Pre-Algebra

Hoover High School
Mathematics Tournament

March 2, 2013

DIRECTIONS:

1. Do not open this test until you are told to do so.

2. 60 minutes will be allowed for completing this examination. The monitor will keep time. Students must stay in the room for the full 60 minutes.

3. Use a #2 lead pencil.

4. NO calculators, books, notes, or other aides may be used. Scratch paper will be provided; you may not furnish your own. If you need more scratch paper during the test, raise your hand and your monitor will bring it to you. You may write on your test.

5. N. O. T. A. stands for "None of these Answers."

6. You will receive four points for each correct answer minus one point for each incorrect answer on the 25 multiple choice questions. There are three tiebreakers at the end of the test and these will be graded on the basis of 0.1 point for each correct answer. Your score on the written test is the sum of these two scores.

7. Your answers to the tiebreakers should be recorded on your tiebreaker answer sheet.

8. Please give the monitor your answer sheet and your tiebreaker answer sheet before you leave the testing room.
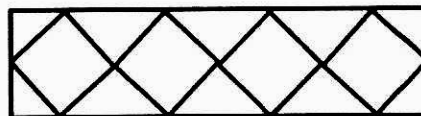
1. Find the average of the following: x, $\dfrac{x}{3}$, $\dfrac{4x}{7}$

a) $\dfrac{40x}{63}$ b) $\dfrac{6x}{11}$ c) $\dfrac{2x}{11}$ d) $\dfrac{40x}{21}$ e)NOTA

2. Simplify: $\dfrac{5!+4!+3!}{(5!)(4!)(3!)}$

a) $\dfrac{5}{16}$ b) 3   c) $\dfrac{5}{576}$ d) $\dfrac{1}{720}$ e)NOTA

3. Squares and right triangle are used to create a path.
   The lengths of the sides of each small square are 5 units each.
   Find the perimeter of the entire rectangular shape:

a) $50\sqrt{2}$ units   b) 50 units   c) $30\sqrt{2}$ units   d) 20 units   e)NOTA

4. How far from the origin is the point of intersection of the two lines: $y = .2x + .6$ and $y = .1x - .4$?

a) $\sqrt{181}$ b) $\sqrt{5.2}$ c) $\sqrt{19}$ d) 19   e)NOTA

5. What percent of the original price is a customer paying if they received a 35% discount and paid 2 % tax?

a) 66.3%   b) .7%   c) 70%   d) 63.7%   e)NOTA

6. Find the area of the answer region for the following system: $y \le 5$, $y \ge x$, $y \ge ^-x$.

a) 15 units^2 b) 25 units^2 c) 5 units^2 d) 50 units^2 e)NOTA

7. The width of a rectangle is 6 inches more than its length. Find the possible lengths (L) of the rectangle if the area of the rectangle is more than 216 square inches.

a) L >12   b) L< 12   c) L > 18   d) L < 18   e)NOTA

8. The 10th term in an arithmetic sequence is 44, the 2nd term is 100, find the 1st term.

a) 144   b) 56   c) 107   d) 114   e)NOTA

9. For the quadratic function, $y = 2x^2 - 8x$, what is the least value for y ?

a) -8   b) -10   c) 0   d) -6   e)NOTA

10. Determine for what integer values of a & b, the statement: $|a + b| = |a| + |b|$ is true.

a) all integers   b) $a > 0, b < 0$ c) $a > 0, b > 0$ d) $a > b$ e) NOTA

11. A license plate is made up of three single digit numbers from 0 to 9 inclusive, followed by 4 letters. Neither the digits nor the letters can be repeated. The letter O cannot be used. How many different license plates are possible?

a) 9936000   b) 15625000   c) 3120   d) 3000   e)NOTA

12. Twenty eight boys went camping. There were two activities to sign up for, football and archery. A total of fourteen boys signed up for football, 5 boys signed up for both and 4 boys signed up for nothing. How many boys signed up only for archery?

a) 10   b) 18   c) 14   d) 19   e)NOTA

13. A point is drawn in the x-y coordinate plane. The point is rotated around the origin 90 degrees counter clockwise. The rotation results in a new point at (4 , -12). What was the location of the original point?

a) (4 , 12)   b) (-12 , 4)   c) (-12 , -4)   d) (4 , -12)   e)NOTA

14. How many diagonals does a 20 sided polygon have?

a) 40   b) 170   c) 160   d) 80   e)NOTA

15. Solve for x: $3^x \cdot 9^x \cdot 27^x \cdot 81^x = 243^5$

a) $\frac{5}{4}$ b) $\frac{5}{2}$ c) $\frac{5}{3}$ d) $\frac{5}{4}$ e)NOTA

16. Harold is going to paint the outside of his neighbor's house. He wants to earn $897 to buy a TV. The front and back sides of the house are 40ft. wide by 22 ft. tall. The left and right sides are 30ft. wide by 22 ft. tall. The house has a total of 8 windows which are 2ft. by 3 ft. and 2 doors that are 3ft by 7ft. The windows and doors will not get painted. How much should Harold charge per square foot in order to make exactly $897?

