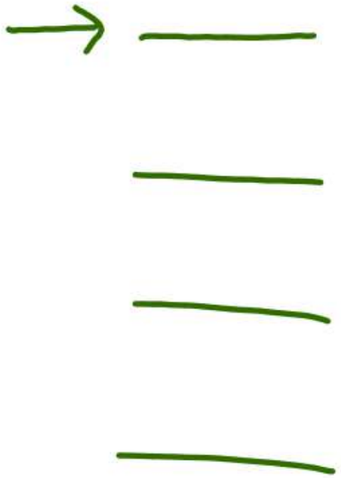
SIMPLIFICATION

सरलीकरण

Class Notes by Aditya Ranjan Sir

	Pre	Mains
~~Simplification~~	(2-3)	(3-4)
Surds & Indices	3-4	5-6

Simplification



CONCEPT-01 (BODMAS Rule)

$\overline{V}$BODMAS

This rule is the basic principle of solving algebraic or numerical expressions.

यह नियम बीजगणितीय या संख्यात्मक व्यंजकों को हल करने का मूल सिद्धांत है।

Order to solve/हल करने के क्रम

B → Bracket (कोष्ठक)

O → of (का)

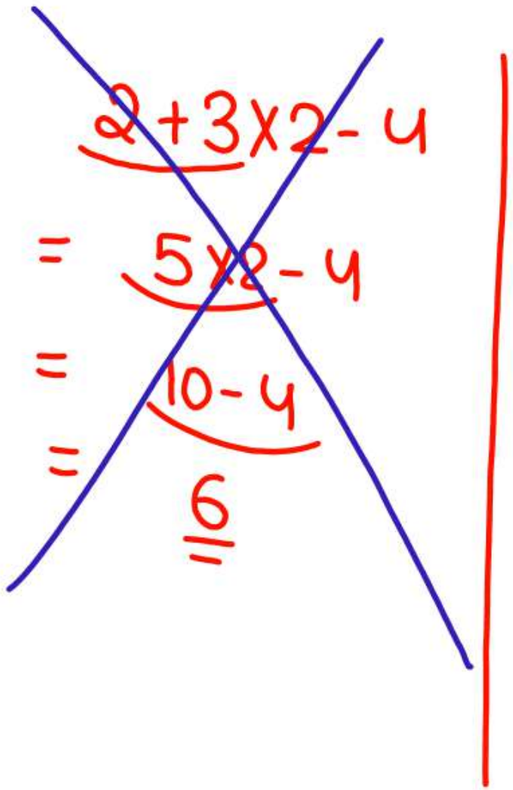
D → Division (भाग)

M → Multiplication (गुणा)

A → Addition (जोड़)

S → Subtraction (घटाव)

$2+3\times2-4$



$2+3\times2-4$

$= 2+6-4$

$= 8-4$

$= 4$ Ans

BODMAS

VBODMAS

V → Vinculam / Bar

Ex :- $2+3\times4+\overline{5-3}$

$= 2+3\times4+2$

$= 2+12+2$

$= \underline{\underline{16}}$

B → Bracket

( )

{ }

[ ]

Ex:- $\left[2+\{3-5(2+3)\}\right]$

$= \left[2+\{3-5\times5\}\right]$

$= \left[2-22\right]$

$= \underline{\underline{-20}}$

Types of Bracket & Solving order

कोष्ठक के प्रकार एवं हल करने के क्रम

(i) $\overline{\quad}$ → Vinculum/Line/Bar bracket (रेखा कोष्ठक)

(ii) ( ) → Small bracket (छोटा कोष्ठक)

(iii) { } → Curly bracket (मंझला कोष्ठक)

(iv) [ ] → Square bracket (बड़ा कोष्ठक)

BODMAS

Q. $14+3\times2-4\div\overline{2\times7}$

$= 14+3\times2-4\div14$

$= 14+3\times2-\frac{\cancel{4}^{2}}{\cancel{14}_{7}}\times\frac{1}{\cancel{7}}$

$= 14+6-\frac{2}{7}$

$= 20-\frac{2}{7}$

$= \frac{140-2}{7}$

$= \frac{138}{7}$

Q. $2+3\text{of}\,7+(4-2)\times5\div\overline{2+3}$

$= 2+3\text{of}\,7+(4-2)\times5\div5$

$= 2+3\text{of}\,7+2\times5\div5$

$= 2+21+2\times5\div5$

$= 2+21+\underline{2\times1}$

$= 2+21+2$

$= \underline{\underline{25}}$

① $(222+111) \div 34 + 24 \times \overline{2-1}$

$= \underbrace{333 \div 34}_{9} + \underbrace{24 \times 1}_{24}$

$= 9 + 24$

$= 33$

BODMAS

1. **The value of 11 × 11 + 11 ÷ 11 – 11 × 11 + 11 + 11 × 11 – 11 – 11 × 11 is:**

11 × 11 + 11 ÷ 11 – 11 × 11 + 11 + 11 × 11 – 11 – 11 × 11 का मान क्या है?

SSC CPO 03/10/2023 (Shift-01)

(a) 121 (b) 0

(c) 11 (d) 1

VBODMAS

$= \underbrace{11\times11}_{121} + \underbrace{11\div11}_{1} - \underbrace{11\times11}_{121} + 11 + \underbrace{11\times11}_{121} - 11 - \underbrace{11\times11}_{121}$

$= 1$

2. Evaluate the following 5 – [96 ÷ 4 of 3 – (16 – 55 ÷ 5)].

12 (16 – 11)

5 – [96 ÷ 4 of 3 – (16 – 55 ÷ 5)] का मान ज्ञात कीजिए।

(a) 0 **(b) 3**

(c) 2 **(d) 4**

= 5 – [96 ÷ 12 – 5]

= 5 – [8 – 5]

= 5 – 3

= 2

✓BODMAS

3. Simplify the given expression.

दिए गए व्यंजक का मान ज्ञात कीजिए।

$18 \div 3 \times 5 + 72 \div 36 \times 3 - 4 \div 8 \times 2$

SSC CGL 14/07/2023 (Shift-4)

(a) 20

(b) $\frac{20}{3}$

(c) $\frac{25}{3}$

(d) 25

$(3 \times 5) + (2 \times 3) - (4 \times \frac{1}{8} \times 2)$

$= 15 + 6 - 1$

$= 20$

VBODMAS

4. Simplify

निम्नलिखित का मान ज्ञात करें।

$2.5 \times [144 \div 198 \times \{121 \times 81 \div (99)\}]$

SSC CGL 17/07/2023 (Shift-01)

(a) 180 (b) 175

(c) 185 (d) 190

$2.5 \times [144 \div 198 \times \{\frac{11}{121} \times \frac{9}{81} \times \frac{1}{99}\}]$

$= 2.5 \times [144 \div 198 \times 99]$

$= 2.5 \times [\frac{72}{144} \times \frac{1}{198} \times 99]$

$= 2.5 \times 72$

$= 180$

5. **Simplify./निम्न का मान ज्ञात करें।**

$325 + 276 \div [150 - \{9 \times 9 + (83 - \cancel{4 \times 15})\}]$

60

SSC CGL 20/07/2023 (Shift-03)

(a) 332 (b) 333

(c) 334 (d) 331

✗BODMAS

$325+276\div[150-\{9\times9+83\}]$

$=325+276\div[150-104]$

$=325+276\div46$

$=325+6$

$=331$

6. If $(48 \div 72 \times 3) - [15 \div 8 \times (40 - 32) - 10] + 2P = 6 \div 2$, then find the value of P?

यदि $(48 \div 72 \times 3) - [15 \div 8 \times (40 - 32) - 10] + 2P = 6 \div 2$, तो P का मान ज्ञात कीजिए?

