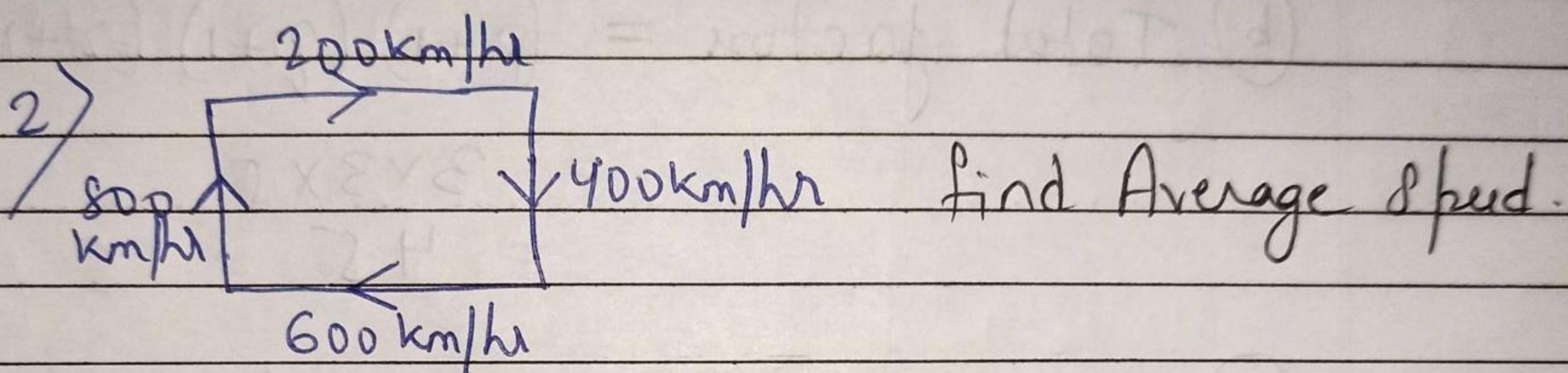


Analytical & Thinking Skills

Average :-

$$1) \frac{2^9 + 2^{10}}{2} = \frac{2^9(1+2)}{2} = 3 \times 2^8.$$



Sol. → $\frac{4n}{\frac{n}{200} + \frac{n}{400} + \frac{n}{600} + \frac{n}{800}}$

$$= \frac{4x}{\frac{25x}{2400}} = \frac{2400 \times 4}{25} = 384 \text{ kmph}$$

Q Marks obtained is 80, 90, 70, 70, 80
Find average Mark & Average %.

Sol → Average Mark = $\frac{80+90+70+70+80}{5}$
= 78

Average % = Can't be calculated.

Q. Number = 22500

(a) Find No. of Even factors.

$$22500 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5 \\ = 2^2 \times 3^2 \times 5^4$$

$$\text{No. of even factor} = 2 \times 3 \times 5 = 30$$

$$(b) \text{ Total factors} = (p+1)(q+1)(r+1) \\ = 3 \times 3 \times 5 \\ = 45$$

$$(c) \text{ No. of odd factors} = \text{Total} - \text{Even} \\ = 45 - 30 \\ = 15$$

$$(d) \text{ Prime factors} = 3$$

(e) Factors with perfect square

$$= \left(\frac{p}{2} + 1\right) \left(\frac{q}{2} + 1\right) \left(\frac{r}{2} + 1\right)$$

$$2 \times 3 \times 2 = 12$$

Q. $N \rightarrow 180000$

(a) No. of factors.

(b) No. of even factors

(c) No. of odd factors

(d) No. of prime factors

(e) No. of perfect square factors :-

$$\begin{aligned}
 \text{Sol} \rightarrow 1800000 &= 3 \times 2 \times 3 \times 10^2 \times 10^2 \\
 &= 3^2 \times 2 \times 2^2 \times 5^2 \times 2^2 \times 5^2 \\
 &= 2^5 \times 3^2 \times 5^4.
 \end{aligned}$$

(a) $6 \times 5 \times 3 = 90$

(b) $5 \times 3 \times 5 = 75$

(c) $90 - 75 = 15$

(d) 3

(e) $\left[\frac{5}{2}\right] \times \left[\frac{2}{2}\right] \times \left[\frac{4}{2}\right] + 1 = 3 \times 1 \times 3 = 18 \text{ Ans}$

Trailing Zeros :-

$$\begin{aligned}
 \underline{\text{Q}} \quad \text{No} &= 2^{49} \times 3^{75} \times 5^{59} \times 7^{21} \\
 &= \underbrace{(2 \times 5)^{49}}_{(10)^{49}} = 49
 \end{aligned}$$

$$\begin{aligned}
 \underline{\text{Q}} \quad \text{No} &= 64^{32} \times (375)^{75} \times (30)^{29} \\
 &= (2^6)^{32} \times (5^3 \times 3)^{75} \times (2 \times 5 \times 3)^{29} \\
 &= 2^{227} \times 5^{254} \\
 &= \underbrace{(10)^{227}}_{227} \text{ Ans}
 \end{aligned}$$

Q Trailing Zero in 104!

