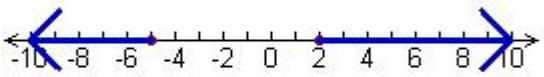
Arkansas Council of Teachers of Mathematics
Algebra I Regional Exam Spring 2008

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

1. The graph shown on the number line below represents the set of values of x that satisfy which of the following inequalities?



a) $(x+2)(x-5) \geq 0$
b) $(x-2)(x+5) \geq 0$
c) $(x+2)(x-5) \leq 0$
d) $(x-2)(x+5) \leq 0$
e) $(x+2)(x+5) \geq 0$

2. In order to estimate the population of quail in a certain area, 132 quail were captured and marked and then released back into the area. Two weeks later 180 quail were captured in the same area, 30 of which bore the markings of the previously captured quail.

   If all of the marked quail were still active in the area when the second group of quail were captured, what should the estimate of the quail population be, based on the probabilities suggested by this experiment?

   a) 850
   b) 1,020
   c) 920
   d) 792
   e) none of the above

3. Which ordered pair satisfies both equations below for x and y?

$$3x+2y=4$$
$$-x+3y=-5$$

   a) (4, -4)
   b) (2, -1)
   c) (5, 0)
   d) (0, 2)
   e) none of the above

4. Given the matrices below, what is the solution to 2A + 3B?

$$A = \begin{bmatrix} 1 & 3 \\ 0 & 5 \end{bmatrix} \qquad B = \begin{bmatrix} -2 & 4 \\ -1 & 6 \end{bmatrix}$$

a) $\begin{bmatrix} -4 & 18 \\ 3 & 20 \end{bmatrix}$

b) $\begin{bmatrix} 8 & 7 \\ -1 & 11 \end{bmatrix}$

c) $\begin{bmatrix} -4 & 18 \\ -3 & 28 \end{bmatrix}$

d) $\begin{bmatrix} -5 & 7 \\ 9 & 22 \end{bmatrix}$

e) none of the above

5. Noah earns $8.50 an hour plus a commission of 8% of his total sales at his job at the pet store. If h represents the number of hours worked, and s represents the total sales, which expression represents Noah's total earnings?

a) $8.50 + h + 0.08s$
b) $8.50(h + 0.08s)$
c) $0.08(8.50h + s)$
d) $8.50h + 0.08s$
e) none of the above

6. Which pair of lines is parallel?

a) $y = 5, x = 5$

b) $y = 5x + 3,\ y = \frac{1}{5}x + 8$

c) $y = -5x + 1,\ y = 5x + 4$

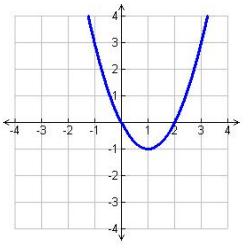
d) $y = -5x + 2,\ y = \frac{1}{5}x - 7$

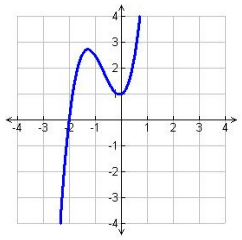
e) $y = -5x + 3,\ y = -5x - 2$

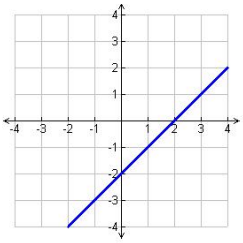
7. When the equation $y = 4x - 7$ is changed to $y = -4x - 7$, what effect does this change have on its graph?

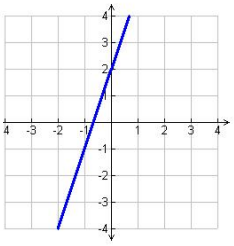
   a) The line moves to the left on the *x*-axis.
   b) The line moves downward on the *y*-axis.
   c) The line slants upward, from left to right, instead of downward.
   d) The line slants downward, from left to right, instead of upward.
   e) The line moves right on the *x*-axis.

8. Which graph of a function has a zero at *x* = -2?

a) 

b) 

c) 

d) 

e) none of the above

9. When graphed, which equation would result in a parabola that opens downward?

   a) $y = 5x^2$
   b) $y = 5x^3$
   c) $y = -5|x^3|$
   d) $y = -5x^2$
   e) $y = -5x$

10. What is the complete factorization of the expression below?

    $4x^2 - 40x + 100$

    a) $4(x^2 - 10x + 25)$
    b) $4(x + 5)(x - 5)$
    c) $4(x - 5)^2$
    d) $(2x^2 - 10)(2x^2 - 10)$
    e) $2(x - 5)(x + 5)$

11. A restaurant gets 70 customers per night when the cost of the buffet is $8 per customer. For each $3 by which the manager raises the rate, the restaurant loses 10 customers. How much money will the restaurant earn in one night when the cost of the buffet is $17 per customer?

a) $700
b) $680
c) $170
d) $720
e) $850

12. Ashley scored 75%, 85%, 83% on her first 3 geometry exams. If she wants her mean score for the first 4 exams to be at least 80%, what is the minimum she must score on the next exam?

a) 81%
b) 80.75%
c) 75%
d) 72%
e) 77%

13. Brian purchased gasoline during the months of August through November as listed below. Which expression represents the total amount of gasoline Brian purchased during these four months?

