500 Recently asked Campus Recruitment

Numerical Aptitude

questions with solution from

INFOSYS

TCS

CTS

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ACCENTURE

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CN Pragadeeswara Prabhu

Why this book

- 500 different question.
- Easiest solutions.
- Questions asked in 2015 and 2014 campus drives.
- Targeted learning.
- Topic weightage analysis for each company's pattern.
- Know more than your competitors.
- Crypt Arithmetic for Infosys solved in organized way.
- Doubt clearing from the author - +91 95666 34509

Must Know topics

- Number Systems
- Permutation, Combination and Probability
- Time and Work
- Time, Speed and Distance
- Ratio, Partnership, Allegations and Mixtures
- Percentage, Profit, Loss and Discount
- Geometry and Mensuration

Tips to increase speed

- Whenever possible, substitute the values in the option after you convert the question into an equation.
- You must know the squares from 1 to 100 by heart or learn the shortcuts from www.facebook.com/aptitube
- Do not waste time by solving it like subjective type questions

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praganag@gmail.com

www.facebook.com/aptitube

Mobile: 095666 34509

Author

CN Pragadeeswara Prabhu

For Doubt clearing and Booking Sessions

Phone: 09566634509

Email: praganag@gmail.com

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Percentage distribution of topics

Topic	Infosys	TCS	CTS	Wipro	Accenture
Number system	14	30	22	22	14
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Permutation	5	10	6	3	3
Combination	6	8	4	3	4
Time and Work	5	11	8	11	11
Time, Speed and Distance	10	3	6	16	11
Percentage, Profit and Loss	9	6	11	8	14
Average, Allegation and Mixtures	4	6	0	8	10
Mensuration and Geometry	6	9	2	5	3
Ratio, Proportion and Partnership	0	0	8	4	5
Problems on Ages	3	2	4	2	5
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Coding and Decoding	2	0	0	0	0
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1. Find the missing number in the series.
2, 5, 10, 17, ? , 41.

Solution:
The difference between the successive terms are a sequence of prime numbers.
2 ~ 5 = 3; 5 ~ 10 = 5;
10 ~ 17 = 7 17 ~ ? = 11;
? ~ 41 = 13
Missing number is 28

2. Find the missing number in the series.
8 : 18 : : 24 : ?

Solution:
$8 = 3^2 - 1$; $18 = 4^2 + 2$
$24 = 5^2 - 1$; $? = 6^2 + 2$
Answer = 38

3. Find the missing number in the series.
7,14,55,110,?

Solution:
7 + reverse of 7 = 7 + 7 = 14
14 + reverse of 14 = 14 + 41 = 55
55 + reverse of 55 = 55 + 55 = 110
110 + reverse of 110
= 110 + 011 = 121

4. Find the missing number in the series.
2,4,7,10,15,18,....

Solution:
0 + 2 = 2; 1 + 3 = 4;
2 + 5 = 7 3 + 7 = 10;
4 + 11 = 15; 5 + 18= 18
6 + 17 = 33
Adding prime numbers to (0,1,2,3, ...)

5. Three members went to a shop and took 3 kerchiefs each costs 10 Rs. Total price is Rs 30. After they went off the owner of the sop realizes that he know the 3 members, so he gives the worker 5 Rs and tells to return them. The worker gives them Rs 5, then they gives 2 Rs tip to him and remaining 3 Rs they share Rs 1. Expense of each person is Rs. 9. Total expense of three persons is Rs. 27.
Tips = Rs. 2. Overall total = Rs. 29.
Where is the remaining 1 Rs?

Solution:
Total Expense Rs. 27 includes the tip.
One should not add Rs. 2 with Rs. 27.
Expense for kerchief = Rs. 25
Tip = Rs. 2
Balance = Rs. 3
Hence tallied.

6. A man has two ropes of varying thickness (Those two ropes are not identical, they aren't the same density nor the same length nor the same width). Each rope burns in 30 minutes. He actually wants to measure 45 minutes. How can he measure 45 minutes using only these two ropes. He can't cut the one rope in half because the ropes are non-homogeneous and he can't be sure how long it will burn.

Solution:
Take the first rope and light it in both ends. It will burn out in 15 minutes.
Take the second rope and light it in one end at the same moment when the first rope burns out.

7. There are 6561 balls out of them 1 is heavy. Find the minimum number of times the balls have to be weighed for finding out the heavy ball.

Solution:
Split 6561 into 3 groups of 2687.
From this take two groups and place them on the two plates of the weight balance. If the heavy ball is on one of the plates, take that group and do the above process again.
If both plates are equal, take the group which was kept aside and do the same process.
Number of weighing = 8.

Shortcut:
If number of balls
$= 3^n$,
number of weighing = n
$6561 = 3^8$.

8. A mango vendor travels between two cities through 30 toll booths. He had 90 mangoes in 3 baskets, each basket with a maximum capacity of 30 mangoes. He has to pay the toll of 1 mango per basket per booth. If the vendor is intelligent, how many mangoes will he have when he reaches the destination?

Solution:
After 10 toll booths he would have given 30 mangoes. So, one basket will be empty. He must throw that basket away.
After another 15 booths, he must throw the second basket.
Now he has 30 mangoes left in one basket and 5 booths left.
He will have 25 mangoes left at the end of the journey.

9. GOOD is coded as 164, BAD is coded as 21. If UGLY coded as 260 then JUMP?

Solution:
Take the position of each letter in the English alphabet.
G = 7; O = 15; D = 4
G+O+O+D = 7 + 15 + 15 + 4 = 41
Sum x Number of letters in the word,
41 x 4 = 164
B+A+D = 3(2 + 1 + 4) = 21
U+G+L+Y = 4(21 + 7 + 12 + 25)
= 260
Similarly,
J+U+M+P = 4(10 + 21 + 13 + 16)
= 240

10. If HAT = 58, then KEEP = ?

Solution:
H = 8; A = 1; T = 20
H+A+T = 29
HAT = 2 x 29 = 58
K+E+E+P = 11 + 5 + 5 + 16 = 37
KEEP = 2 x 37 = 74

11. There are 3 societies A, B, C having some tractors each. A Gives B and C as many tractors as they already have. After some days B gives A and C as many tractors as they have. After some days C gives A and B as many tractors as they have. Finally each has 24 tractors. What is the original Number of tractors each had in the beginning?

Solution:
From the final statement, total number of tractors = 3 x 24 = 72.
Also from the final statement, the number of tractors of A and B got doubled.
Number of tractors with A, B and C, before C lends them is:
A = 12; B = 12; C = 48
From second statement, when B lends to A and C, the number of tractors with A and C gets doubled.
Number of tractors with A, B and C, before B lends them is:
A = 6; B = 42; C = 24
From first statement, when A lends tractors to B and C, the number of tractors with B and C gets doubled.
Number of tractors with A, B and C, before A lends them is:
A = 39; B = 21; C = 12

12. Find the greatest number that will divide 45, 91 and 183 so as to leave the same remainder in each case.
Solution:
Answer will be the HCF of the differences
HCF [(91-45), (183-91)] = HCF(46, 92)
= 46

13. A person goes to a bank and quotes x rupees and y paise on a Cheque. The cashier misreads it and gives y Rs and x paise. The man comes out and donates 5 paise to a beggar. Now, the man has exactly double the amount he has quoted on the Cheque.

Solution:
The actual amount quoted in terms of paise
= 100x + y
The amount yielded by the banker

= 100y + x
100y + x – 5 = 2(100x + y)
100y + x – 200x – 2y = 5
98y = 199x + 5
98y = 196x + (3x + 5)
y = 2x + (3x + 5)/98
(3x + 5)/98 = integer
If (3x+ 5)/98 = 1, x = 31
y = 63.
The Cheque was given for 31 Rupees and 63 paise.

*14. If abcde is a five digit number and abcde*4=edcba, then what is the value of b+c+d? (number of each letter is unique).*

Solution:
Value of 'a' cannot be more than 2. Otherwise the product will end in a 6 digit number.
a ≠ 0, if so, the number will be a four digit.
a ≠ 1, because, any number multiplied with an even number will give even number in the unit digit. (unit digit of "edcba" is 'a').
So, a = 2.
e x 4 = 8. e = 3 or 8.
e ≥ 8, because a = 2; so e = 8
There is no carry over when b is multiplied with 4, because 2 x 4 = 8, where 2 = a
and 8 = e.
So b = 0 or 1. b ≠ 2 because a = 2.
e x 4 = 8 x 4 = 32.
3 is carry over.
4d + 3 = b
Unit digit of 4d = 7 or 8 to get b = 0 or 1.
Unit digit of 4d = 8 because 4 is even number
d = 2 or 7 so that 4 x 2 = 8 or 4 x 7 = 28
d ≠ 2 because, a = 2; so d = 7
4d + 3 = 4 x 7 + 3 = 28+3 = 31.
So, b = 1
3 is carry over.
4c + 3 = c and must have 3 as carry over, because 4b + 3 = 7 = d
The only value of c satisfying the above is 9.
4 x c + 3 = 4 x 9 + 3 = 39.
a = 2; b= 1; c = 9; d = 7; e = 8
b + c + d = 1 + 9 + 7 = 17

15. Lucia is a wonderful grandmother her age is between 50&70. Each of her sons have as many sons as they have brothers. Their combined number gives Lucia's present age. What is the age of Lucia?

Solution:
Assume the number of sons for Lucia = n.
Number of brothers for each son = n-1.
Number of sons for each son of Lucia = n-1
Total grandsons of Lucia = n(n-1)
= n^2 – n
Combined number of sons and grandsons
= n + n^2 – n
= n^2
n is number of sons, so it must be an integer.
A perfect square between 50 and 70 is 64.
Age of Lucia = 64.
Number of sons = 8; grandsons = 56

16. In a soap company a soap is manufactured with 11 parts. For making one soap you will get 1 part as scrap. At the end of the day you have 251 such scraps. From that how many soaps can be manufactured?

Solution:
Effective number of parts per soap = 10
Number of soaps = 251/10 = 25 soaps
One small part will be remaining.

Note:
If total number of parts(n) is not a multiple of number of effective parts(e), then
Number of products = quotient of (n/e)
If total number of parts(n) is a multiple of number of effective parts(e), then
Number of products = (n/e) – 1.

17. There is well of depth 30m and frog is at bottom of the well. He jumps 3m in one day and falls back 2m in the same day. How many days will it take for the frog to come out of the well?

Solution:
Effective distance per day = 1m.
Step 1: Subtract jumping up distance from total height.
30 – 3 = 27
If the frog climbs 1m per day, it will take 27/1 = 27 days for 27 meters.
On the 28th day, it will climb 3m and reach the top.
Total number of days required
= 28 days.

18. A man counted his animals, 80 heads and 260 legs (ducks and goats). how many goats are there?

Solution:
Let number of ducks be x, and
Number of goats be y
x + y = 80 ---(1), because ducks and goats have only one head each.
2x + 4y = 260 ---(2), because ducks have 2 legs and goats have 4 legs.
(1) x 2 = 2x + 2y = 160
(2) x 1 = 2x + 4y = 260
(1)- (2)
-2y = -100
y = 50 = number of goats.
x = 30 = number of ducks.

19. If an integer "k" is divisible by 2,5 and 13. What is the next number to "k" that is divisible by all the three given numbers?
(a) k+13 (b) k+130 (c) 2k (d) 2k+13

Solution:
If "k" is divisible by 2, 5 and 13, then it must be the multiple of LCM of 2, 5 and 13.
Next number to k which is divisible by 2, 5 and 13 is = k + LCM(2, 5, 13)
LCM(2, 5, 13) = 130
The next number to k is = K+130

20. There are 9 cities numbered 1 to 9. From how many cities the flight can start so as to reach the city 8 either directly or indirectly such that the path formed is divisible by 3?

Solution:
Trial and error method.
Starting from city 1:
Route 1 to 8; Sum = 9
Starting from city 2:
Route 2 to 5 to 8; Sum = 15
Starting from city 3:
Route 3 to 4 to 8; Sum = 15
Starting from city 4:
Route 4 to 6 to 8; Sum = 18
Starting from city 5:
Route 5 to 2 to 8; Sum = 15
Like this one can form a route with sum equal to multiple of three from any city except starting from city 8.
The number of cities the flight can start is = 8

21. A family I know has several children. Each boy in this family has as many sisters as brothers but each girl has twice as many brothers as sisters. How many brothers and sisters are there?

Solution:
Assume number of boys = b
Assume number of girls = g
Number of brothers for a boy = b-1
b – 1 = g ---(1)
Number of sisters for a girl = g-1
2(g-1) = b ---(2)
Substitute (2) in (1)
2g – 2 – 1 = g
g = 3
b = 4
Number of brothers = 4
Number of sisters = 3

22. In a class of 150 students 55 speak English; 85 speak Telugu and 30 speak neither English nor Telugu.
i. How many speak both English and Telugu?

ii. How many speak only Telugu?
iii. How many speak at least one of the two languages from English and Telugu?

Solution:
Out of 150, 30 does not speak English or Telugu.
So, 150 – 30 = 120 persons speak English or Telugu or both.
Persons speaking both English and Telugu
= 55 + 85 – 120 = 20
Persons speaking only English
= 55 – 20= 35
Persons speaking only Telugu
= 85 – 20 = 65

23. Find the remainder when the number 12345678910111213...178179 is divided by 180.

Solution:
A number is divisible by 180 if the number is divisible by 4, 5 and 9.
If divided by 4, it gives reminder = 3
If divided by 5, it gives reminder = 4
Sum of the digits = 179 x 180/2 = 16110
Sum of the digits is divisible by 9, so the reminder when divided by 9 = 0.
The first multiple of 9 which when divided by 4 and 5 leaves a reminder 3 and 4 respectively is 99.
So the reminder when 12345678.....178179 is divided by 180 is 99.

24. The least perfect square, which is divisible by each of 21, 36 and 66 is:

Solution:
To be divisible by 21, 36 and 66, the number should be their LCM.
Taking LCM using prime factors:
$21 = 3^1 \times 7^1$
$36 = 2^2 \times 3^2$
$66 = 2^1 \times 3^1 \times 11^1$
LCM = product of each prime factor with its highest power
Therefore LCM = $2^2 \times 3^2 \times 7^1 \times 11^1$
= 2 x 2 x 3 x 3 x 7 x 11
To make it as a perfect square we have to multiply the LCM with 7 x 11
Perfect square value
= 2x2x3x3x7x7x11x11
= 213444

25. If the digits of my present age are reversed then I get the age of my son. If 1 year ago my age was twice as that of my son. Find my present age.

Solution:
Let my age be 10x + y
My son's age is 10y + x
One year ago,
10x + y – 1 = 2(10y + x – 1)
10x -2x + y – 20y – 1 + 2 = 0
8x – 19y = -1
8x = 19y – 1
x = (19y – 1)/8
For y = 3, we get x as an integer
x = (19 x 3 – 1)/8 = 7
My age is 10x7 + 3 = 73
My son's age is = 37

26. Tanya's grandfather was 8 times older to her 16 years ago. He would be three times of her age 8 years from now. Eight years ago what was ratio of Tanya's age to her grandfather?

Solution:
Let present age of Grandfather and Tanya be G and T respectively.
G – 16 = 8(T – 16)
G = 8T – 112 ---(1)
G + 8 = 3(T + 8)
G = 3T + 16 ---(2)
From (1) and (2)
8T – 112 = 3T + 16
T = 128/5 and G = 464/5
8 years ago, T – 8 = 88/5 and
G – 8 = 424/5
Ratio is 88 : 424 = 11 : 53

27. A person is 80 years old in 490 and only 70 years old in 500 in which year is he born?

Infosys

Solution:
This is only possible when the person was born in B.C (Before Christ).
The years will proceed in descending order.
The person was born on 490 + 80
= 570 B.C

28. If A can copy 50 pages in 10 hours and A and B together can copy 70 pages in 10 hours, how much time does B takes to copy 26 pages?

Solution:
Work done by A in 1 hour = 5 pages
Work done by A and B together in 1 hour
= 7 pages.
Work done by B in 1 hour = 7 – 5
= 2 pages.
Time taken for B to copy 26 pages
= 26/2
= 13 hours.

29. Sixty men complete a work in 25 days. One man starts working it at and thereafter one more man joins him every day. In how many days the work will be completed?

Solution:
One man can complete the work in
25 x 60 = 1500 days.
Work done in day 1 = 1/1500
Work done in day 2 = 2/1500
Work done in day 3 = 3/1500
Let us assume that the work has been done for n days.
(1/1500) + (2/1500) + (3/1500) + … (n/1500) = 1
Hence, 1 + 2 + 3 + … + n = 1500
n(n+1)/2 =1500(sum of n natural numbers)
n(n+1) = 3000
n ≃ 54
It takes 54 days to complete the work.

30. 15 men or 10 women complete work in 55 days. Then 5 men and 4 women complete work in how many days?

Solution:
15 Men = 10 Women.
1 Man = (10/15) Woman
5 men = 5(10/15) = (10/3) Women
5 Men and 4 Women
= (10/3) + 4 Women
= 22/3 Women
Time and resource are inversely proportional
(10 W)/[(22/3) W) = x days/55 days
x = 75 days

31. If 5/2 artists make 5/2 paintings using 5/2 canvases in 5/2 days then how many artists are required to make 25 paintings using 25 canvases in 25 days?

Solution:
This is a tricky puzzle.
The same number of artists are required to paint 25 paintings in 25 days using 25 canvases.
To understand,
The work done by 5/2 artists in 1 day is 1 painting.
This is the same case for 25 paintings in 25 days.
Answer is 5/2 artists.

32. In a grass field if 40 cows could eat for 40 days and 30 cows for 60 days, how long could 20 cows eat?

Solution:
Resource and time are inversely proportional
Resources = number of cows
Time = number of days
$[R_1/R_2] = [T_2/T_1]$
$40/20 = T_2/40$
$T_2 = 80$ days.

33. At 20% discount, a cycle is sold at a selling price of 2500 Rs. What is the marked price?

Solution:
Selling price =[(100-20)/100]x Marked price
2500 = (80/100)Marked price
Marked Price = 2500x100/80=Rs. 3125

34. In a certain office, 1/3 of the workers are women, 1/2 of the women are married and 1/3 of the married women have children. If 3/4th of the men are married and 2/3rd of the married men have children, what part of workers are without children?

Solution:
No.of employees = x
No.of women = x/3; No.of men = 2x/3
No.of married women=(x/3)(1/2)=x/6
No.of women with child
= (x/6)(1/3)=x/18
No.of married men = (2x/3)(3/4) = x/2
No.of men with child
= (x/2)(2/3) = x/3
No.of employee with children
=(x/18)+(x/3)
= 7x/18
Part of workers without child
= 1-(7/18)
= 11/18

35. Fifty percent of the articles in a certain magazine are written by staff members. Sixty percent of the articles are on current affairs. If 75 percent of the articles on current affairs are written by staff members with more than 5 years experience of journalism, how many of the articles on current affairs are written by journalists with more than 5 years experience? 20 articles are written by staff members. Of the articles on topics other than current affairs, 50 percent are by staff members with less than 5 years experience.

Solution:
Total number of articles = 20
Number of articles on current affairs
= 60% of 20
= (60/100)20
= 12
Number of articles in current affairs by more than 5 years experienced journalists
= 75% of 12
= 9

36. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

Solution:
Assume the third number = 100
First number = 120% of 100 = 120
Second number = 150% of 100 = 150
Ratio between first and second number
= 120 : 150
= 4 : 5

37. In an exam 49% candidates failed in English and 36% failed in Hindi and 15% failed in both subjects. If the total number of candidates who passed in English alone is 630. What is the total number of candidates appeared in exam?

Solution:
Percentage of students failed in English alone
= 49 – 15 = 34
Percentage of students failed in Telugu
= 36 – 15 = 21%
21% students who are fail in only Telugu are the ones passed only in English.
(21/100) total students = 630;
Total = 3000

38. Suresh invested a sum of Rs. 15000 at 9 percent per annum Simple interest and Rs. 12000 at 8 percent per annum compound interest for a period of 2 years. What amount of interest did Suresh earn in 2 years?

Solution:
SI = PNR/100
SI = 15000x2x9/100 = 2700
CI = $P[1+(R/100)]^2 - P$
CI=12000(108/100)(108/100) – 12000
CI = 1996.8
Total interest = 4696.8

39. A town have a population of 500000 and 42% of males and 28% of females are married to same town. Find the total number of males.

Solution:
Since the males and females get married within their town, the number of married males is equal to number of married females.
Therefore,
42% of males = 28% females
Males : Females = 28 : 42
= 2 : 3
Number of males = (2/5)500000
= 200000

40. Present population of town is 35,000 having males and females. If The population of males is increased by 6% and if the population of females is increased by 4%, then after 1 year the population becomes 36,700. Find the number males and females ?

Solution:
Let number of Males be X
Number of Females = 35000 – X
At the end of one year,
Number of Males = 1.06X
Number of Females = 1.04(35000-X)
1.06X + 36400 – 1.04X = 36700
0.02X = 300
X = 15000 = Number of males
35000–15000 = 20000 = Number of females

41. A shopkeeper purchased an article at 20% discount on list price, he marked up his article in such a way that after selling the article at 20% discount, he gained 20% on SP. what % is SP of the list price?

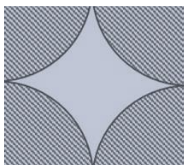
Solution:
Assume list price = 100
Shop keeper purchased at Rs. 80
To get 20% profit, selling price
= 1.2x80 = 96
To get Rs. 96 after 20% discount,
0.8M.P = 96;
Marked Price = 120.
% of S.P with respect to list price
= (96/100)100
= 96%

42. An electric wire runs for 1 km between some number of poles. If one pole is removed the distance between each pole increases by 1 2/6 (mixed fraction). How many poles were there initially?

Solution:
Assume that the number poles initially was 'n'.
Number of gaps when there is n poles
= n-1
Distance of each gap = 1/(n-1)
The number of poles after removing 1 pole = n-1
Number of gaps = n-2
Distance between each gap = 1/(n-2)
Given that
1/(n-2) = 8/6[1/(n-1)]
By solving, we get
6n – 6 = 8n – 16
10 = 2n
n = 5, there were 5 poles initially.

43. 4 horses are tethered at 4 corners of a square plot of side 63 meters so that they just cannot reach one another. The area left un-grazed is?

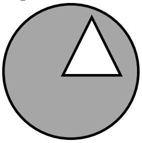
Solution:
The shaded area in the below diagram represents the grazed area.



Un-grazed area = Area(Square)–Area(circle)
$= 63^2 - \pi x 63^2/4$
$= 63^2(1 - (\pi/4)) = 3969(1-(3.14/4))$
= 853 sq.m

44. A rabbit is tied to one end of an equilateral triangle of side 5 m with a rope length of 8m. The rabbit is not allowed to travel inside the triangle then find the maximum area covered by the rabbit?

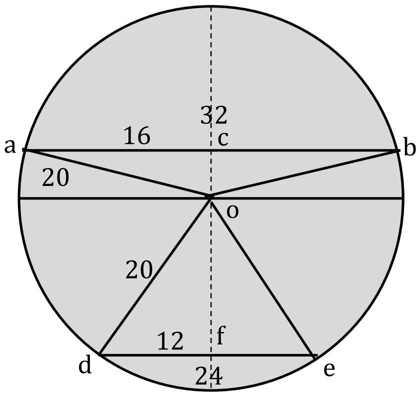
Solution:
The below diagram explains the question.



To find
Area(circle)-Area(triangle)
$= \pi x 8^2 - [(\sqrt{3}/4) x 5^2]$
$= 64\pi - 10.8$
$= 190.2$ sq.m

45. Two parallel chords of length 32 and 24 cm .and radius of circle is 20cm. Find the distance between the chords.

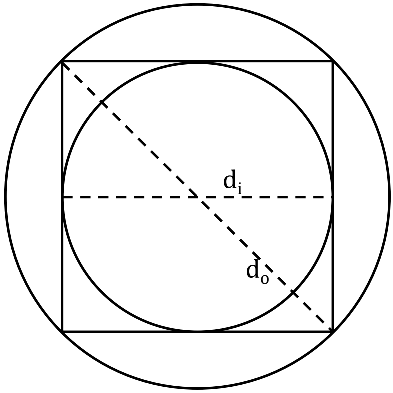
Solution:
Observe the diagram below.



O is the center of the circle.
'ab' and 'cd' are the chords with length 32 and 24 respectively.
'oac' and 'odf' are right angled triangles.
$(of)^2 = 20^2 - 12^2$ ➔ 'of' = 16
$(oc)^2 = 20^2 - 16^2$ ➔ 'oc' = 12
Distance between two chords = of + oc
= 16 + 12 = 28

46. when a circle is inscribed in a square ,and that square is inscribed in a circle. Then ratio of big circle to small circle is:

Solution:
Observe the diagram.



If side of the square is A,
Then diameter of inner circle = A
Diameter of outer circle = diagonal of the square
Diagonal of square = $A\sqrt{2}$
Diameter of outer circle = $A\sqrt{2}$
Ratio between two circles
$= A\sqrt{2} : A$
$= \sqrt{2} : 1$

47. Mr. Lloyd wants to fence his Square shaped land of 120m each side. If a pole is to be laid every 12m how many poles will he need?

Solution:
Number of corner poles = 4
For 120m length, there are 10 segments of 12m. For 10 segments the number of poles required is 11.
Excluding he corner poles, each side needs 9 poles.
Total number of poles = 4 x 9 + 4 = 40

48. A person walking takes 26 steps to come down on a escalator and it takes 30 seconds for him for walking. The same person while running takes 18 second and 34 steps. How many steps are there in the escalator?

Solution:
Assume that the number of steps in the escalator = N
While walking, the person covers 26

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steps, and the escalator covers (N-26) steps in 30 seconds.
While running, the person covers 34 steps and the escalator covers (N-34) steps in 18 seconds.
In both cases, speed of escalator is same.
Speed of escalator = Distance (in steps)/time
Escalator speed in case 1:
S = (N-26)/30
Escalator speed in second case:
S = (N-34)/18
Therefore,
(N-26)/30 = (N-34)/18
18N – 468 = 30N – 1020
12N = 552
Number of steps = N = 46

49. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. What is the ratio of the speed of the train to that of the car?

Solution:
S_t = speed of train; S_c = speed of car
$8 = (120/S_t) + (480/S_c)$ [Time=D/S]
$8.33 = (200/S_t) + (400/S_c)$

$$\frac{8}{8.33} = \frac{\frac{120}{S_t} + \frac{480}{S_c}}{\frac{200}{S_t} + \frac{400}{S_c}}$$

$S_t : S_c = 3 : 4$

50. A person has to cover the fixed distance through his horses. There are five horses in the cart. They ran at the full potential for the 24 hours continuously at constant speed and then two of the horses ran away to some other direction. So he reached the destination 48 hours behind the schedule. If the five horses would have run 50 miles more, then the person would have been only 24 hours late. Find the distance of the destination.

Solution:
Assume speed of 5 horses = S
Speed of 3 horses = 3S/5
Time taken for 5 horses to cover 50 miles
= 50/S
Time taken for 3 horses to cover the same 50 miles
= [50/(3S/5)]
50/S = [50/(3S/5)] – 24
S = 25/18 miles per hour
After first 24 hours, actual time taken by the person to reach the destination be ‘t’,
Distance = Speed x time
S x t= (3S/5) x (t + 48)
t = 72 hours
Total time = 72 + 24
= 96 hours
Distance = 400/3 miles

51. When a train travels at a speed of 60kmph, it reaches the destination on time. When the same train travels at a speed of 50kmph,it reaches its destination 15min late. What is the length of journey?

Solution:
Assume the distance of journey = D
Actual time taken is ‘T’ at actual speed ‘S’.
Time = Distance/Speed
Time taken in first case;
T = D/60 ---(1)
Time taken in second case;
T + (1/4) = D/50
T = (D/50) – (1/4)
T = (4D-50)/200 ---(2)
From (1) and (2)
D/60 = (4D – 50)/200
By solving we get, D = 75km.

52. A participated in cycling contest and he drove the lap at the rate of 6kmph, 12kmph, 18kmph, 24kmph. What is his average speed?
Solution:

$$\frac{4}{A.S} = \frac{1}{6} + \frac{1}{12} + \frac{1}{18} + \frac{1}{24} \rightarrow A.S=11.52$$

53. In a journey of 600 km, due to some problem in the vehicle, speed was reduced by 200 kmph and it takes 30min extra, Find the Actual time taken for journey?

Solution:
Let T be the actual time and S be actual speed
Time = Distance/Speed
Time taken in first case;
T = 600/S ---(1)
Time taken in second case;
T + (1/2) = 600/(S – 200)
T = [600/(S – 200)] – (1/2)
T = (1400 - S)/(2S – 400) ---(2)
From (1) and (2)
600/S = (1400-S)/(2S-400)
1200S – 240000 = 1400S – S^2
S^2 - 200S – 240000 = 0, by solving we get,
S = 600kmph.
T = 600/S = 600/600 = 1 hour.

54. In a 200m race, if A beats B by 10 meters and B beats C by 15 meters then A beats C by how many meters?

Solution:
When A runs 200m, B runs 190m
When B runs 200, C runs 185m
Therefore, 200 : 185 = 190 : x, where x is the distance run by C when A completes the race
x = 190(185)/200
x = 175.75m
A beats C by 200 – 175.75
= 24.25 meters

55. A girl goes to her office for work which is 50 miles. She goes to her office few distance by bicycle and remaining by train. The speed of bicycle is 15 mph and that of train is twice of bicycle. If she spend 20 min. more on bicycle, then total time taken by her from going to office from her home?

Solution:
Speed of cycle = 15mph
Speed of train = 2 x 15
= 30mph
From the question, if the girl travels 1 hour in both cycle and train, the distance covered is
= 15 + 30
= 45
If the girl travels 20 minutes extra by cycle,
The distance travelled = 15x(20/60)
= 5 miles
Total distance = 45 + 5 = 50 miles
Total time taken,
= 1hr + 1hr + 20 min
= 2hr 20 min

56. A car travelling with 5/7 of its actual speed covers 42 km in 1 hour 40 min 48 sec. Find the actual speed of the car.

Solution:
Speed of the car to travel 42 km in 1:40:48
= 42km/(1:40:48)hour
= 42km/(3600+2400+48 sec)
= 42/6048 km per sec
6048sec = 6048/3600 hours
= 1.68 hours
Speed = 42/1.68
= 25kmph
25kmph = (5/7)Actual speed.
Actual speed = 25(7/5) = 35kmph

57. A man completes a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey distance in km.

Solution:
Let the total distance be 2D.
He travels distance D at a speed of 21kmph
The remaining distance D at 24kmph speed
Total time taken:
Time for first half + time for second half
= (D/21) + (D/24) = 10
24D + 21D = 10x504
45D = 5040 → D = 112 km

58. If 1st day of a month is Thursday, then find the number of days in that month if the last day of month is 5th Saturday.

Solution:
If a month starts on Thursday, 29th day of that month will be Thursday, 30th day will be Friday and 31st day will be Saturday.
The month mentioned in the question has 31 days.

59. The quarter of the time from midnight to present time added to the half of the time from the present to midnight gives the present time. What is the present time?

Solution:
Let the present time be T hours.
Time from now to midnight = 24 – T
Given, (1/4)T + (1/2)(24 – T) = T
T/4 + (48 – 2T)/4 = T
T + 48 – 2T = 4T
5T = 48
T = 9.6 hours = 9 hours 36 minutes

60. When the actual time pass 1 hour, the wall clock is 10 min behind it. When 1 hour is shown by wall clock, the table clock shows 10 min ahead of it. When the table clock shows 1 hour, the alarm clock goes 5 min behind it. When alarm clock goes 1 hour, the wrist watch is 5 min ahead of it. Assuming that all clocks are correct with actual time at 12 noon what will be time shown by wrist watch after 6 hours?

Solution:
Ratio between actual time to wall clock
= 60 : 50 = 6 : 5 = A : B
Ratio between wall clock and table clock
= 60 : 70 = 6 : 7 = B : C
Ratio between table clock and alarm
= 60 : 55 = 12 : 11 = C : D
Ratio between alarm and wrist watch
= 60 : 65 = 12 : 13 = D : E
We have to find the ratio between actual time and wrist watch.

$$\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} \times \frac{D}{E} = \frac{A}{E}$$

$$\frac{6}{5} \times \frac{6}{7} \times \frac{12}{11} \times \frac{12}{13} = \frac{5184}{5005}$$

A : E = Actual time : wrist watch time
6 : E = 5184 : 5005
E = 6x5005/5184
E = 5 hours 47 min 34 seconds

61. Sometime after 10:00 PM a murder took place. A witness claimed that the clock must have stopped at the time of the shooting. It was later found that the position of both the hands were the same but their positions had interchanged. Tell the time of the shooting (both actual and claimed).

