Who Wants to Be a Mathematician

Sample Regional Game
If we let $P$ represent the population of Rhode Island, then $\log_{10} P$ is about

A. $-1$
B. $0$
C. $1$
D. $6$
What is the surface area of a sphere of radius $r$ divided by its volume?

A. $\frac{1}{3r}$

B. $\frac{4}{3r}$

C. $\frac{3}{r}$

D. $\frac{4}{r}$

Question #2—200 Points
Three fair two-sided coins are flipped (and H/T is noted). What is the probability that not all three coins land with the same result?

A. 1/2
B. 5/8
C. 3/4
D. 7/8
What is the measure of angle $\alpha$ (in radians)?

A. $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

B. $\frac{\pi}{4}$

C. $\tan^{-1}(\sqrt{2})$

D. It can’t be determined from the given information.
The set pictured is named after which of the following mathematicians?

A. Rene Descartes
B. Pierre Fatou
C. Edward Lorenz
D. Benoît Mandelbrot
The Mandelbrot Set

http://commons.wikimedia.org/wiki/File:Mandelbrot_set_rainbow_colors.png
The number $n^n$ is calculated for each positive integer $n$ from 2010 to 2019 (inclusive). How many different units/ones digits result?

A. 6
B. 7
C. 8
D. 9
A ladder is leaning against the wall (as pictured). Then it is adjusted (against the same wall) so that it now reaches twice as high up the wall. The slope of the ladder is now ...

A. Less than twice what it was initially
B. Exactly twice what it was initially
C. More than twice what it was initially
D. More information is needed to determine which of the above is correct.
What is the sum of the digits of all solutions to

$$\sqrt{x} + \sqrt{x + 56} + \sqrt{x - \sqrt{x + 56}} = 4 ?$$

A. 8
B. 11
C. 17
D. 25
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$x^2 + x + 1 = 0$

Off² Question
Analog clocks and watches are traditionally displayed for sale showing the time 10:10. What is the angle between the hour and minute hands at that time (the smaller of the two angles)?

A. \( \frac{11\pi}{18} \)

B. \( \frac{23\pi}{36} \)

C. \( \frac{2\pi}{3} \)

D. \( \frac{25\pi}{36} \)

E. \( \frac{3\pi}{4} \)
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$x^2 + x + 1 = 0$

Two-Grand Prize Question
Given isosceles triangle $ABC$ (below) where $AB = AC$ and $M$ is the midpoint of $AC$. Find $BM$.

A. $\frac{\sqrt{39}}{2}$  
B. $\frac{\sqrt{57}}{2}$  
C. $\frac{3\sqrt{7}}{2}$  
D. $\frac{\sqrt{71}}{2}$  
E. $\frac{\sqrt{89}}{2}$
Answers

1. D  
2. C  
3. C  
4. B  
5. D  
6. C  
7. C  
8. A  
Square-Off: B  
Bonus: B
Who Wants to Be a Mathematician

$x^2 + x + 1 = 0$

Presented by

The American Mathematical Society

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