

Arkansas Council of Teachers of Mathematics
Algebra I Regional Exam 2006

Select the best answer for each of the following questions and mark it on the answer sheet provided. Be sure to read all answer choices before making your selection. When you are finished with the multiple choice, please attempt the tiebreaker questions.

1. Jessica makes \$56,000 per year and receives a \$2000 per year raise. Which of the following equations represents her income after t years?

- a. $I = 56,000t + 2000$
- b. $I = 2000t + 56,000$
- c. $I = 2000(56,000 + t)$
- d. $I = 56,000 - 2000t$
- e. none of the above

2. Four times the sum of a number and 5 is the same as 6 times the number increased by 2. Find the number.

- a. 11
- b. 2
- c. -9
- d. 9
- e. none of the above

3. What is the slope of the line represented by $y = \frac{2}{3}x + 2$?

- a. $-\frac{2}{3}$
- b. 2
- c. $\frac{3}{2}$
- d. $\frac{2}{3}$
- e. none of the above

4. Find the slope of the line parallel to the line $5x - 2y = 6$

- a. $-2/5$
- b. $2/5$
- c. $-5/2$
- d. $5/2$
- e. none of the above

5. The table given below indicates the amount of money Pedro earns for the corresponding number of hours worked. What is Pedro's pay for 9 hours of work?

# of Hours	0	3	5	7	10	12
Pay in \$	0	24	40	56	80	96

- a. \$72
- b. \$64
- c. \$63
- d. \$88
- e. none of the above

6. Jessica has scores of 76, 91, 63, and 86 on her algebra tests. Use an inequality to find the minimum scores she can make on her last test and the final exam to pass the course with an average of 80 or higher, given that the final exam counts as two tests.

- a. The minimum score is 72
- b. The minimum score is 82
- c. The minimum score is 92
- d. The minimum score is 62
- e. none of the above

7. Write 0.0000316 in scientific notation.

- a. 0.316×10^{-4}
- b. 3.16×10^{-5}
- c. 3.16×10^5
- d. 3.16×10^4
- e. none of the above

8. Find the slope of the line perpendicular to the line $2x + 7y = 6$

- a. $-2/7$
- b. $2/7$
- c. $-7/2$
- d. $7/2$
- e. none of the above

9. Determine the sum of the polynomials: $2x^3 - 5x^2 + 8x + 9$ and $-6x^3 - 3x^2 + x - 16$

- a. $4x^3 - 8x^2 + 9x - 7$
- b. $-4x^3 + 8x^2 - 9x - 7$
- c. $4x^3 - 8x^2 - 9x + 7$
- d. $-4x^3 - 8x^2 + 9x - 7$
- e. none of the above

10. Jeff found that on average it took him $\frac{3}{4}$ of an hour each day to drive a distance of 15 miles to work. What was his average speed?

- a. 20 mph
- b. 30 mph
- c. 40 mph
- d. 11 mph
- e. none of the above

11. The solution to the following system of equations lies in what quadrant?

$$2x - y = -8$$

$$x + 3y = 10$$

- a. Quadrant I
- b. Quadrant II
- c. Quadrant III
- d. Quadrant IV
- e. none of the above

12. A goat is tied to the corner of a shed that is 15-foot square with a 10-foot tether. What is an algebraic expression for the area of the space in which the goat may walk?

- a. $(15x)(10x)$
- b. $\frac{3}{4}(100\pi)$
- c. $\frac{3}{4}(225\pi)$
- d. $\frac{3}{4}(100\pi + 225\pi)$
- e. none of the above

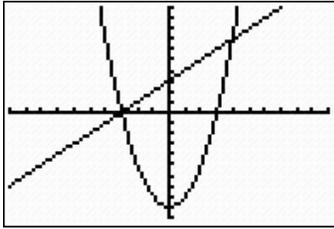
13. Zelda bought an Ipod® on sale for \$169.50. If the Ipod® was discounted by 25%, what was the price of the Ipod® before the discount?

