MATHUS मेथस ACADEMY
BRING THE BEST OUT OF CHILDREN

Grade 7 **MathGenius National Contest March 2017** **Critical Thinking Math**

1. Which of the below is not a rational number?

   A. $\frac{3}{2+\frac{3}{4}}$
   B. 3.14
   C. $\sqrt{1000}$
   D. $\sqrt[3]{1000}$
   E. $\frac{0.\overline{4}}{2.0\overline{5}}$

2. The difference of two prime numbers is 5001. What is the larger of the two prime numbers?

A. 9997
B. 8073
C. 7125
D. 6759
E. 5003

3. Kylie walks $\frac{1}{4}$ mile West, then $\frac{3}{4}$ mile North, and finally $\frac{3}{4}$ mile West. How many miles is she directly away from the starting point?

A. $1\frac{3}{4}$
B. $1\frac{1}{4}$
C. $1\frac{1}{2}$
D. 1
E. 2

4. If the square of an integer x is given as 6084, what is the value of $(x+1)(x-1)$?

A. 37015055
B. 36168
C. 6085
D. 6083
E. 6001

5. The three digit number $ab7$ is divisible by 3, where a and b are any digits. How many different three-digit numbers can $ab7$ represent?

A. 15
B. 57
C. 27
D. 12
E. 30

6. In the sequence, 1, 2, 2, 3, 3, 3, … each digit d appears d times. For example, 3 appears 3 times, 7 appears 7 times and so on. If 16 appears for the first time in the n^{th} place, what is the value of n?

A. 16
B. 65
C. 121
D. 136
E. 137

7. How many positive integers less than 2017 have odd number of factors?

A. 1
B. 44
C. 49
D. 217
E. 1936

8. Each alphabet in the multiplication problem below stands for a different digit. What is the value of $M+A+T+H$?

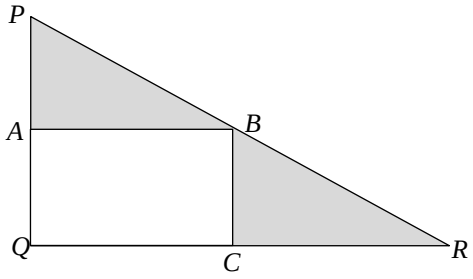
$$\begin{array}{r} M\ A\ T\ H \\ \times \qquad 9 \\ \hline H\ T\ A\ M \end{array}$$

A. 14
B. 16
C. 18
D. 20
E. 22

9. The arithmetic mean of seven positive consecutive integers starting with x is y. What is the arithmetic mean of seven consecutive integers starting with y?

A. $x + 6$
B. $x + 3$
C. $x + 7$
D. $y + 1$
E. $y + 7$

10. Rectangle *ABCQ* is inscribed in ΔPQR. PR = 13 cm, PQ = 5 cm, A is the midpoint of PQ, and C is the midpoint of QR. What is the area of the shaded region in sq. cm?



A. 65
B. 32.5
C. 26
D. 18
E. 15

11. The interior angles of a hexagon are in the ratio of 2:3:5:8:8:10. What is the measure of the largest angle?

A. 100^0
B. 180^0
C. 200^0
D. 240^0
E. 280^0

12. What is the binary (Base 2) representation of the decimal number 137?

A. 10001001
B. 11001011
C. 10110101
D. 10101101
E. 10011011

13. What is the number of digits in the integer form of the number $8^{2017} \times 5^{6050} \times 9$?

A. 2019
B. 2020
C. 6050
D. 6051
E. 6052

14. A right triangle is drawn on the *xy*-coordinate plane so that none of the three lines are parallel to either axes. If the slope of the hypotenuse is -2, what is the product of the slopes of the three lines of the right triangle?

A. 0
B. 1
C. 2
D. 3
E. 4

15. Brian's clock runs 15 hrs for every 12 hrs. If Brian's clock showed 8.00AM correctly as 8 o'clock on Jan 1st, 2017, what time will it show at 8.00 AM on Mar 1st, 2017?

A. 2 O'clock
B. 3 O'clock
C. 5 O'clock
D. 8 O'clock
E. 10 O'clock

16. When a positive integer x is divided by 7, its remainder is 5. What is the remainder when $37x$ is divided by 7?

A. 6
B. 5
C. 4
D. 3
E. 2

17. If $243 \cdot 3^x = 3^6 + 3^6 + 3^6 + 3^6 + 3^6 + 3^6 + 3^6 + 3^6 + 3^6$, what is the value of x?

A. 3
B. 4
C. 5
D. 7
E. 8

18. Two vertices of an octagon are selected at random, and a line segment was drawn connecting the two points. What is the probability that this line segment is a diagonal of the octagon?

A. $\frac{5}{8}$
B. $\frac{5}{7}$
C. $\frac{1}{2}$
D. $\frac{4}{7}$
E. $\frac{3}{8}$

19. Omar's tub has a faucet and a drain. When only the faucet is turned on, it fills the tub in 1 hr. When only the drain is turned on, it empties the tub in 4 hrs. When both the faucet and drain are turned on, how long will it take to fill the tub?

A. 75 minutes
B. 80 minutes
C. 1.5 hrs
D. 2 hrs
E. 3 hrs

20. In how many ways can 6 boys stand in a straight line, if two boys refuse to stand next to each other?

A. 120
B. 240
C. 360
D. 480
E. 720

For any questions, please reach us at support@mathusacademy.com or 2098-MATHUS (209.862.8487)