Sol →

$$\begin{array}{r} 5 | 104 \\ 5 | 20 \\ 5 | 4 \\ \hline x \end{array} \Rightarrow 20+4 = 24 \text{ Ans}$$

Q Highest coefficient of 21 in 104!

$$\begin{array}{r} 7 | 104 \\ 7 | 14 \\ 7 | 2 \\ \hline x \end{array} \Rightarrow 14+2 = 16 \text{ Ans}$$

Q Highest coefficient of 56 in 104!

Sol →

$$\begin{aligned} 56 &= 7 \times 8 \\ &= 7 \times 2^3 \\ &\quad \uparrow \\ &\quad \text{Higher} \end{aligned}$$

$$\begin{array}{r} 7 | 104 \\ 7 | 14 \\ 7 | 2 \\ \hline x \end{array} \Rightarrow 14+2 = 16 \text{ Ans}$$

Q Find average of first 37 whole No.

$$\text{So} \rightarrow 0 + 1 + 2 + \dots + 36$$

$$= \frac{n(n+1)}{2} = \frac{36 \times 37}{2} = 18$$

* $0, 1, 2, \dots, n$

If odd term = Middle element = $\frac{n}{2}$

If even term = $\frac{1+n}{2}$

Q. The average weight of a class is 54 kg. A new student joined the class whose weight is 145 kg and the average weight of the class now become a prime no. less than 72. Find the total no. of student in class.

$$\text{So} \rightarrow 54 + \frac{(145 - 54)}{(n+1)}$$

$$54 + \frac{91}{(n+1)} \Rightarrow 54 + \frac{91}{(6+1)} = 61$$

$$\text{or } 54 + \frac{91}{12+1} = 67$$

\Rightarrow Can not Determine.

Q. Average runs scored by batsman in 4 matches is 48. In 5th match he scores some runs so that his average now becomes 60. In 6th inning he scored 12 runs more than his 5th inning and now the average of his last 5 innings becomes 78. How many runs he scored in first match?

Sol → $48 \times 4 \leftarrow$ Total runs in 4 match.

$$\frac{4 \times 48 + n}{5} = 60$$

$$n = 300 - 192$$

$$n = 108$$

$$\begin{aligned}6^{\text{th}} \text{ inning score} &= 108 + 12 \\&= 120\end{aligned}$$

$$\begin{aligned}\text{Runs in last 5 inning} &= 78 \times 5 \\&= 390\end{aligned}$$

$$\begin{aligned}\text{Runs in 1st match} &= 192 + 108 + 120 \\&\quad - 390 \\&= 30 \quad \underline{\text{Ans}}\end{aligned}$$

Q. Average weight of a class of 10 students is increased by 2 kg when 1 student left and another joined. After a few month this new student left and another student joined whose weight was 10 kg less than the student who left now. What is the difference between initial & final average.

Sol → Let initial average be n .

Average after one student left & joined
 $= n + 2$.

$$\Rightarrow n + \frac{20}{10}$$

Average weight after that student left and another student of 10 kg less joined.

$$\Rightarrow n + \frac{20}{10} - \frac{10}{10}$$

$$= n + 1$$

$$\text{So, difference} = n + 1 - n$$

$$= 1 \text{ kg Ans}$$

Q. In a group of 10 students the mean of lowest 9 score is 42 while mean of highest 9 is 47. For the entire group of 10 students the max possible mean exceeds min possible mean by _____?

Sol $\rightarrow a_1, a_2, a_3, \dots, a_7, a_8, a_9, a_{10}$

$$a_1 + a_2 + a_3 + \dots + a_8 + a_9 = 42 \times 9$$

$$a_2 + a_3 + a_4 + \dots + a_9 + a_{10} = 47 \times 9$$

$$a_{10} - a_1 = 47 \times 9 - 42 \times 9 \\ = 9 \times 5$$

$$\Rightarrow a_{10} - a_1 = 45$$

$$a_{10} = 45 + a_1 \\ a_1 = a_{10} - 45$$

47, 47, 47, 47, 47, 47, 47, 47, 47, 47

42, 42, 42, 42, 42, 42, 42, 42, 42, 42 + 45

$$\Rightarrow \cancel{(47-42) \times 8} \quad \cancel{(47-42) \times 8} + \cancel{(2-42)} + \cancel{(47-42)}$$

$$\text{Max Mean} - \text{Min Mean} \\ = 46.5 - 42.5 \\ = 4 \text{ Ans}$$

Q. There are 7 members in a family whose avg. age is 25 years. A who is second youngest in family is 12 years old. Find avg. just before A was born.

