

# Algebra II

## Individual Test

January 2004

The abbreviation NOTA denotes "None of These Answers."

1. For  $x \geq 4$ , Joe starts at point A, walks north  $3x - 12$  feet, then south  $5x + 1$  feet, then north again for  $3x + 3$  feet. If he is then 120 feet north of point A, then give the value of  $x$ .

- A.  $\frac{128}{11}$
- B.  $\frac{130}{11}$
- C. 128
- D. 130
- E. NOTA

2. If  $2x - 4 < 0$  then which is equivalent to  $|2x - 5|$  ?

- A.  $5 - 2x$
- B.  $2x + 5$
- C.  $\sqrt{29}$
- D.  $2x - 5$
- E. NOTA

3. If  $\frac{1}{3x} + \frac{2}{5x} = 11$  then  $\frac{1}{x} =$

- A. 15
- B. 3
- C.  $\frac{1}{3}$
- D.  $\frac{1}{15}$
- E. NOTA

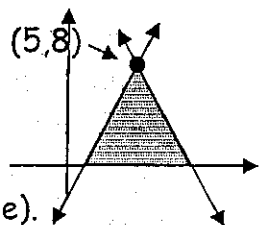
4. If  $x^2 - 2x = 3$  and  $x > 0$  then  $x^2 - x =$

- A. 0
- B. 3
- C. 6
- D. 9
- E. NOTA

5. If  $f(x) = \frac{1}{2}x + 3$  then find the distance between the points on the graph at  $x = 4$  and at  $x = 12$ . Round to the nearest integer.

- A. 4
- B. 7
- C. 8
- D. 9
- E. NOTA

6. The lines with equations  $2x - y = 2$  and  $8x + 3y = 64$  bound a triangle with the positive  $x$ -axis as shown (not to scale). Find the area of the triangle.



- A. 7.5
- B. 14
- C. 28
- D. 56
- E. NOTA

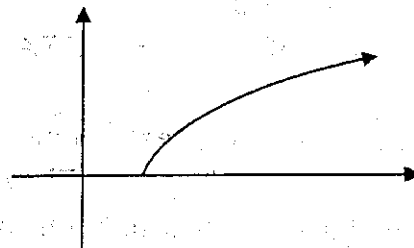
7. If  $f(x) = 9x + 6$  and  $g(x) = 3x^2$  then which is equal to  $g(f(1))$  ?

- A. 2025
- B. 675
- C. 45
- D. 33
- E. NOTA

8. The functions  $f$  and  $g$  are inverses, both with domains of all reals. If  $f(2) = 5$  and  $g(3) = 6$ , then  $g(5) + f(6) =$

- A. -11
- B. 5
- C. 0
- D. cannot be determined
- E. NOTA

9.



The graph of  $y = f(x)$  shown has domain  $x \geq 3$  and range  $y \geq 0$ . The graph of  $y = f(x+1) + 4$  has domain  $x \geq C$  and range  $y \geq D$ . Find  $C + D$ .

- A. 5
- B. 6
- C. 7
- D. 8
- E. NOTA

# Algebra II

## Individual Test

January 2004

10. The line segment  $\overline{AB}$  is divided into three equal-length segments by points C and D (that is,  $AC=CD=DB$ ). If A has coordinates  $(-1, 6)$  and B coordinates  $(14, -3)$ , then which is the equation of the line perpendicular to  $\overline{AB}$  at point C?

- A.  $3x + 5y = 27$       B.  $5x - 3y = 11$   
 C.  $3x + 5y = 57$       D.  $5x + 3y = 29$   
 E. NOTA

11. If  $\frac{3}{x} - \frac{5}{y} = -33$  and  $\frac{2}{x} + \frac{7}{y} = 40$  then

find the value of  $-12xy$ .

- A. 72      B. 36  
 C. 14      D. 2      E. NOTA

12. Two cars are 3000 feet apart, and drive directly toward each other at 40 feet per minute and 20 feet per minute respectively. Assuming constant speeds, in how many minutes will the cars meet?

- A.  $26\overline{6}$       B. 37.5  
 C. 50      D. 80      E. NOTA

13. Two other cars are 5000 feet apart, and drive directly toward each other. They will meet in one hour. A fly starts on the first car when they are 5000 feet apart, and flies back and forth between cars: he flies to the second car, then to the first car, then back to the second car, etc. He moves constantly at 20 feet per minute. When the cars meet, how far will the fly have flown, in feet?

- A. 1000      B. 1200  
 C. 2500      D. 5000      E. NOTA

14. What is the area of the circle with equation  $x^2 + y^2 - 4y - 96 = 0$ ?

- A.  $9216\pi$       B.  $100\pi$   
 C.  $96\pi$       D.  $10\pi$       E. NOTA

15. If  $|5 - 2x| < 13$  has solution set  $a < x < b$  then find the value of  $4a - b$ .

- A. -25      B. -20  
 C. 32      D. 40      E. NOTA

16.  $\sqrt{4^{2x} \cdot 8^{3x}} =$

- A.  $\sqrt{32}^{5x^2}$       B.  $2^{36x^2}$   
 C.  $2^{13x}$       D.  $12^{6x^2}$       E. NOTA

17. The quadratic expression  $12x^2 + 4x - 5$  is factored as  $(ax + b)(cx + d)$  where  $a < c$ . Give the value of  $a + b - c - d$ .

