

## TCS Ninja, Digital, NQT Questions - 1

1) The water from one outlet, flowing at a constant rate, can fill the swimming pool in 9 hours.

The water from second outlet, flowing at a constant rate can fill up the same pool in approximately in 5 hours. If both the outlets are used at the same time, approximately what is the number of hours required to fill the pool?

Ans: Assume tank capacity is 45 Liters. Given that the first pipe fills the tank in 9 hours. So its capacity is  $45 / 9 = 5$  Liters/ Hour. Second pipe fills the tank in 5 hours. So its capacity is  $45 / 5 = 9$  Liters/Hour. If both pipes are opened together, then combined capacity is 14 liters/hour. To fill a tank of capacity 45 liters, Both pipes takes  $45 / 14 = 3.21$  Hours.

2) If 75 % of a class answered the first question on a certain test correctly, 55 percent answered the second question on the test correctly, and 20 percent answered neither of the questions correctly, what percentage answered both correctly?

It is a problem belongs to sets. We use the following formula  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

Here  $n(A \cup B)$  is the people who answered atleast one of the questions.

It was given that 20% answered neither question then the students who answered atleast one question is  $100\% - 20\% = 80\%$

Now substituting in the formula we get  $80\% = 75\% + 55\% - n(A \cap B)$

$\Rightarrow \Rightarrow n(A \cap B) = 50\%$

3) A student's average ( arithmetic mean) test score on 4 tests is 78. What must be the students score on a 5th test for the students average score on the 5th test to be 80?

Ans: We know that  $\text{Average} = \frac{\text{Sum of the observations}}{\text{No of observations}} = \frac{\text{Sum of the observations}}{\text{No of observations}}$

So Sum of 4 test scores =  $78 \times 4 = 312$

Sum of 5 tests scores =  $80 \times 5 = 400$

$\Rightarrow \Rightarrow \text{5th test score} = 400 - 312 = 88$

**Alternative method:** If the student scores 78 in the fifth test also, what could be his average? No change. Is it not?

But to bring the average to 80, he must have scored enough marks extra so that each of the five subject scores increase upto 80. i.e., he should have scored  $2 \times 5 = 10$  runs extra in the fifth subject. So 5th subject score is  $78 + 10 = 88$

4) Rural households have more purchasing power than do urban households at the same income level, since some of the income urban and suburban households use for food and shelter can be used by the rural households for other needs. Which of the following inferences is best supported by the statement made above?

- (A) The average rural household includes more people than does the average urban or suburban household.
- (B) Rural households have lower food and housing costs than do either urban or suburban households.
- (C) Suburban households generally have more purchasing power than do either rural or urban households.
- (D) The median income of urban and suburban households is generally higher than that of rural households.
- (E) All three types of households spend more of their income on housing than on all other purchases combined.

Ans: If average rural household includes more people, then how come they have more purchasing power? Infact, they have less purchasing power as they have to feed more people. Option A ruled out.

Option C does not explain why rural households have more purchasing power than urban. Ruled out.

If median income of urban and suburban households is generally higher than rural households

they are likely to have more purchasing power, assuming other parameters constant. But this does not explain why rural households have more purchasing power. Options D ruled out. Option E does not provide any explanation why rural households have more purchasing power. Ruled out.

Option B is correct as, If rural households spend less income on food and shelter due to less prices they definitely have more disposable income to spend.

5) Jose is a student of horticulture in the University of Hose. In a horticultural experiment in his final year, 200 seeds were planted in plot I and 300 were planted in plot II. If 57% of the seeds in plot I germinated and 42% of the seeds in plot II germinated, what percent of the total number of planted seeds germinated?

Ans: Total seeds germinated in Plot I = 57% of 200 = 114

Total seeds germinated in Plot II = 42% of 300 = 126

Total germinated seeds = 114 + 126 = 240

The percentage of germinated seeds of the total seeds =  $\frac{240}{500} \times 100 = 48\%$

6) A closed cylindrical tank contains  $36\pi$  cubic feet of water and its filled to half its capacity. When the tank is placed upright on its circular base on level ground, the height of water in the tank is 4 feet. When the tank is placed on its side on level ground, what is the height, in feet, of the surface of the water above the ground?

Ans: We know that the volume of cylinder =  $\pi r^2 h$

Given tank hight = 4ft.

$$\Rightarrow \pi r^2 4 = 36\pi$$

$$\Rightarrow r = 3$$

So the radius is 3 which means the diameter is 6.



As the cylinder is filled to initially exactly half of the capacity, When this cylinder is placed on its side, Water comes upto the height of the radius.

So water comes upto 3 ft.

7) The present ratio of students to teachers at a certain school is 30 to 1. If the student enrollment were to increase by 50 students and the number of teachers were to increase by 5, the ratio of the teachers would then be 25 to 1 What is the present number of teachers?

Assume the present students and teachers are  $30K, K$

After new recruitments of students and teachers the strength becomes  $30K + 50, K + 5$  respectively. But given that this ratio = 25 : 1

$$\Rightarrow 30K + 50 : K + 5 = 25 : 1 \Rightarrow 30K + 50 = 25(K + 5)$$

Solving we get  $K = 15$

So present teachers are 15.

8) College T has 1000 students. Of the 200 students majoring in one or more of the sciences, 130 are majoring in Chemistry and 150 are majoring in Biology. If at least 30 of the students are not majoring in either Chemistry or Biology, then the number of students majoring in both Chemistry and Biology could be any number from

If we assume exactly 30 students are not majoring in any subject then the students who take atleast one subject =  $200 - 30 = 170$

We know that  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

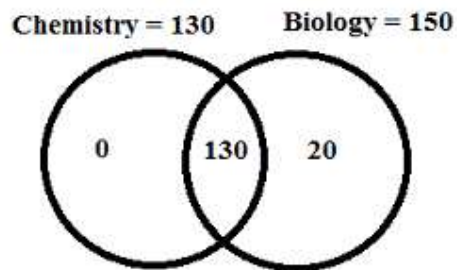
$$\Rightarrow 170 = 130 + 150 - n(A \cap B)$$

Solving we get  $n(A \cap B) = 110$ .

i.e., Students who can take both subjects are 110

But If more than 30 students are not taking any subject, what can be the maximum number of students who can take both the subjects?

As there are 130 students are majoring in chemistry, assume these students are taking biology also. So maximum students who can take both the subjects is 130



So the number of students who can take both subjects can be any number from 110 to 130.

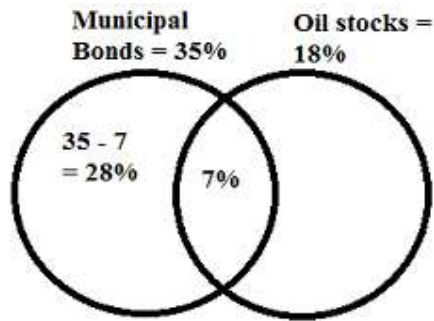
9) Kelly and Chris are moving into a new city. Both of them love books and thus packed several boxes with books. If Chris packed 60% of the total number of boxes, what was the ratio of the number of boxes Kelly packed to the number of boxes Chris packed?

Simple questions. If chris packs 60% of the boxes, kelly packs remaining 40%

So Kelly : Chris = 40% : 60% = 2 : 3

10) Among a group of 2500 people, 35 percent invest in municipal bonds, 18 percent invest in oil stocks, and 7 percent invest in both municipal bonds and oil stocks. If 1 person is to be randomly selected from 2500 people, what is the probability that the person selected will be one who invests in municipal bonds but not in oil stocks?

Ans: Here 2500 is redundant



From the diagram we know that only ones who invested in municipal bonds are 28%, the probability is  $28 / 100 = 7/25$

11) Machine A produces bolts at a uniform rate of 120 every 40 second, and Machine B produces bolts at a uniform rate of 100 every 20 seconds. If the two machines run simultaneously, how many seconds will it take for them to produce a total of 200 bolts?

Ans: Machine A produces  $120/40 = 3$  bolts in 1 second and machine B produces  $100/20 = 5$  bolts in one second.

Hence, both of them will produce 8 bolts per second.

Hence, they wil take  $200/8 = 25$  seconds to produce 200 bolts.

12) How many prime numbers between 1 and 100 are factors of 7150?

Ans:  $7, 150 = 2 \times 5_2 \times 11 \times 13 \times 5_2 \times 11 \times 13$

So there are 4 distinct prime numbers that are below 100

13) Analyzing the good returns that Halocircle Insurance Pvt Ltd was giving, Ratika bought a 1-year, Rs 10,000 certificate of deposit that paid interest at an annual rate of 8% compounded semi-annually.What was the total amount of interest paid on this certificate at maturity?

This is a question on compound interest to be calculated semi annually.

In the case of semi annual compounding, Interest rate becomes half and Number of periods becomes 2 per year.

$$\text{So } A = P(1+R/100)^n(1+R/100)^n$$

$$\Rightarrow A = 10,000(1+4/100)^2 = 10,000 \times 2625 \Rightarrow A = 10,000(1+4/100)^2 = 10,000 \times 2625$$

$$= 10,816$$

$$\text{Interest} = A - P = 10,816 - 10,000 = 816$$

14) Juan is a gold medalist in athletics. In the month of May, if Juan takes 11 seconds to run  $y$  yards, how many seconds will it take him to run  $x$  yards at the same rate?

Ans: If Juan takes 11 seconds to run  $Y$  yards, for 1 yard he will take  $11 / y$  seconds. To run  $x$  yards his time will be  $11 / y \times x = 11x / y$

15) A certain company retirement plan has a rule of 70 provision that allows an employee to retire when the employee's age plus years of employment with the company total at least 70. In what year could a female employee hired in 1986 on her 32nd birthday first be eligible to retire under this provision?

Assume it has taken  $x$  years to the female employee to reach the rule of 70.

So her age should be  $32 + x$ . Also she gains  $x$  years of experience.

$$\Rightarrow (32 + x) + x = 70$$

$$\Rightarrow x = 19.$$

$$\text{Her age at the time of retirement} = 1986 + 19 = 2005$$

16) Of the following, which is the closest approximation of  $(50.2 \times 0.49) / 199.8$  ?

ans: For approximation  $(50.2 \times 0.49) / 199.8$  can be taken as

$$50 \times 0.5 / 200 = 25 / 200 = 1/8 = 0.125$$

17) Andalusia has been promoting the importance of health maintenance. From January 1, 1991 to January 1, 1993, the number of people enrolled in health maintenance organizations increased by 15 percent. The enrollment on January 1, 1993 was 45 million. How many million people (to the

nearest million) was enrolled in health maintenance organizations on January 1, 1991?

Ans: If a number K is to be increased by x % it should be multiplied by  $(100+x)$

So When the enrollment in January 1, 1991 is multiplied by  $(100+x)$  we got 45 million.

$$K \times (100+15) = 45 \Rightarrow K = \frac{45}{1.15} = 39.13$$

$$K = 45 \times 100 \div 115 = 39.13$$

18) What is the lowest possible integer that is divisible by each of the integers 1 through 7, inclusive?

Ans: If a number has to be divisible by each number from 1 to 7, that number should be L.C.M of (1,2,3,4,5,6,7) = 420

19) If the area of a square region having sides of length 6 cms is equal to the area of a rectangular region having width 2.5 cms, then the length of the rectangle, in cms, is

Ans: Given Area of the square = Area of rectangle

$$\Rightarrow a^2 = l \cdot b \Rightarrow 6^2 = l \cdot 2.5$$

Substituting the above values in the formula

$$\Rightarrow 6^2 = l \cdot 2.5 \Rightarrow 36 = l \cdot 2.5$$

$$\Rightarrow l = \frac{36}{2.5} = 14.4 \text{ cm}$$

20) A tank contains 10,000 gallons of a solution that is 5 percent sodium chloride by volume. If 2500 gallons of water evaporate from the tank, the remaining solution will be approximately what percentage of sodium chloride?

Ans: Sodium chloride in the original solution = 5% of 10,000 = 500

Water in the original solution = 10,000 - 500 = 9,500

If 2,500 Liters of the water is evaporated then the remaining water = 9,500 - 2,500 = 7,000

$$\text{Sodium chloride concentration} = \frac{500}{500+7000} \times 100 = 6.67 \%$$



(concentration should be calculated always on the total volume)

21) After loading a dock, each worker on the night crew loaded  $\frac{3}{4}$  as many boxes as each worker on the day of the crew. If the night crew has  $\frac{4}{5}$  as many workers as the day crew, what fraction of all the boxes loaded by two crews did the day crew load?

Assume the number of boxes loaded in dayshift is equal to 4, then the number of boxed loaded in night shift = 3

Assume the worked on dayshift = 5, then workers on night shift = 4

	Day shift	Night shift
<b>Boxes</b>	<b>4</b>	<b>3</b>
<b>Crew size</b>	<b>5</b>	<b>4</b>
<b>Total Loaded</b>	<b>20</b>	<b>12</b>

So boxes loaded in day shift =  $4 \times 5 = 20$ , and boxes loaded in night shift =  $3 \times 4 = 12$

so fraction of boxes loaded in day shift =  $\frac{20}{20+12} = \frac{5}{8}$

22) A bakery opened yesterday with its daily supply of 40 dozen rolls. Half of the rolls were sold by noon and 80 % of the remaining rolls were sold between noon and closing time. How many dozen rolls had not been sold when the bakery closed yesterday?

Ans: If half of the rolls were sold by noon, the remaining are 50 % (40) = 20.

Given 80% of the remaining were sold after the noon to closing time

$\Rightarrow \Rightarrow 80\% (20) = 16$

Unsold =  $20 - 16 = 4$

23) If  $N=4P$ , where P is a prime number greater than 2, how many different positive even divisors does n have including n?

Ans:  $N = 2^2 \times P$

We know that total factors of a number which is in the format of  $a^p \times b^q \times c^r \dots a^p \times b^q \times c^r \dots = (P + 1) \cdot (Q + 1) \cdot (R + 1) \dots = (2 + 1) \cdot (1 + 1) = 6$

Also odd factors of any number can be calculated easily by not taking 2 and its powers.

So odd factors of  $2^2 \times P_1 2^2 \times P_1 =$  the factors of  $P_1 P_1 = (1 + 1) = 2$

Even factors of the number =  $6 - 2 = 4$

24) A dealer originally bought 100 identical batteries at a total cost of q rupees. If each battery was sold at 50 percent above the original cost per battery, then, in terms of q, for how many rupees was each battery sold?

Ans: Per battery cost =  $q / 100$

If each battery is sold for 50% gain, then selling price

=  $\text{Cost Price} \times (100 + \text{Gain} / 100) = \text{Cost Price} \times (100 + 50 / 100)$

$\Rightarrow q / 100 \times (100 + 50 / 100) = 3q / 200$

25) The price of lunch for 15 people was 207 pounds, including a 15 percent gratuity of service. What was the average price per person, EXCLUDING the gratuity?

Ans: Let the net price excluding the gratuity of service = x pounds

Then, total price including 15% gratuity of service =  $x \times (100 + 15 / 100) = 1.15x$  pounds

So,  $1.15x = 207$  pounds

$\Rightarrow x = 207 / 1.15 = 180$  pounds

Net price of lunch for each person =  $180 / 15 = 12$  pounds

## TCS Ninja, Digital, NQT placement questions - 2

1. If  $f(x) = (1+x+x^2+x^3+\dots+x^{2012})^2 - x^{2012}(1+x+x^2+x^3+\dots+x^{2012})^2 - x^{2012}$

$$g(x) = 1+x+x^2+x^3+\dots+x^{2011} + x+x^2+x^3+\dots+x^{2011}$$

Then what is the remainder when  $f(x)$  is divided by  $g(x)$

Let us multiply  $g(x)$  with  $x$  on the both sides

$$x.g(x) = x+x^2+x^3+\dots+x^{2012} + x^2+x^3+\dots+x^{2012}$$

add 1 on both sides

$$x.g(x) + 1 = 1+x+x^2+x^3+\dots+x^{2012} + 1+x+x^2+x^3+\dots+x^{2012}$$

Substitute this value in  $f(x)$

$$\text{then } f(x) = (x.g(x)+1)^2 - x^{2012}(x.g(x)+1)^2 - x^{2012}$$

$$f(x) = x^2.g(x)^2 + 2.g(x) + 1 - x^{2012}x^2.g(x)^2 + 2.g(x) + 1 - x^{2012}$$

Now  $f(x)$  is divisible by  $g(x)$  first two terms are exactly divisible by  $g(x)$  and we get  $1 - x^{2012}x^{2012}$

$$\text{But } 1 - x^{2012}x^{2012} = (1 - x)(1+x+x^2+x^3+\dots+x^{2011} + x+x^2+x^3+\dots+x^{2011})$$

if this expression is divisible by  $g(x)$  we get 0 as remainder.

2. A number has exactly 3 prime factors, 125 factors of this number are perfect squares and 27

factors of this number are perfect cubes. overall how many factors does the number have?

We know that the total factors of a number  $N = a_p.b_q.c_r.a_p.b_q.c_r \dots$

Now the total factors which are perfect squares of a number  $N$

$$= ([p_2]+1).([q_2]+1).([r_2]+1)\dots([p_2]+1).([q_2]+1).([r_2]+1)\dots$$

where  $[x]$  is greatest integer less than that of  $x$ .

$$\text{Given } ([p_2]+1).([q_2]+1).([r_2]+1)\dots([p_2]+1).([q_2]+1).([r_2]+1)\dots = 125$$

$$\text{So } [p_2]+1[p_2]+1 = 5; [q_2]+1[q_2]+1 = 5; [p_2]+1[p_2]+1 = 5$$

$$[p_2][p_2] = 4 \Rightarrow p = 8 \text{ or } 9, \text{ similarly } q = 8 \text{ or } 9, r = 8 \text{ or } 9$$

Given that 27 factors of this number are perfect cubes

$$\text{so } ([p_3]+1).([q_3]+1).([r_3]+1)\dots([p_3]+1).([q_3]+1).([r_3]+1)\dots = 27$$

$$\text{So } [p_3]+1[p_3]+1 = 3 \Rightarrow [p_3][p_3] = 2$$

$$\Rightarrow \Rightarrow p = 6, 7, 8$$

By combining we know that  $p = q = r = 8$

So the given number should be in the format =  $a8.b8.c8a8.b8.c8 \dots$

$$\text{Number of factors of this number} = (8+1).(8+1).(8+1) = 729$$

3. In a class there are 60% of girls of which 25% poor. What is the probability that a poor girl is selected is leader?

Assume total students in the class = 100

$$\text{Then Girls} = 60\% (100) = 60$$

$$\text{Poor girls} = 25\% (60) = 15$$

$$\text{So probability that a poor girls is selected leader} = \text{Poor girls} / \text{Total students} = 15/100 = 15\%$$

4. A and B are running around a circular track of length 120 meters with speeds 12 m/s and 6 m/s in the same direction. When will they meet for the first time?

A meets B when A covers one round more than B.

A's relative speed =  $(12 - 6)$  m/s. So he takes  $120 / 6$  seconds to gain one extra round.

So after 20 seconds A meets B.

5. A completes a work in 20 days B in 60 days C in 45 days. All three persons working together on a project got a profit of Rs.26000 what is the profit of B?

We know that profits must be shared as the ratio of their efficiencies. But efficiencies are inversely proportional to the days. So efficiencies of A : B : C =  $1/20 : 1/60 : 1/45 = 9 : 3 : 4$

$$\text{So B share in the total profit} = \frac{3}{9+3+4} \times 26000 = \text{Rs.}4875$$

6. A completes a piece of work in  $3/4$  of the time in B does, B takes  $4/5$  of the time in C does. They got a profit of Rs. 40000 how much B gets?

Assume C takes 20 Days. Now B takes  $4/5 (20) = 16$  days. A takes  $3/4(16) = 12$

Now their efficiencies ratio =  $1/20 : 1/16 : 1/12 = 12 : 15 : 20$

B's share in the profit of Rs.40000 =  $15/47 (40000) = \text{Rs.}12765$

7. An empty tank be filled with an inlet pipe 'A' in 42 minutes. After 12 minutes an outlet pipe 'B' is opened which can empty the tank in 30 minutes. After 6 minutes another inlet pipe 'C' opened into the same tank, which can fill the tank in 35 minutes and the tank is filled. Find the time taken to fill the tank?

Assume total tank capacity = 210 Liters

Now capacity of pipe A =  $210/42 = 5$  Liters

Capacity of B =  $210 / 30 = - 7$  Liters

Capacity of C =  $210 / 35 = 6$  min

Assume tank gets filled in x min after the third pipe got opened.

So  $x \times 5 + 6 \times (-2) + 4x = 210$   
 $x \times 5 + 6 \times (-2) + 4x = 210$

$\Rightarrow 48 + 4x = 210 \Rightarrow 4x = 162 \Rightarrow x = 40.5$   
 $\Rightarrow 48 + 4x = 210 \Rightarrow 4x = 162 \Rightarrow x = 40.5$

Total time taken to fill the tank =  $40.5 + 12 + 6 = 51.5$

8. Mother, daughter and an infant combined age is 74, and mother's age is 46 more than daughter and infant. If infant age is 0.4 times of daughter age, then find daughters age.

Assume  $M + D + I = 74$ ; .....(1)

Also given  $M - D - I = 46 \Rightarrow M = D + I + 46$

Also  $I = 0.4 D \Rightarrow I = 2/5 D$

Substituting M and I values in the first equation we get  $D - 2525D - 46 + D + 2525D = 74$

Solving  $D = 10$

9. A Grocer bought 24 kg coffee beans at price X per kg. After a while one third of stock got spoiled so he sold the rest for \$200 per kg and made a total profit of twice the cost. What must be the price of X?

$$\text{Total Cost price} = 24 \times X$$

As  $\frac{1}{3}$ rd of the beans spoiled, remaining beans are  $\frac{2}{3}$  (24) = 16 kgs

$$\text{Selling price} = 200 \times 16 = 3200$$

$$\text{Profit} = \text{Selling price} - \text{Cost price} = 3200 - 24 \times X$$

$$\text{Given Profit} = 2 \times \text{Cost price}$$

$$3200 - 24 \times X = 2 \times (24 \times X)$$

$$\text{Solving } X = 44.44$$

10. Bhanu spends 30% of his income on petrol on scooter 20% of the remaining on house rent and the balance on food. If he spends Rs.300 on petrol then what is the expenditure on house rent?

$$\text{Given } 30\% (\text{Income}) = 300 \Rightarrow \text{Income} = 1000$$

After having spent Rs.300 on petrol, he left with Rs.700.

$$\text{His spending on house rent} = 20\% (700) = \text{Rs.140}$$

11. Let  $\exp(m, n) = m$  to the power  $n$ . If  $\exp(10, m) = n \exp(2, 2)$  where  $m$  and  $n$  are integers then  $n =$

$$\text{Given } 10^m = n \cdot 2^2 \cdot 10^m = n \cdot 2^2$$

$$\Rightarrow 2^m \times 5^m = n \cdot 2^2 \Rightarrow 2^{m-2} \times 5^m = n \Rightarrow 2^{m-2} \times 5^m = n$$

For  $m = 2$  we get least value of  $n = 25$ , and for  $m > 2$  we get infinite values are possible for  $n$ .

12. How many kgs. of wheat costing Rs. 5 per kg must be mixed with 45 kg of rice costing Rs. 6.40 per kg so that 20% gain may be obtained by selling the mixture at Rs. 7.20 per kg ?

If the selling price of the mixture is Rs.7.2 when sold at 20% profit then

$$\text{CP} \times 1.20 = 7.2 \Rightarrow \text{CP} = \text{Rs.6}$$

$$\text{Now by applying weighted average formula} = \frac{K \times 5 + 45 \times 6.4}{K + 45} = 6 \Rightarrow K \times 5 + 45 \times 6.4 = 6(K + 45)$$

$$\Rightarrow K = 18 \text{ kgs}$$

13. The diagonal of a square is twice the side of equilateral triangle then the ratio of Area of the Triangle to the Area of Square is?

Let the side of equilateral triangle = 1 unit.

We know that area of an equilateral triangle =  $\frac{\sqrt{3}}{4}a^2$

As side = 1 unit area of the equilateral triangle =  $\frac{\sqrt{3}}{4}$

Now Diagonal of the square = 2 (side of the equilateral triangle) = 2

We know that area of the square =  $\frac{1}{2}D^2$  where D = diagonal

So area of the square =  $\frac{1}{2}(2)^2 = 2$

Ratio of the areas of equilateral triangle and square =  $\frac{\sqrt{3}}{4} : 2 \Rightarrow \sqrt{3} : 8$

14. Raj tossed 3 dices and there results are noted down then what is the probability that Raj gets 10?

Always remember when 3 dice are rolled the number of ways of getting n ( where n is the sum of faces on dice)

=  $(n-1)C_2$  where n = 3 to 8

= 25 where n = 9, 12

= 27 where n = 10, 11

=  $(20-n)C_2$  where n = 13 to 18

The required probability =  $\frac{27}{6^3} = \frac{27}{216} = \frac{1}{8}$

## TCS Ninja, Digital, NQT Questions with Explanations - 3

1) Of the following, which is the closest approximation of  $(50.2 \times 0.49) / 199.8$  ?

Ans: For approximation  $(50.2 \times 0.49) / 199.8$  can be taken as

$$50 \times 0.5 / 200 = 25 / 200 = 1/8 = 0.125$$

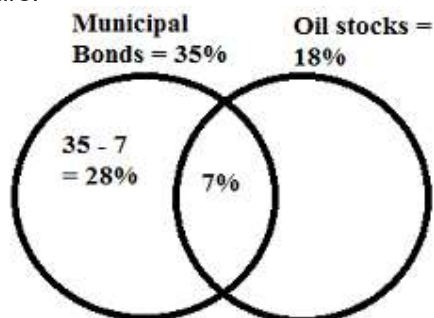
2) How many prime numbers between 1 and 100 are factors of 7150?

Ans:  $7, 150 = 2 \times 5 \times 11 \times 13 \times 5 \times 11 \times 13$

So there are 4 distinct prime numbers that are below 100

3) Among a group of 2500 people, 35 percent invest in municipal bonds, 18 percent invest in oil stocks, and 7 percent invest in both municipal bonds and oil stocks. If 1 person is to be randomly selected from 2500 people, what is the probability that the person selected will be one who invests in municipal bonds but not in oil stocks

Ans: Here 2500 does not require.



From the diagram we know that only ones who invested in municipal bonds are 28%, the probability is  $28 / 100 = 7/25$

4) Country Club has an indoor swimming club. Thirty percent of the members of a swim club have passed the lifesaving test. Among the members who have not passed the test, 12 have taken the preparatory course and 30 have not taken the course. How many members are there in the swim club?



Ans:  $30 + 12 = 42$  did not pass the test. This is equal to 70 % of the total members. So total members =  $100 / 70 \times 42 = 60$

5) A necklace is made by stringing N individual beads together in the repeating pattern red bead, green bead, white bead, blue bead and yellow bead. If the necklace begins with a red bead and ends with a white bead, then N could be:

Ans: The pattern is R G W B Y R G W B Y R .....

So, White bead comes at these positions 3rd, 8th, 13th, 18th...

If we take this as an arithmetic progression, then this series can be expressed as  $3 + (n - 1) 5$ . (

From the formula for general term of AP =  $a + (n-1)d$ ).

This can be expressed as  $5n - 2$

We check the answer options so only 68 satisfy the condition.

6) A dog takes four leaps for every five leaps of a hare but three leaps of the dog is equal to four leaps of the hare. Compare speeds?

Ans: In terms of number of leaps, the ratio of the Dog and hare speeds are 4 : 5

But Given that 3 leaps of dog = 4 leaps of hare, i.e., Leap lengths = 4 : 3 (If Dog is covering in 3 leaps what hare has covered in 4 leaps then Leap lengths are inversely proportional)

So Dog speed =  $4 \times 4 = 16$

Hare speed =  $5 \times 3 = 15$

So speeds ratio = 16 : 15

7) There are two boxes, one containing 39 red balls & the other containing 26 green balls. You are allowed to move the balls b/w the boxes so that when you choose a box random & a ball at random from the chosen box, the probability of getting a red ball is maximized. This maximum probability is

Ans: Very interesting question.

As we are allowed to move the balls, we keep only one red ball in first box and move all the remaining balls to the second box

So first box contains 1 red ball, second box contains 38 red + 26 green = 64 balls

Probability of choosing any box is  $\frac{1}{2}$ .

So probability of taking one red ball =  $\frac{1}{2} \times (1) + \frac{1}{2} \left( \frac{38}{64} \right) \approx 0.8125 \times (1) + \frac{1}{2} \left( \frac{38}{64} \right) \approx 0.8$

8) In how many ways can 3 postcards can be posted in 5 postboxes?

Ans: First card can go into any of the five boxes, Second can go into any of the five boxes, Third can go into any of the five boxes =  $5 \times 5 \times 5 = 125$

9) Apple costs L rupees per kilogram for first 30kgs and Q rupees per kilogram for each additional kilogram. If the price of 33 kilograms is 11.67 and for 36kgs of Apples is 12.48 then the cost of first 10 kgs of Apples is

Ans: By framing equations we get

$$30L + 3Q = 11.67$$

$$30L + 6Q = 12.48$$

Eliminate Q by multiplying the first equation by 2 and subtracting second equation from the first

Then we get  $L = 0.362$

Cost of 10 kgs of apples =  $0.362 \times 10 = 3.62$

10) letters in the word ABUSER are permuted in all possible ways and arranged in alphabetical order then find the word at position 49 in the permuted alphabetical order?

a) ARBSEU

b) ARBESU

c) ARBSUE

d) ARBEUS

Ans: The best way to solve this problem is Just ask how many words start with A. If we fix A,

then the remaining letters can be arranged in  $5!$  ways = 120. So the asked word must start with A.

Arrange all the given letters in alphabetical order. ABERSU

Let us find all the words start with AB.  $AB^{****} = 4! = 24$  ways

Now we find all the words start with AE.  $AE^{****} = 4! = 24$  ways

So next word start with AR and remaining letters are BESU

So option B

11) A is twice efficient than B. A and B can both work together to complete a work in 7 days.

Then find in how many days A alone can complete the work?

Ans: Let us assume A can do 2 units of work each day, then B can do only 1 unit a day. If both can complete the work in 7 days, total work done by these two together =  $(2 + 1) \times 7 = 21$  units

If these 21 units to be done by A alone, then he will take  $21 / 2 = 10.5$  days.

12) In a  $8 \times 8$  chess board what is the total number of squares.

