>, how much force will a wind of 20 mph place on a surface of  $\frac{1}{2}$  ft<sup>2</sup>?

- A. 36 lbs
- B. 48 lbs
- C. 60 lbs
- D. 52 lbs

19. If  $7^{3x-5} = 49^{2x-1}$ , what would be the value of  $2x$ ?

- A. -4
- B. -3
- C. 4
- D. -6

20. Solve  $6x = 5^{\log_5 24}$

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

21. Solve  $\log_3 x + \log_3 (x - 8) = \log_3 33$  for the variable  $x$ .

- A. 6
- B. 12
- C. 11
- D. 9

22. Solve  $4e^{2x-1} = 17$  for the variable  $x$ .

- A. 1.328
- B. 1.615
- C. 1.192
- D. 1.223

23. How long will it take any quantity of iodine 131 to decay to 30% of its initial amount, knowing that it decays according to the function  $A(t) = A_0 e^{-.087t}$ , where  $t$  is time in days?

- A. 11.2 days
- B. 13.8 days
- C. 15.7 days
- D. 12.9 days

24. If  $5x - 3y = 26$  and  $3x + 2y = 8$ , then what is the value of  $x - y$ ?

- A. 6
- B. 8
- C. 4
- D. 2

25. Solve  $2x - 3y + 4z + 10 = 0$ ,  $3x + y + 2z - 26 = 0$ , and  $4x + 2y - z - 46 = 0$  for the value of  $x$ .
- A.  $-2$   
B.  $8$   
C.  $6$   
D.  $-4$
26. Given the system of equations  $3x - 4y + 8z - 8 = 0$ ,  $4x + 2y - 3z + 4 = 0$ , and  $2x + 3y - z + 3 = 0$ , what is element  $a_{31}$  in  $D_x$  according to Cramer's rule?
- A.  $2$   
B.  $3$   
C.  $1$   
D.  $-3$
27. Solve  $\begin{vmatrix} -8 & 3 \\ x & 2 \end{vmatrix} = -1$  for the variable  $x$ .
- A.  $6$   
B.  $-5$   
C.  $3$   
D.  $-2$
28. Find the partial fraction decomposition for  $\frac{x - 49}{4x(3x - 7)}$ .
- A.  $\frac{3}{4x} + \frac{-2}{3x-7}$   
B.  $\frac{5}{4x} + \frac{-3}{3x-7}$   
C.  $\frac{7}{4x} + \frac{-5}{3x-7}$   
D.  $\frac{7}{4x} + \frac{-3}{3x-7}$
29. Solve  $10x^2 - y^2 = 9$  and  $3x + y = 2$  for the value(s) of  $x$ .
- A.  $\{-8, 2\}$   
B.  $\{-4, 3\}$   
C.  $\{-13, 1\}$   
D.  $\{-10, 2\}$
30. The hypotenuse of a right triangle is  $2\sqrt{34}$  m long. Find the shortest leg of the triangle if it is 4 m shorter than the other leg.
- A.  $10$   
B.  $5$   
C.  $9$   
D.  $6$

31. Perform the indicated operation:  $\begin{bmatrix} 4 & -3 & 2 \\ 8 & -5 & 1 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 2 & -4 \\ 6 & 3 \end{bmatrix}$

A. No solution

B.  $\begin{bmatrix} 18 & 22 \\ 20 & 31 \end{bmatrix}$

C.  $\begin{bmatrix} 18 & 50 \\ -16 & 28 \end{bmatrix}$

D.  $\begin{bmatrix} 32 & 39 \\ 14 & 87 \end{bmatrix}$

32. Find the inverse of  $\begin{bmatrix} 7 & 9 \\ 3 & 4 \end{bmatrix}$

A. Does not exist

B.  $\begin{bmatrix} 3 & -4 \\ 5 & -7 \end{bmatrix}$

C.  $\begin{bmatrix} 2 & 7 \\ 1 & 4 \end{bmatrix}$

D.  $\begin{bmatrix} 4 & -9 \\ -3 & 7 \end{bmatrix}$

33. Find the vertex for  $x = y^2 - 12y + 39$ .

A. (3, -6)

B. (3, 6)

C. (2, 5)

D. (-1, 7)

34. Give the equation of the directrix for  $(y + 3)^2 = 36(x - 8)$ .

A.  $y = 3$

B.  $x = 8$

C.  $x = -1$

D.  $y = -4$

35. Write an equation for the parabola having a vertex at (3, -5) and a focus at (3, -3).

A.  $(x - 3)^2 = 8(y + 5)$

B.  $(x + 3)^2 = 16(y - 5)$

C.  $(x + 3)^2 = 8(y - 5)$

D.  $(x + 5)^2 = 12(y - 3)$

36. Write an equation for a hyperbola with center at  $(9, -4)$ ; with a horizontal conjugate axis of length 12; and  $c = 8$ .