Solution:
Let the claimed time be H_1 hours M_1 minutes
The actual time of death is H_2 hours M_2 mins
Since the position of the hands are swapped, M_1 is H_2 and H_1 is M_2
Angle of M_2 = Angle of H_1
$6M_2 = 30H_1 + M_1/2$ ---(1)
$30H_1$ → Angle of hour hand at H_1 hours
$M_1/2$ → Extra angle of hour hand for M_1 mins
Angle of M_1 = Angle of H_2
$6M1 = 30H_2 + M_2/2$ ---(2)
(1)+(2) → $11(M_1 + M_2) = 60(H_1 + H_2)$ ---(3)
(1)–(2) → $13(M_1 – M_2) = 60(H_2 – H_1)$ ---(4)
By substituting values $H_1 = 10$; $H_2 = 11$
Claimed time = 10:59
Actual time = 11:54

62. A clock showing 6'o'clock takes 30 seconds to strike 6 times. How long will it take to strike 12 at midnight?

Solution:

The first bell will ring at zero seconds.
So, at 6'o'clock the remaining 5 bells will ring in 30 seconds at an interval of 6 seconds per bell.
The same case happens at 12'o'clock.
The first bell will ring at zero seconds. The remaining 11 bells will take
11 x 6 = 66 seconds

63. Find the time at which minute and hour hands are at same position between 9am and 10am.

Solution:
Use the following formula to find out the time at which two hands will be overlapping.
60H/11
Where H = least hour among the two
Here H = 9
60x9/11 = 49.09
= 49 mins 6 seconds
They will overlap @ 09:49:06 AM

64. A cube is divided into 729 identical cubelets. Each cut is made parallel to some surface of the cube . But before doing that the cube is colored with green color on one set of adjacent faces ,red on the other set of adjacent faces, blue on the third set. So, how many cubelets are there which are painted with exactly one color?

Solution:
Formula for number of cubes painted on only one face:
$= 6(n^{1/3}-2)^2$
Where n = number of small identical cubes.
Number of cubes painted on one face
$= 6(729^{1/3} – 2)^2$
$= 6(9-2)^2$
= 6(49) = 294

65. We need to carve out 125 identical cubes from a cube . what is the minimum number of cuts needed?

Solution:
Formula:
Minimum number of cuts $= 3(n^{1/3} – 1)$
Where n is the number of small identical cubes
Minimum number of cuts
$= 3(125^{1/3} – 1)$
= 3(5-1) = 12

66. A big cube painted red on all the sides. It was cut into 27 smaller cubes by 6 straight lines. How many of the smaller cubes painted on all 3 sides, on 2 sides, on 1 side and no faces painted?

Solution:
Number of small cubes painted 3 sides
= 8
Constant for any number of small cubes because, only the corners will have three faces painted and a cube has 8 corners.

Number of cubes painted two sides:
These are the cubes which are at the edges.
Formula: 2 sides $= 12(n^{1/3} – 2)$
Where n = number of small identical cubes
2 sides painted cubes $= 12(27^{1/3} – 2)$
= 12

Number of cubes painted one side:
Formula: 1 sided $= 12(n^{1/3} – 2)^2$
Where n = number of small identical cubes
1 sided cubes $= 6(27^{1/3} – 2)^2 = 6$

Number of cubes painted on no face:
Formula: No face painted $= (n – 2)^3 = 1$

67. There is a 4 inch cube painted on all sides. This is cut into no of 1 inch cubes. What is the no of cubes which have no painted sides.

Solution:
The number of small cubes obtained when a cube with side X units is cut into small cubes of side Y units is:
Number of small cubes, $n = (X/Y)^3$
The number of small cubes obtained

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$= (4/1)^3 = 64$
Number of cubes with no faces painted
$= (n - 2)^3 = (4 - 2)^3 = 8$

68. A grocer has a sales of Euro 6435, Euro 6927, Euro 6855, Euro 7230 and Euro 6562 for 5 consecutive months. How much sale must he have in the sixth month so that he gets an average sale of Euro 6500?

Solution:
The expected average for six months
= 6500
Total income till 5 months
= 6435+6927+6855+7230+6562
= 34009
Average income on sixth month= 6500
6500 = (34009 + X)/6
Income on sixth month should be
= 4991

69. A person went to a shop and asked for change for 1.15paise. He insisted on getting the change in the following denominations; 50p,25p,10p and 5p. How many coins did he get in each denomination?

Solution:
It has to be solved by trial and error method or using the options.
Here it is obvious that if the person gets
1 nos of 50p coin
2 nos of 25p coin
1 nos of 10p coin and
1 nos of 5p coin
He will get a total of 1.15 Rupees

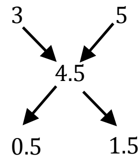
70. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?

Solution:
Let us assume that there is an 8 liter solution
Quantity of water would be 3 liters
Quantity of syrup would be 5 liters
From this solution 1 liter of syrup should be replaced with water.
If 1/5th of the solution is removed, 1 liter syrup and 0.6 liters water will be gone.
If we replace that with 1.6 liters of water, we will now have 4 liters of water and 4 liters of syrup.
Fraction of solution to be removed and replaced is: 1/5

71. A coffee seller has two types of coffee Brand A costing 5 bits per pound and Brand B costing 3 bits per pound. He mixes two brands to get a 40 pound mixture. He sold this at 6 bits per pound. The seller gets a profit of 33 1/2 percent. How much he has used Brand A in the mixture?

Solution:
Selling price = SP; Cost price = CP
SP = (133.33/100)CP
6 = (133.33/100)CP
CP = 4.5

Using
Allegation rule



Ratio between two varieties= 1 : 3
Splitting 40 in the ratio
1 : 3, we get 10 and 40
10 pounds of Brand A was taken.

72. In how many ways can 4 men and 3 women can be arranged so that each men should not sit together and they must be in the order of their age?

Solution:
The 7 persons should be arranged in the following pattern so that the men will not sit together.
M W M W M W M
Since the men are arranged according to their age order, they can be seated in

only one way.
The three women can be arranged in 3! ways.
Total number of arrangements:
= 1 x 3! = 6

73. In how many ways can the letters in mmmnnnppqq can be arranged with two n's together?

Solution:
Arranging with 2 n's together:
Select 2 n's out of three = $^3C_2 = 3$
The selected 2 n's are considered as one.
There will be 9 elements after combining.
Number of arrangements,
= [9!/(3! x 2! x 2!)] x (2!/2!) x 3
= 11340
In the above arrangements, some them will have 3 n's together. We have to eliminate them.
Number of arrangements in which 3 n's are together, = [8!/(3! x 2! x 2!)](3!3!)
= 420
Number of arrangements in which 2 n's are together,
= 11340 – 420 = 10920

74. How many three digit numbers can be formed using 2,3,4 and 5 with none of the digits being repeated?

Solution:
$^nP_r = {}^4P_3 = 4 \times 3 \times 2 = 24$

75. There are 3 types of apples in a box. What is the number of apples one should take so that we end up with 3 apples of one kind. There are three apples in each kind

Solution:
There are three apples in each type.
One should take at least 4 apples to make sure to get 2 of same kind.
Similarly one must take 7 apples to get three apples of same kind.
The number of apples required to have 3 apples of different kind = 7

76. There are N number of railway stations. Each station issues tickets for every other station. Some stations are added. Now they have to issue 46 more tickets. Give the No. of stations after and before added.

Solution:
The number of tickets issued from N number of stations = $^nP_2$
Let x be the number of stations added.
New number of tickets = $^{n+x}P_2$
$^{n+x}P_2 - {}^nP_2 = 46$
(n+x)(n+x-1) – n(n-1) = 46
The equation obtained cannot be solved, Hence, substitute values given in the options in the above equation to get the answer.
In this case the answer is:
n = 11; x = 2

77. 7 members have to be selected from 12 men and 3 women , such that no two women can come together . In how many ways we can select them ?

Solution:
There should not be two women or more in the selection. That means only one woman should be selected from the three women.
Ways of selecting 1 woman = $^3C_1$
The remaining six persons should be selected from 12 men in $^{12}C_6$ ways.
Total ways of selection
= $^{12}C_6 \times {}^3C_1$
= 2772 ways.

78. In how man was team of four can be formed from four boys and three girls such that at least one boy and one girl should be there?

Solution:
Under the given conditions, the team can be formed in either of the following ways.
3 boys and 1 girl, or
2 boys and 2 girls, or
1 boy and 3 girls.

Ways of selecting 3 boys and 1 girl
$= {}^4C_3 \times {}^3C_1 = 4 \times 3 = 12$
Ways off selecting 2 boys and 2 girls
$= {}^4C_2 \times {}^3C_2 = 6 \times 3 = 18$
Ways of selecting 1 boy and 3 girls
$= {}^4C_1 \times {}^3C_3 = 4 \times 1 = 4$
Total ways of selection
$= 12 + 18 + 4 = 34$

79. If a die has 1,6 and 3,4 and 2,5 opposite each other how many such dies can be made.

Solution:
Take any one side as reference, lets say 1.
Side opposite to 1 is always 6.
Imagine that you are facing the side 1.
To the right of side 1, it may be 3 or 4
And to the top of side 1 it may be 2 or 5.
In each case we have 2 possibilities.
So the number of ways the dice can be printed is
= 2 + 2 = 4

80. 15 tennis players take part in a tournament. Every player plays twice with each of his opponents. How many games are to be played?

Solution:
If each player has to play with the other 14 players, the number of games would be
${}^{15}C_2 = (15 \times 14)/(2 \times 1) = 105$
Since each player has to play twice with every other player, the number matches will get doubled.
Total number of matches = 105 x 2 = 210

81. Two dice are thrown simultaneously. What is the probability that the sum of the numbers shown on the two dices will be a prime number?

Solution:
The minimum sum obtained by throwing two dice 2 and the maximum sum is 12.
The prime numbers in this range are:
2, 3, 5, 7, 11.
See the below table to identify, how many results give these numbers as the sum.

Results of dice 1

Results of dice 2	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

The number of shaded boxes = number of expecting results
Probability = 15/36

82. Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

Solution:
Ways of selecting one spade = 13C1
Ways of selecting one heart = 13C1
Ways of selecting 2 cards = 52C2
Probability of selecting one heart and one spade

$$= \frac{{}^{13}C_1 \times {}^{13}C_1}{{}^{52}C_2} = \frac{13 \times 13}{1326}$$

= 13/102

83. 5 boys and 5girls sit around a circular table. What is the probability that 5 boys are sitting together?

Solution:
The number of ways of arranging 5 boys and 5 girls in a circle, where 5 boys are sitting together is:
= 5!(10 – 5)! = 5! x 5!
Number of ways of arranging 10 persons around a circle is:
= (10 – 1)! = 9!

Probability of the above case is:
= (5! x 5!)/9!
= (5 x 4 x 3 x 2 x 1)/(9 x 8 x 7 x 6)
= 5/126

84. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

Solution:
The numbers divisible by 3 in this range are
= 3, 6, 9, 12, 15, 18
The numbers divisible by 5 in this range are
= 5, 10, 15 and 20
15 is occurring in both groups. So we neglect one 15 and take the other.
Leaving one 15, the expected number of results are 9
Probability = 9/20.
Note:
A confusion might arise when you think that 15 is divisible by both 3 and 5, so it will not come in the result.
Compare the question with logic gate.
or = OR gate; "either or" = EXOR gate

85. There is a school were 60% are girls and 35% of the girls are poor. Students are selected at random, what is the probability of selecting a poor girl out of total strength?

Solution:
Assume there are 100 students in the school.
Number of girls = (60/100)100 = 60
Number of poor girls
= (35/100)60 = 21
Probability of selecting one poor girl
= 21/100

86. A bag contains 64 balls of 8 different colors. There are eight of each color (including red). What is the least number of balls one must pick, without looking ,to be sure of selecting 3 red balls?

Solution:
The minimum number of balls to be selected to get one red ball is 57 because, all the balls that have been selected before may be of colors other than red.
58^{th} draw will assure you of second red ball.
59^{th} draw will assure you of third red ball.
Therefore the number of draws = 59

87. The main line train starts at 5.00AM and the harbor line train starts at 5.02AM.Each train has the frequency of 10 minutes. If a guy goes in the morning at a random time what is the probability of he getting main line train?

Solution:
The duration between two main line trains is 10 minutes.
In this 10 minutes, if a passenger reaches in the first two minutes, he will get a harbor line train.
In the remaining 8 minutes, he will get a main line train.
The probability is:
= 8/10 = 0.8

88. What is the probability of A/B to be an integer when A=2x3y and B=2l3m and all of x, y, I, m are positive integers?

Solution:
A and B are four digit numbers.
100 different values can be substituted for x and y pair. They are
[(0,0), (0,1),(0,2),....(5,6),...(9,9)]
Similarly 100 pairs are possible for (l,m)
[(2x3y),(2l3m)] is a pair and only if x = l and y = m, A/B will be an integer.
For example, if (x,y) = (4,5), then A = 2435
Therefore, (l,m) = (4,5) → B = 2435
Total pairs of (A,B) = 100 x 100 = 10000
Pairs with (x = l),(y = m) = 100
Probability = 100/10000
=1/100

89. You are given three coins: one has heads on both faces, the second has tails on both faces, and the third has a head on one face and a tail on the other. You choose a coin at random and toss it, and it comes up heads. The probability that the other face is tails is?

Solution:
Since one of the face is head, it should be either HH coin or HT coin.
The probability of getting tail in the other face is (1/2).

90. One card is drawn from a pack of 52 cards. What is the probability, that it is a spade or ace?

Solution:
Probability of selecting one spade =13/52
Probability of selecting one ace = 4/52
Probability of selecting a spade or ace
= 13/52 + 4/52 – 1/52
= 16/52
(1/52) should be subtracted because one of the ace will be from spade, which is already considered in 13/52, when choosing a spade.

91. If (HE)^H=SHE, where the alphabets takes the values from (0-9) & all the alphabets are single digit then find the value of (S+H+E).

Solution:
In the expression (HE)^H = SHE, HE is a two digit number and SHE is a three digit number.
Let us start with assuming numbers for H.
If H = 0, then (HE)^H = 1, which does not give the required expression.
If H = 1, a two digit number raised to power 1 will give a two digit number. We will not get the required expression.
If H ≥ 3, a two digit number raised to 3 or more will give a number which has more than 3 digits.
Only possible value is: H = 2

25^2 = 625; S = 6; H = 2; E =5; (S+H+E)= 13

92. USA+USSR=PEACE;P+E+A+C+E=?

Solution:
This is a question from crypt arithmetic. Here each letter is assigned with one of the digit from 0 to 9.
Corresponding digit for some of the letters can be identified easily through basic concepts.
For ex, In the above question, a three digit number is added with a four digit number to get a five digit number. So, the first number from left of the five digit number will definitely be 1.
P = 1.
Only when a three digit number is added to a four digit number which starts with 9, we will get a 5 digit number.
U = 9.
When a three digit number is added with a four digit number and we get a five digit number, the second digit from left of the five digit number will be 0.
E = 0.
A + R = 0
Let us start with assuming values for A and R
If A = 2; R = 8, there will be one carry over for S + S

$$\begin{array}{rcccc} & & U & S & A \\ + & U & S & S & R \\ \hline P & E & A & C & E \end{array} \quad = \quad \begin{array}{rcccc} & & & 1 & \\ & & 9 & S & 2 \\ + & 9 & S & S & 8 \\ \hline 10 & & A & C & 0 \end{array}$$

Since A = 2; (9+S) = 12, where we get A= 2 and 1 carry over for 9 in USSR.
SO, S = 12 – 9 = 3.

$$\begin{array}{rcccc} 1 & & 1 & & \\ & & 9 & S & 2 \\ + & 9 & 3 & S & 8 \\ \hline 10 & & 2 & C & 0 \end{array} \quad = \quad \begin{array}{rcccc} 1 & & 1 & & \\ & & 9 & 3 & 2 \\ + & 9 & 3 & 3 & 8 \\ \hline 10 & & 2 & 7 & 0 \end{array}$$

E = 0; P = 1; U = 9; S = 3; C = 7; A = 2; R = 8

P+E+A+C+E = 1 + 0 + 2 + 7 + 0 = 10

93.EVER+SINCE=DARWIN, then D+A+R+W+I+N=?

Solution:
D = 1; A = 0; S = 9, Similar to previous question.
Another method of solving this kind of questions is by using a tabulation.
We have to write the numbers which are sure and then assume values for others.
Here we start with assuming value for E

A	D	S	E	I	R	N	C	V	W	
If E = 2, I>7 to get carry										
0	1	9	2	8	0					X
0	1	9	2	9						X
If E = 3,I>6 to get carry										
0	1	9	3	7	0					X
0	1	9	3	8	1					X
0	1	9	3	9						X
If E = 4,I>5 to get carry										
0	1	9	4	6	0					X
0	1	9	4	7	1					X
0	1	9	4	8	2	6	4			X
0	1	S	4	9						X
If E = 5,I>4 to get carry										
0	1	9	5	5						X
0	1	9	5	6	1					X
0	1	9	5	7	2	7				X
0	1	9	5	8	3	8				X
If there is a carry from V+N, then										
0	1	9	5	7	3	8	2	6	4	√

D = 1; A= 0; R = 3; W = 4; I = 7; N = 8
D+A+R+W+I+N = 1+0+3+4+7+8 = 23

94. CROSS+ROADS=DANGER. FIND D+A+N+G+E+R.

Solution:
For sure, D = 1.
R is an even number.
And E = S + D

D	R	S	E	O	A	G	N	C	
If R= 4; S = 2									
If O = 5									
1	4	2	3	5	6	1			X
1	4	2	3	5	7	2			X
1	4	2	3	5	8	3			X
1	4	2	3	5	9	4			X
If O = 6									
1	4	2	3	6	5	1			X
1	4	2	3	6	6				X
1	4	2	3	6	7	3			X
1	4	2	3	6	8	4			X
1	4	2	3	6	9	5	1		X
If O = 7									
1	4	2	3	7	5	2			X
1	4	2	3	7	6	3			X
1	4	2	3	7	7				X
1	4	2	3	7	8	5	2		X
1	4	2	3	7	9	6	2		X
If O = 8									
1	4	2	3	8	5	3			X
1	4	2	3	8	6	4			X
1	4	2	3	8	7	5	3		X
1	4	2	3	8	8				X
1	4	2	3	8	9	7	3		X
If O = 9									
1	4	2	3	9	5	4			X
1	4	2	3	9	6	5	4		X
1	4	2	3	9	7	6	4		X
1	4	2	3	9	8	7	4		X
1	4	2	3	9	9				X
If R = 6; S = 3									
If O = 2									
1	6	3	4	2	5	7	8	9	√

D =1; A =5; N =8; G =7; E =4; R =6
D+A+N+G+E+R = 31

95. EAT+EAT+EAT=BEET if t=0 then what will the value of TEE+TEE.

Solution:
T = 0.

T	A	E		B	E	E	T	
0	1	3		0	9	3	0	X
0	2	6		1	8	6	0	X
0	3	9		2	7	9	0	X
0	4	2		0	7	2	0	X
0	5	5						X
0	6	8		2	5	8	0	X
0	7	1		0	5	1	0	X
0	8	4		1	4	4	0	√

T = 0; E = 4
TEE+TEE = 044+044
88

96. NINE+FINE = WIVES. Find S+I+N+E. E = 5 and V = 3.

Solution:
S= E+E= 5+5= 0(taking only the unit digit).
W = 1.

```
                        1
   N  I N  E        N  I N  5
 + F  I N  E  →   + F  I N  5
 -----------      -----------
 1  I V  E  S     1  I  3 5  0
```

There should be a carry over for I+I to get 3.
If N = 2, we will get 2+2+1 = 5, but there is no carry over.
If N = 7, we get 7+7+1 = 15 with a carry over. So, N = 7.

```
      1 1
    7 I 7 5
  + F I 7 5
  ---------
  1 I 3 5 0
```

Value of I cannot be one. So, we can substitute 6 in the place of I. I = 6.
1+I+I = 1+6+6 = 13. There is a carry over to 7+F.
1+7+F = 16
F = 8.

```
      1 1 1
      7 6 7 5
    + 8 6 7 5
    ---------
    1 6 3 5 0
```

S = 0; I = 6; N = 7; E = 5
S+I+N+E = 0+6+7+5 = 18

97. XYZ+XYZ+XYZ=ZZZ. Find X+Y+Z

Solution:
Z+Z+Z= Z in the unit place. Z = 0 or 5.
Z cannot be 0. So, Z = 5; Z+Z+Z = 15.
1 is carry over to Y+Y+Y.
(1+Y+Y+Y) ends in 5. 1+8+8+8 = 25.
Y = 8.
2 is the carry over to Z+Z+Z.
2+Z+Z+Z = 5
2+3Z = 5
Z = 1.

```
                  2 1
    X Y Z       1 8 5
    X Y Z       1 8 5
  + X Y Z  →  + 1 8 5
  -------     -------
    Z Z Z       5 5 5
```

X + Y + Z = 14

98. COCA+COLA= OASIS. Find O+A+S+I+S .

Solution:
O = 1.
A+A = S. Two times a same number will always give an even number.
So, S is an even number.
So, O+O = S → 1+1 = 2.
S = 2; O = 1.
A+A = 2.
A should be either 1 or 6 to give S = 2.
A cannot be equal to 1, because O = 1.
So, A = 6
A+A = 12. there is a carry over to C+L.

Since O=1 and A = 6, first two digits of OASIS is 16.
C+C should be equal to 16.
C = 8.
1+C+L = I.
There is no carry over from the above expression to O+O.
So 1+C+L should be less than 10.
1+C+L = 1+8+L < 10
9 + L < 10
So, L = 0
I = 1+8+0 = 9
O+A+S+I+S = 1+6+2+9+2 = 20

99. MOON+SUN=PLUTO.
Find P+L+U+T+O

Solution:
P = 1.
A four digit number is added to get a three digit number. The four digit number will be number starting with 9.
M = 9; and L = 0.
O is an even number because it is twice of N.

L	P	M	O	N	U	T	S	
If O = 2								
0	1	9	2	1				X
0	1	9	2	6	3	7	11	X
If O = 4 and V=3,5,6,8								
0	1	9	4	2	3	7	9	X
0	1	9	4	7	3	8	9	X
0	1	9	4	7	5	0		X
0	1	9	4	7	6	1		X
0	1	9	4	7	8	3	13	X

if O = 6 and V = 2,3,4,5,7								
0	1	9	6	3	2	8	6	X
0	1	9	6	8	2	9		X
0	1	9	6	8	3	0	9	X
0	1	9	6	8	4	1		X
0	1	9	6	8	5	2	8	X
0	1	9	6	8	7	4	10	X
If O = 8 and V = 2,3,...								
0	1	9	8	4	2	0		X
0	1	9	8	4	3	1		X
0	1	9	8	4	5	3	6	√

P = 1; L = 0; U = 5; T = 3; O = 8
P+L+U+T+O = 1+0+5+3+8 = 17

100. BANANA+GUAVA = ORANGE.
Find O+R+A+N+G+E

Solution:
O = B+1; E = A+A; N = 1+A+A
E is always even number.
There should be a carry to A+A= N and A+G=R

E	A	N	U	V	G	R	B	O	
If E = 2 and U = 8									
2	1	3	8	0	3				X
2	1	3	8	7	0	1			X
2	1	3	8	9	2				X
If E = 4 and U = 7									
4	2	5	7	6	1	3			X
4	2	5	7	8	3	5			X
4	2	5	7	9	4	6			X
If E = 6 and U = 6									
6	3	7	6						X

If E = 6 and U = 6									
6	3	7	6						X
If E = 8 and U = 5									
8	4	9	5	0	9				X
8	4	9	5	1	0	5			X
8	4	9	5	2	1	6			X
8	4	9	5	3	2	7	1	2	X
8	4	9	5	4	3	8			X
8	4	9	5	6	5				X
8	4	9	5	7	6	1	2	3	√

O = 3; R = 1; A = 4; N = 9; G = 6; E = 8.
O+R+A+N+G+E = 3+1+4+9+6+8
= 31

Fact

Infosys was launched in 1981 by Mr. Narayana Murthy with six other colleagues on a mere $250 (10000 INR) borrowed from his wife.

1. If given equation is 137+276 = 435, how much is 731+672=?

Solution:
We know that 137+276 ≠ 435 in normal addition.
If you see the second equation, it is the exact reverse of first equation.
The answer for second equation must be exact reverse of answer of first equation.
The answer is
$731 + 672 = 534$

2. If the ratio of two numbers is 3:4 and LCM of the number is 180 then what is the number.

Solution:
Formula:
Product of two numbers = Product of (LCM x HCF)
Assume that the two numbers are
3x and 4x.
HCF = x → LCM = 180
From the formula, we get
$(3x)(4x) = 180x$ → $12x^2 = 180x$
$x = 15$. Sub $x = 15$ in 3x and 4x
$3x = 45$; $4x = 60$
The numbers are 45 and 60

3. $(1/3)^{rd}$ of a number is 6 more than $(1/6)^{th}$ of that number. Find the number.

Solution:
Assume that the number is x.
$(1/3)x - (1/6)x = 6$
$(1/6)x = 6$
$x = 36$.

4. When Rs.250 added to 1/4th of a given amount of money it makes it smaller than 1/3rd of the given amount of money by Rs 100. What is the given amount of money?

Solution:
Assume that the given amount of money is Rs. X
$(1/4)X + 250 - (1/3)X = 100$
By solving, we get X = 1800

5. 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

Solution:
Best method to solve the question is to go with the options.
Sum of the squares of the digits is 109.
Only possibility is $8^2 + 6^2 + 3^2 = 109$
The number may be 863 or 683 according to options.
863 – 495 = 368. This the exact reverse.
The required number = 863

6. Taxi fare is equal to 15 Rs/km & Train fare is equal to 21 Rs/km. If total distance traveled is equal to 450 km and total amount charged is equal to Rs. 8320. Then distance traveled by train is?

Solution:
Assume that the distance travelled by train is X.
The distance traveled by bus will be,
450 – X
Total fare = Train fare + Bus fare
$8320 = 21(X) + 15(450 - X)$
$8320 = 6X + 6750$
X = 261.67 km

7. Anand packs 304 marbles into packets of 9 or 11 so that no marble is left. Anand wants to maximize the number of bags with 9 marbles. How many bags does he need if there should be at least one bag with 11 marbles?

Solution:
Let X be number of bags with 11 marbles
(304 – 11X) should be a multiple of 9.
Substitute X = 1, 2, 3, ... till the above equation is satisfied.
By solving we get, X = 8
8 bags with 11 marbles and 24 bags with 9 marbles

TCS

8. We have an equal arms two pan balance and need to weigh objects with integral weights in the range 1 to 40 kilo grams. We have a set of standard weights and can place the weights in any pan (i.e.) some weights can be in a pan with objects and some weights can be in the other pan. The minimum number of standard weights required is:

Solution:
If both the pans can be used for weighing, the weights required are
$3^0, 3^1, 3^2, 3^3, 3^4$ ...
The weights required are
1, 3, 9, 27.
For example, if we have to weigh 23 kg,
Keep 27kg stone in one pan and 1kg stone, 3kg stone and the material in another pan. The material will weigh 23 kg.
The number of different weights required is 4

9. Divide 50 into two parts so that sum of the reciprocal is 1/12 ?

Solution:
Assume that the two parts of 50 are A and B.
So, A+B = 50
Given, (1/A) + (1/B) = (1/12)
(1/A) + (1/B) = [(A+B)/AB] = (1/12)
50/AB = 1/12
AB = 600
A + B = 50; AB = 600, by solving this, we get
A = 30 and B = 20

10. M men agree to purchase a gift for Rs. D. If three men drop out how much more will each have to contribute towards the purchase of the gift ?

Solution:
Initial Share = D/M
Final Share = D/(M-3)
Extra amount for each person
= [D/(M-3)] – (D/M)
= $3D/(M^2 – 3M)$

11. Three variables x,y,z have sum of 30. All three of them are non- negative integers. If any two variables don't have same value and exactly one variable has a value less than or equal to three, then find the number of possible solution for variables.

Solution:
If x = 1, then y + z = 29 and y or z is greater than 3.
If x = 1, y = 4 then z = 25.
There are 22 different values for y(from 4 to 25) and z value will change accordingly.
When x = 1 , the possibilities are 22
Similarly when y = 1, there are 22 ways and when z = 1, there are 22 ways.
Total when one variable is 1 is = 66
If x = 2, then y + z = 28.
If x = 2 and y = 4, then z = 24.
There are 20 ways for y and z in which y = 14 and z = 14 will not be considered.
Total ways when one variable is 2 is:
19 x 3 = 57.
If x = 3, then y + z = 27.
If x = 3, y = 4, then z = 23
Total ways for y and z = 19.
Total ways when one variable is 3 is:
3 x 19 = 57.
Total possibilities = 66 + 57 + 57 = 180

12. If 28a+30b+31c = 365 then value of a + b + c = ?

Solution:
With only one equation with three unknown variables, it is impossible to find the exact solution.
This question is a puzzle.
There are 28 days in February,
30 days in 4 months of a year and
31 days in 7 months of a year.
So, a = 1;
b = 4 and
c = 7
a + b + c = 12
Or we know that obviously there are 12 months in a year.
No need to add, the answer is 12.

13. When a number is divided by 357 it leaves a remainder 5. If the same number is divided by 17, what is the remainder?

Solution:
357 is a multiple of 17.
So the number which was divided by 357, when it is divided by 17, it leaves the same remainder 5.

14. What is the remainder when (34^31^301) is divided by 9?

Solution:
$((34^{31})^{301})/9 = ((17x2)^{31})^{301})/9$
$= ((17^{31})^{301})$ x $((2^{31})^{301})/9$
$= (17^{9331}$ x $2^{9331})/9$
Reminder of (17/9) = 8 or 8 – 9 = -1
So,
$(-1^{9331}$ x $2^{9331})/9$
$= (-1$ x $2^{9331})/9$
Reminder of $2^1/9 = 2$
Reminder of $2^2/9 = 4$
Reminder of $2^3/9 = 8$
Reminder of $2^4/9 = 7$
Reminder of $2^5/9 = 5$
Reminder of $2^6/9 = 1$
Reminder of $2^7/9 = 2$
Reminder of $2^8/9 = 4$
Here powers of two has reminder cycle 6 when divided by 9.
Reminder of 9331/6 = 1
So, reminder of $2^{9331}/9 = 2$
Reminder of $(-1$ x $2^{9331})/9 = (-1$ x $2)/9$
= -2 or (9 – 2) = 7

15. What is the remainder when
$6^{17} + 17^6$ is divided by 7?

Solution:
Reminder of $6^1/7 = 6$
Reminder of $6^2/7 = 1$
Reminder of $6^3/7 = 6$
Reminder of $6^4/7 = 1$
So, reminder of $6^{17}/6 = 6$
Reminder of $(17)^6$ /7
= reminder of$(14 + 3)^6/7$
= reminder of $3^6/9 = 729/7 = 1$
Reminder of (6 + 1)/7 = 0

16. What is the remainder when 46! is divided by 47?

Solution:
Reminder of 2!/3 = 2
Reminder of 4!/5 = 4
Reminder of 6!/7 = 6
When a factorial is divided by the following number and if the following number is a prime number the reminder will be the factorial number itself.
Since 47 is a prime number,
Reminder of 46!/47will be 46.

17. What is the remainder when 1!+2!+3!+4!+5!+.......+50! is divided by 5!

Solution:
Starting from 5! onwards, all the other factorials are a multiple of 5! i.e. 120.
So, we have to find out the reminder only for sum of factorials from 1 to 4.
1! + 2! + 3! + 4! = 33
Reminder of 33/120 = 33.
Answer = 33.

18. How many trailing zeros are there in 100! After the last significant digit?

Solution:
The formula to find out the number of trailing zeros in n! is:
$(n/5) + (n/5^2) + (n/5^3) + \ldots$
Here n = 100, which is less than 5^3
So the formula is:
$(n/5) + (n/5^2) = (100/5) + (100/25)$
= 20 + 4 = 24
Alternate method:
For every multiple of 10 from 10 to 100 we will have 11 zeros.
For every even number multiplied with a number with unit place 5, there will be 10 zeros.
Example: 32 x 35 will leave a zero.
25 is 5 x 5
50 is 5 x 10
75 is 3 x 5 x 5.
For these extra 3 5's we will get 3 zeros
Total = 11 + 10 + 3 = 24

TCS

19. What is the highest power of 7 that will exactly divide 56!?

Solution:
The product of numbers from 1 to 56 i.e. 56! has the following multiples of 7.
7, 14, 21, 28, 35, 42, 49, 56.
Among these multiples 49 can be written as 7x 7.
So there are 9 number of 7's in 56!.
Highest power of 7 that can divide 56! Is 9.

