Number Series

1. How many terms are there in the series? 201, 208, 215, --------- 369

(A) 23

(B) 24

(C) 25

(D) 26

Answer: (C) 25

$n = \frac{(l-a)}{d} + 1$ where, l = last term = 369

$n = \frac{(369-201)}{7} + 1$ a = first term = 201

$= \frac{(168)}{2} + 1 \quad => \quad 24 + 1 = 25$ d = common difference

Ans : 25

2. $2^2 + 4^2 + 6^2 + \cdots + 20^2 = ------$

(A) 1155

(B) 1540

(C) 2310

(D) 385 × 385

Answer: (B) 1540

$\epsilon n2 = \frac{n(n+1)(2n+1)}{6}$

$= 2^2 (1^2 + 2^2 + 3^2 + 4^2 + ... 10^2)$

Where ,

N= 10 $= 2x2 \left(\frac{10(10+1)(20+1)}{6}\right) = 2x2 \left(\frac{2310}{6}\right)$

$= 2^2 (385) \quad = > 1540$

3. Find the sum of the first 40 terms of the series $1^2 - 2^2 + 3^2 - 4^2 + \cdots$

(A) 820

(B) – 820

(C) 870

(D) – 870

Answer: (B) – 820

If both sign were presented in the equation

$-\frac{n(n+1)}{2} = -\frac{40(40+1)}{2} = -20(41)$

= - 820

4. Find the sum of the following series $2^2 + 3^2 + \cdots + 20^2$

(A) 2867

(B) 2868

(C) 2869

(D) 2870

Answer: (C) 2869

$\epsilon n2 = \frac{n(n+2)(2n+1)}{6}$

$\epsilon n2 = \frac{20(20+1)(2(20)+1)}{6}$

$\epsilon n2 = \frac{20(21)(41)}{6}$

$\epsilon n2 = 2870$

But we should subtract 1^2 from the $\epsilon n2$ becose the question start from 2^2

2870– 1 = 2869

5. $\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \frac{1}{4.5.6}$ is equal to

(A) $\frac{15}{31}$

(B) $\frac{7}{30}$

(C) $\frac{16}{21}$

(D) $\frac{21}{27}$

Answer: (B) $\frac{7}{30}$

$= \frac{1}{6} + \frac{1}{24} + \frac{1}{60} + \frac{1}{120}$

Take LCM $\frac{20+5+2+1}{120} = 28/120$

$= \frac{7}{30}$

6. Find the value of (1 – 1/3) (1 – ¼) (1 – 1/5) --------- (1 – 1 / 100)

(A) 1 / 100

(B) 1 / 50

(C) 2 / 3

(D) 99 / 100

Answer: (B) 1 / 50

6 . $\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right) \dots \dots . (1-\frac{1}{100})$

$=\left(\frac{2}{3}\right)\left(\frac{3}{4}\right)\left(\frac{4}{3}\right) \dots \dots . .\left(\frac{99}{100}\right)$

All the terms will be cancelled expect the first term 2 and last term 100

$\frac{2}{100} = \frac{1}{50}$

$= \frac{1}{50}$

7. In a geometric series, if the fourth term is 2 / 3 and seventh term is 16 / 81, then what is the first term of the series?

(A) 2 / 3

(B) 4 / 9

(C) 8 / 27

(D) 9 / 4

Answer: (D) 9 / 4

7 . 4 th term = $\frac{2}{3}$ $- - - - -- \rightarrow > 1$

7th term $\frac{16}{81}$ $- - - - - - - \rightarrow 2$

To find 1st term

$Ar^3 = 2/3$ $ar^6 = 16/81$

$a = \frac{2}{3}\frac{1}{r6} - - - - -- > 1$

$a = \frac{16}{81}\frac{1}{r6} - - - - -- > 2$

$\frac{2}{3}\frac{1}{r3} = \frac{16}{81}.\frac{1}{r6}$

$$=> r3 = \frac{8}{7} = \frac{2}{3}$$

$A(2/3)^{3/2} = (2/3)$

$A(2/3)^2 = 1$

$\frac{4a}{9} = 1$

$$=> \ a = \frac{9}{4}$$

8. The seventh term in the series 2, 6, 12, 20, 30, …..

(A) 42

(B) 72

(C) 56

(D) 90

Answer: (C) 56

Difference of each number increase by 2

Is 2+4,6+6,12+8,20+10,30+12

So the number is 42

9. The 20th term of 2, 10 30, 68, ….. is

(A) 408

(B) 8020

(C) 820

(D) 420

Answer: (B) 8020

$1^3 + 1 = 2$, $2^3 + 2 = 10$, $3^3 + 3 = 30$

$4^3 + 4 = 68$

$20^3 + 20 = 8000 + 20$

= > 8020

10. Find the sum of first 20 multiples of 15

(A) 3150

(B) 3050

(C) 2750

(D) 2950

Answer: (A) 3150

$\epsilon n = 15 + 30 + 45 + \cdots \ldots \ldots 300$

=15[1+2+3+4+5+……….+20]

$$\epsilon n = \frac{n(n+1)}{2} = 15\left[\frac{20(20+1)}{2}\right]$$

= 15 (210)

= 3150

11. Find the sum of the first 20 terms of the series $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \cdots$.

(A) – 420

(B) – 210

(C) 2870

(D) 420

Answer: (B) – 210

Both signs were present ,

So $-\frac{n(n+1)}{2} = -\frac{20(20+1)}{2}$

= -210

12. $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{7} + \frac{1}{14} + \frac{1}{28}$ is equal to

(A) 2.5

(B) 2.0

(C) 1.5

(D) 1.0

Answer: (B) 2.0.

