

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 $3y$

$$x = 5y$$

$$\text{Original value of diamond} = (5y)^2 = 25y^2$$

$$\text{Value of diamond after breakage} = (2y)^2 + (3y)^2 = 13y^2$$

$$\text{so the percentage loss will be} = \frac{25y^2 - 13y^2}{25y^2} \times 100 = 48\%$$

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.

A O S _ _ : $3! = 6$

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.

$${}^6C_1 \times {}^{14}C_1 / {}^{20}C_2 = 24/190$$

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 : $(\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21})$

$$\begin{aligned} \text{Total probability} &= (\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21} \times \frac{15}{21}) + (\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{15}{21}) \\ &+ (\frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21} \times \frac{6}{21}) \\ &= \frac{312}{16807} \end{aligned}$$

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 and 6 is $7 \times 8 \times 8 \times 8 = 3584$

7. Find the missing in the series: 70, 54, 45, 41, ____.

Sol: 40

$$70 - 54 = 16 = 4^2$$

$$54 - 45 = 9 = 3^2$$

$$45 - 41 = 4 = 2^2$$

$$41 - 40 = 1 = 1^2$$

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 $6!/2! = 720/2 = 360$ 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 $5!/2! = 120/2 = 60$ 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 $4!/2! = 12$ 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

11. 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 $n+r-1C_{r-1}$

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 $n+r-1C_{r-1}$

Here n = 6 and r = 10. So total ways are $10+6-1C_{6-1} = 3003$

12. 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 $(20/36) = (5/9)$

13. 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

14. 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

Let x ques were correct. Therefore, $(26 - x)$ were wrong
 $8x - 5(26 - x) = 0$
 Solving we get $x = 10$

- 5.5
- 4.5
- 7.5
- 6.5

$$\text{New width} = 5 - (10\% \text{ of } 5) = 4.5$$

thus, $9+10=19$.

solving the above equations gives $M=350$ and $W=200$

Solving for $x = 114000 = \text{CP of cow.}$

Next they are 30 and so on

So Using $n(n+1)2 \times 10 \leq 2888$

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".

20. 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 = $9000 - 5832 = 3168$

21. $2ab5$ 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.

22. 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:

$$(\text{tues} + \text{wed} + \text{thurs})/3 = 37$$

$$\text{tues} + \text{wed} + \text{thurs} = 111 \dots (1)$$

$$(\text{wed} + \text{thurs} + \text{fri})/3 = 38$$

$$(\text{wed} + \text{thurs} + \text{fri}) = 114 \dots (2)$$

Given Friday is 39.

$$\text{then, } (2) - (1) \text{ Fri} - \text{Tues} = 3$$

$$\text{So } 39 - \text{Tues} = 3$$

$$\text{Tuesday} = 36$$

23. 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

$$\text{weight of 3rd box} = (125/100) \times 200 = 250$$

$$\text{weight of 2nd box} = (120/100) \times 250 = 300$$

$$\text{weight of 4th box} = 350$$

$$\text{weight of 5th box} = (10/7) \times 350 = 500$$

$$\text{average of 4 highest weighted boxes} = (500 + 350 + 300 + 250)/4 = 350$$

$$\text{average of 4 lightest boxes} = (350 + 300 + 250 + 200)/4 = 275$$

$$\text{therefore difference} = 350 - 275 = 75$$

24. 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 $l = 30$

area = $2(l+b)h$

area= $2*(30+20)*10=1000$

Now after those adjustments in the measurements,

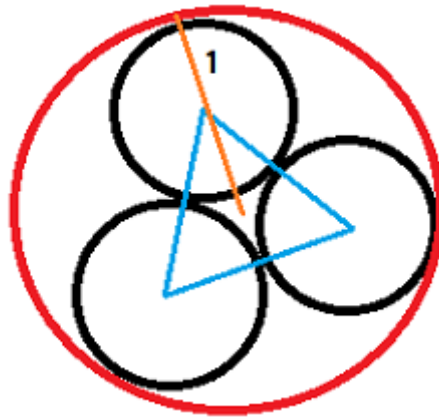
$l=60$, $b=10$, $h=5$

area= $2(l+b)h = 2(60+10)5=700$

Percentage decrease= $\frac{1000-700}{1000} \times 100=30\%$

25. A circle circumscribes three unit circles that touch each other. What is the area of the larger circle? Note that π is the ratio of the circumference to the diameter of a circle (3.14159265).

Sol:



By joining centres 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 = $(1 + \text{Circum radius of the equilateral triangle})$

Circum radius of equilateral triangle = $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{2} = \frac{2}{\sqrt{3}}$

Area of big circle will be = $\pi r^2 = 3.14 \times (1 + \frac{2}{\sqrt{3}})^2 = 3.14 \times (1 + \frac{4}{3} + \frac{4}{3})$

$= 3.14 \times (1 + \frac{4}{3} + \frac{4}{3}) = 3.14 \times (\frac{7}{3} + \frac{4}{3}) = 3.14 \times (\frac{11}{3})$

26. 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= $9 + 9 - 18 = 0$

27. 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=Time/distance

let the speed of joke x then speed of paul will be 7-x

$$24x + 247 - x = 14$$

Try to plugin the values from the options. If Joke speed is 4 the paul is 3.

28. The crew of a rowing team of 8 members is to be chosen from 12 men (M1, M2, ..., M12) and 8 women (W1, W2, ..., W8), 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 W1 and M7 must be selected for one of its sides while M2, M3 and M10 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 ${}^{14}C_2$ ways and this side people can sit in $4C_2 \times 4!$ ways.

Again the first group may take any of the two sides. So total ways are $2 \times 7 \times 4! \times {}^{14}C_2 \times 4!$

29. 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%

30. 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.

31. 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 $(m+n+p)!/m! \times n! \times p!$

But $7 = 1 + 3 + 3$ or $1 + 2 + 4$ or $1 + 1 + 5$

So The number of ways are $(7)!/1! \times 3! \times 3! \times 12! + (7)!/1! \times 2! \times 4! + (7)!/1! \times 1! \times 5! \times 12! = 70 + 105 + 21 = 196$

32. 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 $20z=1200$

33. 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

34. 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 $(1 - \text{replacement quantity} / \text{Final volume})$

$$\text{Final concentration} = 1 \times (1 - 10/15) = 13$$

$$\text{Final concentration} = 13 \times (1 - 10/20) = 16$$

So ratio of alcohol : water = 1 : 5