

Algebra I Individual Test
Vero Beach High School Invitational
March 19, 2005

7. Express the number $7.4\overline{7}$ as a fraction in simplest form. Now give the reciprocal of the ratio of the denominator to the numerator.

A. $\frac{90}{673}$ C. $\frac{747}{100}$ E. NOTA
B. $\frac{100}{747}$ D. $\frac{673}{90}$

8. How many distinct real values of n are there, given the following equation?

$$5(n-3) + 2n^2 - 3(13+n) = 3(48+4n) + 2n(1+n) - 12n$$

A. None C. Two E. NOTA
B. One D. Infinite

9. Thomas drinks a gallon of milk and then runs in the Chugathon race. If the Chugathon is 26.2 miles long, and Thomas sweats out 0.015 gallons of milk every 0.4 miles that he runs, how much milk will be left in the boy at the end of the race? (Assume Thomas loses milk only through sweating and that he had no milk in him before chugging the gallon.) Express your answer in gallons as a simplified fraction.

A. $\frac{7}{200}$ C. $\frac{7}{400}$ E. NOTA
B. $\frac{7}{300}$ D. $\frac{7}{500}$

10. Solve for D in terms of O, N, U, and T, given that $\frac{\frac{D}{O} - \frac{N}{U}}{T} = 5$.

A. $\frac{5T}{U} + NO$ C. $T\left(\frac{5}{O} - \frac{N}{U}\right)$ E. NOTA
B. $O\left(5T + \frac{N}{U}\right)$ D. $\frac{5OUT + 5NU}{O}$

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11. Jerkins, Sengupta, Polk, Amy, Weir, and Kessler are going frog-catching! Each catches a different number of frogs, ranging from one to six. Sengupta does not catch two frogs. Weir catches more frogs than Polk, but less than Jerkins. Amy catches four more frogs than Polk. Sengupta catches more frogs than Kessler does, but Jerkins catches more than Sengupta. The person who catches two frogs is later alphabetically than the person who catches one frog. Given all this, if Kessler catches three frogs, who catches four?
- A. Jerkins C. Sengupta E. NOTA
B. Polk D. Weir
12. Which of the following is/are always true?
- I. $|n|$ is positive for all real values of n
II. If a triangle has sides of lengths x , $x + 2$, and 9 , x is positive.
III. If $y^2 = 17$, y is positive
- A. I. only C. I. and II. E. NOTA
B. II. only D. II. and III.
13. When Hans lines up his soldiers for battle, he notices that he can place forty-nine soldiers in seven rows by seven columns. However, when he adds a column and takes away a row to compensate, there is only room for forty-eight soldiers. This is an example of _____.
- A. Synthetic division C. A system of equations E. NOTA
B. A difference of squares D. A dictatorship
14. Solve the system for x :
- $$3x + y + z = 22$$
- $$2x - y - 4z = -1$$
- $$z = 3$$
- A. 1 C. 3 E. NOTA
B. $2\frac{1}{5}$ D. 6
15. If $x = \sqrt{3}$, then which could be an expression for $9 + \sqrt{75} - x + 3$ in terms of x ?
- A. $12 + \sqrt{75} - \sqrt{3}$ C. $4x^2 - 2x + \sqrt{75}$ E. NOTA
B. $\sqrt{162}x$ D. $x^4 + x^2 + 4x$