A.  $\frac{(x+9)^2}{28} - \frac{(y-4)^2}{36} = 1$   
B.  $\frac{(x-4)^2}{28} - \frac{(y+9)^2}{36} = 1$   
C.  $\frac{(y+4)^2}{28} - \frac{(x-9)^2}{36} = 1$   
D.  $\frac{(y-4)^2}{28} - \frac{(x+4)^2}{36} = 1$

37. Write an equation for an ellipse with center at  $(-4, 9)$ ; focus at  $(-4, 4)$ ; and vertex at  $(-4, 1)$ .

A.  $\frac{(x+4)^2}{64} + \frac{(y-9)^2}{39} = 1$   
B.  $\frac{(y-9)^2}{64} + \frac{(x+4)^2}{39} = 1$   
C.  $\frac{(x-4)^2}{64} + \frac{(y+9)^2}{39} = 1$   
D.  $\frac{(y+9)^2}{64} + \frac{(x-4)^2}{39} = 1$

38. What is the radius of the circle  $x^2 + y^2 + 6x - 14y - 86 = 0$ ?

- A. 9  
B. 10  
C. 15  
D. 12

39. Identify the conic  $8x^2 - 4y^2 + 16x - 8y + 10 = 0$ .

- A. Circle  
B. Parabola  
C. Ellipse  
D. Hyperbola

40. Find the 67<sup>th</sup> term of the arithmetic sequence 8, 15, 22...

- A. 470  
B. 510  
C. 394  
D. 483

41. Evaluate  $\sum_{i=4}^8 (3i - 4)$

- A. 64
- B. 70
- C. 82
- D. 78

42. Find the sum of the first 20 terms of the arithmetic sequence 73, 79, 85...

- A. 1380
- B. 2396
- C. 2600
- D. 2370

43. Find the seventh term of the geometric sequence 4, 28, 196...

- A. 467852
- B. 484158
- C. 568296
- D. 470596

44. Find the sum of the first six terms of the geometric sequence having  $a_1 = 14$  and  $r = 4$ .

- A. 19110
- B. 14893
- C. 13805
- D. 16436

45. A ball is dropped from a height of 21 feet and bounces  $\frac{2}{3}$  of its height. How far will the ball travel before it comes to rest?

- A. 101 feet.
- B. 112 feet
- C. 105 feet
- D. 120 feet

46. Expand  $(3x - y)^4$ .

- A.  $81x^4 - 72x^3y + 36x^2y^2 - 10xy^3 + y^4$
- B.  $81x^4 - 108x^3y + 54x^2y^2 - 12xy^3 + y^4$
- C.  $81x^4 - 54x^3y + 36x^2y^2 - 8xy^3 + y^4$
- D.  $81x^4 - 108x^3y + 27x^2y^2 - 12xy^3 + y^4$

47. Find the third term of  $(5x + 3y)^6$ .

- A.  $84375 x^4 y^2$
- B.  $84605 x^3 y^2$
- C.  $84375 x^3 y^2$
- D.  $84605 x^4 y^2$

48. If a bag contains 12 yellow, 7 white, and 9 blue marbles, how many samples of six can be drawn if the color does not matter?

- A. 382327
- B. 372810
- C. 384915
- D. 376740

49. Two marbles are drawn at random from a box containing 10 red, 4 green, and 7 yellow marbles. What is the probability that both of the marbles are yellow?

- A.  $\frac{1}{10}$
- B.  $\frac{2}{7}$
- C.  $\frac{1}{6}$
- D.  $\frac{2}{9}$

50. A bag contains 10 red, 6 yellow, and 8 green marbles. If a marble is drawn at random, what are the odds in favor of not picking a red marble?

- A. 1 to 2
- B. 7 to 5
- C. 3 to 1
- D. 5 to 7