SSC CPO 03/10/2023 (Shift-3)

(a) 2 (b) 4

(c) 1 (d) 3

$(48 \div 72 \times 3) - [15 \div 8 \times (40-32) - 10] + 2P = 6 \div 2$

$\Rightarrow \left(\frac{48}{72} \times 1 \times 3\right) - [15 \div 8 \times 8 - 10] + 2P = 3$

$\Rightarrow 2 - [15 \times 1 \times 1 - 10] + 2P = 3$

$\Rightarrow 2 - 5 + 2P = 3$

$\Rightarrow 2P = 3$

$$= \frac{\left(\frac{13}{3}+\frac{10}{3}\times\frac{9}{5}\div\frac{15}{4}\times\left(\frac{3}{2}+\frac{4}{3}\right)\right)}{\left(\frac{2}{3}\times\frac{26}{5}\times\frac{2}{3}\right)}$$

$$= \frac{\frac{13}{3}+\frac{2}{3}\times\frac{3}{5}\times\frac{4}{15}\times\frac{17}{6}}{\left(\frac{8}{15}\right)}$$

$$= \frac{5\times13}{5\times3}+\frac{68}{15} \Big/ \frac{8}{15} = \frac{133}{8} = 16\frac{5}{8}$$

7. Find the value of the given expression.

नीचे दिए गए व्यंजक का मान ज्ञात कीजिए।

$$\frac{\left(4\frac{1}{3}+3\frac{1}{3}\times1\frac{4}{5}\div3\frac{3}{4}\times\left(1\frac{1}{2}+1\frac{1}{3}\right)\right)}{\left(\frac{2}{3}\div\frac{5}{6}\times\frac{2}{3}\right)}$$

$$\frac{3}{2}\times\frac{4}{3} = \frac{9+8}{6} = \frac{17}{6}$$

SSC CHSL 10/08/2023 (Shift-2)

(a) $11\frac{3}{8}$

(b) $10\frac{3}{8}$

(c) $14\frac{3}{8}$

(d) $16\frac{5}{8}$

8. Simplify the following expression

दिए गए व्यंजक सरल कीजिए।

$$25-\left[16-\left\{14-\left(18-\overline{8+3}\right)\right\}\right]$$

(a) 16 **(b) 18**
(c) 15 **(d) 20**

$25-[16-\{14-(18-11)\}]$
$= 25-[16-\{14-7\}]$
$= 25-[16-7]$
$= 25-9$
$= 16$

$$\frac{10}{3}-\left\{\frac{13}{3}+\left(\frac{10}{3}\div\overline{\frac{7}{3}-\frac{1}{3}}\right)\right\}$$

$$=\frac{10}{3}-\left\{\frac{13}{3}+\left(\frac{10}{3}\div\frac{6}{3}\right)\right\}$$

$$=\frac{10}{3}-\left\{\frac{13}{3}+\frac{10}{3}\times\frac{3}{6}\right\}$$

$$=\frac{10}{3}-\left\{\frac{13}{3}+\frac{5}{3}\right\}$$

$$=\frac{10}{3}-\frac{18}{3}=-\frac{8}{3}$$

9. Simplify:

निम्न का मान ज्ञात कीजिए।

$$3\frac{1}{3}-\left\{4\frac{1}{3}+\left(3\frac{1}{3}\div\overline{2\frac{1}{3}-\frac{1}{3}}\right)\right\}$$

SSC CPO 04/10/2023 (Shift-01)

(a) $-\frac{8}{3}$

(b) $-\frac{1}{3}$

(c) $\frac{2}{3}$

(d) $\frac{1}{3}$

$3\frac{1}{3}=\frac{10}{3}$

10. If $A = 3\frac{1}{4} \times 4\frac{1}{4} \div 34 - \frac{47}{32} + \frac{47}{16}$ and $B = 2\frac{1}{2} + 5\frac{1}{2} \div 55 - \frac{11}{10}$ then what is the value of A – B?

यदि $A = 3\frac{1}{4} \times 4\frac{1}{4} \div 34 - \frac{47}{32} + \frac{47}{16}$ तथा $B = 2\frac{1}{2} + 5\frac{1}{2} \div 55 - \frac{11}{10}$ हो, तो A – B का मान क्या है?

(a) $\frac{5}{8}$ (b) 1

(c) 0 (d) $\frac{3}{8}$ ✓

$A = \frac{13}{4} \times \frac{17}{4} \div 34 - \frac{47}{32} + \frac{47}{16}$

$= \frac{13}{4} \times \frac{17}{4} \times \frac{1}{2\cancel{34}} - \frac{47}{32} + \frac{94}{32}$

$= \frac{13}{32} + \frac{47}{32} = \frac{60}{32}$

$B = \frac{5}{2} + \frac{11}{2} \div 55 - \frac{11}{10}$

$= \frac{5}{2} + \frac{\cancel{11}}{2} \times \frac{1}{\cancel{55}_{5}} - \frac{11}{10}$

$= \frac{5}{2} + \frac{1}{10} - \frac{11}{10}$

$= \frac{25 - 10}{10} = \frac{15}{10} = \frac{3}{2}$

Ans

$\frac{60}{32} - \frac{3}{2} \times \frac{16}{16}$

$= \frac{\cancel{48}\ 3}{\cancel{32}\ 8}$

CONCEPT-02

(A)

$$a^2 + b^2 = (a + b)^2 - 2ab$$

$$a^2 + b^2 = (a - b)^2 + 2ab$$

$$a^2 - b^2 = (a + b)(a - b)$$

$$\frac{a^2-b^2}{0.24}$$

$$= \frac{5.10 \times 9.60 \times 100}{100 \times 24 \times 100}$$

$$= 204$$

11. Simplify the following expression.

निम्नलिखित व्यंजक का मान ज्ञात कीजिए।

$$\frac{7.35 \times 7.35 - 2.25 \times 2.25}{0.24}$$

SSC CGL 27/07/2023 (Shift-3)

(a) 204 (b) 320

(c) 225 (d) 304

$a^2-b^2 = (a-b)(a+b)$

$$\frac{(a+b)^2+(a-b)^2}{a^2+b^2}$$

$$= \frac{a^2+b^2+2ab+a^2+b^2-2ab}{a^2+b^2}$$

$$= \frac{2(a^2+b^2)}{(a^2+b^2)}$$

$$= 2$$

12. Simpify:

निम्न को सरल कीजिए।

$$\frac{(379+276)^2+(379-276)^2}{379\times379+276\times276}$$

SSC CHSL 11/08/2023 (Shift-2)

(a) 2
(b) 655
(c) 103
(d) 1

$$(a+b)^2+(a-b)^2 = a^2+b^2+2ab+a^2+b^2-2ab = 2(a^2+b^2)$$

$$(a+b)^2-(a-b)^2 = (a^2+b^2+2ab)-(a^2+b^2-2ab)$$

$$= a^2+b^2+2ab-a^2-b^2+2ab$$

$$= \underline{2\times 2ab}$$

$$\frac{(a+b)^2+(a-b)^2}{a^2+b^2}$$

$$= \frac{2(a^2+b^2)}{(a^2+b^2)}$$

12. Simpify:

निम्न को सरल कीजिए।

$$\frac{(379+276)^2+(379-276)^2}{379\times379+276\times276}$$

(a = 379, b = 276)

SSC CHSL 11/08/2023 (Shift-2)

(a) 2
(b) 655
(c) 103
(d) 1

13. Simplify the given expression.

दिए गए व्यंजक का सलीकरण करें।

$$\frac{(326+222)^2-(326-222)^2}{(326\times 222)}$$

$(a+b)^2 - (a-b)^2$

$a \times b$

SSC CGL 18/07/2023 (Shift-01)

(a) 1 (b) 4

(c) 3 (d) 2

$$= \frac{2 \times 2ab}{ab}$$

$$\frac{a^2+b^2+2ab}{a^2-b^2} + \frac{0.5}{1.5} \quad \frac{1}{3}$$

$$= \frac{(a+b)(a+b)}{(a-b)(a+b)} + \frac{1}{3}$$

$$= \frac{0.500}{0.150} + \frac{1}{3}$$

$$= \frac{10}{3} + \frac{1}{3} = \frac{11}{3}$$

14. The value of/का मान ज्ञात करें।

$$\frac{0.325 \times 0.325 + 0.175 \times 0.175 + 25 \times 0.00455}{5 \times 0.0065 \times 3.25 - 7 \times 0.175 \times 0.025} + \frac{0.5}{1.5}$$

SSC CPO 24/11/2020 (Shift-1)

(a) $\frac{11}{3}$ (b) 3

(c) 0 (d) $\frac{7}{3}$

$$0.325 + 0.175 = 0.500 \qquad 0.325 - 0.175 = 0.150$$

$$\Rightarrow \frac{a^2-b^2}{a^2+b^2+2ab} = 1-K$$

$$\Rightarrow \frac{(a-b)(a+b)}{(a+b)(a+b)} = 1-K$$

$$\Rightarrow \frac{334}{1000} = 1-K$$

$$\Rightarrow 0.334 = 1-K$$

$$\Rightarrow K = 1-0.334$$

$$K = 0.666$$

15. The value of

$$\frac{4.669 \times 4.669 - 9 \times (0.777)^2}{(4.669)^2 + (2.331)^2 + 14(0.667)(2.331)}$$

is (1 – k), where k = ?

$$\frac{4.669 \times 4.669 - 9 \times (0.777)^2}{(4.669)^2 + (2.331)^2 + 14(0.667)(2.331)}$$ का मान (1 – k) है, जिसमें k = ?

SSC CPO 11/12/2019 (Shift-02)

(a) 0.666 ✓

(b) 0.647

(c) 0.467

(d) 0.768

16. The value of $\dfrac{(0.13)^2+(0.21)^2}{(0.39)^2+81(0.07)^2}$ $\div \dfrac{(2.4)^4+3\times(11.52)+9}{(2.4)^6+6(2.4)^4+3\times(17.28)}$ lies between:/का मान किसके बीच स्थित है?

