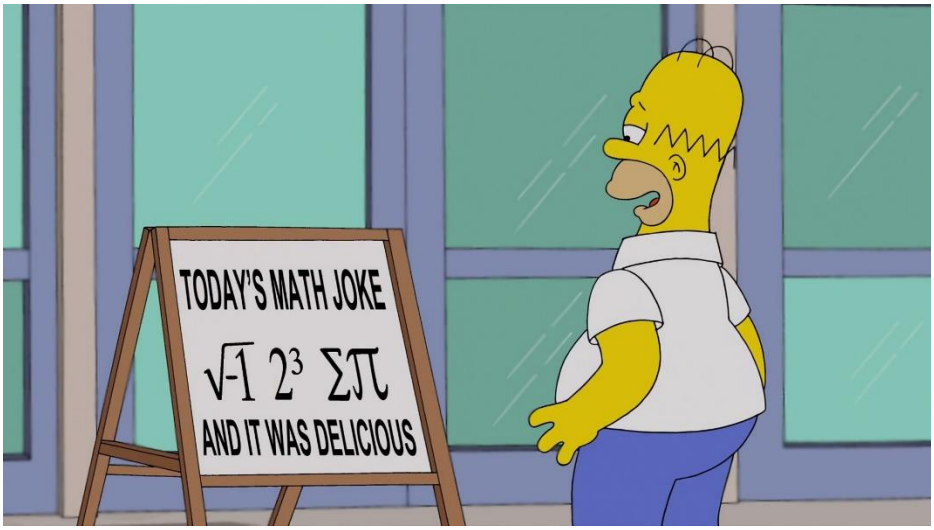
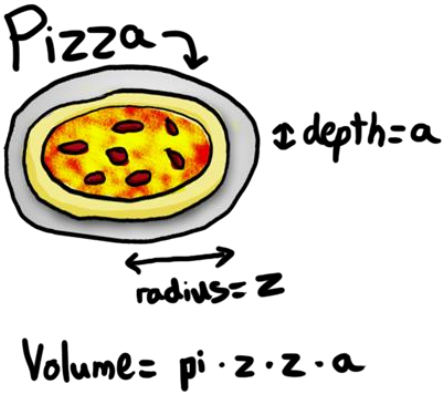
November 5th, 2017 Mock (Practice) AMC 8

Welcome!





2011 = prime number
2012 = 2 · 2 · 503
2013 = 3 · 11 · 61
2014 = 2 · 19 · 53
2015 = 5 · 13 · 31
2016 = $2^5 \cdot 3^2 \cdot 7^1$
2017 = prime number
2018 = 2 · 1009
2019 = 3 · 673
2020 = 2 · 2 · 5 · 101
…
2027 = prime

2017 is a prime number. The next prime number after 2017 is 2027.

Daniel Plotnick

1. Olivia had 2017 pennies and exchanged all of them for nickels with her brother June and she had some number of pennies left over. She then exchanged all of her nickels for dimes with her sister Mikako and she had some number of nickels left over. She then changed all of her dimes for quarters with her aunt Esther and she had some number of dimes left over. She then changed all of her quarters for dollar bills with her mother. How much change did she have left over?

   A. 17 cents B. 30 cents C. 12 cents D. 15 cents E. 42 cents

2. Find the last digit of $2^{2017} + 0^{2017} + 1^{2017} + 7^{2017}$

   A. 2 B. 0 C. 1 D. 7 E. none of these

3. The sum $1 + 2 + 3 + \cdots + 2015 + 2016 + 2017$ is closest to

   A. 2,300,000 B. 2,200,000 C. 2,100,000 D. 2,000,000 E. 1,900,000

4. On a certain 25 problem multiple choice contest, each correct answer is worth 6 points, each incorrect answer is worth 0 points, and each unanswered question is worth 1.5 points. Which of the following is not a possible score?

   A. 82.5 B. 91 C. 99 D. 114 E. 123

5. Which is largest?

   A. ((1/2)/3)/4 B. (1/2)/(3/4) C. (1/(2/(3/4)) D. ((1/(2/3))/4) E. 1/((2/3)/4)

6. A positive integer m has the property that when multiplied by 12, the result is a four-digit number n of the form 20A2 for some digit A. What is the 4 digit number, n?

