

Round One Qualifying Test for *Who Wants to Be a Mathematician*

Student Name:	Grade:
High School:	
HS Address (incl. town/st./zip):	
Contact Person:	Contact Person Phone:
Contact Person Email Address:	

Test-taker acknowledges that, if selected as a contestant for the AMS's WWtBaM contest, which selection belongs solely to the AMS, 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.

You don't have to show your work on this paper. Just write the final answer. No calculators.
You have 15 minutes. Good luck!

1. Solve for x : $2x^3 + 9x^2 = 35x$. _____

2. Find $\sec^2(\theta)$ if $\tan(\theta) = -\sqrt{2}$. _____

3. How many (positive integer) factors does 1000 have (including 1 and itself)? _____

4. What is the coefficient of the x^2y^3 term in the expansion of $(2x - y)^5$? _____

5. An equilateral triangle is inscribed in a circle of radius 1. What is the area of the region inside the circle but outside the triangle? _____

6. (Circle your answer.) The 19th century mathematician Niels Abel was born in what is now
 - a. England
 - b. France
 - c. Norway
 - d. Scotland

7. Two cards are drawn without replacement from a standard deck of 52 cards. What is the probability that both are of the same suit? _____

8. (Circle your answer.) The hypotenuses of two right triangles have the same length. The ratio of the lengths of the legs of the first triangle is 4:3 while the ratio of the lengths of the legs of the second triangle is 16:9. Which of the following is true about the length of the smallest side of the first triangle divided by the length of the smallest side of the second triangle? It's
 - a. between $\frac{1}{2}$ and $\frac{3}{4}$
 - b. between $\frac{3}{4}$ and 1
 - c. between 1 and $\frac{5}{4}$
 - d. greater than $\frac{5}{4}$

9. Suppose a and b are positive integers greater than 1. If $\log_a \sqrt{b} = s$ then what is $\log_b(a^2)$?

10. (Circle your answer.) What is the largest number that cannot be written in the form $6a + 9b + 20c$, where a , b , and c are non-negative integers?
 - a. 22
 - b. 23
 - c. 28
 - d. 37
 - e. 43

Return completed test(s) to Mike Breen (email: paoffice@ams.org; fax: 401-331-3842; or mail: c/o American Mathematical Society; 201 Charles St.; Providence, RI 02904)

Thank you for participating.