Ans: The total number of squares in a  $n \times n$  chess board is equal to "the sum of first  $n$  natural number squares"

i.e.,  $n(n+1)(2n+1)/6$

So Substituting 8 in the above formula we get 204

13) X, Y, W and Z are integers and the expression  $X - Y - Z$  is even and  $Y - W - Z$  is odd. If X is even then which of the following is true?

(a) Y must be odd

(b) Y-Z must be odd

(c) W must be odd

(d) Z must be odd

Ans. If X is even and  $X - Y - Z$  is even then Y and Z both should be odd or both should be even.

If  $Y - W - Z$  is odd, and  $Y$  and  $Z$  are also odd  $W$  should be odd

If  $Y - W - Z$  is even, and  $Y$  and  $Z$  are even then  $W$  should be odd.

So option C is correct. i.e.,  $W$  must be ODD

14) The remainder when  $1!+2!+3!+\dots+50!$  divided by  $5!$  will be

The remainder when the terms greater than  $5!$  are divided by  $5!$  becomes 0 so we need to consider the terms upto  $4!$ .

So remainder will be whatever is obtained by dividing  $1!+2!+3!+4!$  with  $5!$ .

So remainder is obtained by dividing  $(1+2+6+24)=33$  with  $5!$  (120)

So remainder is 33.

15) If there are Six periods in each working day of a school, In how many ways can one arrange 5 subjects such that each subject is allowed at least one period?

Ans. To arrange 6 periods with 5 subjects, then one subject can be arranged in two slots.

5 Subjects can be arranged in 6 periods in  ${}^6P_5$  ways and now we have 1 period which we can fill with any of the 5 subjects in 5 ways. so  ${}^6P_5 \times 5 = 6P5 \times 5 = 3600$

Alternate method:

Assume the subjects are  $X_1, X_2, A, B, C, D$ . Here  $X$  is the subject which repeats. So arranging 6 objects in 6 places will be equal to  $6! = 720$  (here no need to divide this number with  $2!$  as even though the subject is same, but not identical)

But this repeated subject can be any of the five. So total arrangements are  $720 \times 5 = 3600$

16) An article manufactured by a company consists of two parts X and Y. In the process of manufacturing of part X, 9 out of 100 parts may be defective. Similarly, 5 out of 100 are likely to be defective in the manufacture of Y. Calculate the probability that the assembled product will not be defective?

a) 0.6485

b) 0.6565

c) 0.8645

d) none of these

Ans: Probability that the part X is nondefective is  $= 1 - 9/100 = .91$

Probability that the part Y is nondefective is  $= 1 - 5/100 = .95$

so, Probability of nondefective product  $= 0.91 \times 0.95 = 0.8645$

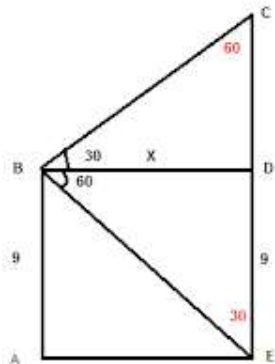
## TCS Ninja, Digital, NQT Latest Placement Questions - 4

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

is  $a \sin A = b \sin B = c \sin C$

In triangle BDE,  $9 \sin 60 = x \sin 30$

$$\text{So } 9\sqrt{3}^2 = x^2 \Rightarrow x = 9\sqrt{3} \quad 9\sqrt{3}^2 = x^2 \Rightarrow x = 9\sqrt{3}$$

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

$$CD \sin 30 = 9\sqrt{3} \sin 60 \Rightarrow CD = 9\sqrt{3} \sin 60 / \sin 30 \Rightarrow CD = 9\sqrt{3} \cdot \frac{\sqrt{3}}{2} / \frac{1}{2} \Rightarrow CD = 9 \cdot \frac{3}{2} \cdot 2 = 27$$

$$\text{So height of the tower} = 9 + 3 = 12$$

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  ${}^{12}C_2 = \frac{12 \times 11}{2} = 66$

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  $35 \times 4 = 140$

$$\text{So time taken by the Ferrari} = 490 / 140 = 3.5 \text{ Hours}$$

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.

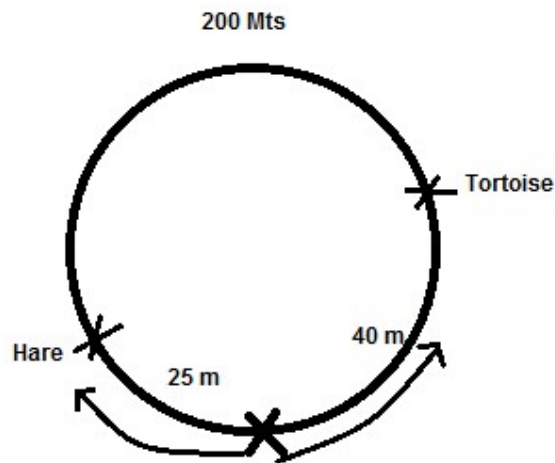
for example, If the 2nd and 3rd persons die, then 7th cask is poisoned. As a rule of thumb, If we have n mice, we can easily find the poison casks upto  $2^n - 1$ . As the number of casks are less than 32 we can use only 5 mice.

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.

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

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)x(Pauls picking the winner corectly) + (A's chances of loosing) x (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:  $\{a_1, a_2\}, \{a_2, a_3\}, \{a_3, a_4\}, \{a_4, a_5\}, \{a_5, a_6\}, \{a_6, a_7\} \dots, \{a_{35}, a_{36}\}, \{a_{36}, a_1\}$

From the above arrangement, If we separate  $a_3, a_6, a_9, \dots, a_{36}$ . Total 12 persons the reamining 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

$$= 12(10) + 12(0) = 12$$

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.

$$\text{So} = 12 \times (1) + 12 \times 9 = 1419$$

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

$$\text{We know that } (a+b)^2 = (a-b)^2 + 4ab$$

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

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 there 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?

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

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 sons 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.

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

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

$$\text{Now } a : b : c = 24 : 40 : 25.$$

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

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.

Now n = 5 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 after noon 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  $(2 \text{ am} + 10 - 5.20 \text{ hrs}) = 6.40 \text{ AM}$ .

## TCS Ninja, Digital, NQT Placement Questions - 5

1. Ray writes a two digit number. He sees that the number exceeds 4 times the sum of its digits by

3. If the number is increased by 18, the result is the same as the number formed by reversing the digits. Find the number.

a) 35

b) 42

c) 49

d) 57

Solution: Let the two digit number be  $xy$ .

$$4(x + y) + 3 = 10x + y \dots\dots(1)$$

$$10x + y + 18 = 10y + x \dots\dots(2)$$

$$\text{Solving 1st equation we get } 2x - y = 1 \dots\dots(3)$$

$$\text{Solving 2nd equation we get } y - x = 2 \dots\dots(4)$$

Solving 3 and 4, we get  $x = 3$  and  $y = 5$

2.  $a, b, c$  are non negative integers such that  $28a + 30b + 31c = 365$ .  $a + b + c = ?$

a) Greater than 14

b) less than or equal to 11

c) 13

d) 12

In a calendar,

Number of months having 28 days = 1

Number of months having 30 days = 4

Number of months having 31 days = 7

$$28 \times 1 + 30 \times 4 + 31 \times 7 = 365$$

Here,  $a = 1$ ,  $b = 4$ ,  $c = 7$ .

$$a+b+c = 12$$

3. George can do a piece of work in 8 hours. Paul can do the same work in 10 hours, Hari can do the same work in 12 hours. George, paul and hari start the same work at 9 am, while george stops at 11 am, the remaining two complete the work. What time will the work complete?

a) 11.30 am

b) 12 noon

c) 12.30 pm

d) 1 pm

Let the total work = 120 units.

As George completes this entire work in 8 hours, his capacity is 15 units /hour

Similarly, the capacity of paul is 12 units / hour

the capacity of Hari is 10 units / hour

All 3 started at 9 am and worked upto 11 am. So total work done upto 11 am =  $2 \times (15 + 12 + 10) =$

74

$$\text{Remaining work} = 120 - 74 = 46$$

Now this work is to be done by paul and hari.  $46 / (12 + 10) = 2$  hours (approx)

So work gets completed at 1 pm

4. If  $x^y$  denotes x raised to the power y, Find last two digits of  $(1141^{3843}) + (1961^{4181})$

a) 02

b) 82

c) 42

d) 22

Remember 1 raised to any power will give 1 as unit digit.

To find the digit in the 10th place, we have to multiply, 10th digit in the base x unit digit in the power.

$$1141^{3843} + 1961^{4181}$$

So the Last two digits of the given expression =  $21 + 61 = 82$

5. J can dig a well in 16 days. P can dig a well in 24 days. J, P, H dig in 8 days. H alone can dig the well in How many days?

a) 32

b) 48

c) 96

d) 24

Assume the total work = 48 units.

Capacity fo J =  $48 / 16 = 3$  units / day

Capacity of P =  $48 / 24 = 2$  units / day

Capacity of J, P, H =  $48 / 8 = 6$  units / day

From the above capacity of H =  $6 - 2 - 3 = 1$

So H takes  $48 / 1$  days = 48 days to dig the well

6. If a lemon and apple together costs Rs.12, tomato and a lemon cost Rs.4 and an apple costs Rs.8 more than a lemon. What is the cost of lemon?

$$L + A = 12 \dots(1)$$

$$T + L = 4 \dots(2)$$

$$L + 8 = A$$

Taking 1 and 3, we get  $A = 10$  and  $L = 2$

7. 3 mangoes and 4 apples costs Rs.85. 5 apples and 6 peaches costs 122. 6 mangoes and 2 peaches costs Rs.144. What is the combined price of 1 apple, 1 peach, and 1 mango.

a) 37

b) 39

c) 35

d) 36

Sol: Note: It is 114 not 144.

$$3m + 4a = 85 \dots(1)$$

$$5a + 6p = 122 \dots(2)$$

$$6m + 2p = 114 \dots(3)$$

$$(1) \times 2 \Rightarrow 6m + 8a = 170$$

$$(3) \Rightarrow 6m + 2p = 114$$

$$\text{Solving we get } 8a - 2p = 56 \dots(4)$$

$$(2) \Rightarrow 5a + 6p = 122$$

$$3 \times (4) = 24a - 6p = 168$$

$$\text{Solving we get } a = 10, p = 12, m = 15$$

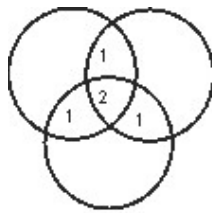
$$\text{So } a + p + m = 37$$



8. An organisation has 3 committees, only 2 persons are members of all 3 committee but every pair of committee has 3 members in common. what is the least possible number of members on any one committee?

- a) 4
- b) 5
- c) 6
- d) 1

Sol:



Total 4 members minimum required to serve only on one committee.

9. There are 5 sweets - Jammun, kaju, Peda, Ladu, Jilebi which can be consumed in 5 consecutive days. Monday to Friday. A person eats one sweet a day, based on the following constraints.

- (i) Ladu not eaten on monday
- (ii) If Jamun is eaten on Monday, Ladu should be eaten on friday.
- (iii) Peda is eaten the day following the day of eating Jilebi
- (iv) If Ladu eaten on tuesday, kaju should be eaten on monday

based on above, peda can be eaten on any day except

- a) tuesday
- b) monday
- c) wednesday
- d) friday

From the (iii) clue, peda must be eaten after jilebi. so Peda should not be eaten on monday.

10. If YWVSQ is 25 - 23 - 21 - 19 - 17, Then MKIGF

a) 13 - 11 - 8 - 7 - 6

b) 1 - 2 - 3 - 5 - 7

c) 9 - 8 - 7 - 6 - 5

d) 7 - 8 - 5 - 3

MKIGF = 13 - 11 - 9 - 7 - 6

Note: this is a dummy question. Dont answer these questions

11. Addition of  $641 + 852 + 973 = 2456$  is incorrect. What is the largest digit that can be changed to make the addition correct?

a) 5

b) 6

c) 4

d) 7

Sol:

641

852

963

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2466

Largest among tens place is 7, so 7 should be replaced by 6 to get 2456

12. Value of a scooter depreciates in such a way that its value at the end of each year is  $\frac{3}{4}$ th of its value at the beginning of the same year. If the initial value of scooter is 40,000, what is the value of the scooter at the end of 3 years.

a) 23125

b) 19000

c) 13435

d) 16875

value of the scooter at the end of the year =  $40000 \times (34)^3$

13. At the end of 1994, R was half as old as his grandmother. The sum of the years in which they were born is 3844. How old R was at the end of 1999

a) 48

b) 55

c) 49

d) 53

In 1994, Assume the ages of GM and R =  $2k, k$

then their birth years are  $1994 - 2k, 1994 - k$ .

But given that sum of these years is 3844.

So  $1994 - 2k + 1994 - k = 3844$

$k = 48$

In 1999, the age of R is  $48 + 5 = 53$

14. When numbers are written in base b, we have  $12 \times 25 = 333$ , the value of b is?

a) 8

b) 6

c) None

d) 7

Let the base = b

So,  $(b+2)(2b+5) = (b+2)(2b+5) = 3b^2 + 3b + 3(b+2)(2b+5) = 3b^2 + 3b + 3$

$2b^2 + 9b + 10 = 3b^2 + 3b + 3$

$b^2 - 6b - 7 = 0$

Solving we get  $b = 7$  or  $-1$

So  $b = 7$

15. How many polynomials of degree  $\geq 1$  satisfy  $f(x^2) = [f(x)]^2 = f(f(x))$   $f(x^2) = [f(x)]^2 = f(f(x))$

a) more than 2

b) 2

c) 0

d) 1

Sol: Let  $f(x) = x^2$

$$f(x^2) = [x^2]^2 = x^4 \quad f(x^2) = [x^2]^2 = x^4$$

$$(f(x))^2 = [x^2]^2 = x^4 \quad (f(x))^2 = [x^2]^2 = x^4$$

$$f(f(x)) = f(x^2) = [x^2]^2 = x^4 \quad f(f(x)) = f(x^2) = [x^2]^2 = x^4$$

Only 1

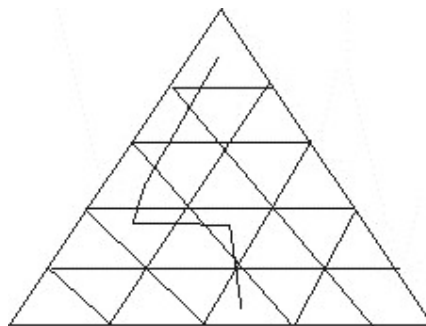
16. Figure shows an equilateral triangle of side of length 5 which is divided into several unit triangles. A valid path is a path from the triangle in the top row to the middle triangle in the bottom row such that the adjacent triangles in our path share a common edge and the path never travels up (from a lower row to a higher row) or revisits a triangle. An example is given below. How many such valid paths are there?

a) 120

b) 16

c) 23

d) 24



Sol:

Number of valid paths =  $(n-1)! = (5-1)! = 24$

17. In the question,  $A^B$  means, A raised to power B. If  $x*y^2*z < 0$ , then which one of the following statements must be true?

(i)  $xz < 0$  (ii)  $z < 0$  (iii)  $xyz < 0$

a) (i) and (iii)

b) (iii) only

c) None

d) (i) only

As  $y^2$  is always positive,  $x*y^2*z < 0$  is possible only when  $xz < 0$ . Option d is correct.

18. The marked price of a coat was 40% less than the suggested retail price. Eesha purchased the coat for half the marked price at the fiftieth anniversary sale. What percentage less than the suggested retail price did Eesha pay?

a) 60

b) 20

c) 70

d) 30

Let the retail price is Rs.100. then market price is  $(100-40)\%$  of 100 = 60. Eesha purchased the coat for half of this price. ie., 30 only. which is 70 less than the retail price. So Option C is correct.

## TCS Ninja, Digital, NQT Placement Questions - 6

1. A cow and horse are bought for Rs.2,00,000. The cow is sold at a profit of 20% and the horse is sold at a loss of 10%. The overall gain is Rs.4000, the Cost price of cow?

a) 130000

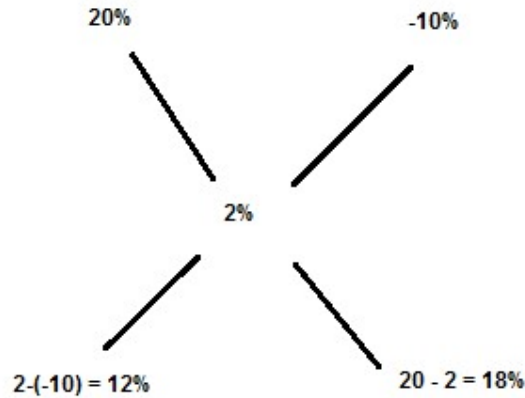
b) 80000

c) 70000

d) 120000

Ans: Overall profit =  $4000200000 \times 100 = 2\%$

By applying alligation rule, we get



So cost price of the cow =  $\frac{2}{5} \times 200000 = 80,000$

2. A circle has 29 points arranged in a clock wise manner from 0 to 28. A bug moves clockwise manner from 0 to 28. A bug moves clockwise on the circle according to following rule. If it is at a point  $i$  on the circle, it moves clockwise in 1 sec by  $(1 + r)$  places, where  $r$  is the remainder (possibly 0) when  $i$  is divided by 11. If it starts in 23rd position, at what position will it be after 2012 sec.

Ans: After 1st second, it moves  $1 + (23/11)r = 1 + 1 = 2$ , So 25th position

After 2nd second, it moves  $1 + 25/11 = 1 + 3 = 4$ , So 29th position = 0

After 3rd second, it moves  $1 + 0/11 = 1 + 0 = 1$ , So 1st position

After 4th second, it moves  $1 + 1 = 3$ rd position

after 5th,  $1 + 3/11 = 4$  So 7th

After 6th,  $1 + 7/11 = 8$  so 15th

After 7th,  $1 + 15/11 = 5$  so 20th

After 8th,  $1 + 20/11 = 10$ th, So 30th = 1st

So it is on 1st after every  $3 + 5n$  seconds. So it is on 1st position after 2008 seconds ( $3 + 5 \times$

401) So on 20th after 2012 position.

3. In a city 100% votes are registered, in which 60% vote for congress and 40% vote for BJP. There is a person A, who gets 75% of congress votes and 8% of BJP votes. How many votes got by A?

Assume total votes are 100. So A got

$$75\% \text{ of } 60 = 45$$

$$8\% \text{ of } 40 = 3.2$$

A total of 48.2 %

4. Mean of 3 numbers is 10 more than the least of the numbers and 15 less than greatest of the

3. If the median of 3 numbers is 5, Find the sum of the 3 numbers?

Ans: Median is when the given numbers are arranged in ascending order, the middle one. Let the numbers are  $x, 5, y$  where  $x$  is the least and  $y$  is greatest.

$$\text{Given that } x+5+y=30 \quad x+5+y=30$$

$$\text{and } x+5+y=30 \quad x+5+y=30$$

Solving we get  $x = 0$  and  $y = 25$ .

$$\text{So sum of the numbers} = 0 + 5 + 25 = 30$$

5. A and B start from house at 10am. They travel from their house on the MG road at 20kmph and 40 kmph. there is a Junction T on their path. A turns left at T junction at 12:00 noon, B reaches T earlier, and turns right. Both of them continue to travel till 2pm. What is the distance between A and B at 2 pm.

$$\text{Distance between House and T junction} = 20 \times 2 = 40.$$

ie., B reached T at 11 am.

$$\text{B continued to right after 11 am and travelled upto 2. So distance covered by him} = 3 \times 40 = 120$$

$$\text{A reached T at 12 noon and travelled upto 2 So distance travelled by him} = 2 \times 20 = 40$$

So total distance between them =  $120 + 40 = 160$  km

6. In a particular year, the month of january had exactly 4 thursdays, and 4 sundays. On which day of the week did january 1st occur in the year.

- a) monday
- b) tuesday
- c) wednesday
- d) thursday

Ans: If a month has 31 days, and it starts with sunday, Then Sundays, Mondays, tuesdays are 5 for that month. If this month starts with monday, then mondays, tuesdays, and wednesdays are 5 and remaining days are 4 each. so this month start with Monday.

7. A, E, F, and G ran a race.

A said "I did not finish 1st /4th

E said "I did not finish 4th"

F said "I finished 1st"

G said "I finished 4th"

If there were no ties and exactly 3 children told the truth, when who finishes 4th?

- a) A
- b) E
- c) F
- d) G

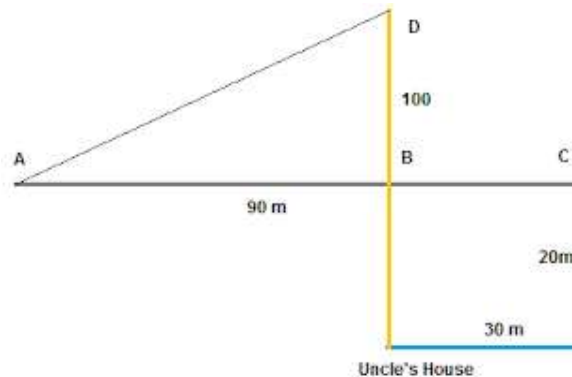
Ans: Option D

8. A child was looking for his father. He went 90 m in the east before turning to his right. he went 20 m before turning to his right afain to lok for his father at his uncles place 30 m from this point. His father was not there. From there he went 100m north before meeting hiss father in a



street. How far did the son meet his father from the starting point.

- a) 90
- b) 30
- c) 80
- d) 100



From the diagram,  $AB = 90 - 30 = 60$  and  $BD = 100 - 20 = 80$

$$AD = \sqrt{AB^2 + BD^2} = \sqrt{60^2 + 80^2} = 100$$

9. In an office, at various times during the day the boss gives the secretary a letter to type, each time putting the letter on top of the pile in the secretary's inbox. Secretary takes the top letter and types it. Boss delivers in the order 1, 2, 3, 4, 5 which cannot be the order in which secretary types?

- a) 2, 4, 3, 5, 1
- b) 4, 5, 2, 3, 1
- c) 3, 2, 4, 1, 5
- d) 1, 2, 3, 4, 5

Ans: Option B

10. At 12.00 hours, J starts to walk from his house at 6 kmph. At 13.30, P follows him from J's house on his bicycle at 8 kmph. When will J be 3 km behind P?

By the time P starts J is  $1.5 \text{ hr} \times 6 = 9 \text{ km}$  away from his house.

J is 3 km behind when P is 3 km ahead of him. ie., P has to cover 12 km. So he takes  $12 / (8 - 6)$   
= 6 hrs after 13.30. So the required time is 19.30Hrs

11. J is faster than P. J and P each walk 24 km. Sum of the speeds of J and P is 7 kmph. Sum of time taken by them is 14 hours. Then J speed is equal to

- a) 7 kmph
- b) 3 kmph
- c) 5 kmph
- d) 4 kmph

Given  $J > P$

$J + P = 7$ , only options are (6, 1), (5, 2), (4, 3)

From the given options, If  $J = 4$  the  $P = 3$ . Times taken by them =  $\frac{24}{4} + \frac{24}{3} = 6 + 8 = 14$

12. In a G6 summit held at london. A french, a german, an italian, a british, a spanish, a polish diplomat represent their respective countries.

- (i) Polish sits immediately next to british
- (ii) German sits immediately next to italian, British or both
- (iii) French does not sit immediately next to italian
- (iv) If spanish sits immediately next to polish, spanish does not sit immediately next to Italian

Which of the following does not violate the stated conditions?

- a) FPBISG
- b) FGIPBS
- c) FGISPB
- d) FSPBGI
- e) FBGSIP

Ans: Option D

13. Raj drives slowly along the perimeter of a rectangular park at 24 kmph and completes one full round in 4 min. If the ratio of length to breadth of the park is 3 : 2, what are the dimensions?

- a) 450 m x 300 m
- b) 150 m x 100 m
- c) 480 m x 320 m
- d) 100 m x 100 m

$$24 \text{ kmph} = \frac{24 \times 1000}{60} = 400 \text{ m / min}$$

$$\text{In 4 minutes he covered } 4 \times 400 = 1600 \text{ m}$$

$$\text{This is equal to the perimeter } 2(l + b) = 1600$$

$$\text{But } l : b = 3:2$$

$$\text{Let } l = 3k, b = 2k$$

$$\text{Substituting, we get } 2(3k + 2k) = 1600 \Rightarrow k = 180$$

$$\text{So dimensions are } 480 \times 320$$

14. M is 30% of Q, Q is 20% of P and N is 50% of P. What is M / N

$$\text{ans: Take } P = 100, \text{ then } N = 50, Q = 20, M = 6. \text{ So } M/N = 3/25$$

15. At what time between 6 and 7 are the hands of the clock coincide?

$$\text{Ans. Total} = 360$$

$$\text{For hour} = 360/12 = 30$$

$$\text{For Minute} = \text{full rotation} = 360$$

$$\text{Let the time is 't', for 6} = 6 \times 30 = 180$$

then

$$30t + 180 = 360t$$

$$330t = 180$$

$$t = 180/330$$

$$t = 6/11 \text{ hr } 6/11 \times 60 = 360/11 = 32\frac{6}{11} \text{ min}$$

Ans. is 6:32

16. Series 1, 4, 2, 8, 6, 24, 22, 88 ?

Sol : The given series is in the format:  $x \times 4, -2, x \times 4, -2, x \times 4, -2, x \times 4, \dots$

$$1 \times 4 = 4$$

$$4 - 2 = 2$$

$$2 \times 4 = 8$$

$$6 \times 4 = 24$$

$$24 - 2 = 22$$

$$22 \times 4 = 88$$

$$88 - 2 = 86$$

Ans: 86

17. 4 Women & 6 men have to be seated in a row given that no two women can sit together. How many different arrangements are there.

Sol : Let us first sit all the 6 men in 6 positions in  $6!$  ways. Now there are 7 gaps between them in which 4 women can sit in  ${}^7P_4$  ways.

So total ways are  $6! \times {}^7P_4$

18.  $x^y + y^x = 46$  Find  $x$  &  $y$  values ?

$$\text{Sol: } 1^4 + 4^5 = 46 \quad 1^5 + 4^4 = 46$$

$$\text{Hence } x = 1, y = 45$$

19. In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B the present age of B is

$$\text{Soln: } A + 10 = 2(B - 10) \dots\dots(1)$$

$$A = B + 9 \dots\dots\dots (2)$$

from equations. 1 & 2

we get  $B = 39$  A will be  $39+9=48$  years old.

20. A student can select one of 6 different math book, one of 3 different chemistry book & one of 4 different science book. In how many different ways students can select book of math, chemistry & science.

Sol:  ${}^6C_1 \times {}^3C_1 \times {}^4C_1 = 6 \times 3 \times 4 = 72$  ways

21. Sum of two number is 50 & sum of three reciprocal is  $1/12$  so find these two numbers

Sol :  $x+y = 50 \dots\dots(1)$   $x=50-y \dots\dots(2)$

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{12} \quad \frac{1}{50-y} + \frac{1}{y} = \frac{1}{12} \Rightarrow y + xxy = 112 \Rightarrow 12(y+x) = xy \Rightarrow y + xxy = 112 \Rightarrow 12(y+x) = xy \dots\dots(3)$$

put (2) in (4)

$$\Rightarrow \Rightarrow 12(y+50-y) = (50-y)y$$

$$\Rightarrow \Rightarrow 12y + 600 - 12y = 50y - y^2$$

$$\Rightarrow \Rightarrow y^2 - 50y + 600 = 0$$

$$\Rightarrow \Rightarrow y^2 - 30y - 20y + 600 = 0$$

$$\Rightarrow \Rightarrow y(y-30) - 20(y-30) = 0$$

$$\Rightarrow \Rightarrow (y-20)(y-30) = 0$$

$$y = 20 \text{ or } y = 30$$

if  $y=20$  then  $x = 30$

or  $y=30$  then  $x = 20$

two numbers are 30 & 20

## TCS Ninja, Digital, NQT Placement Questions - 7

1. Dinalal divides his property among his four sons after donating Rs.20,000 and 10% of his remaining property. The amounts received by the last three sons are in arithmetic progression and the amount received by the fourth son is equal to the total amount donated. The first son

receives as his share RS.20,000 more than the share of the second son. The last son received RS.1 lakh less than the eldest son. 10. Find the share of the third son.

- a) Rs.80,000
- b) Rs.1,00,000
- c) Rs.1,20,000
- d) Rs.1,50,000

Ans: Assume the amounts received by the 2nd, 3rd, and 4th sons are  $a+d$ ,  $a$ ,  $a-d$  (as they are in AP)

Now Eldest son received Rs.20,000 more than the 2nd son. So He gets  $a+d+20,000$

Last son received 1 lakh less than the eldest son. So  $(a+d+20,000) - (a-d) = 1,00,000 \Rightarrow 2d = 80,000 \Rightarrow d = 40,000$

So Amounts received by the 4 sons are  $a + 60,000$ ,  $a+40,000$ ,  $a$ ,  $a - 40,000$ .

Assume His property =  $K$  rupees.

It was given that the youngest son's share is equal to  $20,000 + \frac{1}{10}(K-20,000)$

Then  $20,000 + \frac{1}{10}(K-20,000) = a - 40,000 \dots\dots\dots(1)$

and the Remaining property = Sum of the properties received by all the four son's together.

Remaining property =  $\frac{9}{10}(K-20,000)$

$\Rightarrow \frac{9}{10}(K-20,000) = (a + 60,000) + (a+40,000) + a + (a - 40,000) \dots\dots(2)$

Solving We get  $K = 40,000$  and  $a = 1,20,000$

So third son got Rs.1,20,000

In a quadratic equation, (whose coefficients are not necessarily real) the constant term is not 0.

The cube of the sum of the squares of its roots is equal to the square of the sum of the cubes of its roots. Which of the following is true?

- a) Both roots are real
- b) Neither of the roots is real
- c) At least one root is non-real

d) At least one root is real

Ans: Assume the given quadratic equation is  $ax^2+bx+c=0$  whose roots are  $p, q$ .