Sol → Can't be determined because of age
of youngest is not given.

Arithmetic Progression.

$$a, a+d, a+2d, a+3d, \dots, a+(n-1)d$$

$$T_n = a + (n-1)d$$

$$\begin{aligned} S_n &= \frac{n}{2} (2a + (n-1)d) \\ &= \frac{n}{2} (a + l) \end{aligned}$$

Q 37, 33, 29, 25 - 50th term = ?

$$\begin{aligned} T_{50} &= 37 + (50-1)(-4) \\ &= 37 - 196 \\ &= -159 \end{aligned}$$

Q. 7, $8\frac{1}{2}$, 10, $11\frac{1}{2}$ - 81st term = ?

$$T_{81} = 7 + (81-1)\frac{3}{2}$$

$$= 7 + \frac{80}{2} \times 3 = 127 \text{ Ans}$$

Q 4th term is 19. 12th term = 51.
find 21st term.

$$\begin{aligned} \text{Sol} \rightarrow \quad a + 3d &= 19 \\ -a - 11d &= -51 \\ \hline -8d &= -32 \\ d &= 4. \end{aligned}$$

$$a = 19 - 12$$

$$a = 7$$

$$\begin{aligned} 21^{\text{st}} \text{ term} &= 7 + (20) \times 4 \\ &= 87 \quad \underline{\text{Ans}} \end{aligned}$$

Q. 6th term = 47, 10th term = 75.
find 30th term.

$$\begin{aligned} \text{Sol} \rightarrow \quad a + 5d &= 47 \\ -a - 9d &= -75 \\ \hline -4d &= -28 \\ d &= 7 \end{aligned}$$

$$a = 47 - 5 \times 7 = 12.$$

$$\begin{aligned} 30^{\text{th}} \text{ term} &= 12 + 29 \times 7 \\ &= 12 + 203 \\ &= 215 \quad \underline{\text{Ans}} \end{aligned}$$

Q 100, 93, 86, ... (20 term) · Find S_n .

$$\text{Sol} \rightarrow S_n = \frac{n}{2} (2 \times 100 + 19 \times (-7)) \\ = \frac{20}{2} (200 + (-133)) \\ = 670 \quad \underline{\text{Ans}}$$

Q 7, $\frac{19}{2}$, 12, $\frac{29}{2}$, ... (30 term) · Find S_n .

$$\text{Sol} \rightarrow S_n = \frac{n}{2} (2 \times 7 + 29 \times \frac{5}{2}) \\ = \frac{30}{2} \times \left(\frac{28 + 145}{2} \right) = \frac{15 \times 173}{2} = \frac{2595}{2} \\ \underline{\text{Ans}}$$

Q. 4th term of an AP is 22 and its 10th term is 52. Find the sum of first 40 terms.

$$\begin{aligned} \text{Sol} \rightarrow a + 3d &= 22 \\ a + 9d &= 52 \\ \hline -6d &= -30 \\ d &= 5 \end{aligned}$$

$$\begin{aligned} a &= 22 - 15 \\ a &= 7 \end{aligned}$$

$$\begin{aligned} S_{40} &= \frac{40}{2} (2 \times 7 + (39) \times 5) \\ &= 20 (202) = 4040 \quad \underline{\text{Ans}} \end{aligned}$$

Q. Sum of 6 terms of an AP is 57. Sum of its 10 term is 155. Find the 20th term.

$$\text{Sol} \rightarrow \frac{6}{2} (2a + 5d) = 57$$

$$\frac{10}{2} (2a + 9d) = 155$$

$$\begin{array}{r} 2a + 5d = 19 \\ -2a + 9d = 31 \\ \hline -4d = -12 \\ d = 3 \end{array}$$

$$\begin{aligned} 2a + 5d &= 19 \\ a &= \frac{4}{2} = 2 \end{aligned}$$

$$T_{20} = 2 + 19 \times 3 = 59 \quad \underline{\text{Ans}}$$

Q. Find the sum of all natural no. exactly divisible by 11 and lies between 1 & 580.

$$\text{Sol} \rightarrow 11 + \dots + 572$$

$$\begin{aligned} 572 &= 11 + (n-1)11 \\ (n-1) &= \frac{561}{11} = 51 \end{aligned}$$

$$n = 52$$

$$\begin{aligned} S_m &= \frac{52}{2} (11 + 572) \\ &= 26 \times 583 \\ &= 15158 \quad \underline{\text{Ans}} \end{aligned}$$

Q 3 No. of are in AP their sum & product is 39 & 2080 respectively. Find Nos.

