

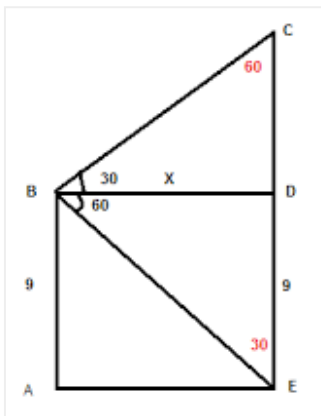
## TCS Latest Placement Paper Questions - 2014 (4)

1. Adam sat with his friends in the Chinnaswamy stadium at Madurai to watch the 100 metres running race organized by the Asian athletics Association. Five rounds were run. After every round half the teams were eliminated. Finally, one team wins the game. How many teams participated in the race?

Ans: Total five rounds were run. So in the final round 2 teams must have participated. In the penultimate round 4 teams, and 3rd round 8, 2nd round 16 and in the first round 32 teams must have participated as in each round half of the teams got eliminated.

2. From the top of a 9 metres high building AB, the angle of elevation of the top of a tower CD is  $30^\circ$  and the angle of depression of the foot of the tower is  $60^\circ$ . What is the height of the tower?

Ans:



We have to find the value of CD. We use Sine rule to find the answer easily. Sine rule

$$\text{is } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{In triangle BDE, } \frac{9}{\sin 60} = \frac{x}{\sin 30}$$

$$\text{So } \frac{9}{\frac{\sqrt{3}}{2}} = \frac{x}{\frac{1}{2}} \Rightarrow x = \frac{9}{\sqrt{3}}$$

$$\text{In triangle BCD, } \frac{CD}{\sin 30} = \frac{\frac{9}{\sqrt{3}}}{\sin 60}$$

$$\frac{CD}{\frac{1}{2}} = \frac{\frac{9}{\sqrt{3}}}{\frac{\sqrt{3}}{2}} \Rightarrow CD = 3$$

So height of the tower =  $9 + 3 = 12$

3. 49 members attended the party. In that 22 are males, 27 are females. The shake hands are done between males, females, male and female. Total 12 people given shake hands. How many such kinds of such shake hands are possible?

Ans: If only 12 people shook their hands, then total hand shakes are  $^{12}C_2 = 66$

4. Ferrari S.P.A is an Italian sports car manufacturer based in Maranello, Italy. Founded by Enzo Ferrari in 1928 as Scuderia Ferrari, the company sponsored drivers and manufactured race cars before moving into production of street-legal vehicles in 1947 as Ferrari S.P.A. Throughout its history, the company has been noted for its continued participation in racing, especially in Formula One where it has employed great success. Rohit once bought a Ferrari. It could go 4 times as fast as Mohan's old Mercedes. If the speed of Mohan's Mercedes is 35 km/hr and the distance traveled by the Ferrari is 490 km, find the total time taken for Rohit to drive that distance.

Ans: As Ferrari's speed is four times that of the Mercedes, its speed is  $35 \times 4 = 140$

So time taken by the Ferrari =  $490 / 140 = 3.5$  Hours

5. A sheet of paper has statements numbered from 1 to 40. For all values of  $n$  from 1 to 40, statement  $n$  says:

'Exactly  $n$  of the statements on this sheet are false.' Which statements are true and which are false?

a) The even numbered statements are true and the odd numbered statements are false.

b) The odd numbered statements are true and the even numbered statements are false.

c) All the statements are false.

d) The 39th statement is true and the rest are false

Ans: Assume there is only one statement is there. The statement should read "Exactly 1 statement on this sheet is false". If the truth value of the statement is true, then given statement should be false. This is contradiction. If the statement is false, Then the given statement is true. but there is not other true statement.

Assume there are two statements. By the above logic, 2nd statement should not be true. But 1st statement is true as it truthfully says the truthfulness. By this logic we know that If there are " $n$ " statements,  $(n-1)$ th statement is the only true statement And all other are false

6. If there are 30 cans out of them one is poisoned if a person tastes very little he will die within 14 hours so if there are mice to test and 24 hours to test, what is the minimum no. of mice's required to find poisoned can?

Ans:

Casket No.	P3	P2	P1
1	0	0	0
2	0	0	1
3	0	1	0
4	1	0	0
5	0	1	1
6	1	0	1
7	1	1	0
8	1	1	1

If only 3 person are used, by giving wine drops suggested by the diagram, we can find the poisoned casks upto 8.