- a. \$127.13
- b. \$678.00
- c. \$339.00
- d. \$226.00
- e. none of the above

14. An investment of \$5500 is made at an annual simple interest rate of 8.5%. How much additional money must be invested at an annual simple interest rate of 10% so that the total interest earned is at least \$1000 after 1 year?

- a. \$1000
- b. \$2500
- c. \$5500
- d. \$10000
- e. none of the above

15. The line $y = x + 3$ intersects the parabola $y = x^2 - 9$ as shown below:



The x and y coordinates of the 2 points of intersection are:

- a. (7,4) and (-3, 0)
- b. (4, 7) and (-3, 0)
- c. (4, 7) and (0, 3)
- d. (7, 4) and (0, -3)
- e. none of the above

16. Solve: $|2x - 3| \geq 11$

- a. $\{-7 \leq x \leq 4\}$
- b. $\{-4 \leq x \leq 7\}$
- c. $\{-4 \geq x \text{ or } x \geq 7\}$
- d. $\{-7 \leq x \text{ or } x \geq 4\}$
- e. none of the above

17. Chris decides that he will study at most 20 hours every week and the he must work at least 10 hours per week. Let x represent the hours studying and y represent the hours working. Write two inequalities that model this situation.

- a. $x \leq 10$, and $y \geq 20$
- b. $x \leq 20$ and $y \geq 10$
- c. $y \leq 10$ and $x \geq 20$
- d. $y \leq 20$ and $x \geq 10$
- e. none of the above

18. Simplify: $-(-4a^3b^2)^2$

- a. $-16a^6b^4$
- b. $16a^6b^4$
- c. $-16a^{-6}b^{-4}$
- d. $16a^{-6}b^{-4}$
- e. none of the above

19. The number of students in a school is 285. The ratio of boys to girls is 3 to 2. In a class of 25, how many boys would you expect to find?

- a. 15
- b. 10
- c. 12
- d. 57
- e. none of the above

20. The perimeter of a rectangle whose width is a constant 3 inches and whose length is x inches given by $y = 2x + 6$. What is the perimeter y when x is 4 inches?

- a. 12
- b. 9
- c. 16
- d. 14
- e. none of the above

21. Solve the following system of equations: $\begin{cases} 4x - y = 9 \\ 3x - 5y = 45 \end{cases}$

- a. $\{(0, -9)\}$
- b. $\{(-9, 0)\}$
- c. $\{(0, 9)\}$
- d. $\{(9, 0)\}$
- e. none of the above

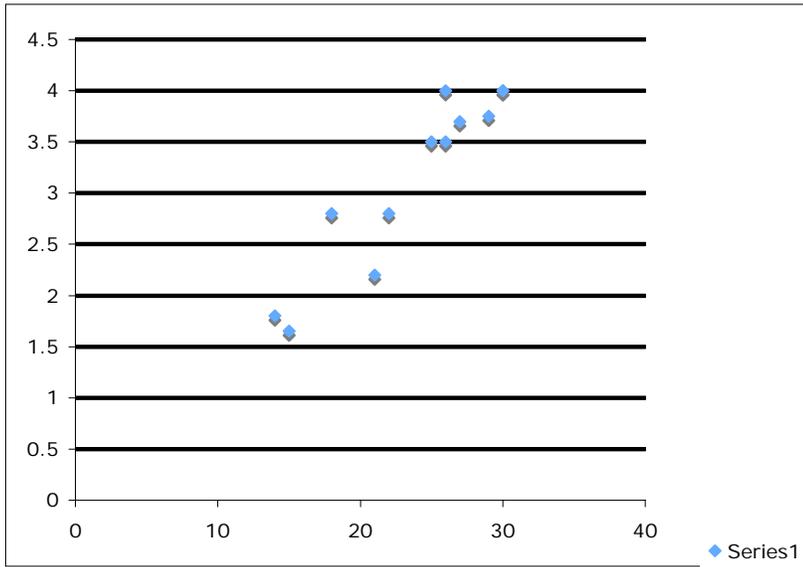
22. Harvard University annually receives 35,000 applications to become a student. It accepts only 5% of these applicants. How many students does this represent?