Months	Gallons of Gasoline
August	x
September	$3x + 10$
October	$x^2 - 7x + 2$
November	$x - 6$

a) $x+6$
b) $-x^6+6$
c) $-x^2+6$
d) x^2-2x+6
e) $6x^2-7x+6$

14. Which of the five tables represent a function?

a)

Age (Years)	Shoe Size
12	6 ½
13	7
12	5 ½
14	7
15	8

b)

x	y
3	5
3	7
3	-6
3	-3
3	9

c)

Price (dollars)	Sales Tax (percent)
1	.06
2	.12
3	.18
4	.24
5	.30

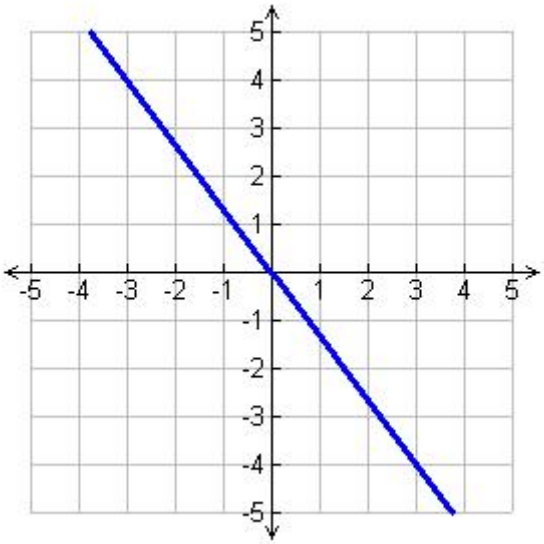
d)

Age (Years)	Height (inches)
13	59
14	60
12	61
14	65
15	66

e)