   A. 2012 B. 2032 C. 2052. D. 2072 E. 2092

7. Alix, Kimberly, Fiona, and Indrani played 6 games of tennis together. In each game, the four of them split into two teams of two and one of the teams won the game. If Alix was on the winning team for 5 games, Kimberly for 2 games, and Fiona for 1 game, for how many games was Indrani on the winning team?

   A. 1 B. 2 C. 4 D. 5 E. 8

8. Given three consecutive positive integers, which of the following is a possible value for the difference of the squares of the largest and the smallest of these three integers?

   A. 2015 B. 2016 C. 2017 D. 2018 E. 2019

9. The symbol $n!$ is pronounced “n factorial” and is shorthand for the product $n \times (n-1) \times (n-2) \times \ldots \times 2 \times 1$. How many zeros does 2017! end in?

   A. 403 B. 483 C. 499 D. 502 E. None of These

10. The sum of the factors of the sum of the factors of 2017 is

A. 2018 B. 3030 C. 3029 D. 1012 E. 1011

11. Two standard 6 sided dice with numbers 1 through 6 on the sides. What is the probability that the product of the numbers showing is either a prime or a square number?

A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $\frac{7}{12}$ D. $\frac{7}{18}$ E. $\frac{11}{18}$

12. Suppose a regular hexagon has a side R that is the same length as the radius of a circle. What is the ratio of the area of the circle to the area of the hexagon?

A. $\frac{2\pi\sqrt{3}}{9}$ B. $\frac{4\pi\sqrt{3}}{9}$ C. $\frac{\pi}{3}$ D. $\frac{\pi}{\sqrt{3}}$ E. $\frac{\pi\sqrt{3}}{3}$

13. A positive integer is said to be bi-digital if it uses two different digits, with each digit used exactly twice. For example, 1331 is bi-digital, whereas 1113, 1111, 1333, and 303 are not. Determine the exact value of the integer b, the number of bi-digital positive integers.

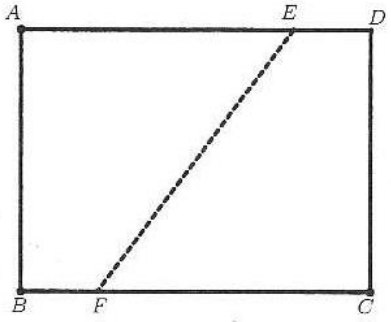
A. 270 B. 243 C.192 D. 162 E. 300

14. If M and N are non-negative integers with M < N, we define M Ω N to be the sum of the integers from M to N including M and N. For example, 5 Ω 8 = 5 + 6 + 7 + 8 = 26

For every positive integer a, the numerical value of $\frac{[(2a-1)\,\Omega\,(2a+1)]}{[(a-1)\Omega\,(a+1)]}$ is the same. Determine this value.

A. 1 B. 2 C. 3 D. 4 E. 8

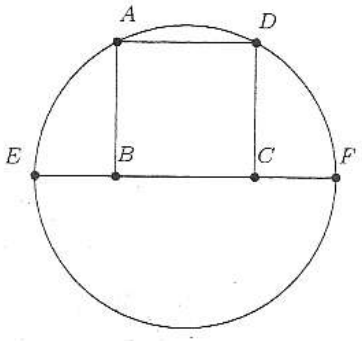
15. Let ABCD be a rectangular sheet of paper with AB = 6 and BC = 8. We can fold the paper along the dotted crease line EF so that point C coincides with point A. Find the length of the resulting line segment AF.



A. 25/4 B. 13/2 C. 27/4

D. 7 E. None of these

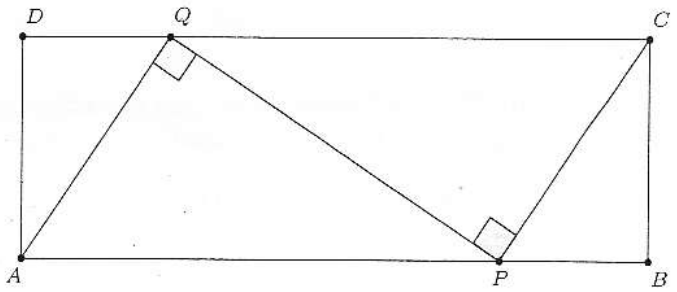
16. In the diagram below, EF is a diameter of the circle and ABCD is a square with points B and C on EF and points A and D on the circle. If AB = $17\sqrt{5}$, find the length of EF.