20. Find the greatest number that will divide 43,91,183 so as to leave the same remainder in each case.

Solution:
Take the difference between the successive numbers.
91 – 43 = 48.
183 – 91 = 92.
The answer for the question is the HCF of the differences.
HCF(48, 92) = 4.
So, when the numbers 43, 91 and 183 are divided by 4, you will get the same reminders.

21. The numbers 272738 and 232342, when divided by n, a 2 digit number leaves a remainder 13 and 17 respectively. Find the sum of digits of n?

Solution:
(272738 – 13) = 272725
is exactly divisible by n.
(232342 – 17) = 232325
is exactly divisible by n.
The last two digits of the numbers after removing the reminders is 25.
So both numbers are exactly divisible by 25.
n = 25. Sum of the digits
= 2 + 5 = 7.

22. When a number is successively divided by 5, 3 and 2 leaves a remainder of 0, 2 and 1 respectively. What are the remainders when the same number is divided by 2, 3 and 5 successively?

Solution:
Assume that the number is X.
X is a multiple of 5.
So, X = 5Y. ---(1)
When X is divided by 5, the quotient is Y and reminder is zero.
Y = 3Z + 2, ---(2)
When Y is divided by 3, the quotient is Z and reminder is 2.
Z = 2A + 1 ---(3)
When Z is divided by 2, the quotient is A and the reminder is 1.
Substitute (3) in (2)
Y = 3(2A + 1) + 2 = 6A + 5 ---(4)
Substitute (4) in (1)
X = 5(6A + 5) = 30A + 25.
For A = 0, X = 25.
Since LCM of 5, 3 and 2 is 30, we can assume that the number is 25 itself.
Reminder of 25/2 = 1; Quotient = 12
Reminder of 12/3 = 0; Quotient = 4
Reminder of 4/5 = 4
The required answer is (1, 0, 4).

23. 8+88+888+.......+8888.............8888. There are 21 "8" digits in the last term of the series. Find the last three digits of the sum.

Solution:
Write all the numbers one by one, to get 21 "8's" in the unit place, 20 "8's" in the tens place and 19 "8's" in the hundreds place.
Sum of all 8's in units place
= 21 x 8 = 168
8 will be the unit place of the result.
16 is carried over to tens place values.
Sum of all numbers in tens place plus the carry over
= 20 x 8 + 16
= 160 + 16 = 176
6 will be the tens place of the result and 17 is carried over to the hundreds place.
Sum of all numbers in hundreds place plus the carry over
= 19 x 8 + 17 = 169.
9 will be the hundreds place of the result
The last three digits of the sum is
968.

24. What is the number of zeros at end of number 28! + 29!?

Solution:
28! + 29! = 28! + (29 x 28!)
= 28! (1 + 29)
= 28! (30)
Number of zeros in 28!
= Quotient of (28/5) + (28/25)
= 5 + 1 = 6
The number of zeros at the end of 28! is 6.
When 28! is multiplied with 30, there will be 7 zeros at the end.

25. Find the last two digits of the expression (1141)^3843+(1961)^4181

Solution:
1 raised to any number will give 1.
Unit digit of 1141^{3843} = 1.
Tens digit of 1141^{3843}
= tens digit of base value x unit digit of power value
= 4 x 3 = 12.
Tens digit of 1141^{3843} = 2
Last two digits of 1141^{3843} = 21
Unit digit of 1961^{4181} = 1
Tens digit of 1961^{4181} = 6 x 1 = 6
The last two digits of 1961^{4181} = 61
The last two digits of
$1141^{3843} + 1961^{4181}$
= 21 + 61 = 82.

26. Find the missing number in the series 70, 54, 45, 41,___ .

Solution:
70 – 54 = 16
54 – 45 = 9
45 – 41 = 4
The difference between the successive numbers are square values in the descending order.
The last square value is 4 which is the square of 2.
The next square value will be square of 1 i.e. 1.
41 – 1 = 40
Missing number = 40

27. Mr. A took up the sum of natural numbers, by mistaken he add a number twice and find the sum to be 1000.Find the repeated number.

Solution:
The formula to find out sum of n natural numbers = n(n+1)/2
Substitute values for n, so that the sum will be almost equal to 1000 but less than 1000.
If n = 44, sum = 990.
To this 990 if 10 is added, the sum occurred due to error will be 1000.
The number which is added twice = 10.

28. What is the 50th term of term of the series 1,3,6,10,15,21?

Solution:
First number in the series is sum of first 1 natural number.
Second number in the series is sum of first 2 natural numbers.
Third number in the series is sum of first 3 natural numbers.
So, 50^{th} term of the series will be sum of first 50 natural numbers.
50^{th} term = 50(50+1)/2
= 1275.

29. What are the last three numbers of the series 11234783131___?

Solution:
23 – 11 = 12
47 – 23 = 24
83 – 47 = 36
131 – 83 = 48
X – 131 = 60
X = 191. Last three digits = 191.

30. If 212=25; 213=36; 214=47; 215=58; 216=69; 218=??

Solution:
212 = 25. Unit digit of 212 becomes tens digit, to that sum of the digits of 212 is added.
218 = 80 + 11 = 91

T C S

TCS

31. Average age of students of an adult school is 40 years. 120 new students whose average age is 32 years joined the school. As a result the average age is decreased by 4 years. Find the number of students of the school after joining of the new students.

Solution:
Let the actual number of students before the entry of 120 students be X.
Sum of the ages of original number of students = 40X.
Average age of old students and new students = 36.
Sum of ages of new 120 students
= 120 x 32 = 3840.
From the above data, we get:

$$\frac{40X + 3840}{X + 120} = 36$$

By solving the above equation, we get
X = 120
Alternate method:
Using allegation rule.

40 32

36

4 4

The ratio between the number of students in each category = 4 : 4 = 1 : 1.
Therefore the number of old students
= 120

32. Mean of three numbers is 10 more than the least of the numbers and 15 less than greatest of the three numbers. The median is five. Find the sum of the three numbers.

Solution:
(X + Y + Z)/3 = Mean (M)
Y = 5; M = X + 10→ X = M – 10
M = Z – 15→ Z = M + 15
(M – 10 + 5 + M + 15)/3 = M
→ M = 10 → X = 0; Z = 25
X + Y + Z = 0 + 5 + 25 = 30

33. If two consecutive terms are removed from a series 1,2...........n ,then the average of remaining terms is 26(1/4). What is the no of terms?

Solution:
26(1/4) = 105/4
Let the numbers removed be x and x+1

$$\frac{[n(n+1)/2] - x - (x+1)}{n-2} = \frac{105}{4}$$

n – 2 will be a multiple of 4
If n - 2 = 4; n = 6. Does not satisfy the equation.
If n - 2 = 8; n = 10. Does not satisfy.
If n – 2 = 12; n = 14. Does not satisfy.
If n – 2 = 16; n = 18. Does not satisfy.
Going on like this, when
n – 2 = 12 x 4 = 48; n = 50
50(50+1)/2 = 1275 and
105 x 12 = 1260.
1275 – 1260 = 15.
Sum of two consecutive integers = 15.
The two numbers which are removed
= 7, 8
The number of terms in the series = 50.

34. Three math classes: X, Y, and Z, take an algebra test. The average score in class X is 83. The average score in class Y is 76. The average score in class Z is 85. The average score of all students in classes X and Y together is 79. The average score of all students in classes Y and Z together is 81. What is the average for all the classes?

Solution:
Using allegation rule, find the ratio between number of students in each class.
Ratio between number of students in class X and class Y.

83 76

79

3 : 4

Ratio between number of students in X and Y = 3 : 4
Ratio between number of students in class Y and Z

76 85

81

4 : 5

Ratio between number of students in Y and Z = 4 : 5
Ratio between number of students in X, Y and Z = 3 : 4 : 5
Assume that the number of students in class X, Y and Z are 3, 4 and 5 respectively.
Overall average = overall total/overall numbers.
Total marks by students in X
= 3 x 83 = 249
Total marks by students in Y
= 4 x 76 = 304
Total marks by students in X
= 5 x 85 = 425
Overall total = 249+304+425 = 978
Overall numbers = 3 + 4 + 5 = 12
Overall average = 978/12 = 81.33

35. A cask contains 12 gallons of mixture of wine and water in the ratio 3:1. How much of the mixture must be drawn off and water substituted so the wine and water become half and half.

Solution:
The quantity of wine in the mixture
= 12 x (3/4) = 9 liters
The quantity of water in the mixture
= 12 – 9 = 3 liters
The result should have half and half of wine and water.
Therefore, there must be 6 liters of wine and 6 liters of water.
Out of 9 liters of wine, 3 liters must be replaced with water.
The fraction of the solution to be replaced by water = 3/9 = 1/3.

36. If a person mixes Rs. 50/kg rice and Rs. 60/kg rice and sold them at Rs. 70/kg and earned a profit of 20%, then in what ratio should he mix the two varieties?

Solution:
Selling price of the mixture = Rs. 70
Profit % = 20
Cost Price of the mixture:
SP = 1.2 CP
CP = 70/1.2 = Rs. 58.33
Find the ratio using allegation rule.

50 60

58.33

1.67 : 8.33

The ratio between the two varieties is 1 : 5.

37. The shopkeeper charged Rs. 12 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 how many chocolates I received in 12 rupees. What is the first asking price?

Solution:
Actual price of 1 chocolate = 12/x
Discount price of 1 chocolate = 12/x+2
Actual price of 12 chocolates = 144/x
Discount price of 12 chocs = 144/x+2
Given,
(144/x) – (144/x+2) = 1
By solving this, we get x = 16.
Actual price of the chocolate
= 12/16
= Rs. 0.75

38. If apples are bought at the rate of 30 for Rs.100. How many apples must be sold for Rs.100 so as to gain 20%?

Solution:
Cost price of one apple = 100/30 = 3.33
X be the number of apples sold at 20%

profit.
Cost price of X apples = 100/1.2 = 83.33
Number of apples which cost 83.33
= 83.33/3.33 = 25

39. A batsman scored 110 runs which includes 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?

Solution:
Runs scored through boundaries and sixes = 3x4 + 8x6 = 12 + 48 = 60.
Runs scored by running between the wickets = 110 – 60 = 50
Percentage of runs scored by running between the wickets,
= (50/110) x 100 = 45.45%

40. In June, a baseball team that played 60 games had won 30% of its game played. After a phenomenal winning streak, this team raised its average to 50%. How many games must the team have won in a row to attain this percentage?

Solution:
Number of matches won in the first 60 matches = (30/100) x 60 = 18
Let the number matches played after the 60^{th} match be N.
Given, after playing N matches, the winning percentage becomes 50.
So,
[(18+N)/(60+N)] = 50/100
1800 + 100N = 3000 + 50N
50N = 1200
N = 24.

41. In an examination 80% of student passed in mathematics. 55% in English. 29% failed in both subject. The pass percent in both subjects is?

Solution:
Percentage of students passed in at least one subject = 100 – 29 = 71%
Students passed in both
= 80+55-71 = 64%

42. Eesha has a wheat business. She purchases wheat from a local wholesaler at a particular cost per kilogram. The price of the wheat at her stores is Rs. 3 per kg. Her faulty spring balance reads 0.9 kg for 1 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 ?

Solution:
Actual price of the wheat at faulty weight is = 0.9 x 3
= Rs. 2.70
Discount price of the wheat (@ 10%)
= 3 – (10/100) x 3
= Rs. 2.70
The actual price and discount price are both same and yet Eesha did not get any profit or loss.
Therefore, Eesha sold the wheat at cost price.
Cost price of the wheat is:
Rs. 2.70 for 0.9 kg
= Rs. 3 per kg.

43. The ages of the two friends were in the ratio of 2:3. If the sum of their ages is 55.Then after how many years their ratio will become 4:5?

Solution:
Since the present age of A and B are in the ratio 2 : 3 we can assume that the actual present age od A and B as,
2x and 3x
2x + 3x = 55
x = 11
Age of A = 22
Age of B = 33
Let n be the number of years after which their ages will be in the ratio 4 : 5.
Therefore,
(22 + n)/(33 + n) = 4/5
5(22 + n) = 4(33 + n)
110 + 5n = 132 + 4n
5n – 4n = 132 – 110
n = 22

TCS

44. When Usha was thrice as old as Nisha, her sister Asha was 25. When Nisha was half as old as Asha, then sister Usha was 34. Their present ages add to 100. How old is Usha?

Solution:
When Nisha's age is x, Usha's age is 3x and Asha's age is 25
x, 3x, 25
When Asha is 2y, Nisha is y and Usha is 34.
Subtract the ages of each person in both the cases:
$x - y = 3x - 34 = 25 - 2y$
$2x + y = 34$
$3x + 2y = 59$
By solving the two equations, we get
$x = 9$ and $y = 16$
When Usha is 34, Nisha is 16 and Asha is 32.
$34 + 16 + 32 = 82$
82 is 18 short of 100.
Add 6 years to each person.
The present age of Usha = $34 + 6 = 40$.

45. 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, ..., FRIedcake, and SATchel. Please help Elva find the day of the week on 08-Jan-2029.

Solution:
Remember this day of the date always.
Jan 1, 2001 is Monday.
From Jan 1, 2001 to Dec 31, 2028, there are 28 years.
In these 28 years, there are 21 normal years and 7 leap years.
Number of odd days for 21 normal years
$= 21 \times 1 = 21$
Number of odd days for 7 leap years
$= 7 \times 2 = 14$
Total odd days + 8 days in 2029 = 43
Reminder of 43/7 = 1.
Since looking from past to future, add one day to Monday. Answer: Tuesday

46. If there are only 4 Sundays and 4 Thursdays in the month of January then what day will be on 31st Jan?

Solution:
If a month has 31 days, there will be exactly 3 days out of Sunday to Saturday which will occur five times.
Between Thursday and Sunday, there are only two days(Friday and Saturday).
But between Sunday and Thursday, there are three days(Monday, Tuesday and Wednesday).
There are 3 Mondays, 3 Tuesdays and 3 Wednesdays in that month.
The last day of the month is Wednesday.

47. The famous church in the city of Kumbakonam 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?

Solution:
For every 60 minutes of the actual time, the faulty time is 54 minutes.
The faulty time from 10:00AM Monday to 3:00PM Friday is:
$(14 + 24 + 24 + 24 + 15) = 101$ hours.
The ratio between faulty time and actual time is 54 : 60.
therefore,

$$\frac{54}{60} = \frac{101}{X}$$

Where X is the actual time when faulty time is 3:00PM
X = 112.22 = 112 hr 13 min 20 sec
Actual time is 02:22:20AM Saturday.

48. George does 3/5 of a piece of work in 9 days. He then calls Paul and they finish the work in 4 days. How long would Paul take to do the work by himself?

Solution:
Time taken by George to complete $1/5^{th}$

TCS

of work = 9/3 = 3 days.
Work done by George in 3 days = 1/5
Work done by George in 1 day = 1/15
Remaining work = 1 – (3/5) = 2/5
Time taken by both George and Paul together to complete 2/5th of the work = 4 days
Time taken for them to complete full work = 4 x 5/2 = 10 days.
Work done by George and Paul together in one day = 1/10

$$\frac{1}{G} + \frac{1}{P} = \frac{1}{10}$$

$$\frac{1}{15} + \frac{1}{P} = \frac{1}{10}$$

P = 30 days.

49. The five tyres of a car (four road tyres and one spare) were used equally in a journey of 40,000 km. The number of km of use of each tyre was?

Solution:
The number of tyres on the road at any time is 4.
The total distance of each of the four tyres facing the road = 40000.
Total distance by the tyres facing the road = 4 x 40000 = 160000.
The average distance for each of the 5 tyres = 160000/5 = 32000

50. A certain quantity of rice is spent daily for 30 students in a hostel. One day some students were absent as a result, the quantity of rice has been spent in the ratio of 6 : 5. How many students were present on that day?

Solution:
The rice per student is considered constant.
Ratio of rice used is directly proportional to the ratio of number of students available.

$$\frac{6}{5} = \frac{30}{X}$$

X = 25.
Number of students present = 25

51. The number of times a bucket of capacity 4 liters to be used to fill up a tank is less than the number of times another bucket of capacity 3 liters used for the same purpose by 4. What is the capacity of the tank?

Solution:
LCM of 4 and 3 is 12.
For a 12 liter tank, we need 3 buckets of four liter and 4 buckets of 3 liter.
The number of 4 liters bucket is 1 less than the number of 3 liter buckets required.
For the number of 4 liters buckets to be less than the number of 3 liter buckets by 4, the tank should be 4 times of the 12 liters tank.
The capacity of the required tank is = 4 x 12 = 48 liters.
For 48 liters, 4 liter buckets required is 12 and 3 liter buckets required is 16.

52. A cistern consists of 3 pipes. By the help of 1st and 2nd pie the tank gets filled in 10 hours and 15 hours respectively but by the help of 3rd pipe tank becomes empty in 5 hours. At 8 a.m., 1st pipe was opened. At 9 a.m., 2nd pipe was also opened with 1st. At 10 a.m., 3rd pipe was also opened with 1st and 2nd. When the tank becomes filled or empty?

Solution:
Let N be the number of hours required to fill the tank.
The first pipe is opened for N hours.
Second pipe is opened for N – 1 hours.
Third pipe is opened for N – 2 fours.

$$\frac{N}{10} + \frac{N-1}{15} - \frac{N-2}{5} = 1$$

$$\frac{3N}{30} + \frac{2N-2}{30} - \frac{6N-12}{30} = 1$$

N = - 44, we are considering that the tank will never get filled, but a which is already full will get emptied in a time of 44 minutes.

53. Arun and Vinay together can do a piece of work in 7 days. If Arun does twice as much work as Vinay in a given time how long will Arun take to do work?

Solution:
Work done by Arun and Vinay together in one day = 1/7.
Let us assume that the work done by Vinay in one day = 1/V
So, work done by Arun in one day = 2/V
So,

$$\frac{1}{V} + \frac{2}{V} = \frac{1}{7}$$

V = 21 days.
Arun will complete the work in half time of Vinay.
Time taken by Arun = 21/2 = 10.5 days.

54. Brilliant software company, Chennai has been doing an excellent business in the last four years. The company went on a recruitment spree from among the engineering colleges in and around Chennai. They recruited people from ECE, CSE, IT streams. All programmers are of equal respect. They receive equal salaries and perform equal load of work. Suppose 15 such programmers take 15 minutes to write 15 lines of code in total. How long will it take for 84 programmers to write 84 lines of code in total?

Solution:
Work done is directly proportional to resource and time taken.
Here the work done (W) is number of lines of code.
Resources (R) is the number of programmers.
Time (T) is the number of minutes.

$$\frac{W_1}{W_2} = \frac{R_1T_1}{R_2T_2}$$

$$\rightarrow \frac{15}{84} = \frac{15 \text{ x } 15}{84 \text{ x } T_2}$$

T_2 = 15 minutes.

55. There are 4 machines namely P, Q, R and S in a factory. P and Q running together can finish an order in 10 days. If R works twice as P and S works 1/3 as much as Q then the same order of work can be finished in 6 days. Find the time taken by P alone to complete the same order.

Solution:

$$\frac{1}{P} + \frac{1}{Q} = \frac{1}{10} \quad \text{---(1)}$$

$$\frac{1}{R} + \frac{1}{S} = \frac{1}{6}$$

$$\rightarrow \frac{2}{P} + \frac{1}{3Q} = \frac{1}{6} \quad \text{---(2)}$$

Assume that (1/P) = x and (1/Q) = y
From equ. (1), we get
x + y = 1/10 ---(3)
From equ. (2), we get
2x + (y/3) = 1/6 → 6x + y = ½ ---(4)
By solving (3) and (4), we get
y = 1/50 and x = 2/25
x = (1/P) = (2/25)
P = 25/2 = 12.5 days.

56. If two-third of a bucket is filled in one minute then the time taken to fill the bucket completely will be?

Solution:
$2/3^{rd}$ of a bucket is filled in 1 minute.
Time taken to fill $1/3^{rd}$ of the bucket
= ½ minutes = 30 seconds.
Time taken to fill the full bucket
= 30 x 3 = 90 seconds = 1.5 minutes.

57. If 10 lions can kill 10 deer in 10 minutes how long will it take 100 lions to kill 100 deer.

Solution:

$$\frac{W_1}{W_2} = \frac{R_1T_1}{R_2T_2}$$

$$\rightarrow \frac{10}{100} = \frac{10 \text{ x } 10}{100 \text{ x } T_2}$$

T_2 = 10 minutes.

58. A cistern can be filled by one of the pipes in 30 min and by the other in 36 min .both pipes are opened for a certain time but being partially clogged only 5/6 of the quantity of water flows though the former and only 9/10 through the later the obstruction however being suddenly removed the cistern is filled in 3.5 minutes form that moment. How long was it before the full of water began?

Solution:
Let N be the number of minutes for which the clogs were there in the two pipes.
Time taken to fill the tank by pipe 1 with the clog = 30 x (6/5) = 36 minutes.
The fraction of tank filled by pipe 1 in one minute, when the clog is there is,
= 1/36
Total fraction of tank filled by pipe 1 is:

$$\frac{N}{36} + \frac{3.5}{30}$$

Time taken to fill the tank by pipe 2 with the clog = 36 x (10/9) = 40 minutes.
The fraction of tank filled by pipe 2 in two minutes, when the clog is there is,
= 1/40
Total fraction of tank filled by pipe 2 is:

$$\frac{N}{40} + \frac{3.5}{36}$$

Combined work:

$$\frac{N}{36} + \frac{3.5}{30} + \frac{N}{40} + \frac{3.5}{36} = 1$$

By solving the above equation, we get
19N + 77 = 360
19N = 283; N ≃ 15 minutes

59. 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 km ahead of car A if the speed of car is 60kmph?

Solution:
Distance travelled by car 1 before car 2 starts at 7pm = 2 x 40 = 80km
Time taken for car 2 to meet car 1
=80/(60 – 40) = 80/20 = 4 hours.
Time taken for car 2 to be 9km ahead of car 1 = 9/(60/40)
= 9/20
= 0.45 hours.
= 0.45 x 60 = 27 minutes.
Total time taken for car 2 to be ahead of car 1 = 4 hours 27 minutes.

60. Jake is faster than Paul. Each walk 24 km. The sum of their speeds is 7kmph and the sum of the times taken by them is 14 hr. Then Jake speed is equal to:

Solution:
Let the speed of Jake and Paul be x and y respectively.
Given, x + y = 7 ---(1)
Time taken by Jake = 24/x
Time taken by Paul = 24/y
(24/x) + (24/y) = 14
(24x + 24y)/xy = 14
xy = 24(x+y)/14 = 168/14
xy = 12 ---(2)
By solving (1) and (2)
We get, x = 4 and y = 3
Speed of Jake = 4 kmph.

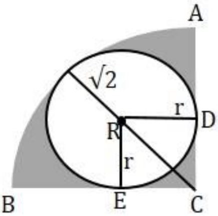
61. Ram and Shakil run a race of 2000 meters. First, Ram gives Shakil a start of 200 meters and beats him by one minute. If Ram gives Shakil a start of 6 minutes Ram is beaten by 1000 meters. Find the time in minutes in which Ram and Shakil finish the race separately.

Solution:
Let S_1 be the speed of Ram and S_2 be the speed of Shakil.
Time taken by Ram in first case
$= 2000/S_1$
Time taken by Shakil in first case
$= 1800/S_2$
From the question,
$(2000/S_1) = (1800/S_2) – 1$ ---(2)
Time taken by Ram in second case
$= 1000/S_1$
Time taken by Shakil in second case

$= 2000/S_2$
From the question
$1000/S_1 = 2000/S_2 - 6$ ---(1)
By solving (1) and (2), we get
$S_1 = 250$ and $S_2 = 200$
Time taken for Ram to complete the race
$= 2000/250 = 8$ minutes
Time taken for Shakil to complete race
$= 2000/200 = 10$ minutes.

62. If ABC is a quarter circle and a smaller circle is inscribed in it; if radius of quarter circle is 1.414units. Find the radius of smaller circle.

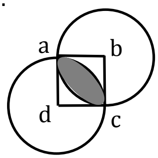
Solution:
The following diagram represents the given question.



RE is perpendicular to BC.
REDC form a square.
From the diagram, RE = EC = r
RC = r√2. (Diagonal of a square = a√2)
$r + r\sqrt{2} = \sqrt{2}$
$r(1 + \sqrt{2}) = \sqrt{2}$
$r = \sqrt{2}/(1+ \sqrt{2})$
r = 0.586 units.

63. 2 identical circles intersect so that their centers and the points at which they intersect form a square of side 1cm. The area in sq. cm of the portion that is common to 2 circles is:

Solution:
The following diagram represents the question.



Area of the square = 1 x 1 = 1sq.cm
Area of half of the square = 0.5 sq.cm
Area of the section formed by 'adc' in the circle $= (1/4) \times \pi r^2 = (¼)\ \pi$
Area of the shaded part below the diagonal of the square 'abcd'
$= \pi/4 - 0.5$
= 0.285 sq.cm
Similarly area of the shaded part above the diagonal = 0.285 sq.cm
Total shaded area = 2 x 0.285
= 0.57 sq.cm.

64. Usha bought a linen cloth and rope to build a tent. If the rope is 153 m long and it is to be cut into pieces of 1m length, then how many cuts are to be made to cut the ropes into 153 pieces?

Solution:
In a two meter rope, if one cut is made, there will be two pieces.
In a three meter rope, if two cuts are made, there will be three pieces.
Number of cuts required =
Number of pieces – 1.
For 152 pieces, the number of cuts
= 153 – 1 = 152.

65. Given 3 lines in the plane such that the points of intersection form a triangle with sides of length 19, 19 and 19, the number of points equidistant from all the 3 lines is?

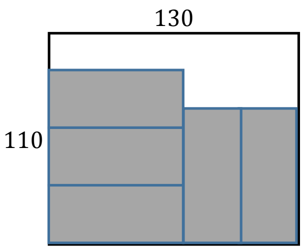
Solution:
For an equilateral triangle, the point which is equidistance from all the lines is the in-center of the triangle.
In-center is the exact middle of the equilateral triangle.
Number of points = 1.

66. 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?*

Solution:
The difference b/n the circumference of the two wheels = 57
For every one revolution of the back wheel, the front wheel has to make one revolution + 57 uneves.
The extra uneves covered by the front wheel with 9 more revolutions = 9x133 = 1197 uneves
The number of 57 extra uneves in 1197 = 1197/57 = 21.
So, the back wheel has made 21 revolutions. The total distance covered = 21 x 190 = 3990 uneves.

67. Rectangular tile each of size 70cm by 30cm must be laid horizontally on a rectangular floor of size 110cm by 130cm,such that the tiles do not overlap and they are placed with edges touching against each other on all edges. A tile can be placed in any orientation so long as its edges are parallel to the edges of floor. No tile should overshoot any edge of the floor. The maximum number of tiles that can be accommodated on the floor is:

Solution:
The following diagram represents the above description.



The maximum number of tiles that can be placed =5(without breaking the tiles)
With breaking= 110x130/30x70 = 6

68. If length, breadth and height of cube are decreased, decreased & increased by5%,5%,20% respectively then what will be the impact of surface area of cube?

Solution:
Surface area of cube = 6a2
Assume that the side of a cube = 100.
Surface area of cube = 60,000
The cube will become a cuboid after changing the dimensions as per the question.
Sides of the cuboid:
Length, l = 95
Breadth, b = 95
Height, h = 120
Surface area of cuboid = 2(lb + bh + hl)
= 2(95x95 + 95x120 + 120x95)
= 63,650
Percentage change = (3650/60000)100
= 6.08% increase.

69. On planet korba, a solar blast has melted the ice caps on its equator. 9 years after the ice melts, tiny planetoids called echina start growing on the rocks. Echina grows in the form of circle, and the relationship between the diameter of this circle and the age of echina is given by the formula d = 4(t-9) for t>9, where d represents the diameter in mm and t the number of years since the solar blast. Jagan recorded the radius of some echina at a particular spot as 7mm. How many years back did the solar blast occur?*

Solution:
Radius = 7mm; Diameter = 14mm
So, 14 = 4(t – 9)
t – 9 = 14/4 = 3.5
t = 12.5 years.

70. A boy wants to make cuboids of dimension 5m, 6m and 7m from small cubes of .03 m3. Later he realized he can make same cuboids by making it hollow. Then it takes some cubes less. What is the number of the cubes to be removed?

Solution:
The volume of the whole cuboid
$= 5 \times 6 \times 7 = 210\ m^3$
After removing the outer shell, the cuboid which has to be originally removed will be inside.
The volume of that cuboid is
$(5 - 0.03)x(6 - 0.03)x(7 - 0.03)$
$= 4.97 \times 5.97 \times 6.97$
Volume $= 206.8\ m^3$
This 206.8 is the volume that has to be removed from $210m^3$ cube.
The number of small cubes in $206.8m^3$ cube is
$=206.8/0.03 = 6893$ cubes.

71. A person is writing all the 4 digit numbers. How many times he will use 2?

Solution:
From 00 to 99 there are 20 2's.
There are 90 sets of 00 to 99 as the last two digits from 1000 to 9999.
Number of 2's in the last two digits of all 4 digit numbers $= 90 \times 20 = 1800$
From 000 to 999, there are 100 2's in the hundreds place.
There are 9 sets of 000 to 999 from 1000 to 9999.
The number of 2's in the hundreds place
$= 9 \times 200 = 1800$
From 1000 to 9999, there are 1000 numbers in which the thousands place is 2.
Total number of times, two is written
$= 1800 + 1800 + 2000 = 5600$

72. 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?

Solution:
There are three even numbers in the given set of numbers (2, 3 and 6).
The number of ways in which we can form a pair of even numbers for the last two digits out of three even numbers is:
$^3P_2 = 3 \times 2 = 6$. They are
24, 26, 42, 46, 62 and 64

There are six cases and in each six case there are 5 numbers remaining, which can be arranged in 5! ways. (Without repetition).
The total number of arrangements
$= 6 \times 5! = 720$.

73. The letters in the word "PLACES" are permuted in all possible ways and arranged in the alphabetical order. Find the word at 48 position.

Solution:
Arrange the given letters in alphabetical order as below.
ACELPS.
Assign numbers as given below.
A = 1; C = 2; E = 3; L = 4; P = 5; S = 6
When we arrange the numbers in ascending order, the first number will be 123456.
We have to find the 48^{th} term.
48 is a multiple of 4!.
24^{th} term will be the reversal of the last 4 digits.
24^{th} term = 126543
25^{th} term = 132456
48^{th} term will be the reversal of last 4 digits of 25^{th} term.
48^{th} term = 136542
Arrange the letters according to the numbers above.
48^{th} word will be
AESPLC.

74. What is the sum of all 5 digit numbers which can be formed with the digits 0,1,2,3,4 without repetition?

Solution:
Total number of five digit numbers that can be formed:
First digit can be filled in 4 way.(except zero).
Second digit can be filed in 4 ways (including zero).
Third digit can be filled in 3 ways.
Fourth digit in 2 ways and
Fifth digit in 1 way.
Total ways = 4x4x3x2x1 = 96 ways.

TCS

Among the 96 five digit numbers,
24 numbers will start with 1,
24 numbers will start with 2,
24 numbers will start with 3,
24 numbers will start with 4,
For numbers starting with 1, the unit place will be either 0 or 2 or 3 or 4.
Out of these 24 numbers starting with 1, we will have
6 numbers ending with 0,
6 numbers ending with 2,
6 numbers ending with 3, and
6 numbers ending with 4.
Sum of these unit place numbers
= 6(0+2+3+4) = 54.
Sum of tens digits = 540
Sum of hundreds digits = 5400
Sum of thousands digits = 54000
Sum of ten thousands digits
= 10000 x 24 = 240000
Sum of the 24 numbers starting with 1
= 54+540+5400+54000+240000
= 299994
Similarly, sum of units digits of numbers starting with 2 = 6(0+1+3+4) = 48
Sum of all numbers starting with 2
= 48 + 480 + 4800 + 48000 + 480000
= 533328
Similarly sum of unit digits of numbers starting with 3 = 6(0+1+2+4) = 42
Sum of all numbers starting with 3
= 42 + 420 + 4200 + 42000 + 720000
= 766662
Similarly, sum of unit digits of numbers starting with 4 = 6(0+1+2+3) = 36
Sum of all numbers starting with 4
= 36 + 360 + 3600 + 36000 + 960000
= 999996
Sum of all the 96 numbers
= 299994+533328+766662+999996
= 2599980

75. How many words can be formed using the letters of the word "DAUGHTER" so that all the vowels occur together?

Solution:
The vowels in the letter DAUGHTER are A, U and E.
There are no letters repeated in the given word.
Combine A, U and E as one element.
The number of elements available now = 6.
Number of ways of arranging these 6 letters = 6!.
Number of ways of arranging the 3 vowels internally = 3!
Total ways of arranging = 3! X 6!
= 6 x 720 = 4320

76. How many 6 digit numbers can be formed using digits 1,2,3,4,5,6 without repetition such that hundreds digit is greater than ten's digit and ten's is greater than ones digit?