Now given that  $(\alpha^2+\beta^2)^3=(\alpha^3+\beta^3)^2$

By expanding we

$$\text{get, } \alpha^6+3\alpha^4\beta^2+3\alpha^2\beta^4+\beta^6=\alpha^6+\beta^6+2\alpha^3\beta^3$$

$$3\alpha^2\beta^2(\alpha^2+\beta^2)=2\alpha^3\beta^3$$

$$3(\alpha^2+\beta^2)=2\alpha\beta^3$$

$$3(\alpha^2+\beta^2)+6\alpha\beta-6\alpha\beta=2\alpha\beta^3+6\alpha\beta-6\alpha\beta=2\alpha\beta$$

$$3(\alpha+\beta)^2=8\alpha\beta \quad \dots(1)$$

We know that sum of the roots =  $\alpha+\beta=-\frac{b}{a}$

product of the roots =  $\alpha\beta=\frac{c}{a}$

Substituting in the equation (1) we get  $3(-\frac{b}{a})^2=8\frac{c}{a} \Rightarrow 3b^2=8ac$

The nature of the roots can be determined by finding the magnitude of the determinant

$$= b^2-4ac$$

But we know that  $ac = \frac{3b^2}{8}$

$$\text{So } b^2-4ac = b^2-4\left(\frac{3b^2}{8}\right) = -\frac{b^2}{2} < 0$$

So the roots are imaginary.

3. A man sold 12 candies in \$10 had loss of  $b\%$  then again sold 12 candies at \$12 had profit of  $b\%$  find the value of  $b$ .

Ans: Here 12 candies is immaterial.

$$\text{Loss \%} = \frac{CP-SP}{CP} \times 100$$

So Here  $SP = 10$  and  $\text{loss\%} = b\%$

$$\frac{CP-10}{CP} \times 100 = b \Rightarrow \frac{CP-10}{CP} = \frac{b}{100} \Rightarrow CP-10 = \frac{b}{100}CP$$

In the second case he got a profit of  $b\%$

$$\text{Profit \%} = \frac{SP-CP}{CP} \times 100$$

So Here  $SP = 12$  and  $\text{profit\%} = b\%$

$$12 - \text{CPCP} \times 100 = b \Rightarrow 12 - \text{CPCP} = b100 \quad 12 - \text{CPCP} \times 100 = b \Rightarrow 12 - \text{CPCP} = b100$$

Solving 1 and 2 we get  $b = 1/11$  or 9.09%

4. find the total number of combinations of 5 letters a,b,a,b,b taking some or all at a time?

Ans: 1 letter can be chosen in 2 ways. a or b

2 letters can be chosen in 3 way. aa, ab, bb

3 letters can be chosen in 3 ways. bbb, aab, bba

4 letters can be chosen in 2 ways. aabb, bbba

5 letters can be chosen in 1 way.

So total ways are 11

5. what is the sum of all the 4 digit numbers that can be formed using all of the digits 2,3,5 and 7?

Ans: use formula  $(n-1)! \times (111\dots n \text{ times}) \times (\text{Sum of the digits})$

here n is number of different letters

So answer is  $3! \times 1111 \times 17$

6.  $30^{72} 87$  divided by 11 gives remainder

Ans: Fermat little theorem says,  $a_{p-1} \equiv 1 \pmod{p}$  remainder is 1.

ie.,  $30_{10} 87_{10}$  or  $8_{10} 10_{10}$  when divided by 11 remainder is 1.

The unit digit of  $72_{87} 7287$  is 8 (using cyclicity of unit digits) [Click here](#)

So  $72_{87} 7287 = 10K + 8$

$$30_{(10K+8)} 11 = (30_{10})_K.30_{811} = 1k.30_{811} 30_{(10K+8)} 11 = (30_{10})_K.30_{811} = 1k.30_{811}$$

$$8_{811} = 2_{24} 11 = (25)_4.2_{411} = 16_{11} = 5_{88} 11 = 22_{411} = (25)_4.2_{411} = 16_{11} = 5$$

7. 1234567891011121314151617181920.....424344 what is remainder when divided by 45?

Ans: Let  $N = 1234567891011121314151617181920.....424344$



Remainder when N is divided by 5 is 4. So  $N = 5K + 4$  .....(1)

Remainder when N is divided by 9 is Sum of the digits of N divided by 9. We know that

$1+2+3+\dots+44 = 990$  Which gives digit sum as 9. So remainder when N is divided by 9 is 0.

So  $N = 9L$  .....(2)

Equation (1) and (2) we  $9L = 5K + 4$

For  $K = 1$  this equation gets satisfied. So least possible number satisfies the condition is 9

So The general format of  $N = w(\text{LCM of } (9, 5)) + \text{Least number satisfies the condition.}$

So  $N = w.45 + 9$

When N is divided by 45, we get 9 as remainder.

## TCS Ninja, Digital, NQT Latest Placement Questions - 8

1. The wages of 24 men and 16 women amounts to Rs.11600 per day. Half the number of men and 37 women earn the same amount per day. What is the daily wage of a man?

Let the wage of a man is m and woman be w.

$$24m+16w=11600$$

$$12m+37w = 11600$$

Solving we get  $m = 350$

2. The sum of three digits a number is 17. The sum of square of the digits is 109. If we subtract 495 from the number, the number is reversed. Find the number.

Let the number be abc.

$$\text{Then } a + b + c = 17 \text{ .....(1)}$$

$$a^2+b^2+c^2=109 \quad a^2+b^2+c^2=109 \text{ .....(2)}$$

$$100a+10b+c -495 = 100c+10b+a \text{ .....(3)}$$

From 3, we get  $a - c = 5$

So the possibilities for (a, c, b) are (6,1,10), (7,2,8), (8,3,6), (9,4,4)

From the above, (8,3,6) satisfies the condition.

3. A calculator has a key for squaring and another key for inverting. So if  $x$  is the displayed number, then pressing the square key will replace  $x$  by  $x^2$  and pressing the invert key will replace  $x$  by  $1/x$ . If initially the number displayed is 6 and one alternatively presses the invert and square key 16 times each, then the final number displayed (assuming no roundoff or overflow errors) will be

Even number of inverse key has no effect on the number. For example, Initially the given number is 6. Square key makes it  $6^2=36$  and invert key makes it  $1/36$ . Now again square key makes it  $(1/36)^2=1/1296$  and invert key makes it  $6^4=1296$ . Now observe clearly, after pressing square key 2 times, the power of 6 became 4.

By pressing the square key, the value got increased like 2, 4, 8, .... Which are in the format of  $2n$ . So after the 16 pressings the power becomes  $2 \times 16 = 32$

So the final number will be  $6^{2 \times 16} = 6^{32}$

4. How many two digit numbers are there which when subtracted from the number formed by reversing its digits as well as when added to the number formed by reversing its digits, result in a perfect square.

Let the number  $xy = 10x + y$

Given that,  $10x+y - (10y - x) = 9(x-y)$  is a perfect square

So  $x-y$  can be 1, 4, 9. ----- (1)

So given that  $10x+y +(10y +x) = 11(x+y)$  is a perfect square.

So  $x+y$  be 11. Possible options are (9,2), (8,3),(7,4),(6,5) -----(2)

From the above two conditions only (6,5) satisfies the condition

Only 1 number 56 satisfies.

5. Find the 55th word of SHUVANK in dictionary

Sol: Arranging the letters in alphabetical order we get : A H K N S U V

Now Total words start with A are 6!

Total words start with AH are  $5! = 120$

Now

Total words start with AHK are  $4! = 24$

Total words start with AHN are  $4! = 24$

Total words start with AHSK are  $3! = 6$

Now AHSNKUV will be the last word required.

6. Car A leaves city C at 5pm and is driven at a speed of 40kmph. 2 hours later another car B leaves city C and is driven in the same direction as car A. In how much time will car B be 9 kms ahead of car A if the speed of car is 60kmph

Relative speed =  $60 - 40 = 20$  kmph

Initial gap as car B leaves after 2 hours =  $40 \times 2 = 80$  kms

Car B should be 9 km ahead of the A at a required time so it must be 89 km away

Time =  $89 / 20 = 4.45$  hrs or 267 mins

7. Find the average of the terms in the series  $1-2+3-4+5....+199-200$

Sol:  $(1-2) + (3-4) + (5-6) + ..... (199-200) = -100$

Average =  $100 / 200 = -0.5$

8.  $n$  is a natural number and  $n^3$  has 16 factors. Then how many factors can  $n^4$  have?

Total factors of a number  $N = a_p \cdot b_q \cdot c_r \dots a_p \cdot b_q \cdot c_r \dots$  is  $(p+1)(q+1)(r+1) \dots$

As  $n^3$  has 16 factors  $n^3$  can be one of the two formats given below

$$n^3 = a^{15}$$

$$n^3 = a^3 \cdot b^3$$

If  $n^3 = a^{15}$  then  $n = a^5$  and number of factors of  $n^4 = 21$

$n^3 = a^3 \cdot b^3$  then  $n = ab$  and number of factors  $n^4 = 25$

9. Two cars start from the same point at the same time towards the same destination which is 420 km away. The first and second car travel at respective speeds of 60 kmph and 90 kmph. After travelling for sometime the speeds of the two cars get interchanged. Finally the second car reaches the destination one hour earlier than the first. Find the time after which the speeds get interchanged?

Let the total time taken by the cars be a and b

Let the time after which the speed is interchanged be t

For car A,  $60t + 90(a-t) = 420$ ,  $90a - 30t = 420$  .....(1)

For car B,  $90t + 60(b-t) = 420$ ,  $60b + 30t = 420$  ....(2)

Using both (1) and (2), we get  $90a + 60b = 840$

But as  $a - b = 1$ ,  $90a + 60(a-1) = 840$ .

Solving  $a = 6$ .

Substituting in equation 1, we get  $t = 4$

## TCS Ninja, Digital, NQT Latest Placement Questions - 9

1. A and B run a 1 km race. If A gives B a start of 50m, A wins by 14 seconds and if A gives B a start of 22 seconds, B wins by 20 meters. Find the time taken by A to run 1 km.

To solve these type of questions, always keep in your mind that, the ratio of the speeds of two contestants never change.

A gives B a start of 50 m means, A runs 1000 m and B runs only 950. By the time A reaches the target, B has to take 22 seconds to reach the target.

$$a/b = 1000/950 = 14/b \Rightarrow 1000b = 950 \times 14 \Rightarrow b = \frac{950 \times 14}{1000} = 13.3$$

$$50/1000 = 22/b \Rightarrow 50b = 22000 \Rightarrow b = 440$$

Solving we get  $b = 25/3$

Now Assume A's speed = x

$$1000/950 - 14/(25/3) = x/(25/3) \Rightarrow 1000/950 - 14(25/3) = x(25/3)$$

$$x = 10$$

So x takes  $1000/10 = 100$  seconds.

2. A owes B Rs.50. He agrees to pay B over a number of consecutive days on a Monday, paying single note or Rs.10 or Rs.20 on each day. In how many different ways can A repay B.

He can pay by all 10 rupee notes = 1 way

3 Ten rupee + 1 twenty rupee =  $4!3! \times 1!4!3! \times 1! = 4$  ways

1 Ten rupee + 2 twenty rupee notes =  $3!2! \times 1!3!2! \times 1! = 3$  ways

Total ways =  $1 + 4 + 3 = 8$

3. W, X, Y, Z are integers. The expression  $X - Y - Z$  is even and the expression  $Y - Z - W$  is odd. If X is even what must be true?

a) W must be odd

b)  $Y - Z$  must be odd

c) Z must be even

d) Z must be odd

Sol: X is even so Y, Z both are even or both are odd.

Now  $Y - Z$  in both cases even. So  $(Y - Z) - W = \text{odd}$  happens only when w is odd

Ans: W is odd

4. Raj writes a number. He sees that the number of two digits exceeds four times the sum of its digits by 3. If the number is increased by 18, the results is the same as the number formed by reversing the digits. Find the next immediate prime greater than the number.

Let the number be  $xy = 10x + y$

$$10x + y = 4(x+y) + 3 \Rightarrow 2x - y = 1 \text{ -----(1)}$$

$$\text{Also } 10x + y + 18 = 10y + x, 9(y-x) = 18, y-x = 2 \text{ -----(2)}$$

Solving we get  $x = 3, y = 5$

The number is 35. So next immediate prime is 37

5. Kate wanted to buy 2kgs of apples. The vendor kept the 2kg weight on the right side and weighed 4 apples for that. She doubted on the correctness of the balance and placed 2 kg weight on the left side and she could weight 14 apples for 2 kgs. If the balance was correct how many apples she would have got?

As she got less apples when the weight put on the right side, the left pan has more weight say  $w$  kgs.

$$\text{Now } w + 4a = 2$$

$$\text{and } w + 2 = 14a$$

Solving we get  $a = 2/9$  Kgs.

So she gets,  $2/(2/9) = 9$  apples

6. Find the remainder when  $32^{33^{34}}$  is divided by 11

We know that when the divisor is a prime number, Fermat little theorem says,  $a^{p-1} \equiv 1 \pmod{p}$  when divided by  $p$ , remainder is 1

So  $32^{10}$  gives remainder 1.

Now we have to write  $32^{33^{34}}$  in this format. So we have to find the remainder  $33^{34}$  when divided by 10. The remainder is nothing but unit digit of the number. [Click here](#) to learn this concept

$33^{34}$  gives unit digit of 9.

$$\text{So } 33^{34} = 10K + 9$$

$$32^{33^{34}} = 32^{(10K+9)} = (32^{10})^K \cdot 32^9$$

Now this expression when divided by 11 leaves a remainder of  $32^9$  which in turn is equal to  $(-1)^9 = -1 \equiv 10 \pmod{11}$

7. Find the option to replace the question mark in the series below

5 ? 15 75 525 4725

$$\text{Sol: } 5 \times 1 = 5$$

$$5 \times 3 = 15$$

$$15 \times 5 = 75$$

$$75 \times 7 = 525$$

$$525 \times 9 = 4725$$

$$\text{So } ? = 5$$

8. There are several bags of same weight. A bag is 6 kgs plus three fourth of the weight of another bag. What is the weight of a bag?

Let the bags weight is x

$$\text{Then } 6 + \frac{3}{4}x = x,$$

$$\text{Solving we get } x = 24$$

9. Find the remainder when  $6^{50}$  is divided by 215

$$\text{Ans: } 6^{50} = (6^3)^{16} \cdot 6^2 = 216^{16} \cdot 6^2 \quad 6^{50} = (6^3)^{16} \cdot 6^2 = 216^{16} \cdot 6^2$$

So this expression gives a remainder of 36

10. Find last two digits of the following expression  $(201 \cdot 202 \cdot 203 \cdot 204 \cdot 246 \cdot 247 \cdot 248 \cdot 249)^2$

To find the last two digits of a product take the last two digits in each number and

multiply.  $01 \cdot 02 \cdot 03 \dots 48 \cdot 49$  (use onscreen calculator)

this gives 76. So  $76^2 = 5776$  So last two digits are 76

## TCS Ninja, Digital, NQT Latest Placement Questions - 10

1. Ahmed, Babu, Chitra, David and Eesha each choose a large different number. Ahmed says, "My number is not the largest and not the smallest". Babu says, "My number is not the largest and not the smallest". Chitra says, "My number is the largest". David says, "My number is the smallest". Eesha says, "My number is not the smallest". Exactly one of the five children is lying. The others are telling the truth. Who has the largest number?

- a) Eesha
- b) David
- c) Chitra
- d) Babu

Ans: A

Largest ->	A	B	C	D	E
A	F	T/F	T/F	T/F	T/F
B	T/F	F	T/F	T/F	T/F
C	F	F	T	F	F
D	T/F	T/F	T/F	F	T/F
E	T/F	T/F	T/F	T/F	T

From the above table, If we assume that A has the largest then A and C both are lying. Similarly if we find the truthfullness of the remaining people, it is clear that E has the largest and C lied. (Only one F in the last column)

2. In the equation  $A + B + C + D + E = FG$  where FG is the two digit number whose value is  $10F + G$  and letters A, B, C, D, E, F and G each represent different digits. If FG is as large as possible. What is the value of G?

- a) 4
- b) 2
- c) 1
- d) 3

Ans: B

FG is as large as possible and all the 7 numbers should be different.

By trial and Error method,

$$9 + 8 + 7 + 6 + 5 = 35 \dots 5 \text{ is getting repeated twice.}$$

$$9 + 8 + 7 + 6 + 4 = 34 \dots 4 \text{ is getting repeated}$$



$$9 + 8 + 7 + 5 + 4 = 33 \dots 3 \text{ repeats}$$

$$9 + 8 + 6 + 5 + 4 = 32$$

None of the numbers repeat in the above case and 32 is the maximum number FG can have. The value of G is 2.

3. A farmer has a rose garden. Every day he either plucks 7 or 6 or 24 or 23 roses. The rose plants are intelligent and when the farmer plucks these numbers of roses, the next day 37 or 36 or 9 or 18 new roses bloom in the garden respectively. On Monday, he counts 189 roses in the garden. He plucks the roses as per his plan on consecutive days and the new roses bloom as per intelligence of the plants mentioned above. After some days which of the following can be the number of roses in the garden?

a) 4

b) 7

c) 30

d) 37

Ans: A

If he plucks 23, then only 18 grows the next day. This means total roses get decreases by 5. So after n days assume the number of roses got decreased 185 where  $n = 37$ , then 4 roses left.

4. What is the value of  $(44444445 \cdot 88888885 \cdot 44444442 + 44444438) / 44444444^2$

a) 88888883

b) 88888884

c) 88888888

d) 44444443

Ans: A

Let  $x = 44444444$

$$(x+1) \times (2x-3) \times (x-2) + (x-6)x^2(x+1) \times (2x-3) \times (x-2) + (x-6)x^2$$

$$(x^2-x-2) \times (2x-3) + (x-6)x^2(x^2-x-2) \times (2x-3) + (x-6)x^2$$

$$2x^3-2x^2-4x-3x^2+3x+6+x-6x^2x^3-2x^2-4x-3x^2+3x+6+x-6x^2$$

$$2x^3-5x^2x^2=2x-5$$

Substituting the value of x in  $2x - 5$ , we get 88888883

4. For which of the following “n” is the number  $2^{74} + 2^{2058} + 2^{2n}$  is a perfect square?

a) 2012

b) 2100

c) 2011

d) 2020

Ans: D

$$2^{74} + 2^{2058} + 2^{2n} = K^2$$

$$2^{74} + 2^{2058} + 2^{2n} = (2^{37})^2 + 2^{2058} + (2^n)^2 = (2^{37})^2 + 2 \cdot 2^{2058} + (2^n)^2$$

We try to write this expression as  $(a+b)^2 = a^2 + 2ab + b^2$

Now  $a = 2^{37}$ ,  $2ab = 2^{2058}$  and  $b = 2^n$

Substituting the value of a in  $2ab$ , we get  $b = 2020$

5. Raj writes a number. He sees that the number of two digits exceeds four times the sum of its digit by 3. If the number is increased by 18, the result is the same as the number formed by reversing the digit. Find the number

a) 35

b) 57

c) 42

d) 49

Ans: A

Going by the options,  $35 = 8(4) + 3$ .

6. Weight of M, D and I is 74. Sum of D and I is 46 greater than M. I is 60% less than D. What is D's weight.

Ans: 10

$$M + D + I = 74 \text{ --- (1)}$$

$$(D + I) - M = 46 \text{ --- (2)}$$

$$I = \frac{4}{10}D \Rightarrow 5I = 2D \Rightarrow I = \frac{2D}{5} \text{ --- (3)}$$

Adding (1) and (2) we get  $2D + 2I = 120$

Substituting the value of I in the above equation,

$$2D + 2\left(\frac{2D}{5}\right) = 120$$

$$\Rightarrow 14D = 600$$

$$\Rightarrow D = \frac{600}{14} = 42.8$$

7. Father is 5 times faster than son. Father completes a work in 40 days before son. If both of them work together, when will the work get complete?

a. 8 days

b.  $8 \frac{1}{3}$  days

c. 10 days

d. 20 days

Ans: B

As efficiency is inversely proportional to days, If Father : son's efficiency is 5 : 1, then Days taken by them should be 1 : 5. Assume, the days taken by them are k, 5k.

$$\text{Given that father takes 40 days less. So } 5k - k = 40 \Rightarrow k = 10$$

Father takes 10 days to complete the work. Total work is  $10 \times 5 = 50$  units.

If both of them work together, they complete  $5 + 1$  units a day. 6/day. To complete 50 units, they take  $50/6 = 8 \frac{1}{3}$  days.

8. A beaker contains 180 liters of alcohol. On 1st day, 60 l of alcohol is taken out and replaced by water. 2nd day, 60 l of mixture is taken out and replaced by water and the process continues day after day. What will be the quantity of alcohol in beaker after 3 days

Ans: 53.3

Use the formula,

Final Alcohol = Initial Alcohol  $\times (1 - \frac{\text{Replacement quantity}}{\text{Final Volume}})^n$

Final Alcohol =  $180 \times (1 - \frac{60}{180})^3 = 180 \times (\frac{2}{3})^3 = 53.3$

Final Alcohol =  $180(1 - \frac{60}{180})^3 = 180 \times (\frac{2}{3})^3 = 53.3$

9. If  $f(f(n)) + f(n) = 2n + 3$ ,  $f(0) = 1$  then  $f(2012) = ?$

Ans: 2013

$$f(f(0)) + f(0) = 2(0) + 3 \Rightarrow f(1) = 3 - 1 = 2, f(1) = 2$$

$$f(f(1)) + f(1) = 2(1) + 3 \Rightarrow f(2) = 5 - 2 = 3, f(2) = 3$$

$$f(f(2)) + f(2) = 2(2) + 3 \Rightarrow f(3) = 7 - 3 = 4, f(3) = 4$$

.....

$$f(2012) = 2013$$

10. What will be in the next series

1, 7, 8, 49, 56, 57, 343, ...

Ans: 344

$$1 = 1$$

$$7 = 1 \times 7$$

$$8 = 1 \times 7 + 1$$

$$49 = 7 \times 7 + 1$$

$$50 = 7 \times 7 + 1$$

$$56 = 8 \times 7$$

$$57 = 8 \times 7 + 1$$

$$343 = 49 \times 7$$

Next term should be  $49 \times 7 + 1 = 344$

11. In a  $3 \times 3$  grid, comprising 9 tiles can be painted in red or blue. When tile is rotated by 180 degrees, there is no difference which can be spotted. How many such possibilities are there?

- a. 16
- b. 32
- c. 64
- d. 256

Ans: B

2	3	1
4	5	4
1	3	2

This grid even rotated 180 degrees the relative positions of the tiles do not change. So we paint tile number 1's with red or blue (only one color should be used) , 2's with red or blue.....tile 5 red or blue. Then total possibilities are  $2^5 = 32$

## TCS Ninja, Digital, NQT Latest Placement Questions - 11

1. In a staircase, there are 10 steps. A child is attempting to climb the staircase. Each time she can either make 1 step or 2 steps. In how many different ways can she climb the staircase?

- a) 10
- b) 21
- c) 36
- d) None of these

Ans: d

Use fibonacci series, with starting two terms as 1, 2. So next terms are 3, 5, 8, 13, 21, 34, 55,

2. A boy buys 18 sharpeners, (Brown/white) for Rs.100. For every white sharpener, he pays one rupee more than the brown sharpener. What is the cost of white sharpener and how much did he buy?

- a) 5, 13
- b) 5, 10
- c) 6, 10
- d) None of these

Ans: C

Assume that he bought  $b$ , brown sharpeners and  $w$ , white sharpeners and the cost of brown sharpener is  $x$  and white sharpener is  $x + 1$

$$\text{So } w(x+1) + bx = 100$$

$$w + b = 18$$

$$b = 18 - w$$

Substituting in equation 1, we get  $w(x+1) + (18-w)x = 100$  so  $w + 18x = 100$

Take option 1: If white sharpeners are 13,  $x = (100 - 13) / 18 = 4.833$

Option 2, If white sharpeners are 10,  $x = (100 - 10) / 18 = 5$  So white sharpeners cost is 6.

Option 3 Satisfies this condition.

3. Letters of alphabets no from 1 to 26 are consecutively with 1 assigned to A and 26 to Z. By 27th letter we mean A, 28th B. In general  $26m+n$ ,  $m$  and  $n$  negative integers is same as the letters numbered  $n$ .

Let  $P = 6$ , strange country military general sends this secret message according to the following codification scheme. In codifying a sentence, the 1st time a letter occurs it is replaced by the  $p$ th letter from it. 2nd time if occurred it is replaced by  $P^2$  letter from it. 3rd time it occurred it is replaced by  $P^3$  letter from it. What is the code word for ABBATIAL

- a) GHNNZOOR
- b) GHKJZOHR

c) GHHGZOG R

d) GHLKZOIR

Ans: D

A should be coded as  $1+6 = 7$  (it occurred for first time)

B should be coded as  $2+6 = 8$  (it occurred for first time)

B Should be coded as  $2 + 36 = 38 - 26 = 12 = L$  (it occurred for second time)

Option D is correct

4. Of a set of 30 numbers, average of 1st 10 numbers is equal to average of last 20 numbers. The sum of last 20 numbers is?

a) 2 x sum of last 10 numbers

b) 2 x sum of 1st 10 numbers

c) sum of 1st 10 numbers

d) Cannot be determined

Ans: B

Let average of first 10 numbers is  $a$ . Then sum =  $10a$

Average of last 10 numbers also  $a$ . Then their sum =  $20a$

From the options B correct

5. In how many ways a team of 11 must be selected a team 5 men and 11 women such that the team must comprise of not more than 3 men.

a) 1565

b) 2256

c) 2456

d) 1243

Ans: B

Maximum 3 men can be played which means there can be 0, 1, 2, 3 men in the team.

$$({}^5C_0 \times {}^{11}C_{11}) + ({}^5C_1 \times {}^{11}C_{10}) + ({}^5C_2 \times {}^{11}C_9) + ({}^5C_3 \times {}^{11}C_8) = 2256$$

$$({}^5C_0 \times {}^{11}C_{11}) + ({}^5C_1 \times {}^{11}C_{10}) + ({}^5C_2 \times {}^{11}C_9) + ({}^5C_3 \times {}^{11}C_8) = 2256$$

6. The wages of 24 men and 16 women amount to 11600 per day. Half the number of men and 37 women has same money. The daily wages paid to each man is

- a) 375
- b) 400
- c) 350
- d) 325

Ans: C

$$24m + 16w = 11600$$

$$12m + 37w = 11600$$

Solving we get  $12m = 21w$

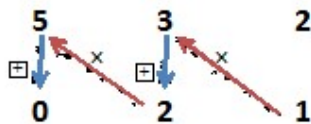
Substituting in the first equation we get,  $42w + 16w = 11600 \Rightarrow w = 200$

$$M = 350$$

7. A number when successively divided by 5, 3, 2 gives remainder 0, 2, 1 respectively in that order. What will be the remainder when the same number is divided successively by 2, 3, 5 in that order

- a) 4, 3, 2
- b) 1, 0, 4
- c) 2, 1, 3
- d) 4, 1, 2

Ans: B





use this simple technique.  $[(1 \times 3) + 2] = 5$

$$[(5 \times 5) + 0] = 25$$

Procedure:

Let the number = N

$$\text{Now } N = 5K$$

$$K = 3L + 2$$

$$L = 2M + 1$$

$$K = 3(2M + 1) + 2 = 6M + 5$$

$$N = 5(6M + 5) = 30M + 25$$

For  $M = 0$  we get the least number as 25. Now when 25 is divided by 2, we get 12 as quotient and 1 as remainder. When 12 is divided by 3 we get 4 as quotient, and 0 as remainder. When 4 is divided by 5 we get 4 as remainder.

8. a,b,c,d,e are distinct numbers. if  $(75-a)(75-b)(75-c)(75-d)(75-e)=2299$  then  $a+b+c+d= ?$

Hint: 2299 is divisible by 11.

$$2299 = 11 \times 11 \times 19 \times 1 \times 1 = 11 \times -11 \times 19 \times -1 \times 1 = 11 \times 11 \times 19 \times 1 \times 1 = 11 \times -11 \times 19 \times -1 \times 1 =$$

Two of the terms in the given expression should equal to 1. As all the digits are distinct, two of the terms should be negative.

$$\text{One possible solution} = (75 - 64)(75 - 56)(75 - 86)(75 - 74)(75 - 76)$$

$$\text{Then } a + b + c + d + e = 64 + 56 + 86 + 74 + 76 = 356$$

But as the sum of only 4 terms was asked, we have to subtract one term.

So given answer can be one of 292, 306, 270, 282, 280

9. If  $A^B$  means A raised to the power of B, in which of the following choices must P be greater than Q

a)  $0.9^P = 0.9^Q$

b)  $0.9^P = 0.92^Q$

c)  $0.9^P > 0.9^Q$

Option A is wrong as  $P = Q$

Option B is wrong as  $PQ = \log 0.92 \log 0.9 = 0.79139$   $PQ = \log 0.92 \log 0.9 = 0.79139$

Option C is also wrong as  $a^P > a^Q$   $P > Q$  then  $P > Q$  if  $a > 1$

10. 2 gears one with 12 teeth and other one with 14 teeth are engaged with each other. One tooth in smaller and one tooth in bigger are marked and initially those 2 marked teeth are in contact with each other. After how many rotations of the smaller gear with the marked teeth in the other gear will again come into contact for the first time?

a) 7

b) 12

c) Data insufficient

d) 84

Correct Option : A

Assume the distance between the teeth is 1 cm. Then the circumference of first gear is 12 cm and the second is 14 cm.

Now LCM (12, 14) = 84. So to cover 84 cm, the first gear has to rotate  $84/12 = 7$  rounds (the second gear rotates  $84/14 = 6$  rounds as it is bigger)

## TCS Ninja, Digital, NQT Placement Questions - 12

1. One day Eesha started 30 min late from home and reached her office 50 min late while driving 25% slower than her usual speed. How much time in min does eesha usually take to reach her office from home?

Ans: We know that Speed is inversely proportional to time

While she drives 25% slower means she drove at  $\frac{3}{4}S$

We know that  $D = S \times T$

When speed became  $\frac{3}{4}S$  then Time taken should be  $\frac{4}{3}T$

i.e, She has taken  $\frac{4}{3}T - T$  extra to cover the distance.

Extra Time =  $\frac{1}{3}T = 20$  min (as 20 min late due to slow driving)

Actual time  $T = 60$  Minutes

2. In 2003 there are 28 days in February and 365 days in a year in 2004 there are 29 days in February and 366 days in the year. If the date march 11 2003 is Tuesday, then which one of the following would the date march 11 2004 would be?

Ans: If 11-3-2003 is Tuesday, Then 11-3 - 2004 is Thursday

The number of odd days between the two dates are  $[366] \text{Rem} [366] \text{Rem} = 2$ .

3) How many positive integers less than 500 can be formed using the numbers 1,2,3,and 5 for digits, each digit being used only once.

Ans: Single digit numbers = 4

Double digit numbers =  $4 \times 3 = 12$

Three digit numbers =  $3 \times 3 \times 2 \times 1 = 18$

Total = 34

4) A circular swimming pool is surrounded by a concrete wall 4 feet wide.if the area of the wall is  $\frac{11}{25}$  of the area of the pool, then the radius of the pool in feet is?