a) 30 cents/ft^2 b) 25 cents/ft^2 c) 33 cents/ft^2 d) 40 cents/ft^2 e)NOTA

17. The shape shown to the right is created by three congruent, regular octagons. Each octagon has a perimeter of 1 unit. Find the perimeter of the shape created by 8 of these regular octagons set up the same way.
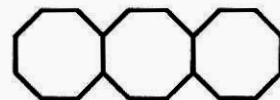
a) 48 units   b) 50 units   c) 56 units   d) 64 units   e)NOTA

18. Find the length of the segment created by the intersection of the graphs of: $y = x - 4$ and $x^2 + y^2 = 26$

a) $6\sqrt{2}$ units   b) $6\sqrt{3}$ units   c) $4\sqrt{26}$ units   d) $4\sqrt{10}$ units   e)NOTA

19. Which of the following could be the lengths of the sides of a 30°, 60°, 90° triangle?

a) $\sqrt{3}, 2, \sqrt{5}$ b) $9, \sqrt{6}, \sqrt{3},$ c) $1, 2, \sqrt{3}$ d) $1, \sqrt{2}, 2$ e)NOTA

20. A triangle has a perimeter of 119 inches. One side of the triangle is 42 inches. The other two sides have a ratio of 3:4. Find the length of the longest side.

a) 77   b) 44   c) 42   d) 70   e)NOTA

21. A small business owner is looking over his payroll and number of employees. In order to stay within federal guidelines for his small business he must have an average monthly employment of exactly 50 workers. The chart shows the current 10 months of employees. Since December is busy, he knows he must have twice as many workers during the month of December as he has in November. How many more workers will there be in December than in November?

Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of Employees:	60	50	45	45	45	30	30	40	45	45		

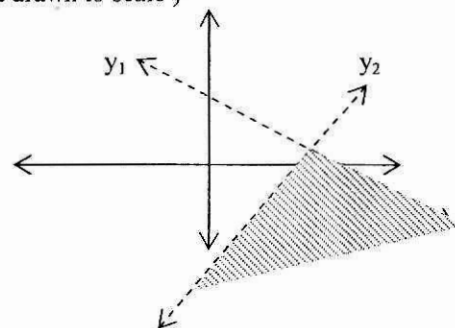a) 55   b) 165   c) 60   d) 110   e)NOTA

22. For the following shape which statement is not true?

a)   segment AB is parallel to line CD
b)   segment BC is a hypotenuse
c)   angle ABC + angle BCD = 90°
d)   angle DCB is acute
e)   NOTA
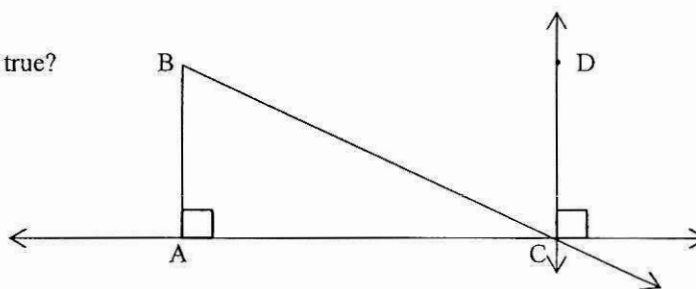
23. Which system of inequalities could be represented by the graph? (graph not drawn to scale)

a) $y_1 < \frac{1}{2}x + 2$ and $y_2 < \frac{1}{2}x - 4$

b) $y_1 > -\frac{1}{2}x + 2$ and $y_2 < 4 - 2x$

c) $y_1 < -2x - 4$ and $y_2 > 4 - \frac{1}{2}x$

d) $y_1 < 2 - \frac{1}{2}x$ and $y_2 < 2x - 4$

e) NOTA

24. Find the values of a and b so that: $-a\,|b + 3| > 0$

a) $a > 0$ and $b > 0$ b) $a < 0$ and $b = -3$ c) $a > 0$ and $b < 0$ d) $a < 0$ and $b < 0$ e)NOTA

25. Which of the following angle pairs could be 2 of the 3 angle measures in an acute triangle?.

a) 20° , 30°   b) 30° , 60°   c) 40° , 45°   d) 50° , 50°   e)NOTA

TB1: Which one of the following numbers is the mean of the other 4? { 25 , 27, 28 , 29 , 36 }
TB2: Let x be the surface area of a cube. If the volume of a cube is 2 cubic units, find x.
TB3: Find the value of b: $\frac{3x-1}{4} + \frac{x+6}{4} = x + b$