



EXUN_ELITE_2008.cpp
SUB-JUNIOR PROGRAMMING
(VII-VIII)

General Instructions:

The paper has been divided into two Sections (A, B)
Class VII students have to attempt **only Section A**
Class VIII students have to attempt **Section A + Section B**

Points of each question have been mentioned with it.
Total Points = A(45) + B(35) = **80 points**
Allowed time – **1 hour**
There is no negative marking in the paper
Please note that there are **6 printed pages**

Name of the Participants	Class	Section
1. _____	_____	_____
2. _____	_____	_____

How to go about solving this paper?

- For each question we have given some clues which represent some hidden message.
- These can be broadly divided into two categories:
 - a) **Logical Type (L) ::** Most questions in this paper fall under this category.
 - b) **Mechanical Type (M) ::** These are the tedious questions for which you will have to use the rough paper provided with this paper. Don't worry there aren't many of these here.

Please open the seal after the announcement has been made!

SECTION "A"- 45 points

Q 1. Give the logic behind this series:

0, 1, 1, 2, 3, 5, 8, 13 ... (L) - 2 points

Fibonacci series: $T_n = T_{(n-1)} + T_{(n-2)}$

Q 2. What is the largest number you can form with three 9s using any arithmetic signs, arrangement etc.? (L)-2 points

$(9^9)^9$

Q 3. What should be the shape of an ice cream that has a fixed volume but the least surface area? (Cone, Cube, Sphere, Prism, Tetrahedron) (L)-2 points

Sphere(minimum surface area for a fixed volume)

Q 4. If 'HELLO' is coded as 'EBIIL', then decode 'AUZDV'. (L)-2 points

DXCGY

Q 5. A one kilometer long train is traveling at the speed of 1 Km/hr. How much time will it take to cross a one kilometer long tunnel? (L)-2 points

2 HRS

Q 6. Find a number whose double is greater than its half by 51. (L)-2 points

34

Q 7. Pointing out to a photograph, a man tells his friend, "She is the daughter of the only son of my father's wife." How is the girl related to the man in the photograph? (L)-2 points

The girl is her daughter

Q 8. A family I know has several children. Each boy in this family has as many sisters as brothers but each sister has twice as many brothers as sisters. How many brothers and sisters are there? (L)-2 points

4 boys, 3 girls

Q 9. In a row of trees, one tree is fifth from either end of the row. How many trees are there in the row? (L)-2 points

9 trees

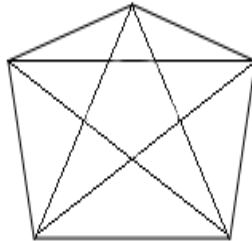
Q 10. X says, "Y is my brother"

Y says, "X is not my brother"

Assuming that none of them are lying, how is this possible? (L)-2 points

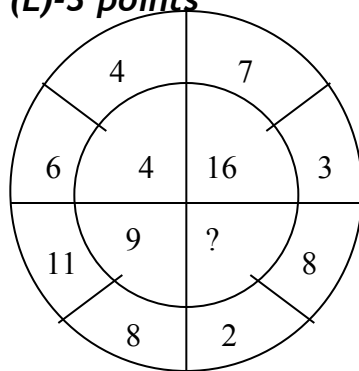
X is the sister of Y

Q 12. Count the number of triangles: (M)-3 points



36

Q 13. Fill the missing number: (L)-3 points



36 (square of differences)

Q 12. When do the hour and the minute hands of the clock meet between 4:20 and 4:25?

(M+L) - 4 points

$$4:22:10 \text{ seconds}$$

$$4:20 + \frac{12 * 120}{11}$$

Q 13. A fish reproduces every 20 minutes to give 2 offspring. If no fish dies in the next 3 hours, how many fish will we have after 3 hours? (L+M)-4 points

After 20 min—3

After 40 min—3+6=9

After 60 min—3+6+18=27

This is known as a Geometric Progression as there is a common ratio(3) between the terms

$$3^1 + 3^2 + 3^3 + \dots + 3^9 = \frac{3}{3-1}(3^{10} - 1)$$

Q 14. In a caravan, there are some camels, some goats, some hens and some pigeons along with 50 men, women and children. The number of hens is three

times that of pigeons and that of camels four more than that of goats. If the ratio of animals and birds be 2:5 and there be 226 legs more than the heads, how many camels and hens are there in the caravan? **(M)-4 points**

$$\text{Pigeons}=x, \text{ hen}=3x, \text{ goats}=y, \text{ camels}=y+4$$
$$2(x+3x+50) + 4(y+4+y) - (x+3x+50+y+4+y) = 226$$

$$\frac{2y + 4}{4x} = \frac{2}{5}$$

$$\text{Camels}=18 \text{ hens}=60$$

Q 15.