Sol → Let Number be $(a-d), a$ & $(a+d)$

$$\begin{aligned} a + a - d + a + d &= 39 \\ a &= 13 \end{aligned}$$

$$(13 - d) \times 13 \times (13 + d) = 2080$$

$$\begin{aligned} 13^2 - d^2 &= 160 \\ -d^2 &= 160 - 169 \\ d &= \pm 3 \end{aligned}$$

So, Nos are 16, 13, 10 or
10, 13, 16 Ans

Q 5 Numbers whose sum is 50 are in AP.
If fifth no. is 3 times the second no. find the nos.

Sol → $(a+2d) + (a+d) + a + (a-d) + (a+2d) = 50$

$$a = 10$$

alq.

$$a+2d = 3(a-d)$$

$$\Rightarrow 10 + 2d = 30 - 3d$$

$$\Rightarrow 5d = 30 - 10$$
$$d = 4.$$

Nos. $\Rightarrow 2, 6, 10, 14, 18$ Ans

Q. The sum of 5 Nos ~~are~~ in AP is 30 & product of first and last is 20. Find the nos.

Sol $\rightarrow a - 2d + a - d + a + a + d + a + 2d = 30$

$$a = 6$$

$$(a - 2d)(a + 2d) = 20$$

$$6^2 - 4d^2 = 20$$
$$4d^2 = 16$$
$$d = \pm 2$$

$$\Rightarrow 2, 4, 6, 8, 10 \text{ or } 10, 8, 6, 4, 2 \quad \underline{\text{Ans}}$$

1. The sum of the second and fifth term of an A.P. is 8 and that of third and the seventh term is 14. Find 11th term. 1/1

- 21
- 17
- 19
- 18

2. If $S_n = n^2 + 2n$ is a sum of n terms of an A.P., then find the 25th term. 1/1

- 41
- 51
- 44
- 48

3. If sum of first 11 terms of an A.P. is equal to sum of first 19 terms, then find 1/1 the sum of first 30 terms.

- 99
- 0
- 66
- 51

4. If the sum of 7th term and 12th term is equal to the sum of 5th term and xth 1/1 term in an A.P. then find the value of x?

- 13
- 14
- 12
- 15

Geometric Progressions

In a Geometric Sequence each term is found by multiplying the previous term by a constant.
In general we write a geometric sequence like this

$$a, ar, ar^2, ar^3, \dots$$

a = First term, r = Common ratio = any term/preceding term

nth term of GP: $x_n = ar^{n-1}$

Sum of nth term of GP: $S_n = \frac{a(r^n - 1)}{r - 1}; \text{ where } r > 1, S_n = \frac{a(1 - r^n)}{1 - r}, \text{ where } r < 1 \quad r \neq 1$

Sum to Infinity of GP: $S_{\infty} = \frac{a}{1 - r}; \text{ where } -1 < r < 1$

Campus Aptitude by Dr. Ajay Kumar

1. Geometric Mean:

The geometric mean is calculated as the N-th root of the product of all values, where N is the number of values.

$$GM = \sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdots \cdots \cdot x_n}$$

$$GM = (x_1 \times x_2 \times x_3 \times \cdots \cdots \times x_n)^{1/n}$$

To find the Geometric Mean between two quantities:

Let a and b be the two quantities; G the geometric mean.