Let the radius of the pool be  $r$ . Then area of the wall and pool =  $\pi(r+4)^2 - \pi r^2$

Area of the pool =  $\pi r^2$

Area of the wall =  $\pi(r+4)^2 - \pi r^2$

Given  $\pi(r+4)^2 - \pi r^2 = \frac{11}{25} \pi r^2$

$r^2 + 8r + 16 - r^2 = \frac{11}{25} r^2$

$$11r^2 - 200r - 400 = 0 \quad 11r^2 - 200r - 400 = 0$$

Solving  $r = 20$

5) A survey of  $n$  people in the town of badaville found that 50% of them prefer brand A. Another survey of 100 people in the town of chottaville found that 60% prefer brand A. In total 55% of all the people surveyed together prefer Brand A. What is the total number of people surveyed?

$$\text{Sol: } 50\% (n) + 60\% (100) = 55\% (n + 100)$$

Solving we get  $n = 100$

6) In the simple subtraction problem below some single digits are replaced by letters. Find the value of  $7A + 5D + 6CD$ ?

A5C5

-1B87

-----

674D

$$\text{Sol: } 15 - 7 = 8 \text{ So } D = 8$$

$$10 + (C - 1) - 8 = 4 \text{ So } C = 3$$

$$10 + (5 - 1) - B = 7 \text{ So } B = 7$$

$$(A - 1) - 1 = 6 \text{ So } A = 8$$

$$7A + 5D + 6CD = 56 + 40 + 144 = 240$$

7) Two full tanks one shaped like the cylinder and the other like a cone contain liquid fuel the cylindrical tank held 500 lts more than the conical tank. After 200 lts of fuel is pumped out from each tank the cylindrical tank now contains twice the amount of fuel in the conical tank. How many lts of fuel did the cylindrical tank have when it was full?

Ans: Let the cylindrical tank capacity  $x + 500$  then the conical tank capacity  $= x$

After 200 lts pumped out, then remaining fuel with the tanks  $= x + 300, x - 200$

Given that first term is doubt the second.

$$x+300x-200=21x+300x-200=21$$

Solving we get  $x = 700$

Cylindrical tank capacity = 1200 lts

8. A shop sells chocolates It is used to sell chocolates for Rs.2 each but there were no sales at that price. When it reduced the price all the chocolates sold out enabling the shopkeeper to realize Rs 164.90 from the chocolates alone If the new price was not less than half the original price quoted How many chocolates were sold?

$$\text{Sol: } 16490 = 2 \times 5 \times 17 \times 97$$

Now new chocolate price should be greater than 1 and less than 2. So  $2 \times 5 \times 17 = 170$

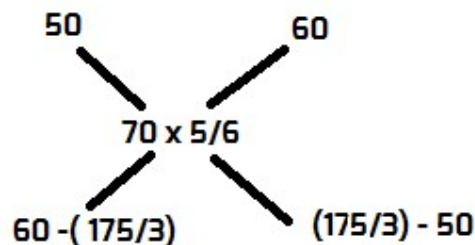
So Total chocolates sold = 97 and New chocolate price = Rs.1.7

9) Eesha bought two varieties of rice costing 50Rs per kg and 60 Rs per kg and mixed them in some ratio. Then she sold that mixture at 70 Rs per kg making a profit of 20 % What was the ratio of the mixture?

Sol: Selling price of the mixture = 70 and profit = 20%

$$\text{Cost price of the mixture} = 70 \times 100 / 120 = 70 \times 5 / 6$$

By applying alligation rule:



$$\text{So ratio} = 60 - 175/3 : 175/3 - 50 = 1 : 5$$

10. Star question:

If  $f(1)=4$  and  $f(x+y)=f(x)+f(y)+7xy+4$ , then  $f(2)+f(5)=?$

Sol: Let  $x=1$  and  $y=1$

$$f(1+1) = f(1) + f(1) + 7 \times 1 \times 1 + 4 \Rightarrow f(2) = 19$$

Let  $x=2$  and  $y=2$

$$f(2+2) = 19 + 19 + 7 \times 2 \times 2 + 4 \Rightarrow f(4) = 70$$

Let  $x=1$  and  $y=4$

$$f(1+4) = 4 + 70 + 28 + 4 = 106$$

$$f(2) + f(5) = 125$$

## TCS Ninja, Digital, NQT Placement Questions - 13

1. If  $f(f(n))+f(n)=2n+3$  and  $f(0)=1$ , what is the value of  $f(2012)$ ?

a) 2011

b) 2012

c) 2013

d) 4095

**Ans: Option C**

Put  $n=0$

$$\text{Then } f(f(0))+f(0) = 2(0) + 3 \Rightarrow f(1) + 1 = 3 \Rightarrow f(1) = 2$$

Put  $n=1$

$$f(f(1)) + f(1) = 2(1) + 3 \Rightarrow f(2) + 2 = 5 \Rightarrow f(2) = 3$$

Put  $n=2$

$$f(f(2)) + f(2) = 2(2) + 3 \Rightarrow f(3) + 3 = 7 \Rightarrow f(3) = 4$$

.....

$$f(2012) = 2013$$

2. If  $5+3+2=151022$ ,  $9+2+4=183652$ , then  $7+2+5=?$

**Ans: 143547**

If the given number is  $a + b + c$  then  $a.b \mid a.c \mid a.b + a.c - b$

$$\Rightarrow 5+3+2 = 5.3 \mid 5.2 \mid 5.3 + 5.2 - 3 = 151022$$

$$\Rightarrow 9+2+4 = 9.2 \mid 9.4 \mid 9.2 + 9.4 - 2 = 183652$$

$$7+2+5 = 7.2 \mid 7.5 \mid 7.2 + 7.5 - 2 = 143547$$

3. The savings of employee equals income minus expenditure. If the income of A,B,C are in the ratio 1:2:3 and their expense ratio 3:2:1 then what is the order of the employees in increasing order of their size of their savings?

**Ans:  $A < B < C$**

As the the ratio of their incomes are in ascending order, and their expenses are in descending order, their savings also in their incomes order.

So savings order =  $A < B < C$

4. Entry fee is Re.1.there are 3 rides each is of Re.1. total boys entering are 3000.total income is Rs.7200. 800 students do all 3 rides. 1400 go for atleast 2 rides.none go the same ride twice. then no of students who do not go any ride is?

**Ans: 1000**

Total entries are 3000 So fee collected through entry fee =  $3000 \times 1 = \text{Rs.}3000$

Income generated through rides =  $7200 - 3000 = 4200$

Now 800 went for 3 rides so total fee paid by these 800 =  $800 \times 3 = 2400$

$(1400 - 800)$  went for 2 rides so fee paid by these 600 =  $600 \times 2 = 1200$

Assume K went for exactly 1 ride

Then  $K \times 1 + 1200 + 2400 = 4200 \Rightarrow K = 600$

So number of boys who did not go for any ride =  $3000 - (600 + 600 + 800) = 1000$

5. The average mark obtained by 22 candidates in an examination is 45. The average of the first ten is 55 while the last eleven is 40 .The marks obtained by the 11th candidate is ?

**Ans: 0**

It is clear that  $22 \times 45 = 10 \times 55 + K + 11 \times 40 \Rightarrow K = 0$

6. What is the largest positive integer  $n$  for which  $3^n$  divides  $44^{44}$ ?

**Ans:  $n = 0$**

The digit sum of  $44^{44}$  is when remainder obtained  $44^{44}$  divided by 9

$$44^{44} = (45-1)^{44} = \sum_{k=0}^{44} \binom{44}{k} 45^k (-1)^{44-k}$$

Each term is a multiple of 9 but the last term which is  $(-1)^{44} = 1$

So the digit sum of  $44^{44}$  is 1.

Now the divisibility rule for 3, 9, 27... is the sum of the digits should be divisible by 3, 9, 27

respectively. In each case the digit sum is either multiple of 3 or 9.

So for any value of  $n > 1$ , the given expression is not divisible by  $3^n$

7.  $1(1!) + 2(2!) + 3(3!) + \dots + 2012(2012!) = ?$

**Ans:  $2013! - 1$**

$$1(1!) = 1 \Rightarrow 2! - 1$$

$$1(1!) + 2(2!) = 1 + 4 = 5 \Rightarrow 3! - 1$$

$$1(1!) + 2(2!) + 3(3!) = 1 + 4 + 18 = 23 \Rightarrow 4! - 1$$

.....

.....

$$1(1!) + 2(2!) + 3(3!) + \dots + 2012(2012!) = 2013! - 1$$

## TCS Ninja, Digital, NQT Placement Paper with solutions - 14

1. A two digit number is 18 less than the square of the sum of its digits. How many such numbers are there?

(1) 1

(2) 2



(3) 3

(4) 4

Ans: Option 2

Take  $N = 10a+b$ .

Given that,  $(10a+b)+18 = K^2 = (a+b)^2$

Given number  $= K^2 - 18 = (10a+b)$

That means, when we add 18 to the given number it should be a perfect square. So  $K^2$  takes the following values. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, ....

1 to 16 are ruled out as if we subtract 18 from them, the resulting number is a single digit number.

Now  $25 - 18 = 7$

$36 - 18 = 18$

$49 - 18 = 31$

$64 - 18 = 46$

$81 - 18 = 63$

$100 - 18 = 82$

$121 - 18 = 103$

Now 63, 82 satisfies.

2. A two digit number is 18 less than the sum of the squares of its digits. How many such numbers are there?

(1) 1

(2) 2

(3) 3

(4) 4

Ans: Option 2

Only 47 and 67 satisfy the condition

3. For real number  $x$ ,  $\text{int}(x)$  denotes integer part of  $x$ .  $\text{int}(x)$  is the largest integer less than or equal to  $x$ .  $\text{int}(1,2)=1, \text{int}(-2,4)=-3$ . Find the value of  $\text{int}(1/2)+\text{int}(1/2+100)+\text{int}(1/2+2/100)+\dots+\text{int}(1/2+99/100)$

Sol:  $\text{int}(1/2) = 0$

$\text{int}(1/2 + 100) = 100$

$\text{int}(1/2 + 2/100) = 0$

.....

$\text{int}(1/2 + 50/100) = 1$

$\text{int}(1/2 + 51/100) = 1$

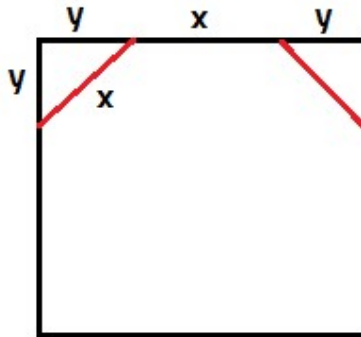
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$\text{int}(1/2 + 99/100) = 1$

So  $100 + 1 + 1 + \dots 50 \text{ times} = 150$

4. Given a square of length  $2m$ . Its corners are cut such that to represent a regular octagon. Find the length of side of octagon

Sol:



Let  $x$  is the side of the octagon and  $x + 2y$  is the side of the square.

In the given octagon,  $y^2 + y^2 = x^2 \Rightarrow 2y^2 = x^2 \Rightarrow y = x\sqrt{2}$

But  $x\sqrt{2} + x + x\sqrt{2} = 2x + x\sqrt{2} = 2$

$$\Rightarrow \sqrt{2}x + x = 2 \Rightarrow 2x + x = 2$$

$$\Rightarrow x = 2\sqrt{2} + 1 = 2\sqrt{2} + 1 \times \sqrt{2} - 1\sqrt{2} - 1 = 2(\sqrt{2} - 1) \Rightarrow x = 2\sqrt{2} + 1 = 2\sqrt{2} + 1 \times 2 - 1\sqrt{2} - 1 = 2(2 - 1)$$

5. Find the number of ways a batsman can score a double century only in terms of 4's & 6's?

Assume the batsman scored x 4's and y 6's.

$$4x + 6y = 200 \Rightarrow 2x + 3y = 100 \Rightarrow 2x + 3y = 100 \Rightarrow x = 100 - 3y \Rightarrow x = 100 - 3 \times 2 = 50 - 3 \times 2 = 50 - 6 = 44$$

As x is an integer, y should be a multiple of 2.

If

$$y = 0, x = 50$$

$$y = 2, x = 47$$

$$y = 4, x = 44$$

...

$$y = 32, x = 2$$

So total ways are  $(32-0)/2 + 1 = 17$  (if 0 6's are possible) otherwise 16

6. 5000 voted in an election between two candidates. 14% of the votes were invalid. The winner won by a margin approximately closer to 15%. Find the number of votes secured by the person

$$\text{Invalid Votes} = 14\% (5000) = 700$$

$$\text{Valid Votes} = 5000 - 700 = 4300 = R \text{ (say)}$$

Assume the looser got 'L' votes and winner got 'W' votes.

$$W - L = 15\% (R)$$

$$W + L = R$$

Solving we get  $W = 57.5\%$  and  $L = 42.5\%$

$$\text{So Winner got } 57.5\% (4300) = 2472$$

7. There are 100 wine glasses. I offered my servant to 3 paise for every broken glass to be

delivered safely and forfeit 9 paisa for every glass broken at the end of day. He received Rs.2.40

.how many glass did he break.

a. 20 b. 73 c. 5 d. 8

If a glass has been broken, he has to lose 3 paisa + 9 paise = 12 paise

Assume K glasses got broken

$$100 \times 3 - 12 \times K = 240 \Rightarrow K=5 \Rightarrow K=5$$

8. A is 20 percent more efficient than B. If the two persons can complete a piece of work in 60 days.in how many days. A working alone can complete the work

a. 80 b. 90 c. 100 d. 110

As A is 20% more efficient than B, If B's per day work is 100 units then A's 120.

Both persons together complete (100 + 120) units = 220 units a day.

They took 60 days to complete the work. So total work = 60 x 220

If A alone set to complete the work, he takes =  $60 \times 220 / 120 = 110$  days

9. A property was originally on a 99 years lease and two thirds of the time passed is equal to the four fifth of the time to come.how many years are there to go.

a. 45 b. 50 c. 60 d. 55

Assume x years have passed and y years to go

$$\text{Given } \frac{2}{3}x = \frac{4}{5}y \Rightarrow x = \frac{4}{5} \times \frac{3}{2}y = \frac{6}{5}y \Rightarrow x = \frac{6}{5}y$$

$$\text{But } x + y = 99$$

$$\text{So } \frac{6}{5}y + y = 99 \Rightarrow \frac{11}{5}y = 99 \Rightarrow y = 45$$

Solving we get y = 45 years

10. In how many different ways can the letters of the word "LEADING" be arranged in such a way that the vowels always come together.

a. 360

b. 720

c. 480

d. 5040

Given letters are A, E, I, D, L, N, G

Of which AEI are vowels. Let us combine them into a single letter x. Now total letters are x, D, L, N, G

These letter are arranged in  $5!$  ways. But 3 vowels can arrange themselves in  $3!$  ways. So total ways  $5! \times 3! = 720$

11. There is a plane contains 32 points.all the 32 points have equal distance from point x. which of the following is true .

a. all 32 points lie in circle

b. the distance from x to all 32 points is less than the distance between each other

c. both a and b

d. none of these

Sol: Option 3

X must be the center of the circle and 32 points are on the circumference. So Option A is correct

Number of diagonals of a regular polygon =  $\frac{n(n-3)}{2}$

So for a polygon of 32 sides, Number of diagonals = 464. Now the minimum distance between any two points =  $2\pi r$

Now total length of all the distances from 32 points =  $2\pi r \times 32$  + Sum of the lengths of all the 464 diagonals.

Sum of the lengths of x to all the 32 points = 32 radius =  $32r$

But the 464 diagonals have 16 diameters connecting 2 opposite points connecting via center. So

Sum of the lengths of distances from point to point is clearly greater than sum of the length from x to all 32 points. Option B is correct

Correct Option 3

12. When asked what the time is, a person answered that the amount of time left is  $\frac{1}{5}$  of the time already completed. What is the time.

- 1. 8 pm
- 2. 8 am
- 3. 12 pm
- 4. 12 am

Sol: A day has 24 hrs. Assume  $x$  hours have passed. Remaining time is  $(24 - x)$

$$24 - x = \frac{1}{5}x \Rightarrow x = 20$$

Time is 8 PM

13. Perimeter of the backwheel = 9 feet, front wheel = 7 feet on a certain distance, the front wheel gets 10 revolutions more than the back wheel. What is the distance

Let the backwheel make  $x$  revolutions then front wheel makes  $x + 10$

$$x \times 9 = (x + 10) \times 7$$

$$x = 35$$

$$\text{So distance traveled} = 35 \times 9 = 315$$

14. There are 2 groups named brown and red. They can't marry in the same group. If the husband or wife dies then the person will revert to their own group. If a person is married then the husband will have to change his group to his wife's group. Children will own the mother's group. If a man is red then his mother's brother belongs to which group if he is married

- a. red
- b. brown
- c. red and brown
- d. none

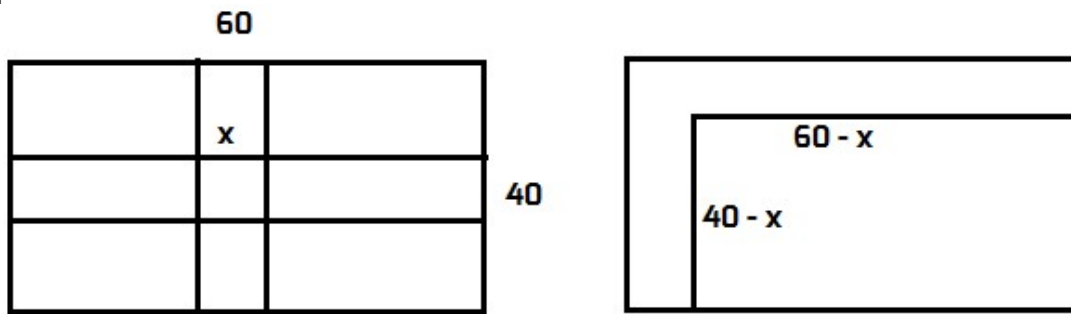
Option: b

If a man is Red, his mother must be red, his mothers brother also red but after marriage, he gets converted to Brown.

15. A rectangular park 60 m long and 40 m wide has concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. if the area of the lawn is 2109 sq.m, then what is the width of the road.

- a. 2.91 m
- b. 3m
- c. 5.82 m
- d. none

Option : B



Let us shift the path to the left hand side and top. This does not change the area of the lawn.

Now lawn area =  $(60 - x)(40 - x)$

for  $x = 3$ , we get lawn area = 2109.

## TCS Ninja, Digital, NQT Placement Questions - 15

1. A man is known to speak truth 3 out of 4 times. He throws die and reports that it is a 6. The probability that it is actually a 6 is

Sol: If 6 actually appeared, he can report it with the probability of  $3/4$ . If 6 has not appeared, still he can report it wrongly with the probability of  $1/4$

So the probability that it is actually a 6 = (Probability to appear 6 x His truthfulness to report + Probability to appear any other number x His lying probability )

$$= 16 \times 34 + 56 \times 14 = 1316 \times 34 + 56 \times 14 = 13$$

The probability that it is actually 6 = Probability that he reports 6 Total probability to appear

6 Probability that he reports 6 Total probability to appear

$$6 = 34 \times 1634 \times 16 + 14 \times 56 = 3834 \times 1634 \times 16 + 14 \times 56 = 38$$

2. In how many ways can we distribute 10 pencils to 4 children so each child gets atleast one pencil?

Number of ways of distributing r identical objects to n distinct objects so that each get atleast one

$$= {}_{(n-1)}C_{(r-1)}(n-1)C(r-1) = {}_{(10-1)}C_{(4-1)} = {}_9C_3(10-1)C(4-1) = 9C_3$$

3. A drawer holds 4 red hats and 4 blue hats. what is probability of getting exactly 3 red hats or 3 blue hats when taking out 4 hats randomly out of drawer and immediately returning every hat to drawer before taking out next??

As the objects are replaced, the probability of drawing red or blue is equal.

$$\text{Probability to draw exactly 3 red hats and 1 blue hat} = 12 \times 12 \times 12 \times 12 = 11612 \times 12 \times 12 \times 12 = 116$$

Similarly probability to draw exactly 3 blue hats and 1 red hat

$$= 12 \times 12 \times 12 \times 12 = 11612 \times 12 \times 12 \times 12 = 116$$

$$\text{Total probability} = 116 + 116 = 18116 + 116 = 18$$

4. A father purchased dress for his 3 daughters. The dresses are of same color but diff size and they are kept in dark room. what is probability that all the 3 will not choose their own dress?

$$\text{This is a case of de-arrangements} = D_n = n!(12! - 13! + 14! - \dots) D_n = n!(12! - 13! + 14! - \dots)$$

So number of ways that none of them chooses their own dress

$$= D_3 = 3!(12! - 13!) = 2D_3 = 3!(12! - 13!) = 2$$

$$\text{So probability} = \frac{2}{3!} = \frac{2}{6} = \frac{1}{3}$$

5. 60% of male in a town and 70% of female in a town are eligible to vote. out of which 70% of



male and 60% of female who are eligible to vote voted for candidate A. what is the value of votes in % did A get?

Let the ratio of men and women are 100 : k

Male eligible votes = 60 and female eligible votes = 70% (k)

Number of males who voted for A = 70% (60) = 42

Number of females who voted for A = 60%(70% (K) = 42% (k)

Percentage of votes got by A

$$= \frac{42 + 42 \times 100(K)60 + 70 \times 100(K)}{42 + 42 \times 100(K)60 + 70 \times 100(K)} \times 100 = \frac{4200 + 42K6000 + 70K \times 100}{42 + 42 \times 100(K)60 + 70 \times 100(K)} \times 100$$

So this value cannot be determined as the value of K is not known

6. George and Mark can paint 720 boxes in 20 days. Mark and Harry in 24 days and Harry and George in 15 days. George works for 4 days, Mark for 8 days and Harry for 8 days. The total number of boxes painted by them is

$$\text{Capacity of G + M} = 720 / 20 = 36$$

$$\text{M + H} = 720 / 24 = 30$$

$$\text{H + G} = 720 / 15 = 48$$

$$\text{Combined capacity} = 2 (\text{G + H + M}) = 114$$

$$\text{G + H + M} = 114 / 2 = 57$$

$$\text{Now capacity of G} = (\text{G+H+M}) - (\text{H + M}) = 57 - 30 = 27$$

$$\text{M} = (\text{G+H+M}) - (\text{H + G}) = 57 - 48 = 9$$

$$\text{H} = (\text{G+H+M}) - (\text{G + M}) = 57 - 36 = 21$$

Given that G worked for 4 days, and mark for 8 and harry for 8 days

$$\text{So total work by them} = 4 \times 27 + 8 \times 9 + 8 \times 21 = 348$$

7. Two equilateral triangle of side 12cm are placed one on top another, such a 6 pionted star is formed if the six vertices lie on a circle what is the area of the circle not enclosed by the Star?

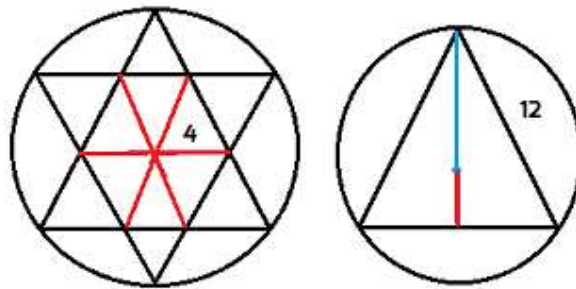
a)61

b)57

c)68

d)83

Sol: Given that two equilateral triangles of length 12 has inscribed in a circle.



$$\text{Altitude of the triangle} = \sqrt{3} \cdot \frac{12}{2} = 6\sqrt{3}$$

We know that centroid divides the altitude in the ratio 2 : 1 and  $\frac{2}{3}(\text{Altitude}) = \text{Circum radius}$

$$\text{Circum radius} = \frac{2}{3}(6\sqrt{3}) = 4\sqrt{3}$$

$$\text{Area of the circle} = \pi r^2 = 3.14 \times (4\sqrt{3})^2 = 3.14 \times 48$$

Now the two triangles in the circle forms 12 small equilateral triangles with side 4. So their total

$$\text{area} = 12 \times \frac{\sqrt{3}}{4} \cdot 4^2 = 12 \times 4\sqrt{3}$$

Area which is not covered by the equilateral triangles

$$= 3.14 \times 48 - 12 \times 4\sqrt{3} = 67.65 \approx 68$$

8. There are 4 different letters and 4 addressed envelopes. In how many ways can the letters be put in the envelopes so that atleast one letter goes to the correct address ?

a)15

b)16

c)18

d)12

Total ways of putting r letters to r covers =  $r! = 4! = 24$

Number of ways that none of them goes into the right envelope

$$= D_4 = 4!(1 - \frac{1}{1} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!}) = 9$$

So atleast one envelope goes into the right one =  $24 - 9 = 15$

9. There are 250 men and 150 women in a committee, if all will work they will complete 12 units per day, if all men work they will complete 15 units per day, how many units will women complete per day?

I think there is a mistake in this question. If all men and women together complete 12 units, how only men can do 15 Units of work a day?

Forgetting about the reality, Women can do -3 units a day.

10. How many odd and even numbers are there between 42 and 400?? Find the sum of odd numbers and the sum of even numbers!

Sol: Odd numbers are from 43 to 399. Number of odd numbers

$$= \frac{1 - \text{ad} + 1}{2} = \frac{399 - 43 + 1}{2} = 179$$

$$\text{Their sum} = \frac{n^2(1+a)}{2} = \frac{179^2(43+399)}{2} = 39559$$

Even numbers are from 44 to 398. Number of even numbers

$$= \frac{1 - \text{ad} + 1}{2} = \frac{398 - 44 + 1}{2} = 178$$

$$\text{Their sum} = \frac{n^2(1+a)}{2} = \frac{178^2(44+398)}{2} = 39338$$

11. The famous church in the city of Kumbakonnam has a big clock tower and is said to be over 300 years old. Every Monday 10.00 A M the clock is set by Antony, doing service in the church. The Clock loses 6 mins every hour. What will be the actual time when the faulty clock shows 3 P.M on Friday?

a. 4 AM

b. 3.16 PM

c. 4.54 AM

d. 3 AM

Total time passed in the faulty clock = Monday 10 am to Friday 3 pm =  $24 \times 4 + 5$  hours = 96 and 5 hours = 101 hrs

54 min in the faulty clock = 60 minutes of the correct clock

101 hrs in the faulty clock = ?

$$10154 \times 60 / 10154 \times 60 = 112.2 \text{ Hrs.}$$

$$96 \text{ Hrs} + 16.2 \text{ Hrs}$$

$$\text{Friday 10 am} + 16 \text{ hrs} = \text{Saturday 2am}$$

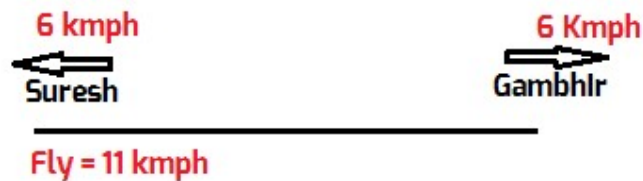
$$0.2 \times 60 \text{ min} = 12 \text{ min}$$

So Saturday 2.12 min AM

12. Suresh Raina and Gautam Gambhir after a scintillating IPL match decide to travel by cycle to their respective villages. Both of them start their journey travelling in opposite directions. Each of their speeds is 6 miles per hour. When they are at a distance of 50 miles, a housefly starts flying from Suresh Raina's cycle towards Gautam Gambhir at a relative speed of 17 miles per hour with respect to Raina's speed. What will be the time taken by housefly to reach Gambhir?

- a. 10 hrs
- b. 15 hrs
- c. 20 hrs
- d. 25 hrs

Sol:



Fly speed is 17 kmph w.r.t to suresh as fly is moving in opposite direction to suresh, its actual speed is  $17 - 6 = 11$ .

$$\text{Now relative speed of fly and gambhir} = 11 - 6 = 5 \text{ kmph}$$

$$\text{So fly takes} = \frac{50}{11 - 6} = 10 \text{ Hrs}$$

**TCS Ninja, Digital, NQT placement questions - 16**

1. The value of diamond varies directly as the square of its weight. If a diamond falls and breaks into two pieces with weights in the ratio 2:3. what is the loss percentage in the value?

Sol: Let weight be "x"

the cost of diamond in the original state is proportional to  $x^2$

when it is fallen it breaks into two pieces  $2y$  and the  $3y$

$$x = 5y$$

$$\text{Original value of diamond} = (5y)^2 = 25y^2$$

$$\text{Value of diamond after breakage} = (2y)^2 + (3y)^2 = 4y^2 + 9y^2 = 13y^2$$

$$\text{so the percentage loss will be} = \frac{25y^2 - 13y^2}{25y^2} \times 100 = 48\%$$

2. Five college students met at a party and exchanged gossips. Uma said, "Only one of us is lying". David said, "Exactly two of us are lying". Thara said, "Exactly 3 of us are lying". Querishi said, "Exactly 4 of us are lying". Chitra said "All of us are lying". Which one was telling the truth?

a)David

b)Querishi

c)Chitra

d)Thara

Sol: As all are contradictory statements, it is clear that ONLY one of them is telling the truth. So remaining 4 of them are lying. Querishi mentioned that exactly 4 are lying. So, he is telling the truth.

Explanation: Let us 1st assume that Uma is telling the truth. Then according to her only one is lying. But if only one is lying then all the others' statements are contradicting the possibility. In the same way all the other statements should be checked. If we assume the Querishi is telling the truth, according to him exactly 4 members are lying. So all the others are telling lies and he is the one who is telling the truth. This case fits perfectly.

3. Cara, a blue whale participated in a weight loss program at the biggest office. At the end of

every month, the decrease in weight from original weight was measured and noted as 1, 2, 6, 21, 86, 445, 2676. While Cara made a steadfast effort, the weighing machine showed an erroneous weight once. What was that.

a) 2676

b) 2

c) 445

d) 86

SOL: This is a number series problem nothing to do with the data given.

$$1 \times 1 + 1 = 2$$

$$2 \times 2 + 2 = 6$$

$$6 \times 3 + 3 = 21$$

$$21 \times 4 + 4 = 88 \text{ and not } 86$$

$$88 \times 5 + 5 = 445$$

$$445 \times 6 + 6 = 2676$$

4. The letters in the word ADOPTS are permuted in all possible ways and arranged in alphabetical order then find the word at position 42 in the permuted alphabetical order?

a) AOTDSP

b) AOTPDS

c) AOTDPS

d) AOSTPD

SOL:

In alphabetical order : A D O P S T

A \_ \_ \_ \_ : the places filled in 5! ways = 120, But we need a rank less than 120. So the word starts with A.

