Algebra I

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.

2013 Hoover High School Math Tournament
Algebra I Written Test

1. What is the inverse of: $f(x)=4x^2$?

A. $f^{-1}(x)=\pm\sqrt{2x}$ B. $f^{-1}(x)=\pm\frac{1}{2}\sqrt{x}$ C. $f^{-1}(x)=2x$ D. $f^{-1}(x)=\frac{\pm\sqrt{x}}{4}$ E. NOTA

2. What is the y-intercept of a line that contains the point $(-1,4)$ and has the same x-intercept as $x+2y=-3$?

A. -13 B. -3 C. 14 D. 6 E. NOTA

3. Find $p(a-2)$ if $p(x)=3x+2x^2-x^3$.

A. $-a^3+2a^2+3a-6$ B. $-a^3+2a^2+3a-32$ C. $-a^3+8a^2-17a+10$ D. $-a^3+2a^2-a-32$ E. NOTA

4. For all non-negative numbers n, let n' be defined as $n'=\frac{\sqrt{n}}{2}$. If n'=4, what is the value of n?

A. 64 B. 2 C. 16 D. 13 E. NOTA

5. Determine half the product of the roots for $-x^2+2x=-24$.

A. -12 B. 6 C. 12 D. -6 E. NOTA

6. Simplify $\frac{8}{15}+\frac{3}{32}\div\left(\frac{13}{16}-\frac{11}{12}\right)$ and give the answer as a reduced fraction.

A. $\frac{-11}{30}$ B. $-6\frac{1}{50}$ C. $6\frac{1}{50}$ D. $\frac{-2}{5}$ E. NOTA

7. The decimal: 1.024 is equivalent to which fraction?

A. $\frac{41}{40}$ B. $\frac{13}{8}$ C. $\frac{32}{31}$ D. $\frac{128}{125}$ E. NOTA

8. One angle of a triangle is 5° more than twice a second angle. The third angle is 5° less than three times the second angle. How many degrees is the third angle?

A. 30° B. 65° C. 75° D. 85° E. NOTA

9. Solve for x: $2(x+5)^2+5(x+5)=3$

A. -5 B. $\frac{1}{2}$ *and* -3 C. $\frac{-9}{2}$ *and* -8 D. -6 *and* $\frac{-3}{5}$ E. NOTA

10. The length of a rectangular painting is 6 inches less than three times its width. If the frame (which does not overlap the painting) is 3 inches wide and the area of the frame (without the painting) is 432 sq. inches, find the length of the painting.

A. 9 in. B. 47 in. C. 18 in. D. 48 in. E. NOTA

11. Find the solution set for x: $|4-7x|>18$

A. $x<-2$ *or* $x>\frac{22}{7}$ B. $x<-2$ C. $-2<x<\frac{22}{7}$ D. $x<2$ *or* $x>\frac{22}{7}$ E. NOTA

12. Solve for x: $\frac{5}{7}(x+2)-\frac{3}{4}(x+3)+\frac{1}{2}=0$

A. 9 B. −9 C. $\frac{39}{11}$ D. $\frac{-39}{11}$ E. NOTA

13. Factor completely: $48x^2-27y^4$

A. $3(4x+3y^2)(4x+3y^2)$ B. $3(4x-3y^2)(4x-3y^2)$ C. $3(2x+3y^2)(2x-3y^2)$ D. $3(4x+3y^2)(4x-3y^2)$ E. NOTA

14. Simplify: $\dfrac{x+2-\frac{16}{x-4}}{x+1-\frac{28}{x-2}}$

A. $\frac{4x^2+8x+16}{-7x^2+7x+7}$ B. $\frac{1}{2}b^2-\frac{1}{2}ab+\frac{7}{6}b$ C. $\frac{2x^2-6x}{3x^2-x+16}$ D. $\frac{x^2+2x-8}{x^2+x-20}$ E. NOTA

15. Solve: $-6y+4=|4y+12|$

A. $-\frac{4}{5}$ *or* 8 B. $-\frac{4}{5}$ *or* -4 C. $\frac{4}{5}$ D. $-\frac{4}{5}$ E. NOTA

16. If the area of a square with side x is 9, what is the volume of a cube with side 4x?

A. 729 B. 27 C. 144 D. 1728 E. NOTA

17. Susan has a box of toys that contain 8 squeaky toys, 5 plush toys and 2 building toys. If she selects a toy at random, what is the probability that it is a plush toy or a building toy?

A. $\frac{7}{15}$ B. $\frac{1}{3}$ C. $\frac{7}{8}$ D. $\frac{2}{3}$ E. NOTA

18. A cookie recipe requires three-fourths cup of sugar and two cups of flour. How many cups of flour would you need if you used two and one-fourth cups of sugar?

A. $\frac{27}{32}$ B. 6 C. $\frac{2}{3}$ D. 3 E. NOTA

19. A bag contains 8 blue marbles, 6 red marbles and 5 green marbles. If 3 marbles are drawn one at a time, find the probability for the following situation: the 3rd marble is green, given that the first two are red and replaced back in the bag of marbles.

A. $\frac{3}{19}$ B. $\frac{5}{57}$ C. $\frac{17}{57}$ D. $\frac{5}{19}$ E. NOTA

20. The average of five numbers is nine. The average of seven other numbers is 8. What is the average of all twelve numbers?

A. $8\frac{1}{2}$ B. $8\frac{3}{4}$ C. $8\frac{5}{12}$ D. $8\frac{7}{12}$ E. NOTA

21. What is three less than twice the product of the zeros for $3x^2+5=16x$?

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

22. Simplify: $6\left(-2x^2y^3\right)^3 + x^2y\left(3xy^2\right)^4$

A. $60x^6y^9$ B. $33x^6y^9$ C. $129x^6y^9$ D. $48x^5y^6$ E. NOTA

23. Solve for x: $2a(3x-a) = 3b(b-x) + 7ab$

A. 7ab B. $\frac{1}{2}b^2 - \frac{1}{2}ab + \frac{7}{6}b$ C. $\frac{a+3b}{3}$ D. $\frac{3b^2+2a^2}{6a-3b}$ E. NOTA

24. Determine seven less than the sum of the solutions for this system of equations:

$$\begin{aligned} -2x+5y+3z &= -25 \\ -4x-3y-8z &= -39 \\ 6x+8y-5z &= 14 \end{aligned}$$

A. 7 B. 0 C. 14 D. -15 E. NOTA

25. Write a quadratic equation in standard form with the given roots: $\frac{-4}{7}$ and $\frac{3}{8}$.

A. $56x^2+11x-12=0$ B. $6x^2+3x-12=0$ C. $12x^2+11x-56=0$ D. $56x^2-11x-12=0$ E. NOTA

TIEBREAKERS

TB1 The shape of a table top is a trapezoid. The longer base is 8 more than 3 times the length of the shorter base, and the height is one more than 3 times the shorter base. What is the dimension of the height if the area is 4104 square feet?

TB2 What are the restrictions for the domain of $\frac{x^2+7x+2}{3x-4}$?

TB3 A box measures 12x16x18 inches. To increase each dimension of the box by the same number of inches and have a new volume of 5985 cubic inches, how much should be added to each dimension?