Solution:
Number of ways of selecting 3 digits out of 6 digits for the last three digits
= $^6C_3$ = 20.
3 numbers can be arranged in 6 ways out of which only one arrangement will have hundreds place greater than tens place and tens place greater than ones place.
So, in all these selections there is only one arrangement in each which follows the condition.
Number of arrangements for the last three digits = 20 x 1 = 20
The remaining three digits can be arranged in 3! Ways = 6 ways.
Total number of arrangements for the above condition = 6 x 20 = 120 ways.

77. How many 9 digit numbers can be formed using the digits 1, 2, 3, 4, 5 which are divisible by 4 if the repetition is allowed?

Solution:
To be divisible by 4, the last two digits of the number must be divisible by 4.
The number of two digit numbers which are divisible by 4 that can be formed using 1,2,3,4,5 are
12, 24, 32, 44 and 52.
We have 5 different cases.

For each case the remaining 7 digits out of 9 digits can be arranged in 5^7 ways, since thee repetition is allowed.
Total number of arrangements
$= 5^7 \times 5 = 5^8$
= 390625 ways.

78. How many positive numbers not greater than 4300 can be formed using the digits 0,1,2,3,4 where repetition is allowed?

Solution:
All 1 digit, 2 digit and 3 digit numbers are less than 4300.
Number of 1 digit numbers that can be formed from 0,1,2,3,4 = 4 (zero is neither positive nor negative.
Number of two digit numbers
= 4 x 5 = 20
Number of three digit numbers
= 4 x 5 x 5 = 100
Number of 4 digit numbers starting with 1 or 2 or 3
= 3 x 5 x 5 x 5 = 375
Number of four digit numbers starting with 40 or 41 or 42
= 3 x 5 x 5 = 75.
Total numbers less than 4300
= 20 + 100 + 375 + 75
= 570

79. Find the rank of the word GOOGLE if all the words which can be formed by permuting letters of this word without repetition are arranged in dictionary in alphabetical order?

Solution:
Arranging the letters in alphabetical order, we get
EEGGLE.
Assign numbers in ascending order, we get, E = 1; G = 2; L = 3 and O = 4
The first number will be,
122344
The number arrangement according to the question = 244231
Total number of arrangements for the word GOOGLE = 6!/2!x2! = 180.

If the first number is 1, the remaining 5 digits can be arranged in 5!/(2!x2!) = 30 ways.
Since the starting number of the given word is 2, the rank is definitely greater than 30.
If the first number is 2, the remaining 5 digits can be arranged in 5!/(2!) = 60 ways.
The rank of the given word is between 30 and 90.
If the second number is 1, the remaining 4 digits can be arranged in 4!/2! = 12 ways.
So the rank is above 42.
If the second number is 2, the remaining digits can be arranged in 4!/2! = 12 ways.
So the rank is above 54.
If the second number is 3, the remaining digits can be arranged in 4!/2! = 12 ways.
So the rank is above 66.
if the second number is 4, the remaining digits can be arranged in 4! = 24 ways.
The rank is between 66 and 90.
If the third number is 1, the remaining 3 digits will be arranged in 3! = 6 ways.
If the third number is 2, the remaining digits will be arranged in 3! = 6ways
If the third digit is 3, the remaining 3 digits will be arranged in 3! = 6 ways.
If the third number is 4, the remaining digits will be arranged in 3! = 6 ways.
The rank is between 84 and 90.
If the fourth number is 1, the remaining 2 digits can be arranged in 2! = 2 ways.
If the fourth number is 2, the remaining 2 digits will be arranged in 2! = 2 ways
The rank is between 87 or 88.
If the fifth number is 1 the rank is 87.
Since the fifth number is 3, the rank is 88.

80. In how many ways can the digit of the number 2233558888 be arranged so that the odd digits are placed in the even positions?

Solution:

The odd numbers in 2233558888 are 3,3,5,5.
The blank spaces below are the even places.

E_E_E_E_E_

Out of 5 even places four should be selected for the odd numbers.
It can be done in $^5C_4$ = 5 ways.
In each selection the odd numbers can be arranged in 4!/(2!x2!) = 6 ways.
Total ways for odd numbers = 6x5 = 30
The remaining 6 places can be arranged in 6!/(2!x2!x2!) = 90 ways.
Total number of arrangements = 30 x 90 = 2700 ways.

81. 7 noun, 5 verbs and 2 adjectives are written on blackboard. We can form a sentence by choosing 1 from each available set without caring it makes sense or not. What is the number of ways of doing this?

Solution:
Number of ways of selecting 1 noun and 1 verb and 1 adjective is
$^7C_1$ x $^5C_1$ x $^2C_1$ = 7 x 5 x 2 = 70
The number of ways in which the three words can be arranged = 3! = 6
Total number of sentences
= 6 x 70 = 420.

82. A teacher sets a question paper consisting of 8 question of total 40 marks such that each question contains minimum two marks and integer number of marks. In how may ways this can be done?

Solution:
The minimum marks for all the 8 questions = 8 x 2 = 16
Remaining marks = 40 – 16 = 24.
By applying non negative integer formula, we get
$^{(24+8-1)}C_{(8-1)}$
= $^{31}C_7$
= 2629575
The questions can be taken in
2629575 ways.

83. There are 4 boxes colored red, yellow, green and blue. If 2 boxes are selected, how many combinations are there for at least one green box or one red box to be selected ?

Solution:
The number of ways of selecting 2 boxes out of 4 boxes = $^4C_2$ = 6.
Out of these 6 selections, one selection will have yellow and blue (neither red nor green)
The remaining 5 selections will have at least one red or one green.
Answer = 5

84. In how many ways can 7 different objects be divided among three persons so that either one or two of them do not get any object?

Solution:
If two of them do not get any object, it can be done in 3 ways. Either first or second or the third person will get all the objects.
If one of them did not get any object, the remaining two persons can have the number of objects in the following manner (1,6) or (2,5) or (3, 4).
The two persons out of the three can be selected in 3C2 = 3 ways.
And in each selection the number of objects will interchange.
Total ways when two persons are having the objects = 3 x 2 =6
Total ways = 3 + 6 = 9 ways.

85. In how many ways we can distribute 10 identical looking pencils to 4 students so that each student get at least one pencil?

Solution:
Give each student one pencil. Remaining number of pencils = 6
Using negative integer formula, we get
$^{(6+4-1)}C_{(4-1)}$ = $^9C_3$ ways
The number of ways
= 84 ways.

86. It is dark in my bedroom and I want to get two socks of the same color from my drawer, which contains 24 red and 24 blue socks. How many socks do I have to take from the drawer to get at least two socks of the same color?

Solution:
There are two different colors of socks. By picking the first socks if it is red, the second socks may be red or blue. In thee second draw it is not guaranteed to get two socks of same color.
In the third draw you will get either red or blue. In this draw it is sure to have either the second red sock or the second blue sock.
The number of draws required = 3.

87. 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?

Solution:
The number of men should not be more than 3.
The different cases are:
0 men and 11 women or
1 man and 10 women or
2 men and 9 women or
3 men and 8 women.
The total ways of selecting
$=({}^5C_0 x {}^{11}C_{11}) + ({}^5C_1 x {}^{11}C_{10}) + ({}^5C_2 x {}^{11}C_9) + ({}^5C_3 + {}^{11}C_8)$
= (1x1) + (5x11) + (10x55)+ (10x165)
= 1 + 55 + 550 + 1650
= 2256 ways.

88. At the beginning of a peace conference between two tribes, each person shook hands precisely once with every other member of his own tribe. A total of 3856 handshakes(each pair meeting counting as one handshake). After the conference each person shook hands precisely once with every person in the other tribe. A total of 3525 handshakes. How many people attended the conference?

Solution:
Assume that the number of persons in first tribe is ‘a’ and the second tribe is ‘b’.
Number of handshakes between the members of first tribe = ${}^aC_2$
Number of handshakes between the members of second tribe = ${}^bC_2$
${}^aC_2 + {}^bC_2 = 3856$
If there are 3 persons in one group and 4 persons in another group, each person in first group will have four handshakes with the persons in the other group.
Total handshakes will be 3 x 4 = 12.
From the question, when both the groups shook hand with each other, there were 3525 handshakes.
So, a x b = 3525
Factors of 3525 = 5 x 5 x 3 x 47
One of the tribe has 5x5x3 = 75 and
The other tribe has 47 members.
Total members = 75 + 47 = 122

89. A lady took out jacket and gloves, which are available in blue 16, yellow 40 and red 36. Power goes off, she can distinguish between gloves and jacket but not in colors. What's the possibility that she will pick up pair of gloves from any one color?

Solution:
Ways of selecting 2 blue gloves from 16
$= {}^{16}C_2 = 120$
Ways of selecting 2 yellow gloves
$= {}^{40}C_2 = 780$
Ways of selecting2 red gloves
$= {}^{36}C_2 = 630$
Ways of selecting 2 gloves
$= {}^{92}C_2 = 4186$
Probability
= (120 + 780 + 630)/4186
= 1530/4186

90. What is probability that 5 letters can not put in to their right envelope?

Solution:
Let us name the envelops and letters
a, b, c, d, e are envelops
1, 2, 3, 4, 5 are letters.

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Envelop ‘a’ must not have letter 1. So it can be arranged in 4 ways.
Envelop ‘b’ must not have letter 2. So it can be arranged in 3 ways.
Envelop ‘c’ must not have letter 3. So it can be arranged in 2 ways.
Envelop ‘d’ must not have letter 4. So it can be arranged in 1 way.
If the first 4 envelops does not have corresponding letters, the fifth envelop will also have the wrong letter.
Total ways of arranging in wrong manner = 4x3x2x1 = 24
Total ways of arranging 5 letters I 5 envelops = 5! = 120
Probability = 24/120 = 1/5

91. 3 houses are available in a locality. 3 persons apply for the houses. Each apply for one house without consulting others. The probability that all 3 apply for the same house is:

Solution:
Number of ways of selecting one house by one person = ${}^3C_1$
Number of ways of selecting one house by three persons = ${}^3C_1$ x ${}^3C_1$ x ${}^3C_1$= 27
Number of ways in which all the three persons select House number 1 or 2 or 3 = 3
Probability = 3/27 = 1/9

92. Thirty days are in September, April, June and November. Some months are of thirty one days. A month is chosen at random. Then its probability of having exactly three days less than maximum of 31 is?

Solution:
Three days less than 31 days = 28 days.
The month of February has 28 days.
February also has 29 days in a leap year.
Out of every 4 years, three years have 28 days in February and one year has 29 days in February.
Number of months in four years = 48
Number of months with 28 days = 3
Probability = 3/48

93. A car manufacturer produces only red and blue models which come out of the final testing area at random. What are the odds that five consecutive cars of same color will come through the test area at any one time?

Solution:
Probability of all five cars to be red
= (½)(½)(½)(½)(½) = (1/32)
Probability of all five cars being blue
= (½)(½)(½)(½)(½) = (1/32)
Probability of all five cars being red or blue
= 1/32 + 1/32
= 1/16

94. A bag contains 5 five-rupee coins, 8 two-rupee coins and 7 one-rupee coins. If four coins are drawn from the bag at random, then find the odds in favor of the draw yielding the maximum possible amount.

Solution:
To get the maximum possible amount, we must have four 5Rs. coin.
Ways of selecting four 5Rs coins
= 5C4 = 5
Ways of selecting 4 coins out of (5+7+8= 20) 20 coins = 20C4 = 4845
Probability = 5/4845
= 1/969

95. Four people each roll a die once. Find the probability that at least two people will roll the same number?

Solution:
Total number of results when four dice are rolled = 6^4 = 1296
Number of ways in which at least two people roll same number = total results – number of ways in which all results are different.
Number of ways in which all results are different = 6 x 5 x 4 x 3 = 360
Probability = 1 – (360/1296)
= 1 – 5/18
= 13/18

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96. One card is lost out of 52 cards. Two cards are drawn randomly. They are spade. What is the probability that the lost card is also spade?

Solution:
Assume that initially 2 cards are taken out and the two cards are spade.
Now there will be 11 spades out of 50 cards.
The probability of losing one spade
= 11/50

97. A bag contains 3 black and 3 white boxes, second bag contains 5 black and 1 white boxes, and finally third bag contains 4 black and 5 white boxes. If a box is chosen at random from one of these bags, the probability that it is not a white box is ?

Solution:
Probability of not selecting a white box
= probability of selecting black box.
Total ways of selecting one box
= ways of selecting one box from bag 1
+ ways of selecting one box from bag 2
+ ways of selecting one box from bag 3
$= {}^6C_1 + {}^6C_1 + {}^9C_1 = 21$
Ways of selecting one black box from bag 1, 2 and 3 $= {}^3C_1 + {}^5C_1 + {}^4C_1 = 12$
Probability = 12/21 = 4/7

98. A basket contains 6 red balls, 5 blue balls, 4 green balls and 3 white balls. Five balls are to be drawn together at random, then what is the probability that there is at least a ball of each color?

Solution:
Total ways of selecting 5 balls $= {}^{18}C_5$
If there must be 1 ball in each color, there should be only one color with two balls out of the five.
Ways of selecting 2R, 1B, 1G, 1W
$= {}^6C_2 \times {}^5C_1 \times {}^4C_1 \times {}^3C_1 = 900$
Ways of selecting 1R, 2B, 1G, 1W
$= {}^6C_1 \times {}^5C_2 \times {}^4C_1 \times {}^3C_1 = 720$
Ways of selecting 1R, 1B, 2G, 1W
$= {}^6C_1 \times {}^5C_1 \times {}^4C_2 \times {}^3C_1 = 540$
Ways of selecting 1R, 1B, 1G, 2W
$= {}^6C_1 \times {}^5C_1 \times {}^4C_1 \times {}^3C_2 = 360$
Total ways of selecting 5 balls according to the condition
= 900 + 720 + 540 + 360
= 2520
Probability $= 2520/({}^{18}C_5)$
= 2520/8568

99. Three dice are rolled. What is the probability of getting the sum as 13?

Solution:
Total number of results when three dice are rolled $= 6^3 = 216$
Three numbers add up to 13. The possibilities are:
(3,4,6), (4,4,5), (5,5,3), (6,5,2), (6,6,1)
In each case the results can be arranged in 3! ways.
Total number of results which give sum 13 = 5 x 3! = 30
Probability = 30/216
= 5/36

100. If f(x) = 2x+2 what is f(f(3))?

Solution:
f(x) = 2x + 2
f(3) = 2(3) + 2
f(3) = 8
f(f(3)) = f(8)
= 2(8) + 2
= 18

Fact

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1. If log (p+q)= -1, then what is the value of log(p+q)($p^2 - q^2$)?

Solution:
$\log(p+q)(p^2 - q^2)$
$= \log(p+q)(p+q)(p - q)$
$= \log(p+q)^2(p - q)$
$= \log(-1)^2(p - q)$
$= \log(1)(p - q)$
$= 0 + \log(p - q)$
$= \log(p - q)$

2. $\log_4 2+\log_4 32$ is equal to?

Solution:
$\log_4 2 + \log_4 32 = \log_4 (2x32)$
$= \log_4 64$
$= \log_4 4^3$
$= 3 \log_4 4$
$= 3 x 1 = 3$

3. Find the value of log1+log2+log3?

Solution:
log 1 = 0
log 2 = 0.3010
log 3 = 0.4771
log 1 + log 2 + log 3 = 0.7781

4. Find the missing number.
3 , 11 , 25 , 45 ,__

Solution:
11 – 3 = 8
25 – 11 = 14
45 – 25 = 20
The difference between the successive terms is an arithmetic progression with common difference 6.
So, the next difference will be
20 + 6 = 26
The missing number is
45 + 26 = 71

5. Find the missing number in the series 1, 11, 21, 1211, 111221,____.

Solution:
The second term in the series represents that there is 'one' 1 i.e. '1'1 = 11
The third term represents that there are 'two' 1's in the second term i.e. '2'1 = 21
The fourth term represents that there is 'one' 2 and 'one' 1 i.e. '1'2 '1'1 = 1211
So, the missing term is 'three' 1 'two' 2 'one'1 i.e. 312211

6. Find the missing term 16, 136, 1096, ?

Solution:
(16 x 8) + 8 = 136
(136 x 8) + 8 = 1096
Therefore the missing number is,
(1096 x 8) + 8 = 8776

7. Find the missing number
25,168, ? , 8176

Solution:
25 x 7 – 7 = 168
168 x 7 – 7 = 1169
1169 x 7 – 7 = 8176
Therefore the missing number is,
1169

8. Find the missing number
24,39,416,525,___

Solution:
24 = 2, 4 = 4 is the square of 2
39 = 3, 9 = 9 is the square of 3
416 = 4, 16 = 16 is the square of 4
525 = 5, 25 = 25 is the square of 5
Therefore the missing number is,
6, square of 6 = 6, 36
= 636

9. Find the missing number
8,12,24,60,___

Solution:
8 x 1.5 = 12
12 x 2 = 24
24 x 2.5 = 60
60 x 3 = 180
Missing number is 180

10. Find the missing number
10,7,12,10,14___

Solution:

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10 – 3 = 7
7 + 5 = 12
12 – 2 = 10
10 + 4 = 14
The difference between the terms is decreasing and increasing in the following manner
-3, +5, -2, +4
The next change will be -1.
The missing term is 14 – 1 = 13

11. Find the missing number
3,6,9,_,24,36.

Solution:
The sixth term is 4 x (third term)
4 x 9 = 36
The fifth term is 4 x (second term)
4 x 6 = 24
Therefore the fourth term
= 4 x (first term) = 4 x 3
= 12

12. Find the missing term
3, 6, 12, 48, 29, ___

Solution:
Take the numbers as pairs.
(3,6), (12,48), (29, x)
(3,6) = 3, $3x2^1$
(12, 48) = 12, $12x2^2$
(29, x) = 29, $29x2^3$
The missing number is,
29 x 23 = 29 x 8 = 232

13. If 5+4 = 2091; 6+3 = 1893; 7+5 = 35122; then 9+8 = ?

Solution:
5+4 = 2091
First two digits of 2091 = 20 = 5 x 4
Third digit of 2091 = 9 = 5 + 4
Last digit of 2091 = 1 = 5 – 4
Therefore,
For 9 + 8
First two digits = 9 x 8 = 72
Next two digits = 9 + 8 = 17
Last digit = 9 – 8 = 1
The value of 9 + 8
= 72171

14. What is the remainder when we divide 125! by 10^{31}?

Solution:
The number of zeros at the end of 125!
= (125/5) + (125/25) + (125/125)
= 31
The number of zeros at the end of 10^{31} =31
So, when 125! is divided by 10^{31}, the reminder = 0

15. If all 6's are replaced by 9, the algebraic sum of all numbers from 1 to 100 (both inclusive)varies by?

Solution:
Total number of 6's in units place from 1 to 100 = 10
Increase in sum by changing all the 6's in units place to 9 will be = 10x3 = 30
Total number of 6's in tens place from 1 to 100 = 10.
Increase in sum by changing all the 6's in tens place to 9 will be = 10x30 = 300
Total increase = 300 + 30 = 330

16. $2^{74}+2^{2058}+2^{2n}$. For what value of n the expression is a perfect square?

Solution:
$(a+b)^2 = a^2 + 2ab + b^2$
Consider $a^2 = 2^{74}$; $b^2 = 2^{2n}$
So, $a = 2^{37}$; $b = 2^n$
For the expression to be a perfect square
$2^{2058} = 2 \times 2^{37} \times 2^n$
$2^{2058} = 2^{(1+37+n)}$
So,
2058 = 1+37+n
n = 2058 – 38
n = 2020

17. The value of $6^{(-2)}$ is?

Solution:
$6^{(-2)} = 1/(6^2)$
= 1/36

18. If X^Y denotes X raised to the power of Y, find out last two digits of (2957^3661) + (3081^3643).

Solution:
Last two digits of 2957^{3661}
The base ends in 7.
$57^{3661} = 57^{4(915)} \times 57^1$
$(57^2 \times 57^2)^{915} \times 57$
Last two digits of $57^2 = 49$
So,
$(49 \times 49)^{915} \times 57$
Last two digits of 49x49 = 01
So, last two digits of 2957^{3661}
$= (01)^{915} \times 57 = 57$
Last two digits of 3081^{3643}
Last digit will be 1.
Second last digit(only if the base ends in 1) = unit place of (tens digit of base x unit digit of the power value)
= unit place of (8 x 3)
= unit place of 24 = 4
Last two digits of $3081^{3643} = 41$
Last two digits of the expression
= 57 + 41
= 98

19. The reciprocal of the HCF and LCM of two numbers are 1/12 and 1/312. If one of the number is 24 then the other number is:

Solution:
The HCF and LCM are 12 and 312 respectively.
Product of two numbers = product of their HCF and LCM
24 x N = 12 x 312
N = 156
The second number = 156

20. Sum of the digits of a 3-digit number is subtracted from the number. The resulting number is always divisible by?

Solution:
Let the three digit number be xyz.
Sum of the digits = x+y+z
xyz can be written as 100x + 10y + z
100x + 10y + z – x – y – z = 99x + 9y
After subtracting the sum of the digits from the actual number, the resulting number will always be a multiple of 9.

21. More than half of the members of a club are ladies. If 4/7 of the ladies and 7/11 of the gents in the club attended the meeting, then what is the smallest number that club could have?

Solution:
According to the fractions given in the question, if the number of ladies = 7 and number of gents = 11, the conditions given in the question are not satisfied.
So, double the fraction of number of ladies in the club.
New fraction = 8/14
Now we have 14 ladies and 11 gents, which satisfy the condition.
Minimum number of members in the club = 14 + 11 = 25

22. If mini download three more songs in her mobile, she will have songs with 512MB in her mobile. If on an average each song is 4 MB, how many songs did she initially have in her phone before downloading?

Solution:
If each song is 4 MB, the total MB before downloading the three songs
= 512 – (3x4)
= 500 MB
Number of songs she had initially
= 500/4 = 125 songs

23. What is the unit digit of the following expressions:
1+2^2+3^3+4^4+5^5+.....10^10

Solution:
Unit place of $1^1 = 1$
Unit place of $2^2 = 4$
Unit place of $3^3 = 7$
Unit place of $4^4 = 6$
Unit pace of $5^5 = 5$
Unit place of $6^6 = 6$
Unit place of $7^7 = 3$

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Unit place of $8^8 = 6$
Unit place of $9^9 = 9$
Unit place of $10^{10} = 0$
Unit place of the expression
= 1+4+7+6+5+6+3+6+9+0
= unit place of 47
= 7

24. Divide the sum of 3/5 and 8/11 by their difference.

Solution:
Sum of 3/5 and 8/11
= 3/5 + 8/11 = (33+40)/55
= 73/55
Difference between 3/5 and 8/11
= 8/11 – 3/5
= (40 – 33)/55
= 7/55
Divide 73/55 by 7/55
We get
(73/55)/(7/55)
= 73/7

25. What is the smallest number ,which when divided by 7,18,56 and 36, leaves a remainder 0?

Solution:
The smallest number is the LCM of the given numbers.
LCM of (7, 18, 56, 36)
= 7584

26. The difference of 2 numbers is 8 and the difference of their squares is 160. Find the numbers?

Solution:
Let the two numbers be X and X – 8
$X^2 – (X – 8)^2 = 160$
$X^2 – (X^2 + 64 – 16X) = 160$
X2 – X2 – 64 + 16X = 160
16X = 224 ; X = 14
The two numbers are 14 and 6

27. The total number of numbers that are divisible by either 2 or 3 between 100 and 200(inclusive) are:

Solution:
The first number in the series which is divisible by 2 = 100.
The last number that is divisible by 2 = 200
Common difference between each terms that are divisible by 2 = 2
Using the formula to find out the number of terms in an arithmetic series:
N = [(l – a)/d] + 1
Number of terms divisible by 2
= [(200 – 100)/2] + 1
= 51
The first number in the series that is divisible by 3 = 102
The last number that is divisible by 3 = 198
Number of terms = [(198-102)/3]+1
= 33
In both the series, e have numbers which are both a multiple of 2 and a multiple of 3, that has to be removed.
The numbers which are divisible by 2 and 3 are divisible by 6.
The first term divisible by 6 = 102
The last term divisible by 6 = 198
Number of terms = [(198-102)/6]+1
= 17
Number of terms which are either divisible by 2 or 3
= 51 + 33 – 17
= 67

28. Convert Binary to Octal
$(11111011)_2 = ( )_8$

Solution:
Segregate the binary numbers in groups of three from the right end:
$(11\ 111\ 011)_2$
Octal equivalent of 011 = 3
Octal equivalent of 111 = 7
Octal equivalent of 11 = 3
$(11111011)_2 = (373)_8$

29. I and two of my friends were playing a game. For each win I get Rs 3. totally I had three wins. Player 2 got Rs9 and player 3 got Rs 12. How many games had been played.

Solution:
The number of games I won = 9/3 = 3
Number of games my friends won
= (9/3) + (12/3) = 7
Total games played = 10

30. Three wheels make 36, 24, 60 revolution/min. Each has a black mark on it. It is aligned at the start. When does it align again for the first time?

Solution:
Time taken for first wheel to complete one revolution = 60/36 minutes
Time taken for second wheel to complete one revolution = 60/24 mins
Time taken for third wheel to complete one revolution = 60/60 = 1 minute.
The time taken for all the black marks to align is
= LCM[(60/36), (60/24), 1]
= LCM(5/3 , 5/2, 1)
= 5 minutes

31. Number of prime factors of $30^7 \times 22^5 \times 34^{11}$?

Solution:
$30^7 = (2 \times 3 \times 5)^7 = 2^7 \times 3^7 \times 5^7$
$22^5 = (2 \times 11)^5 = 2^5 \times 11^5$
$34^{11} = (2 \times 17)^{11} = 2^{11} \times 17^{11}$
$30^7 \times 22^5 \times 34^{11} = 2^{23} \times 3^7 \times 5^7 \times 11^5 \times 17^{11}$
The number of prime factors = 5

32. What is the remainder wen 2^35 is divided by 5?

Solution:
To find the reminder when divided by 5, we have to know only the unit digit of the numerator.
Unit digit of $2^{35} = 8$
So the reminder of $2^{35}/5 = 3$

33. What is the remainder wen 8^{25} is divided by 7?

Solution:
Reminder of $[x^n/(x-1)] = 1$
So reminder of $8^{25}/7$
= 1

34. 8^2x / 8^5 = 8^7. Find x

Solution:
$8^{2x} / 8^5 = 8^{(2x - 5)}$
$8^{(2x - 5)} = 8^7$
$2x - 5 = 7$
$2x = 12$
$x = 6$

35. 2^81 when divided by 6, what is the remainder?

Solution:
Reminder of $2^1/6 = 2$
Reminder of $2^2/6 = 4$
Reminder of $2^3/6 = 2$
Reminder of $2^4/6 = 4$
So, (2^odd/6) = reminder = 2
(2^even/6) = reminder = 4
Therefore, the reminder of
$2^{81}/6 = 2$

36. Five farmers have 7,9,11,13 & 14 apple trees respectively in their orchards. Last year each of them discovered that every tree in their own orchard bore exactly the same no of apples. Further if the 3rd farmer gives one apple to the 1st & the 5th gives 3 to each of the 2nd & the 4th they would all exactly have the same no of apples. What were the yields per tree in the orchards of the 3rd & 4th farmers?

Solution:
Assume that the number of apples bore in each farmers trees = A, B, C, D, E.
After exchanging all the apples, the number of apples left with each farmer
= A + 1, B+3, C – 1, D + 3, E – 6
Now the number of apples with all farmers are same.
Therefore,
C – 1 = D + 3
We know that C had 11 trees and D had 13 trees. So, C is a multiple of 11 and D is a multiple of 13.
11x – 1 = 13y + 3
By trial and error method, we can find that x = 11 and y = 9

C T S

37. Four persons can cross a bridge in 3,7,13,17 minutes. Only two can cross at a time. Find the minimum time taken by the four to cross the bridge?

Solution:
Let 17 minute person and 13 minute person cross the bridge initially.
In 13 minutes, one person will cross and the 17 minute person will be on the bridge.
At the end of 13 minutes, let 7 minute person start walking on the bridge so that there are only two persons on the bridge now.
When 17 minutes is completed, the two persons would have crossed the bridge and the 7 minutes person is still on the bridge with 3 minutes remaining to cross.
At this time the person with 3 minutes may start crossing the bridge.
At the end of 20 minutes, all the persons would have crossed the bridge.
Minimum time taken = 20 minutes.

38. I had Rs100 and I play. If I win I will have Rs110 and if I lose I will have Rs90. at the end I have 2 wins and 2 loses. How much do I have?

Solution:
The prize percentage is 10%.
Amount after first win
= 100 + 10%(100) = 110
Amount after second win
= 110 + 10%(110) = 121
Amount after first lose
= 121 – 10%(121) = 108.9
Amount after second lose
= 108.9 – 10%(108.9) = 98.01

39. There are 9 balls which of one are defective. Find the minimum chance to take that defective one.

Solution:
The 9 balls are separated as groups of three.
Now we have 3 groups of 3 balls each.
Case 1:
Weighing number 1:
Take the weight balance and keep any two groups on each plate.
If one of the plate goes down, take that plate for the next weighing.
Weighing number 2:
Out of the three balls chosen from first weighing, take any two and keep one on each plate. The plate which goes down carries the defected ball. If the plates did not go down, the ball which was kept outside was the defected one.
Case 2:
Weighing number 1:
Take the weight balance and keep any two groups on each plate.
If none of the plate goes down, take the group of balls which was kept outside for the next weighing.
Weighing number 2:
Out of the three balls chosen from first weighing, take any two and keep one on each plate. The plate which goes down carries the defected ball. If the plates did not go down, the ball which was kept outside was the defected one.
Minimum number of measurements = 2

40. A worker is to perform work for you for seven straight days. In return for his work, you will pay him 1/7th of a bar of gold per day. The worker requires a daily payment of 1/7th of the bar of gold. What and where are the fewest number of cuts to the bar of gold that will allow you to pay him 1/7th each day?

Solution:
The minimum number of cuts = 2
Explanation:
On day one $1/7^{th}$ of the bar is cut and given to the worker.
On second day, $2/7^{th}$ of the bar is cut and given to the worker and you must get back the $1/7^{th}$ bar given on the first day.
Third day, the $1/7^{th}$ bar will be given again.
Fourth day, $4/7^{th}$ of the bar which was remaining will be given to the worker

and the 1/7th bar and 2/7th bar will be bought back.
On the 5th day, 1/7th bar will be given.
On 6th day, 2/7th bar will be given and the 1/7th bar will be bought back.
On 7th day, 1/7th bar will be given back.

41. It was 4 'o' clock in the evening. Shilu was staring at the new watch that was presented by her Dad two day's ago. She was trying to measure the exact time between 4 and 5 'o' clock during which the hands of the watch point in opposite directions forming a straight line. What would be that time?

Solution:
The two hands will be 30 minutes apart from each other when they are pointing in exact opposite directions.
The formula to find out the time is:
T = [(12/11)(5h + 30)]
Where h = 4.
T = [(12/11)(20+30)]
T = 54.54 minutes past 4 'o' clock
T = 4 hours 54 minutes 33 seconds

42. In a clock (Conventional clock with numbers 1 to 12 in order)is cut into 3 pieces such that the sum of each piece is in arithmetic progression with a common difference of 1. What is the count of numbers in each piece? and what are the numbers?

Solution:
Sum of all the numbers from 1 to 12 is 12(12+1)/2 = 78.
So sum of the three groups after splitting will be 78.
Since the sum of each group is in arithmetic progression, one of the group has sum as the average of three groups.
Average = 78/3 = 26.
Sum of the groups are: 25, 26 and 27
The hour groups are
25 = 3 + 4 + 5 +6 + 7
26 = 11 + 12 + 1 + 2
27 = 8 + 8 + 10
We have to find out using trial method.

43. Pooja told Narmadha, "I am four times as old as you were when I was your present age and also I am 9 years older than you" . What is Pooja's age?