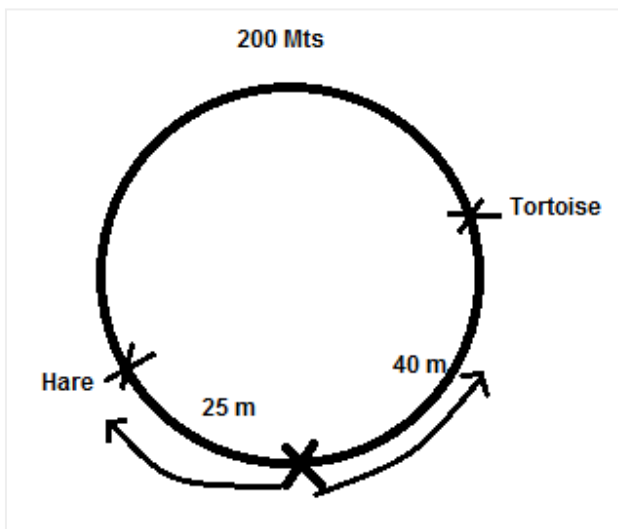
for example, If the 2nd and 3rd persons die, then 7th cask is poisoned. As a rule of thumb, If we have  $n$  mice, we can easily find the poison casks upto  $2^n$ . As the number of casks are less than 32 we can use only 5 mice.

7. How many 9 digit numbers are possible by using the digits 1, 2, 3, 4, 5 which are divisible by 4 if the repetition is

allowed?

Ans: If A number has to be divisible by 4, the last two digits must be divisible by 4. So possibilities are, 12, 24, 32, 44, 52. And the of the remaining 7 places, each place got filled by any of the five digits. So these 7 places got filled by  $5 \times 5 \times \dots (7 \text{ times}) = 5^7$  ways. So total ways are  $5 \times 5^7 = 5^8$

8. A hare and a tortoise have a race along a circle of 100 yards diameter. The tortoise goes in one direction and the hare in the other. The hare starts after the tortoise has covered  $\frac{1}{5}$  of its distance and that too leisurely. The hare and tortoise meet when the hare has covered only  $\frac{1}{8}$  of the distance. By what factor should the hare increase its speed so as to tie the race?



Assume the circumference of the circle is 200 meters. Hare and tortoise started at the same point but moves in the opposite direction. It is given that by that time tortoise covered 40 m ( $\frac{1}{5}$ th of the distance), Hare started and both met after hare has covered 25. This implies, in the time hare has covered 25m, hare has covered  $200 - 40 - 25 = 135$  meters. So Hare : tortoise speeds =  $25 : 135 = 5 : 27$

Now Hare and tortoise has to reach the starting point means, Hare has to cover 175 meters and Tortoise has to cover only 25 meters in the same time.

$$\text{As time} = \frac{\text{Distance}}{\text{Speed}} = \frac{25}{27} = \frac{175}{5 \times K}$$

ie., Hare has to increase its speed by a factor K. Solving we get  $K = 37.8$

9. For the FIFA world cup, Paul the octopus has been predicting the winner of each match with amazing success. It is rumored that in a match between 2 teams A and B, Paul picks A with the same probability as A's chances of winning. Let's assume such rumors to be true and that in a match between Ghana and Bolivia; Ghana the stronger team has a probability of  $\frac{2}{3}$  of winning the game. What is the probability that Paul will correctly pick the winner of the Ghana-Bolivia game?

- a)  $\frac{1}{9}$
- b)  $\frac{4}{9}$
- c)  $\frac{5}{9}$
- d)  $\frac{2}{3}$

The probability that Paul correctly picks the winner = (A's Chances of winning)  $\times$  (Pauls picking the winner corectly) + (A's chances of loosing)  $\times$  (Paul picks wrongly) =  $\frac{2}{3} \times \frac{2}{3} + \frac{1}{3} \times \frac{1}{3} = \frac{5}{9}$

10. 36 people  $\{a_1, a_2, \dots, a_{36}\}$  meet and shake hands in a circular fashion. In other words, there are totally 36 handshakes involving the pairs,  $\{a_1, a_2\}, \{a_2, a_3\}, \dots, \{a_{35}, a_{36}\}, \{a_{36}, a_1\}$ . Then size of the smallest set of people such that the rest have shaken hands with at least one person in the set is

a) 12

b) 11

c) 13

d) 18

Ans: {a1, a2}, {a2, a3}, {a3, a4}, {a4, a5}, {a5, a6}, {a6, a7} ..., {a35, a36}, {a36, a1}

From the above arrangement, If we separate a3, a6, a9, .....a36. Total 12 persons the remaining persons must have shaken hand with atleast one person. So answer is 12.

11. There are two boxes, one containing 10 red balls and the other containing 10 green balls. You are allowed to move the balls between the boxes so that when you choose a box at random and a ball at random from the chosen box, the probability of getting a red ball is maximized. This maximum probability is

If rearrangement is not allowed, then actual probability of picking up a red ball =  $\frac{1}{2}(10) + \frac{1}{2}(0) = \frac{1}{2}$

As we are allowed to move the balls, we keep only 1 red in the first box, and shift the remaining 9 to the second.

$$\text{So} = \frac{1}{2} \times (1) + \frac{1}{2} \times \frac{9}{19} = \frac{14}{19}$$

12. The difference between two no is 9 and the product of the two is 14. What is the square of their sum?

We know that  $(a + b)^2 = (a - b)^2 + 4ab$

Substituting  $a - b = 9$ , and  $ab = 14$ ,  $(a + b)^2 = (9)^2 + 4(14) = 137$

13. There are two water tanks A and B, A is much smaller than B. While water fills at the rate of one liter every hour in A, it gets filled up like 10, 20, 40, 80, 160 in tank B. (At the end of first hour, B has 10 liters, second hour it has 20, third hour it has 40 and so on). If tank B is  $\frac{1}{32}$  filled after 21 hours, what is the total duration required to fill it completely?