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16. If the probability of drawing a blue marble out of an urn containing only blue and red marbles (a marble must be drawn) is $\frac{2}{5}$, how many red marbles are there for every blue marble?
- A. $\frac{2}{5}$ C. $\frac{3}{2}$ E. NOTA
B. $\frac{3}{5}$ D. 3
17. When $y + 9 = 17$, which of the following is true?
- A. $y = (2!)^3$ C. $(2!)^{3!}$ E. NOTA
B. $y = 2^{3!}$ D. $y = 8! - 7!$
18. If $(x^2 - 4x + 4) - 2(x - 2) + 1 = 0$ and $y = x - 2$, what is the sum of x and y ?
- A. 2 C. 6 E. NOTA
B. 4 D. 8
19. Given $x = \frac{1-z}{1+z}$ and $z = \frac{1+y}{1-y}$, find $x + y$ assuming no denominators are equal to zero.
- A. 0 B. $\frac{z+1}{z-1}$
C. $\frac{2z-1}{z-2}$ D. cannot be determined E. NOTA
20. On January 1st, Mr. Erfurt puts one ice cream sandwich into his mouth, eating it in one bite. On January 2nd, he does the same with two ice cream sandwiches, and on the 3rd, he eats three ice cream sandwiches whole. If he continues this bizarre activity throughout the rest of the month, how many ice cream sandwiches will he have consumed in the month of January? (Note: January has 31 days).
- A. 6 C. 356 E. NOTA
B. 31 D. 496
21. Not to be outdone by Mr. Erfurt (see problem 20), Sam decides to make a secret potion that he will drink every morning. To make a gallon of the potion, Sam mixes five twelfths of an ice cream sandwich with eleven twelfths of a sock in his blender. If Sam drinks a gallon of the potion every morning of the month of January (which still has 31 days), how many more socks will he consume in January than ice cream sandwiches? (Assume that he consumes no additional ice cream sandwiches or socks beyond those in his daily potion)
- A. 12 C. 19 E. NOTA
B. 15.5 D. 31

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22. At a baseball stadium, \$2.50 can buy seven hot dogs and two sodas, with forty cents change, or one hot dog and six sodas with twenty cents change. How much change would one receive after paying \$2.50 for one hot dog and one soda?
- A. \$0.20 C. \$2.00 E. NOTA
B. \$0.60 D. \$2.50
23. If there are two J in a Q, nine H in three J, and two Q in half a C, how many H are in a C?
- A. 8 C. 54 E. NOTA
B. 24 D. 72
24. Which choice has the most possible distinct values?
- A. $\sqrt{2}$ C. x , where $x^2 = 4$ E. NOTA
B. 2^2 D. x , where $x^3 = 4$
25. Two bikes begin racing straight towards each other, one at a speed of 15 miles per hour and the other at a speed of 20 miles per hour. At these speeds (which remain constant), they will collide exactly one hour after they begin to move. As soon as they start heading towards each other, a fly flies from the front of one to the front of the other. Once reaching the other bike, the fly immediately turns around and heads back the way it came. It repeats this, flying at a constant speed of 25 miles per hour (it's a superfly) until the bikes crash and the poor fly gets crushed between them. What total distance did the fly fly before getting crushed?
- A. 10 miles C. 20 miles E. NOTA
B. 15 miles D. 25 miles
26. Give the simplified value of $\frac{8}{11} + \frac{8}{99} - \frac{8}{9}$.
- A. $-\frac{8}{99}$ C. $\frac{512}{9801}$ E. NOTA
B. $\frac{8}{101}$ D. $\frac{168}{99}$

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27. P = the greatest common factor of 5 and 12
 Q = the least common multiple of 6 and 13
 R = the arithmetic mean of P and Q
- What is the value of $3R$?
- A. 39.5 C. 120 E. NOTA
B. 91.5 D. 207
28. For the distinct real numbers W , X , Y , and Z , $WX = 13$ and $YZ = 12$. If $XY = 4$, what does WZ equal?
- A. 11 C. 29 E. NOTA
B. 14 D. 39
29. The average of 79, 100, 64, 52, 86, 94, and X is at least 73. The smallest X could be is _____.
- A. 36 C. 64 E. NOTA
B. 49 D. 81
30. Drew the Curious Beaver hears a noise outside his dam. Curious as always, he peeks out to see that a group of blood-thirsty piranhas has invaded the area of the school of fish that usually live next to his dam. However, these piranhas are very slow and take three months to eat a single fish. Drew is not the brightest beaver ever to chew wood and does not realize until half the fish from the school have been eaten that the piranhas will follow him if he leaves. Feeling sad, he says goodbye to the remaining fish in the school and leaves. If there were originally thirty fish in the school near the dam, how long did it take Drew to realize he needed to leave the school behind?
- Please, to help Drew out, round your answer to the nearest year.
- A. 2 years C. 4 years E. NOTA
B. 3 years D. 5 years