Simplification

1. $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\ldots\ldots\left(1-\frac{1}{19}\right)\left(1-\frac{1}{20}\right)=?$

(a) $\frac{1}{20}$

(b) $\frac{2}{19}$

(c) $\frac{19}{10}$

(d) इनमें से कोई नहीं

Solve:

$\frac{1}{2}\times\frac{2}{3}\times\frac{3}{4}\times\frac{4}{5}\times\ldots\ldots\times\frac{18}{19}\times\frac{19}{20}$

$\Rightarrow \boxed{\frac{1}{20}}$

$\left(1-\frac{1}{2}\right)$

$\frac{2-1}{2}=\frac{1}{2}$

Ques:- $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{5}\right)\ldots\left(1+\frac{1}{19}\right)\left(1+\frac{1}{20}\right)=?$

Solve:-

$\frac{3}{2}\times\frac{4}{3}\times\frac{5}{4}\times\frac{6}{5}\times\ldots\times\frac{20}{19}\times\frac{21}{20}$

$\frac{21}{2}=\boxed{10.5}$

2. $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)\ldots\left(2-\frac{997}{999}\right)=?$

(a) $\frac{1001}{3}$

(b) $\frac{5}{999}$

(c) $\frac{1001}{9}$

(d) None of these.

Solve:

$\frac{5}{3}\times\frac{7}{5}\times\frac{9}{7}\times\ldots\times\frac{1001}{999}$

$\Rightarrow \boxed{\frac{1001}{3}}$

$\begin{array}{r} 999 \\ \times\ 2 \\ \hline 1998 \\ -\ 997 \\ \hline 1001 \end{array}$

3. $\left(1-\frac{1}{5}\right)\left(1-\frac{1}{6}\right)\left(1-\frac{1}{7}\right)\ldots\left(1-\frac{1}{100}\right)=?$

(a) 0

(b) $\frac{1}{25}$

(c) $\frac{1}{50}$

(d) $\frac{1}{100}$

Solve:

$\frac{4}{5}\times\frac{5}{6}\times\frac{6}{7}\times\ldots\times\frac{99}{100}$

$\frac{4}{100}\Rightarrow\frac{1}{25}$

Type

Continuous Fraction Series.

Simplification

4. $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\text{------}+\frac{1}{n(n+1)}$ का मान ज्ञात करें-

(a) $\frac{(n+1)}{n}$

(b) $\frac{n+1}{2n}$

(c) $\frac{n(n+1)}{2}$

(d) $\frac{n}{n+1}$

Solve:

योग $\Rightarrow \frac{1}{\text{अन्तर}}$ [1st - Last]

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

$\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \text{----} + \frac{1}{n(n+1)}$

अन्तर = 1 ; 1 ; 1 ; 1

5. $\frac{1}{11\times12}+\frac{1}{12\times13}+\frac{1}{13\times14}+\text{-----}+\frac{1}{80\times81}$

(a) $\frac{69}{890}$

(b) $\frac{70}{891}$

(c) $\frac{71}{790}$

(d) $\frac{72}{891}$

Solve:

First term $= \frac{1}{11}$, Last term $= \frac{1}{81}$

योग $= \frac{1}{\text{अन्तर}}$ [1st - Last]

$\Rightarrow \frac{1}{1}\left[\frac{1}{11}-\frac{1}{81}\right] \Rightarrow \frac{81-11}{11\times81} = \frac{70}{891}$

6. $\frac{1}{1\times4}+\frac{1}{4\times7}+\frac{1}{7\times10}+\text{----}+\frac{1}{97\times100}$

(a) $\frac{33}{100}$

(b) $\frac{34}{99}$

(c) $\frac{35}{99}$

(d) $\frac{37}{100}$

Solve:

1st Term $\Rightarrow \frac{1}{1}=1$, Last term $= \frac{1}{100}$

योग $\Rightarrow \frac{1}{3}\left[1-\frac{1}{100}\right]$

$\Rightarrow \frac{1}{3}\times\frac{99}{100}^{33} = \frac{33}{100}$

7. $\frac{1}{3\times7}+\frac{1}{7\times11}+\frac{1}{11\times15}+\text{----}+\frac{1}{899\times903}$

अन्तर = 4

(a) $\frac{21}{509}$

(b) $\frac{18}{409}$

(c) $\frac{25}{301}$

(d) $\frac{29}{31}$

Solve:

योग $= \frac{1}{\text{अन्तर}}$ [1st - Last]