- a. 175
- b. 3325
- c. 332
- d. 1750
- e. none of the above

23. Which of the following numbers is rational?

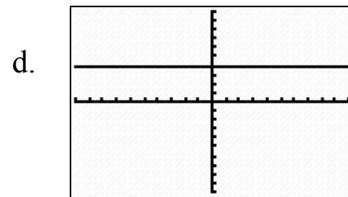
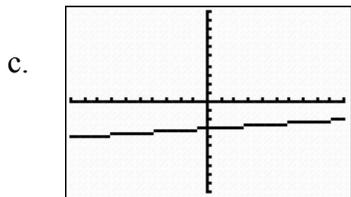
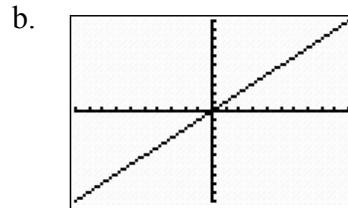
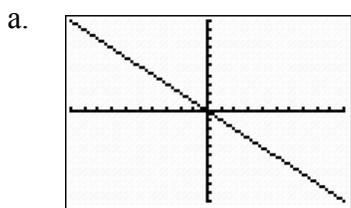
- a. $\sqrt{12}$
- b. $\sqrt{48}$
- c. $\sqrt{36}$
- d. $\sqrt{96}$
- e. none of the above

24. The following graph shows student scores on the ACT and their GPA in the first semester in college. Based on the graph, what can be said about the relationship?



- a. There is no relationship between ACT and grade point average
- b. There is a positive relationship between ACT and grade point average
- c. There is a negative relationship between ACT and grade point average
- d. People with high ACT scores have low first semester grade point averages
- e. none of the above

25. Which of the following graphs is a line segment with a zero slope?

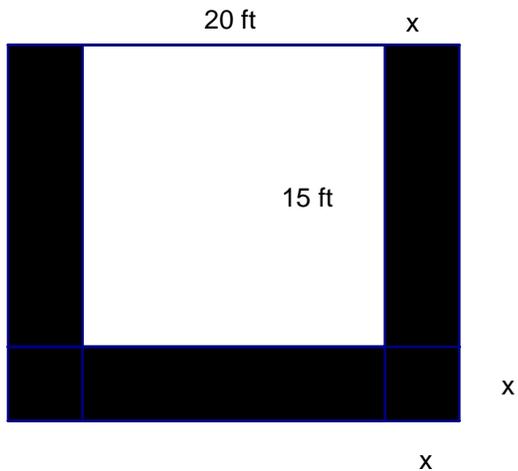


- e. none of the above

Name: _____

Tie-Breaker #1

The figure below represents a swimming pool surrounded by a lawn.



Write an equation that represents the area of the shaded region.

Name: _____

Tie-Breaker #2

An oil tank has two inlet pipes. One inlet pipe can fill the tank in 12 hours, and the other inlet pipe can fill the tank in 20 hours. How long would it take to fill the tank with both pipes pumping?

Name: _____

Tie-Breaker #3

In a wildlife preserve, 60 ducks are captured, tagged, and then released. Later, 200 ducks are examined, and three of the 200 ducks are found to have tags. Estimate the number of ducks in the preserve.

Solutions:

1. b
2. d
3. d
4. d
5. a
6. b
7. b
8. d
9. d
10. a
11. b
12. b
13. d
14. c
15. b
16. c
17. b
18. a
19. a
20. d
21. a
22. d
23. c
24. b
25. d

Tie Break #1: $A_{shaded} = A_{total} - 300 \Rightarrow A_{shaded} = (20 + 2x)(15 + x) - 300$

Tie Break #2: 7.5 hrs.

$$\frac{1}{12} + \frac{1}{20} = \frac{1}{x}$$

$$\frac{32}{240} = \frac{1}{x}$$

$$x = \frac{240}{32} \approx 7.5hrs$$

Tie Break #3: 4000 ducks

$$\frac{60}{n} = \frac{3}{200}$$

$$3n = 12000$$

$$n = 4000$$