A D \_ \_ \_ : empty places can be filled in 4!=24

A O \_ \_ \_ : the places filled with 4! ways = 24. If we add 24 + 24 this total crosses 42. So We

should not consider all the words starting with AO.

A O D \_ \_ \_ :  $3! = 6$

A O P \_ \_ \_ :  $3! = 6$

Till this 36 words are obtained, we need the 42nd word.

AOS \_ \_ \_ :  $3! = 6$

Exactly we are getting the sum 42. So last 3 letters in the descending order are TPD.

So given word is AOSTPD

4. A man who goes to work long before sunrise every morning gets dressed in the dark. In his sock drawer he has 6 black and 8 blue socks. What is the probability that his first pick was a black sock, but his second pick was a blue sock?

SOL: This is a case of without replacement. We have to multiply two probabilities. 1. Probability of picking up a black sock, and probability of picking a blue sock, given that first sock is black.

$${}^6C_1 \times {}^{14}C_1 = 6 \times 14 = 84$$

5. There are 6 red balls, 8 blue balls and 7 green balls in a bag. If 5 are drawn with replacement, what is the probability at least three are red?

Sol: At least 3 reds means we get either : 3 red or 4 red or 5 red. And this is a case of replacement.

case 1 : 3 red balls :  $\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21} \times \frac{15}{21}$

case 2 : 4 red balls :  $\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21}$

case 3 : 5 red balls :  $\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21}$

$$\begin{aligned} \text{Total probability} &= \left( \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21} \times \frac{15}{21} \right) + \left( \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21} \right) + \\ &\left( \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \right) \\ &= \frac{312}{16807} \end{aligned}$$

6. Total number of 4 digit number do not having the digit 3 or 6.

Sol:

consider 4 digits \_ \_ \_ \_

1st blank can be filled in  ${}^7C_1$  ways (0,3,6 are neglected as the first digit should not be 0)

2nd blank can be filled in  ${}^8C_1$  ways (0 considered along with 1,2,4,5,7,8,9)

3rd blank can be filled in  ${}^8C_1$  ways

4th blank can be filled in  ${}^8C_1$  ways

Therefore total 4 digit number without 3 or 6 is  $7 \times 8 \times 8 \times 8 = 3584$

7. Find the missing in the series: 70, 54, 45, 41, \_\_\_\_.

Sol: 40

$$70 - 54 = 16 = 4 \times 4$$

$$54 - 45 = 9 = 3 \times 3$$

$$45 - 41 = 4 = 2 \times 2$$

$$41 - 40 = 1 = 1 \times 1$$

8. A school has 120, 192 and 144 students enrolled for its science, arts and commerce courses.

All students have to be seated in rooms for an exam such that each room has students of only the same course and also all rooms have equal number of students. What is the least number of rooms needed?

Sol: We have to find the maximum number which divides all the given numbers so that number of rooms get minimized. HCF of 120, 192 & 144 is 24. Each room have 24 students of the same course.

$$\text{Then rooms needed } \frac{120}{24} + \frac{192}{24} + \frac{144}{24} = 5 + 8 + 6 = 19$$

9. A farmer has a rose garden. Every day he picks either 7, 6, 24 or 23 roses. When he plucks these number of flowers the next day 37, 36, 9 or 18 new flowers bloom. On Monday he counts



189 roses. If he continues on his plan each day, after some days what can be the number of roses left behind? (Hint : Consider number of roses remaining every day)

a)7

b)4

c)30

d)37

Sol:

let us consider the case of 23. when he picks up 23 roses the next day there will be 18 new, so in this case., 5 flowers will be less every day. So when he counts 189, the next day 184,

179,174,169,.....

finally the no. of roses left behind will be 4.

10. What is the 32nd word of "WAITING" in a dictionary?

Sol: Arranging the words of waiting in Alphabetical Order : A,G,I,I,N,T,W

Start with A\_ \_ \_ \_ \_ This can be arranged in  $6!/2!$  ways= $720/2=360$  ways

so can't be arranged starting with A alone as it is asking for 32nd word so it is out of range

AG\_ \_ \_ \_ \_ then the remaining letters can be arranged in  $5!/2!$  ways so,  $120/2=60$  ways. Out of range as it has to be within 32 words.

AGI\_ \_ \_ \_ Now the remaining letters can be arranged in  $4!$  ways =24

AGN\_ \_ \_ \_ can be arranged in  $4!/2!$  ways or 12 ways

so,  $24+12=36$ th word so out of range. So we should not consider all the words start with AGN

now AGNI\_ \_ \_ can be arranged in  $3!$  ways =6 ways

so  $24+6=30$  within range

Now only two word left so, arrange in alphabetical order.

AGNTIIW - 31st word

AGNTIWI - 32nd word

## TCS Ninja, Digital, NQT Latest Placement Questions with solutions - 17

1. A manufacturer of chocolates makes 6 different flavors of chocolates. The chocolates are sold in boxes of 10. How many "different" boxes of chocolates can be made?

Sol:

If  $n$  similar articles are to be distributed to  $r$  persons,  $x_1 + x_2 + x_3 + \dots + x_r = n$  each person is eligible to take any number of articles then the total ways are  ${}^{n+r-1}C_{r-1}$

In this case  $x_1 + x_2 + x_3 + \dots + x_6 = 10$

in such a case the formula for non negative integral solutions is  ${}^{n+r-1}C_{r-1}$

Here  $n = 6$  and  $r = 10$ . So total ways are  ${}^{10+6-1}C_{6-1} = {}^{15}C_5 = 3003$

2. In a single throw with two dice, find the probability that their sum is a multiple either of 3 or 4.

a.  $1/3$

b.  $1/2$

c.  $5/9$

d.  $17/36$

Sol: Their sum can be 3, 4, 6, 8, 9, 12

For two dice, any number from 2 to 7 can be get in  $(n-1)$  ways and any number from 8 to 12 can be get in  $(13 - n)$  ways.

Then possible ways are  $2 + 3 + 5 + 5 + 4 + 1 = 20$  possible cases.

So probability is  $(20/36) = (5/9)$

3. B alone can do piece of work in 10 days. A alone can do it in 15 days. If the total wages for the work is Rs 5000, how much should B be paid if they work together for the entire duration of the work?

a. 2000

b. 4000

c. 5000

d. 3000

Sol:

Time taken by A and B is in the ratio of = 3:2

Ratio of the Work = 2 : 3 (since, time and work are inversely proportional)

Total money is divided in the ratio of 2 : 3 and B gets Rs.3000

4. On a 26 question test, 5 points were deducted for each wrong answer and 8 points were added for right answers. If all the questions were answered how many were correct if the score was zero.

a. 10

b. 11

c. 13

d. 12

Sol:

Let x ques were correct. Therefore, (26- x) were wrong

$$8x - 5(26 - x) = 0$$

Solving we get x=10

5. Arun makes a popular brand of ice cream in a rectangular shaped bar 6cm long, 5cm wide and 2cm thick. To cut costs, the company had decided to reduce the volume of the bar by 19%. The thickness will remain same, but the length and width will be decreased by some percentage. The new width will be,

a. 5.5

b. 4.5

c. 7.5

d. 6.5

Sol:

$$\text{Volume} = l \times b \times h = 6 \times 5 \times 2 = 60 \text{ cm}^3$$

Now volume is reduced by 19%.

Therefore, new volume =  $(100-19)100 \times 60 = 48.6(100-19)100 \times 60 = 48.6$

Now, thickness remains same and let length and breadth be reduced to x%

so, new volume:  $(x100 \times 6)(x100 \times 5)^2 = 48.6(x100 \times 6)(x100 \times 5)^2 = 48.6$

Solving we get  $x = 90$

thus length and width is reduced by 10%

New width =  $5 - (10\% \text{ of } 5) = 4.5$

6. If all the numbers between 11 and 100 are written on a piece of paper. How many times will the number 4 be used?

Sol: We have to consider the number of 4's in two digit numbers. \_ \_

If we fix 4 in the 10th place, unit place be filled with 10 ways. If we fix 4 in units place, 10th place be filled with 9 ways (0 is not allowed)

So total 19 ways.

**Alternatively:**

There are total 9 4's in 14, 24, 34...,94

& total 10 4's in 40,41,42....49

thus,  $9+10=19$ .

7. If twenty four men and sixteen women work on a day, the total wages to be paid is 11,600. If twelve men and thirty seven women work on a day, the total wages to be paid remains the same. What is the wages paid to a man for a day's work?

Sol: Let man daily wages and woman daily wages be M and W respectively

$$24M + 16W = 11600$$

$$12M + 37W = 11600$$

solving the above equations gives  $M=350$  and  $W=200$

8. The cost price of a cow and a horse is Rs 3 lakhs. The cow is sold at 20% profit and the horse is sold at 10% loss. Overall gain is Rs 4200. What is the cost price of the cow?

Sol:

$$\text{Profit} = 4200$$

$$\text{Profit} = \text{SP} - \text{CP}$$

$$4200 = \text{SP} - 300000 \text{ therefore } \text{SP} = 304200$$

$$x + y = 300000$$

$$1.2x + 0.9y = 304200$$

Solving for  $x = 114000 = \text{CP of cow.}$

9. 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 4.....

In the above sequence what is the number of the position 2888 of the sequence.

a) 1

b) 4

c) 3

d) 2

Sol: First if we count 1223334444. they are 10

In the next term they are 20

Next they are 30 and so on

$$\text{So Using } n(n+1)2 \times 10 \leq 2888 \quad n(n+1)2 \times 10 \leq 2888$$

For  $n = 23$  we get LHS as 2760. Remaining terms 128.

Now in the 24th term, we have 24 1's, and next 48 terms are 2's. So next 72 terms are 3's.

The 2888 term will be "3".

10. How many 4-digit numbers contain no.2?

Sol: Total number of four digit numbers = 9000 (i.e 1000 to 9999 )

We try to find the number of numbers not having digit 2 in them.

Now consider the units place it can be selected in 9 ways (i.e 0,1,3,4,5,6,7,8,9)

Tens place it can be selected in 9 ways (i.e 0,1,3,4,5,6,7,8,9)

Hundreds place it can be selected in 9 ways (i.e 0,1,3,4,5,6,7,8,9)

Thousands place can be selected in 8 ways (i.e 1,3,4,5,6,7,8,9) here '0' cannot be taken

Total number of numbers not having digit 2 in it =  $9 \times 9 \times 9 \times 8 = 5832$

Total number of numbers having digit 2 in it =  $9000 - 5832 = 3168$

## TCS Ninja, Digital, NQT Placement Questions with solutions - 18

1. 2ab5 is a four digit number divisible by 25. If a number formed from the two digits ab is a multiple of 13, then ab is

- a. 52
- b. 45
- c. 10
- d. 25

Sol: For a number to be divisible by 25, last two digits of that number should be divisible by 25. So b must be either 2 or 7

it is given that ab must be divisible by 13 and in the options only 52 is divisible by 13.

2. The average temperature of Tuesday Wednesday and Thursday was 37 C. The average temperature of Wednesday and Thursday and Friday was 38 C. if the temperature on Friday was 39 C.

Find the temperature on Tuesday.

- a. 37.33
- b. 38.33
- c. 36

d. None of the above

Sol:

$$(\text{Tues} + \text{Wed} + \text{Thurs})/3=37$$

$$\text{Tues} + \text{Wed} + \text{Thurs}=111...(1)$$

$$(\text{Wed} + \text{Thurs} + \text{Fri})/3=38$$

$$(\text{Wed} + \text{Thurs} + \text{Fri}) =114...(2)$$

Given friday is 39.

$$\text{Then, } (2) - (1) \text{ Fri} - \text{Tues} = 3$$

$$\text{So } 39 - \text{Tues} = 3$$

$$\text{Tuesday} =36$$

3. There are 5 boxes in a cargo. The weight of the 1st box is 200 KG, the weight of the 2nd box is 20% higher than the third box, whose weight is 25% higher than the 1st box weight. The 4th box which weighs 350 KG is 30% lighter than the 5th box. Find the difference in average weight of the 4 heaviest boxes and the four lightest boxes.

Sol: weight of 1st box=200

$$\text{weight of 3rd box}=(125/100)*200=250$$

$$\text{weight of 2nd box}=(120/100)*250=300$$

$$\text{weight of 4th box} =350$$

$$\text{weight of 5th box}=(10/7)*350=500$$

$$\text{average of 4 highest weighted boxes}=(500+350+300+250)/4=350$$

$$\text{average of 4 lightest boxes}=(350+300+250+200)/4=275$$

$$\text{therefore difference}=350-275=75$$

4. The length, breadth and height of a room are in the ratio 3:2:1. If the breadth and height are halved, while the length is doubled. Then the total area of the 4 walls of the room will be decreased by

a. 30%

b. 18.75%

c. 15%

d. 13.6%

Sol: Given  $l:b:h=3:2:1$

let  $h=10$ ,  $b = 20$ , and  $l = 30$

$$\text{area} = 2(l+b)h$$

$$\text{area} = 2(30+20)10 = 1000$$

Now after those adjustments in the measurements,

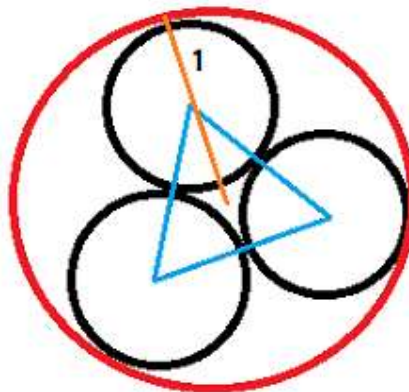
$$l=60, b=10, h=5$$

$$\text{area} = 2(l+b)h = 2(60+10)5 = 700$$

$$\text{Percentage decrease} = \frac{1000 - 700}{1000} \times 100 = 30\%$$

5. A circle circumscribes three unit circles that touch each other. What is the area of the larger circle? Note that  $p$  is the ratio of the circumference to the diameter of a circle (3.14159265).

Sol:



By joining centers of 3 unit circles we will get an equilateral triangle of length 2 unit. We have to find the length of the orange line.

And center of the equilateral triangle will be the center of the big circle.

So radius of the big circle will be = (1 + Circum radius of the equilateral triangle)



Formula for Circul radius of the equilateral triangle =  $\frac{23 \times (\sqrt{3}a)}{23 \times (32a)}$  here  $\sqrt{3}a$  is the height of the triangle. a is the side of the triangle

Circum radius of equilateral triangle =  $\frac{23 \times \sqrt{3}}{2 \times 2} = \frac{23 \times 32 \times 2}{23}$

Area of big circle will be

$$\begin{aligned} \pi r^2 &= 3.14 \times (1 + 2\sqrt{3})^2 \pi r^2 = 3.14 \times (1 + 23)^2 = 3.14 \times (1 + 4\sqrt{3} + 43) = 3.14 \times (1 + 43 + 43) \\ &= 3.14 \times (1 + 4\sqrt{3} + 43) = 3.14 \times (1 + 43 + 43) = 3.14 \times (73 + 4\sqrt{3}) = 3.14 \times (73 + 43) \\ &= 3.14 \times (7 + 4\sqrt{3}) = 3.14 \times (7 + 43) \end{aligned}$$

6. Rajesh calculated his average over the last 24 tests and found it to be 76. He finds out that the marks for three tests have been inverted by mistake. The correct marks for these tests are 87, 79 and 98. What is the approximate percentage difference between his actual average and his incorrect average?

Sol: No Change

Incorrect value is: 78, 97, 89

correct values are: 87, 79, 98

difference between correct and incorrect value is =  $9 + 9 - 18 = 0$

7. Joke is faster than Paul, Joke and Paul each walk 24 KM. The sum of their speed is 7 Km per hour.

And the sum of times taken by them is 14 hours. Then, Joke speed is

a. 3 KM/Hr

b. 4 KM/Hr

c. 5 KM/Hr

d. 7 KM/Hr

Sol:

Speed = Distance / Time

let the speed of joke x then speed of paul will be 7-x

$$24x + 24(7-x) = 14 \times 24$$

Try to plugin the values from the options. If Joke speed is 4 the paul is 3.

8. The crew of a rowing team of 8 members is to be chosen from 12 men ( $M_1, M_2, \dots, M_{12}$ ) and 8 women ( $W_1, W_2, \dots, W_8$ ), such that there are two rows, each row occupying one the two sides of the boat and that each side must have 4 members including at least one women. Further it is also known  $W_1$  and  $M_7$  must be selected for one of its sides while  $M_2, M_3$  and  $M_{10}$  must be selected for other side. What is the number of ways in which rowing team can be arranged.

Sol:

We need two person for one side and 1 women for the another side. We select that women in 7 ways. Now that second side people can sit in  $7 \times 4!$  ways.

Now for the first side we need two people from the remaining 14. So this can be done in  ${}^{14}C_2 {}^{14}C_2$  ways and this side people can sit in  $4C_2 \times 4! {}^{14}C_2 \times 4!$  ways.

Again the first group may take any of the two sides. So total ways are  $2 \times 7 \times 4! \times {}^{14}C_2 \times 4! \times 2 \times 7 \times 4! \times {}^{14}C_2 \times 4!$

9. In a certain city, 60% of the registered voters are congress supporters and the rest are BJP supporters. In an assembly election, if 75% of the registered congress supporters and 20% of the registered BJP supporters are expected to vote for candidate A, what percent of the registered voters are expected to vote for candidate A?

Sol: let the people in the city be 100

Congress supporters = 60% of 100 = 60

40% are BJP = 40% of 100 = 40

out of 60, 75% voted for congress =  $75\%(60) = 45$

out of 40, 20% voted for congress =  $20\%(40) = 8$

Total =  $45 + 8 = 53$

Total percent = 53%

10. Anusha, Banu and Esha run a running race of 100 meters. Anusha is the fastest followed by Banu and then Esha. Anusha, Banu and Esha maintain constant speeds during the entire race. When Anusha reached the goal post, Banu was 10m behind. When Banu reached the goal post Esha was 10m behind. How far was behind Anusha when the latter reached the goal post.

option

a) 70

b) 81

c) 90

d) 80

Sol:

By that time Anusha covered 100m, Bhanu covered 90m. So ratio of their speeds = 10 : 9

By that time Bhanu reached 100m, Esha covered 90m. So ratio of their speeds = 10 : 9

Ratio of the speed of all the three = 100 : 90 : 81

By that time Anusha covered 100m, Esha Covers only 81.

11. Seven different objects must be divided among three persons. In how many ways this can be done if at least one of them gets exactly one object.

Sol: Division of  $m+n+p$  objects into three groups is given

by  $(m+n+p)!/m! \times n! \times p! (m+n+p)!/m! \times n! \times p!$

But  $7 = 1 + 3 + 3$  or  $1 + 2 + 4$  or  $1 + 1 + 5$

So The number of ways

are  $(7)!/1! \times 3! \times 3! \times 12! (7)!/1! \times 3! \times 3! \times 12! + (7)!/1! \times 2! \times 4! (7)!/1! \times 2! \times 4! + (7)!/1! \times 1! \times 5! \times 12! (7)!/1! \times 1! \times 5! \times 12! = 70 + 105 + 21 = 196$

12. George while driving along the highway saw road markers which are at equal distances from each other. He crosses the markers every 20 seconds. If he increases his speed by x meters per second, he crosses the markers at every 15 seconds. But if he increases his speed by y meters per

second, he crosses the marker at every 10th second. If  $y - x = 40$  meters per second, then what is the distance between two markers.

Sol: Let speed be  $=z$  m/s then Distance =  $20z$  m

$$(z+x)15=20z; (z+y)10=20z$$

Also given that  $y - x = 40$

solving we get  $20z=1200$

13. How many different 9 digit numbers can be formed from the number 223355888 by re-arranging its digits so that the odd digits occupy even position?

Sol: Odd places are 4 and these are occupied by 3355. So this can be done in  $4! / (2! 2!) = 6$

There are 5 even numbers which have to be placed at 5 odd places. So  $5! / (2! 3!) = 10$  ways

so total number of ways of arranging all these numbers are  $10 * 6 = 60$  ways

14. In a vessel, there are 10 litres of alcohol. An operation is defined as taking out five litres of what is present in the vessel and adding 10 litres of pure water to it. What is the ratio of alcohol to water after two operations?

a) 1 : 5

b) 2 : 3

c) 1 : 6

d) 3 : 2

Sol: Final concentration = Initial concentration  $(1 - \text{replacement quantity} / \text{final volume})$   
 $(1 - \text{replacement quantity} / \text{final volume})$

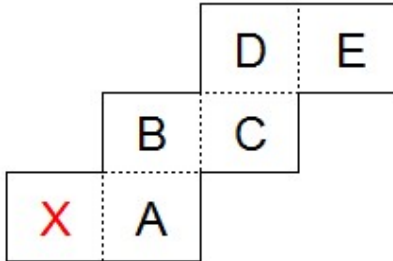
$$\text{Final concentration} = 1 \times (1 - 10/15) = 13/15 = 1 \times (1 - 10/15) = 13/15$$

$$\text{Final concentration} = 13/15 \times (1 - 10/20) = 16/15 \times (1 - 10/20) = 16/15$$

So ratio of alcohol : water = 1 : 5

**TCS Ninja, Digital, NQT latest Placement Questions - 19**

1. The figure shown can be folded into the shape of a cube. In the resulting cube, which of the lettered faces is opposite the face marked x?



a. c

b. a

c. d

d. b

Ans: a

Explanation: If you fold the above picture at the dotted lines, X and C are opposite to each other.

2. In how many ways a team of 11 must be selected from 5 men and 11 women such that the team must comprise of not more than 3 men?

a. 1565

b. 1243

c. 2256

d. 2456

Ans: C

Explanation;

The team may consist of 0 men + 11 women, 1 men + 10 women, 2 men + 9 women, or 3 men + 8 women.

So Number of ways are

$$= {}^{11}C_{11} + {}^5C_1 \times {}^{11}C_{10} + {}^5C_2 \times {}^{11}C_9 + {}^{11}C_{11} + {}^5C_1 \times {}^{11}C_{10} + {}^5C_2 \times {}^{11}C_9 + {}^5C_3 \times {}^{11}C_8 = 2256$$

3. Given that  $0 < a < b < c < d$ , which of the following the largest ?

a.  $(c+d) / (a+b)$

b.  $(a+d) / (b+c)$

c.  $(b+c) / (a+d)$

d.  $(b+d) / (a+c)$

Sol: A

Explanation: Take  $a = 1, b = 2, c = 3, d = 4$ . option A is clearly true.

4. Eesha bought 18 sharpeners for Rs.100. She paid 1 rupee more for each white sharpener than for each brown sharpener. What is the price of a white sharpener and how many white sharpener did she buy ?

a. Rs.5, 10

b. Rs.6, 10

c. Rs.5, 8

d. Rs.6, 8

Sol: B

Explanation: Just check the options. If she bought 10 white sharpeners at Rs.6 per piece, She has spent Rs.60 already. And with the remaining Rs.40, she bought 8 brown sharpeners at  $40/8 = \text{Rs.}5$  which is Rs.1 less than White sharpener.

5.

			7				x				8		
--	--	--	---	--	--	--	---	--	--	--	---	--	--

The fourteen digits of a credit card are to be written in the boxes shown above. If the sum of every three consecutive digits is 18, then the value of x is :

a. 3

b. cannot be determined from the given information.

c. 2

d. 1

Sol : A

Explanation:

Let us assume right most two squares are a , b

Then Sum of all the squares =  $18 \times 4 + a + b \dots\dots\dots (1)$

Also Sum of the squares before 7 = 18

Sum of the squares between 7, x = 18

and sum of the squares between x , 8 = 18

So Sum of the 14 squares =  $18 + 7 + 18 + x + 18 + 8 + a + b (2)$

Equating 1 and 2 we get  $x = 3$

6. Four people each roll a four die once. Find the probability that at least two people will roll the same number ?

a. 5/18

b. 13/18

c. None of the given choices

d. 1295/1296

Sol: B

Explanation:

The number of ways of rolling a dice where no two numbers probability that no one rolls the same number =  $6 \times 5 \times 4 \times 3$

Now total possibilities of rolling a dice =  $6^4$

The probability that a no one gets the same number =  $\frac{6 \times 5 \times 4 \times 3}{6^4} = \frac{518}{6^4} = \frac{518}{1296}$

So the probability that at least two people gets same number =  $1 - \frac{518}{1296} = \frac{1318}{1296}$

7. Jake can dig a well in 16 days. Paul can dig the same well in 24 days. Jake, Paul and Hari

together dig the well in 8 days. Hari alone can dig the well in

- a. 96 days
- b. 48 days
- c. 32 days
- d. 24 days

Sol:

Explanation: Simple one. Let the total work to be done is 48 meters. Now Jake can dig 3 mts, Paul can dig 2 mts a day. Now all of them combined dug in 8 days so per day they dug  $48/8 = 6$  mts. So Of these 6 mts, Hari capacity is 1 mt.

So he takes  $48 / 1 = 48$  days to complete the digging job.

**Updated :**

8. Eesha bought 18 sharpeners for Rs.100. She paid 1 rupee more for each white sharpener than for each brown sharpener. What is the price of a white sharpener and how many white sharpener did she buy ?

- a. Rs.5, 10
- b. Rs.6, 10
- c. Rs.5, 8
- d. Rs.6, 8

Ans:

Explanation: This question can be solved easily by going through options.

A. White sharpener total cost:  $\text{Rs.}5 \times 10 = \text{Rs.}50$ . Brown sharpeners cost =  $\text{Rs.}4 \times 8 = 32$ . Total cost is only Rs.82. Wrong option.

B. White sharpener total cost:  $\text{Rs.}6 \times 10 = \text{Rs.}60$ . Brown sharpeners cost =  $\text{Rs.}5 \times 8 = 40$ . Total cost is Rs.100. Correct option.



9. The sum of the digits of a three digit number is 17, and the sum of the squares of its digits is 109. If we subtract 495 from the number, we shall get a number consisting of the same digits written in the reverse order. Find the number.

- a. 773
- b. 683
- c. 944
- d. 863

Ans: D

Explanation: Check options. Sum of the squares should be equal to 109. Only Options B and D satisfying. When we subtract 495, only 863 becomes 368.

10. Mark told John "If you give me half your money I will have Rs.75. John said, "if you give me one third of your money, I will have Rs.75/- How much money did John have ?

- a. 45
- b. 60
- c. 48
- d. 37.5

Ans: B

Explanation: Let the money with Mark and John are M and J respectively.

Now

$$M + J/2 = 75$$

$$M/3 + J = 75$$

Solving we get M = 45, and J = 60.

11. Eesha has a wheat business. She purchases wheat from a local wholesaler of a particular cost per pound. The price of the wheat of her stores is \$3 per kg. Her faulty spring balance reads 0.9 kg for a KG. Also in the festival season, she gives a 10% discount on the wheat. She

found that she made neither a profit nor a loss in the festival season. At what price did Eesha purchase the wheat from the wholesaler ?

- a. 3
- b. 2.5
- c. 2.43
- d. 2.7

Ans: C

Explanation: Faulty spring balance reads 0.9 kg for a kg" means that she sells 1 kg for the price of 0.9 kgs, so she loses 10% of the price because of the faulty spring balance. She loses another 10% because of the discount.

So, she actually sells 1 kg for  $\$3 \times 0.9 \times 0.9 = \$2.43$  and since at that price she made neither a profit nor a loss, then Eesha purchase the wheat from the wholesaler for \$2.43.

12. Raj goes to market to buy oranges. If he can bargain and reduce the price per orange by Rs.2, he can buy 30 oranges instead of 20 oranges with the money he has. How much money does he have ?

- a. Rs.100
- b. Rs.50
- c. Rs.150
- d. Rs.120

Ans: D

Explanation: Let the money with Raj is M. So  $M/20 - M/30 = 2$ . Check options. Option D satisfies.

13. A city in the US has a basketball league with three basketball teams, the Aziecs, the Braves and the Celtics. A sports writer notices that the tallest player of the Aziecs is shorter than the shortest player of the Braves. The shortest of the Celtics is shorter than the shortest of the

Aziecs, while the tallest of the Braves is shorter than the tallest of the Celtics. The tallest of the Braves is taller than the tallest of the Aziecs.

Which of the following can be judged with certainty ?

X) Paul, a Brave is taller than David, an Aziec

Y) David, a Celtic, is shorter than Edward, an Aziec

- a. Both X and Y
- b. X only
- c. Y only
- d. Neither X nor Y

Ans: B

Sol: We solve this problem by taking numbers. Let the shortest of Braves is 4 feet. Then tallest of Aziecs is less than 4. So let it be 3 feet.

A -> 2 - 3

B -> 4 - 6

C -> 1 - 7

From the above we can safely conclude X is correct. but Y cannot be determined.

14. There are 3 classes having 20, 24 and 30 students respectively having average marks in an examination as 20, 25 and 30 respectively. The three classes are represented by A, B and C and you have the following information about the three classes.

- a. In class A highest score is 22 and lowest score is 18
- b. In class B highest score is 31 and lowest score is 23
- c. In class C highest score is 33 and lowest score is 26.

If five students are transferred from A to B, what can be said about the average score of A; and

what will happen to the average score of C in a transfer of 5 students from B to C ?

- a. definite decrease in both cases
- b. can't be determined in both cases
- c. definite increase in both cases
- d. will remain constant in both cases

Ans: B

Explanation:

Class A average is 20. And their range is 18 to 22

Class B average is 25. And their range is 23 to 31

Class A average is 30. And their range is 26 to 33

If 5 students transferred from A to B, A's average cannot be determined but B's average comes down as the highest score of A is less than lowest score of B.

If 5 students transferred from B to C, C's average cannot be determined the B's range of marks and C's range of marks are overlapping.

15. The value of a scooter depreciates in such a way that its value at the end of each year is  $\frac{3}{4}$  of its value at the beginning of the same year. If the initial value of the scooter is Rs.40,000, what is the value at the end of 3 years ?

- a. Rs.13435
- b. Rs.23125
- c. Rs.19000
- d. Rs.16875

Ans: D

Explanation:  $40,000 \left(\frac{3}{4}\right)^3 = 16875$

16. Rajiv can do a piece of work in 10 days, Venky in 12 days and Ravi in 15 days. They all start the work together, but Rajiv leaves after 2 days and Venky leaves 3 days before the work is

completed. In how many days is the work completed ?