$$G^2 = a * b$$

Campus Aptitude by Dr. Ajay Kumar

5. Find the 10th term of the series: 3, 6, 12, 24, 48

1/1

- 999
- 1622
- 768
- 1536

6. Find the sum of first 10 terms of the series: 5, 10, 20, 40,

1/1

- 10230
- 5115
- 5525
- 4092

7. Find the sum of the series upto infinite terms.

1/1

16,8,4,2,.....∞

- 36
- 40
- 32
- 28

8. Find the sum of the series upto infinite terms: $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \dots, \infty$

1/1

- $\frac{255}{266}$
- 1
- 2
- $\frac{3}{4}$

9. Which term of the G.P.

1/1

5,10,20,40....is 1280

- 8th
- 9th
- 10th
- 11th

10. If the AM and HM of two numbers are 27 and 12 respectively, then what is their GM equal to?

1/1

- 12
- 18
- 24
- 27

11. If the AM and GM of two numbers are 5 and 4 respectively, then what is the HM of those numbers?

1/1

- $\frac{5}{4}$
- $\frac{16}{5}$
- $\frac{9}{2}$
- 9

12. The harmonic mean of two numbers is 21.6. If one of the numbers is 27, then what is the other number?

1/1

- 16.2
- 17.5
- 18
- 19

1. The sum of third and eighth term of an A.P. is 42 and sum of 5th and 13th term is 70, then find its 20th term. 1/1

- 71
- 69
- 75
- 79

2. If $S_n = n^2 + 2n$ is a sum of n terms of an A.P. then find 25th term. 1/1

- 41
- 51
- 44
- 48

3. If sum of first 13 terms of an A.P. is equal to sum of first 23 terms, then find the sum of first 36 terms. 1/1

- 99
- 0
- 66
- 51

4. If sum of 11th term and 50th term is equal to the sum of 23rd term and xth term in an A.P. then find the value of x? 1/1

- 35
- 36
- 37
- 38

5. Find the sum of first 8 terms of the series: 2, 6, 18, 54,

1/1

- 2187
- 19683
- 6560
- 6564

6. The tenth term of a G.P. is 16 times of its 6th term. Find first term if its fourth term is 48.

1/1

- 9
- 6
- 8
- 7

7. What is the sum to 7 terms of a G.P whose first term is 1 and the 4th term is 1/27?

1/1

- 1093
- 3279
- 2231
- None of these

8. What is the product of first 9 terms of a G.P having a total of 13 terms given that 5th term is 2?

0/1

- 512
- 216
- 16
- None of these

9. What is the geometric mean of the Geometric Progression 2,4,8,16?

1/1

- 32
- 64
- 16
- None of these

10. Find 15th term of the series: 1/10, 1/20, 1/30, 1/40.....

1/1

- 1/150
- 1/140
- 1/30
- 1/115

11. If the AM and GM of two numbers are 5 and 4 respectively, then what is the HM of those numbers?

- 5/4
- 16/5
- 9/2
- 9

12. The harmonic mean of two numbers is 21.6. If one of the numbers is 27,

1/1

then what is the other number?

- 16.2
- 17.5
- 18
- 19

Set Theory

$$* A \cup B = A + B - A \cap B$$

$$* A \cup B \cup C = A + B + C - A \cap B - A \cap C - B \cap C + A \cap B \cap C.$$

* Cardinal no \rightarrow No. of element in set.

$$* (A - B)' = U - (A - B).$$

Q. In a class of 100 students 50 like Cricket
40 like football & 30 like Tennis. 20 likes
both Cricket & football, 15 likes both football
& Tennis and 10 likes both tennis & cricket.

a) Find no. of student which take all
3 sport.

b) If 10 student don't like any sport and
20 likes all the 3 sports then whether
the information given stands true or not.

$$\text{Sol} \rightarrow \textcircled{a} 100 = 50 + 40 + 30 - 20 - 15 - 10 + n$$

$$n = 100 - 75$$

$$n = 25$$

$$\textcircled{b} 100 - 10 = 50 + 40 + 30 - 20 - 15 - 10 + 20$$
$$90 = 95$$
$$\Rightarrow \underline{\text{False}}$$

Q. How many even integers n where n is greater than equal to 100 & less than equal to 200 are divisible by neither 7 nor 9.

Sol →

~~105~~

Divisible by 7 → 112, 126, ... 196.

$$196 = 112 + (n-1)14$$

$$n = 7$$

Divisible by 9 :- 108, 126, ... 198.

$$198 = 108 + (n-1)9$$

$$n = 6$$

Divisible by 9 & 7 :- 126,
 $n = 1$

$$(9 \cup 7) = 7 + 6 - 1$$

$$= 12$$

Neither 9 nor 7 = Total - $(9 \cup 7)$

$$= 51 - 12$$

$$= 39 \text{ Ans}$$

Q. A visited B during vacation. In the morning they would go for yoga. In evening they would play tennis. To have more fun they indulge only in one activity per day. There were 5 days when they were lazy & stayed at home all day long. There were 24 morning where they did nothing. There were 14 evening where they stayed home and a total of 22 day where they played ~~yo~~ tennis or did yoga.

- (a) For how many days, A stayed with B.
- (b) For how many day they were lazy.

$$\text{Sol} \rightarrow @ \text{Yoga} : - \cancel{n} - 24$$

$$\text{Tennis} : - n - 14$$

$$n - 24 + n - 14 = 22$$

$$2n = 22 + 38$$

$$2n = 60$$

$$n = 30.$$

$$(b) \text{ Total} - 22$$

$$30 - 22$$

$$= 8 \quad \underline{\text{Ans}}$$

4. In a class of 345 student, the student who took math, English & Science are equal in no. There are 30 student who took both Eng & so Math, 26 who took Math & Sci, 28 who took Sci & Eng. 14 who took all three subject. There are 43 student who took no subject.