SSC CPO 12/12/2019 (Shift-01)

(a) 0.7 and 0.8 (b) 0.4 and 0.5

(c) 0.6 and 0.7 (d) 0.5 and 0.6

$\dfrac{a^2+b^2}{(3a)^2+(3b)^2} \div \dfrac{[(2.4)^2]^2+2\times(2.4)^2\times3+(3)^2}{[(2.4)^2]^3+2\times3\times[(2.4)^2]^2+3\times(2.4)^2\times3}$

$= \dfrac{a^2+b^2}{9a^2+9b^2} \div \dfrac{c^2+2\times c\times d+d^2}{c^3+2\times d\times c^2+d^2\times c}$

$= \dfrac{a^2+b^2}{9(a^2+b^2)} \div \dfrac{c^2+2cd+d^2}{c(c^2+2cd+d^2)}$

$= \dfrac{1}{9}\times\dfrac{c}{1}$

$= \dfrac{1}{\cancel{3}\cancel{9}}\times\dfrac{\cancel{2.4}\times\cancel{2.4}}{10\times10}$

$= \dfrac{64}{100} = 0.64$

let $(2.4)^2 = c$

$3 = d$

$\dfrac{(2.4)^4+3\times2.4\times2.4\times2+(3)^2}{(2.4)^6+}$

$17.28 = 2.4\times2.4\times3$

(B)

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(a^3+b^3)=(a+b)(a^2+b^2-ab)$$

$$(a^3-b^3)=(a-b)(a^2+b^2+ab)$$

$$\frac{a^2+b^2-ab}{a^3+b^3}$$

$$= \frac{(a^2+b^2-ab)}{(a+b)(a^2+b^2-ab)} = \frac{1}{(a+b)}$$

$$= \frac{1}{679}$$

17. Simplify the given expression.

दिए गए व्यंजक का सरलीकरण करें।

$$\frac{432 \times 432 + 247 \times 247 - 432 \times 247}{432 \times 432 \times 432 + 247 \times 247 \times 247}$$

a x a b x b - axb

SSC CGL 19/07/2023 (Shift-01)

(a) $\frac{1}{259}$

(b) $\frac{1}{185}$

(c) $\frac{1}{679}$ ✓

(d) $\frac{1}{450}$

$(0.1)^1 = 0.1$

$(0.1)^2 = 0.01$

$(0.1)^3 = 0.001$

$(0.1)^4 = 0.0001$

$$\frac{a^3-b^3}{a^2+ab+b^2}$$

$$= \frac{(a-b)(a^2+b^2+ab)}{(a^2+b^2+ab)}$$

$$= 0.43$$

18. Simplify: $\dfrac{(0.83)^3 - (0.1)^3}{(0.83)^2 + 0.083 + 0.01} = ?$

समीकरण $\dfrac{(\underset{a}{0.83})^3 - (\underset{b}{0.1})^3}{(0.83)^2 + 0.083 + (0.1)^2} = ?$

SSC CHSL 14/08/2023 (Shift-2)

(a) 0.98
(b) 0.27
(c) 0.93
(d) 0.73 ✓

$$\begin{array}{r} 0.83 \\ -\ 0.10 \\ \hline 0.73 \end{array}$$

19. The value of/का मान ज्ञात कीजिए।

$$\frac{(0.013)^3 + (0.007)(0.000049)}{(0.007)^2 + 0.013(0.013 - 0.007)}$$

a^3 $b \times b^2$

SSC CPO 13/12/2019 (Shift-02)

(a) 0.07 (b) 0.02

(c) 0.06 (d) 0.04

$$\frac{a^3+b^3}{b^2+a(a-b)} = \frac{(a+b)(a^2+b^2-ab)}{(b^2+a^2-ab)} = 0.020$$

$$\begin{array}{r} 0.013 \\ 0.007 \\ \hline 0.020 \end{array}$$

M-1

$$\frac{a^3+b^3}{\frac{a}{10}\times\frac{a}{10}+\frac{b^2}{100}-\frac{ab}{100}}$$

$$= \frac{(a+b)(a^2+b^2-ab)}{\frac{1}{100}(a^2+b^2-ab)}$$

$$= 100(a+b)$$

$$= 100 \times 1000$$

$$= 100000$$

20. $$\frac{675\times675\times675+325\times325\times325}{67.5\times67.5+32.5\times32.5-67.5\times32.5}$$ is equal to:

$$\frac{675\times675\times675+325\times325\times325}{67.5\times67.5+32.5\times32.5-67.5\times32.5}$$

निम्नलिखित में से किसके बराबर है:

(a) 100
(b) 10,000
(c) 1,000
(d) 1,00,000

20. $\dfrac{675 \times 675 \times 675 + 325 \times 325 \times 325}{67.5 \times 67.5 + 32.5 \times 32.5 - 67.5 \times 32.5}$ is equal to:

$$\frac{675 \times 675 \times 675 + 325 \times 325 \times 325}{67.5 \times 67.5 + 32.5 \times 32.5 - 67.5 \times 32.5}$$

निम्नलिखित में से किसके बराबर है:

(a) 100 (b) 10,000

(c) 1,000 (d) 1,00,000

$$\frac{[a^3+b^3]}{a^2+b^2-ab} \times 100$$

$$= \frac{(a+b)(a^2+b^2-ab)}{(a^2+b^2-ab)} \times 100 = 1000 \times 100$$

$$\frac{[a^3+b^3]}{a^2-ab+b^2} \times 100 = 5 \times 10^k$$

$$\Rightarrow \frac{(a+b)(a^2+b^2-ab)}{(a^2+b^2-ab)} \times 100 = 5 \times 10^k$$

$$\Rightarrow 50000 = 5 \times 10^k$$

$$\Rightarrow 5 \times 10^4 = 5 \times 10^k$$

$$k = 4$$

21. The value of $\frac{(251)^3 + (249)^3}{25.1 \times 25.1 - 624.99 + 24.9 \times 24.9}$ is 5×10^k, where the value of k is ____.

$$\frac{100 \times (251)^3 + (249)^3}{25.1 \times 25.1 - 624.99 + 24.9 \times 24.9}$$ का मान 5×10^k, है, जहाँ **k** का मान ____ है।

(a) 4 (b) 5
(c) 3 (d) 6

(C)

If $a + b + c = 0$

then $\Rightarrow a^3 + b^3 + c^3 = 3abc$

$(2)^3 + (3)^3 + (-5)^3 = 3 \times (2)(3)(-5)$

$= 8 + 27 - 125$

$= 35 - 125$

$= -90$ ✓

-90 ✓

$$\frac{2\times0.34\times3\times0.41\times0.13}{(0.34)^3+(0.41)^3+(-2\times0.39)^3}$$

$$= \frac{0.34\times0.41\times0.78}{3\times0.34\times0.41\times(-0.78)}$$

$$= \frac{1}{(-3)} = -\frac{1}{3}$$

22. What is the value of/का मान ज्ञात कीजिए।

$$\frac{0.74\times1.23\times0.13}{(0.37)^3+(0.41)^3-8(0.39)^3}$$

SSC CPO 11/12/2019 (Shift-01)

(a) $-\frac{1}{3}$ (b) 1

(c) −1 (d) $\frac{1}{3}$

$(2)^3 = 8 \quad (-2)^3 = -8$

$(3)^3 = 27 \quad (-3)^3 = -27$

22. What is the value of/का मान ज्ञात कीजिए।

$$\frac{0.74 \times 1.23 \times 0.13}{(0.37)^3 + (0.41)^3 - 8(0.39)^3}$$

$\frac{abc}{3a(-a)} = -\frac{1}{3}$

SSC CPO 11/12/2019 (Shift-01)

(a) $\frac{-1}{3}$ (b) 1

(c) −1 (d) $\frac{1}{3}$

$(2a)^3 = 8a$

$(3a)^3 = 27a$

$$\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ac}$$

$$= \frac{(a+b+c)(a^2+b^2+c^2-ab-bc-ac)}{(a^2+b^2+c^2-ab-bc-ac)}$$

$$= 7.247$$

23. Simplify/सरल करें:

$$\frac{(3.321)^3 + (2.681)^3 + (1.245)^3}{(3.321)^2 + (2.681)^2 + (1.245)^2}$$

$$\frac{-3 \times 3.321 \times 2.681 \times 1.245}{-(3.321 \times 2.681) - (2.681 \times 1.245) - (1.245 \times 3.321)}$$

SSC CHSL 04/08/2023 Shift-01

(a) 6.125 (b) 8.645

(c) 7.247 (d) 10.245

$a^3+b^3+c^3-3abc = (a+b+c)[a^2+b^2+c^2-ab-bc-ac]$

3.321
2.681
1.245
7.247

24. Simplify the given expression.

$$\frac{(80\times 80\times 80)+(70\times 70\times 70)+(50\times 50\times 50)-840000}{6400+4900+2500-5600-3500-4000}$$

a, b, c, 3abc

दिए गए व्यंजक को सरल कीजिए।

SSC CHSL 10/08/2023 (Shift-01)