- a. 5
- b. 6
- c. 9
- d. 7

Ans: D

Explanation: Let the work be 60 units. If venky leave 3 days before the work, Last 3 days must be worked by Ravi. So the remaining days of work be x days, total days to complete the work be x + 3 days.

Now Capacities of Rajiv is  $60/10 = 6$ , Venky is 5, Ravi is 4.

$$(6 + 5 + 4) 2 + (5 + 4) (x - 3) + 4 \times 3 = 60.$$

$$30 + 9x - 27 + 12 = 60$$

$$9x - 15 = 30$$

$$9x = 45$$

$$x = 5$$

So total days to complete the work =  $2 + 5 = 7$  days.

17. A man has a job, which requires him to work 8 straight days and rest on the ninth day. If he started work on Monday, find the day of the week on which he gets his 12th rest day.

- a. Thursday
- b. Wednesday
- c. Tuesday
- d. Friday

Ans: B

Explanation:

He works for 8 days and takes rest on the 9th day. So On the 12th rest day, there are  $9 \times 12 = 108$  days passed. Number of odd days =  $(108 - 1) / 7 = 107 / 7 = 2$ . So the 12th rest day is

wednesday.

18. On a 26 question test, five points were deducted for each wrong answer and eight points were added for each correct answer. If all the questions were answered, how many were correct, if the score was zero ?

- a. 10
- b. 12
- c. 11
- d. 13

Ans: A

Explanation:

Take options and check. If 10 are correct, his score is  $10 \times 8 = 80$ . But 16 are wrong. So total negative marking is  $16 \times 5 = 80$ . So final score is zero.

## TCS Ninja, Digital, NQT placement questions - 20

1. problemsolvingproblemsolvingprob . . . . . Find the 2015th term in the series?

Sol.

Problemsolving = 14 letter word. So divide 2015 by 14 and find the remainder. Here remainder is 13. so 13th letter in problemsolving is 'n'

2. 4 men can check exam papers in 8 days working 5 hours regularly. What is the total hours when 2 men will check the double of the papers in 20 days?

Sol.

Let a man can do 1 unit of work in 1 hour.

Total units of work =  $4 \times 8 \times 5 = 160$  units.

Now work =  $2 \times 160 = 320$  units.

Now 2 men work for 20 days. Let in x hours they have to work per day.

Now total work =  $2 \times x \times 20 = 40x$

$$40x = 320 \text{ So } x = 320/40 = 8 \text{ hours.}$$

3.  $X = 101102103104105106107.....146147148149150$  (From numbers 101-150). Find out the remainder when this number is divided by 9.

Sol:

The divisibility rule for 9 is sum of the digits is to be divisible by 9. So

We calculate separately, sum of the digits in hundreds place, tenths place, and units place.

Sum of the digits in hundreds place:  $1 \times 50 = 50$

Sum of the digits in tenths place :  $0 \times 9 + 1 \times 10 + 2 \times 10 + 3 \times 10 + 4 \times 10 + 5 \times 1 = 105$

Sum of the digits in units place :  $(1 + 2 + 3 + ... + 9) \times 5 = 225$

So total = 380

So remainder =  $380 / 9 = 2$

4. A number is  $101102103104...150$ . As  $101 \ 102 \ 103 \ 103.... \ 150$ . What is reminder when divided by 3?

Sol. Divisibility rule for 3 also same as 9. so from the above discussion sum of the digits = 380 and remainder =  $380/3 = 2$ .

5. In 4 years, Raj's father age twice as raj, Two years ago, Raj's mother's age twice as raj. If Raj is 32yrs old in eight yrs from now, what is the age of Raj's mother and father?

Sol. Raj present age =  $32 - 8 = 24$ .

After 4 years Raj's age is 28. and Raj's fathers age is  $28 \times 2 = 56$ , and his present age is 52.

Two years ago, Raj's age is 22. and his mother's age is  $22 \times 2 = 44$ . His mother's present age = 46

6.  $7^1 + 7^2 + 7^3 + ..... + 7^{205}$ . Find out how many numbers present which unit place contain 3?

Sol. Units digits of first 4 terms are 7, 9, 3, 1. and this pattern repeats. So for every 4 terms we get one term with 3 in its unit digit. So there are total of  $205/4 = 51$  sets and each set contains one terms

with 3 in its unit digit.

Ans is 51.

7. In paper A, one student got 18 out of 70 and in paper B he got 14 out of 30. In which paper he did fare well?

Sol. Find the percentages. Paper A =  $18/70 \times 100 = 25.7$

Paper B =  $14/30 \times 100 = 46.6$

8. Find the total no of divisors of 1728 (including 1 and 1728)

Sol. Direct formula from our lesson on factors. [Click Here](#).

The number of factors or divisors of a number  $N = a_p \cdot b_q \cdot c_r \dots$   $N = a_p \cdot b_q \cdot c_r \dots = (p+1) \cdot (q+1) \cdot (r+1) \dots$  where  $a, b, c \dots$  prime numbers.

$$1728 = 2^6 \times 3^3 \times 2^6 \times 3^3$$

$$\text{So total number of divisors} = (6 + 1) \cdot (3 + 1) = 28$$

9. The sum of two numbers is 45. Sum of their quotient and reciprocal is 2.05, Find the product of the numbers.

Sol: Let  $a, b$  be the numbers.

$$a + b = 45$$

$$ab + baab + ba = 2.05$$

$$\Rightarrow a^2 + b^2 ab \Rightarrow a^2 + b^2 ab = 2.05$$

$$\Rightarrow (a+b)^2 - 2abab = 2.05 \Rightarrow (a+b)^2 - 2abab = 2.05$$

$$\Rightarrow (a+b)^2 \Rightarrow (a+b)^2 = 2.05ab + 2ab = 4.05ab$$

$$\Rightarrow \Rightarrow ab = 45^2 / 4.05 = 500$$

10. A number is divided by 406 leaves remainder 115 , What will be the remainder when it will be divided by 29?

Sol. Let the number be  $N$ .



So  $N = 406x + 115$ .

Now divide this number by 29. As 406 is exactly divisible by 29, we have to divide 115 by 29 and find the remainder. So remainder = 28

11.  $(p/q - q/p) = 21/10$ . Then find  $4p/q + 4q/p$ ?

sol.

Let  $p/q = a$ , then  $(a - 1/a) = 21/10$

$$\Rightarrow a^2 - 1 = a \cdot \frac{21}{10} \Rightarrow a^2 - 1 = a \cdot \frac{21}{10}$$

$$\Rightarrow 10a^2 - 21a - 10 = 0$$

Roots of the equation =  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$a = \frac{21 \pm \sqrt{441 + 400}}{20}$$

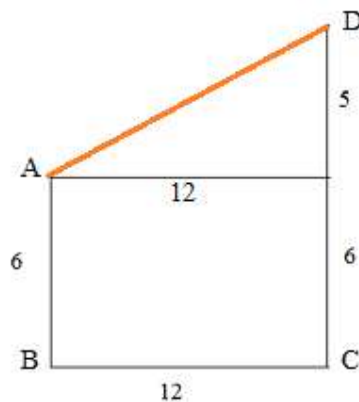
$$a = \frac{21 \pm 29}{20} = \frac{5}{2} \text{ or } -\frac{2}{5}$$

For  $a = 5/2$ ,  $4p/q + 4q/p = 58/5$

For  $a = -2/5$ ,  $4p/q + 4q/p = -58/5$

12. Two vertical ladders length of 6 m and 11 m are kept vertically at a distance of 12 m. Find the top distance of both ladders?

Sol:

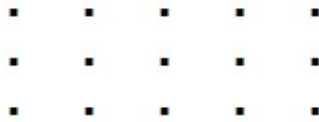


$$\text{So distance between the top points} = AD = \sqrt{12^2 + 5^2} = 13$$

So in paper B he did well.

**Updated:**

13.



Here is 15 dots. If you select 3 dots randomly, what is the probability that 3 dots make a triangle?

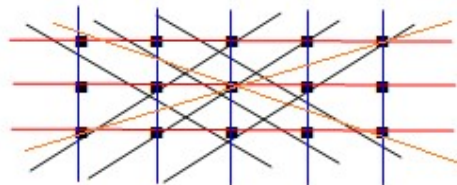
a. 440/455

b. 434/455

c. 449/455

d. 438/455

Sol.



I think there seem some problem with this question. Total ways of selecting 3 dots out of 15 is  ${}^{15}C_3 = 455$ . If 3 dots are collinear then triangle may not be formed. Now look at the above diagram. If we select any 3 dots from the red lines they may not form a triangle. They are  $3 \times {}^5C_3 = 30$ . If we select the three letters from blue lines, they may not form a triangle. They are in total 5 ways. Also there are 6 others lines which don't form a triangle. Also another two orange lines. Total =  $30 + 5 + 6 + 2 = 43$ . So we can form a triangle in  $455 - 43 = 412$ . So answer could be 412/455.

14. In a series of numbers , the next number is formed by adding 1 to the sum of the previous numbers, and the 10th number is 1280. Then what is the first number in the series? (series will be like this  $x, x+1, (x+(x+1))+1, \dots$  )

a. 1

b. 4

c. 5

d. None of these

Answer: Option B

Sol.

The given series is  $x, x + 1, 2x + 2, 4x + 4, \dots$

If you observe the pattern here, the coefficient of  $x + 1$  is in the powers of 2. So 4th term has a power of 2, 5th term has a power of 3... 10th term has a power of 8. So tenth term would be  $2^8 2^8(x + 1)$   
 $= 256(x+1)$ .

Given  $256(x+1) = 1280$

$x = 4$ .

15. The number of multiples of 10 which are less than 1000, which can be written as a sum of four consecutive integers is

a. 50

b. 100

c. 150

d. 216

Answer: Option A

Sol:

We can write  $10 = 1 + 2 + 3 + 4$ . So we have to find how many multiples of 10 can be written in this manner.

Let the first of the four numbers be  $n$ . So

$$n + (n+1) + (n+2) + (n+3) = 10k$$

$$4n + 6 = 10k$$

$$2n + 3 = 5k$$

$$n = 5k - 325k - 32 = 2k - 1 + k - 12k - 12$$

So  $n$  is integer for  $k =$  an odd number. So for  $k = 1, 3, 5, \dots, 99$  we can write a number as a sum of four consecutive integers.

So there are 50 numbers.

16. Mr. Bean chooses a number and he keeps on doubling the number followed by subtracting one from it, if he chooses 3 as initial number and he repeats the operation for 30 times then what is the final result?

- a.  $(2^{30}) - 1$
- b.  $(2^{30}) - 2$
- c.  $(2^{31}) - 1$
- d.  $(2^{31}) - 2$

Ans: No option

Sol:

$$\text{Step 1: } (3 \times 2) - 1 = 5 (2^2 + 1)$$

$$\text{Step 2: } (5 \times 2) - 1 = 9 (2^3 + 1)$$

$$\text{Step 3: } (9 \times 2) - 1 = 17 (2^4 + 1)$$

$$\text{Step 4: } (17 \times 2) - 1 = 33 (2^5 + 1)$$

So After 30 steps we have  $2^{31} + 1$

17. Tony alone can paint a wall in 7 days and his friend Roy alone can paint the same wall in 9 days.

In how many days they can paint the wall working together? Round off the answer to the nearest integer.

- a. 3
- b. 4
- c. 5
- d. 7

Answer: Option B

Sol. use formula  $(xy / x+y)$

So nearest value for  $3.93 = 4$

18. In this question,  $A^B$  means A raised to the power B. Let  $f(X)=1+X+x^2+....x^6$ . The remainder when  $f(X^7)$  is divided by  $f(X)$  is

- a. 0
- b. 6
- c. 7
- d. None of the other 3 choices.

Answer: C

Explanation:

Given that  $f(x^7)=1+x^7+(x^7)^2f(x^7)=1+x^7+(x^7)^2 +$

$....+(x^7)^6(x^7)^6 = 1+x^7+x^{14}+....+x^{42}1+x^7+x^{14}+....+x^{42}$

We will rewrite the above

equation,  $f(x^7)=1+(x^7-1)+(x^{14}-1)+f(x^7)=1+(x^7-1)+(x^{14}-1)+... + (x^{42}-1)+6(x^{42}-1)+6$

We know that  $x^7-1=(x-1)(x^6+x^5+...1)x^7-1=(x-1)(x^6+x^5+...1)$

$(\because x^n-ax^n-an = (x-a)(x-a).(x^{n-1}+x^{n-2}.a+(x^{n-1}+x^{n-2}.a+x^{n-3}.a^2+....+a^{n-1}x^{n-3}.a^2+....+a^{n-1})$

Now It is clear that  $x^7-1x^7-1$  is exactly divisible by  $f(x)$ .

Also  $x^{14}-1=(x^7)^2-1x^{14}-1=(x^7)^2-1$  and  $x^7-1x^7-1$  is a factor of this

expression.  $(\because x^n-ax^n-an$  is always divisible by  $x-ax-a$

Similarly, we write  $x^{21}-1=(x^7)^3-1x^{21}-1=(x^7)^3-1$ ,  $x^{28}-1=(x^7)^4-1x^{28}-1=(x^7)^4-1$ ....

So remainder =  $1 + 6 = 7$

## TCS Ninja, Digital, NQT latest model placement questions - 21

1. How many of the numbers  $x$  ( $x$  being integer) with  $10 \leq x \leq 99$  are 18 more than the sum of their digits

- a. 9
- b. 12
- c. 18
- d. 10

Answer: d

Explanation:

Let the number be  $ab$ . So given that

$$\Rightarrow 10a + b = 18 + a + b$$

$$\Rightarrow 9a = 18$$

$$\Rightarrow a = 2$$

So 20, 21, ... upto 29 there are total 10 numbers possible.

2. Apples cost  $L$  rupees per kilogram for the first 30 kilograms and  $Q$  per kilogram for each additional kilogram. If the price paid for 33 kilograms of Apples is Rs.1167 and for 36 kilograms of apples is Rs.1284, then the cost of the first 10 kgs of apples is:

- a. Rs.117
- b. Rs.350
- c. Rs.281
- d. Rs.1053

Answer: b

Explanation:

Given that

$$30L + 3Q = 1167$$

$$30L + 6Q = 1284$$

Solving we get  $Q = 39$ ,  $L = 35$

So cost of first 10 kgs of apples =  $35 \times 10 = 350$

3. A conical tent is to accommodate 10 persons. Each person must have 6 sq.meter space to sit and 30 cubic meter of air to breathe. What will be the height of the cone?

- a. 150m
- b. 37.5 m
- c. 15 m
- d. 75 m

Answer: c

Explanation:

Each person needs 6 sq meter of space. So

$$\Rightarrow \pi r^2 = 6 \times 10 = 60 \quad \pi r^2 = 6 \times 10 = 60$$

$$\Rightarrow \pi r^2 \pi r^2 = 60$$

$$\text{Total volume of the tent} = 30 \times 10 = 300$$

$$\text{So } 13\pi r^2 h = 300 \quad 13\pi r^2 h = 300$$

$$\Rightarrow 13 \times 60 \times h = 300 \quad 13 \times 60 \times h = 300$$

$$\Rightarrow h = 15 \text{ m}$$

4. George and Mark can paint 720 boxes in 20 days, Mark and Harry in 24 days and Harry and George in 15 days. George works for 4 days, Mark for 8 days and Harry for 8 days. The total number of boxes painted by them is

- a. 252
- b. 516
- c. 348
- d. 492

Answer: c

Explanation:

Capacities of these people as follows

$$G + M = 720/20 = 36$$

$$M + H = 720/24 = 30$$

$$H + G = 720/15 = 48$$

$$\text{Adding all above we get } 2(G + M + H) = 114 \Rightarrow G + M + H = 114/2 = 57$$

Now individual capacities are given below

$$G = 27 ; M = 9; H = 21$$

$$\text{So } 27 \times 4 + 9 \times 8 + 21 \times 8 = 348$$

5. University of Vikramsila has enrolled nine PhD candidates. Babu, Chitra, Dheeraj , Eesha, Farooq, Gowri , Hameed, Iqbal, Jacob.

-Farooq and Iqbal were enrolled on the same day as each other, and no one else was enrolled that day.

-Chitra and Gowri were enrolled on the same day as each other, and no one else was enrolled that day.

-On each of the other days of hiring , exactly one candidate was enrolled.

-Eesha was enrolled before Babu.

-Hameed was enrolled before Dheeraj

-Dheeraj was enrolled after Iqbal but before Eesha

-Gowri was enrolled after both Jacob and Babu

-Babu was enrolled before Jacob

Who were the last two candidates to be enrolled?

- a. Babu and Gowri
- b. Eesha and Jacob
- c. Babu and Chitra
- d. Gowri and Chitra

Answer: d

Explanation:

Given that



1. Easha < Babu
2. Hameed < Dheeraj
3. Iqbal < Dheeraj < Easha
4. Jacob/Babu < Gowri
5. Babu < Jacob

from 1 and 5, Easha was before Babu and Jacob so she cannot be in the last two. Option B ruled out

from 4 and 5, babu is before Jacob and Gowri so he cannot be in the last two. Options a, c ruled out.

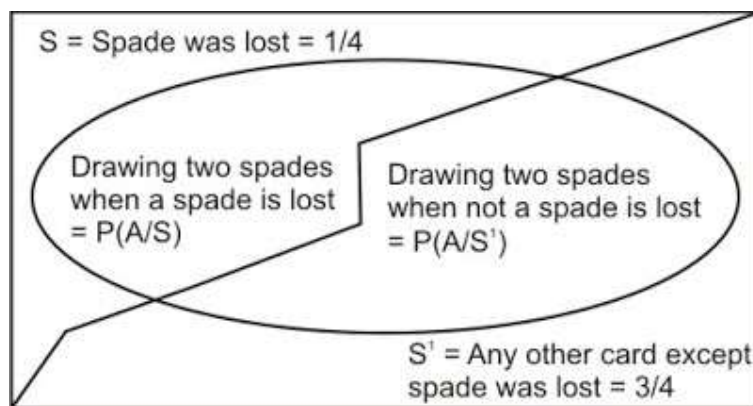
So option d is correct.

6. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both spade. Find the probability of the lost card being a spade.

- a. 10/50
- b. 10/53
- c. 11/50
- d. 11/53

Answer:

Explanation:



Let  $S$  and  $S'$  be the respective events of choosing a spade and a card which is not

spade. Let A denote drawing two spades. Out of 52 cards, 13 are spade and 39 cards are not spade.

$$P(SS) = 13/52 = 1/4$$

$$P(S_1S_1) = 39/52 = 3/4$$

We first calculate the total probability of drawing two spades when the missing card is a spade and the missing card is not a spade.

Total probability

$$= P(A)P(A) = P(S \cap A) + P(S_1 \cap A)P(S \cap A) + P(S_1 \cap A) = P(S).P(AS) + P(S_1).P(AS_1)P(S).P(AS) + P(S_1).P(AS_1)$$

When one spade is lost, there are 12 spades out of 51 cards. Two cards can be drawn out of 12 spade cards in  ${}^{12}C_2$  ways. Similarly, 2 cards can be drawn out of 51 cards in  ${}^{51}C_2$  ways.

$$\text{Probability of drawing 2 spades when one spade is lost} = \frac{{}^{12}C_2}{{}^{51}C_2} = \frac{22}{2425}$$

$$P(S \cap A) = P(S).P(AS)P(S \cap A) = P(S).P(AS) = \frac{14}{51} \times \frac{22}{2425}$$

When the lost card is not spade, there are 13 spades out of 51 cards. Two cards can be drawn out of 13 spades in  ${}^{13}C_2$  ways whereas 2 cards can be drawn out of 51 cards in  ${}^{51}C_2$  ways.

The probability of getting two cards, when one card is lost which is not spade, is given by  $P(AS_1)P(AS_1)$

$$P(AS_1)P(AS_1) = \frac{{}^{13}C_2}{{}^{51}C_2} = \frac{26}{2425}$$

$$P(S_1 \cap A) = P(S_1).P(AS_1)P(S_1 \cap A) = P(S_1).P(AS_1) = \frac{34}{51} \times \frac{26}{2425}$$

The probability that the lost card is spade given that two spades are drawn

$$= \frac{P(SA)P(SA)}{P(SA)P(SA) + P(S_1A)P(S_1A)} = \frac{P(S).P(A/S)P(S).P(A/S)}{P(S).P(A/S)P(S).P(A/S) + P(S_1).P(A/S_1)P(S).P(A/S)} = \frac{1/4 \times 22/425}{1/4 \times 22/425 + 3/4 \times 26/425} = \frac{11}{50}$$

7. There are two bags containing white and black balls. In the first bag there are 8 white and 6

black balls and in the second bag, there are 4 white and 7 black balls. One ball is drawn at random from any of these two bags. Find the probability of this ball being black.

a.  $\frac{21}{154}$

b.  $\frac{7}{54}$

c.  $\frac{21}{77}$

d.  $\frac{41}{77}$

Answer:

Explanation:

$$\text{Probability} = \frac{12 \times 6C_{11}4C_1 + 12 \times 7C_{11}11C_1}{12 \times 6C_{11}4C_1 + 12 \times 7C_{11}11C_1} = \frac{41}{77}$$

8. A bag contains 1100 tickets numbered 1, 2, 3, ... 1100. If a ticket is drawn out of it at random, what is the probability that the ticket drawn has the digit 2 appearing on it?

a.  $\frac{291}{1100}$

b.  $\frac{292}{1100}$

c.  $\frac{290}{1100}$

d.  $\frac{301}{1100}$

Answer: c

Explanation:

Numbers which don't have 2 from 1 to 9 = 8

Numbers which don't have 2 from 10 to 99:

Let us take two places \_\_\_. Now left most place is fixed in 8 ways. Units place is filled with 9 ways. Total 72 numbers.

Numbers which don't have 2 from 100 to 999 = \_\_\_ =  $8 \times 9 \times 9 = 648$

Numbers which don't have 2 from 1000 to 1099 =  $10\_ = 9 \times 9 = 81$

Finally 1100 does not have 2. So 1.

Total number with no 2 in them =  $8 + 72 + 648 + 81 + 1 = 810$

Tickets with 2 in them =  $1100 - 810 = 290$

Required probability =  $290 / 1100$

9. In how many ways a team of 11 must be selected a team 5 men and 11 women such that the team must comprise of not more than 3 men.

a) 1565

b) 2256

c) 2456

d) 1243

Answer: b

Explanation:

Maximum 3 men can be played which means there can be 0, 1, 2, 3 men in the team.

$$\begin{aligned} & ({}^5C_0 \times {}^{11}C_{11}) + ({}^5C_1 \times {}^{11}C_{10}) + ({}^5C_2 \times {}^{11}C_9) + ({}^5C_3 \times {}^{11}C_8) \\ & + ({}^5C_0 \times {}^{11}C_{11}) + ({}^5C_1 \times {}^{11}C_{10}) + ({}^5C_2 \times {}^{11}C_9) + ({}^5C_3 \times {}^{11}C_8) = 2256 \end{aligned}$$

## TCS Ninja, Digital, NQT placement paper - 22

1. X takes 4 days to complete one-third of a job, Y takes 3 days to complete one-sixth of the same work and Z takes 5 days to complete half the job. If all of them work together for 3 days and X and Z quit, how long will it take for Y to complete the remaining work done.

a. 6 days

b. 7 days

c. 5.1 days

d. 8.1 days

Answer: c

Explanation:

X takes 12 days to complete the full work. Y takes 18 days, Z takes 10 days.

$$3 \text{ days work} = 3\left(\frac{1}{12} + \frac{1}{18} + \frac{1}{10}\right) = \frac{4360}{1000}$$

$$\text{Remaining work} = 1 - \frac{4360}{1000} = \frac{5640}{1000}$$

This work should be completed by Y in  $\frac{5640}{1000} \times 18 = 5.1$  days

2. Thomas takes 7 days to paint a house completely whereas Raj would require 9 days to paint

the same house completely. How many days will take to paint the house if both them work together.(give answers to the nearest integer)?

- |      |      |
|------|------|
| a. 4 | b. 2 |
| c. 5 | d. 3 |

Answer: a

Explanation:

Simple formula =  $\frac{xy}{x+y} = \frac{7 \times 9}{7+9} \approx 4$

3. One day, Eesha started 30 minutes late from home and reached her office 50 minutes late, while driving 25% slower than her usual speed. How much time in minutes does Eesha usually take to reach her office from home?

- |       |       |
|-------|-------|
| a. 20 | b. 40 |
| c. 60 | d. 80 |

Answer: c

Explanation:

She got late to the office 20 minutes late as she drove at 3/4 th of the speed.

Given,  $\frac{3}{4}d = d + 20$

$\Rightarrow \frac{3}{4}d - d = 20$

$\Rightarrow \frac{3d - 4d}{4} = 20$

4. Curious Elva asked her father what he would gift for her nineteenth birthday. Father replied that it would depend on the day of the week and be one of SUNglasses, MONeybag, ..., FRIdcake, and SATchel. Please help Elva find the day of the week on 08-Jan-2029

- |             |             |
|-------------|-------------|
| a. Monday   | b. Tuesday  |
| c. Thursday | d. Saturday |

Answer: a

Explanation:

Number of odd days upto 2000 = 0

From 2001 to 2028 =  $28 + 7 = 35 = 0$  ( $\because 35/7$  remainder zero)

From 2019 January 1 to 7 = 7 = 0

So 08 - Jan - 2029 falls on the same week day as 1-1-1 which is Monday.

5. All even numbers from 2 to 98 inclusive, except those ending 0, are multiplied together. What is the rightmost digit (the units digit) of the product?

- a. 6
- b. 2
- c. 0
- d. 4

Answer: a

Explanation:

$$2 \times 4 \times 6 \times 8 \times 12 \times 14 \times \dots \times 98$$

Now units digit of  $2 \times 4 \times 6 \times 8 = 4$

Also  $12 \times 14 \times 16 \times 18$  also 4. So on

Total 10 times 4 occurs in the units digit =  $4_{10} = 6410 = 6$

6. In 2003, there are 28 days in February and there are 365 days in the year. In 2004, there are 29 days in February and there are 366 days in the year. If the date March 11, 2003 is Tuesday, then which one of the following would the date March 11, 2004 be?

- a. Monday
- b. Thursday
- c. Wednesday
- d. Tuesday

Answer: b

Explanation:

March 11, 2003 is Tuesday. So March 11, 2004 weekday will be 2 days after Tuesday. i.e.,

Thursday.

7. 8 year old Eesha visited her grandpa. He gave her this riddle.

I started working at 13. I spent  $\frac{1}{6}$  of my working life in a factory. I spent  $\frac{1}{4}$  of my working life in an office, and I spent  $\frac{1}{4}$  of my working life as a school caretaker. For the last 32 years of my working life I've been doing social service. How old am I?

- a. 109
- b. 102

c. 105

d. 113

Answer: a

Explanation:

Let  $x$  be the number of years he worked.

$$\Rightarrow x^6 + x^4 + x^4 + 32 = x \Rightarrow x^6 + x^4 + x^4 + 32 = x$$

$$\Rightarrow x = 96 \Rightarrow x = 96$$

$$\text{His age} = 96 + 13 = 109$$

8. 100 students appeared for two examinations. 60 passed the first, 50 passed the second and 30 passed both. Find the probability that a student selected at random has failed in both the examinations?

a.  $1/5$

b.  $5/6$

c.  $1/7$

d.  $5/7$

Answer: a

Explanation:

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$n(A \cup B) = 60 + 50 - 30 = 80$$

So 80 passed in atleast one of the exams.  $100 - 80 = 20$  failed in both.

$$\text{Probability} = 20/100 = 1/5$$

9. What is the greatest power of 143 which can divide  $125!$  exactly

a. 12

b. 11

c. 8

d. 9

Answer: d

Explanation:

$143 = 11 \times 13$ . So highest power of 13 should be considered in  $125!$ .

$$\left. \begin{array}{r} 11 \overline{) 125} \\ 11 \overline{) 11} \\ \hline 1 \end{array} \right\} 12 \qquad \begin{array}{r} 13 \overline{) 125} \\ \hline 9 \end{array}$$

So only nine 13's are available. So we can form only nine  $143$ 's in  $125!$ . So maximum power of  $143$  is 9.

d. 54:113

So milk and water concentration =  $53 : (168 - 53) = 53 : 115$

d. None of the above answer



Answer: a

Explanation:

For some x, 97.8% fish was caught. So

$$\Rightarrow 100 - 0.04x^2 - 0.24x = 97.8$$

$$\Rightarrow 0.04x^2 + 0.24x = 2.2$$

$$\Rightarrow 4x^2 + 24x = 220$$

$$\Rightarrow x^2 + 6x - 55 = 0$$

Solving we get  $x = 5$  and  $-11$

So  $x = 5$  is correct option.

**2. Oranges can be packed in sets of 10 oranges in box type A or 25 oranges in box type B. A carton comprising of 1000 oranges of type a and b is packed. How many different combinations are possible in the number of type A and type B boxes while organizing the oranges?**

a. 21

b. 20

c. 19

d. 18

Answer: a

Explanation:


$$\text{Given that } 10a + 25b = 1000 \Rightarrow 2a + 5b = 200$$

One general solution for the above equation is when  $a = 0$ , then  $b = 40$ .

To get other solutions,  $a$  is increased by 5 and  $b$  is decreased by 2. So next solution is  $(5, 38)$

Now  $b$  is reduced upto 0.

$$\text{So total solutions} = 40 - 0 + 1 = 41$$

( Solving equations in integers is an interesting branch of mathematics. These equations are called diophantine equations. [Click here](#) to read the article on this topic)

a. 2400                      b. 1440

c. 2480                      d. 1240

$\therefore$  2480 meters he run in bringing back all the potatoes.

a. 1    b. 3  
c. 2    d. 0

Answer: a

Explanation:

We divide all the numbers into groups of 9. (1 to 9), (10 to 18).....

Now when we divide each term in the first group by 9, we get 1, 2, 3 ..0 as remainders. Now digit sum is nothing but finding remainder when a number is divided by 9. So the last term,  $10^{2012}$  gives remainder 1 when divided by 9. So there is one "1" extra than 2's.