- (a) What % of student did not take Science
(b) 11 11 11 11 u u u Math
(c) 11 11 11 11 u u u Eng.

Sol $\rightarrow 345 - 43 = a + a + a - 30 - 26 - 28 + 14$

$$3a = 302 + 70$$
$$a = \frac{372}{3} = 124$$

(a) $\frac{302 - 124}{302} \times 100\% = 59\%$

- (b) 59%
(c) 59%

5. In an AP of 1000 terms m^{th} term from beginning is 10 & m^{th} term from end is 20. Find the sum.

$$\text{Sol} \rightarrow \text{Sum} = \frac{n}{2} (10 + 20)$$

$$= \frac{1000 \times 30}{2}$$

$$= 15000 \text{ Ans}$$

C Find the sum of all 3 digit no that leaves a remainder 5 when divided by 7.

- (A) 59489 (B) 66879 (C) 71079 (D) 78679

$$\text{Sol} \rightarrow 103, \dots, 999$$

$$999 = 103 + (n-1)7$$

$$\frac{896}{7} = n-1$$

$$n = 129$$

$$\text{Sum} = \frac{n}{2} (103 + 999)$$

$$= 129 \times \frac{1102}{2} = 129 \times 551$$

$$= 71079$$

Ans

7 Find the sum of all odd integers b/w 150 & 256 that are not ending with 3.

- (a) 4504 (b) 7524 (c) 3634 (d) 3164

$$\text{Sol} \rightarrow S_{149} = \left[\frac{1}{2} (149+1) \right]^2 \\ = \left(\frac{1}{2} \times 250 \right)^2 = 75^2$$

$$S_{245} = (123)^2$$

~~$$S_{151-245}$$~~
$$S_{151-245} = 123^2 - 75^2 = \\ = (123+75)(123-75) \\ = 9504.$$

$$153, 163, 173, 183 - 243.$$

$$\Rightarrow \frac{10}{2} (153+243)$$

$$= 1980$$

$$\text{Sum} = 9504 - 1980 \\ = 7524$$

$$* S_{\text{odd}} = \left(\frac{1}{2} (n+1) \right)^2$$

$$* S_{\text{even}} = \left\{ n(n+1) \right\}$$

Q. Every term in the series starting from 3rd term is sum of two preceding term If first term is odd & second term is even and total no. of term in series is 150. Find the ratio of no. of even terms to the no. of odd terms.

Sol → $\frac{1}{1}, \frac{2}{2}, 3, 5, 8, 13, 21, 24, 45, 69, 114, \dots$

\downarrow
 2

148

$$\frac{148}{3} = 49 \quad 148^k \rightarrow \text{odd}$$

1 odd, 1 even, 49 even, 98 odd, $148^k \rightarrow \text{odd}$

$$\Rightarrow \frac{\text{Even}}{\text{Odd}} = \frac{50}{98+1+1} = \frac{50}{100}$$

$$\Rightarrow 1 : 2 \quad \underline{\text{Ans}}$$

Q. If first term of infinit GP is equal to twice of sum of terms that follow then what is the ratio of 3rd term to the 6^k term.

$$\text{Sol} \rightarrow a = 2 \cdot \frac{a\gamma}{1-\gamma} \Rightarrow 1-\gamma = 2\gamma \Rightarrow \gamma = \frac{1}{3}$$

$$\frac{3^{\text{rd}}}{6^k} = \frac{a\gamma^2}{a\gamma^5} \Rightarrow \frac{1}{\gamma^3} = \frac{1}{(\frac{1}{3})^3} = 27 : 1$$

Ans

Q. If $2n+y=28$, then find the maximum value of $n^4 y^3$.

- (a) $3^{18} \times 2^3$
- (b) $3^{15} \times 2^3$
- (c) $2^{15} \times 3^5$
- (d) $2^{18} \times 3^3$

$$\text{Sol} \rightarrow 2n+y = 28$$

$$\Rightarrow \left(\frac{n}{2}\right)^4 + \left(\frac{n}{2}\right)^4 + \left(\frac{y}{2}\right)^3 + \left(\frac{y}{2}\right)^3 + \frac{y}{3} + \frac{y}{3} + \frac{y}{3} = 28$$