Solution:
Let Narmadha's present age be N.
Let Pooja's present age be P.
N = P – 9 ---(1)
P – 9 = 4(N – 9) ---(2)
Sub (1) in (2)
P – 9 = 4[(P – 9) – 9]
P – 9 = 4P – 72
3P = 63
P = 21 → Age of Pooja = 21

44. If I am twice as old as he was when I was as old as him, sum of our ages is 42. Find my present age?

Solution:
Let my present age be X.
Let his present age be Y.
His age when I was at his age
= Y – (X – Y)
X = 2(Y – (X – Y))
X = 4Y – 2X
3X = 4Y and
X + Y = 42
4X + 4Y = 168
4X + 3X = 168 – 7X = 168
X = 24.

45. When I was married 10 years back my wife was the sixth member of my family. Now I have a baby. Today my father was dead and I had a new baby. now the average age of my family is the same as that when I was married. Find the age of my father when I was married.

Solution:
Let the average age of my family when I got married be X.
Total age of the family 10 years ago = 6X.
Total age of the family now with the new born baby = 6X + 60 + 0 = 6X + 60
Average age of the family with my father died = X

CTS

Let the father's age be F.
After the death of father the total age of family = 6X + 60 – F
So, [6X + 60 - F]/6 = X
F = 60.
Age of father when he died = 60

46. A boy asks his father, "What is the age of grandfather?" Then father replied "He will be X years old in the year X^2". The father was talking about the 21st century. In which year was the grandfather born?

Solution:
The only perfect square in between 2000 and 2100 is 2025.
2025 is the square of 45.
So in the year 2025, the grandfather will be 45 years old.
The grandfather was born in the year 1980.

47. A trend was observed in the growth of population in Saya Islands. The population tripled every month. Initially the population of Saya Islands was 100. What would be population after 4 months ?

Solution:
Population after one month = 300
Population after two months = 900
Population after three months = 2700
Population after four months = 8100

48. The speeds of two trains are in the ratio 5:3.If the speed of the first train is 350km in 2hours. Then the speed of second train is?

Solution:
Speed of first train = (350/2) kmph
= 175 kmph.
Ratio between the speed of two trains = 5 : 3
Speed of train A : Speed of train B = 175 : X
5 : 3 = 175 : X
X = 105 kmph.

49. In a class the ratio of boys and girls is 5:6. If 25% of boys and 20% of girls are scholarship holders, find the percentage of students who are not scholarship holders?

Solution:
Let us assume that there are 100 boys and 120 girls. (It is 5 : 6 ratio).
25 boys are scholarship holders and 75are not.
24 girls are scholarship holders and 96 are not.
Total number of students not having scholarship = 75 + 96 = 171.
Total number of students = 220
Percentage of students with no scholarship
= (171/220)100
= 77.72%

50. A joined in a partnership with B after 3 months by investing Rs. 27000. The profit of A is 3/5th of B's share at the end of one year. What was the amount invested by B?

Solution:
Let the Share of B = X
Ratio between share of A and B is
(3/5)X : X = 3 : 5
Share is directly proportional to investment and duration of investment.
A invested for 9 months and B invested for 12 months
3 : 5 = 27000 x 9 : B x 12
12B = 27000 x 9 x 5 / 3
B = 33750

51. Increasing of length and breadth is proportional. If length 6m is changed to 21m and breadth changes to 14m then what was the previous value of breadth?

Solution:
Length1 : Breadth1 :: Length2 : Breadth2
6 : B1 :: 21 : 14
6/B1 = 21/14
B1 = 6x14/21
B1 = 4m.

52. Ramesh, xyz and Rajeev put a partnership. Total profit is 36000. If Ramesh and xyz invested in the ratio 5:4 and xyz and Rajeev invested in the ratio 8:9, find Rajeev's share.

Solution:
Ratio of Ramesh and xyz = 5 : 4 = 10 : 8
Ratio of xyz and Rajeev = 8 : 9
Then ratio of Ramesh : xyz : Rajeev is
= 10 : 8 : 9
Share of Rajeev=36000 x [9/(10+8+9)]
= 36000 x (1/3)
= 12000

53. A Product is supported each week by the same three Customer Service Representatives (CSR's). Last month the first CSR took 450 calls, the second took 350 calls, and the third took 300 calls. This month the job will consists of 1500 calls. If the three CSR's each increase their work proportionately, how many more calls will the first CSR take this month than last month?

Solution:
The number of calls for first CSR out of total 1100 calls = 450.
Since the number of calls increase proportionally, the number of calls attended by him in this month will be:
450/1100 = X/1500
X = 450 x 1500/1100
X ≃ 613 calls.

54. Diamonds value is proportional to square of its weight. When diamonds broke into pieces in ratio 1:2:3:4:5 total loss in value is 85000. What is the value of the diamond twice the weight of original diamond?

Solution:
Let the actual weight of the diamond pieces after broken down be
1x, 2x, 3x, 4x, 5x.
Total weight of the diamonds = 15x
Value of the diamond as a whole
= $(15x)^2 = 225x$

Value of each piece after broke down
= $(1x)^2 + (2x)^2 + (3x)^2 + (4x)^2 + (5x)^2$
= $x^2 + 4x^2 + 9x^2 + 16x^2 + 25x^2$
= $55x^2$
Difference between the two values
= $225x^2 – 55x^2 = 85000$
= $170x^2 = 85000$
$x^2 = 500$
Actual weight = 15x
Double the weight = 30x
Price of a diamond with weight 30x
= $(30x)^2$
= $900x^2$
= 900 x 500
= 450000

55. Every year before the festive season, a shopkeeper increases the price of the product by 35% and then introduce two successive discount of 10% and 15% respectively. What is percentage loss or percentage gain through this transaction?

Solution:
Assume that the cost price of the product is Rs. 100.
After marking it up by 35%, the marked price will be = Rs. 135
10% discount from 135 will give
135 – (10/100)135 = 121.5
From 121.5 after giving 15% discount we get,
121.5 – (15/100)121.5
= 103.275
The selling price is more than cost price.
The profit percentage is
= [(103.275 – 100)/100]100
= 3.275% profit.

56. Steward assign $1/8^{th}$ of his monthly salary for food. Steward's total food bill for the month is Rs.6500. What is Steward's yearly salary?

Solution:
(1/8) x Monthly salary = 6500
Monthly salary = 6500 x 8 = 52000
Annual salary = 52000 x 12
= 624000

57. Manu has invested 30% of the capital in Petro bonds and rest in LIC plan. He has invested Rs.34000 more in LIC plan than in Petro bonds. How much is the total investment made by Manu?

Solution:
Investment % made in LIC = 100 – 30
= 70%
Percentage of amount invested in LIC is 70 – 30 = 40% more than Petro bonds.
40% of total investment = 34000
So,
[(40/100)T.I] = 34000
Total Investment = 34000 x 100/40
= Rs. 85000

58. A supplier supplies cartridges to a news paper publishing house. He earns a profit of 20% by selling cartridges for Rs. 540. Find the cost price of the cartridges?

Solution:
Selling Price = 120% of Cost Price
540 = (120/100)C.P
Cost price = 540 x 100/120
Cost price = 450

59. Ram sold his car for RS. 50,000 less than what he bought it for and lost 8%. At what price should he have sold the car, if he wanted to gain as much as he lost in the first transaction?

Solution:
Loss = 8% of Cost price
50000 = (8/100)CP
CP = 625000
To gain 8%, he should sell at a profit of Rs. 50000.
Selling price at 8% gain = 675000

60. A man sells his articles in such a way that even after allowing 25% discount on cash purchase, he gains 10 5/14 %. If the cost price of the articles is Rs.280 then the labeled price is?

Solution:
Profit earned = 10(5/14) = (145/14)%
Selling price of the product
= [100 + (145/14)]% of Cost price
= (1545/14)% of CP
Selling price = [(1545/14)/100] x 280
Selling price = Rs. 309
Selling price is 25% less than the marked price.
S.P = M.P – (25/100)M.P
S.P = (75/100)M.P
M.P = 309 x 100/75
Marked price = Rs. 412

61. A man buys a spirit at Rs. 60/lt. and adds water to it and then sells it at Rs. 75/lt. What is the ratio of spirit to water if his profit in the deal is 75%?

Solution:
To get 75% profit by selling at Rs. 75, the cost price of the spirit must be
S.P = (175/100)C.P
C.P = 75 x 100/175
C.P = 300/7
By using allegation rule, we can find out the ratio between spirit and water.

420/7 0
300/7
300/7 : 120/7

The ratio between spirit and water
= 5 : 2

62. Buy one get 1 free offer. Selling price of a t-shirt is 4200. Shopkeeper says he got 33.33% profit. What is cost price?

Solution:
Shopkeeper sold 2 t-shirts for Rs. 4200 as one is free.
So, selling price of one t-shirt = Rs. 2100
S.P = C.P + (33.33/100)C.P
S.P = (133.33/100)CP
CP = 2100 x 100/133.33
C.P = 1575
Cost price of 1 t-shirt = Rs. 1575

63. At flat 40% discount a girl buys one jacket for Rs. 480. What is the marked price?

Solution:
SP = MP – (40/100)MP
480 = (60/100)MP
MP = 480 x 100/60
Marked price = Rs. 800

64. Find out Difference between SI and CI if p=1000000 r=4% ant t=3 years?

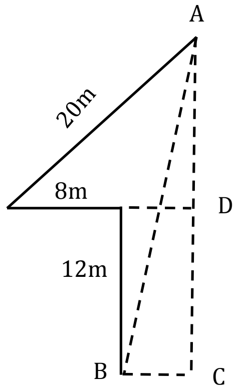
Solution:
Simple interest for 3 years
= 1000000 x 3 x 4/100
= 120000
Compound interest for first year
= 1000000 x 4/100
= 40000
Compound interest for second year
= 1040000 x 4/100
= 41600
Compound interest for third year
= (1000000+40000+41600) x 4/100
= 1081600 x 4/100
= 43264
Total compound interest
= 124864
Difference = 120000 – 124864
= Rs. 4864

65. Shopkeeper bought 400 meter cloths at Rs. 40,000 and sells at Rs. 200 per one and half meter cloth. What is the gain or loss percent?

Solution:
Cost price of 1 meter cloth = 40000/400
= Rs. 100
Cost price of 1.50 meter cloth = Rs. 150
Selling price of 1.50 m cloth = Rs. 200
Profit % = [(S.P – C.P)/C.P] x 100
= [(200-150)/150] x 100
= 33.33%

66. A walks 20m towards north-east. B walk towards east 8m and then 12m south from the same point as A. Now calculate the distance between A and B?

Solution:
The following figure represents the above question.



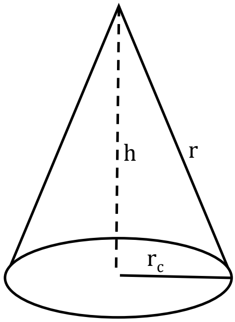
The dark lines are the path travelled by A and B.
We have to find the distance of the dotted line AB.
Since A travelled 20m in North-east direction, the distance covered by him can be considered as the diagonal of a square.
AD is the side of that square.
Side = Diagonal/$\sqrt{2}$
AD = $20/\sqrt{2} = 10\sqrt{2}$
BC = $10\sqrt{2} - 8$
AC = $10\sqrt{2} + 12$
ABC is a right angled triangle with AB as the hypotenuse side.
$AB^2 = AC^2 + BC^2$
$AB^2 = (10\sqrt{2} + 12)^2 + (10\sqrt{2} - 8)^2$
$AB^2 = (200+144+240\sqrt{2})+(200+64-160\sqrt{2})$
$AB^2 = 608 - 80\sqrt{2}$
$AB^2 = 608 - 113.2 = 494.8$
AB = 22.24

67. From a circular sheet of paper of radius 10 cm, a sector of area 40% is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and the height of the cone is?

Solution:
Circumference of the base of the cone
= 60% of circumference of the circle.
Circumference of circle
= $2\pi r = 2\pi(10)$

C T S

Circumference of base of the cone
$= (60/100)2\pi(10) = 2\pi(6)$
Radius of base of the cone:
$2\pi r_c = 2\pi(6)$
$r_c = 6$
The following image gives the description of the cone thus formed.



r, r_c and h form a right angled triangle.
$r^2 = r_c^2 + h^2$
$10^2 = 6^2 + h^2$
h = 8cm
Ratio between radius and height of the cone is
6 : 8 = 3 : 4

68. It takes 52 days to complete an agreement deal by a certain number of men. After 17 days 300 men are added and 21 days are reduced. how many men were working initially?

Solution:
After 17 days of work, out of 52 days, the remaining number of days required is 35.
The amount of work to be done by N number of men or N+300 number of men remains the same.
Work done = Resource x Time
Work done by N men = N x 35
Work done by N+300 men
= (N+300)x14
So,
35N = 14N + 4200
21N = 4200
N = 200
200 men were working initially.

69. A, B and C together can complete a work in 8 days. All the 3 started the work together but C quit after 2 days. If the remaining work is now completed by A and B in 9 days, then how many days will C alone will take to complete the total work?

Solution;
One day work of A, B and C = 1/8
Work done by A, B and C in two days
= 2 x (1/8) = ¼
Remaining work = 1 – ¼ = ¾
3/4th of the work is done by A and B in 9 days.
Time taken for A and B to complete full work = 9 x 4/3 = 12 days.
One day work of A and B = 1/12

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{8}$$

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{12}$$

$$\frac{1}{12} + \frac{1}{C} = \frac{1}{8}$$

$$\frac{1}{C} = \frac{1}{24}$$

C = 24
C alone can do the work in 24 days.

70. 4 men can repair a road in 7 hours. How many men are required to repair the road in 2 hours?

Solution:
Resource is inversely proportional to time.

$$\frac{R_1}{R_2} = \frac{T_2}{T_1}$$

Let X be the number of men required to complete the work in 2 hours.
Then,

$$\frac{4}{X} = \frac{2}{7}$$

X = 14
14 men are required.

71. A large rubber cushion can be filled with air pump in 10 minutes, another pump can fill the same cushion in 12 minutes. If both the pumps operate together, how long will it take to fill the cushion?

Solution:
The formula to find out time taken to complete the work together by 2 individuals (T) is:

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{T}$$

$$\frac{1}{10} + \frac{1}{12} = \frac{1}{T}$$

T = 60/11 minutes.

72. A is thrice as good a workman as B and takes 10 days less to do a piece of work than B takes. the number of days taken by B to finish the work is?

Solution:
Work done by B in one day = 1/B
Work done by A in one day = 3/B
Time taken by A to complete the work is
= B/3
Difference in tie taken by A and B to complete the work
= B – (B/3) = 10
= 2B/3 = 10
B = 15 days.
B alone takes 15 days to complete the work, whereas A takes only 5 days.

73. Two Copiers are being used to produce 2400 copies of a 1-page document. One Copier runs at 150% of the speed of the other. How many copies should be made on the faster copier so that both copiers will finish the same time?

Solution:
When one copier prints 100 copies, the other prints 150 copies in the same time.
Ratio between number of copies in each printer is 2 : 3.
By dividing the total number of copies (2400) in the ratio 2 : 3, we get,
Number of copies by the slower machine
= (2/5)2400 = 960 copies
Number of copies by the faster machine
= (3/5)2400 = 1440

74. A can construct a wall in 40 minutes and B can construct the wall in 45 minutes. How many hours is needed to construct a wall if both the persons are working together?

Solution:
The formula to find out time taken to complete the work together by 2 individuals (T) is:

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{T}$$

$$\frac{1}{40} + \frac{1}{45} = \frac{1}{T}$$

T = 360/17 hours

75. A and B can do a piece of work in 28 days. With the help of C, they can finish it in 21 days . How long will C alone take to finish the work?

Solution:

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{21} \quad \text{---(1)}$$

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{28} \quad \text{---(2)}$$

Substitute (2) in (1), we get,

$$\frac{1}{28} + \frac{1}{C} = \frac{1}{21}$$

C = 12 days.

76. Without stoppages a train travels a certain distance with an average speed of 80 km/h and with stoppages with an average speed of 60 km/h.

CTS

How many minutes per hour does the train stops?

Solution:
Distance travelled by the train without stoppages in one hour is 80km.
Even when the train is travelling with stoppages, the speed of the train is 80kmph.
Time taken for the train to travel 60km at the speed of 80kmph
= 60/80 = 0.75 hour = 45minutes.
The train has travelled for 45 minutes.
That means the stoppages are for
60 – 45 = 15 minutes.

77. A man covers a distance of 1200 km in 70 days resting 9 hours a day. If he rests 10 hours a day and walks with speed 1½ times of the previous in how many days will he cover 750 km?

Solution:
Total time taken to cross 1200 km in the first case = 70 x (24 – 9) = 1050 hours
Speed of the man = 1200/1050
= 8/7 kmph
1 ½ times the original speed = 1.5 x 8/7
= 12/7 kmph.
Time taken to cross 750 km at a speed of 12/7kmph = 750/(12/7)
= 437.5 hours.
If the man is taking rest for 10 hours a day in the second case, he will be walking (24 – 10) = 14 hours a day.
Number of days taken to cover the 750km distance = 437.5/14
= 31.25 days.

78. If Raghav travels at a speed of 15kmph he reaches office at 10am. If he travels at 10kmph he reaches office at 10:30 am. At what speed should he travel so that he reaches office at 10:15am? (assume that he leave home at same time and takes the same route).

Solution:
When the speed is decreased by $1/3^{rd}$, the time will increase by 1/2.
The time is increased from 10:00 to 10:30.
That means the increased time 30 minutes is half of the actual time taken to travel.
Actual time taken to travel
= 30 x 2 = 60 minutes.
Raghav starts at home everyday at 9:00am.
The distance from his home to office
= 1 x 15 = 15 km.
Time taken to reach the office at 10:15
= 1.25 hours
Speed required to cover 15km in 1.25 hours = 15/1.25 = 12 kmph

79. A man decided to cover a distance of 80km in 8 hrs. He can walk at a speed of 6 kmph and cycle at 8 kmph successively. How long will he walk and how long will he cycle?

Solution:
To cover 80km in 8 hours, the average speed required is 10kmph.
In the question, the two speeds given are 6kmph and 8kmph.
For these two values an average speed of 10kmph can never be achieved.
This is one of the dummy question, which must be avoided in the examination.

80. Megha drives along the perimeter of square field of side 10 km. She drives along the first side at 10 kmph, along the second side at 20 kmph, along the third side at 30 kmph and along the fourth side at 40 kmph. Her average speed is?

Solution:
The distance in each case is same and there are four cases.
Assume that the speed in each case is
S_1 = 10kmph; S_2 = 20kmph
S_3 = 30kmph; S_4 = 40kmph

$$\frac{4}{A_s} = \frac{1}{S_1} + \frac{1}{S_2} + \frac{1}{S_3} + \frac{1}{S_4}$$

By solving, Average speed A_s=19.2kmph

CTS

81. A goods train leaves a station at a certain time and at fixed speed. After 6hrs another train leaves the same station and move in same direction at an uniform speed of 90kmph. The train catches up the goods train in 4hrs. Find the speed of the goods train.

Solution:
The distance traveled by the second train to catch the first train in 4 hours
= 4 x 90 = 360 km.
The distance travelled by the goods train
= 360 km.
Time taken by goods train to travel 360km = 6 + 4 = 10 hours.
Speed of goods train = 360/10
= 36 kmph.

82. Five different roads join a village to the nearby city. The number of different ways in which a person can go to the town and come back is?

Solution:
Number of ways to go from village to city = 5
Number of ways to return to the village = 5
The two events are dependent with each other.
For dependent events, we have to multiply.
Number of ways = 5 x 5 = 25.

83. Using the digits 1,2,3,4,5,6 and 7 how many 4 digit number can be formed without repetition?

Solution:
There are 7 elements out of which 4 elements should be taken and arranged.
Number of ways $^nP_r = {}^7P_3$
= 7 x 6 x 5 = 210

84. What is the sum of all four digit numbers that can be formed using the digits 1, 2, 5, 8 without repetition?

Solution:
The number of four digit numbers that can be formed using 1, 2, 5 and 8
= 4! = 24.
Among the 24 numbers, in the units digit, each of the four numbers will occur for 24/4 = 6 times.
Sum of all the unit digits
= 24(1+2+5+8) = 384
Sum of all tens place numbers
= 3840
Sum of all 100's place numbers
= 38400
Sum of all thousands place numbers
= 384000
Sum of all 24 different numbers
= 384 + 3840 + 38400 + 384000
= 426624

85. Using the digits 2, 3, 6 and 7 how many four digit numbers can be formed without repetition, that are divisible by 4?

Solution:
Condition for divisibility by 4 is, the last two digits of the number must be divisible by 4.
The different pairs that can be formed using the given numbers which are divisible by 4 are:
32, 36, 72, 76.
There are four cases and in each case there will be 2 more numbers left to be arranged. They can be arranged in 2! Ways.
Total possible ways = 4 x 2! = 8

86. How may 5 digit odd numbers can be formed from 1 2 3 4 5 without repeating any numbers?

Solution:
To be an odd number, the last digit must be an odd number.
The last digit can be either 1 or 3 or 5.
In each case the other four places can be arranged in
4! Ways.
Total possible ways
= 3 x 4! = 72

87. How many number of three digit numbers can be formed using the numbers 2,3,4,5 with no repetition?

Solution:
$^4P_3 = 4 \times 3 \times 2 = 24$ number of four digit numbers can be formed.

88. From the cards Jack, Queen, King and Ace are removed. The algebraic sum of the rest of cards will be?

Solution:
After removing the face cards, the remaining cards will be numbered from 2 to 10.
Sum of the numbers from 2 to 10
= 54.
Sum of all the number cards
= 4 x 54 = 216

89. What is value of $^{15}C_{13}$?

Solution:
$^nC_r = {}^nC_{(n-r)}$
So, $^{15}C_{13} = {}^{15}C_{15-13}$
= 15C2
= (15 x 14)/(2 x 1) = 105

90. If $^nC_5 = {}^nC_6$, what is the value of n?

Solution:
$^nC_r = {}^nC_{(n-r)}$
$^nC_5 = {}^nC_6$
r = 5 and n –r = 6
n – 5 = 6
n = 11

91. In how many ways can the captain of a cricket team select 11 players from a squad of 14 players?

Solution:
Since the person selecting is the captain, he will definitely get selected.
So the captain has to select the remaining 10 players from the remaining 13 players.
Ways of selecting = $^{13}C_{10}$
= (13 x 12 x 11)/(3 x 2 x 1) = 286 ways.

92. The Probability of finishing a test on time by A is 1/2, B is 2/3 and by C is 3/5. If all of them write the test independently, then what is the probability that just two of them are able to write the test on time?

Solution:
Probability of A and B completing the test on time and C not completing on time
= (1/2)(2/3)(2/5) = 4/30
Probability of B and C completing the test on time and A not completing on time
= (2/3)(3/5)(1/2) = 1/5
Probability of A and C completing the test on time and B not completing on time
= (1/2)(3/5)(1/3) = 1/10
Probability of only two of them completing the test on time
= (4/30) + (1/5) + (1/10)
= 13/30

93. Varun is guessing which of the 2 hands holds a coin. What is the probability that Varun guesses correctly three times in a row?

Solution:
Probability of guessing correctly for one time = ½.
Probability of guessing correctly for three times in a row
= ½ x ½ x ½ = 1/8

94. Ravi has a bag of 10 Nestle and 5 Cadbury chocolates. Out of these, he draws two chocolates. What is the probability that he would get at least one Nestle Chocolate?

Solution:
Probability of getting at least one Nestle
= 1 – Probability of getting no Nestle
Probability of getting no Nestle
= $^5C_2/^{15}C_2$ = 10/105
Probability of getting at least one Nestle
= 1 – (10/105) = 95/105 = 19/21

95. Two distinct no's are taken from 1,2,3,4......28. Find the probability that their sum is less than 13.

Solution:
Let us assume that the two numbers to be chosen are x and y.
Given, $x + y < 13$
The maximum possible value for
$x + y = 12$
If $x = 1$, then y can be any value from 2 to 11. There are 10 pairs if $x = 1$
If $x = 2$, then y can be any value from 1 to 10 except 2. There are 9 pairs if $x = 2$
If $x = 3$, then y can be any value from 1 to 9 except 3. There are 8 pairs if $x = 3$
Similarly when $x = 4$ there are 7 pairs
When $x = 5$ there are 6 pairs
When $x = 6$ there are 5 pairs
When $x = 7$ there are 5 pairs
When $x = 8$ there are 4 pairs
When $x = 9$ there are 3 pairs
When $x = 10$ there are 2 pairs and
When $x = 11$ there is 1 pair.
Total number of ways in which there will be a sum less than 13 is 60.
Total number of ways in which two numbers can be selected from1 to 28 is
$= {}^{28}C_2 = (28 \times 27)/(2 \times 1) = 378$.
Probability = 60/378

96. There are 5 dogs and three cats. What is the probability that there is one cat at both the ends when arranged?

Solution:
Number of ways of selecting two cats to sit at the end $= {}^{3}C_2 = 3$ ways.
Out of the three different cases in all cases the remaining 5 dogs and 1 cat can be arranged in 6! ways.
The two cats which are at the end can also be rearranged in 2! ways.
Total number of arrangements in which the two cat sits at the each end
$= 2! \times 3 \times 6!$
= 4320 ways.
Total number of ways arranging 5 dogs and three cats = 8! = 40320
Probability = 4320/40320

97. Two cards are drawn at random from a pack of 52 cards. What is the probability that either both are black or both are queen?

Solution:
Number of ways of selecting two black cards $= {}^{26}C_2 = 325$ ways.
Number of ways of selecting two queen cards $= {}^{4}C_2 = 6$ ways.
Total ways of selecting two black cards or two queens = 325 + 6 – 1 = 330.
We are subtracting 1 because out of the six ways of selecting 2 queens in one way, both the queen cards will be black.
Total ways of selecting 2 cards out of 52 cards $= {}^{52}C_2 = 1326$
Probability = 330/1326

98. Dividend of Rs. 504 lakhs for shares was announced by a company. 100 employee cum share holders get Rs. 3.60 lakh each & the share holder who is not the employee gets Rs. 2.40 lakh each. How many share holders are there who are not employee?

Solution:
Number of share holders who are employees = 100.
Assume that the number of share holders who are not employees = N.
$100 \times 3.6 + N \times 2.4 = 504$
$2.4N = 504 - 360$
$2.4N = 144$
$N = 60$
There are 60 shareholders who are not employee of the company.

99. If f(X)= 2X-1 + f(X-1), if X is not equal to zero and if f(X=0)=0, find the value of f(5).

Solution:
$f(5) = 2(5) - 1 + f(4)$
$f(4) = 2(4) - 1 + f(3)$
$f(3) = 2(3) - 1 + f(2)$
$f(2) = 2(2) - 1 + f(1)$
$f(1) = 2(1) - 1 + f(0)$
$f(1) = 1$

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f(2) = 2(2) – 1 + 1 = 4
f(3) = 2(3) – 1 + 4 = 9
f(4) = 2(4) – 1 + 9 = 16
f(5) = 2(5) – 1 + 16 = 25

100. APPLE + PEAR = GRAPE.
G+R+A+P+E = ?

Solution:
The problem is based on
Crypt arithmetic.
Each letter is assigned with a distinct one digit number.
The different letter in the question are
A, P, L, E, R and G

```
  A P P L E
+   P E A R
-----------
  G R A P E
```

A + 1 = G
E + R = E, So R = 0
P + P = R → P + P = 0, So P = 5

P	R	A	G	L	E	
5	0	1	2	4	6	X
5	0	2	3	3		X
5	0	3	4	2	8	X
5	0	4	5			X
5	0	5				X
5	0	6	7	9	10	X
5	0	7	8	8		X
5	0	8	9	7	2	√

P = 5; R = 0; A = 8; G = 9; L = 7 and
E = 2
G+R+A+P+E = 9+0+8+5+2 = 24

Fact

There are two C's in the company's logo.

*Blue 'C' represents the **'Customer'** and Green 'C' represents the **'Company'.***

It symbolizes that the company is 'Flexible' for the customer. Both 'C's are over-laced symbolizing the 'bond' and close interaction.

1. What is the next number in the series 6,24,120,720?

Solution:
3! = 6
4! = 24
5! = 120
6! = 720
7! = 5040
The missing number is 5040

2. What is the next number in the series 4,18,48,100,180,__ ?

Solution:
$4 = 1 \times 2^2$
$18 = 2 \times 3^2$
$48 = 3 \times 4^2$
$100 = 4 \times 5^2$
$180 = 5 \times 6^2$
The missing term will be $6 \times 7^2 = 294$

3. Find the next number in the series 4, 2, 2, 3, 6, 15, __.

Solution:
4 x 0.5 = 2
2 x 1 = 2
2 x 1.5 = 3
3 x 2 = 6
6 x 2.5 = 15
15 x 3 = 45
The missing number is 45.

4. Two series are 16,21,26… and 17,21,25… What is the sum of first hundred common numbers?

Solution:
The first series is an arithmetic progression with common difference 5.
The second series is an arithmetic progression with common difference 4.
The first common number is 21.
The second common number will be 41.
The series of common numbers is 21, 41, 61, 81, …
The sum of the first hundred common numbers will be
= 21 + 41 + 61 + … 2001
= (20+1) + (40+1) + … +(2000+1)
= 100 + (20+40+60+…+2000)
= 100 + 20(1 + 2 + 3 + … + 100)
= 100 + 20[(100)(101)/2]
= 100 + 101000
= 101100

5. Find the missing number in the series 1,3,7,13,21,31,__ .

Solution:
Difference between the terms
= 2, 4, 6, 8, 10.
The next difference will be 12.
The missing number is 31 + 12 = 43.

6. 6 bells commence tolling together and they toll at an interval of 2,4,6,8,10 and 12 seconds. In 30 minutes how many times will they toll together?

Solution:
The time taken for all the six bells to toll together from the time they tolled together for the first time
= LCM(2,4,6,8,10,12) = 120
In every 120 seconds they will ring together i.e. in every 2 minutes.
The number of times they will toll together in 30 minutes
= 30/2 = 15 times.

7. There are some players in a volley ball team. After the end of the game each girl drinks 4 liters of water and each boy drinks 7 liters of water and the coach drinks 9 liters of water. After end of the game 42liters of water is drank by all. The find the no of boys and girls in the volley ball team.

Solution:
The coach drank 9 liters out of 42 liters.
The remaining quantity of water drank by the players = 42 – 9 = 33
Let x be the number of boys and y be the number of girls.
7x + 4y = 33
The only integer values possible for x and y are 3 and 2. 3 boys and 2 girls.

8. Total amount of some cats and the beans is Rs. 360 in a shop. But at night the shop keeper forget to close the door. The next day he found the 2 cats and ½ kg bean is lost and the present cost is Rs. 340. Find the number of cats and the beans.

Solution:
Let us assume there were x number of cats and y kg of beans.
Price of cat be 'c' and price of beans be 'b'.
Therefore,
$cx + by = 360$
After two cats and ½ kg bean were lost, the equation will become
$(x-2)c + (y - 0.5)b = 340$
From this we get
$2c + 0.5\ b = 20$
Multiplying both sides by 18, we get
$36c + 9b = 360$
There were 36 cats and 9 kg of beans.

9. In how many ways can 840 be written as the product of two numbers?

Solution:
The prime factors of 840:
$= 2 \times 2 \times 2 \times 7 \times 5 \times 3$
$= 2^3 \times 3^1 \times 5^1 \times 7^1$
Add the power values with 1 and multiply them and divide it by 2!.
The number of ways in which 840 can be written as a product of two numbers
$= (3+1)(1+1)(1+1)(1+1)/2!$
= 16 ways.

10. Square of 2 more than a 2 digit number is multiplied and divided by 2 and 5 respectively. If twice of the result is equal to 500 then find the number.

Solution:
Let the number be N
Given that, $(N+2)^2 \times (2/5) = 500/2$
$(N+2)^2 = 625$
$N + 2 = 25$
$N = 25 - 2 = 23$
The number required is 23.

11. 2/3rd of a two digit number is equal to a number whose ten's place is three less than the ten's place of the 2 digit number and unit's place is one more than the unit's place of the 2 digit number. Then find the quotient when the unit's place of the 2 digit number divides 261.

Solution:
2/3rd of the two digit number is also an integer. Let us start from the highest two digit number which is a multiple of 3.
If the actual number is 99, 2/3rd of the number = 66. The condition does not satisfy.
If the actual number is 96, 2/3rd of the number = 64. The condition does not satisfy.
If the actual number is 93, 2/3rd of the number = 61. The condition does not satisfy.
If the actual number is 90, 2/3rd of the number is 60. The condition does not satisfy.
If the actual number is 87, 2/3rd of the number is 58. The condition satisfies.