x	y
1	8
2	8
3	8
4	8
1	-8

15. What is the slope of the line on the graph below?



a) $\frac{-4}{3}$

b) $\frac{-3}{4}$

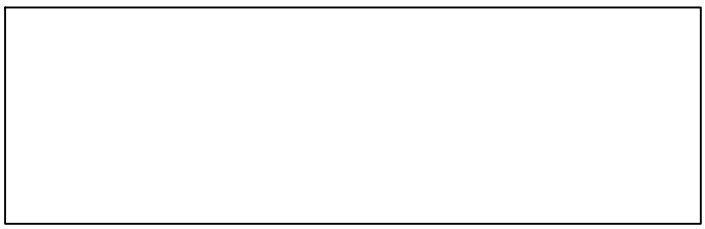
c) $\frac{4}{3}$

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

e) $\frac{-1}{2}$

16. What is the perimeter of the rectangle below?

$3x^2$



$5x^2 + x - 3$

a) $16x^2 + 2x - 6$

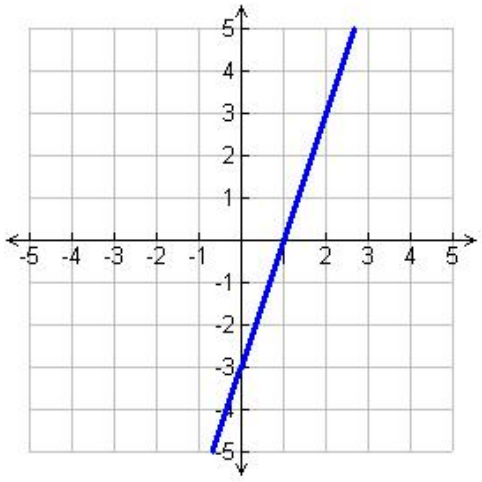
b) $8x^2 + x - 3$

c) $15x^4 + 3x^3 - 9x^2$

d) $16x^4 + 2x^2 - 6$

e) $16x^2 + x - 3$

17. Which linear equation describes the line on the graph below?



a) $y = 3x - 1$

b) $y = 3x + 3$

c) $y = 3x - 3$

d) $y = \frac{1}{3}x - 3$

e) $y = \frac{-1}{3}x + 1$

18. Which equation describes the data in the table?

x	*y*
-2	9
-1	7
3	-1
5	-5

a) $y = \frac{-1}{2}x + 5$

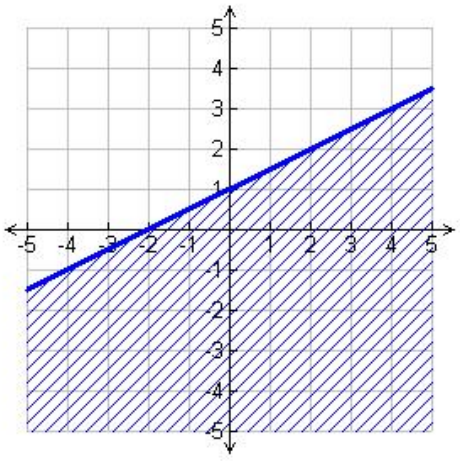
b) $y = \frac{1}{2}x - 5$

c) $y = 2x - 5$

d) $y = -2x + 5$

e) $y = 2x + 1$

19. Which inequality best describes the graph below?



a) $y \leq \frac{-1}{2}x + 5$

b) $y \geq \frac{1}{2}x + 1$

c) $y < 2x + 1$

d) $y \leq -2x + 5$

e) $y \leq \frac{1}{2}x + 1$

20. Simplify: $\dfrac{5y^2 - 15y}{-5y}$

a) $3 - y$

b) $\dfrac{y-3}{y}$

c) $\dfrac{3-y}{5}$

d) $\dfrac{-y-15}{-1}$

e) $-y-15$

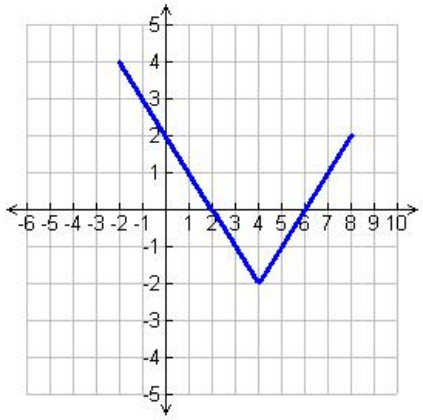
21. A recent pole stated that only 42% of the registered voters voted in a local school board election. If 4,871 people voted, how many registered voters are there? (round answer to nearest voter).

a) 2825
b) 11,598
c) 2046
d) 8398
e) 4913

22. A basketball team played 4 more games this season than last season. Last season, the team won 55% of its games, and this season it won 50% of its games. The team won the same number of games this season as last season. How many games were played this year?

a) 55
b) 44
c) 40
d) 38
e) 22

23. What is the domain of the function shown on the graph?



a) $x = -2, 4, 8$

b) $-2 \le y \le 8$

c) $-2 \le x \le 8$

d) $-2 \le x \le 4$

e) $-2 \le y \le 4$

24. Solve $V = \frac{\pi r^2 h}{3}$ for *h*.

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

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

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

d) $h = 3\pi V r^2$

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

25. Solve for *x*: $\frac{2x+4}{7} = \frac{3x-7}{4}$.

a) $\frac{65}{29}$

b) 5

c) $\frac{-33}{29}$

d) 7.5

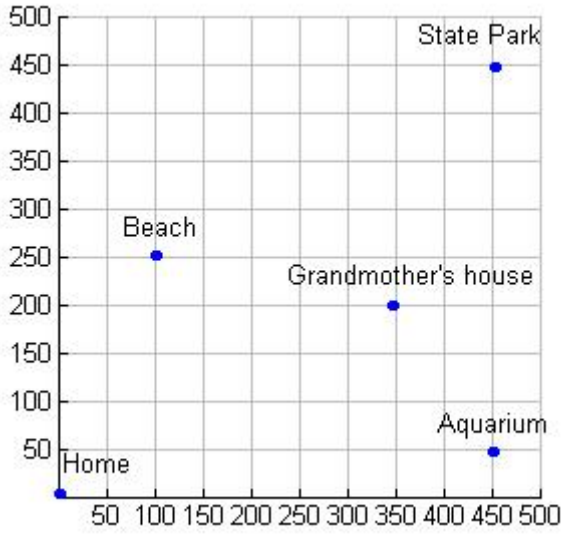
e) -3

Name _____

In the event of a tie, the following questions will be graded in order. ***Please work them consecutively and show all your work.***

Tie-Breaker # 1

You are planning a family vacation. Each side of a square in the coordinate plane that is superimposed on the map represents 50 miles. You leave your home and travel the shortest path to the Beach. After visiting the Beach you take the shortest path to the State Park. You then return Home by the shortest route. How far did you travel (to the nearest mile)?



Name _____

Tie-Breaker # 2

You bought a car for $18,500. You expect the car to depreciate at a rate of 12% per year.

a) Write an exponential decay model to represent this situation.
b) When will the car be worth 50% of what you paid for it? (Round answer to nearest thousandths place).

Name _____

Tie-Breaker # 3

Show that $6-\sqrt{20}$ is a solution to the equation $0=0.5x^2-6x+8$. Be sure to show ALL work!

Answers: Algebra Regional Exam Spring 2008

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

Tie Breaker 1:
Home to Beach = 269.258 miles, Beach to Park = 403.113 miles, Park to Home= 636.396 miles.
Total distance = 1309 miles

Tie Breaker 2:

a) $y = 18,500(1-.12)^t$
$y = 18,500(.88)^t$

b) Graphically: Graph of $y = 18,500(.88)^t$ and $y = 9,250$, intersection point at x = 5.422 years. Or Solve $9,250 = 18,500(.88)^t$ taking natural logs of each side of equation.

Tie Breaker 3:

$.5\left(6-\sqrt{20}\right)^2 - 6\left(6-\sqrt{20}\right)+8=0$
$.5\left(36-12\sqrt{20}+20\right)-36+6\sqrt{20}+8=0$
$18-6\sqrt{20}+10-36+6\sqrt{20}+8=0$
$18+10-36+8-6\sqrt{20}+6\sqrt{20}=0$
$28+8-36+0=0$
$36-36=0$
$0=0$