$$\frac{28}{7} \geq \sqrt[7]{\frac{y}{2} \times \frac{y}{2} \times \frac{y}{2} \times \frac{y}{2} \times \frac{y}{2} \times \frac{y}{3} \times \frac{y}{3} \times \frac{y}{3}}$$

$$4 \geq \left(\frac{n^4 y^3}{2^4 \times 3^3} \right)^{1/7}$$

$$(4)^7 \geq \frac{n^4 y^3}{2^4 \times 3^3}$$

$$\Rightarrow 2^{14} \times 2^4 \times 3^3 \geq n^4 y^3$$

$$\Rightarrow \text{Maximum Value} = 2^{18} \times 3^3$$

Ans

Q Interior angle of a convex polygon are in an AP with common difference of 10° . If the first angle is 100° . Find no. of sides.

$$\text{Sol} \rightarrow 100^\circ + 110^\circ + 120^\circ + 130^\circ + 140^\circ + 150^\circ + 160^\circ + 170^\circ$$

$\Rightarrow 8$ sides Ans

Q. Find sum of infinite series of

$$\frac{1}{3^2-4} + \frac{1}{4^2-4} + \frac{1}{5^2-4} + \dots$$

$$\text{Sol} \rightarrow \frac{1}{3^2-4} + \frac{1}{4^2-4} + \frac{1}{5^2-4}$$

$$= T_n = \frac{1}{n^2-4} \quad T_n = \frac{1}{4} \left[\frac{(n+2)-(n-2)}{(n-2)(n+2)} \right]$$

$$T_n = \frac{1}{4} \left[\frac{1}{(n-2)} - \frac{1}{n+2} \right]$$

$$\frac{1}{3^2-4} + \frac{1}{4^2-4} + \frac{1}{5^2-4} + \dots$$

$$= \frac{1}{4} \left[\frac{1}{1} - \cancel{\frac{1}{2}} + \cancel{\frac{1}{3}} - \cancel{\frac{1}{4}} + \cancel{\frac{1}{5}} + \cancel{\frac{1}{6}} + \cancel{\frac{1}{7}} - \cancel{\frac{1}{8}} + \cancel{\frac{1}{9}} \right. \\ \left. - \cancel{\frac{1}{10}} + \cancel{\frac{1}{11}} - \cancel{\frac{1}{12}} + \dots \right]$$

$$= \frac{1}{4} \left[\frac{12+6+4+3}{24} \right] = \frac{25}{48} \quad \text{Ans}$$

Q. Find the sum of following series.
 $1 + 2 + 5 + 10 + \dots + 12 + \dots$, 50 term

$$\text{Sol} \rightarrow T_n = n^2 + 1$$

$$\left(\sum_{n=1}^{49} n^2 + 1 \right) + T_0$$

$$= \frac{n(n+1)(2n+1)}{6} + n + 1$$

$$\Rightarrow \frac{49 \times 50 \times 99}{6} + 49 + 1$$

$$\Rightarrow 40425 + 50$$

$$\Rightarrow 40475 \quad \underline{\text{Ans}}$$

Q. Set f_n gives all factors of n . Set M_n gives all multiples of n less than 1000 which of the following is True.

- ~~Sol~~
- (a) $F_{108} \cap F_{84} = F_{12}$
 - (b) $M_{12} \cup M_{18} = M_{36}$
 - (c) $M_{12} \in (M_6 \cap M_4)$
 - (d) $M_{12} \cap M_{48} = M_{36}$

