

Skyview Invitational Games for Mathematical Achievement
Speed Math– 2005 ROUND 2

Name _____
Division (circle one) Mu Alpha Theta

Score: _____
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 $2x - 3 = 7$, then $x^2 - 4x$ equals?
2. The area, in terms of r , of the largest triangle that can be inscribed in a semicircle of radius r is?
3. Trains leave from Seattle to Portland every hour on the hour. The trip takes three hours. Each train then waits at the Portland departs one half-hour and then returns to Seattle. The number of trains going the other way it will pass on its return trip is?
4. Solve for x : $3x = \sqrt{3 + \sqrt{3 + \sqrt{3 + \dots}}}$
5. Sam and Susie are brother and sister. Sam has twice as many sisters as brothers. Susie has twice as many brothers as sisters. The number of girl children in the family is?
6. Let $f(x)$ be a quadratic polynomial such that $f(2) = -3$ and $f(-2) = 21$. The coefficient of x in $f(x)$ is?
7. Given that $\log_b(a^2) = 3$, then $\log_a(b^2)$ is?
8. If a and b are integers such that $x^2 - x - 1$ is a factor of $ax^3 + bx^2 + 1$, then b is?
9. Two successive discounts of 10% each have the same effect as a single discount of what percent?
10. If $2^a = 5$ and $2^b = 3$, express $\log_3 10$ in terms of a and b
11. If $x^2 + y^2 = 1$, then the maximum value of $(x + y)^2$ is?
12. The value of $\sin^2(10) + \sin^2(20) + \sin^2(30) + \dots + \sin^2(90)$ is?
13. Find the sum of the infinite series $\frac{1}{3} + \frac{2}{3^2} + \frac{1}{3^3} + \frac{2}{3^4} + \frac{1}{3^5} + \frac{2}{3^6} + \frac{1}{3^7} + \dots$
14. For all real numbers x , the function $f(x)$ is $2f(x) + f(1-x) = x^2$. Find $f(5)$
15. Two fair dice are rolled. What is the probability that their sum is a prime number greater than 6?
16. The measure of an interior angle of an n -gon is twice the measure of its exterior angle. Find its perimeter if each side measures 3 units.
17. If $f(x) = 2x^2 + 3$, write $f(2x)$ in terms of $f(x)$
18. If 60% of x is 30% of y ; then y is what percent of x ?
19. Evaluate the sum in base 5: $214_5 + 343_5 = x_5$. What is x ?
20. Find the area of the region bounded by the lines $y = -2x$, $y = 2x$, and $x = 5$

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 2

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: _____

	5		1.
	r^2		2.
	7		3.
$\frac{1+\sqrt{13}}{6}$ OR $\frac{\sqrt{13}+1}{6}$ OR $\frac{1}{6} + \frac{\sqrt{13}}{6}$ OR $\frac{\sqrt{13}}{6} + \frac{1}{6}$			4.
	2		5.
	-6		6.
	$\frac{4}{3}$		7.
	-2		8.
19 or 19%			9.
$\frac{a+1}{b}$ OR $\frac{a}{b} + \frac{1}{b}$ OR $\frac{1}{b} + \frac{a}{b}$			10.
	2		11.
	5		12.
	$\frac{5}{8}$		13.
	$\frac{34}{3}$		14.
	$\frac{2}{9}$		15.
18 (units)			16.
$4f(x) - 9$ OR $-9 + 4f(x)$			17.
200 or 200%			18.
1112 or 1112 ₅			19.
50 (u ² or units ²)			20.