

Ciphering Fall Classic 2003

Questions 19 & 20

Name _____

School _____

Grade _____

Team # _____

- 1) The sum of the digits of James' positive two-digit number is 9. If the number is not a multiple of 6, is not a perfect square, and is not a perfect cube, list in order from smallest to largest all possible solutions.

ANSWER _____

- 2) For how many positive integers $m \leq 100$ is $(m - 5)(m - 23)(m - 68)$ positive?

ANSWER _____

- 3) If Mary bought 5 apples the first week, 6 apples the second week, 7 apples the third week and this pattern continued for 20 weeks, how many total apples had Mary purchased by the end of the 20 weeks?

ANSWER _____

- 4) How many positive three-digit numbers are there for which the ten's digit exceeds the sum of the other two digits?

ANSWER _____

5) Jill would like to design a right rectangular prism with a volume of 32 cubic feet such that one edge is twice as long as another and each dimension is of integral length. How many unique prisms could she make?

ANSWER _____

6) A lock has 5 buttons numbered 1-5. The lock is opened by pushing two buttons simultaneously and then pushing one button alone. How many different combinations are possible?

ANSWER _____

7) Christina is building a circular corral for her dog Spot. To form the corral she pounds 20 posts equally spaced around the circumference. Each post contributes 6 inches to the circumference and the fencing between adjacent posts contributes 8 feet to the circumference. To the nearest integer, what is the number of square feet in the area of the corral? Use $\frac{22}{7}$ for π .

ANSWER _____

8) If a, b and c each represent a different integer 0-9, what is the value of c?

$$\begin{array}{r} \text{aaaa} \\ \text{bbbb} \\ + \text{cccc} \\ \hline \text{baaac} \end{array}$$

ANSWER _____

9) Selina's age on her birthday in 1993 is equal to the sum of the digits of her birth year. How old is she?

ANSWER _____

10) What is the value of the largest mean among the following sets of whole numbers?

A: all the multiples of 3 between 1 and 50,

B: all the multiples of 4 between 1 and 50,

C: all the multiples of 6 between 1 and 50,

D: all the multiples of 7 between 1 and 50,

E: all the multiples of 9 between 1 and 50.

ANSWER _____

- 11) On a true/false test of 100 items, every question that is a multiple of 4 is true, and all others are false. If a student marks every item that is a multiple of 3 false and all others true, how many of the 100 items will be correctly answered?

ANSWER _____

- 12) Step 1: Solve for x

$$3x - 3(x - 3) - 3(x - 3) - (3 - x) - 3(3 - x) = 4(x - 4) - 4(4 - x) - 4$$

- Step 2: Insert the value for x into the following and find y

$$y = x^2 - x^3 + x^4$$

- Step 3: Find the sum of the digits of y

ANSWER _____

- 13) On a number line Point A has the coordinate -8 and Point B has the coordinate 13 . What are the coordinates of all points on the line whose distance from Point A is two-thirds of its distance from Point B?

ANSWER _____

- 14) If you use 999 digits to write page numbers consecutively starting with 1, how many page numbers could you write?

ANSWER _____

15) What is the unit's digit of the sum of the following?

$$1! + 2! + 3! + 4! + \dots + 14! + 15!$$

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ANSWER _____

16) What is the smallest positive integer that cannot be expressed as the sum of eight or fewer cubes of positive integers?

ANSWER _____

- 17) What is the largest 7-digit number that contains each of the digits 1-7 and has the property that the sum of any two consecutive digits is a prime number?

ANSWER_____

- 18) Of the following which has the greatest volume in cubic centimeters, the cube, the prism, the pyramid or the sphere?

A cube with edge = 12cm

A rectangular prism with length = 11cm, width = 12cm and height = 13cm

A square pyramid with the area of the base 160cm^2 , and height of 30cm

Or a sphere with radius 7cm (Use 3.14 for π)

ANSWER_____

19) In a tennis tournament, n women and $2n$ men play, and each player plays exactly one match with every other player. If there are no ties and the ratio of the number of matches won by women to the number of matches won by men is $7:5$, then n equals what?

ANSWER _____

20) A jar of marbles has 40 blue marbles and 24 red marbles and 36 orange marbles. What is the probability that if I randomly select 3 marbles from the jar, they are all of different colors? Express your answer as a reduced fraction.

ANSWER _____