(a) 100 (b) 200
(c) 400 (d) 300

$$\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ac}=\frac{(a+b+c)(a^2+b^2+c^2-ab-bc-ac)}{(a^2+b^2+c^2-ab-bc-ac)}$$

$= 200$

ⓘ Timing_

11:45 11:40 11:30 → advance (Simplification)

6:30 → arithmetic (%)

Champions Doubt Group

8506003399

$$= \frac{a^3+b^3}{25(a^2-ab+b^2)}$$

$$= \frac{(a+b)(a^2+b^2-ab)}{25(a^2+b^2-ab)}$$

$$= \frac{0.013}{25} \times \frac{1}{1000}$$

$$= \frac{13}{25} \times 10^{-3}$$

25. Simplify the following.

निम्नलिखित का सरलीकरण कीजिए।

$$\frac{0.01 \times 0.01 \times 0.01 + 0.003 \times 0.003 \times 0.003}{0.05 \times 0.05 - 0.015 \times 0.05 + 0.015 \times 0.015}$$

$a = 0.01$, $b = 0.003$

$25\,(0.01 \times 0.01 - 0.003 \times 0.01 + 0.003 \times 0.003)$

SSC CGL 24/07/2023 (Shift-3)

(a) $\frac{13}{25} \times 10^{3}$

(b) $\frac{13}{15} \times 10^{-3}$

(c) $\frac{13}{15} \times 10^{3}$

(d) $\frac{13}{25} \times 10^{-3}$

Bar Type Questions

- ✓ $0.\bar{7}$
- ✓ $0.\overline{73}$
- $0.7\bar{3}$
- $0.2\bar{3}\bar{5}$
- $0.23\overline{5}$
- $2.\bar{1}5$

Proof

① $x = 0.\bar{7}$

Ans $x = 0.777777\ldots\infty$ — (i)

$10x = 7.77777\ldots\infty$

$\Rightarrow 10x = 7 + 0.77777\ldots\infty$

$\Rightarrow 10x = 7 + x$

$\Rightarrow 9x = 7$

$\Rightarrow x = \frac{7}{9}$

Trick:

$0.\bar{7} = \frac{7}{9}$

Type 1:

$$0.\overline{23} = \frac{23}{99}$$

$$0.\overline{475} = \frac{475}{999}$$

$$0.\overline{3112} = \frac{3112}{9999}$$

$$0.\overline{234} = \frac{231}{999}$$

CONCEPT-03 (Bar Type Questions)

26. Convert 0.7777..... ∞ into fraction

दशमलव **0.7777..... ∞** को भिन्न में बदलें

$= 0.\overline{7}$

$= \frac{7}{9}$

(a) $\frac{7}{9}$

(b) $\frac{7}{3}$

(c) $\frac{7}{10}$

(d) $\frac{77}{99}$

27. Convert 0.535353.....∞ into fraction

दशमलव 0.535353.....∞ को भिन्न में बदलें

(a) $\frac{53}{99}$ (b) $\frac{53}{49}$

(c) $\frac{53}{100}$ (d) $\frac{53}{59}$

$= 0.535353 - - \infty$

$= 0.\overline{53}$

$= \frac{53}{99}$

Type 2:

$0.2\overline{35}$

Trick: $\frac{235-2}{990}$

$= \frac{233}{990}$

$0.2\overline{39}$

$\frac{239-2}{990}$

$= \frac{237}{990}$

$0.11\overline{8}$

$\frac{118-11}{900}$

$= \frac{107}{900}$

$0.2\overline{47}$

$\frac{247-2}{990}$

$= \frac{245}{990}$

28. Convert it into vulgar fraction

$0.5\overline{87}$

CISF HCM 30/10/2023 Shift-01

$$\frac{584-5}{990}$$

$$= \frac{582}{990} \quad \frac{97}{165}$$

(a) $\frac{93}{167}$

(b) $\frac{97}{165}$

(c) $\frac{95}{167}$

(d) $\frac{91}{165}$

$x = 0.01\overline{23}$

Basic

$x = 0.01232323\ldots\infty$

$100x = 1.232323\ldots\infty$ — (i)

$= 1 + 0.\overline{23}$

$10000x = 123.232323\ldots\infty$ — (ii)

$= 123 + 0.\overline{23}$

(ii) − (i)

$9900x = 122$

$\Rightarrow x = \frac{122}{9900}$ ✓

Trick:

$x = 0.01\overline{23}$

$ans = \frac{0123 - 01}{9900}$

$= \frac{122}{9900}$ ✓

$0.06\overline{54}$

$= \frac{654 - 6}{9900}$

$= \frac{648}{9900} \frac{72}{1100} \frac{18}{275}$

29. Correct expression of $0.06\overline{54}$. (the bar indicates repeating decimal)

$0.06\overline{54}$ का सही व्यंजक है (बार दशमलव की पुनरावृत्ति को दर्शाता है):

NTPC CBT-2 19/01/2017 (Shift-1)

(a) $\frac{654}{1000}$

(b) $\frac{654}{10000}$

(c) $\frac{18}{275}$

(d) $\frac{18}{277}$

Type 3:

$x = 1.2\overline{34}$

$= 1 + 0.2\overline{34}$

$= 1 + \left(\frac{234-2}{990}\right)$

$= 1 + \frac{232}{990}$

$= \frac{990+232}{990}$

$= \frac{1222}{990}$

Trick: $\frac{1234-12}{990} = \frac{1222}{990}$

① $4.3\overline{52}$

Ans $\frac{7352 - 73}{990}$

$= \frac{7279}{990}$

② $6.32\overline{3}$

$= \frac{6323 - 63}{990}$

$= \frac{6260}{990}$

30. **Correct expression of $1.4\overline{27}$. (the bar indicates repeating decimal)**

$1.4\overline{27}$ का सही सरलीकरण है (बार दशमलव की पुनरावृत्ति को दर्शाता है):

$\frac{1427-14}{990}$

$= \frac{1413}{990} \frac{157}{110}$

NTPC CBT-2 17/01/2017 (Shift-3)

(a) $\frac{1427}{1000}$

(b) $\frac{157}{110}$

(c) $\frac{1427}{10000}$

(d) $\frac{157}{111}$

31. $2.\overline{8768} = ?$

$= \frac{28768-28}{9990}$

$= \frac{28740}{9990} \frac{958}{333}$

$= 2\frac{292}{333}$

(a) $2\frac{878}{999}$

(b) $2\frac{9}{10}$

(c) $2\frac{292}{333}$

(d) $2\frac{4394}{4995}$

$333\overline{)958(2}$
666
292

32. Find the Value of x/x का मान ज्ञात कीजिये

$$0.\overline{3} + 0.\overline{4} + 0.\overline{5} + 0.\overline{6} = x$$

(a) 3 (b) 5

(c) 2 (d) 8

$$\frac{3}{9} + \frac{4}{9} + \frac{5}{9} + \frac{6}{9}$$

$$= \frac{18}{9} \quad 2$$

$$= 2$$

33. The value of $0.\overline{56} + 0.\overline{43} + 0.\overline{89}$ is

$0.\overline{56} + 0.\overline{43} + 0.\overline{89}$ का मान है

NTPC CBT-1, 23/02/2021 (Shift-01)

(a) $1.\overline{98}$ $\frac{197}{99}$ ✗

(b) $1.\overline{87}$

(c) $1.\overline{89}$ $\frac{188}{99}$ ✓

(d) $1.\overline{88}$ $\frac{188-1}{99} = \frac{187}{99}$

$$\frac{56}{99} + \frac{43}{99} + \frac{89}{99}$$

$$= \frac{188}{99}$$

34. $3.2\overline{45} + 1.2\overline{34} - 2.\overline{12}$ is equal to:

$3.2\overline{45} + 1.2\overline{34} - 2.\overline{12}$ बराबर है -

ICAR Mains, 08/07/2023 (Shift-3)

