Skyview Invitational Games for Mathematical Achievement
Speed Math– 2005 ROUND 3

Name _____ Score: ____
Division (circle one) Mu Alpha Theta Verify: ____

Instructions: Write all answers in EXACT form in the box. Anything outside the answer box will be disregarded. Leave all answers in terms of π and reduced radicals. Express all fractions in improper form reduced to lowest terms. Make sure you write your answer in the correct box. You will have 15 minutes.

1. If $\sin(x) = 3\cos(x)$, then the value of $\sin(x)\cos(x)$ is?

2. A goat is tied to the vertex of an barn shaped like an equilateral triangle with sides of 5 meters. If the goat's rope is 6 meters long, what is the area ($m^2$) of the range it can graze?

3. The point (1,3) is the vertex of the parabola $ax^2 + bx + 1$. Find *a*.

4. If $\log_2 x - \log_4 y = 2$, what is *x* in terms of *y*?

5. Find the largest positive integer *n* which has the following property: All of the positive integers less than *n* that are relatively prime to *n* are prime numbers except for 1

6. The sum of the positive prime factors of 2001 is?

7. *n* is a positive integer. Which could be the exact value of $n^3$ (Give letter(s) in alphabetical order). $\left\{A: 2.7*10^{17}, B: 1.25*10^{83}, C: 0.8*10^{16}, D: 2.7*10^{15}, E: 1.25*10^{12}, F: 2.7*10^{22}\right\}$

8. The sum of the ages of the Andy, Arnold, and Art is 56. Art is five years younger than Andy and in three years, Art will be the same age as Arnold is now. How old is Art now?

9. Find the value of A if $\frac{12x+8}{x^2-16} = \frac{B}{x-4} + \frac{A}{x+4}$

10. In a recent election, Sally won at an 8 to 5 ratio of votes. If she received 16000 votes, how many did her opponent receive?

11. How many odd integers between 3000 and 5000 have DIFFERENT digits?

12. What is the ratio of the sum of the roots (expressed as a fraction) of $9x^2 + 16x + 4 = 0$ to $9x^2 + 24x + 16 = 0$

13. If $3^{x+Y} = 243$ and $2^{y-x} = 512$, then $y^2$ equals?

14. Twelve cards are numbered 3 through 14. Two cards are drawn, without replacement. What is the probability that one card is odd and one card is even?

15. If $\sqrt{21+\sqrt{320}} = x + \sqrt{y}$, and x and y are positive integers, then $x + y = ?$

16. A money bag contains $5.75 and consists of quarters and nickels. Find the smallest possible number of coins in the bag if it must be a multiple of 7.

17. The interior angles of a pentagon are in arithmetic progression. If the largest angle equals twice the smallest, find its smallest angle in degrees.

18. In the expansion of $(x+y)^n$, the coefficients of the $5^{th}$ and $15^{th}$ terms are equal. *n*=?

19. Find the value of the infinite sum: $\sum_{n=2}^{\infty} 3^{1-n}$

20. Find *x* if $2x + y = 7$, $2y + x = 3$

| |
|---|
| 1. |
| 2. |
| 3. |
| 4. |
| 5. |
| 6. |
| 7. |
| 8. |
| 9. |
| 10. |
| 11. |
| 12. |
| 13. |
| 14. |
| 15. |
| 16. |
| 17. |
| 18. |
| 19. |
| 20. |

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Speed Math ANSWERS– 2005 ROUND 3

The key is below. Overlay, mark incorrect answers, and count the number of correct
The number correct is the score. Multiple forms of each answer is possible, they are indicated. In addition, the units for each answer (always optional) are given in parentheses
Accept an answer giving the units

Score: ____
Verify: ____

| | |
|---|---|
| $\frac{3}{10}$ | 1. |
| $\frac{92}{3}\pi OR\frac{92\pi}{3}$ ($m^2$) | 2. |
| (a=) -2 | 3. |
| $4\sqrt{y}$ | 4. |
| (n=) 30 | 5. |
| 55 | 6. |
| B,C,F or BCF | 7. |
| 16 (years old) | 8. |
| (A=) 5 | 9. |
| 10000 | 10. |
| 504 (integers) | 11. |
| $\frac{2}{3}$ | 12. |
| 49 | 13. |
| $\frac{6}{11}$ | 14. |
| 9 | 15. |
| 35 (coins) | 16. |
| 72 or 72 degrees or 72° | 17. |
| 20 | 18. |
| ½ | 19. |
| (x =) $\frac{11}{3}$ | 20. |