First term $= \frac{1}{3}$, Last term $= \frac{1}{903}$

$\Rightarrow \frac{1}{4}\left[\frac{1}{3}-\frac{1}{903}\right]$

$\Rightarrow \frac{1}{4}\left[\frac{903-3}{2709}\right] \Rightarrow \frac{1}{4}\times\frac{\cancel{900}^{100}}{\cancel{2709}_{301}} = \frac{25}{301}$

Simplification

9. $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}$ का मान ज्ञात कीजिए?
(2×3, 3×4, 4×5, 5×6, 6×7, 7×8, 8×9)

(a) $\frac{7}{9}$
(b) $\frac{3}{4}$
(c) $\frac{6}{5}$
(d) $\frac{8}{9}$

Solve:

$\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+\frac{1}{4\times5}+\frac{1}{5\times6}+\cdots\cdots\frac{1}{8\times9}$

अन्तर = 1 Last = $\frac{1}{9}$, 1st = $\frac{1}{1}=1$.

योग $\Rightarrow \frac{1}{1}\left[1-\frac{1}{9}\right] \Rightarrow \frac{8}{9}$

10. $\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}+\frac{1}{90}$ का मान ज्ञात कीजिए।

(a) $\frac{1}{10}$
(b) $\frac{3}{5}$
(c) $\frac{3}{20}$
(d) $\frac{7}{20}$

Solve:

$\frac{1}{4}-\frac{1}{10}=\frac{6}{40}=\frac{3}{20}$

No. of zeros - शून्यों की संख्या

$2\times5 \Rightarrow$ एक zero

$2\times2\times5\times5=100$

$2^5\times5^3$ में कितने zero = ?

$\Rightarrow 1\times2\times3\times4=24$

$\Rightarrow 1\times2\times3\times4\times5=120$ ↑ एक zero

$2^5\times5^3$

$2^2\times2^3\times5^3$

$\Rightarrow 32\times125$

$\Rightarrow 4000$

* $1=2^3\times5^{17}$ में कितने zero = ? 3
* $2=2^{20}\times5^4$ में कितने zero = ? 4
* $3: 2^{17}\times5^4\times4^{19}\times6^{20}\times8^{77}\times9^{44}$ में कितने zero = ? 4

(2^{17} × 5^4 × $(2^2)^{19}$)

Simplification

$2^2 \times 5^4 \times 4^4$ में कितने zero = ?

$(2^2)^4$

$\Rightarrow 2^2 \times 5^4 \times 2^8$

$\Rightarrow 2^{10} \times 5^4 \Rightarrow$ No. of zeroes = **4.**

6^3
$(2\times3)^3$
$6^3 = 2^3 \times 3^3$

$2^8 \times 5^4 \times 6^4 \times 10^{14}$ में कितने zero = ?

$\Rightarrow 2^8 \times 5^4 \times (2\times3)^4 \times (5\times2)^{14}$

$\Rightarrow 2^8 \times 5^4 \times 2^4 \times 3^4 \times 5^{14} \times 2^{14}$

$\Rightarrow 2^{26} \times 5^{18} \Rightarrow$ No. of zeroes → **18.**

$10^2 = 100$
$10^3 = 1000$
$10^4 = 10000$

20! = 120 में अन्त में कितने zero होंगे ? **4**

5	20
	4

$120 = 20 \times 19 \times 18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$20 = 5\times4$, $15 = 5\times3$, $10 = 5\times2$, $5 = 5$

80 में अन्त में कितने zero हैं ?

$\longrightarrow 80 \times 79 \times 78 \times 77 \ldots 4 \times 3 \times 2 \times 1.$

5	80
5	16
	3

$\Rightarrow 16 + 3 = 19$

5	85
5	17
	3

$17 + 3 = 20$

5	83
5	16
	3

$\Rightarrow 16 + 3 = 19.$

13. What will be the number of zeros in $5^{217} \times 2^{129} \times 6^{10}$?
$5^{217} \times 2^{129} \times 6^{10}$ के अंत में शून्यों की संख्या क्या होगी ?

(a) **139**
(b) 129
(c) 217
(d) 151

Solve:

$5^{217} \times 2^{129} \times (2\times3)^{10}$

$\Rightarrow 5^{217} \times 2^{129} \times 2^{10}$

$\Rightarrow 5^{217} \times 2^{139}$.

$129 + 10 =$ **139.**

15. $1 \times 2 \times 3 \times 4 \times 5 \times \ldots\ldots \times 161 \times 162 \times 163$ में शून्यों की संख्या क्या होगी?

Solve:-

(a) 39

(b) 40

(c) 38

(d) 35.

5	162
5	32
5	6
	1

$32 + 6 + 1 = 39$