(a) $2.3\overline{58}$ $\frac{2358-23}{990}$ (b) $2.4\overline{37}$

$= \frac{2335}{990}$

(c) $2.2\overline{43}$ (d) $2.5\overline{36}$

$\frac{3245-32}{990} + \frac{1234-12}{990} - \frac{212-2}{99}$

$= \frac{3213}{990} + \frac{1222}{990} - \frac{210}{99}$

$= \frac{3213+1222-2100}{990} = \frac{2335}{990}$

35. Find the value of/का मान ज्ञात कीजिये

$$0.\overline{2} + 0.\overline{3} + 0.\overline{32}$$

(a) $0.\overline{77}$ (b) $0.\overline{82}$

(c) $0.\overline{86}$ (d) $0.\overline{87}$

$$\frac{2}{9} + \frac{3}{9} + \frac{32}{99}$$

$$= \frac{22+33+32}{99} = \frac{87}{99}$$

36. Find the value of/का मान ज्ञात कीजिये

$$\left[\frac{324786-324}{999}\right]-\left[\frac{10193-1019}{900}\right]$$

$$324.\overline{786}-10.19\overline{3}$$

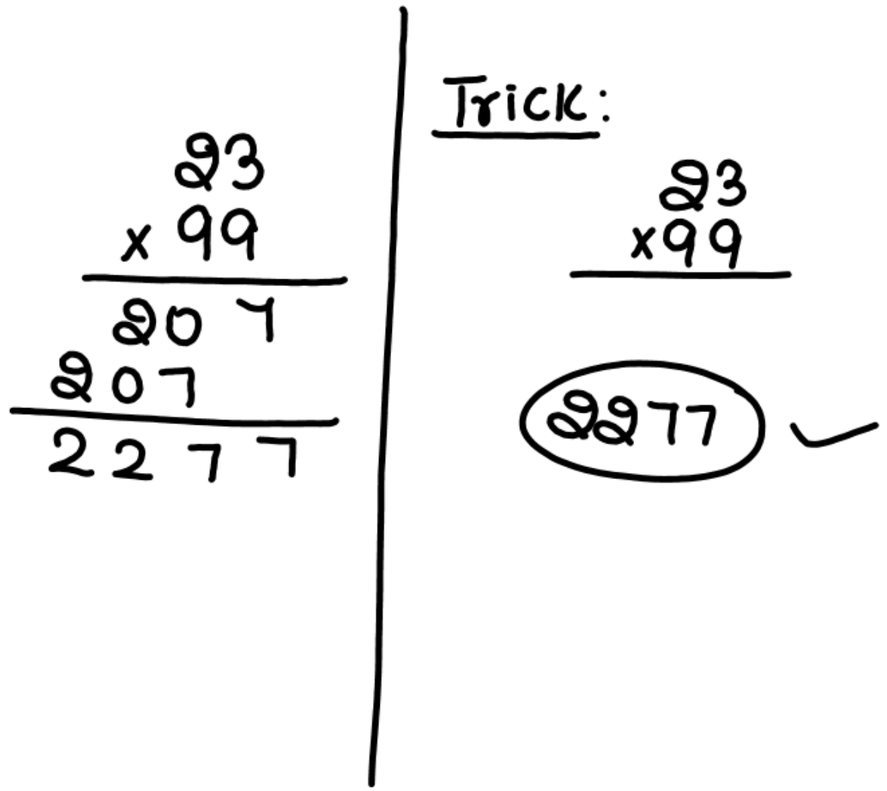
(a) $314.59345\overline{}$ (b) $314.5944\overline{5}$

(c) $314.59\overline{345}$ (d) $314.5944\overline{5}$

$$=\left(\frac{108154}{\cancel{324462}\ \cancel{999}\ 333}\right)-\left(\frac{3058}{\cancel{9174}\ \cancel{900}\ 300}\right)$$

$$=\frac{108154\,00-339438}{33300}$$

$$=\frac{10475962}{33300}=\frac{31427886}{99900}$$



34x99

3366

$$\frac{309}{990} + \frac{411}{990} + \frac{279}{900}$$

$$= \frac{720 + 279}{990\ 900}\ \begin{matrix}31\\100\end{matrix}$$

$$= \frac{7200 + 3069}{9900}$$

$$= \frac{10269}{9900}\ \frac{1141}{1100}$$

37. **If $A = 0.3\overline{12}$, $B = 0.4\overline{15}$ and $C = 0.30\overline{9}$, then what is the value of A + B + C?**

यदि $A = 0.3\overline{12}$, $B = 0.4\overline{15}$ तथा $C = 0.30\overline{9}$ है, तो $A + B + C$ का मान कितना है?

309 - 30

279

(a) $\frac{1211}{1100}$

(b) $\frac{1043}{1100}$

(c) $\frac{1097}{1100}$

(d) $\frac{1141}{1100}$ ✓

$$
\begin{array}{r}
0.3\,|\,212\,|\,12 \\
+\ 0.4\,|\,15\,|\,15 \\
+\ 0.3\,|\,09\,|\,999 \\
\hline
1.0\,|\,3\,|\,4272\,6
\end{array}
$$

$= 1.03\overline{72}$

$= \dfrac{10372-103}{9900}$

$= \dfrac{10269}{9900} = \dfrac{1141}{1100}$

37. **If $A = 0.3\overline{12}$, $B = 0.4\overline{15}$ and $C = 0.30\overline{9}$, then what is the value of A + B + C?**

यदि $A = 0.3\overline{12}$, $B = 0.4\overline{15}$ तथा $C = 0.30\overline{9}$ है, तो $A + B + C$ का मान कितना है?

(a) $\dfrac{1211}{1100}$

(b) $\dfrac{1043}{1100}$

(c) $\dfrac{1097}{1100}$

(d) $\dfrac{1141}{1100}$

38. Find the value of/का मान ज्ञात कीजिये

$$22.\overline{4} + 11.5\overline{67} - 33.5\overline{9}$$

SSC CGL TIER - II 11/09/2019

$$\frac{224-22}{9} + \frac{11567-115}{990} - \left(\frac{3359-335}{90}\right)$$

$$= \frac{202}{9} + \frac{11452}{990} - \frac{3024}{90}$$

$$= \frac{22220+11452-33264}{990}$$

$$= \frac{408}{990}$$

(a) $0.\overline{412}$ (b) $0.3\overline{1}$

(c) $0.4\overline{12}$ (d) $0.\overline{32}$

$$\frac{412-4}{990} = \frac{408}{990}$$

38. Find the value of/का मान ज्ञात कीजिये

$$22.\overline{4} + 11.\underline{5}\overline{67} - 33.\underline{5}\overline{9}$$

SSC CGL TIER - II 11/09/2019

(a) $0.\overline{412}$ (b) $0.3\overline{1}$

(c) $0.4\overline{12}$ (d) $0.\overline{32}$

Trick:

Two points:

⊙ max^{m} bar → 2

⊙ max^{m} no bar → 1

Option $.\underline{a}\,\overline{\underline{b}\,\underline{c}}$

39. Find the value of/का मान ज्ञात कीजिये

$$0.\overline{57} - 0.4\overline{32} + 0.3\overline{5}$$

SSC CGL TIER - II 16/11/2020

(a) $0.\overline{494}$

(b) $0.\overline{498}$

(c) $0.49\overline{8}$

(d) $0.49\overline{4}$

bar → 2
no bar → 1

Ans = $0.a\overline{bc}$

39. Find the value of/का मान ज्ञात कीजिये

$$0.\overline{57} - 0.4\overline{32} + 0.3\overline{5}$$

SSC CGL TIER - II 16/11/2020

(a) $0.\overline{494}$ (b) $0.\overline{498}$

(c) $0.\overline{498}$ (d) $0.\overline{494}$

$$\frac{57}{99} - \frac{428}{990} + \frac{32}{90}$$

$$= \frac{570 - 428 + 352}{990}$$

$$= \frac{494}{990}$$

40. Find the value of/का मान ज्ञात कीजिये

$$0.4\overline{7} + 0.5\overline{03} - 0.3\overline{9} \times 0.\overline{8}$$

SSC CGL TIER - II 13/09/2019

(a) $0.6\overline{15}$ (b) $0.\overline{615}$

(c) $0.62\overline{5}$ (d) $0.6\overline{25}$

$$\frac{43}{90} + \frac{498}{990} - \frac{36}{90} \times \frac{8}{9}$$

$$= \frac{11}{90} + \frac{498}{990}$$

$$= \frac{121+498}{990} = \frac{619}{990}$$

41. Find the value of/का मान ज्ञात कीजिये

H.W

$0.5\overline{6} - 0.7\overline{23} + 0.3\overline{9} \times 0.\overline{7}$

SSC CGL TIER - II 12/09/2019

(a) $0.1\overline{54}$ (b) $0.\overline{154}$

(c) $0.\overline{158}$ (d) $0.1\overline{58}$

42. Find the value of/का मान ज्ञात कीजिये

$$\left(2.\overline{4} \times 0.\overline{6} \times 3 \times 0.1\overline{6}\right) \times \left[0.\overline{27} \times \left(0.8\overline{3} \div 0.1\overline{6}\right)\right]$$