The number we are looking for is 87.
Units place of the number = 7.
Quotient when 261 is divided by 7 is:
Quotient(261/7) = 37.

12. In a 2 digit number the units place is one more than 4 times the digit in ten's place. If the difference between the number formed by interchanging the digit of the number and the original number is 36 more than the original number, find the 2 digit number.

Solution:
If the tens digit is 1, the units place of the number will be 5. The actual number will be 15.
If the tens digit is 2, the units place will be 9. The actual number will be 29.
The tens place cannot be more than 2.
15 + 36 = 51.
The required number is 15.

13. A trip takes 6 hours to complete. After traveling 1/4 of an hour, 1(3/8) hours, and 2 (1/3) hours, how much time will it take to complete the trip?

Solution:
Total time travelled
= (1/4) + 1(3/8) + 2(1/3)
= (1/4) + (11/8) + (7/3)
= (6/24) + (33/24) + (56/24)
= 95/24 = 3(23/24)
= 3 hours 57 minutes 30 seconds
Time remaining
= 2 hours 2 minute 30 seconds.

14. 2 oranges, 3 bananas and 4 apples cost Rs.15. 3 oranges 2 bananas 1 apple costs Rs 10. what is the cost of 3 oranges, 3 bananas and 3 apple?

Solution:
2o + 3b + 4a = 15---(1)
3o + 2b + 1a = 10---(2)
By adding (1) and (2) we get
5o + 5b + 5a = 25
5(o + b + a) = 25
o + b + a = 5
Cost of 3 oranges, 3 bananas and 3 apples = 3(o+ b + c) = 3 x 5 = 15

15. At a reception, one-third of the guests departed at a certain time. Later two-fifths of the guests departed. Even later two-thirds of the remaining guests departed. If six people were left, how many were originally present at the party?

Solution:
Let N be the total number of members attended the party.
After $1/3^{rd}$ of them left, the remaining number of guests = (2/3)N = 2N/3
After $2/5^{th}$ of the remaining guests left, the remaining number of guests
= (3/5)(2N/3) = 6N/15
After further $2/3^{rd}$ of the guests left the remaining = (1/3)(6N/15) = 6N/45
6N/45 = 6 → N = 45.
45 persons attended the party.

16. Ram ordered for 6 black toys and some additional brown toys. The price of black toy is 2.5 times that of a brown toy. While preparing the bill, the clerk interchanged the number of black toys and brown toys which increased the bill by 45%. Find the number of brown toys.

Solution:
Assume that the price of 1 brown toy
= Rs. 100
So, the price of 1 black toy = Rs. 250
Assume that the number of brown toys = N.
Actual price of all the toys
= 6 x 250 + N x 100 = 1500 + 100N
Faulty price of all the toys
= N x 250 + 6 x 100 = 600 + 250N
Given that,
600 + 250N = (145/100) (1500+100N)
By solving, we get
N = 15
Number of brown toys = 15.

17. If half of 5 were 3, that would one-third of 10 be
(a) 5 (b) 4 (c) 3 (d) 2

Solution:
(1/2)5 = 3
So, (1/3) 5= 2
If (1/3) 5 = 2
Then (1/3)10 = 4
The answer is 4.

18. Find remainder of $30^{80}/17$.

Solution:
$R(30^{80}/17) = R(13^{80}/17)$
because reminder of 30/17 = 13.
$R(13^{80}/17) = R((13^2)^{40}/17)$
$= R(169^{40}/17)$
= R((-1)40/17)
= R(1/17) = 1

19. Three people (A, B, and C) need to cross a bridge. A can cross the bridge in 10 minutes, B can cross in 5 minutes, and C can cross in 2 minutes. There is also a bicycle available and any person

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can cross the bridge in 1 minute with the bicycle. What is the shortest time that all men can get across the bridge? Each man travels at his own constant rate.

Solution:
Assume that the length of the bridge is 10m.
Speed of A = 1m/min
Speed of B = 2m/min
Speed of C = 5m/min
Speed of cycle = 10m/min.
Less time will be taken if rides the cycle first and B and C start walking on the bridge.
Assume that A cycles for x meters and abandons the cycle to walk the rest of the bridge.
Time taken by A = (x/10) + (10 – x)/1
Now C will take the abandoned cycle and ride back for y meters and leave the cycle for B and he will walk back.
Time taken by C
= (x/5)+ (y/10) + (10-x-y)/5
Now B will take that cycle and ride till the end
Time taken for B
= (x – y)/2 + (10 – x – y)/1
Time taken by all the three persons are same.
By equating the above three equations, we get,
Time taken to cross = 2.92 minutes.

20. In a transport company each van can carry a maximum load of 13 tonnes. 12 sealed boxes each weighing 9 tonnes have to be transported to a factory. The number of van loads needed to do this is?

Solution:
Total weight of all the boxes
= 12 x 9 = 108 tonnes.
The number of vans needed
= 108/13 = 8.307
The number of vans cannot be a decimal value.
The minimum number of van loads
= 9

21. Sudhir goes to the market once every 64 days and Sushil goes to the same market once every 72 days. They met each other one day. How many days later will they meet each other again?

Solution:
The number of days taken for them to meet each other = LCM(64, 72)
= 576 days.

22. In a total of 36 vehicles after one car there is one scooter. After 2nd car there will be two scooters and after 3rd car there will be 3 scooters so on. Then find the number of scooters in the right half of arrangement.

Solution:
In the first set there will be 1car + 1 scooter = 2 vehicles.
In the second set there will be 1car and 2 scooters = 3 vehicles
In the third part there will be 4 vehicles.
2+3+4+5+6+7+8 = 35 vehicles and the 36^{th} vehicle will be a car.
When they are arranged as left and right, Vehicle number 19 to 36 will be on the right.
They will be arranged in the following manner
cscsscssscsssscsss|sscssssscssssssc
The number of scooters in the right side
= 15

23. After striking the floor , a rubber ball rebounds to 4/5th of the height from which it has fallen. Find the total distance that it travels before coming to rest if it has been gently dropped from a height of 120 m.

Solution:
The distance travelled decreases by 20 percent or it decreases by $1/5^{th}$ every time.
If the distance is decreased by ½ every time, the ball would have travelled double the drop distance.
For $1/5^{th}$ it will travel 5 times = 600m

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24. The minimum number of numbers required to form a number from 9 to 9000 which are multiples of 5 is?

Solution:
A number to be divisible by 5, the number should end with 0 or 5.
The unit place of the numbers from 9 to 9000 can be filled with 2 digits (0 or 5)
The tens place can be filled with digits 0 to 9. There are 10 digits for tens place.
The hundreds place can be filled with 10 different digits 0 to 9.
The thousands place can be filled with digits 1 to 9. 9 digits.
Total number of digits required
= 9 + 10 + 10 + 2 = 31.

25. Find the largest 4-digit number, which gives the remainder 7 and 13 when divided by 11 and 17?

Solution:
Divide smallest 5 digit number with the LCM of 11 and 17 and take the remainder.
LCM(11, 17) = 187
Remainder(10000/187) = 89
The largest 4 digit number which is exactly divisible by 11 and 17 is
= 10000 – 89 = 9911.
To give reminder 7 and 13 when divided by 11 and 17, subtract the difference between 11 and 7 from 9911
Difference between 11 and 7 = 4
The largest 4 digit number that gives remainder 7 and 13 when divided by 11 and 17 is = 9911 – 4 = 9907

26. What is vale of 'a' if a is integer provided that $a^4=1$ and $a^3+1=0$?

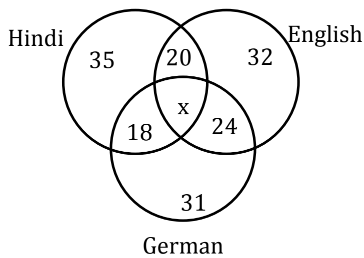
Solution:
$a^4 = 1$
From this we can derive a = +1 or a = -1
If a = +1
Then $a^3 + 1 = 2$
It does not satisfy.
If a = -1, then $a^3 + 1 = 0$
So, a = -1.

27. The time showed by an analog clock at a moment is 11 am, then 1234567890 hours later it will show time as?

Solution:
We have to find the reminder of 1234567890 when divided by 24.
Reminder of 1234567890/24 = 18
The time will be 18 hours past 11 am
= 5 am.

28. Out of 52 students 35 can speak Hindi, 32 can speak English, 31 can speak German, 20 speak both Hindi and English, 18 speak both Hindi and German and 24 both English and German. How many can speak all languages?

Solution:
Solving using Venn Diagram.



Assume that the number of persons who speak all three languages = x
Number of persons who speak Hindi and English alone = 20 – x
Number of persons who speak Hindi and German alone = 18 – x
Number of persons who speak English and German alone = 24 – x
Hindi alone = 35 – (20 – x) – (18 – x)
English alone = 32 – (20 – x) – (24 – x)
German alone = 31 – (18 – x) – (24 – x)
Total = (20–x)+(18-x)+(24-x)+(35-(20-x)-(18-x))+(32-(20-x)-(24-x))+(31-(18-x)-(24-x))+x = 52
By solving this we, get,
44 + 4x = 52
x = 2. Two students speak all languages.

W i p r o

29. A team of 36 members is divided into groups of equal size to make a trip. Since the groups were too large to fit in a car , 3 members were taken from each group and these members then formed into two additional groups . After this, all the groups had the same number of members. How many members of the team were in a group before the three members were taken out from each group?

Solution:
Assume that there were N members before splitting the group.
After splitting there are N – 3 members per group.
Both N and N – 3 are factors of 36 because in both the cases there were equal number of members in each group.
The possible values for N and N -3 are (9 and 6) or (12 and 9).
If there were 12 members per group initially, there were 3 groups and after removing there will be 9 members who will form 1 group. This does not satisfy the condition.
If there were 9 members in a group before splitting, there were 4 groups from which 12 members will be removed. They will form 2 additional groups.
The number of members per group originally = 9.

30. A monkey is climbing a 200 meter tall building. It starts from the ground and climbs 4m in 1st second, slips 2m in 2nd second, climbs 6m in 3rd second, then slips 2m in 4th second, climbs 8m in 5th second, slips 2m in the next and so on. When would the monkey reach the top of the building?

Solution:
In the first two seconds the monkey climbs 2m. In the next two it climbs 4 and in the next two it climbs 6.
The height increases as a multiple of 2.
The nearest value we will get less than 200 by adding like this:
2 + 4 + 6 + …
= 2(1+2+3+4+…)
= 2(1+2+3+…13)
= 2(91)
= 182 m
In 13 x 2 = 26 seconds, the monkey would have climbed 182 m.
In the 27th second the monkey will climb another 28 meters and by that it would have climbed more than the height of the building.
The monkey will reach the top in 27 seconds.

31. A man driving a car sees his speedometer and the number is a palindrome. The number is 13931 km. after driving for 2hr then he see the another palindrome number. find the speed of the car?

Solution:
The next palindrome number will be 14041.
The distance travelled between the two points = 110 km.
Time taken = 2 hours.
Speed = 110/2 = 55kmph.

32. A frog can climb up a well at 3 feet per min but due to slipperiness of the well, frog slips down 2 feet before it starts climbing the next minute. If the depth of the well is 57 feet, how much time will the frog take to reach the top?

Solution:
The effective distance climbed by the frog in two minutes = 3 – 2 = 1 feet.
To climb 57 – 3 = 54 feet, the frog will take 54 x 2 = 108 minutes.
At 109th minute the frog will climb 3 feet and reach the top of the well.
Time taken = 109 minutes.

33. There are 27 balls, of which 1 is heavier. Given a weight balance, minimum how many times you need to weigh to find out the odd ball?

Solution:
Split 27 balls into 3 groups of 9 balls each.
Weigh any two groups in the balance.
If both are of same weight, take the group which was kept outside for the measurement.
If one of the group goes down, take that group for the next measurement.
Out of the one group which got selected, split the 9 balls in 3 groups of three balls in each.
Repeat the above process to select a group of three balls in which one is overweight.
Out of the three balls selected, take two balls and place them on separate plates of the balances.
If they are of same weight, the ball kept outside is of more weight.
If one of them goes down, then that ball is overweight.
Total measurements required = 3
$27 = 3^3$. The power value of three will always be the answer.

34. An ore contains 25% of an alloy that has 90% iron. Other than this, in remaining 75% of the ore there is no iron. How many kilogram of the ore is needed to obtain 60 kg. of pure iron?

Solution:
If there is a 100kg ore, there will be 25kg of alloy.
Quantity of iron in the 25 kg alloy
= (90/100)25 = 22.5kg.
For 22.5kg iron we need 100kg ore.
The quantity of ore required to get 60kg of iron:
(22.5/60) = (100/x)
x = 266.67.
The quantity of ore required is 266.67kg

35. The average of 7 numbers is 50. The average of first three of them is 40, while the average of the last three is 60. What must be the remaining number?

Solution:
Sum of all the 7 numbers = 7 x 50 = 350
Sum of first three numbers
= 3 x 40 = 120
Sum of the last three numbers
= 3 x 60 = 180
Sum of first three and the last three numbers = 120+ 180 = 300
Value of the remaining number
= 350 – 300 = 50.

36. The average age of a class of 39 students is 15 years. If the age of the teacher be included, then the average increases by 3 months. Find the age of the teacher.

Solution:
Average age increases by three months or 0.25 years after adding the teacher's age.
New average = 15.25
New total age = 15.25 x 40 = 610
Old average = 15
Old total age = 15 x 39 = 585.
Age of teacher = 610 – 585 = 25.

37. A 10-litre mixture of milk and water contains 30 percent water. Two liters of this mixture is taken away. How many liters of water should now be added so that the amount of milk in the mixture is double that of water?

Solution:
After removing 2 liters of the mixture, the remaining quantity will be
= 10 – 2 = 8 liters.
Quantity of water in the 8 liter mixture
= (30/100)8 = 2.4 liters.
Quantity of milk = 8 – 2.4 = 5.6 liters.
Amount of milk should be double that of water.
Amount of milk = 5.6.
So the amount of water should be
= 5.6/2 = 2.8 liters.
Available quantity of water
= 2.4 liters
Quantity of water to be added
= 2.8 – 2.4
= 0.4 liters = 400ml.

38. Gavaskar's average runs in the first 50 innings was 50. After the 51st innings his average became 51. How many runs did he score in the 51st innings?

Solution:
Total score of Gavaskar till the first fifty innings = 50 x 50 = 2500.
After 51st innings, his total score
= 51 x 51 = 2601
His score in the 51st innings
= 2601- 2500 = 101
He scored 101 runs in 51st match.

39. The average of a set of numbers is 46. If 4 numbers whose average is 52 are subtracted from this set, the average becomes 44.5. Fin the original number of numbers in the set.

Solution:
Let us assume that there were N number of numbers initially.
Total of N numbers = N x 46 = 46N
After removing 4 numbers, the total of N-4 numbers = (N-4)44.5 = 44.5N – 178
Difference between the two sets
= 4 x Average of removed 4 numbers
= 4 x 52 = 208
So,
46N – 44.5N – 178 = 208
1.5N = 30
N = 20
There were 20 numbers initially.

40. In two alloys, copper and tin are related in the ratios of 4:1 and 1:3. 10kg of 1st alloy, 16 kg of 2nd alloy and some pure copper are melted together. An alloy is obtained in which the ratio of copper and tin was 3:2. Find the weight of the new alloy.

Solution:
Quantity of copper in 10kg of 1st alloy
= 10(4/5) = 8 kg
Quantity of tin in 10kg of 1st alloy
= 10(1/5) = 2 kg
Quantity of copper in 16 kg of 2nd alloy
= 16(1/4) = 4kg
Quantity of tin in 16kg of 2nd alloy
= 16(3/4) = 12kg.
Total quantity of copper before adding additional copper
= 8 + 4 = 12kg.
Total quantity of Tin
= 2 + 2 = 14
The ratio of Copper and Tin at present
= 12 : 14
The required ratio
= 3 : 2 = 21 : 14
The quantity of Copper to be added
= 21 – 12 = 9kg.

41. One type of liquid contains 25% of Kerosene, the other contains 30% of Kerosene. A can is filled with 6 parts of the first liquid and 4 parts of the second liquid. Find the percentage of the Kerosene in the new mixture.

Solution:
Let us assume that the capacity of the can is 100 liters.
Out of 100 liters 60 liters is filled with 1st type. And 40 liters is filled with 2nd type.
Quantity of kerosene in 60 liters of first type = (25/100)60 = 15 liters.
Quantity of Kerosene in 40 liters od second type = (30/100)40 = 12 liters.
Total quantity of kerosene = 15 + 12
= 27 liters.
Percentage of kerosene = 27%.

42. Rajan and Rakesh started a business and invested Rs. 20,000 and Rs. 25,000 respectively. After 4 months Rakesh left and Mukesh joined by investing Rs. 15,000. At the end of the year there was a profit of Rs. 4,600. What is the share of Mukesh?

Solution:
The profit share is directly proportional to the amount invested and duration off investment.
$P_1 : P_2 : P_3 = T_1I_1 : T_2I_2 : T_3I_3$
$P_1 : P_2 : P_3 = 12x20 : 4x25 : 8x15$
$P_1 : P_2 : P_3 = 240 : 100 : 120 = 12 : 5 : 6$
Share of Mukesh = (6/23)4600 = 1200.

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43. A starts business with Rs.3500 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2 : 3. What is B's contribution in the Capital?

Solution:
$P_a : P_b = T_1T_1 : T_2I_2$
T_1 = Duration of investment of A = 12
T_2 = Duration of investment of B = 7
I_1 = Investment amount of A = 3500
I_2 = ?
$P_a : P_b = 12 \times 3500 : I_2 \times 7$
$2 : 3 = 6000 : I_2$
$I_2 = 9000$
Investment of B = Rs. 9000

44. Ratio between 2 numbers is 5:7 and their product is 560. What is the difference between 2 numbers?

Solution:
Assume that the two numbers are 5x and 7x.
Given that, (5x)(7x) = 560
$35x^2 = 560$
$x^2 = 16 \rightarrow x = 4$
The two numbers are, 5(4) = 20 and 7(4) = 28.
Difference between two numbers = 8

45. A and B together have Rs. 2412. If 8/25 of A's amount is equal to 2/5 of B's amount then how much amount does A have?

Solution:
(8/25)A = (2/5)B
→ (8/25)A = (10/25)B
So, 8A = 10B
A : B = 5 : 4
Share of A = (5/9)2412 = Rs. 1340.

46. A shopkeeper keeps MRP of a product as Rs 45. But he sells it at Rs. 42. Then after he gains a profit of 5%. What is the cost price of the product?

Solution:
Profit % = [(SP – CP)/CP]100
(105/100)CP = 42
CP = 42 x 100/105
Cost price of the product = Rs. 40.

47. In a certain school, 20% of the students are below 8 years of age. The number of students above 8 years of age is (2/3) of the number of students of 8 years age which is 96. What is the total number of students in the school?

Solution:
Number of students whose age is exactly 8 years = 96.
Number of students above 8 years age = (2/3) x 96 = 64.
Total number of students with age 8 years and above = 96 + 64 =160.
Percentage of students below 8 years age = 20%
Therefore, Percentage of students with age 8 years or above = 100 – 20 = 80%
Let N be the total number of students in the school.
(80/100)N = 160
N = 200.
There are 200 students in the school.

48. There are 5000 voters in a town out of which 20% are not eligible to vote and there are two candidates contesting. The winning candidate won by 15% of votes. What is the number of votes he got?

Solution:
The number of persons eligible for voting = 5000 – (20/100)5000
= 4000 votes.
The winning candidate got 15% more votes than the losing candidate.
Let % of votes by winning candidate = X and % of votes by losing candidate = Y
X + Y = 100
X – Y = 15
By solving the above two equations, we get
X = 57.5
Percentage of votes got by winning candidate = 57.5%
Votes he got = (57.5/100)4000 = 2300

49. A shopkeeper gives a discount of 20% on the sale. By what percent he had to increase the selling price of the item so that after giving discount he gets the cost price?

Solution:
Even after giving 20% discount the shopkeeper does not incur loss or gain.
That means 80 percentage of selling price = Cost price.
Assume that the cost price = Rs. 100
So, (80/100)S.P = 100
Selling price = Rs. 125
The shopkeeper must increase the price from 100 to 125.
Percentage increase
= [(125-100)/100]100 = 25%
The cost price must be increased by 25%

50. If the price of petrol increases by 25% and Kevin intends to spend only 15% more on petrol, by how much percent should he reduce the quantity of petrol that he buys?

Solution:
Assume that the price of 1 liter petrol
= Rs. 100.
After increasing the price by 25%, the price of 1 liter petrol = Rs. 125.
But Kevin is ready to spend only 15% more on petrol.
The amount he is willing to spend = 100+(15/100)100 = Rs. 115
The price to be spent decreases fro 125 to 115.
Percentage decrease in quantity
= [(125 – 115)/125]100 = 8%
Kevin reduces the petrol consumption by 8%

51. Two equal amounts of money are lent out at 6% and 5 % simple interest respectively at the same time. The former is recovered two years earlier than the latter and the amount so recovered in each case is Rs. 2800. Determine the amount that is lent out?

Solution:
Let N be the number of years at 5% simple interest.
The number of years for which the amount is lent at 6% simple interest
= N – 2
In both the cases the amount got back is same.
Amount = P + PNR/100
Amount in first case
= P + [P x (N – 2) x 6/100]
Amount in second case
= P + [P x N x 5/100]
Given that both amounts are equal.
So,
P+[Px(N-2)x6/100] = P+[PxNx5/100]
(N – 2) x 6 = N x 5
6N – 12 = 5N
N = 12 years.
The amount lent at 5% interest
= P + (P x 12 x 5/100) = 2800
= 1.6P = 2800
P = 1750.
The amount invested in each case
= Rs. 1750.

52. The price of Maruti car has risen by 25% and the sales have come down by 4%. What is the total percentage change in revenue.

Solution:
Assume that the price of one car
= Rs. 100
Assume that the initial sales numbers is
= 100 cars.
Total revenue in the initial stage
= 100 x 100 = Rs. 10000
Current price of Maruti car = Rs. 125
Current sales number = 96
Current revenue = 96 x 125 = Rs. 12000
The percentage increase in revenue
= [(12000 – 10000)/10000]100
= 20% increase.

53. My friend collects antique stamps. She purchased 2 but found that she need to raise money urgently. So she sold them for Rs. 8000 each. On one she made 20% profit and on the other she *lost 20%. How much did she gain or lost in the entire transaction?*

Solution:
Selling price of each stamp = Rs. 8000.
Selling price of first stamp
= (120/100)CP = 8000
Cost price of first stamp
= 8000 x 100/120 = Rs. 6666.67
Selling price of second stamp
= (80/100)CP = 8000
Cost price of second stamp
= 8000 x 100/80 = Rs. 10000
Total Cost price = 16666.67
Total selling price = 16000
Loss percentage = 4%.
Shortcut:
(20^2/100) % loss ; (a^2/100)% loss

54. The total age of Old and Young is 48. Old was twice as old as Young when Old was half as old as Young will be when Young is three times as Old was when Old was three times as old as Young. How old is Old?

Solution:
When Old was three times as old as Young
O = 3Y
Young is three times as old as Old, when Old was trice as old as Young.
When Y = 3O when O = 3Y
So, Y = 9xO.
Now, Old is half as old as Young.
O = 9xO/2
And O = 18xO
Old = 30 and
Young = 18

55. A father's age was 5 times his son's age 5 years ago and will be 3 times son's age after 2 years, the ratio of their present ages is equal to:

Solution:
Assume that the present age of father and son is F and S.
(F – 5) : (S – 5) = 5 : 1 and
(F + 2) : (S + 2) = 3 : 1
From the ratios we get,
F – 5 = 5S – 25
F – 5S = - 20 ---(1)
F + 2 = 3S + 6
F – 3S = 4 ---(2)
By solving (1) and (2), we get
S = 12 and F = 40
Ratio of present ages of father and son
= 40 : 12 = 10 : 3

56. If the circumference of a circle is 200 units, then what will the length of the arc described by an angle of 20 degree?

Solution:
For 360° of the circle, the circumference = 200 units.
For 20° of the circle we will get an arc.
If the length of the arc is x, then
20/360 = x/200
x = 4000/360
x = 11.11 units.

57. A rectangle has twice the area of a square. The length of the rectangle is 14 cm greater than that side of the square whereas breadth is equal to side of the square. Find the perimeter of the square?

Solution:
Since breadth of the rectangle is same as the side of the square and area of rectangle is twice that of area of square, the length of rectangle is equal to twice the side of square.
Length of rectangle = 14 x 2 = 28
Breadth of rectangle = 14
Perimeter = 2(14+28) = 84cm.

58. If the area of a square increases by 69% then the side of the square will increase by what percentage?

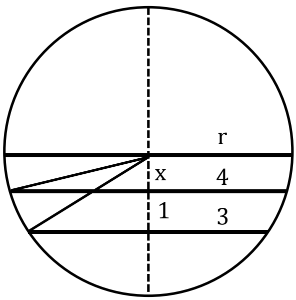
Solution:
Assume that the are of square was 100
Now the area is 169.
Side of increased square = 13
Side of initial square = 10
Percentage increase of side = 30%

59. If the radius of a circle is decreased by 10% then its area is decreased by what percentage?

Solution:
Assume that the radius of circle initially = 10 units
Area of the circle initially
= $\pi(10x10) = 100\ \pi$
Current radius of the circle
= 9 units
Current area = $\pi(9x9) = 81\pi$
Percentage change in area
= 19% decrease.

60. A circle has 2 parallel chords one of length 6 cm and other of length 8 cm. If the chords are in the same side of the center then distance between them 1 cm, find diameter of the circle.

Solution:



$r^2 = 3^2 + (1 + x)^2$
$r^2 = 4^2 + x^2$
$9 + (1+x)^2 = 16 + x^2$
$1 + x^2 + 2x = x^2 + 16 - 9$
$2x = 6 \rightarrow x = 3$
$r^2 = 3^2 + (1 + 3)^2$
$r = 5$
Radius of the circle is 5cm.
Diameter of the circle = 10cm.

61. A garrison of 3300 men has provisions for 32 days, when given at a rate of 850 grams per head. At the end of 7 days a reinforcement arrives and it was found that now the provisions will last 8 days less, when given at the rate of 825 grams per head. How, many more men can it feed?

Solution:
Quantity of food = Number of men x Number of days x Food per head
After 7 days the quantity of food remaining = 3300 x 25 x 850
The same quantity food is provided for the extra men.
Let us assume that the new number of men added = N
The quantity of food for the new total number of men
= (3300+N) x (25-8)x825
In each case, the quantity of food remains the same.
So,
3300x25x850= (3300+N)x 17 x 825
N = 1700
The new number of men arrived = 1700

62. On a certain pasture the grass grows at an even rate. It is known that 40 cows can graze on it for 40 days before the grass is exhausted, but 30 cows can graze there as long as 60 days. How many days would the pasture last if 20 cows were allowed to graze on it?

Solution:
When the number of cows in decreased by $1/4^{th}$ (from 40 to 30), the number of days increased by 50%.
When the number of cows is decreased by $1/3^{rd}$ (from 30 to 20) the number of days will increase by 100%.
The number of days taken by 20 cows to graze the field = 120 days.

63. A and B working separately can do a piece of work in 9 and 12 days respectively. If they work for a day alternatively with A beginning the work, in how many days the work will be completed?

Solution:
Work done by A on the first day = 1/9
Work done by B on the second day
= 1/12

Total work done in two days

$$\frac{1}{9} + \frac{1}{12} = \frac{7}{36}$$

The time taken to complete $35/36^{th}$ of the work is = 10 days.
On the 11^{th} day when A has to work, the remaining work = 1 – (35/36)
= 1/36
Time taken for A to complete $1/36^{th}$ of the work = (1/36) x 9 = ¼ days.
Total time taken = 10.25 days

64. 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?

Solution:
Let N be the time taken to fill the tank.
Pipe A is opened for N minutes.
Pipe B is opened for N – 12 minutes.
Pipe C is opened for N – 18 Minutes.
Fraction of tank filled by pipe A in 1 minute = 1/42
Fraction of tank emptied by pipe B in 1 minute = 1/30
Fraction of tank filled by pipe C in 1 minute = 1/35
So,

$$\frac{N}{42} - \frac{N-12}{30} + \frac{N-18}{35} = 1$$

By solving the above, we get
5N – 7N + 84 + 6N – 108 = 210
4N = 234
N = 58.5 minutes

65. A is 6 times as fast as B and takes 100 days less to complete a work than B. Find the total number of days taken by A and B to complete the work together.

Solution:
Let us assume that the one day work of B = 1/B
Then one day work of A = 6/B
Time taken by B to complete the work = B days.
Time taken by A to complete the work = B/6 days.
Given, B – (B/6) = 100
5B/6 = 100
B = 120 days
If B can do it in 120 days, time taken for A to complete the work = 120/6
= 20 days.
Time taken by both of them together
= [20 x 120/(20 + 120)]
= 2400/140
= 120/7 days.

66. 30 men take 20 days to complete a job working 9 hours a day. How many hours a day should 40 men work to complete the job in 40 days?

Solution:
$W_1R_2D_2H_2 = W_2R_1D_1H_1$
W = work done
R = resource or human power
D = number of days
H = hours per day
From the question, $W_1 = W_2$
So,
40 x 40 x H_2 = 30 x 20 x 9
H_2 = 3.375
= 3 hours 22 minutes 30 seconds

67. A, B and C can do a piece of work in 30, 45 and 90 days. How many days A alone do the work if he is assisted by B and C on every 4th day?

Solution:
Work done by A in first three days
= 3/30 = 1/10
Work done on 4^{th} day
= (1/30) + (1/45) + (1/90)
= 1/15
Total work done in every 4 days
= (1/10) + (1/15) = 1/6
In every 4 days $1/6^{th}$ of the work I done.
Time taken to complete the whole work
= 6 x 4 = 24 days.
Days worked by A alone = 24 – 6 = 18

68. 16 men can complete a work in 24 days while 48 children can do it in 16 days. 12 men started the work , after 14 days 12 children joined them. In how many days will they do the remaining work?

Solution:
If 16 men can complete the work in 24 days, time taken for 12 men to complete the work will be:
(16/12) = (x/24)
x = 32 days.
If 48 children can complete the work in 12 days, time taken for 12 children to complete the work will be:
(48/12) = (y/16)
y = 64 days.
Time taken by 12 men and 12 children to complete the work
= [32x64/(32+64)] = 64/3 days.
Work done by 12 men in 14 days
= 14(1/32) = 7/16
Remaining work after 14 days = 9/16
Time taken for 12 men and 12 children to complete $9/16^{th}$ of the work
= (9/16)(64/3)
= 12 days.

69. Two men and 7 children complete a certain piece of work in 4 days while 4 men and 4 children complete the same work in only 3 days. The number of days required by 1 man to complete the work is?

Solution:
Assume that 1 man can complete the work in M days and 1 child can complete the work in C days.
Work done by one man in 1 day = 1/M
Work done by 1 child in one day = 1/C
Therefore, from the question:
(2/M) + (7/C) = 1/4 and
(4/M) + (4/C) = 1/3
Assume (1/M) = x and (1/C) = y
Then,
2x + 7y = 1/4
4x + 4y = 1/3
By solving the above equations, we get
y = 1/60 = 1/C
One child can do the work in 60 days.
x = 1/15 = 1/M
One man can complete the work in 15 days.

70. If 5 men take an hour to dig a hole, then how long would 12 men take to dig to hole of the same type?

Solution:
Time and resource are inversely proportional.
So,
If x is the time taken by 12 men to dig the hole, then
5/12 = x/1
x = 5/12 hours
= 25 minutes.
12 men will dig the hole in 25 minutes.

71. A pipe can be fill a tank in 20 min but there is a leakage in it which can empty the full tube in 60 min. In how many minutes the tank can be filled if both the pipe and the leakage are opened?

Solution:
Fraction of tank filled in 1 minute by the inlet pipe = 1/20
Fraction of tank emptied by the leakage in one minute = 1/60
Fraction of tank filled if both are opened together = (1/20) – (1/60)
= 1/30
Time taken to fill the tank = 30 minutes.

72. A solar powered car is being test driven. The vehicle is driven at 30 mph under solar power and 40 mph under regular power. The trip to the nearest town takes 45 min using both solar and regular power whereas the return trip takes 50 min using only solar power. On the trip to the town find the distance driven using regular power?