- A. 14      B. 11  
 C. 2      D. -10      E. NOTA

18. For  $x \neq \pm 1, x \neq 0$ ,

$$\frac{x^2 - x}{x^2 - 2x + 1} \cdot \frac{x^2 - 1}{1 - x} \cdot \frac{-x + 1}{x} = x + B.$$

Which is the value of B?

- A. -2      B. -1  
 C. 0      D. 1      E. NOTA

## Algebra II

## Individual Test

January 2004

19. The graph of the quadratic with equation  $y = 2x^2 + 8x + C$  passes through the x-axis at the point  $(-1, 0)$ . The graph also passes through the x-axis at the point  $(k, 0)$ . Find the value of  $k$ .

A. 4      B. 1  
C. -3      D. -5      E. NOTA

20. The graph of  $f(x) = -x^2 + 2x + q$  has maximum value 6 at  $x=1$ . What is the value of  $f(2)$ ?

A. 6      B. 5  
C. -3      D. -2      E. NOTA

21. A point is moving along the line with equation  $4x - y = 12$  such that the x-value of the point increases as time increases. If the x-coordinate of the point increases 0.5 units for each increase of 1 second, then what is the absolute change in y-values of the point for each 1 second?

A. 0.5      B. 1.5  
C. 2      D. 2.5      E. NOTA

22.  $\sqrt{-8} \cdot \sqrt{-18} = k$ . Which is the value of  $\frac{1}{1-k}$ ? ( $i = \sqrt{-1}$ )

A.  $\frac{-1}{11}$       B.  $\frac{-i}{11}$   
C.  $\frac{1}{13}$       D.  $\frac{i}{13}$       E. NOTA

23. The lines with equations  $f(x) = x - 10$  and  $g(x) = c - x$  intersect at a point that is 5 units below the x-axis. Find the value of  $c$ .

A. 20      B. 10  
C. 5      D. 0      E. NOTA

24. Four tickets to the movie and five colas at the movie cost \$120. Two tickets to the movie and one cola at the movie costs \$42. How much will one ticket and one cola cost, if the cost of the colas and the cost of the tickets remain constant throughout this problem. (Tickets and colas are very overpriced in this problem.)

A. \$15      B. \$27  
C. \$29      D. \$32      E. NOTA

25. For  $x > 0$ ,  $\sqrt{x^c} \cdot \sqrt{x^{2c}} = \sqrt[4]{x}$ . Give the value of  $18c + 1$ .

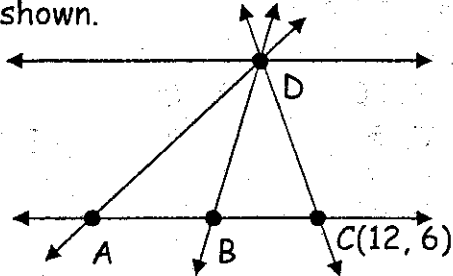
A. 4      B. 19  
C. 48      D. 49      E. NOTA

# Algebra II

## Individual Test

January 2004

26. The graphs of the lines with equations  $4x - 7y + 38 = 0$ ,  $4x - y = 22$ ,  $y = 6$  and  $y = 10$  are drawn on the same coordinate plane as shown.



The line through points D and C shown is also graphed. What is the ratio of the area of triangle BDC to the area of triangle ADB.

- A. 2:1      B. 4:5  
C. 5:6      D. 6:7      E. NOTA
27. A ball is thrown into the air from the ground, and it follows a parabolic path. If its maximum height is 100 feet high, and it hits ground 6 seconds after it is thrown. How many feet high is the ball 2 seconds after it is initially thrown?

- A.  $11.\bar{1}$       B.  $16.\bar{6}$   
C.  $33.\bar{3}$       D.  $88.\bar{8}$       E. NOTA

28. If  $f(x+2) = x^2 + 4x$  then which is equal to  $f(5)$  ?

- A. 45      B. 43  
C. 21      D. 9      E. NOTA

29. If  $k < 0$  then which is equivalent to  $\sqrt{-8k} \cdot \sqrt{-18k}$  ? ( $i = \sqrt{-1}$ )

- A.  $12k$       B.  $-12k$   
C.  $-|12k|$       D.  $12ki$       E. NOTA

30. A triangle is drawn with vertices on the points  $(0, 0)$ ,  $(0, 4)$  and  $(6, 0)$ . A point is randomly graphed on the same coordinate plane in the interior of the triangle. What is the probability that the point has an x-coordinate that is greater than 4 ?

- A.  $\frac{2}{3}$       B.  $\frac{4}{9}$   
C.  $\frac{1}{2}$       D.  $\frac{1}{9}$       E. NOTA