Take LCM = 28

$$= \frac{28 + 14 + 7 + 4 + 2 + 1}{28} = \frac{56}{28}$$

= 2

13. If $1^3 + 2^3 + 3^3 + \cdots + n^3 = 36100$ then 1 + 2 + 3 + …… + n is equal to

(A) 290

(B) 190

(C) 390

(D) 490

Answer: (B) 190

1 + 2 + 3 + ... +n = ?

$\epsilon k3 = \epsilon k2$

36100 = (1 + 2 + 3 + ...) ^{2}

1 + 2 + 3 + ... n = $\sqrt{36100}$

N = 190

14. Find the sum of all-natural numbers between 300 and 500 which are divisible by 11.

(A) 7337

(B) 7227

(C) 7447

(D) 7557

Answer: (B) 7227

A = first number = 308

L = last number = 495

D = difference between each number = 11

$=> n = \frac{l-a}{d} = \left(\frac{495-308}{11}\right) + 1$

N = 18

$=> \epsilon n = \frac{n}{2}(a + l)$

= = $\frac{18}{2}(308 + 495)$ = 9 (803)

$\epsilon n = 7227$

15. The product of n consecutive positive integers is divisible by

(A) $(n + 1)!$

(B) $n!$

(C) $(n - 1)!$

(D) $(n + 1)(n - 1)$

Answer: (B) $n!$

If n = 1 , 2 , 3 , 4 then it will be divisible by n only

16 . 5th term in series $\frac{2}{5},\frac{6}{25},\frac{18}{125}$ .....

$r = \frac{3}{5}(difference)$

$a = \frac{2}{5}(first\ number\ )$

$Ar^{n-1} = \frac{2}{5}X3^{5-1}/5$ = 2/5 X 3^4/5

$= \frac{81}{625} \times \frac{2}{5} = \frac{162}{3125}$

(OR)

Take $\frac{2}{5}$ $then \frac{2}{5}(1,\frac{3}{5},\frac{9}{25},\frac{27}{125},\frac{81}{625})$

Then take fifth term and multiply with 2/5

$$\frac{81}{625}X\frac{2}{5} = \frac{162}{3125}$$

17. The sum of all 3-digit numbers which are divisible by 8 is

(A) 61376

(B) 63176

(C) 67136

(D) 66137

Answer: (A) 61376

A = first number = 104

L = last number = 992

D= difference = 8

$n = \left(\frac{l-a}{d}\right) + 1$

$n = \left(\frac{992-104}{8}\right) + 1$ n =112

$\epsilon n = \frac{n}{2}(a + l)$

= 56 (1096)

= 61376

18. The value of $\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+ ---- +\frac{1}{\sqrt{9}+\sqrt{8}}$ is:

(A) $1+\sqrt{2}+\sqrt{3}+\sqrt{4}+-----+\sqrt{9}$

(B) $\sqrt{3}+\sqrt{5}+\sqrt{7}$

(C) $10\sqrt{5}$

(D) 2

Answer: (D) 2

18 . $\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+\ \ldots..+\frac{1}{\sqrt{9}+\sqrt{8}}$

If we conjugate 1 term = $\frac{1}{\sqrt{2}+1} X \frac{\sqrt{2}-1}{\sqrt{2}-1}=\frac{\sqrt{2}-1}{\sqrt{2}-1}$

$= \sqrt{2}-1$

Then all other terms will be like this

$\sqrt{2}-1+\sqrt{3}-2+\sqrt{4}-\sqrt{3}+\cdots \ldots..\sqrt{9}-\sqrt{8}$

All the other terms expect $\sqrt{9} and -1$

Will be other cancelled then $\sqrt{9}-1=3-1=>2$

19. Find the sum of the first 20 terms of the geometric series 5 / 2 + 5 / 6 + 5 / 18 + ….

(A) $\frac{15}{4}\left[1-\left(\frac{1}{3}\right)^{20}\right]$

(B) $\frac{15}{4}\left[1-\left(\frac{1}{3}\right)^{18}\right]$

(C) $\frac{15}{4}\left[1-\left(\frac{1}{3}\right)^{16}\right]$

(D) $\frac{15}{4}\left[1-\left(\frac{1}{3}\right)^{14}\right]$

Answer: (A) $\frac{15}{4}\left[1-\left(\frac{1}{3}\right)^{20}\right]$

19 . Sum of first 20 terms of geometric series $\frac{5}{2}+\frac{5}{6}+\frac{5}{18}+\cdots$ ....

A = first term = 5/2 n=total no.of terms

R = difference = 1/3

$$\sum_{k=0}^{n}((a^k)) = 1\left(\frac{1-\mathrm{rn}}{1-\mathrm{r}}\right)$$

$$= \frac{5}{2}\left(\frac{1-\left(\frac{1}{3}\right)n}{1-\frac{1}{3}}\right)^{20}$$

$$= \frac{5}{2}\left(\frac{1-\left(\frac{1}{3}\right)}{\frac{3-1}{3}}\right)^{20}$$

$$= \frac{5}{2}\left(\frac{1-\left(\frac{1}{3}\right)}{\frac{2}{3}}\right)^{20}$$

$$=> \frac{15}{4}[1-\left(\frac{1}{20}\right)^{20}$$