SSC CGL TIER - II 15/11/2020

(a) $0.\overline{814}$ (b) $0.\overline{11}$

(c) $1.\overline{1}$ (d) $1.\overline{36}$

$\frac{10}{9}$

$$\left[\frac{2}{9} \times \frac{6}{9} \times 3 \times \frac{15}{90} \times \frac{3}{\frac{27}{99}} \times \frac{5}{\frac{75}{90}} \times \frac{90}{15}\right]$$

$$= \frac{10}{9}$$

43. $\bar{2}.75 + \bar{3}.78$

(a) $\bar{1}.03$ (b) $\bar{1}.53$

(c) $\bar{4}.53$ (d) $\bar{5}.53$

$\bar{4}.53 = -4 + 0.53$

$= -2 + 0.75 - 3 + 0.78$

$= -5 + 1.53$

$= -4.53$

$= \bar{4}.53$

$\bar{2}.47 + \bar{3}.52$

$= -2 + 0.47 - 3 + 0.52$

$= -5 + 0.99$

$= \bar{5}.99$ ✓

$\bar{2}.13 = -2 + 0.13$

$\left(\frac{ab-a}{90}\right)+\left(\frac{ba-b}{90}\right)=\frac{5}{9}$

44. If $0.a\bar{b}+0.b\bar{a}=\frac{5}{9}$, find the value of a + b.

$\Rightarrow \left(\frac{a\times10+b\times1-a}{90}\right)+\left(\frac{b\times10+a\times1-b}{90}\right)=\frac{5}{9}$

यदि $0.a\bar{b}+0.b\bar{a}=\frac{5}{9}$, तो a + b का मान ज्ञात कीजिये।

(a) 5 (b) 6
(c) 7 (d) 8

$\Rightarrow \frac{10a+b-a+10b+a-b}{90}=\frac{5}{9}$

$\Rightarrow \frac{10(a+b)}{90}=\frac{5}{9}$

$a+b=5$

$0.2\bar{3}=\frac{23-2}{90}=\frac{21}{90}$

$0.\overline{23}=\frac{23}{99}$

$23=2\times10+3\times1$

$xy=x\times10+y\times1$

$123=1\times100+2\times10+3\times1$

$xyz=x\times100+y\times10+z\times1$

* $0.a\bar{b} + 0.b\bar{a} = \frac{5}{9}$

$a+b$

Trick:

$\therefore a+b = 5$

* $0.a\bar{b} + 0.b\bar{a} = \frac{7}{3} = \frac{7 \times 3}{3 \times 3} = \frac{21}{9}$

$a+b = ?$

$\therefore a+b = 21$

45. If $0.\overline{xy} = \frac{7}{11}$, find $x^2 + y^2 = ?$

$0.\overline{xy} = \frac{7}{11}$

$\Rightarrow \frac{xy}{99} = \frac{7}{11}$

$\Rightarrow \boxed{xy = 63}$

$\therefore x^2+y^2$

$= 6^2+3^2$

$= 45$

यदि $0.\overline{xy} = \frac{7}{11}$, तब $x^2 + y^2 = ?$

(a) 36 (b) 44

(c) 45 (d) 55

$$\frac{2387}{2388} \qquad \frac{4532}{4533}$$

Cross Multiplication

$\frac{2}{3} \times \frac{4}{7}$

$14 > 12$

$\frac{20}{3} > \frac{4}{1}$

Q. $\frac{2}{3} \quad \frac{4}{7} \quad \frac{3}{8}$

$\frac{2}{3} > \frac{4}{7} > \frac{3}{8}$

CONCEPT-04

(COMPARISON OF FRACTION/भिन्नों की तुलना)

Cross Multiplication Method

46. Which fraction among the following is the least?

निम्नलिखित में से कौन-सा भिन्न सबसे छोटा है?

$\frac{5}{11}, \frac{7}{12}, \frac{8}{13}, \frac{9}{17}$

SSC CGL MAINS (08/08/2022)

(a) $\frac{8}{13}$

(b) $\frac{5}{11}$

(c) $\frac{9}{17}$

(d) $\frac{7}{12}$

47. Find the greatest of the following fractions.

निम्नलिखित भिन्नों में से सबसे बड़ी भिन्न ज्ञात कीजिए।

$\frac{8}{11}, \frac{15}{19}, \frac{4}{5}, \frac{13}{21}$

84 65

CRPF HCM 23/02/2023 (Shift - 01)

(a) $\frac{13}{21}$

(b) $\frac{15}{19}$

(c) $\frac{4}{5}$

(d) $\frac{8}{11}$

48. Which of the following is the largest fraction?

निम्न में से सबसे बड़ी भिन्न कौन सी है?

120 117

$\frac{8}{9}, \frac{6}{11}, \frac{4}{9}, \frac{13}{15}$

(a) $\frac{8}{9}$

(b) $\frac{6}{11}$

(c) $\frac{4}{9}$

(d) $\frac{13}{15}$

LCM METHOD

$\frac{1}{2}, \frac{5}{7}, \frac{3}{4}, \frac{6}{7}$

$\frac{1\times14}{2\times14}, \frac{5\times4}{7\times4}, \frac{3\times7}{4\times7}, \frac{6\times4}{7\times4}$

$\frac{14}{28} \quad \frac{20}{28} \quad \frac{21}{28} \quad < \frac{24}{28}$

49. Find the greatest among

निम्नलिखित भिन्नों में से सबसे बड़ी भिन्न ज्ञात कीजिए।

$\frac{1}{2}, \frac{5}{7}, \frac{3}{4}$ & $\frac{6}{7}$

(a) $\frac{1}{2}$

(b) $\frac{5}{7}$

(c) $\frac{3}{4}$

(d) $\frac{6}{7}$

50. Find the smallest among

निम्नलिखित में से कौन-सा भिन्न सबसे छोटा है?

$\frac{18}{27}$ $\frac{24}{27}$ $\frac{10}{24}$ $\frac{48}{27}$

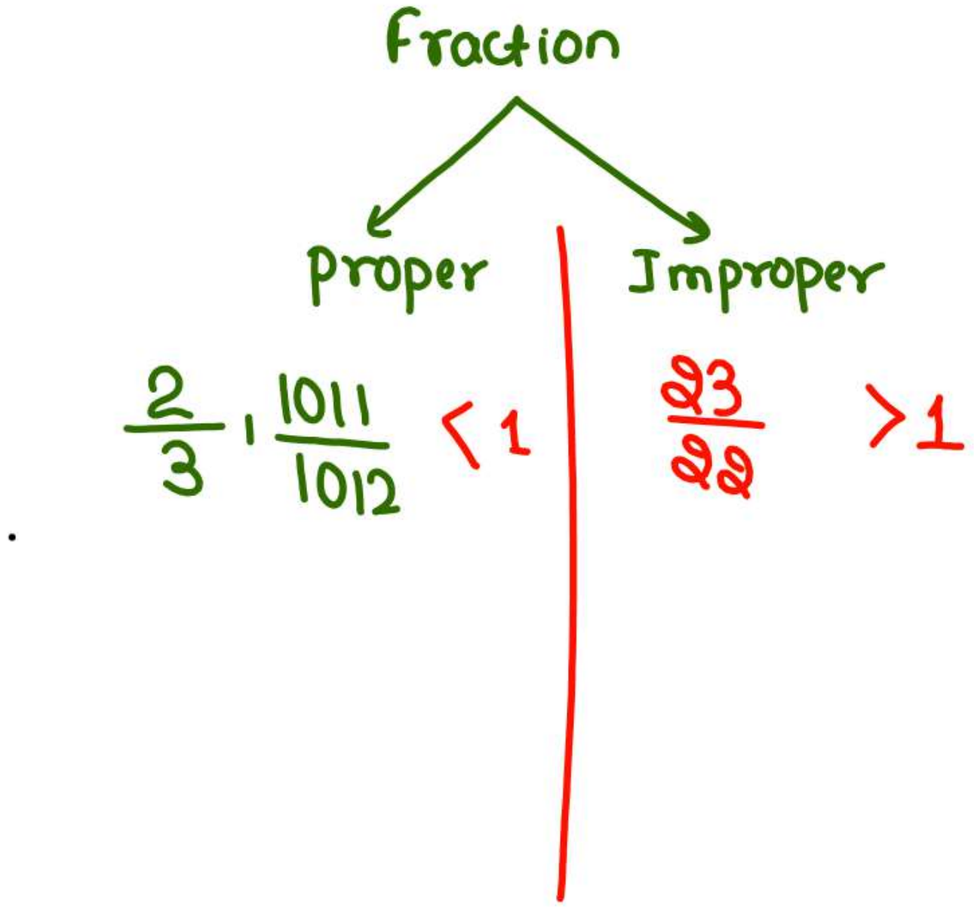
$\frac{2}{3}, \frac{8}{9}, \frac{10}{27}$ & $\frac{16}{9}$

(a) $\frac{2}{3}$

(b) $\frac{8}{9}$

(c) $\frac{10}{27}$

(d) $\frac{16}{9}$


Fraction
Proper
Improper
$\frac{2}{3}, \frac{1011}{1012}$ < 1
$\frac{23}{22}$ > 1

PROPER FRACTIONS

Numerator of the fraction is less then denominator or we can say value of the fraction is less than 1.

