MATHUS मेधस ACADEMY
BRING THE BEST OUT OF CHILDREN

Grade 8 **MathGenius National Contest March 2017** **Critical Thinking Math**

1. If a square's area is $\frac{81}{16}$, its perimeter is __

A. 9
B. 6
C. 3
D. $\frac{9}{4}$
E. $\frac{3}{2}$

2. How many digits in all can the product of a four-digit number and five-digit number can have?

A. 10
B. 7
C. 11
D. 6
E. 8

3. How many points of intersection are there for $x + y = 5$ and $y = x^2 - 5$?

A. 0
B. 1
C. 2
D. More than 2
E. It cannot be determined with the given information

4. If $4^x = \sqrt{2} \cdot \sqrt{2} \cdot \sqrt{2}$, what is the value of x?

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

5. If x and y are odd integers, which of the following must also be an odd integer?

A. $x^2 - 3y^2$
B. $x^2 + xy - 2y^2$
C. $x^2 + xy + y^2$
D. $x(y^2 - x^2)$
E. $(x+y)y$

6. If x is a prime number between 100 to 1000, which one of the following cannot be a prime number?

A. $x - 90$
B. $x + 90$
C. $x + 99$
D. $x + 990$
E. $x + 9990$

7. What is the greatest value of *a* for which 36^a is a factor of *36!*?

A. 8
B. 16
C. 17
D. 18
E. 36

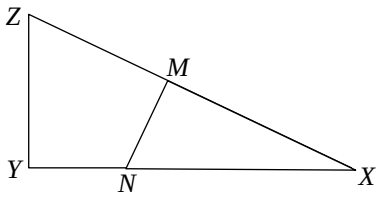
8. What is the largest Base 10 number that can be represented as a 4-digit number in Base 4?

A. 128
B. 255
C. 256
D. 1023
E. 1024

9. A student body with 12 members is to choose three board members. How many different ways are there to choose the three board members?

A. 220
B. 36
C. 72
D. 1320
E. 660

10. In the below figure, *XM* = 8 cm, *MZ* = 5 cm, and *YZ* = 5 cm. What is the area of quadrilateral *MNYZ* in sq. cm?



A. 65
B. 40
C. 20
D. $\frac{50}{3}$
E. $\frac{40}{3}$

11. What is the units digit of $27^{85} + 27^{86} + 27^{87} + 27^{88}$?

A. 9
B. 7
C. 3
D. 1
E. 0

12. Two real numbers are selected at random between 0 and 6. What is the probability that their sum is less than 4?

A. $\frac{5}{49}$
B. $\frac{5}{36}$
C. $\frac{2}{9}$
D. $\frac{4}{9}$
E. $\frac{5}{9}$

13. A rectangle is formed by four lines on a coordinate plane. None of the four lines are parallel to any axis. What is the product of the slopes of the four lines?

A. $\sqrt{2}$
B. -2
C. 2
D. -1
E. 1

14. What is the sum of all values of x that satisfy the equation $2017^{(x^2+13x+42)} = 1$?

A. 1
B. -13
C. 13
D. 21
E. -21

15. A set of 9 positive integers have a unique mode of 1, mean of 6, median of 7. What is the largest possible value of any number in the set?

A. 15
B. 23
C. 19
D. 24
E. 21

16. Which of the following numbers is the largest?

A. 2^{3^4}
B. 2^{4^3}
C. 3^{4^2}
D. 4^{3^2}
E. 4^{2^3}

17. In a class of 100 students, 91 students like to swim, 83 like to play basketball, 79 like to dance, and 86 like to sing. At least how many students like all four activities?

A. 39
B. 51
C. 21
D. 49
E. 61

18. Oscar's tub has a faucet and a drain. When only the faucet is turned on, it fills the empty tub in 1 hr. When both the faucet and drain are turned on, the tub fills in 2 hrs. If only the drain is turned on, how long will it take to empty a full tub?

A. 40 minutes
B. 1 hr
C. 1.5 hrs
D. 2 hrs
E. 3 hrs

19. Jenny divided the least common multiple of all whole numbers from 1 through 25 by the product of all the prime numbers from 1 to 25. What is the quotient that Jenny got, assuming she did it correctly?

A. 3600
B. 120
C. 60
D. 30
E. 1

20. How many positive two digit integers have exactly 8 positive factors?

A. 6
B. 8
C. 9
D. 10
E. 11

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