Solution:
Using the return travel we can find the distance of the nearest town

W i p r o

Distance of the nearest town
= Speed under solar power x time
= 30 x (50/60)
= 25 miles.
Let us assume that in the onward journey, the vehicle is driven under regular power for T minutes and under solar power for (45 – T) minutes.
Distance travelled by regular power
= (40/60) x T
Distance travelled by solar power
= 30 x (45 – T)/60
Both distances add up to 25 miles.
So,
(40/60)T + 30 x (45 – T)/60 = 25
40T + 1350 – 30T = 1500
10T = 150
T = 15 minutes.
Distance travelled by regular power
= (15/60) x 40
= 10 miles.

73. The ratio of time taken to run by Harish and Dev is 4:3 and thus Dev wins by 360m. What is the distance of the race course?

Solution:
Let us assume that the time taken by Harish and Dev are 4 seconds and 3 seconds.
Harish has to cover 360m in 1 second to finish the race.
Speed of Harish = 360m per second.
He runs for 4 seconds to finish the race.
Length of the race track = 4 x 360
= 1440m

74. A passenger train takes two hours less for a journey of 300km if its speed is increased by 5 kmph from its normal speed. The normal speed is.

Solution:
Assume that the actual speed = S and actual time taken = T
Then,
T = 300/S and
T – 2 = 300/(S+5)
T = [300/(S-5)] + 2
300/S = [300/(S+5)]+2
300S + 1500 = 300S + $2S^2$ + 10S
$2S^2$ + 10S – 1500 = 0
S^2 + 5S – 750 = 0
By solving this, we get S = 25
Speed of the train is 25kmph.

75. A man travels by bus for 20 hours and they by train for 5 hours. If the average speed of the bus was 20 kmph and that of the entire journey was 24 kmph what was the average speed of the train?

Solution:
Total time taken for the journey
= 20+5 = 25 hours.
Total distance covered
= Time x Average speed
= 25 x 24 = 600km.
Distance travelled by bus
= 20 x 20 = 400km.
Distance travelled by train
= 600 – 400 = 200km.
Average speed of train
= 200/5 = 40kmph.

76. A starts 3min after B for a place 4.5 km distant. B on reaching his destination immediately returns and after walking 1 km meets A. If A can walk 1km in 18min, then what is B's speed?

Solution:
Assume that the time taken by B to walk 4.5 + 1 = 5.5 km is = T
Time taken for A to meet B = T – 3.
The distance travelled by A to meet B = 3.5 km.
Time taken for A to cover 3.5 km
= 3.5 x 18
= 63 minutes
= 1 hour and 3 minutes.
= 1.05 hours
Time taken by B to cover 5.5km
= 63 + 3
= 66 minutes
= 1.1 hours
Speed of B = 5.5/1.1
= 5 kmph

77. A race course is 400m long. A and B run a race and A wins by 5m. B and C run over the same course and B win by 4m. C and D run over it and D wins by 16m. If A and D run over it, then who would win and by how much?

Solution:
Ratio between distance of A and B when A finishes the race = 400 : 395
Ratio between distance of B and C when B finishes the race = 400 : 396
Ratio between distance of C and D when D finishes the race = 384 : 400.
A : D = (A/B)(B/C)(C/D)
A : D = (400/395)(400/396)(384/400)
A : D = (400 x 384)/(395 x 396)
A : D = 2560 : 2607
A/D = 2560/2607
D will beat A. the distance covered by A when D covers 400 m will be:
A/400 = 2560/2607
A = 2560 x 400/2607
A = 392.8m
D beats A by 7.2m.

78. A train travelled from A to B and back in a certain time at rate of 60kmph. If the train had travelled from A to B at a rate of 80kmph and back from B to A at a rate of 40kmph it would have taken 2 hrs longer. Find the distance between A and B.

Solution:
Assume that the distance between A and B = D.
Assume that the time taken at 60kmph to travel from A to B and B to A = 2T
Time taken in the second case = 2T + 2.
From the first case:
D = 2T x 60 = 120T
Average speed in the second case:
= 2(80x40)/(80+40) = 53.33
From second case:
D = 53.33 x (2T – 2) = 106.67T+106.67
120T = 106.67T + 106.67
T = 8 hours.
Distance between A and B
= 8 x 60 = 480km.

79. 120m long train crosses the pole in 2.5 seconds. Find how much time will it take to cross a 140m long platform?

Solution:
Speed of train = 120/2.5 = 48m/s
Time taken to cross a platform
$T = (L_t + L_p)/S_t$
L_t = length of train
L_p = length of platform
S_t = Speed of train
T = (120 + 140)/48
T = 5.41 seconds.

80. Two men together start a journey in the same direction. They travel at a speed of 9 kmph and 15 kmph respectively. After travelling for 6 hours the man travelling at 9kmph doubles his speed and both of them finish the distance in the same time. How many hours will they take to reach their destination?

Solution:
The distance covered by first person in 6 hours = 6 x 9 = 54 km
The distance covered by second person in 6 hours = 6 x 15 = 90km
Distance between the two persons at this point is = 90 – 54 = 36km.
Time taken for the first person to catch the second person after doubling his speed:
T = 36/(12 – 9) = 36/3 = 12 hours.
Total tie of the journey
= 6 + 12 = 18 hours.

81. The ratio between speeds of 2 trains is 7:8. If the 2nd train runs 400km in 4 hours what is the speed of 1st train?

Solution:
Speed of second train = 400 km in 4hours
= 400/4 kmph
= 100kmph.
Speed of 1st train:
7/8 = x/100
Speed of first train = 87.5 kmph

82. A car travelling at 5/7th of its actual speed covers 42km in 1hr 40min 48 sec. What is the actual speed of the car?

Solution:
Write 1 hour 40 minutes 48 seconds in decimal value.
40 minutes = 40 x 60 = 2400 seconds
40 minutes 48 seconds
= 2400 + 48 = 2448 seconds
= 2448/3600 = 0.68 hours
So, 1 hour 40 minutes 48 seconds
= 1.68 hours.
Speed of the car at reduced speed
= 42/1.68
= 25kmph
Actual speed of the car
= 25 x 7/5 = 35kmph.

83. A man can row a distance of 5 km in 60 min with the help of the tide. The direction of the tide reverses with the same speed. Now he travels a further 20 km in 10 hours. How much time he would have saved if the direction of tide has not changed?

Solution:
Speed of the boat when the tide is on the same direction = 5kmph
To cover 5 + 20 = 25km
The time taken will be 25/5 = 5 hours
Actual time taken was
1 + 10 = 11 hours.
If the tide has not changed its direction, he would have saved
11 – 5 = 6 hours.

84. When not moving on the sidewalk, Maya can walk the length of the sidewalk in 7 minutes. If she stands on the sidewalk as it moves, she can travel the length in 4 minutes. If Maya walks on the sidewalk as it moves, how many minutes will it take her to travel the same distance? Assume she always walks at the same speed, and express your answer as a decimal to the nearest tenth.

Solution:
Assume that the speed length of the side walk is 280 m. (assuming a value which is a common multiple of 4 and 7)
Speed of Maya while walking near the sidewalk
= 280/7 = 40 meter per minute
Speed of the sidewalk
= 280/4 = 70 meter per minute.
Speed of Maya when walking on the side walk = 40 + 70 = 110 m/minute
Time taken when Maya walks on the sidewalk
= 280/110
= 2.54 minutes
= 2.5 minutes (nearest tenth decimal).

85. Maria drove to the mountains last weekend. There was heavy traffic on the way there, and the trip took 9 hours. When Maria drove home, there was no traffic and the trip only took 4 hours. If her average rate was 40 miles per hour faster on the trip home, how far away does Maria live from the mountains?

Solution:
Assume that the distance from home to mountain = D
Assume that her average speed on the way to mountain = S kmph
So, her speed down the mountain
= S + 40 kmph.
Calculating distance while going up the mountain:
D = 9S
Calculating distance while coming down the mountain:
D = 4(S + 40)
Therefore from the above two equations, we get
9S = 4S + 160
5S = 160 → S = 32kmph.
Distance from home to mountain
= Speed x time taken.
Considering the equation
D = S x 9
We get,
= 32 x 9
= 288km

86. A train leaves New York City at 7.15 am and arrives in Buffalo at 2.47 that afternoon. What total length of time does the trip take?

Solution:
Time taken for the journey
= 02:47am – 07:15am
Time from 07:15 to 12:00 = 4 hours 45 minutes.
Time from 12:00 to 2:47 = 2 hours 47 minutes.
Total time = 04:45 + 02:47
= 07:32 hours
7 hours 32 minutes.

87. Two trains travel in the same direction with 56 kmph speed. The first train crosses a person standing in 78.9sec. Find the length of the first train.

Solution:
Distance travelled by the train to cross the man = length of the train.
Length of the train = Speed x time
Speed of the train
= 56 x 5/18 = 15.55 mps
Length of the train
= 15.55 x 78.9
= 1226.8 m

88. Given 10 letters out of which 5 are to be chosen. How many words can be made with at least one repetition.

Solution:
Number of ways of arranging with at least 1 repetition = Number of arrangements with repetition – Number of arrangements without repetition.
Number of arrangements with repetition
= 10^5
= 100000
Number of arrangements without repetition
= ${}^{10}P_5$ = 10x9x8x7x6 = 30240
Number of arrangements with at least one repetition
= 100000 – 30240
= 69760

89. How many 7-digit numbers are formed having digit 3 three times and digit 5 four times?

Solution:
An example of a 7 digit number with the digit 3 three times and the digit 5 five time is:
3335555
Number of ways of arranging
= 7!/(3!x4!)
= 35

90. What is the rank of the word "MOTHER" when all the letters of the word are arranged in dictionary order?

Solution:
The first word in the alphabetical order will be: "EHMORT"
Assign number for each letter in ascending order
E = 1; H = 2; M = 3; O = 4; R = 5; T = 6
The word written in terms of number
= 346215
There are totally 6! = 720 words possible.
Among the numbers 346215, '3' comes third in ascending order.
So, (3 -1)5! = 240
Among the numbers 46215, '4' comes third in ascending order.
So, (3 -1)4! = 48
Among the numbers 6215, '6' comes 4th in ascending order.
So, (4-1)3! = 18
Among the numbers 215, '2' comes 2nd in ascending order.
So, (2-1)2! = 2
By arranging the remaining numbers 15 in ascending order rank of 15 is 1.
Adding all the values:
240 + 48 + 18 + 2 + 1
= 309.
Rank of the word Mother = 309

91. In a game each person is dealt three cards from a deck of 52 cards & a player is said to have a winning deck if & only if he or she has a king, queen & a jack each

Wipro

irrespective of the color of the sign. What is the total possible number of winning decks for this game?

Solution:
Number of ways of having 1 king = ${}^4C_1$ = 4 ways
Number of ways of having 1 queen = ${}^4C_1$ = 4 ways
Number of ways of having 1 jack = ${}^4C_1$ = 4 ways
Total number of ways of having a winning deck = 4 x 4 x 4 = 64 ways.

92. There are 30 socks in a drawer. 60% of the socks are red and the rest are blue. What is the minimum number of socks that must be taken from the drawer without looking in order to be certain that at least two blue socks have been chosen?

Solution:
Number of red socks
= (60/100)30 = 18
Number of blue socks = 30 – 24 = 12
By drawing the socks the first 18 socks may be red. While drawing the 19^{th} sock we can be sure that we have got 1 blue sock.
by drawing the 20^{th} sock we can be sure that we have 2 blue socks.
The minimum number of socks to be drawn = 20.

93. Mr. Varma has 4 different paintings that he wishes to divide among his 3 children. In how many ways can he do this if each child must get at least 1 painting?

Solution:
Selecting 3 paintings for three persons can be done in ${}^4C_3$ = 4 ways.
The tree paintings can be arranged among the three children in 3! = 6 ways.
The remaining 1 painting can be given to any one of the children in ${}^3C_1$ = 3 ways.
Total ways of giving the paintings
= 4 x 6 x 3 = 72.

94. A, B and C are three speakers. They have to speak randomly along with 5 other speakers in a function. What is the probability that A speaks before B and B speaks before C?

Solution:
Among the three speakers A, B and C they can be arranged in 3! = 6 ways.
Out of the six ways in only 1 way A will be before B and B will be before C.
In all the arrangements 1 out 6 ways A will be before B and B will be before C.
The probability = 1/6

95. If A and B are 2 numbers and are selected randomly from the values 1, 2, 3, 4, 5, … 25 what is the probability that A and B are not equal?

Solution:
The number of ways in which two numbers can be selected fro the numbers 1 to 25 = ${}^{25}C_2$ = 300
The selections in which the numbers are same = (1,1), (2,2), (3,3), … (25,25)
There are 25 selections in which the two numbers will be same.
The number of selections in which the two numbers will not be same
= 300 – 25 = 275
Probability = 275/300 = 11/12

96. A and B each throw a dice. What is the probability that A's throw is not greater than B?

Solution:
Total number of results when two dice are thrown = 6^2 = 36
The number of results in which the two results will be same = 6
Remaining results = 30.
Number of results in which A will be less than B = 30/2 = 15
It is said that A's throw is not greater than B's throw.
A's throw is less than or equal to B's throw
Probability = (15 + 6)/36 = 21/36

97. There are 3 red balls, 3 green balls and 3 blue balls. What is the probability that when three balls are selected at least two of them are of same color?

Solution:
Total ways of selecting 3 balls with at least two balls of same color
= Total number of selections – number of selections in which all balls are of different colors.
Total ways of selecting three balls
= ${}^9C_3$ = 84 ways
To have 3 balls from different colors, we have to select 1 from each color.
Number of ways of selecting three different colors = ${}^3C_1 \times {}^3C_1 \times {}^3C_1 = 27$
Number of selections in which there are at least two balls of different colors
= 84 – 27 = 67
Probability = 67/84

98. In an objective exam which has 2 answer options each for all the 20 questions, what is the probability that a person answers all the questions correctly? (Assume that he answers all the questions)

Solution:
Number of ways of answering all the questions = 2^{20}
Number of ways of answering all the questions correctly = $1^{20} = 1$
Probability = $1/2^{20}$

99. Two dice are tossed. What is the probability of getting an even number on first die or sum of the results is 8?

Solution:
Total number of results = $6^2 = 36$
Number of results in which the sum is 8
= 5, {(2,6),(3,5),(4,4),(5,3),(6,2)}
The number of results in which the first dice will have even number = 36/2 = 18
The 18 results in which the first dice has even number, 3 results are common to the results having sum equal to 8.
Probability = (5+18 – 3)/36 = 20/36

100. In a conventional clock, how many times does the minutes hand pass the hour hand between noon and midnight?

Solution:
The time between noon and midnight = 12 hours.
The number of times the two hands overlap is asked between 12pm and 12 am. So those two times cannot be taken into account.
The hour hand and minute hand overlaps between (1 and 2), (2 and 3), (3 and 4), ... and (10 and 11).
Number of times the two hands overlap = 10 times.

Fact

Wipro was the first company to implement the Six Sigma. The company is very particular about the quality and the process.
Wipro currently has close to 160,000 employees across the globe. The company has employees of 98 nationalities from 61 different countries in the world. The presence of Wipro can be seen in more than 175 cities and 8.5% of the work force of Wipro is non-Indian.

1. What is the next number of the following sequence 2,2,12,12,30,30,_?

Solution:
$2 = 1^1 + 1$
$2 = 2^2 – 2$
$12 = 3^2 + 3$
$12 = 4^2 – 4$
$30 = 5^2 + 5$
$30 = 6^2 – 6$
7^{th} term $= 7^2 + 7 = 56$

2. What is the missing number in this series 8, 2, 14, 6, 11, ___ , 14, 6, 18, 12?

Solution:
Sum of first digit and last digit = 20
Sum of second digit and second last digit = 20
Sum of third digit and third last digit = 20
Similarly, the sum of 11 and the missing number = 20
$11 + X = 20$
$X = 9$
The missing number is 9.

3. Find the missing number in the series 15, 51, 216, 1100, ___ ,46452?

Solution:
15 x 3 + 6 = 51
51 x 4 + 12 = 216
216 x 5 + 20 = 1100
1100 x 6 + 30 = 6630
6630 x 7 + 42 = 46452
The missing number is 6630.

4. What is the next number of the following sequence 2, 12, 36, 80, 150,.... ?

Solution:
$1^3 + 1^2 = 2$
$2^3 + 2^2 = 12$
$3^3 + 3^2 = 36$
$4^3 + 4^2 = 80$
$5^3 + 5^2 = 150$
So the missing number is
$6^3 + 6^2 = 216 + 36$
= 252.

5. What is the 56743^{rd} term in the series 1234567891011121314.......?

Solution:
Number of 1 digit numbers = 9
Number of 2 digit numbers = 90
Number of 3 digit numbers = 900
Number of 4 digit numbers = 9000
So, the numbers of terms till the last 4 digit number
= 9x1 + 90x2 + 900x3 + 9000 x 4
= 9 + 180 + 2700 + 36000
= 38889
56743 – 38889 = 17854
For the remaining 17854 digits, there are groups of 5 digit numbers.
17854/5 = 3570 and reminder 4
Among the 3590 set of 5 digit numbers, the first number is 10000 and the last number is 13569
So, 56739^{th} term = 9 and
56740^{th} term to 56743^{rd} term = 1357
56743^{rd} term = 7

6. One dog tells the other that there are two dogs in front of me. The other one also shouts that he too had two behind him. How many are there?

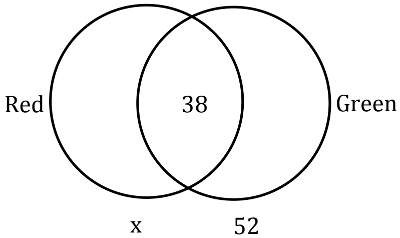
Solution:
There are three dogs.
The three dogs are walking in a circular pattern making both statement true.

7. A number of cats got together and decided to kill between the 999919 mice. Every cat killed an equal number of mice. Each cat killed more mice than there were cats. How many cats do you think there were?

Solution:
Assume that the number of cats = x and number of mice killed by each cat = y
xy = 999919
999919 = 100000 – 81
$= (1000)^2 – (9)^2 = (1000 + 9)(1000-9)$
= 1009 x 991
Number of cats
=991

8. 70 students are required to paint a picture. 52 use green color and some children use red, 38 students use both the colors. How many students use red color?

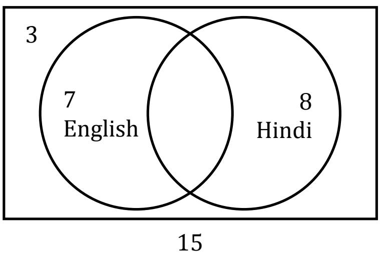
Solution:



Number of students using green alone
= 52 – 38 = 14
Number of students using green or red and green = 14 +38 = 52
The number of students using red alone
= 70 – 52 = 18
Number of students using red = 18 + 32
= 50

9. In a class total number of students is 15 in which 7 students speak English and 8 student speak Hindi, 3 students can not speak in both languages. So how many student can speak both languages?

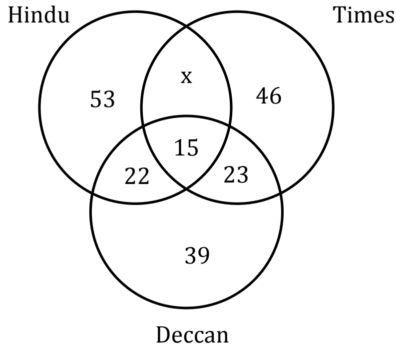
Solution:



Number of students who speak at least one language = 15 – 3 = 12
P(A∩B) = P(A) + P(B) – P(A∪B)
Number of students who speak both the languages
= 7 + 8 – 12
= 3

10. There are 76 people residing in a colony. 53 read Hindu, 46 read Times, 39 read Deccan and 15 read all. If 22 read Hindu and Deccan, 23 read Deccan and Times, then what is the number of persons who reads only Times and Hindu?

Solution:



Number of people who read only Deccan and Hindu = 22 – 15 = 7
Number of people who read only Times and Deccan = 23 – 15 = 8
Number of people who read only Deccan
= 39 – 7 – 8 – 15 = 9
Number of people who read only Hindu
= 53 – 7 – 15 – x
Number of people who read only Times
= 46 – 8 – 15 – x
Total people
= 15 + 7+ 8 + x + 9 + (53 – 7 – 8 – x) + (46 – 8 – 15 – x) = 76
100 – x = 76
x = 24
Number of people who read both Hindu and Times = 24

11. At an international conference, 100 delegates spoke English, 40 spoke French, and 20 spoke both English and French. How many delegates could speak at least one of these two languages?

Solution:
Number of people who speak English alone = 100 – 20 = 80

Number of people who speak French alone = 40 – 20 = 20
Number of people who speak at least one language = 100 + 20 + 20 = 140.

12. The sum of 3 single digit numbers is 15 less than their product. If we subtract 2 from first given number then sum of these numbers will become 7 more than their product. The product of given 3 numbers will be?

Solution:
Assume that the tree 1 digit numbers are x, y and z
Sum of the three numbers = x + y + z
Product of the three numbers = xyz.
Given,
xyz – (x + y + z) = 15 ---(1)
And,
[(x-2) + y + z] – [(x-2)yz] = 7
(x + y + z) – xyz + 2yz = 9 ---(2)
(1) + (2) will give
2yz = 24
yz = 12
There are two solutions for y and z. They are:
(y, z) = (3, 4) or (2, 6)
Substitute (3, 4) in (1), we get
12x – x – 3 – 4 = 15
11x = 22
x = 2
Substitute (2,6) in (1) we get
12x – x – 2 – 6 = 15
11x = 23
x = 2.09
We know that x is a 1 digit number. So the only solution for (y, z) = (3, 4) and x = 2
Product of three numbers = 2x3x4 = 24

13. If N is the greatest number that will divide 1305, 4665 and 6905, leaving the same remainder in each case. What is the sum of the digits of N?

Solution:
N = HCF of difference between the numbers
Difference between the numbers is
= 3360, 2240, 5600
To find HCF (3360, 2240, 5600), first take the prime factors of each number.
Prime factors of 3360
= 2x2x2x2x2x5x7x3 = 2^5 x 5^1 x 7^1 x 3^1
Prime factors of 2240
= 2x2x2x2x2x2x7x5 = 2^6 x 5^1 x 7^1
Prime factors of 5600
= 2x2x2x2x2x5x5x7 = 2^5 x 5^2 x 7^1
HCF of prime factors = product of common factors raised to their least powers.
So, HCF(3360, 2240, 5600)
= 2^5 x 5^1 x 7^1 = 1120
The number 1120 is the greatest number which will divide 1305, 4665 and 6905 and leave the same reminder.
N = 1120
Sum of the digits of N = 1+1+2+0 = 4.

14. Find the numbers between 100 and 400 which is divisible by either 2,3,5,7?

Solution:
Number of terms divisible by 2 or 3 or 5 or 7 = Number of terms divisible by 2 + Number of terms divisible by 3 + Number of terms divisible by 5 + Number of terms divisible by 7 – Number of terms divisible by 2 and 3 – Number of terms divisible by 2 and 5 – Number of terms divisible by 2 and 7 – Number of terms divisible by 3 and 5 – Number of terms divisible by 3 and 7 – Number of terms divisible by 5 and 7 – Number of terms divisible by 2, 3, 5 – Number of terms divisible by 2, 3, 7 – Number of terms divisible by 3, 5, 7 – number of terms divisible by 2, 5, 7 – Number of terms divisible by 2,3,5,7
Using the formula to find the number of terms in an arithmetic progression we can find the number of terms in each category.
The formula is:
N = [(l – a)/d] + 1
Where l = last term of the series
a = first term of the series
d = common difference between terms
N = number of terms.

Accenture

$N_2 = [(398 – 102)/2] + 1 = 149$
$N_3 = [(399 – 102)/3] + 1 = 100$
$N_5 = [(395 – 105)/5] + 1 = 59$
$N_7 = [(399 – 105)/7] + 1 = 43$
$N_{2,3} = [(396 – 102)/6] + 1 = 50$
$N_{2,5} = [(390 – 110)/10] + 1 = 29$
$N_{2,7} = [(392 – 112)/14] + 1 = 21$
$N_{3,5} = [(390 – 105)/15] + 1 = 20$
$N_{3,7} = [(399 – 105)/21] + 1 = 15$
$N_{5,7} = [(385 – 105)/35] + 1 = 8$
$N_{2,3,5} = [(390 – 120)/30] + 1 = 10$
$N_{2,5,7} = [(350 – 140)/70] + 1 = 4$
$N_{2,3,7} = [(378 – 126)/42] + 1 = 7$
$N_{3,5,7} = [(315 – 105)/105] + 1 = 3$
$N_{2,3,5,7} = [(210 – 210)/210] + 1 = 1$
The required answer is:
149 + 100 + 59 + 43 – 50 – 29 – 21 – 20 – 15 – 8 – 10 – 4 – 7 – 3 – 1 = 183

15. A number consists of 3 digits whose sum is 10. The middle digit is equal to the sum of the other two and the number will be increased by 99 if its digits are reversed. The number is?

Solution:
Let the three digit number be xyz which can be written as 100x + 10y + z
When the number is reversed we get zyx which can be written as 100z + 10y + x
Given y = x + z
So,
100x + 10(x + z) + z = number xyz
100z + 10(x + z) + x = number zyx
From these two equations, we get
110z + 11x – 110x – 11z = 99
99z – 99x = 99
z – x = 1
(x, y, z) can have different values:
(x, y, z) = (1, 3, 2) or (2, 5, 3) or (3, 7, 4) and so on.
But only for the values (2, 5, 3), the sum of the digits = 10
The number is 253.

16. If one-third of one-fourth of a number is 15, then three-tenth of that number is?

Solution:
Let the number be X
Given,
(1/3)(1/4) X = 15
X = 15 x 3 x 4 = 180
One – tenth of the number is
= (1/10) x 180 = 18.

17. The ratio of two numbers is 3:4 and their HCF is 4.Their LCM is?

Solution:
Let us assume that the two numbers are 3x and 4x. Then x will be the HCF.
HCF = x = 4
The two numbers are 12 and 16.
LCM of 12, 16 = 48

18. Find the smallest number which leaves 22,35, 48 and 61 as remainders when divided by 26, 39, 52 and 65 respectively.

Solution:
LCM of 26, 39, 52, 65 is the smallest number which will leave reminder = 0
LCM(26, 39, 52, 65) = 780
The difference between the divisor and the reminder in each case = 4.
So subtract 4 from 780.
The required number = 780 – 4 = 776

19. The sum of the squares of three numbers is 138, while the sum of their products taken two at a time is 131. Their sum is?

Solution:
Le the three numbers be x, y, z
Given that $x^2 + y^2 + z^2 = 138$
xy + yz + xz = 131
$(x+y+z)^2 = x^2+y^2+z^2+ 2(xy + yz + xz)$
$(x+y+z)^2 = 138 + 2(131) = 400$
x+y+z = 20
Sum of the three numbers = 20.

20. A two-digit number is such that the product of the digits is 8. When 18 is added to the number, then the digits are reversed. The number is?

Solution:

The two digits will be either (1, 8) or (2, 4) because the product of them is 8.
If the number is 18, when reversed it becomes 81, which is not 18 more than 18.
But if the number is 24, when it is reversed, we get 42 which is 18 more than 24.
The required number is 24.

21. What is the sum of two consecutive even numbers, whose squares give the difference 84?

Solution:
Let the first be x.
Then the second number is x + 2.
Given that
$(x+2)^2 - x^2 = x^2 + 4x + 4 - x^2 = 84$
$4x = 80$
$x = 20$
The first number is 20 and the second number is 22
Sum of the numbers = 42.

22. 215 : 474 :: 537 : ___?
a) 26 b) 27 c) 25 d)22

Solution:
2+1+5+4+7+4 = 23
5+3+7+x = 23
x = 8
When the digits of the missing number is added, we must get 8.
Only from option (a) 26, we get 2 + 6 =8

23. A 20 liter mixture contains milk and water in the ratio 3:5. If 4 liters of mixture is replaced with 4 liters of water what is the final ratio of milk and water?

Solution:
After removing 4 liters, we will be left with 16 liters.
Quantity of milk = (3/8) x 16 = 6
Quantity of water = (5/8) x 16 = 10
When 4 liters of water is added we will have 6 liters of milk and 14 liters of water.
Final ratio of Milk and Water = 6 : 14

24. If the ratio of work done by (x-1) men in (x+1)days to the work done by (x+2)men in (x-1)days is 9:10, then x is equal to?

Solution:
Work done is directly proportional to number of men and the time taken.
From the question, we can derive
W1 : W2 = (x-1)(x+1) : (x+2)(x-1)
9/10 = (x-1)(x+1) : (x+2)(x-1)
9/10 = (x+1)/(x+2)
9x + 18 = 10x + 10
x = 8

25. In a theatre the ratio of car & two wheeler is 1:8. Total Number of tyres are 100. Find how many are cars and how many are two wheelers?

Solution:
Let the number of cars = x and
Let the number of two wheelers = 8x
Number of car wheels = 4x
Number of bike wheels = 2(8x) = 16x
4x + 16x = 100
x = 5
Number of cars = x = 5
Number of bikes = 8x = 8(5) = 40

26. In a race of 200 m, A can beat B by 31 m and C by 18 m. In a race of 350 m, C will beat B by what distance?

Solution:
Distance travelled by B and C when A completes the race = 169 and 182
Ratio between distance of B and C
= 13 : 14
Assume that 'd' is the distance travelled by B when C completes the race.
Then,
13/14 = d/200
d = 185.7
C beats B by 14.3 meters.

27. 729ml of a mixture contains milk and water in ratio 7:2. How much water should be added to get a new mixture containing half milk and half water?

Solution:
Quantity of Milk = (7/9) x 729 = 567
Quantity of water = (2/9) x 729 = 162
To have half water and half milk, the quantity of water must be increased to 567.
Available quantity of water = 162.
Required quantity of water = 567 – 162 = 324.

28. The proportion of milk and water in 3 samples is 2:1, 3:2 and 5:3. A mixture comprising of equal quantities of all 3 samples is made. The proportion of milk and water in the mixture is?

Solution:
There are 2+1 = 3 parts in 1^{st} mixture, 5 parts in 2^{nd} mixture and 8 parts in 3^{rd} mixture. To make easy calculation, let us assume that the quantity taken in each mixture is the LCM of (3,5,8).
Quantity taken in each mixture = 120
Mixture 1:
Milk : Water = 2 : 1 = 80 : 40
Mixture 2:
Milk : Water = 3 : 2 = 72 : 48
Mixture 3:
Milk : Water = 5 : 3 = 75 : 45
After mixing all the mixtures,
Final quantity of Milk
= 80 + 72 + 75 = 227
Final quantity of Water
= 40 + 48 + 45 = 133
Final ratio = 227 : 133

29. In a mixture of petrol and kerosene, petrol is only 99 liters. If this same quantity of petrol would be presented in another mixture of petrol and kerosene where total volume would be 198 liters less than the actual mixture then the concentration of petrol In the present mixture would have been 13.33% point less than that. What is the concentration of petrol in actual mixture?

Solution:
Let us Assume that the actual quantity of the mixture = N
The quantity of mixture which is 198 liters less than the actual mixture
= N – 198
According to the question, percentage of petrol in the less quantity mixture – percentage of petrol in the actual mixture = 13.33%
So,
[99/(N-198)]x100-[99/(N)]x100=13.33
By solving the above equation, we get
99N – 99N
N = 495
Concentration of Petrol in the actual quantity = (99/495) x 100 = 20%

30. An alloy of zinc and copper contains the metals in the ratio 5 : 3. The quantity of zinc to be added to 6 kg of the alloy so that the ratio of the metal may be 3 : 1 is:

Solution:
Quantity of zinc in 6 kg = (5/8)6 = 3.75
Quantity of copper = 6 – 3.75 = 2.25
For the quantity of zinc to be thrice that of the quantity of copper, zinc's weight should be 3 x 2.25 = 6.75 kg
Available quantity of zinc = 3.75 kg
Quantity of zinc to be added
= 6.75 – 3.75 = 3 kg.

31. A mixture of 40 liters of milk and water contains 10% water. How much water should be added to this so that water may be 20% in the new mixture?

Solution:
Quantity of water in original mixture
= (10/100) x 40 = 4 liters.
Quantity of milk in original mixture = 36
After adding water to the mixture, the new mixture has 20% water, that means the percentage of milk in the new solution is = 80%.
The quantity of milk is same in both mixtures.
So, 80% of New quantity = 36
(80/100) x New quantity = 36
New quantity = 45 liters
The quantity of water added
= 45 – 40 = 5 liters.

32. Three jackals Paar, Maar and Taar together have 675 loaves of bread. Paar has got three times as much as Maar and 25 loaves more than Taar. How many does Taar have?