अंश का मान हर से छोटा हो अथवा भिन्न का मान 1 से कम हो।

- $\frac{1}{2}, \frac{2}{3}, \frac{4}{5}, \frac{7}{11}, \frac{12}{23}$ **etc.**

To compare/तुलना के लिए:

Step 1: Take the difference of N^r and D^r of each of the fractions. /प्रत्येक भिन्न के अंश तथा हर का अंतर ज्ञात करें।

Step 2: Difference must be same. If the given difference is not same, make them same by taking LCM of each difference./अंतर समान होना चाहिए। यदि अंतर समान नही हैं तो प्रत्येक अंतर का ल.स.प. लेकर उसे समान कर लें।

Step 3: Fraction with smaller N^r will be least and fraction with greater N^r will be greatest./
इस प्रकार प्राप्त न्यूनतम अंश वाली भिन्न सबसे छोटी तथा अधिकतम अंश वाली भिन्न सबसे बड़ी होगी।

Ex: Compare/तुलना करें।

S L

$\frac{4}{5}, \frac{6}{7}, \frac{13}{14}, \frac{11}{12}$

1 1 1

diff → Same

Ex: The greatest value among the fractions

सबसे बड़ा और सबसे छोटा भिन्न ज्ञात करें।

$$\frac{2}{7}, \frac{1}{3}, \frac{5}{6}, \frac{3}{4}$$

2×5 ($\frac{2}{7}$) 5×2 ($\frac{1}{3}$) 10×1 ($\frac{5}{6}$) 10×1 ($\frac{3}{4}$)

$\frac{4}{14}$ $\frac{5}{15}$ $\frac{50}{60}$ $\frac{30}{40}$

51. What is difference between the largest and the smallest fractions among $\frac{5}{9}, \frac{7}{11}, \frac{8}{15}$ and $\frac{11}{17}$?

$\frac{5}{9}$)4X21 $\frac{7}{11}$)4X21 $\frac{8}{15}$)7X12 $\frac{11}{17}$)6X14

S S L

$\frac{105}{189}$ $\frac{147}{231}$ $\frac{96}{180}$ $\frac{154}{187}$ S

$\frac{5}{9}, \frac{7}{11}, \frac{8}{15}$ और $\frac{11}{17}$ में से सबसे बड़े और सबसे छोटे भिन्न का अंतर क्या है?

$\frac{11}{17} - \frac{8}{15}$

$= \frac{165 - 136}{255}$

$= \frac{29}{255}$

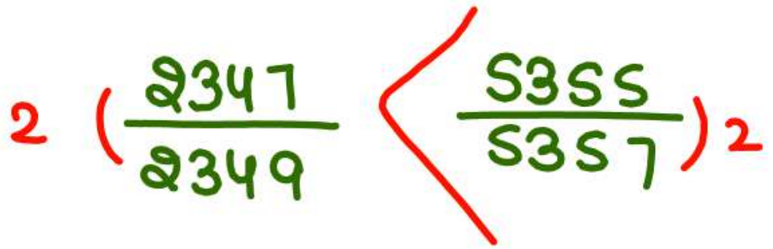
CRPF HCM 24/02/2023 (Shift - 02)

(a) $\frac{29}{255}$ ✓

(b) $\frac{8}{99}$

(c) $\frac{1}{45}$

(d) $\frac{17}{165}$



52. What is the difference of the largest and smallest of the given fractions?

दी गई भिन्नों में से सबसे बड़ी और सबसे छोटी भिन्न का अंतर क्या है?

$\frac{5}{11}, \frac{5}{7}, \frac{3}{8}, \frac{6}{11}$

SSC CHSL 13/03/2023 (Shift-01)

(a) $\frac{17}{56}$

(b) $\frac{19}{56}$

(c) $\frac{1}{7}$

(d) $\frac{23}{56}$

L S

5X6 ($\frac{5}{11}$ 15X2 ($\frac{5}{7}$ 6X5 ($\frac{3}{8}$ 6X5 ($\frac{6}{11}$

25 (75) (18) 36

L S

Ans = $\frac{5}{7} - \frac{3}{8}$

= $\frac{19}{56}$

IMPROPER FRACTIONS

Numerator is greater than denominator or value of the fraction is greater than 1.

अंश का मान हर से बड़ा हो अथवा भिन्न का मान 1 से अधिक हो।

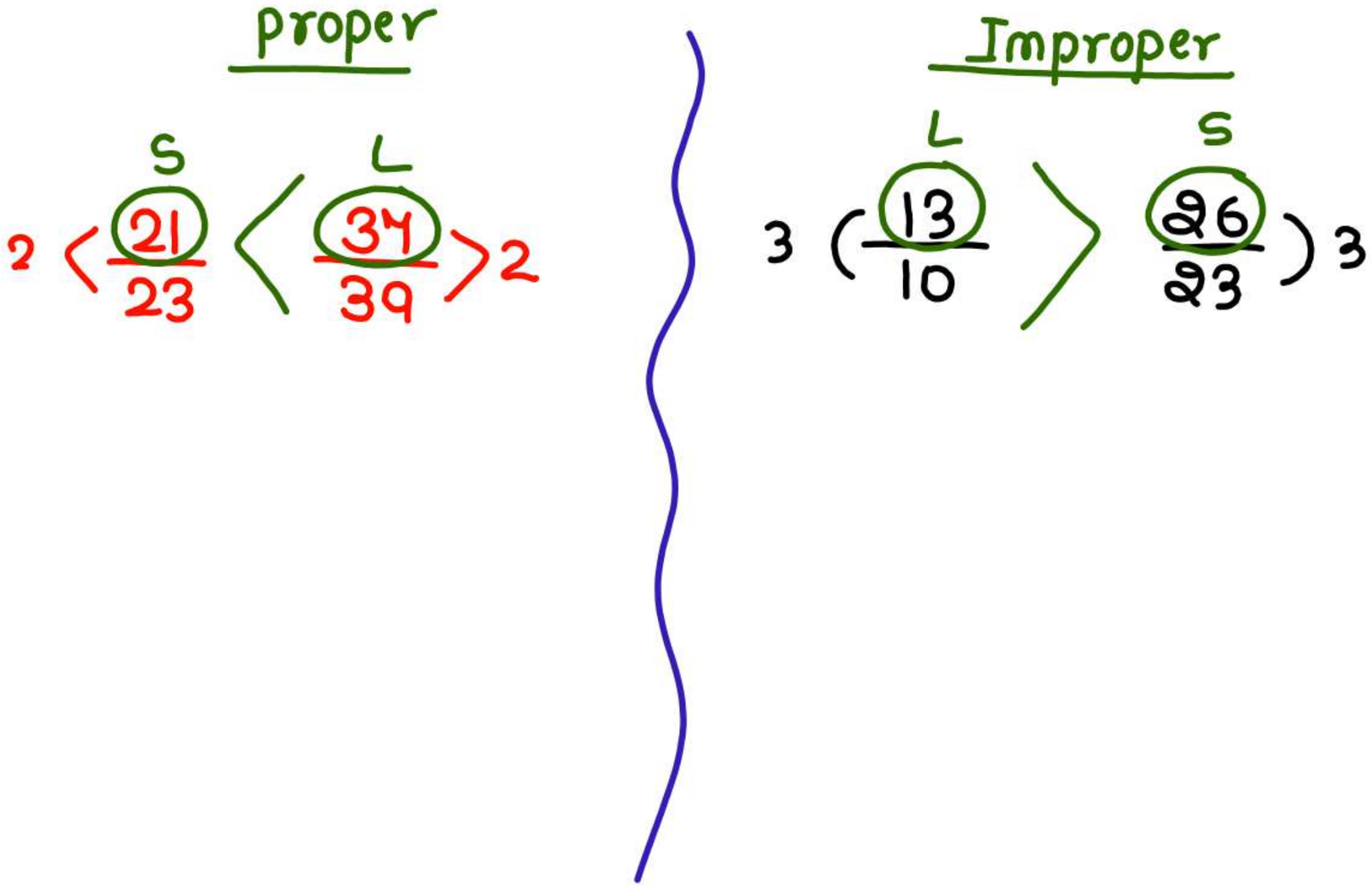
$\frac{3}{2}, \frac{13}{4}, \frac{6}{5}, \frac{27}{17}$ **etc.**

To compare/तुलना के लिए:

Step 1: Take the differecne of N^r and D^r of each of the fractions./प्रत्येक भिन्न के अंश तथा हर का अंतर ज्ञात करें।

Step 2: Difference must be same. If the given difference is not same, make them same by taking LCM of each difference./अंतर समान होना चाहिए। यदि अंतर समान नही हैं तो प्रत्येक अंतर का ल.स.प. लेकर उसे समान कर लें।