$$\text{Sol} \rightarrow @ F_{108} \cap F_{84} = F_{12}$$

$$F_{108} = \{1, 2, 3, 4, 6, 9, 12, \dots\}$$

$$F_{84} = \{1, 2, 3, 4, 6, 12, \dots\}$$

$$F_{12} = \{1, 2, 3, 4, 6, 12\}$$

\Rightarrow True

$$@ M_{12} = \{12, 24, 36, 48, 60, \dots\}$$

$$M_{18} = \{18, 36, 54, \dots\}$$

$$M_{36} = \{36, 72, 108, \dots\}$$

\Rightarrow False

$$@ M_{12} = \{12, 24, 36, 48, 60\}$$

$$M_6 = \{6, 12, 18, 24, 30, 36, \dots\}$$

$$M_4 = \{4, 8, 12, 16, 20, 24, \dots\}$$

Tone

$$@ M_{12} = \{12, 24, 36, 48, \dots\}$$

$$M_{18} = \{48, 96, 144, 192, \dots\}$$

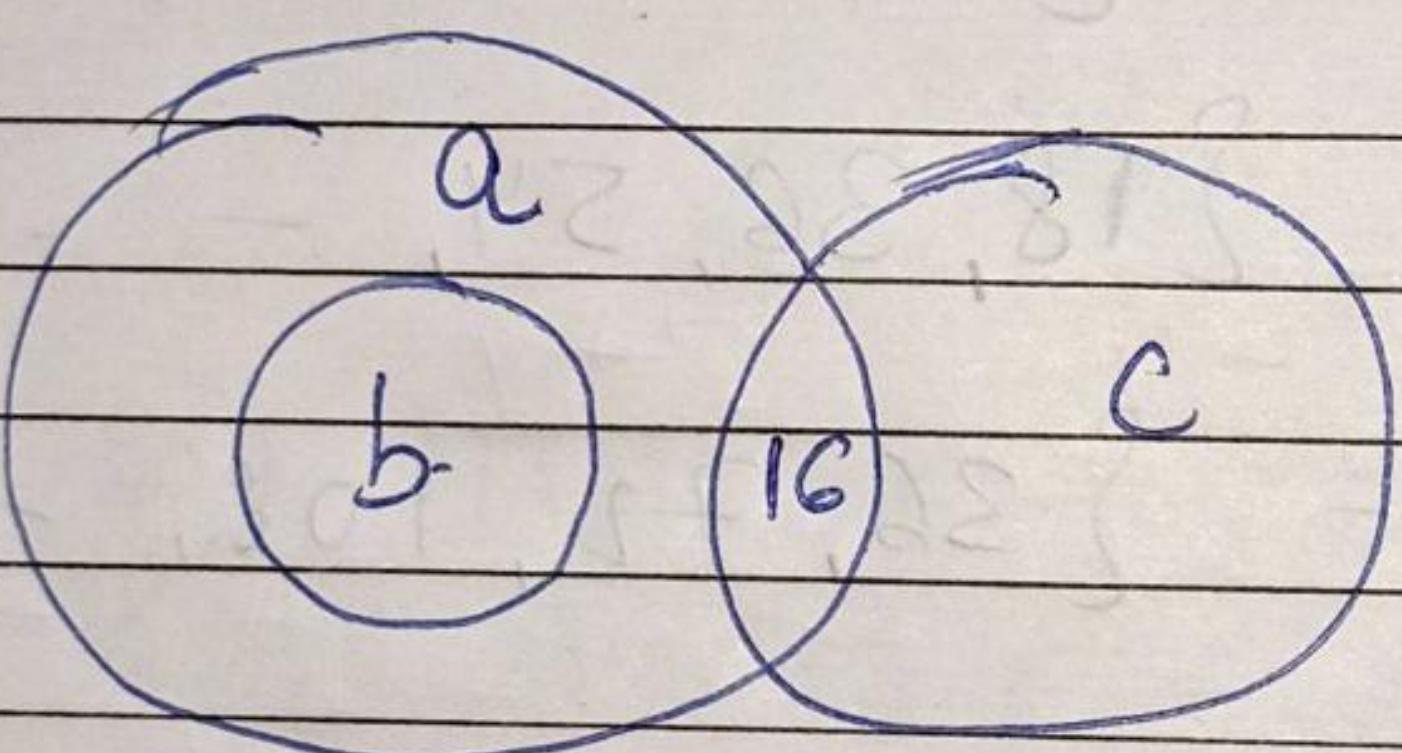
$$M_{36} = \{36, 72, \dots\}$$

\Rightarrow Tone

Q

In a class of 60 student anyone who has chosen to study Maths & Physics as well. But no one do Maths & Chemistry. 16 do Phy & Che. All the student do at least one of the 3 subjects and no. of people who do exactly 1 of the subject is more than the no. of people who do more than 1 of 3 subjects. What are the max & min no. of people who could have done only Chemistry.

Sol →



$$a + b + c + 16 = 60 - 16$$

$$a + b + c = 44$$

$$\text{alg. } a + c \geq b + 16$$

$$c = 0, a \geq b + 16$$

$$43 \geq 1 + 16$$

$$c = 44, 44 \geq 16$$

⇒ (0, 44, 0) Ans'

Q Set P comprise of all multiple of 4 less than 500. Set Q comprise of all odd multiple of 7 less than 500. Set R comprise of all multiple of 6 less than 500. How many elements are present in PUQUR.

$$\text{So } \rightarrow n(4) = 124$$

$$n(7) = 36$$

$$n(6) = 83$$

$$n(4 \& 7) = 0$$

$$n(6 \& 7) = 0$$

$$n(4 \& 6) = 41$$

$$n(4 \& 7 \& 6) = 0$$

$$\Rightarrow PUQUR = 124 + 36 + 83 - 41 \\ = 202 \text{ Ans}$$