Solution:
Let the number of loaves with Paar, Maar and Taar be P, M and T respectively.
P + M + T = 675 ---(1)
P = 3M → M = P/3
P = T + 25 → T = P – 25
Substitute M and T in (1)
P + (P/3) + P – 25 = 675
7P/3 = 700
P = 700 x 3/7
P = 300
T = P – 25 = 300 – 25 = 275
The number of loaves with T = 275

33. A box contains 90 bolts each of 100 grams and 100 bolts each of 150 grams. If the entire box weighs 35.5 kg, then what is the weight of the empty box?

Solution:
Let Weight of Box be B.
B + (90x100) + (100x150) = 35500gm.
(Express both sides in terms of grams).
B + 9000 +15000 = 35500
B = 11500 grams
Weight of the box is 11.5 kg

34. Ravi had got twice as much marks as Ramu. His teacher had made him a promise that, for every mark he scores above Ramu, he would be awarded 50% of those marks as bonus. Find the ratio of his bonus marks to the total marks of Ravi and Ramu.

Solution:
Assume that the mark scored by Ramu is N.
So, the mark scored by Ravi = 2N
Marks scored by Ravi more than Ramu = 2N – N = N
Bonus marks awarded to Ravi = N/2
Required ratio = (N/2) : (3N) = 1 : 6

35. When Raja was born, his father was 32 years older than his brother and his mother was 25 years older than his sister. If Raja's brother is 6 years older than Raja and his mother is 3 years younger to his father, how old was Raja's sister when Raja was born?

Solution:
When Raja was born, age of his brother is 6 years.
Father's age at that time = 6 + 32 = 38.
Age of mother at that time = 38 – 3 = 35
Age of sister is 25 less than age of mother.
Age of sister when Raja was born = 35 – 25 = 10

36. A father is three times as old as his son. After fifteen years the father will be twice as old as his son's age at that time. Hence the father's present age is?

Solution:
Assume that the father's present age = F
Son's present age = S
At present, F = 3S
After 15 years,
F + 15 = 2(S + 15)
F = 2S + 15
Substitute F = 2S + 15 in F = 3S
2S + 15 = 3S → S = 15 and F = 45

37. Six years ago, the ratio of the ages of Kunal and Sagar was 6 : 5. Four years hence, the ratio of their ages will be 11:10. What is Sagar's age at present?

Solution:
Kunal's present age = K
Sagar's present age = S
From the question, age of Kunal and Sagar 6 years ago = 6x, 5x
Four years hence, the ages = 11x, 10x
Difference in ratio = (11 – 6) or (10 – 5) = 5
Difference in years = 10
x = diff in years/diff in ratio → x = 2.
Age of Sagar 6 years ago = 5(2) = 10
Sagar's present age = 16.

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38. The age of the grand father is the sum of the ages of his three grandsons. The second grandson is 2 years younger than first one and the third one is 2 years younger than the second one. Then what will be the age of the grandfather with respect to the second grandson?

Solution:
Let the age of first grandson is x.
Agee of second grandson = x – 2.
Age of third grandson = x – 4.
Age of grandfather
= x + (x – 2) + (x – 4) = 3x – 6
Ratio of age of grandfather to age of second grandson
= (3x – 6) : (x – 2)
= 3 : 1
Grandfather's age is thrice that of the second grandson's age.

39. Total of the ages of A, B and C at present is 90 years. Ten years ago, the ratio of their ages was 1: 2: 3. What is the age of B at present?

Solution:
Total age of A, B and C 10 years ago
= 90 – 3(10) = 60
The ratio of their ages 10 years ago
= 1 : 2 : 3
Age of B 10 years ago = (2/6) x 60 = 20
Present age of B = 20 + 10 = 30 years.

40. The average age of 10 members of a committee is the same as it was 4 years ago, because an old member has been replaced by a young member. Find how much younger is the new member?

Solution:
Let the average age of 10 members 10 years ago = N
Total age 10 years ago = 10N.
Total age at present before replacing
= 10N + 4 x (10) = 10N + 40
Present total after replacing = 10N
Difference between the age of person remove and the person replaced
= 10N + 40 – 10N = 40 years.

41. The average marks of a student in ten papers are 80. If the highest and the lowest scores are not considered, the average is 81. If his highest score is 92, find the lowest.

Solution:
Total marks in 10 papers
= 80 x 10 = 800
Removing the highest and the lowest score the average is = 81.
Total marks of the remaining 8 subjects
= 8 x 81 = 648.
Total marks scored in highest and lowest = 800 – 648 = 152.
Highest + Lowest = 152
92 + Lowest = 152
Lowest = 152 – 92 = 60
His lowest score is 60.

42. In an exam, Ajith, Sachu, Karna, Saheep and Ramesh scored an average of 39 marks. Saheep scored 7 marks more than Ramesh. Ramesh scored 9 fewer than Ajith. Sachu scored as many as Saheep and Ramesh scored. Sachu and Karna scored 110 marks them. If Ajith scores 32 marks then how many marks did Karna score?

Solution:
Total marks of five persons
= 39 x 5 = 195
Saheep = Ramesh + 7
Ramesh = Ajith – 9
So, Saheep = Ajith – 9 + 7 = Ajith – 2
Sachu = Saheep + Ramesh
Sachu = Ajith – 2 + Ajith – 9 = 2Ajith-11
Sachu + Karna = 110
2Ajith – 11 + Karna = 110
2 x 32 – 11 + Karna = 110
Karna = 110 + 11 – 64
Karna = 57

43. The average weight of a class of 24 students is 36kg. When the weight of the teacher is also included, the average weight increases by 1kg. What is the weight of the teacher?

Solution:
Total weight of 24 students
= 36 x 24 = 864
Total weight of 24 students and 1 teacher = (24 + 1)(36 + 1)
= 925
Weight of teacher = 925 – 864 = 61 kg.

44. Average temperature on Wednesday, Friday and Thursday was 26^o. Average temperature on Thursday, Friday and Saturday was 24^o. If the temperature on Saturday was 27^o, what was the temperature on Wednesday?

Solution:
Wed + Thu + Fri = 3 x 26 = 78^o
Thu + Fri + Sat = 3 x 24 = 72^o
Thu + Fri + 27 = 72^o
Thu + Fri = 45^o
Substitute Thu + Fri = 45 in
Wed + Thu + Fri = 78^o
Wed + 45 = 78
Wed = 78 – 45 = 33^o C

45. A certain quantity of 40% solution is replaced with 25% solution such that the new concentration is 35%. What is the fraction of the solution that was replaced?

Solution:
Assume that the quantity of the mixture is 100 liters.
In 100 liters, 40 liters was acid.
If 1 liter of 40% solution is replaced with 1 liter of 25% solution, we will have
40 – 0.4 + 0.25 = 39.85 liters of acid.
For every 1 liter replacement, the percentage decrease = 0.15%
For 5% decrease the quantity to be replaced = 5/0.15 = 33.33 liters.
Fraction of 33.33 in 100 liters
= 33.33/100 = 1/3

46. If a shopkeeper accidentally sells a pen at double its actual selling price, his profit increases 4 fold. Then he realizes his mistake and sells other pens at their original selling price. Find his actual profit percentage.

Solution:
Assume that the actual selling price = S and the cost price = C
Profit = S – C
At double the selling price, the profit is 2S – C.
Given, 2S – C = 4(S – C)
4S – 2S = 4C – C
2S = 3C
S/C = 3/2
This implies, for cost price = 2, the selling price = 3
Profit percentage = 50%.

47. A ball dropped from H height and moves 80% of height each time. Total distance covered is?

Solution:
Distance in 1^{st} drop = H
Distance in 2^{nd} drop = 2 x 0.8H = 1.6H
Distance in 3^{rd} drop = 2 x 0.8 x 0.8 H
= 1.28H
Distance in 4^{th} drop = 2 x 0.8 x 0.8 x0.8H
= 1.03H
By adding all the distance from 2^{nd} drop to the last drop, the maximum distance the ball can jump = 8H
Total distance travelled = 8H + H = 9H.

48. A student gets an aggregate of 60% marks in five subjects in the ratio 10 : 9 : 8 : 7 : 6. If the passing marks are 50% of the maximum marks and each subjects has the same maximum marks, in how many subjects did he pass the exam?

Solution:
Assume that the maximum marks in each subject = 100
Total marks scored by the candidate
= (60/100) 500 = 300
Let the actual marks be 10x,9x,8x,7x,6x.
10x + 9x + 8x + 7x + 6x = 300
40x = 300 → x = 7.5
Marks in each subject
= 75, 67.5, 60, 52.5, 45
He passed in 4 subjects.

49. After a discount of 11.11%, a trader still makes a gain of 14.28%. At how many percent above the cost price does he mark his goods?

Solution:
Assume that the marked price = 9.
After 11.11% discount the price of the product = 8
By selling Rs. 7 product for Rs. 8, one can gain 14.28% profit.
Cost price : Marked price = 7 : 9
Marked price is 28.57% above cost price.

50. A man purchased a watch for Rs. 400 and sold it at a gain of 20%. The selling price of the watch is?

Solution:
Selling price = CP + (20/100)CP
Selling price = 400 + (20/100)400
Selling price = Rs. 480

51. In an examination involving quantitative aptitude and logical reasoning, 65% examinees cleared quantitative aptitude test while 70% cleared logical reasoning test. If 50% examinees passed both the tests, then how many failed in both tests?

Solution:
Percentage passed in Quant alone
= 65 – 50 = 15%
Percentage passed in reasoning alone
= 70 – 50 = 20%
Percentage passed in at least one subject
= 15 + 20 + 50 = 85%
Percentage failed in both=100–85=15%

52. Nitish sold his watch and sunglasses at a loss of 4% and gain of 4% respectively for 2600 to Kamal. Kamal sold the same sun glasses and watch at a loss of 4% and gain of 4% respectively for 2700. The price of watch and sun glasses to Nitish were?

Solution:
Assume that the cost price of watch is A.
Assume that the cost price of sunglass is B.
Given,
(96/100)A + (104/100)B = 2600 and
(104/100)A + (96/100)B = 2700
From the above two equations we get
96A + 104B = 260000 ---(1)
104A + 96B = 270000 ---(2)
By solving (1) and (2)
A = 1950 and B = 700

53. If the price of gold increases by 30%, find by how much the quantity of ornaments must be reduced so that the expenditure may remain the same as before?

Solution:
Assume that the price of gold was Rs.100
After increasing the price by 30%, the new price is = Rs. 130.
Rs. 30 worth of ornaments should be reduced.
Percentage decrease
= [(130 – 100)/130] x 100 = 23.07%

54. The price of a jewel, after passing through three merchants rises on the whole by 80%. If the first and the second merchants earned 20% and 25% profit respectively, find the percentage profit earned by the third merchant.

Solution:
Formula to find final value after 3 successive profits is:

$$F.V = \frac{100+a}{100} \times \frac{100+a}{100} \times \frac{100+a}{100} \times I.V$$

$$F.V = \frac{120}{100} \times \frac{125}{100} \times \frac{100+c}{100} \times I.V$$

If initial value (I.V) is 100, then the final value(F.V) will be 180
180 = (6/5)(5/4)[(100+c)/100] x 100
180 = (30/20)(100 + c)
100 + c = 180 x (20/30) = 120
c = 20
The third profit percentage is
20%

Accenture

55. An exhibition was conducted for 4 weeks. The number of tickets sold in 2nd work-week was increased by 20% and increased by 16% in the 3rd workweek but decreased by 20% in the 4th workweek. Find the number of tickets sold in the beginning, if 1392 tickets were sold in the last week.

Solution:
Tickets in 4^{th} week = (80/100) 3^{rd} week
1392 = (80/100)3^{rd} week
3^{rd} week = 1392 x 100/80 = 1740
3^{rd} week = (116/100) 2^{nd} week
2^{nd} week = 1740(100/116) = 1500
2^{nd} week = (120/100)1^{st} week
1^{st} week = 1500 x (100/120) = 1250.
Number of tickets in 1^{st} week = 1250

56. Consider three brothers Ram, Ravi and Rahul. Consider Ram to be taller than Ravi by 10% and Rahul is taller than Ravi by 30%. Now, by how much percentage Rahul is taller than Ram?

Solution:
Assume that the height of Ravi = 100cm.
Height of Ram = 110cm.
Height of Rahul = 130cm.
Percentage increase from height of Ram to Rahul:
% = [(130 – 110)/110] x 100 = 18.18%

57. Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

Solution:
Assume that the number of students in each department is 50, 70 and 80.
After increasing,
Maths = 50 + (40/100) x 50 = 70
Physics = 70 + (50/100) x 70 = 105
Biology = 80 + (75/100) x 80 = 140
Number of students after increasing
= 70, 105, 140
Ratio = 2 : 3 : 4

58. What will Rs.1500 amount to in three years if it is invested in 20% p.a. compound interest, interest being compounded annually?

Solution:
Amount
= (120/100)(120/100)(120/100)1500
= (6/5)(6/5)(120)(15)
= 6 x 6 x 24 x 3
= Rs. 2592

59. The number of degrees that the hour hand of a clock moves through between noon and 2.30 in the afternoon of the same day is?

Solution:
Hour hand moves 30 degrees in 1 hour.
Time between 12:00 and 2:30 = 2.5hr
Degrees made by hour hand
= 2.5 x 30 = 75 degrees.

60. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through how many degrees?

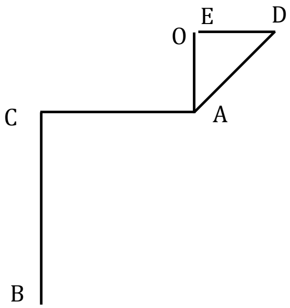
Solution:
Time taken from noon to 10 minutes past 5 = 5 hours and 10 minutes
= 5.166 hours.
Degrees made by hour hand
= 5.166 x 30 = 155 degrees.

61. My husband's watch gains 2 minutes every hour and my watch loses 1 minute for each hour. One day, we were late to marriage because the difference between the time in the two watches was 1 hr. and we looked at the slow watch. When did we last set our watches to the same time?

Solution:
The delay of 1 hour is because husband was 40 minutes early and the wife was 20 minutes late.
(Since the ratio between error time is 2:1). According to the wife's watch they have set the time 20 hours before.

62. A person travels through 5 cities - A, B, C, D, E. City E is 2 km west of D. D is 3 km north-east of A. C is 5 km north of B and 4 km west of A. If this person visits these cities in the sequence B - C - A - E - D, what is the effective distance between cities B and D?

Solution:
The question can be represented in a diagram as follows.



OA = OD = side of the square with diagonal AD.
Diagonal AD = 3.
Side OD = $3/\sqrt{2} = 2.12$
OE = OD – ED = 0.12
$AE^2 = OA^2 + OE^2$
$AE^2 = 2.12^2 + 0.12^2$
AE $\simeq$ 1.5
Effective distance for B-C-A-E-D
= 5 + 4 + 1.5 + 2 = 12.5km.

63. Four horses are there at the four corners of a square of side 14m such that two horses along the same side can just reach each other. They were able to graze the area in 11 days. How many days will they take in order to graze the left out area?

Solution:
Shaded part is the area grazed by the horse when tied to the corners.

Un-grazed area = Area of square –
4 Area of quarter circle
$= 14^2 - (22/7)7^2$
= 196 – 154 = 42.
Grazed area = 154 m^2
It takes 11 days to graze 154 m^2.
Time taken to graze 42 m^2 will be:
154/42 = 11/N
N = 11 x 42/154 = 3 days.

64. If the diagonal and the area of a rectangle are 25 m and 168 m^2, what is the length of the rectangle?

Solution:
Let diagonal be D, which is 25.
$D^2 = L^2 + B^2$
$625 = L^2 + B^2$
L x B = 168
$(L + B)^2 = L^2 + B^2 + 2LxB$
$(L + B)^2 = 625 + 2 \times 168$
$(L + B)^2 = 961 \rightarrow L + B = 31$
L + B = 31 and L x B = 168
By solving we get, L = 24 and B = 7

65. 10 men can complete a piece of work in 15 days and 15 women can complete the same work in 12 days. If all the 10 men and 15 women work together, in how many days will the work get completed?

Solution:
Time taken by two groups together
= (AB)/(A+B) = (15 x 12)/(15 + 12)
= 180/27 = 6.67 days.

66. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

Solution:
Work done by A in 1 day = 1/20
Work done by B in 1 day = 1/30
Work done by C in 1 day = 1/60
Work done in 1st and 2nd day =2(1/20)
= 1/10
Work done on the third day
= (1/20) + (1/30) + (1/60) = 1/10

Work done in three days
= (1/10) + (1/10) = 1/5
Time taken to complete the work will be equal to 5 x 3 = 15 days

67. If 20 men or 24 women or 40 boys can do a job in 12 days working for 8 hours a day, how many men working with 6 women and 2 boys take to do a job four times as big working for 5 hours a day for 12 days?

Solution:
24 women = 20 men; 6 women = 5 men
40 boys = 20 men; 2 boys = 1 man
Le the number of men required be N.
So, N + 5 + 1 = N + 6 men are there in the second case.

$$W_1R_2T_2H_2 = W_2R_1T_1H_1$$

1 x (N + 6) x 12 x 5 = 4 x 20 x 12 x 8
(N + 6) = 128
N = 122.
122 men are required.

68. Each helper can make either 2 large cakes or 35 small cakes per hour. The kitchen is available for 3 hours and 20 large cakes and 700 small cakes are needed. How many helpers are required?

Solution:
1 helper can make 2 large cakes in 1st hour and 70 small cakes in the next 2 hours.
If there are 10 helpers, they can make 20 large cakes in first hour and 700 small cakes in next 2 hours.
Total helpers required = 10.

69. A fort has enough food for 45 days for 175 soldiers. If after 15 days 100 soldiers leave the fort, for how many more days the food will last?

Solution:
After 15 days there will be food for 175 soldiers for 30 days.
The number of soldiers for 30 days = 75
(30 x 175) = D x 75→ D = 70 days.

70. A can do a piece of work in 36 days, B in 54 days and C in 72 days. All of them began together but A left 8 days and B left 12 days before the completion of the work. How many days in all did C put in till the entire work was finished?

Solution:
Let the number of days worked by C = N
Number of days worked by A = N – 8
Number of days worked by B = N – 12
Work done by all A, B and C:
[(N–8)/36]+[(N–12)/54]+N/72 = 1
6(N – 8) + 4(N – 12) + 3N = 216
6N – 48 + 4N – 48 + 3N = 216
13N = 312
N = 24. C worked for 24 days.

71. One man or two women or three boys can do a work in 44 days. How many days will one man, one women and one boy together take to complete the work?

Solution:
2 women= 1 man; 1 woman= (1/2)man
3 boys = 1 man; 1 boy = (1/3) man.
1 man + 1 woman + 1 boy
= 1 + (1/2) + (1/3) men = 11/6 men.
If 1 man can complete the work in 44 days and 11/6 men can do it in N days, then,
[1/(11/6)] = N/44
N = 24
They can complete the job in 24 days.

72. If a certain computer is capable of printing 4900 monthly credit card bills per hour, while a new model is capable of printing at a rate of 6600 per hour, the old model will take approximately how much longer than the new model to print 10000 bills?

Solution:
Time taken by old model = 10000/4900
Time taken by new model= 10000/6600
Difference= 10000/4900 – 10000/6600
= 0.5253 hours
= 31 minutes 32 seconds

73. Three friends Gerald, Rooney and Ronaldo work together to dig a hole. Gerald alone can complete the work in 10 days, Ronaldo in 8 days and together all three can complete it in 4 days. They earn a total of Rs.1,200. Find the share of Rooney if the money that they received is proportional to the work that they do?

Solution:
Let the time taken by Gerald, Rooney and Ronaldo to complete the work be A, B and C respectively.
A = 10; C = 8
Given, (1/A) + (1/B) + (1/C) = ¼
(1/10) + (1/B) + (1/8) = ¼
By solving, we get B = 40
Ratio of their salary is proportional to ratio of their 1 day work.
Salary ratio of:
Gerald : Rooney : Ronaldo
= (1/10) : (1/40) : (1/8)
= 4 : 1 : 5
Share of Rooney = (1/10) x 1200 = 120

74. Two pipes can fill a tank in 10 hours and 12 hours respectively while a third, pipe empties the full tank in 20 hours. If all the three pipes operate simultaneously, in how much time will the tank be filled?

Solution:
Let T be the time taken together.
(1/T) = (1/10) + (1/12) – (1/20)
(1/T) = (6/60) + (5/60) – (3/60)
(1/T) = 8/60 → T = 60/8 = 7.5 hours

75. A, B and C can do a work in 5 days, 10 days and 15 days respectively. They started together to do the work but after 2 days A and B left. How long did C take to finish the remaining work?

Solution:
Work done in 1st two days
= 2[(1/5) + (1/10) + (1/15)] = 22/30
Remaining work = 8/30
Time taken for C alone:
= 15 x (8/30) = 4 days.

76. Three runners A, B and C run a race, with runner A finishing 12 meters ahead of runner B and 18 meters ahead of runner C, while runner B finishes 8 meters ahead of runner C. Each runner travels the entire distance at a constant speed. What was the length of the race?

Solution:
While A completes the race, B is 6 meters ahead of C.
When B completes the race, B is 8 meters ahead of C.
B takes 12 meters to get a lead of 2 m.
So, for 8m lead he needs 4 x 12 = 48m.
Length of the rave is 48 meters.

77. In a stream running at 2kmph, a motor boat goes 6km upstream and back again to the starting point in 33 minutes. Find the speed of the motor boat in still water.

Solution:
Time taken in terms oh hours = 33/60
Total time
= upstream time + downstream time
$33/60 = [6/(S_b – S_r)] + [6/(S_b – S_r)]$
$33/360 = [1/(S_b – 2)] + [1/(S_b + 2)]$
$11/120 = [(S_b + 2 + S_b – 2)/(S_b^2 – 4)]$
$11S_b^2 – 44 = 240S_b$
$11S_b^2 – 240S_b – 44 = 0$
By solving this, we get
$S_b = 22$
Speed of boat in still water = 22kmph

78. Riya and Priya set on a journey from same point. Riya moves eastward at a speed of 20kmph and Priya moves westward at a speed of 30 kmph. How far will be Priya from Riya after 30 minutes?

Solution:
Distance = Time x relative speed
Distance between Riya and Priya after 30 minutes
= (30/60) x (20 + 30) = 0.5 x 50
(since opposite direction add the speed)
= 25 km.

79. There are three runners Tom, Dick and Harry with their respective speeds of 10kmph, 20kmph and 30kmph they are initially at P and they have to run between the two points P and Q which are 10 km apart from each other. They start their race at 6 am and end at 6 pm on the same day. If they run between P and Q without any break, then how many times they will be together either at P or Q during the given time period?

Solution:
Time taken for Tom to travel 20km
= 20/10 = 2 hours = 120 minutes
Time taken for Dick to travel 20 km
= 20/20 = 1hour = 60 minutes
Time taken for Harry to travel 20 km
= 20/30 = 0.66 hours = 40 minutes.
LCM of (120, 60, 40) = 120
In every 2 hours the three persons will meet.
In 12 hours they will meet for 12/2
= 6 times.

80. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 kmph, he will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 P.M.?

Solution:
If a person increase the speed by ½ then the time taken will reduce by 1/3rd .
Here Robert increases the speed by ½ and the time taken reduced by 2 hours.
2 hours = (1/3) x Time taken at 10kmph
Time taken = 6 hours.
Distance = 6 x 10 = 60 kmph.
He started his journey 6 hours before 2pm i.e. at 8am.
Time taken from 8am to 1pm = 5 hours
Speed required to cover 60km in 5 hours
= 60/5 = 12 kmph.

81. A man rows to a place 48 km distant and come back in 14 hours. He finds that he can row 4 km with the stream in the same time as 3 km against the stream. What is the rate of the stream?

Solution:
Speed is directly proportion to distance
Speed ratio = 3 : 4
Time is inversely proportional to speed.
Time ratio = 4 : 3
Assume that the actual times
= 4x and 3x
4x + 3x = 7x = 14 hours → x = 2
Actual time taken upstream and downstream = 8 hours , 6 hours
S_{US}, Upstream speed = 48/8 = 6kmph
S_{DS}, Downstream speed=48/6 = 8 kmph
Speed of current = $(S_{DS} - S_{US})/2$
= 1 kmph

82. A supportive young hare and tortoise raced in opposite directions around a circular track that was 100 km in diameter. They started at the same spot, but the hare did not move until the tortoise had a start of one eighth of the distance (that is, the circumference of the circle). The hare held such a poor opinion of the other's racing ability that he sauntered along, nibbling the grass until he met the tortoise. At this point the hare had gone one sixth of the distance. How many times faster than he went before must the hare now run in order to win the race?

Solution:
The circumference value can be anything for this question. So, let us take a number which is a multiple of both 6 and 8 for easy calculation.
Assume that the race track is 48 km long.
Hare gives 6 km start to tortoise.
Assume that the hare and tortoise meet at 1/6th the distance in 1 hour.
Distance travelled by hare = 8 km and distance travelled by tortoise = 34 yards
Initial speed of hare = 8 kmph
Speed of tortoise = 34kmph.
Time taken for tortoise to cover the 8 km distance = 34/8 = 4.25 hours.
To win the race the hare must reach the

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end point within 4.25 hours.
Distance to be travelled by hare within 4.25 hours = 40 km.
Speed of hare must be greater than
= 40/4.25 = 9.41 kmph.
Fractional increase from the initial speed of the hare to required speed
= (9.41 – 8)/8 = 0.176 or 17.6 %.

83. A train 120 meter long passes an electric pole in 12 seconds and another train of same length traveling in opposite direction in 8 seconds. The speed of the second train is?

Solution:
Let the speed of the trains be S_a and S_b
Time taken to cross a pole
= $120/S_a = 12$
$S_a = 10$ mps.
Speed of the first train = 10mps.
Time taken to cross another train
= $[(120+120)/(S_a + S_b)] = 8$
$240 = 8 \times 10 + 8S_b$
$8S_b = 160$
Speed of second train = 20 mps.

84. Two trains, 200 and 160 meters long take a minute to cross each other while traveling in the same direction and take only 10 seconds when they cross in opposite directions. What are the speeds at which the trains are traveling?

Solution:
In same direction:
$60 = [(200 + 160)/(S_a - S_b)]$
$S_a - S_b = 6$ ---(1)
In opposite direction:
$10 = [(200 + 160)/(S_a + S_b)]$
$S_a + S_b = 36$ ---(2)
By solving (1) and (2), we get
$S_a = 21$ and $S_b = 15$

85. Two trains are 2km apart. Speed of one train is 20m/s and the other train is running at 30 m/s. Lengths of the trains are 200 and 300m. In how much time do the trains cross each other?

Solution:
Total distance to be travelled to cross each other = 2km + 200m + 300m
= 2500m
Time taken = 2500/(20 + 30) = 50 sec.

86. A boat whose speed is 15 kmph in still water goes 30 kmph downwards and come back in total 4 hours 30 min. What is the speed of stream in kmph?

Solution:
Total time = 4.5 hours
Upstream time+Downstream time = 4.5
$4.5 = [30/(15 + S_r)] + [30/(15 – S_r)]$
$3/20 = [(15 – Sr) + (15+Sr)]/(225–S_r^2)$
$3/20 = 30/(225 – S_r^2)$
$675 – 3S_r^2 = 600$
$3S_r^2 = 75 \rightarrow S_r = 5$ kmph

87. How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?

Solution:
The last digit must be 5.
The remaining 2 digits for the three digit number can be arranged from the remaining 5 digits.
Number of ways = ${}^5P_2 = 20$

88. How many ways to arrange a word ORANGE in which vowels are not together?

Solution:
Consider the three vowels in the word orange as a single element.
The number of elements now is 4 which can be arranged in 4! ways.
The three vowels which are together can be arranged in 3! ways.
Number of arrangements in which vowels are together = 3! X 4!
= 144.
Total arrangements
= 6! = 720.
Vowels not together
= 720 – 144 = 576

89. In how many ways can a lock be opened if that lock has three digit number lock if sum of the first two digits is less than or equal to the last digit? Numbers are from 0-9.

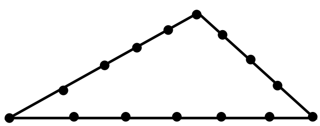
Solution:
The 3rd digit = 9
If the sum of 1st and 2nd digit = 9, the results are (0,9), (9,0), (1,8), (8,1), (2,7), (7,2), (3,6), (6,3), (4,5), (5,4) = 10 results.
If the sum = 8, the results are (0,8), (8,0), (1,7), (7,1), (2,6), (6,2), (3,5), (5,3), (4,4) = 9 results.
The number of results will decrease by 1 for the successive sums.
Total results = 10+9+8+...+2+1 = 55

90. A box contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least one black ball is to be included in the draw?

Solution:
Total ways of selecting 3 balls – ways of selecting 3 balls from white and red balls = ways of selecting 3 balls with at least 1 black ball.
Number of selections = ${}^{9}C_3 - {}^{6}C_3 = 104$.

91. The sides AB, BC and CA of a triangle ABC having 3, 4 and 5 interior points receptively on them. The total number of triangles that can be constructed by using these points as vertices is?

Solution:



Selecting any three points – selecting three points from the same line = Number of triangles.
Total number of points = 3+4+5 = 12
12C3 – 3C3 – 4C3 – 5C3 = 220 – 15
= 205 triangles can be formed.

92. After a get-together every person present shakes the hand of every other person. If there were 105 hands-shakes in all, how many persons were present in the party?

Solutions:
Number of handshakes = ${}^{n}C_2$, because there are two persons involved in a handshake and 1st man shaking hand with 2nd man is not different from 2nd man with the 1st man.
${}^{n}C_2 = n(n - 1)/(2 \times 1) = 105$
$n(n - 1) = 210$
Product of two successive numbers=210
By solving we get, n = 15
15 persons attended the party.

93. In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?

Solution:
${}^{8}C_3 \times {}^{10}C_6 = {}^{8}C_3 \times {}^{10}C_4 = 56 \times 210 = 11760$

94. A class consists of 100 students, 25 of them are girls and 75 boys; 20 of them are rich and remaining poor; 40 of them are fair complexioned. The probability of selecting a fair complexioned rich girl is?

Solution:
Probability of selecting a girl = ¼
Probability of selecting a rich person = 1/5
Probability of selecting fair complexion = 2/5
Overall probability = (1/4)(1/5)(2/5) = 2/100 = 1/50

95. A box contains 5 brown and 4 white socks. A man takes out two socks. The probability that they are of the same color is?

Solution:
The 2 socks may be either brown or white.
Selections = ${}^{5}C_2 + {}^{4}C_2 = 16$
Probability = $16/[{}^{9}C_2] = 16/36 = 4/9$

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96. A coin is tossed and simultaneously a dice is rolled. What is the probability that the coin will show heads an the dice will have a composite number?

Solution:
Probability for head = 1/2
Probability for composite number = 3/6
Overall probability
= (1/2) x (1/2) = 1/4

97. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red are?

Solution:
Ways of selecting 3 red balls = ${}^{5}C_{3}$ = 10
Ways of selecting any 3 balls=${}^{15}C_{3}$ = 455
Probability = 10/455

98. Find the probability that a leap year contains 53 Sundays.

Solution:
Reminder of 366/7 = 2
A leap year has two odd days.
If the leap year starts with Sunday, it will end in Monday.
If it starts with Saturday, it will end in Sunday.
Out of 7 days in a week, if the leap year starts on these two days, we will have 53 Sundays.
Probability = 2/7

99. If f(x) = $|(x^2 - 50)|$, what is the value of f(-5)?

Solution:
F(-5) = $|(-5^2 - 50)|$ = 25.

100. HOW+MUCH=POWER.
Find the value of P+O+W+E+R

Solution:
The question is from Crypt Arithmetic.
A three digit number is added to a four digit number to get a five digit number.
So,
P = 1; O = 0 and M = 9

There must be a carry over for M.
O + C = E, that means 0 + C = E.
So, there must be a carry over for W + H

$$\begin{array}{ccccc} & 1 & & 1 & \\ & & H & O & W \\ + & M & U & C & H \\ \hline P & O & W & E & R \end{array}$$

P	O	M	W	H	R	U	C	E	
1	0	9	2	9					X
1	0	9	2	8	0				X
1	0	9	3	9					X
1	0	9	3	8	1				X
1	0	9	3	7	0				X
1	0	9	4	9					X
1	0	9	4	8	2	4			X
1	0	9	4	7	1				X
1	0	9	5	9					X
1	0	9	5	8	3	5			X
1	0	9	5	7	2	8	3	4	√

P = 1; O = 0; W = 5; E = 4; R = 2
P+O+W+E+R = 1+0+5+4+2 = 12

Fact
The name Accenture is an acronym for

"Accent on the Future"

Accent (v) - Emphasize