Grissom Math Tournament

20 ALGEBRA I 14

Written Test

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

2. No calculators, books, notes, or other aides may be used. Your monitor will supply scratch paper; you may not furnish your own. If you need more scratch paper during the test, raise your hand and the monitor will bring it to you.

3. You will receive four points for each correct answer minus one point for each incorrect answer on the twenty-five multiple choice questions. There are three tie breakers at the end of the test. Correct answers on the tie breakers are worth one-tenth of a point. Your score on the written test is the sum of these two scores.

4. If there are ties after the scores are computed as described in point 3 above, we will break them by counting number 25, then number 24, then number 23, and so on in this order as tie breakers.

5. Please give the monitor your answer sheet before you leave. You may keep the test copy. ***Be sure to bubble your student number in the appropriate place on your answer sheet. Otherwise, your paper will not be graded.***

Grissom Mathematics Tournament **Algebra I Test** **January 11, 2014**

1. $a + b + c + d = c + d + b + a$ is an example of which property of addition?

A. Reflexive B. Symmetric C. Associative D. Commutative E. Distributive

2. If x = 5 and y = -3, evaluate $y^3 - x^2 - xy$.

A. 17 B. -37 C. -67 D. -10 E. None of these

3. Write as a reduced common fraction: $0.6\overline{87}$

A. $\frac{687}{1000}$ B. $\frac{683}{990}$ C. $\frac{622}{999}$ D. $\frac{227}{330}$ E. None of these

4. The length of a rectangle is increased by 10%, while the width is increased by 25%. By how much is the area increased?

A. 37.5% B. 35% C. 27.5% D. 137 ½ % E. None of these

5. Find the equation of the line that is perpendicular to the line x + 3y = 2 at its x-intercept?

A. $3x + y = -6$ B. $x + 3y = -2$ C. $3x - y = 6$ D. $x - 3y = 2$ E. None of these

6. The circumference of a circle is 32π. Calculate the area of the circle in terms of π.

A. $4\pi\sqrt{2}$ B. 64π C. 256π D. $8\pi\sqrt{2}$ E. None of these

7. Find the ratio x:y if $\frac{4x+3y}{27x} = \frac{5}{2}$.

A. 127:6 B. 6:127 C. 64:3 D. 3:64 E. None of these

8. Doug and Russell live 55 miles apart. Doug drives directly east and Russell drives directly west. They meet at Bobby's house. If Russell drives 7 miles further than Doug, what is the sum of the digits in the number of miles driven by Doug?

A. 4 B. 11 C. 6 D. 8 E. 3

9. Where defined, $\frac{x^2+5x+6}{x^2+2x-3} \div \frac{x^2+2x}{1-x}$ simplifies to which of the following?

A. $-\frac{1}{x}$ B. $-x$ C. 1 D. $x + 1$ E. $x - 1$

10. The sum of the squares of three consecutive integers is 77. What is the sum of those integers?

A. 17 B. 21 C. 19 D. 15 E. None of these

11. A certain tub can be filled in A minutes using the hot water faucet. The same tub can be filled by the cold water faucet in 3 minutes. When the tub is full, the drain can empty the tub in 12 minutes. If both faucets are filling the tub, but the drain is left open, the tub will be filled in exactly 2 minutes. What is the value of $A^2 + 7A$?

A. 44 B. 30 C. 98 D. 60 E. None of these

12. Tommy has taken 3 tests and makes a 74, 79, and 75. If he makes the same score on the final two tests, what must this score be in order to have an average of exactly 80?

A. 78 B. 82 C. 83 D. 86 E. 88

13. The parabola with equation $y = x^2 + 12x + 33$ crosses the x-axis in how many places?

A. 0 B. 1 C. 2 D. 3 E. 4

14. If $135_9 - 135_8 = ab_7$, then what is the product of the digits a and b?

A. 12 B. 14 C. 16 D. 26 E. None of these

15. Given: $f(x) = x^2 + 2x + 1$ and $g(x) = x^2$. Evaluate f(g(f(g(f(-1)))))

A. 25 B. 225 C. 289 D. 16 E. None of these

16. One school brought 68 students to this math tournament. Of those students 34 plan to ride the Space Shot, and 42 plan to ride G-Force. If 13 of the students from this school plan to ride neither of the two, how many plan to ride both?

A. 17 B. 21 C. 27 D. 31 E. 45

17. If $\frac{9}{16} = \frac{x}{4}$, then x = ?

A. 3 B. 2.5 C. 2.25 D. $0.\overline{4}$ E. None of these

18. The distance between the points (9, 5) and (a, -3) is 10 units. Find the product of the possible values of a.

A. 9 B. 36 C. 45 D. 63 E. None of these

19. Simplify: $\frac{8a^3+27b^3}{2a+3b}$.

A. $4a^2 + 9b^2$ B. $2a^2 + ab + 3b^2$ C. $4a^2 - 6ab + 9b^2$ D. $4a^2 - 9b^2$ E. None of these

20. Find the sum of the solutions to the equation: $|2x - 17| = 22$.

A. 12 B. 17 C. 22 D. 34 E. 39

21. Mr. Hernandez invested \$7,800, part at 6% interest and part at 4% interest. If the interest from the 4% investment exceeded the interest from the 6% investment by \$92, then how much more was invested at 4% than at 6%?

A. \$2200 B. \$3600 C. \$4400 D. \$5600 E. None of these

22. Turbo the snail begins his ascent of the 363 ft. tall Saturn V rocket on Monday morning. Each morning, Turbo's clammy, climbing self climbs 15ft. Each evening, his sleepy, slippery self slides down 4 ft. On which day of the week does Turbo reach the tip-top of the Saturn V rocket (for the first time)?

A. Tuesday B. Wednesday C. Thursday D. Friday E. None of these

23. The points (4,3), (8,9), and (a,b) are collinear. Find the value of $3a - 2b$.

A. 6 B. -3 C. 3 D. -6 E. None of these

24. The solution to the system of equations below is the point (x, y, z), find the sum of x, y, and z.

$$2x - y + z = 1$$
$$x + 3y - z = 9$$
$$4x + y - z = 11$$

A. 1 B. 3 C. 5 D. 7 E. None of these

25. $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\cdots\left(1-\frac{1}{2013}\right)\left(1-\frac{1}{2014}\right) = ?$

A. $\frac{2012}{2013}$ B. $\frac{1}{2014}$ C. $\frac{1001}{2014}$ D. $\frac{2013}{2014}$ E. None of these

TIE BREAKERS:

TB1: What is the smallest positive number n, when n>1, such that n is both a perfect square and a perfect cube?

TB2: What value of k will make the lines $3x + 8y = 17$ and $4x - ky = -13$ parallel?

TB3: What is the smallest positive number that gives remainder 1 when divided by 2, remainder 2 when divided by 3, remainder 4 when divided by 5, and remainder 6 when divided by 7?