



Qualifying Test for *Who Wants to Be a Mathematician*

<i>Student Name:</i>	<i>Grade:</i>
<i>High School:</i>	
<i>High School Address:</i>	<i>State and zip:</i>
<i>Contact Person:</i>	<i>Contact Person Phone:</i>
<i>Contact Person Email Address:</i>	

Test-taker acknowledges that, if selected as a contestant for the AMS's *Who Wants to Be a Mathematician* contest, which selection belongs solely to the AMS based on the questions below and on the attached test, he/she will abide by the rules of the contest and that the decisions of the AMS as to prizes and eligibility thereto are solely at the discretion of the AMS.

What's your favorite subject in school? _____

What's your favorite non-school activity? _____

If you won the top prize, what would you do with the \$5000? (in 30 words or less):

You don't have to show your work on the test paper. Just write the final answer. No calculators. You have ten minutes (for the problems on the next page). Good luck!

1. What is the tens digit (the digit second from the right) of 11^{2009} ? _____ .
2. What is the radius of the circle with equation $x^2 - 4x = 1 - y^2 - 6y$? _____
3. How many vertices does a regular icosahedron have? _____
4. $\cos\left(2\sin^{-1}\frac{1}{5}\right) =$ _____
5. Put the following mathematicians in order according to their year of birth, starting with the first born: Galois, Gauss, Hilbert, Newton. _____
6. Find a fourth-degree polynomial with real coefficients that has i and $2-i$ as roots. (Do not leave your answer in factored form.)

Ans: _____

7. A triangle, M, is formed from $\triangle ABC$ by constructing segments that connect the midpoints of the three sides. What is the ratio of the area of M to the area of $\triangle ABC$? _____
8. How many odd numbers are in the 17th row of Pascal's triangle (where the 0th row is **1** and the 1st row is **1 1**)? _____
9. A Pythagorean triple (a, b, c) consists of three positive integers such that $a^2 + b^2 = c^2$. Write all Pythagorean triples that contain the number 37. (Consider triples in which a and b are interchanged to be equal, that is $(3, 4, 5)$ and $(4, 3, 5)$ are regarded as one triple.)

Ans: _____

10. A googol (in base ten) is 1 followed by one hundred zeros. Within ten, how many digits are there in a googol written in base five? _____

Thank you for participating.

Return completed test(s)—so that they arrive by Oct. 20, 2009—to Mike Breen; c/o American Mathematical Society; 201 Charles St.; Providence, RI 02904.