**5. On a certain assembly line, the rejection rate for Hyundai i10s production was 4 percent, for Hyundai i20s production 8 percent and for the 2 cars combined 7 percent.**

**What was the ratio of Hyundais i10 production?**

- |        |        |
|--------|--------|
| a. 3/1 | b. 2/1 |
| c. 1/1 | d. 1/2 |

Answer: a

Explanation:

Simple weighted average rule can be applied. Let aa cars of i10's and bb cars of i20s are made.

$$4(a) + 8(b) = 7(a + b)$$

$$4(a) + 8(b) = 7a + 7b$$

$$3a = b \Rightarrow a/b = 3/1$$

**6. Two decks of cards are there. Each deck contains 20 cards, with numbers from 1 to 20 written on them. A card is drawn of random from each deck, getting the numbers x and y What is the probability that  $\log x + \log y$  is a positive integer. Logs are taken to the base 10.**

- |          |           |
|----------|-----------|
| a. 3/200 | b. 29/200 |
| c. 7/400 | d. 1/50   |

Answer: c

Explanation:

$$\log x + \log y = \log(xy)$$

$\log xy$  is integer when  $(x,y) = (1, 10), (10, 1), (10, 10), (5, 20), (20, 5), (2, 5), (5, 2)$

So required probability =  $7/400$

**7. Let  $a, b, c, d$  and  $e$  be distinct integers in ascending order such that  $(76-a)(76-b)(76-c)(76-d)(76-e) = 1127$ . What is  $a + b + c + d$**

a. 30

b. 274

c. 334

d. 136

Answer: b

Explanation:

*(Personally I liked the beauty of this question)*

Product of 5 terms equal to 1127. As all the five terms are integers, given product should be a product of 5 numbers. Now factorize 1127.

$$1127 = 7^2 \times 23 = 7 \times 7 \times 23$$

But given that all the  $a, b, c, d, e$  are distinct. And we are getting only 3 terms with 7 repeats.

Now the logic is, integers means positive and negative, 7 and - 7 possible and 1, - 1 also possible. As  $a, b, c, d, e$  are in ascending order, the factors should be in decreasing order. So  $(23, 7, 1, -1, -7)$

Now  $a = 53; b = 69; c = 75; d = 77$

$$a + b + c + d = 274.$$

**8. In how many ways a team of 11 must be selected a team 5 men and 11 women such that the team must comprise of not more than 3 men.**

a. 1565

b. 2256

c. 2456

d. 1243

Answer: b

Explanation:

Maximum 3 men can be played which means there can be 0, 1, 2, 3 men in the team.



$$212 + B + D = x \text{ -----(4)}$$

$$317 + A = x \text{ -----(5)}$$

$$214 + E + B = x \text{ -----(6)}$$

$$214 + C + F = x \text{ -----(7)}$$

$$309 + D = x \text{ -----(8)}$$

$$196 + F + D = x \text{ -----(9)}$$

$$327 + C = x \text{ -----(10)}$$

Here 7 variables but 10 equations. So can be solved easily.

From (2) and (10)

$$212 + A + C = 327 + C \Rightarrow A = 115$$

$$\text{From (5), } x = 317 + 115 = 432$$

$$\text{From (1), } E = 432 - 311 = 121$$

$$\text{From (3), } F = 432 - 319 = 113$$

$$\text{From (8), } D = 432 - 309 = 123$$

$$\text{From (4), } B = 432 - 123 - 212 = 97$$

$$\text{From (10), } C = 432 - 327 = 105$$

93	E = 121	119	99
A = 115	103	C = 105	109
107	111	F = 113	101
117	B = 97	95	D = 123

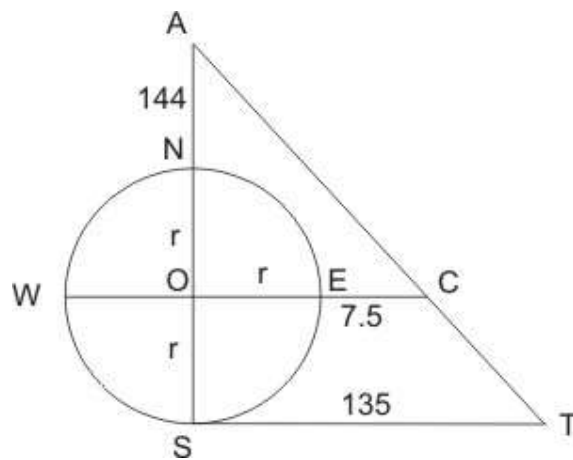
$$\text{So } (A*B) + (C*D) - (E*F) = (115*97) + (105*123) - (121*113) = 10397$$

11. In the medieval times, the sheikdom of Al kurazi had a proud tradition of inventing their own measurements units. The unit for distance was du, and the unit of time was pu. Unfortunately exactly what these measurement units are in modern terminology has been lost. The sheikh of Al Kurazi had built a huge mansion in the desert (near an oasis) with a circular wall around it, and the wall had four gates pointing north, south, east and west. He had built three observation towers, one 144 du to the north of the north gate, one 135 du to the east of the south gate, and one 7 1/2 du to the east of the east gate. They had been aligned to be all in a straight line passing thru the oasis. What was the diameter of the wall that surrounded the city (in Du)?

- a. 178
- b. 183
- c. 180
- d. 181

Answer: c

Explanation:



All the three gates are represented by A, C, and T. Now A is 144 du away from N and C is 7.5 du away from E and T is 135 du away from S, and all are in straight line.

$\triangle AOC, \triangle AST, \triangle AOC, \triangle AST$  are similar triangles. So

$$\Rightarrow A00C=ASST \Rightarrow AOOC=ASST$$

$$\Rightarrow 144+rr+7.5=144+2r135 \Rightarrow 144+rr+7.5=144+2r135$$

Solving we get  $r = 90$ . So diameter of the wall = 180 du

**12.** What is the minimum value of  $\text{abs}(187m - 396n - 526)$  as  $m, n$  take all integer values? Here  $\text{abs}$  is the absolute value function (that is, if  $x > 0$ , then  $\text{abs}(x) = x$  and if  $x < 0$ , then  $\text{abs}(x) = -x$ ).

a. 0

b. 9

c. 2

d. 1

Answer: c

Explanation:

We have to find the minimum value

$$\text{of } |(187m-396n-526)| \text{ is } |(187m-396n-526)| = |(187m-396n)-526|$$

If  $|187m-396n|$  is 526 then the given expression attains minimum.

Now observe carefully, both 187, 386 are multiples of 11.

So  $|11(17m-36n)|$  may not equal to exactly 526 but some value near to 526.

Nearest multiple of 11 is 528.

$$\text{Now } |11(17m-36n)|=528 \Rightarrow |17m-36n|=48$$

$$\Rightarrow (17m-36n)=48 \Rightarrow (17m-36n)=48$$

$$\Rightarrow m=48+36n17 \Rightarrow m=48+36n17$$

$$\Rightarrow m=2+2n+14+2n17 \Rightarrow m=2+2n+14+2n17$$

So for  $n = 10$ , we get  $m = 24$ .

So  $|11(17m-36n)| = 528$  So minimum value of the given expression is 2.

**3.** In this problem,  $\text{ABS}(x)$  provides absolute value of  $x$ , without regard to its sign. For example

$$\text{ABS}(3) = \text{ABS}(-3) = 3$$



The graphs of  $y = -\text{ABS}(x - a) + b$  and  $y = -\text{ABS}(x - c) + d$  intersect at points (2,5) and (8, 3).

Find  $a + c$

a. 8

b. 10

c. 7

d. 5

Answer: a

Explanation:

Both curves intersect at (2, 5)

$$\text{So } 5 = -|2 - a| + b \Rightarrow 5 + |2 - a| - b = 0 \text{ --- (1)}$$

$$5 = -|2 - c| + d \Rightarrow 5 + |2 - c| - d = 0 \text{ --- (2)}$$

Also,

$$3 = -|8 - a| + b \Rightarrow 3 + |8 - a| - b = 0 \text{ --- (3)}$$

$$3 = -|8 - c| + d \Rightarrow 3 + |8 - c| - d = 0 \text{ --- (4)}$$

$$\text{Equating 1 and 3, } 5 + |2 - a| = 3 + |8 - a| \Rightarrow 2 + |2 - a| = |8 - a|$$

$$\text{So } a = 4$$

Similarly if we equate 2 and 4, we get  $c = 4$

$$a + c = 8$$

**14.** Professor nitwit obtains a hash number of a given positive integer  $> 3$  as follows. He subtracts 2 from the number (to get the new number), and multiplies the new number by 2 to get a term. He repeats this with the new number (to get newer numbers and terms) until the number becomes 2 or 1. The hash is defined as the sum of all the numbers generated in the process. For example, with the number 5, he multiplies  $(5-2 = 3)$  by 2 to get the first term 6. He multiplies  $(3 - 2 = 1)$  by 2 to get the second term 2. As the number has become 1, he stops. The hash is the sum of the two numbers  $(6+2) = 8$ .

If Professor Nitwit is given 3 numbers 19, 7, 15, what is the sum of the hash numbers he obtains

for the three numbers?

- a. 297
- b. 273
- c. 290
- d. 278

Answer: d

Explanation:

As we are subtracting 2 continuously from the resulting numbers, get a progression with a common difference of 2 and we need to multiply the sum by 2 to get hash number.

For example 5:  $(3 + 1) \times 2 = 8$

19 :  $(17 + 15 + 13 + .....+1) \times 2 = 81 \times 2 = 162$

7 :  $(5 + 3 + 1) \times 2 = 18$

15:  $(13 + 11 + 9 + 7 + 5 + 3 + 1) \times 2 = 98$

Sum of the hash numbers = 278

15. Four people each roll a fair dice once. Find the probability that at least two people will roll the same number?

- a. None
- b. 5/18
- c. 13/18
- d. 1295/1296

Answer:

Explanation:

The probability of atleast two persons roll the same number =  $1 - \text{None of them rolls the same number.}$

$$= 1 - [66 \times 56 \times 46 \times 36] 1 - [66 \times 56 \times 46 \times 36] = 1 - 518 = 13181 - 518 = 1318$$

**TCS Ninja, Digital, NQT placement questions - 24**

1. How many 6 digit even numbers can be formed from digits 1, 2, 3, 4, 5, 6, and 7 so that the digit should not repeat and the second last digit is even?

- |         |        |
|---------|--------|
| a. 6480 | b. 320 |
| c. 2160 | d. 720 |

Answer: d

Explanation:

If the we have to form even numbers, units digit must be 2, 4, 6. i.e., 3 ways. Also 5th digit should be even. So it can be filled in 2 ways. Now remaining 5 digits can be filled in  $5!$  ways. So total  $5! \times 3 \times 2 = 720$  ways.

2. The five tyres of a car (four road tyres and one spare) were used equally in a journey of 40,000 kms. The number of kms of use of each tyre was

- |          |          |
|----------|----------|
| a. 40000 | b. 10000 |
| c. 32000 | d. 8000  |

Answer: c

Explanation:

Total kilometers travelled by 4 tyre =  $40000 \times 4 = 1,60,000$ . This has to be share by 5 tyres. So each tyre capacity =  $1,60,000 / 5 = 32,000$ . You have a doubt, after we travel 32,000 km, we are left with 4 worn tyes and one new tyre. But If the tyres are rotated properly after each 8000 km, all the tyres are equally used.

3. In a group of five families, every family is expected to have a certain number of children, such that the number of children forms an arithmetic progression with a common difference of one, starting with two children in the first family. Despite the objection of their parents, every child in a family has as many pets to look after as the number of offsprings in the family. What is the total number of pets in the entire group of five families.

- |       |       |
|-------|-------|
| a. 99 | b. 9  |
| c. 55 | d. 90 |

Answer: d

Explanation:

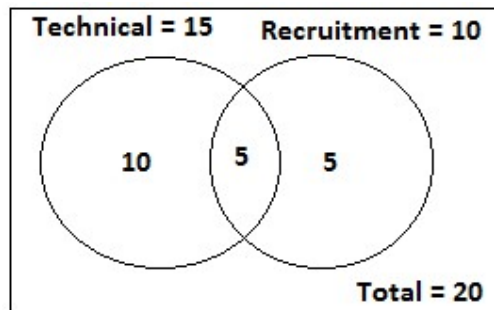
As the number of children are in arithmetic progression starting with 2, the five families have 2, 3, 4, 5, 6 kids respectively. As each children has kept the pets equal to the number of kids in the family, each family has  $n^2$  pets. So total =  $2^2 + 3^2 + 4^2 + 5^2 + 6^2 = 90$

4. According to the stock policy of a company, each employee in the technical division is given 15 shares of the company and each employee in the recruitment division is given 10 shares. Employees belonging to both committees get 25 shares each. There are 20 employees in the company, and each one belongs to at least one division. The cost of each share is \$10. If the technical division has 15 employees and the recruitment division has 10 employees, then what is the total cost of the shares given by the company?

- a. 2650
- b. 3180
- c. 3250
- d. 3120

Answer: c

Explanation:



We have to use addition formula  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$$20 = 15 + 10 - x$$

$$x = 5$$

So total shares given to only technical =  $10 \times 15 = 150$

Shares given to only Recruitment =  $5 \times 10 = 50$

Share given to Technical as well as recruitment people =  $5 \times 25 = 125$

$$\text{Total shares} = 150 + 50 + 125 = 325.$$

$$\text{Total value} = 325 \times 10 = 3250$$

5. The average marks of 3 students A, B and C is 60. When another student D joins the group, the new average becomes 56 marks. If another student E, who has 3 marks more than D, joins the group, the average of the 4 students B, C, D and E becomes 55 marks. How many marks did A get in the exam?

- |       |       |
|-------|-------|
| a. 50 | b. 54 |
| c. 51 | d. 53 |

Answer: c

Explanation:

$$\text{Given that } A + B + C = 60 \times 3 = 180$$

$$A + B + C + D = 56 \times 4 = 224$$

$$\text{Therefore, } D = 44$$

$$E = 44 + 3 = 47$$

$$\text{Given, } B + C + D + E = 55 \times 4 = 220$$

$$B + C + 44 + 47 = 220$$

$$\Rightarrow B + C = 220 - 91 = 129$$

$$\text{So } A + 129 = 180 \Rightarrow A = 51$$

6. What is the number of ways of expressing 3600 as a product of three ordered positive integers (abc, bca etc. are counted as distinct). For example, the number 12 can be expressed as a product of three ordered positive integers in 18 different ways.

- |        |         |
|--------|---------|
| a. 441 | b. 540  |
| c. 84  | d. 2100 |

Answer: b

$$3600 = 2^4 \times 3^2 \times 5^2$$

$$\text{Let } abc = 2^4 \times 3^2 \times 5^2$$

We have to distribute four 2's to three numbers a, b, c in  $4+3-1C_{3-1}=6C_2$   $4+3-1C_{3-1}=6C_2 = 15$  ways.

Now two 3's has to be distributed to three numbers in  $2+3-1C_{3-1}=4C_2$   $2+3-1C_{3-1}=4C_2 = 6$  ways

Now two 5's has to be distributed to three numbers in  $2+3-1C_{3-1}=4C_2$   $2+3-1C_{3-1}=4C_2 = 6$  ways

Total ways =  $15 \times 6 \times 6 = 540$

7. There is a 7-digit telephone number with all different digits. If the digit at extreme right and extreme left are 5 and 6 respectively, find how many such telephone numbers are possible?

- |                  |          |
|------------------|----------|
| a. 120           | b. 30240 |
| c. None of these | d. 6720  |

Answer: d

Explanation:

If left and right digits are fixed with 5 and 6, then the remaining 5 places can be filled by remaining 8 digits in  $8P_5$   $8P_5 = 6720$  ways.

8. A certain sum of money is sufficient to pay either George's wages for 15 days or Mark's wages for 10 days. For how long will it suffice if both George and Mark work together?

- |      |      |
|------|------|
| a. 8 | b. 6 |
| c. 9 | d. 5 |

Answer: b

Explanation:

Let the money to be paid = 30 rupees. Then George daily wage =  $30/15 = 2$ , and Mark daily wage =  $30/10 = 3$ .

If both are working, then 5 rupees to be paid. So given sum is sufficient for  $30 / 5 = 6$  days.

9. The remainder when  $m + n$  is divided by 12 is 8, and the remainder when  $m - n$  is divided by 12 is 6. If  $m > n$ , then what is the remainder when  $mn$  divided by 6?

- |      |      |
|------|------|
| a. 3 | b. 4 |
| c. 2 | d. 1 |

Answer: d

Explanation:

$$m + n = 12a + 8 \Rightarrow (m+n)^2 = 144a^2 + 192a + 64 \quad (1)$$

$$m - n = 12b + 6 \Rightarrow (m-n)^2 = 144b^2 + 144b + 36 \quad (2)$$

$$(1) - (2) \Rightarrow 4mn = 144a^2 + 192a - 144b^2 - 144b + 28 \quad 144a^2 + 192a - 144b^2 - 144b + 28$$

$$mn = 36a^2 + 48a - 36b^2 - 36b + 7$$

Now  $mn$  is divided by 6, all the terms except 7 gives 0. So 7 divided by 6, remainder = 1

10. There is a set of 36 distinct points on a plane with the following characteristics:

\* There is a subset A consisting of fourteen collinear points.

\* Any subset of three or more collinear points from the 36 are a subset of A.

How many distinct triangles with positive area can be formed with each of its vertices being one

of the 36 points? (Two triangles are said to be distinct if at least one of the vertices is different)

a. 7140

b. 4774

c. 1540

d. 6776

Answer: d

Explanation:

The given data indicates that 14 points are collinear and remaining 22 points are non collinear.

A triangle can be formed by taking 1 points from 14 and 2 points from 22 (or) 2 points from 14

and 1 points from 22 (or) 3 points from 22

$$\Rightarrow {}^{14}C_1 \times {}^{22}C_2 + {}^{14}C_2 \times {}^{22}C_1 + {}^{22}C_3 = 14C_1 \times 22C_2 + 14C_2 \times 22C_1 + 22C_3 = 6776$$

## TCS Ninja, Digital, NQT placement questions - 25

1. How many liters of a 90% of concentrated acid needs to be mixed with a 75% solution of concentrated acid to get a 30 liter solution of 78% concentrated acid?

a. 3

b. 4

c. 6

d. 10

Answer: c

Explanation:

Let  $n_1$  liters of 90% concentration has to be mixed with  $n_2$  liters of 75% concentration to get 78% concentration solution. Using weighted average

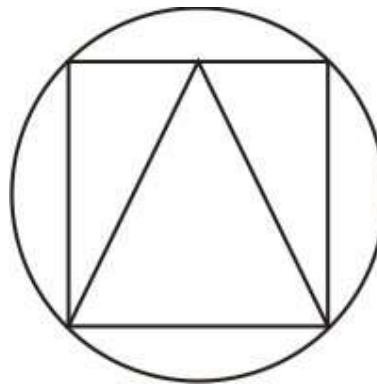
$$\text{formula } a_x = \frac{n_1 \times a_1 + n_2 \times a_2}{n_1 + n_2} \quad a_x = \frac{n_1 \times a_1 + n_2 \times a_2}{n_1 + n_2}$$

$$78 = \frac{n_1 \times 90 + n_2 \times 75}{n_1 + n_2} \quad 78(n_1 + n_2) = n_1 \times 90 + n_2 \times 75$$

$$n_1 n_2 = 14 \quad n_1 n_2 = 14$$

by dividing 30 in the ratio 1:4 we get 6 : 24. So we need 6 liters.

2. Find the ratio of the area of square to area of triangle.



a. 1:2

b. 2:1

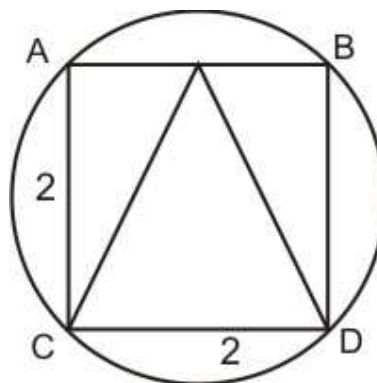
c. 2:3

d. 3:2

Answer: b

Explanation:

Have a look at the diagram below.





Let the side of the square = 2 units.

Now the area of the square =  $2^2 = 4$ .

Area of the triangle =  $12 \times 2 \times 2 = 212 \times 2 \times 2 = 2$

Ratio =  $4 : 2 = 2 : 1$ .

3. In this question  $A^B$  means A raised to the power B. If  $f(x) = ax^4 - bx^2 + x + 5$  and  $f(-3) = 2$ , then  $f(3) =$

a. 1

b. - 2

c. 3

d. 8

Answer: d

Explanation:

$$f(-3) = a(-3)^4 - b(-3)^2 + (-3) + 5 = 81a - 9b + 2 = 2 \text{ So } 81a - 9b = 0$$

$$f(3) = a(3)^4 - b(3)^2 + (3) + 5 = 81a - 9b + 8$$

Substituting the value of  $81a - 9b = 0$  in the above we get  $f(3) = 8$

4. Of a set of 30 numbers, average of first 10 numbers = average of last 20 numbers. Then the sum of the last 20 numbers is?

a. Cannot be determined.

b. 2 x sum of last ten numbers

c. 2 x sum of first ten numbers

d. sum of first ten numbers

Answer: c

Explanation:

We know that sum = average x number of observations.

Let the common average = x

Now sum of first 10 numbers =  $10x$

Sum of the last 20 numbers =  $20x$ .

So sum of the last 20 numbers =  $2 \times$  sum of the first ten numbers.

5. A play school has chocolates which can supply 50 students for 30 days. For the first ten days only 20 students were present. How many more students can be accommodated into the earlier group such that the entire chocolates get consumed in 30 days. Assume each student takes the same number of chocolates.

a. 45

b. 60

c. 55

d. 70

Answer: a

Explanation:

Let each students gets 1 chocolate. Now total chocolates =  $50 \times 30 = 1500$

If first 10 days only 20 students were present, then total chocolates consumed =  $10 \times 20 = 200$

Now we are left with  $1500 - 200 = 1300$  chocolates. These were to be consumed in 20 days.

So each day  $1300/20 = 65$  chocolates were to be distributed.

So we can add  $65 - 20 = 45$  students.

6. In the town of Unevenville, it is a tradition to have the size of the front wheels of every cart different from that of the rear wheels. They also have special units to measure cart wheels which is called uneve. The circumference of the front wheel of a cart is 133 uneves and that of the back wheel is 190 uneves. What is the distance traveled by the cart in uneves, when the front wheel has done nine more revolutions than the rear wheel?

a. 570

b. 1330

c. 3990

d. 399

Answer: c

Explanation:

LCM of 133 and 190 is 1330. So to cover this distance, front wheel takes 10 rounds, and back

wheel takes 7 rounds.

So for 3 rounds extra, 1330 uneves distance has to be travelled. To take 9 rounds extra,  $1330 \times 3 = 3990$  uneves has to be traveled.

7. There are 20 persons sitting in a circle. In that there are 18 men and 2 sisters. How many arrangements are possible in which the two sisters are always separated by a man?

a.  $18! \times 2$

b.  $17!$

c.  $17 \times 2!$

d. 12

Answer: a

Explanation:

Let the first sister name is A. Now she can sit any where in the 20 places (Symmetrical). Now her sister B can sit to her left or right in 2 ways. Now the remaining 18 persons can be sit in 18 places in  $18!$  ways. Total =  $18! \times 2$

8. A number plate can be formed with two alphabets followed by two digits, with no repetition. Then how many possible combinations can we get?

a. 58500

b. 67600

c. 65000

d. 64320

Answer: a

Explanation:

Easy.  $26 \times 25 \times 10 \times 9 = 58500$

9. A alone can do  $\frac{1}{4}$ th of the work in 2 days. B alone can do  $\frac{2}{3}$ th of the work in 4 days. If all the three work together, they can complete it in 3 days so what part of the work will be completed by C in 2 days?

a.  $\frac{1}{12}$

b.  $\frac{1}{8}$

c.  $1/16$

d.  $1/20$

Answer: a

Explanation:

A can do the total work in 8 days, and B can do it in 6 days.

Let the total work be 24 units. Now capacities are

$$A = 24/8 = 3,$$

$$B = 24/6 = 4,$$

$$A + B + C = 24/3 = 8$$

So Capacity of C = 1 unit.

In two days C will do 2 units which is  $2/24$ th part of the total work. So  $1/12$ th part.

10. How many prime numbers are there which are less than 100 and greater than 3 such that they are of the following forms

- $4x + 1$
- $5y - 1$

a. 11

b. 12

c. 7

d. None of the above

Answer: d

Explanation:

Let the number be N.

$$\text{So } N = 4x + 1 = 5y - 1$$

$$\Rightarrow x = 5y - 24 \Rightarrow x = 5y - 24$$

$y = 2$  satisfies the equation. So minimum number satisfies both the equations is 9 and general format of the numbers which satisfies the equation = k.  $\text{LCM}(4, 5) + 9 = 20k + 9$ .

Now by putting values 1, 2, 3 . . . for k, we get 29, 49, 69, 89. Of which only 29, 89 are primes.

11. Babla alone can do a piece of work in 10 days. Ashu alone can do it in 15 days. The total

wages for the work is Rs.5000. How much should be Babla be paid if they work together for an entire duration of work.

a. 2000

b. 4000

c. 5000

d. 3000

Answer: d

Explanation:

Money should always be divided in the inversely proportion way. So Babla will get  $1515 + 10 \times 5000 = 3000$

12. The shopkeeper charged 12 rupees for a bunch of chocolate. but i bargained to shopkeeper and got two extra ones, and that made them cost one rupee for dozen less then first asking price. How many chocolates I received in 12 rupees ?

a. 10

b. 16

c. 14

d. 18

Answer: b

Explanation:

Let the number of chocolates bought = n or n/12 dozens

Assume this would cost x rupees.

Now given that  $(n+2)/12$  dozens cost x - 1 rupee.

So  $12n/12 = x$   $12n/12 = x$  - - - (1)

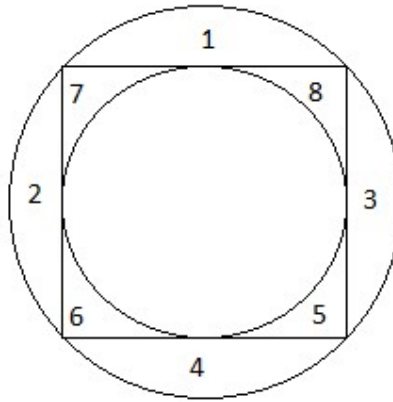
and  $12(n+2)/12 = x - 1$   $12(n+2)/12 = x - 1$  - - - (2)

(1) - (2) =  $144n - 144n + 2 = 1$   $144n - 144n + 2 = 1$

From the options, 16 satisfies.

## TCS Ninja, Digital, NQT placement placement questions - 26

1. Radius of the bigger circle is 1. Which area will be greater?



a. 5

b. 4

c. Cannot be determined

d. None of these

Answer: b

Explanation:

If the radius of the bigger circle is 1, then diameter = 2 units. Which in turn equals to diagonal of square.

Let the side of the square be  $x$ . Then  $x^2 + x^2 = 2^2 \Rightarrow 2x^2 = 4 \Rightarrow x = \sqrt{2}$

Now diameter of the inner circle = side of the square. So radius of the inner circle

$$= \frac{\sqrt{2}}{2} = 1 \times \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$$

Areas marked by 1, 2, 3, 4 = (Area of the circle - area of the square)/4

$$= \frac{\pi(1)^2 - (\sqrt{2})^2}{4} = \frac{\pi(1) - 2}{4} = \frac{\pi - 2}{4} \approx 0.285$$

Areas marked by 5, 6, 7, 8 = (Area of the square - area of the inner circle)/4

$$= \frac{(\sqrt{2})^2 - \pi\left(\frac{\sqrt{2}}{2}\right)^2}{4} = \frac{2 - \pi \times \frac{2}{4}}{4} = \frac{2 - \frac{\pi}{2}}{4} \approx 0.1075$$

So Area marked by 4 is bigger.

2. An old man and a young man are working together in an office and staying together in a near by apartment. The old man takes 30 minutes and the young 20 minutes to walk from apartment to office. If one day the old man started at 10.00 AM and the young man at 10:05AM from the apartment to office, when will they meet?

a. 10:15

b. 10:30

c. 10.45

d. 10:00

Answer:

Explanation:

Let the distance be 12 km. So the old man speed =  $\frac{12 \text{ km}}{12 \text{ hr}} = 1 \text{ km/hr}$

The young man speed =  $\frac{12 \text{ km}}{13 \text{ hr}} = \frac{12}{13} \text{ km/hr}$

As the old man started 5 minutes earlier, he covers  $1 \times \frac{5}{60} = \frac{1}{12} \text{ km}$  in 5 minutes.

Now the time taken to the young man to meet him =  $\frac{\frac{1}{12}}{\frac{1}{13} - 1} = 10 \text{ min.}$

So the time at which young man meet the old man =  $10.05 + 10 = 10.15 \text{ min.}$

3. There are 16 teams divided in 4 groups. Every team from each group will play with each other once. The top 2 teams will go to the next round and so on the top two teams will play the final match. Minimum how many matches will be played in that tournament?

a. 43

b. 40

c. 14

d. 50

Answer: a

Explanation:

In each group, total matches played =  ${}^4C_2 = 6$ .

So total matches played in the first round =  $6 \times 4 = 24$

Now top two teams from each group progress to the next round. Now these 8 teams are pooled into 2 groups. Total matches played in the second round =  $6 \times 2 = 12$

Now 4 teams progress to the next round. Total matches played in the third round = 6

From this round, 2 teams progress to the next round. And final will be played between them.

Total matches =  $24 + 12 + 6 + 1 = 43$

4. A sealed envelope contains a card with a single digit written on it. Three of the following

statements are true and one is false.

I. The digit is 1.

II. The digit is not 2.

III. The digit is not 9.

IV. The digit is 8.

Which one of the following must necessarily be correct?

a. II is false

b. III is true\*

c. IV is false

d. The digit is even.

e. I is true

Answer: b

Explanation:

Three of the given statements are true. So both II and III are correct, and the given number is one of 1 or 8. So option b is correct.

5. How many 2's are there between the terms 112 to 375?

a. 313

b. 159

c. 156

d. 315

Answer: c

Explanation:

Let us calculate total 2's in the units place. (122, 132, 142 ... 192), (201, 212, 222, ... 292), (302, 312, ... 372) =  $8 + 10 + 8 = 26$

Total 2's in tenth's place, (120, 121, 122, ..., 129) + (220, 221, ..., 229) + (320, 321, ..., 329) = 30

Total 2's in hundred's place = (200, 201, ... 299) = 100.

Total 2's between 112 and 375 =  $26 + 30 + 100 = 156$



6. Ram and Shakil run a race of 2000 meters. First, Ram gives Shakil a start of 200 meters and beats him by one minute. If, Ram gives Shakil a start of 6 minutes Ram is beaten by 1000 meters. Find the time in minutes in which Ram and Shakil can run the races separately.

a. 12, 18

b. 10, 12

c. 11, 18

d. 8, 10

Answer: d

Explanation:

Let the speeds of Ram and Shakil =  $r$  and  $k$  respectively. Always remember, to solve problems involving races, try to equate the ratio of the speeds because how ever the two contestants run, the ratio of their speed won't change.

