Math is Cool" Championships – 2014-15

11th & 12th Grade – October 22, 2014

Student Name_____

Proctor Name_____Room #_____

SCHOOL NAME_____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. It is not necessary to write your personal name on the test, but you may put it at the bottom of the test so your coach will be able to give you back the correct test. This test is taken individually, but it is part of your team score, including zeros for missing team members. Your team score will be calculated by taking the mean of your four team members' scores. When you are prompted to begin, tear off the colored sheet and begin testing. ***Since this is a multiple choice test, ONLY a letter response should be indicated as an answer on the answer sheet.*** *No talking during the test.*

DO NOT WRITE IN SHADED REGIONS

	Answer	-1, 0 or 2	-1, 0 or 2
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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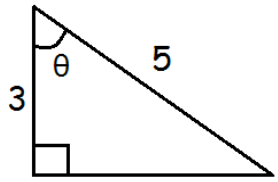
Sponsored by:

11th & 12th Grade – October 22, 2014

Individual Multiple Choice Contest

1	Evaluate: $3^4 - 5! + \frac{1}{10^{-3}}$. A) -38.999 B) 39.001 C) 961 D) 1039 E) Answer not given.
2	Find the units digit of 3^{447}. A) 1 B) 3 C) 7 D) 9 E) Answer not given.
3	 Find $\tan\theta$. Express as an improper fraction. A) 3/5 B) 3/4 C) 4/5 D) 4/3 E) Answer not given.
4	What is the remainder when $x^4 - 7x^3 + 4x^2 + 11$ is divided by $x + 2$? A) 0 B) 89 C) 99 D) $x - 1$ E) Answer not given.
5	How many subsets with five elements can be made from a set containing: Bulbasaur, Ivysaur, Venusaur, Charmander, Charmeleon, Charizard, Squirtle, Wartortle, and Blastoise. A) 45 B) 56 C) 84 D) 126 E) Answer not given.
6	How many 5-digit base 3 numbers will be a 3-digit number when converted to base 5? Answer in base 10. A) 33 B) 44 C) 55 D) 62 E) Answer not given.
7	Find the sum of all α on the interval $0 \leq \alpha \leq \pi$ such that: $2\sin^2(2\alpha) + 2\cos^2(2\alpha) - 2\sin^2(3\alpha) = \frac{3}{2}$. A) 2π B) $5\pi/2$ C) 3π D) $7\pi/2$ E) Answer not given.
8	Let $i = \sqrt{-1}$. Evaluate: $i \cdot i^2 \cdot i^3 \cdot \ldots \cdot i^{2013} \cdot i^{2014}$. A) $-i$ B) i C) -1 D) 1 E) Answer not given.
9	Consider the sequence that begins $a_n = \left\{\frac{1}{2}, \frac{5}{3}, \frac{11}{8}, \frac{27}{19}, \ldots\right\}$ where each new number has a denominator that is the sum of previous number numerator and denominator and whose numerator is its denominator plus the previous number denominator. What is the limit as n approaches infinity? A) $\sqrt{2}$ B) $\frac{3}{2}$ C) $\frac{1+\sqrt{5}}{2}$ D) ∞ E) Answer not given.
10	The point (2,2) is rotated 30 degrees counter-clockwise about the origin to point (*x,y*). What is the value of *x+y*? A) $\sqrt{3}$ B) $2\sqrt{2}$ C) $2\sqrt{3}$ D) 4 E) Answer not given.