

Qualifying Test for *Who Wants to Be a Mathematician*

<i>Student Name:</i>	<i>Grade:</i>
<i>High School:</i>	
<i>School Address (incl. town):</i>	<i>State/ zip:</i>
<i>Teacher:</i>	<i>Teacher Phone:</i>
<i>Teacher 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? _____

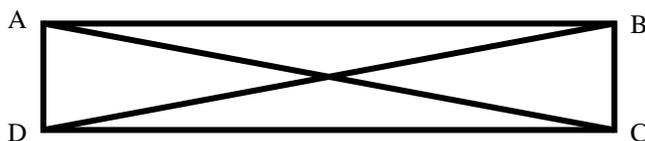
If you won the top prize, what would you do with the \$5000? (in 30 words or less)

Fill in the blank: My favorite mathematician is _____

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

Return completed test(s)—so that they arrive by Oct. 19—to Mike Breen; c/o American Mathematical Society; 201 Charles St.; Providence, RI 02904.

- Find (the principal value of) $\sin^{-1}(\sin 10)$ _____ (10 radians, not degrees)
- What is the highest power of 5 that divides $2011!$? _____
- How many real solutions are there to the equation $\sqrt{x} - 1 = \sqrt[4]{x}$? _____
- True or False* (circle one)? No path that begins and ends at A traverses each segment exactly once. (The two diagonals each count as one segment; ignore their point of intersection.)



- Use digits $a, b,$ and c to form a three-digit number abc . How many such numbers between 100 and 200 are prime and have the property that $ab, ac,$ and bc (each considered as two-digit numbers) are themselves all prime? _____

- Which of the following Greek mathematicians was known as “Beta”? (circle one)
 A. Archimedes B. Eratosthenes C. Euclid D. Pythagoras
- Put the following events in order from the least likely to the most likely (use the indicated letters):
 E: Tossing six fair coins and getting exactly three heads
 F: Rolling two fair six-sided dice and getting a sum of 6 or 7
 G: Choosing a letter from the English alphabet (26 letters) at random and getting a letter that either immediately precedes or immediately follows a vowel. (Here we are not counting Y as a vowel and we assume that the alphabet ends at Z—it doesn’t wrap back to A.)

- How many non-real solutions are there to the equation $12x^8 - 3x^4 - 15 = 0$? _____

- A unit cube (each side has length 1) is inscribed in a sphere. What is the surface area of the sphere? _____

- How many positive numbers x satisfy the equation ? $x^{x-1} = 10$? _____