In the first race, Ram gives shakil a start of 200 meters and beat him by 1 min. This means, Initially Ram runs 2000 mts and Shakil runs 1800 mts. And finally, Ram beats Shakil by 1 min or 60 seconds. This means, By that time Ram finishes his race, Shakil takes another 60 seconds to finish his race. That means, he is  $60k$  meters away from the finishing point. So by the time Ram finishes his race of 2000 mts, Shakil runs  $(1800-60k)$ .

Ratio of speeds = Ratio of Distances covered

Therefore,  $\frac{r}{k} = \frac{2000}{1800-60k}$  --- (1)

In the second race, Ram has given Shakil a start of 6 min. So Shakil start his race 6 min before Ram. In 6 minutes, Shakil runs  $360 \times k = 360k$  mts. As Ram was beaten by 1000 mts, by that time shakil completes his race, Ram has covered 1000 mts only and Shakil covered  $2000-360k$ .

The ratio of the speeds =  $\frac{r}{k} = \frac{1000}{2000-360k}$  --- (2)

Equating  $r/k$  in both

equations,  $\frac{2000}{1800-60k} = \frac{1000}{2000-360k}$

Solving we get  $s = 10/3$ . So time taken by Shakil to cover the distance =  $2000/(10/3) = 10$  minutes.

7. Three generous friends, each with some money, redistribute the money as follows: Sandra gives enough money to David and Mary to double the amount of money each has. David then gives enough to Sandra and Mary to double their amounts. Finally, Mary gives enough to Sandra and David to double their amounts. If Mary had 11 rupees at the beginning and 17 rupees at the end, what is the total amount that all three friends have?

- a. 105  
b. 60  
c. 88  
d. 71

Answer:

Explanation:

Let Sandra, David and Mary each has  $s$ ,  $d$  and 11 respectively.

After the first distribution,

David has  $d + d = 2d$ , Mary has  $11 + 11 = 22$  and Sandra has  $s - d - 11$ .

After the second distribution,

Sandra has  $2 \times (s - d - 11)$ , Mary has  $2 \times 22 = 44$  and David has  $2d - (s - d - 11) - 22 = 3d - s - 11$ .

After the third distribution,

Sandra has  $2 \times 2(s - d - 11)$ , David has  $2 \times (3d - s - 11)$  and Mary has  $44 - 2(s - d - 11) - (3d - s - 11) = 77 - s - d$

It is given that finally Mary has Rs.17. So,  $77 - s - d = 17$

$$\Rightarrow s + d = 60$$

$$\Rightarrow s + d + 11 = 60 + 11 = 71.$$

8. George walks 36 kms partly at a speed of 4 kms per hour and partly at 3 km per hour. If he had walked at a speed of 3 km per hour when he had walked at 4 and 4 km per hour when he had walked at 3 he would have walked only 34 kms. The time (in hours) spent by George in walking was

- a. 8  
b. 12

c. 5

d. 10

Answer: d

Explanation:

Let George walked "a" hours at 4 kmph, and "b" hours at 3 kmph.

Given,  $4a + 3b = 36$  - - - (1)

$3a + 4b = 34$  - - - (2)

Adding the above two equations and simplifying them,  $a + b = 10$ .

9. The sum of the four consecutive two digit odd numbers, when divided by 10, becomes a perfect square. Which of the following can be one of these four numbers?

a. 31

b. 25

c. 41

d. 67

Answer: c

Explanation:

Let the numbers are  $2a + 1$ ,  $2a + 3$ ,  $2a + 5$ ,  $2a + 7$  and their sum =  $8a + 16$

Given that if this sum is divided by 10, results in a perfect square.

So  $8a + 16 = k^2$

$\Rightarrow a = \frac{k^2 - 16}{8}$

$\Rightarrow a = \frac{k^2 - 16}{8}$

As  $k^2$  is a perfect square and has to be divided by 8, only even numbers should be considered for k.

For  $k = 2$ , we get,  $a = 3$ , but  $2a + 1$  is not a two digit number.

For  $k = 4$ ,  $a = 18$  for which the given condition is satisfying.

So the numbers are 37, 39, 41, 43.

For  $k = 6$ ,  $a = 43$ . The number are 87, 89, 91, 93.

10. Consider the sequence of numbers 0, 2, 2, 4,... Where for  $n > 2$  the nth term of the sequence

is the unit digit of the sum of the previous two terms.

Let  $s_n$  denote the sum of the first  $n$  terms of this sequence. What is the smallest value of  $n$  for which  $s_n > 2771$ ?

- a. 692
- b. 693
- c. 694
- d. 700

Answer: a

Explanation:

[0, 2, 2, 4, 6, 0, 6, 6, 2, 8, 0, 8, 8, 6, 4, 0, 4, 4, 8, 2], 0, 2, 2...this series repeats after every 20 terms.

Sum of these 20 terms = 80

So  $2771 = 34 \times 80 + 51$

Sum of 13 terms = 52

So we have to use 34 times 20 terms =  $34 \times 20 = 680$

$680 + 13 = 693$

## TCS Ninja, Digital, NQT placement placement questions - 27

1. I bought a certain number of marbles at a rate of 27 marbles for rupees 2 times  $M$ , where  $M$  is an integer. I divided these marbles into 2 parts of equal numbers, one part of which I sold at the rate of 13 marbles for Rs.  $M$  and the other at the rate of 14 marbles for Rs.  $M$ . I spent and received an integral no of rupees, but bought the least number of marbles. How many did I buy?

- a. 870
- b. 102660
- c. 1770
- d. 9828

Answer: d

Explanation:

Let he bought  $2x$  marbles.

27 marbles costs = Rs.  $2M$  so 1 marble costs =  $\text{Rs. } 2M/27$

Therefore,  $x$  marbles costs =  $\text{Rs. } (2M \times x) / 27$

Now we calculate the selling prices.

He sold  $x$  marbles at the rate of 13 for Rs.  $M$  so 1 marble selling price =  $M/13$

$x$  marbles selling price =  $x \times M/13$

He sold another  $x$  marbles at the rate of 14 for Rs.  $M$  so 1 marble selling price =  $M/14$

$x$  marbles selling price =  $x \times M/14$

Now  $2Mx/27, xM/13, xM/14$  are integers.

So  $x$  marbles must be divisible by 27, 13, 14. LCM of 4914

So  $2x = 9828$

2. How many different integers can be expressed as the sum of three distinct numbers from the set  $\{3, 10, 17, 24, 31, 38, 45, 52\}$ ?

option

a) 8

b) 56

c) 16

d) 15

Answer: c

Explanation:

Interesting question. If you think that  ${}^8C_3 = 56$  is correct then it is wrong answer. We are not asked how many ways we can select 3 numbers out of 8. But how many different numbers can be expressed as a sum of three numbers from the given set. For example,  $3 + 10 + 31 = 3 + 17 + 24 = 47$ . So 47 can be expressed as a sum of 3 numbers in two different ways but 47 should be considered as only one number.

Now the minimum number that can be expressed as a sum of 3 numbers = 30. The next number is 37. Similarly the largest number is  $38 + 45 + 52 = 135$ .

So there exists many numbers in between, with common difference of 7.

$$\text{Total numbers} = l - ad + 1 = 135 - 307 + 1 = 16.$$

3. How many different integers can be expressed as the sum of three distinct numbers from the set {3, 8, 13, 18, 23, 28, 33, 38, 43, 48}?

option

a) 8

b) 56

c) 120

d) 22

Answer: d

Explanation:

From the above discussion, minimum number = 24 and maximum number = 129. So there exist many numbers in between these two numbers, with common difference of 5. All these numbers can be expressed as a sum of 3 different integers from the given set.

$$\text{Total numbers} = l - ad + 1 = 129 - 245 + 1 = 22.$$

4. A owes B Rs.50. He agrees to pay B over a number of consecutive days starting on a Monday, paying single note of Rs.10 or Rs.20 on each day. In how many different ways can A repay B.

Explanation:

He can pay by all 10 rupee notes in 5 days = 1 way

$$3 \text{ Ten rupee} + 1 \text{ twenty rupee} = \frac{4!}{3! \times 1!} = 4 \text{ ways}$$

$$1 \text{ Ten rupee} + 2 \text{ twenty rupee notes} = \frac{3!}{2! \times 1!} = 3 \text{ ways}$$

$$\text{Total ways} = 1 + 4 + 3 = 8$$

5. HCF of 2472, 1284 and a third number 'n' is 12. If their LCM is  $8 \times 9 \times 5 \times 103 \times 107$ , then the number

'n'is..

a.  $2^2 \cdot 3^2 \cdot 5^1$

b.  $2^2 \cdot 3^2 \cdot 7^1$

c.  $2^2 \cdot 3^2 \cdot 8103$

d. None of the above.

Answer:

Explanation:

$$2472 = 2^3 \times 3 \times 103$$

$$1284 = 2^2 \times 3 \times 107$$

$$\text{HCF} = 2^2 \times 3$$

$$\text{LCM} = 2^3 \times 3^2 \times 5 \times 103 \times 107$$

HCF of the numbers is the highest number which divides all the numbers. So N should be a multiple of  $2^2 \times 3$

LCM is the largest number that is divided by the given numbers. As LCM contains  $3^2 \times 5$  these two are from N.

$$\text{So } N = 2^2 \times 3^2 \times 5 \times 103 \times 107$$

6. What is the value of  $\frac{77! \cdot (77! - 2 \cdot 54!)^3}{(77! + 54!)^3 + 54! \cdot (2 \cdot 77! - 54!)^3}$

a.  $77! - 54!$

b.  $77! + 54!$

c.  $77!^2 - 54!^2$

d.  $77!$

Answer: a

Explanation:

The above question can be written

$$\text{as } \frac{77! \cdot (77! - 2 \cdot 54!)^3}{(77! + 54!)^3 + 54! \cdot (2 \cdot 77! - 54!)^3}$$

Let  $A = 77!$ ,  $B = 54!$

Then equation in the form

$$a(a-2b)^3(a+b)^3 + b(2a-b)^3(a+b)^3 = a(a-2b)^3(a+b)^3 + b(2a-b)^3(a+b)^3$$

$$a(a-2b)^3a(a-2b)^3 = a(a^3-6a^2b+12ab^2-8b^3)a(a^3-6a^2b+12ab^2-8b^3) = a^4-6a^3b+12a^2b^2-8ab^3$$

$$b(2a-b)^3b(2a-b)^3 = b(8a^3-12a^2b+6ab^2-b^3)b(8a^3-12a^2b+6ab^2-b^3) = 8a^3b-12a^2b^2+6ab^3-b^4$$

Grouping similar

$$\text{terms, } a^4-6a^3b+12a^2b^2-8ab^3 + 8a^3b-12a^2b^2+6ab^3-b^4$$

$$= a^4-b^4+(-6a^3b+8a^3b)a^4-b^4+(-6a^3b+8a^3b) + (12a^2b^2-12a^2b^2)(12a^2b^2-12a^2b^2) + (-8ab^3+6ab^3)(-8ab^3+6ab^3)$$

$$= a^4-b^4+2a^3b-2ab^3$$

$$= (a^2-b^2)(a^2+b^2)(a^2-b^2)(a^2+b^2)+2ab(a^2-b^2)2ab(a^2-b^2)$$

$$= (a^2-b^2)[(a^2+b^2)+2ab](a^2-b^2)[(a^2+b^2)+2ab]$$

$$= (a^2-b^2)(a+b)^2(a^2-b^2)(a+b)^2$$

$$= (a-b)(a+b)(a+b)^2(a-b)(a+b)(a+b)^2$$

$$= (a-b)(a+b)^3(a-b)(a+b)^3$$

$$\text{Therefore, } a(a-2b)^3(a+b)^3 + b(2a-b)^3(a+b)^3 = (a-b)(a+b)^3(a+b)^3 = a-b$$

### Shortcut:

If you try to solve this questions using above method, its almost impossible. The best way is take  $a = 4$ , and  $b = 2$ . and substitute in the given equation.  $0 + 2(8-2)^36^3 = 22(8-2)^36^3 = 2$ . Now substitute  $a, b$  values in the given options and check where it is equal to 2. Option a satisfies. If you like this shortcut, +1 this!!



7. The marked price of coat was 40% less than the suggested retail price. Eesha purchased the coat for half of the marked price at the 15th anniversary sale. What percent less than the suggested retail price did Eesha pay?

- a) 60%
- b) 20%
- c) 70%
- d) 30%

Answer:

Explanation:

Let the retail price = 100

So the market price will be =  $(100 - 40)\% (100) = 60$

Easha purchased price =  $60/2 = 30$

So she bought it for 70% less than retail price.

8. In a city there are few engineering, MBA and CA candidates. Sum of four times the engineering, three times the MBA and 5 times CA candidates is 3650. Also three times CA is equal to two times MBA and three times engineering is equal to two times CA. In total how many MBA candidates are there in the city?

- a. 200
- b. 300
- c. 450
- d. 400

Answer: c

Explanation:

Let e = Number of engineering students, m = Number of MBA students and c = Number of CA students.

Given that,

$$4e + 3m + 5c = 3650 \text{ --- (1)}$$

$$3c = 2m, \text{ therefore } c = \frac{2m}{3}$$

$$3e = 2c \Rightarrow e = \frac{2c}{3} = \frac{2 \times \frac{2m}{3}}{3} = \frac{4m}{9}$$

Substituting values of c and e in the given equation,

$$4 \times \frac{4m}{9} + 3m + 5 \times \frac{2m}{3} = 3650$$

$$\Rightarrow \frac{16m}{9} + 3m + \frac{10m}{3} = 3650$$

$$\Rightarrow \frac{16m}{9} + \frac{27m}{9} + \frac{30m}{9} = 3650$$

$$\Rightarrow \frac{73m}{9} = 3650 \Rightarrow m = \frac{3650 \times 9}{73}$$

9. A rectangle is divided into four rectangles with area 70, 36, 20, and x. The value of x is

70	36
x	20

a.  $\frac{350}{9}$

b.  $\frac{350}{7}$

c.  $\frac{350}{11}$

d.  $\frac{350}{13}$

Answer: a

Explanation:

Areas are in proportion.

$$\frac{70}{x} = \frac{36}{20} \Rightarrow x = \frac{350}{9}$$

10. If a ladder is 10 m long and distance between bottom of ladder and wall is 6 m. What is the maximum size of cube that can be placed between the ladder and wall.

a. 34.28

b. 24.28

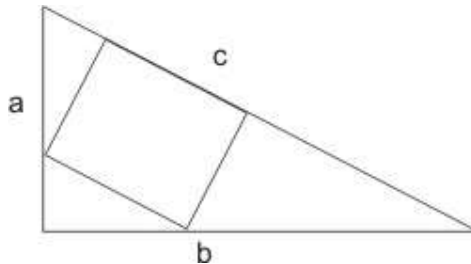
c. 21.42

d. 28.56

Answer:

Explanation:

Here  $a = 6$ , and  $c = 10$ .  $b = 8$  ( $\because$  using Pythagorean theorem)



The maximum side of the square which can be inscribed in a right angle triangle

$= \frac{abc}{a^2+b^2+ab}$  ( $\because$  see 7th question [here](#) for formula)

So side  $= \frac{10 \times 6 \times 8}{6^2+8^2+6 \times 8} = 3.243$

Volume of the cube  $= 3.243^3 = 34.075$

**Note:**

The maximum side of a square is obtained when two sides of the square matches with  $a$  and

$b$ . In this case side  $= \frac{ab}{a+b} = 3.428$  which is higher than 3.243.

## TCS Ninja, Digital, NQT placement questions - 28

1. 11, 23, 47, 83, 131, . What is the next number?

a. 145

b. 178

c. 176

d. 191

Explanation:

11, 23, 47, 83, 131

$23 - 11 = 12$

$$47-23 = 24$$

$$83-47 = 36$$

$$131-83 = 48$$

Therefore,  $131+60=191$

**2. A series of book was published at seven year intervals. When the seventh book was published the total sum of publication year was 13, 524. First book was published in?**

a. 1911

b. 1910

c. 2002

d. 1932

Answer:

Explanation:

Let the years be  $n, n+7, n+14, \dots, n+42$ . ( $\because$  use formula  $T_n=a+(n-1)d$  to find  $n$ th term)

$$\text{Sum} = S_n = n/2(2a+(n-1)d) \Rightarrow S_n = n/2(2n+(7-1)7) = 13,524$$

$$\Rightarrow 7n+147=13,524 \Rightarrow 7n=13,377 \Rightarrow n=1911$$

$$\Rightarrow n = 1911$$

**3. Crusoe hatched from a mysterious egg discovered by Angus, was growing at a fast pace that Angus had to move it from home to the lake. Given the weights of Crusoe in its first weeks of birth as 5, 15, 30, 135, 405, 1215, 3645. Find the odd weight out.**

a) 3645

b) 135

c) 30

d) 15

Answer: c

Explanation:

$$5 \times 3 = 15$$

$$15 \times 3 = 45 \Rightarrow \Rightarrow \text{Given as 30}$$

$$45 \times 3 = 135$$

$$135 \times 3 = 405$$

$$405 \times 3 = 1215$$

$$1215 \times 3 = 3645$$

**4. A can complete a piece of work in 8 hours, B can complete in 10 hours and C in 12 hours. If A,B, C start the work together but A leaves after 2 hours. Find the time taken by B and C to complete the remaining work.**

1)  $2 \frac{1}{11}$  hours

2)  $4 \frac{1}{11}$  hours

3)  $2 \frac{6}{11}$  hours

4) 2 hours

Explanation:

A,B,C's 1 hour work is

$$= \frac{1}{8} + \frac{1}{10} + \frac{1}{12} = \frac{15}{120} + \frac{12}{120} + \frac{10}{120} = \frac{37}{120}$$

A,B,C worked together for 2 hours, Therefore, 2 hours work is

$$= \frac{37}{120} \times 2 = \frac{37}{60}$$

$$\text{Remaining work} = 1 - \frac{37}{60} = \frac{23}{60}$$

$\frac{23}{60}$  work is done by B and C together)

$$\text{B, C's 1 hour work} = \frac{1}{10} + \frac{1}{12} = \frac{6}{60} + \frac{5}{60} = \frac{11}{60}$$

$\frac{23}{60}$ th part of the work done by B, C in

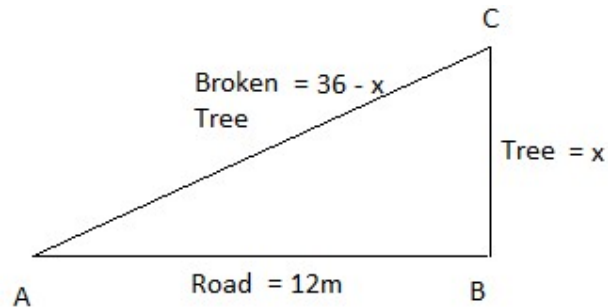
$$= \frac{23}{60} \times \frac{60}{11} = 2 \frac{1}{11} \text{ hours.}$$

5. A tree of height 36m is on one edge of a road broke at a certain height. It fell in such a way that the top of the tree touches the other edge of the road. If the breadth of the road is 12m, then what is the height at which the tree broke?

- a. 16
- b. 24
- c. 12
- d. 18

Explanation:

Let the tree was broken at  $x$  meters height from the ground and  $36 - x$  be the length of other part of the tree.



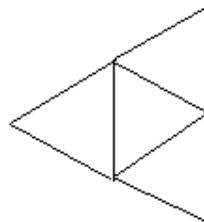
From the diagram,  $(36-x)^2 = x^2 + 12^2$

$$\Rightarrow 1296 - 72x + x^2 = x^2 + 144 \Rightarrow 1296 - 72x = 144$$

$$\Rightarrow 72x = 1296 - 144 \Rightarrow 72x = 1152$$

$$\Rightarrow x = 16$$

6. The sticks of same length are used to form a triangle as shown below. If 87 such sticks are used then how many triangles can be formed?



Explanation:

First triangle is formed by using 3 sticks, but any subsequent triangle may be formed by using 2 sticks. Therefore, If 1st triangles uses 3 sticks, Remaining sticks =  $87 - 3 = 84$ . With these 84, we can form 42 triangles. So total =  $42 + 1 = 43$

**Shortcut:**

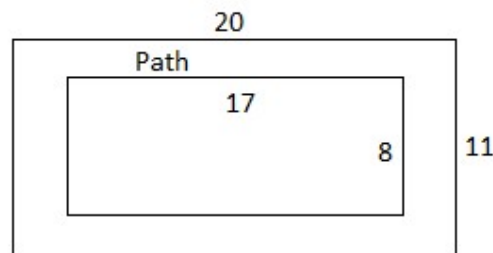
To solve questions like these, use formula,  $2n + 1 = k$ . Here  $n$  = triangles,  $k$  = sticks

$$2n+1 = 87 \Rightarrow n = 43.$$

**7.  $17 \times 8$  m rectangular ground is surrounded by 1.5 m width path. Depth of the path is 12 cm. Gravel is filled and find the quantity of gravel required.**

- a. 5.5
- b. 7.5
- c. 6.05
- d. 10.08

Explanation:



$$\text{Area of the rectangular ground} = 17 \times 8 = 136 \text{ m}^2$$

Area of the big rectangle considering the path width

$$= (17 + 2 \times 1.5) \times (8 + 2 \times 1.5) = 220 \text{ m}^2$$

$$\text{Area of the path} = 220 - 136 = 84 \text{ m}^2$$

$$\text{Gravel required} = 84 \text{ m}^2 \times 12 \text{ m} = 1008 \text{ m}^3$$

**8. A sum of Rs.3000 is distributed among A, B, and C. A gets  $\frac{2}{3}$  of what B and C got together and C gets  $\frac{1}{3}$  of what A and B got together, C's share is?**

Explanation:

Let B+C together got 3 units, then A get 2 units. or  $B+C=3$   $A=2$  --- (1)

Let A+B together got 3 units, then B get 1 units. or  $A+B=3$   $A=2$  --- (2)

By using Componendo and Dividendo, we can re-write equations (1) and

(2),  $A+B+C=3+2=5$   $A+B+C=3+2=5$  and  $A+B+C=3+1=4$   $A+B+C=3+1=4$

So  $A = 8$ ,  $B = 7$ ,  $C = 5$

C's share =  $5(8+7) \times 3000 = 7500$

**9. The numbers 272738 and 232342, when divided by n, a two digit number, leave a remainder of 13 and 17 respectively. Find the sum of the digits of n?**

a. 7

b. 8

c. 5

d. 4

Explanation:

From the given information, (272738 - 13, 232342 - 17) are exactly divisible by that two digit number.

We have to find the HCF of the given numbers 272725, 232325.

HCF = 25.

So sum of the digits = 7.

**10. Assume that  $f(1)=0$  and  $f(m+n)=f(m)+f(n)+4(mn-1)$ . For all natural numbers (Integers > 0) m and n. What is the value of  $f(17)$ ?**

a. 5436

b. 4831



c. 5508

d. 4832

Explanation:

$$f(1) = 0$$

$$f(2) = f(1+1) = f(1) + f(1) + 4(9 \times 1 \times 1 - 1) = 0 + 0 + 4 \times 8 = 32$$

$$f(4) = f(2+2) = f(2) + f(2) + 4(9 \times 2 \times 2 - 1) = 32 + 32 + 4 \times 35 = 204$$

$$f(8) = f(4+4) = f(4) + f(4) + 4(9 \times 4 \times 4 - 1) = 204 + 204 + 4 \times 143 = 980$$

$$f(16) = f(8+8) = f(8) + f(8) + 4(9 \times 8 \times 8 - 1) = 980 + 980 + 4 \times 575 = 4260$$

$$f(17) = f(1+16) = f(16) + f(1) + 4(9 \times 16 \times 1 - 1) = 4260 + 0 + 4 \times 143 = 4832$$

## TCS Ninja, Digital, NQT placement questions - 29

1. The perimeter of a equilateral triangle and regular hexagon are equal. Find out the ratio of their areas?

a. 3:2

b. 2:3

c. 1:6

d. 6:1

Correct Option: b

Explanation:

Let the side of the equilateral triangle =  $a$  units and side of the regular hexagon is  $b$  units.

$$\text{Given that, } 3a = 6b \Rightarrow a = 2b$$

$$\text{Now ratio of the areas of equilateral triangle and hexagon} = \frac{\sqrt{3}}{4}a^2 : \frac{\sqrt{3}}{2}b^2$$

$$\Rightarrow \frac{\sqrt{3}}{4}(2b)^2 : \frac{\sqrt{3}}{2}b^2 = \frac{34}{2} : \frac{332}{2}b^2$$

$$\Rightarrow 2:3$$

2. What is the remainder of  $(32^{31^{301}})$  when it is divided by 9?

a. 3

b. 5

c. 2

d. 1

Correct option: b

Explanation:

See solved example 6 [here](#)

$$32_{31301}932313019 = 5_{31301}95313019$$

Euler totient theorem says that  $[a\phi(n)]_{\text{Rem}}=1$   $[a\phi(n)]_{\text{Rem}}=1$

$\phi(n)=n(1-a)(1-b)\dots$   $\phi(n)=n(1-a)(1-b)\dots$  here  $n=a_p.b_q\dots$   $n=a_p.b_q\dots$

$$\text{Now } \phi(9)=9(1-13)=6 \quad \phi(9)=9(1-13)=6$$

Therefore,  $5_656$  when divided by 9 remainder 1.

$$\text{Now } 31_{3016}=1_{301}=1313016=1301=1$$

So  $31_{301}31301$  can be written as  $6k + 1$

$$\Rightarrow 5_{31301}=(5_6)_K.51 \Rightarrow 531301=(56)_K.51$$

$$5_{31301}9=(5_6)_K.519=1_K.59=55313019=(56)_K.519=1_K.59=5$$

**3. Which of the following numbers must be added to 5678 to give a remainder 35 when divided by 460?**

a. 980

b. 797

c. 955

d. 618

Correct option: b

Explanation:

Let  $xx$  be the number to be added to 5678.

When you divide  $5678 + xx$  by 460 the remainder = 35.

Therefore,  $5678 + xx = 460k + 35$  here  $kk$  is some quotient.

$\Rightarrow \Rightarrow 5643 + xx$  should be exactly divisible by 460.

Now from the given options  $x = 797$ .

**4. A girl entered a store and bought  $x$  flowers for  $y$  dollars ( $x$  and  $y$  are integers). When she was about to leave, the clerk said, "If you buy 10 more flowers I will give you all for \$2, and you will save 80 cents a dozen". The values of  $x$  and  $y$  are:**

- a. (15,1)
- b. (10,1)
- c. (5,1)
- d. Cannot be determined from the given information.

Correct option: c

Explanation:

Given she bought  $xx$  flowers for  $yy$  dollars.

So 1 flower cost =  $\frac{y}{x}$

12 flowers or 1 dozen cost =  $12\frac{y}{x}$

Again,  $x+10$  cost = 2 dollars

1 flower cost =  $\frac{2}{x+10}$

12 flowers or 1 dozen cost =  $2 \times \frac{12}{x+10} = \frac{24}{x+10}$

Given that this new dozen cost is 80 cents or  $\frac{4}{5}$  dollar less than original cost.

$$\Rightarrow 12\frac{y}{x} - \frac{24}{x+10} = \frac{4}{5} \Rightarrow 12yx - 24(10+x) = 4(5x)$$

From the given options, c satisfies this.

**5. If a number is divided by 357 the remainder is 5, what will be the remainder if the number is divided by 17?**

- a. 9
- b. 3
- c. 5

d. 7

Correct option: c

Explanation:

Let 'N' be the given number.

$$N = 357k + 5$$

If this number is divided by 17 remainder is 5 as 357k is exactly divided by 17.

**6. In how many possible ways can write 3240 as a product of 3 positive integers a, b and c.**

a. 450

b. 420

c. 350

d. 320

Correct option:

Explanation:

$$3240 = 2^3 \times 3^4 \times 5^1 = a \times b \times c$$

We have to distribute three 2's to a, b, c in  ${}^{3+3-1}C_{3-1} = {}^{5}C_2 = 10$  ways

We have to distribute four 3's to a, b, c in  ${}^{3+4-1}C_{3-1} = {}^{6}C_2 = 15$  ways

We have to distribute one 5 to a, b, c in 3 ways.

Total ways =  $10 \times 15 \times 3 = 450$  ways.

**7. On door A - It leads to freedom  
On door B - It leads to Ghost house  
On door C - door B leads to Ghost house  
The statement written on one of the doors is wrong. Identify which door leads to freedom.**

a. A

b. B

c. C

d. None

Correct option: c

Explanation:

Case 1: A, B are true. In this case, Statement C also correct. So contradiction.

Case 2: B, C are true. In this case, B leads to ghost house and C confirms it. Now A is wrong. So door A does not lead to freedom. So Door C leads to freedom.

**8. In the given figure, If the sum of the values along each side is equal. Find the possible values a, b, c, d, e, and f.**

32	a	b	10
e			f
15	c	d	5

a. 9, 7, 20, 16, 6, 38

b. 4, 9, 10, 13, 16, 38

c. 4, 7, 20, 13, 6, 38

d. 4, 7, 20, 16, 6, 33

Correct option: c

Explanation:

From the above table,  $42 + a + b = 47 + e$ . Therefore,  $a + b = 5 + e$ . Option a, b ruled out.

$47 + e = 15 + f$ . Therefore,  $32 + e = f$ . Option d ruled out.

4 men throw a die each simultaneously. Find the probability that at least 2 people get the same number

a.  $5/18$

b.  $13/18$

c.  $1/36$

d.  $1/2$

**9. 70, 54, 45, 41..... What is the next number in the given series?**

a. 35

b. 36

c. 38

d. 40

Correct option: d

Explanation:

Consecutive squares are subtracted from the numbers.

$$70 - 54 = 16$$

$$54 - 45 = 9$$

$$45 - 41 = 4$$

So next we have to subtract 1. So answer =  $41 - 1 = 40$

**10. How many positive integers less than 500 can be formed using the numbers 1,2,3,and 5 for digits, each digit being used only once.**

a. 52

b. 68

c. 66

d. 34

Correct option:

Explanation:

Single digit number = 4

Double digit number =  $4 \times 3 = 12$

Three digit numbers =  $3 \times 3 \times 2 = 18$  ( $\because$  If Hundred's place is 5, then the number is greater than 500)

Total = 34.