Ans: The data related to the first tank A is not necessary. As you can see, the capacity that gets filled in the tank B after each hour is doubled. So If the tank is  $\frac{1}{32}$ nd part is full after 21 hours, it is  $\frac{1}{16}$ th part full after 22 hours,  $\frac{1}{8}$ th part full after 23 hours,  $\frac{1}{4}$ th part full after 24 hours,  $\frac{1}{2}$  full after 25 hours, completely full after 26 hours.

14. 3 friends A, B, C went for week end party to McDonald's restaurant and there they measure their weights in some order in 7 rounds. A, B, C, AB, BC, AC, ABC. Final round measure is 155kg then find the average weight of all the 7 rounds?

Average weight =  $[(a + b + c + (a+b) + (b+c) + (c+a) + (a+b+c))] / 7 = 4(a+b+c) / 7 = 4 \times 155 / 7 = 88.5$  kgs

15. A grand father has 3 grand children. Age difference of two children among them is 3. Eldest child age is 3 times the youngest child's age and the eldest child age is two year more than the sum of age of other two children. What is the age of the eldest child?

Ans: As the eldest son's age is 3 times that of the youngest, eldest son's age should be a multiple of 3. From the given options take 15 as the eldest son's age. Then youngest son's age becomes 5. But Eldest son's age is 2 more than the sum of the remaining two sons. So Sum of the remaining two sons is 13. So the age of the middle son is  $13 - 5 = 8$ . Which satisfies another condition in the question that the difference between the two sons age is 3. So

answer is 15.

16. In a mixture of a, b and c, if a and b are mixed in 3:5 ratio and b and c are mixed in 8:5 ratio and if the final mixture is 35 liters, find the amount of b?

Ans: As b is common in both ratios, we should equate b in both ratios by multiplying suitable numbers.

$$a:b = 3 : 5 = 24 : 40$$

$$b:c = 8 : 5 = 40 : 25$$

Now  $a : b : c = 24 : 40 : 25$ .

$$\text{Amount of b in the mixture} = \frac{40}{89} \times 35 = 15.73$$

17. After the typist writes 12 letters and addresses 12 envelopes, she inserts the letters randomly into the envelopes (1 letter per envelope). What is the probability that exactly 1 letter is inserted in an improper envelope?

Ans: Tricky one but simple. How do you put exactly 1 letter in the wrong envelope? we need minimum two. So answer is 0.

18. 10 suspects are rounded by the police and questioned about a bank robbery. Only one of them is guilty. The suspects are made to stand in a line and each person declares that the person next to him on his right is guilty. The rightmost person is not questioned. Which of the following possibilities are true?

- A. All suspects are lying.
- B. leftmost suspect is innocent.
- C. leftmost suspect is guilty

- a) A only
- b) A or C
- c) A or B
- d) B only

There are only 2 cases. Either left one is guilty or one of the remaining 9 to his right is guilty.

So If the left most is guilty, All the statements including the guilty one are lies. A and C are correct.

Or If Any one except left most one is guilty, Then one of the statements given by the person should be true. In this case all the suspects are lying does not hold. So If B is correct, A is not correct. i.e., only A or B is correct. Option C is correct.

19. A hollow cube of size 5 cm is taken, with a thickness of 1 cm. It is made of smaller cubes of size 1 cm. If 4 faces of the outer surface of the cube are painted, totally how many faces of the smaller cubes remain unpainted?

The Hollow cube volume =  $n^3 - (n-2)^3$ , Here n is the number of small cubes lie on the big cube edge.

$$\text{Now } n = 5 \text{ so Hollow cube volume} = 5^3 - (5-2)^3 = 125 - 27 = 98$$

So 98 small cubes required to make a hollow cube of size 5 cm. Now total surfaces =  $6 \times 98 = 588$

Now if the bigger cube is painted 4 sides, total  $4 \times 25$  small faces got paint. So remaining small faces which does not have paint after cutting is  $588 - 100 = 488$

20. My flight takes off at 2am from a place at 18N 10E and landed 10 Hrs later at a place with coordinates 36N70W.

What is the local time when my plane landed?

- a) 12 noon
- b) 6: 40 AM
- c) 5: 20 PM
- d) 6:50 AM

Remember, while moving from east to west countries lag in time. Remember when Test cricket starts in England? 3.30 in afternoon. Right? ie., We are in afternoon means they are in morning.

If the coordinates change from 10 E to 70W, the plane has moved a total of 80 degrees. We know that with each degree time increases by 4 minutes while going from east to west. (How?  $24 \times 60 \text{ min} / 360 \text{ degrees}$ , So 1 degree = 4 min)

So total time change =  $4 \times 80 = 320 \text{ min} = 5 \text{ hrs} + 20 \text{ minutes}$ .

After 10 hours local time is  $(2 \text{ am} + 10 - 5.20 \text{ hrs}) = 6.40 \text{ AM}$ .

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