- a. If each of five persons in a group shakes hands with each of the other persons, then how many handshakes took place in all? **(L)-2 points**

$$4+3+2+1=10$$

-
- b. A frog jumps up 2 feet and slips down one foot every second, how much time will it take to climb up a 30 feet high wall? **(L)-2 points**

$$29 \text{ seconds}$$

-
- c. In one box there are 10 red balls 12 green balls and 15 blue balls. If you are blindfolded, what are the minimum number of balls you need to pick from the box to ensure that you have at least 7 blue and 2 green balls. **(L)-3 points**

$$10+12+7=29$$

SECTION "B"- 35 points

- Q 16.** A baker has only 2 timers that can measure 7 minutes and 11 minutes. How can he set a timer for 15 minutes to bake a cookie? **(L)- 4 points**

$$11+(11-7)=15$$

Note the trick that if we can produce a linear expression such as the above then we can say that the time can be measured.

Q 17. One of the words listed below is my secret word.

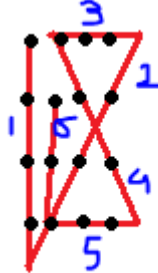
AIM DUE MOD OAT TIE

With this list in front of you, if I were to tell you any one letter of my secret word, then you would be able to tell me the number of vowels in my secret word.

Which word is my secret word? (L) - 4 points

TIE

Q 18. Can you join a 4x4 matrix of points by six straight lines without lifting your pen or folding the page etc? (L)-4 points



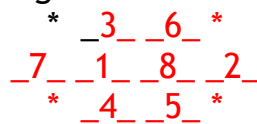
Q 19. How many trailing 0's does 20! Have? N! = Factorial of N = N * N-1 * N-2 *2 * 1

Example, 4! = 1*2*3*4 = 24 (4 points)

4 zeroes

Q 20. Fill the eight spaces below with numbers from 1 to 8. No number that comes before or after any other number should be placed in an adjacent space, either horizontally, vertically or diagonally. (Please Turn Over)
(For example 2 should not be next to the number 1 or the number 3) (M) - 5 points

The arrangement of the space is



Q 21. Fermat's last theorem states that the following condition always holds for integers (x, y, z) & (n > 2) :

$$x^n + y^n \neq z^n$$

It was one of the most alluring of mathematical statements whose proof eluded mathematicians for many years before it was proved by Andrew Wiles in the 1990s.

A computer scientist claims that he proved somehow that the Fermat theorem is incorrect for the following 3 numbers:

x=2233445566,

y=7788990011,
z=9988776655

He announces these 3 numbers and calls for a press conference where he is going to present the value of N and to show that

$$x^n + y^n = z^n$$

As the press conference starts, a 10-year old boy raises his hand and says that the respectable scientist has made a mistake and the Fermat theorem cannot hold wrong for

those 3 numbers. The scientist checks his computer calculations and finds a bug. How did the boy figure out that the scientist was wrong? (L)- 6 points

$X^n=6^n$ will always give 6 as last digit
 $y^n=1^n$ will always give 1 as last digit
 $6^n + 1^n$ 7 as the last digit

$z^n=5^n$ will always give 5 as last digit

Q 22. You have 10 bags each containing 10 gold coins. All the coins have equal weight (10 grams) except those in one bag, which weigh one gram less than the others. You are given a spring balance. By weighing just once how can you find out which bag has the coins that weigh less than the others. (L)- 8 points

Select 1 coin from 1st bag
Select 2 coins from 2nd bag
Select 3 coins from 3rd bag
.
.
.
Select 10 coins from 10th bag

Total weight should be $(1+2+3+..10)*10=550g$
If the weighing comes (for example) 546 g then we know that its 4g less than actual and hence the defected bag is 4th as it would have weighed 36g ($9*4$) instead of 40 ($10*4$) hence creating a defect of 4g.

Please reply to sajaljain4+exun@gmail.com if you have some problem with the solutions given. I hope you enjoyed the event!