A. $34\sqrt{5}$ B. $5\sqrt{68}$ C. $25\sqrt{17}$

D. $\frac{85}{2}$ E. 85

17. In the diagram, ABCD is a rectangle in which AB = 34 and BC = 12. P and Q are points on AB and CD respectively such that ∠CPQ and ∠PQA are right angles. Find the sum of the two possible integral lengths of segment AP.



A. 17 B.34 C. 51

D. 68 E. None of these

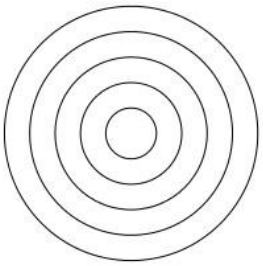
18. Let a sequence be defined such that the first term is 2017 and every term after the first is equal to the sum of the squares of the digits of the previous term. So, the 2nd term of the sequence is $2^2 + 0^2 + 1^2 + 7^2 = 54$ and the 3rd term is calculated to be $5^2 + 4^2 = 41$, and so on. Find the 2017th term of the sequence.

A. 29 B. 42 C. 85 D. 89 E. 145

19. Let N = $20.\overline{17}$ where the bar over the decimal part means a repeating decimal, N= 20.171717… The value of N can be written in the form $A + \frac{B}{C}$. Where A, B, and C are natural numbers. What is the value of A + B + C?

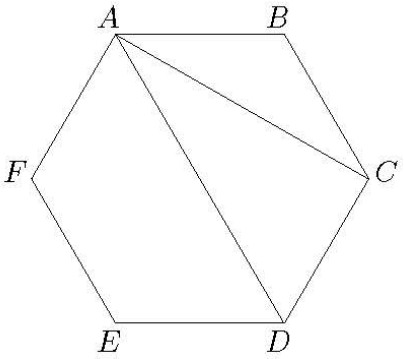
A. 136 B. 116 C. 38 D. 37 E. 997

20. In the figure below, the concentric circles have radii 1, 2, 3, 4, and 5. The total area that is contained inside an odd number of these circles is mπ for a positive number m. What is the value of m?



A. 1 B. 10 C. 15 D. 24 E. 25

21. Let ABCDEF be a hexagon all of whose sides are equal in length and all of whose angles are equal. The area of hexagon ABCDEF is exactly r times the area of triangle ACD. Determine the value of r.



A. $\sqrt{3}$ B. $3\sqrt{3}$ C. $\frac{\sqrt{3}}{2}$

D. $\frac{3\sqrt{3}}{2}$ E. 3

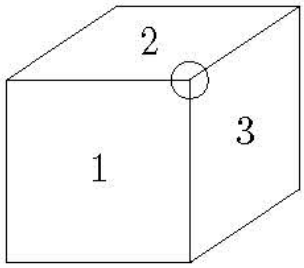
22. What is the value of $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\ldots(1+\frac{1}{2016})(1+\frac{1}{2017})$?

A. 2017 B. 2018 C. 1009 D. 2018/2017 E. 2017/2

23. Arthur is driving to David's house intending to arrive at a certain time. If he drives at 60 miles/hour, he will arrive 5 minutes late. If he drives at 90 miles/hour, he will arrive 5 minutes early. If he drives at n miles/hour, he will arrive exactly on time. What is the value of n?

A. 84 B. 80 C. 76 D. 72 E. 64

24. The faces of a cube contain the numbers 1, 2, 3, 4, 5, 6 such that the sum of the numbers on each pair of opposite faces is 7. For each of the cube's eight corners, we multiply the three numbers on the faces incident to that corner, and write down its value. (In the diagram, the value of the indicated corner is 1 × 2 × 3 = 6.) What is the sum of the eight values assigned to the cube's corners?



A. 216 B. 256 C. 336 D. 343 E. 512

25. The numbers 1, 2, 3, . . . , 9 are placed in a square array. The sum of the three rows, the sum of the three columns, and the sum of the two diagonals are added together to form a "grand sum", S. For example, if the numbers are placed as shown, the grand sum is S = row sums + column sums + diagonal sums = 45 + 45 + 30 = 120. What is the maximum possible value of the grand sum S?

1	2	3
4	5	6
7	8	9

A. 120 B. 128 C. 132 D. 134 E. 144