Step 3: Fraction with smaller N^r will be greatest and fraction with greater N^r will be smallest./इस प्रकार प्राप्त न्यूनतम अंश वाली भिन्न सबसे बड़ी तथा अधिकतम अंश वाली भिन्न सबसे छोटी होगी।


proper
S
L
2 < 21/23 < 34/39 > 2
Improper
L
S
3 (13/10 > 96/93) 3

S L

0 $\frac{4382}{4379}$ 3 $\frac{134}{131}$ 3

$\frac{4382}{4379} < \frac{134}{131}$

Ex: Compare/तुलना करें।

5 $\left(\frac{23}{18}, \frac{37}{32}\right)$ 5

$\frac{23}{18} > \frac{37}{32}$

Ex: Find smallest and greatest fraction

सबसे छोटा और सबसे बड़ा भिन्न ज्ञात करें।

$$\left(\frac{16}{15}, \frac{20}{19}, \frac{25}{24}, \frac{35}{34}\right)$$

L S

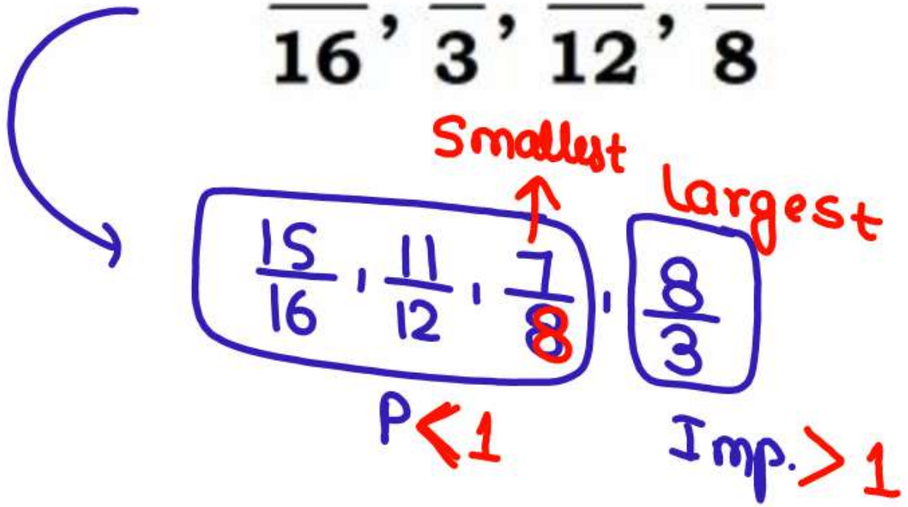
Smallest → $\frac{35}{34}$

largest → $\frac{16}{15}$

Ex: Find smallest and greatest fraction

सबसे छोटा और सबसे बड़ा भिन्न ज्ञात करें।

$$\frac{15}{16}, \frac{8}{3}, \frac{11}{12}, \frac{7}{8}$$



BASE METHOD

(i) When denominator is equal.

जब हर बराबर हो।

S L

$\frac{2}{17}, \frac{14}{17}, \frac{9}{17}, \frac{25}{17}$ N ↑ value ↑

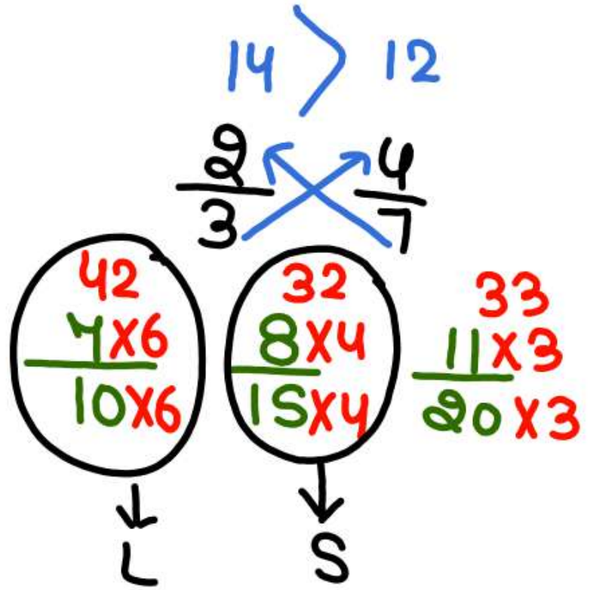
Fraction with greater numerator will be greatest and vice-versa.

बड़े अंश वाला भिन्न सबसे बड़ा होगा और इसके विपरीत भी सही होगा।

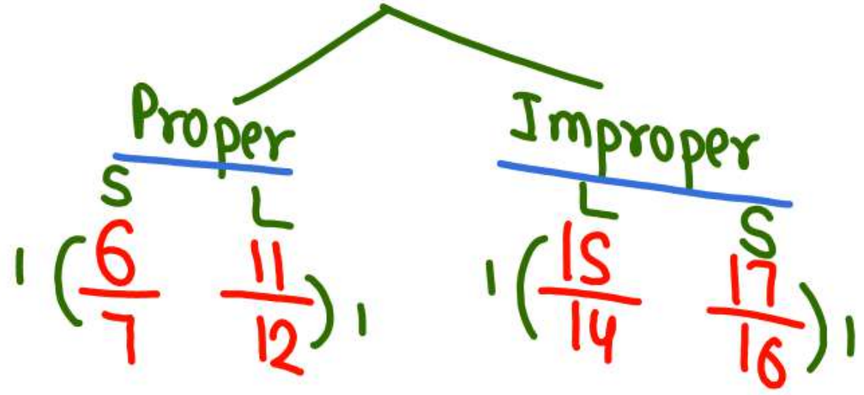
Fraction Comparison

(i) Cross multiplication

(ii) LCM Method.



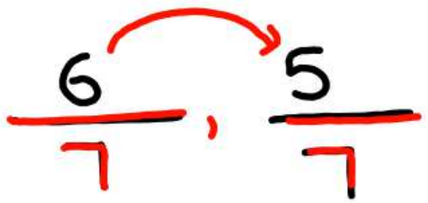
(iii) Difference method



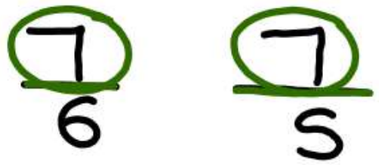
(iv) Base Method

Deno^{m} Samu

Num^{r} Samu



N^{m} ↑↓ value ↑↓



D ↑↓ value ↓↑

Case I: $\frac{N}{D} \longrightarrow \frac{N\uparrow}{D\downarrow}$ ↑↑ Ex:- $\frac{23}{14} < \frac{25}{14}$ ↑↑

Case: II $\frac{N}{D}$ $\frac{N\downarrow}{D\uparrow}$ ↓↓

$\frac{57}{53} > \frac{50}{59}$ ↓↓

Case III:

$\frac{N}{D}$ $\frac{N\uparrow}{D\uparrow}$ or $\frac{N\downarrow}{D\downarrow}$

$\frac{100}{1000} < \frac{150}{1100}$ (50% between 100 and 150; 10% between 1000 and 1100)

100 → 150 (50%)

1000 → 1100 (10%)

$\frac{50}{100} \times 100\%$

$\frac{100}{1000} \times 100\%$

$\frac{N}{D}$ $\frac{N\uparrow}{D\downarrow}$

Ex:- $\frac{4000}{5000} < \frac{4800}{5500}$ (20% ↑, 10% ↓)

$\frac{20}{4000} \times 100\%$

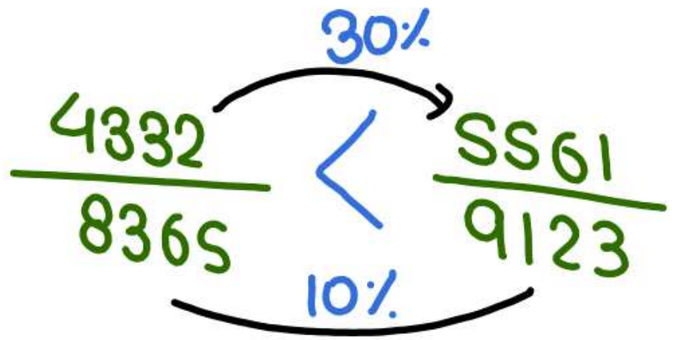
$\frac{500}{5000} \times 10\%$

Ex:- $\frac{6000}{7000} > \frac{6600}{9100}$ (10% ↑, 30% ↑)

D ↑ Value ↓

Ex:- $\frac{4332}{8365}$ $\frac{5561}{9123}$

Ex:-



N ↑ value ↑

(iv) Base Method

(i) $\frac{13}{8} < \frac{15}{7}$ ↑↑

(ii) $\frac{13}{8} > \frac{11}{9}$ ↓↓

(iii) $\frac{20}{12} \quad \frac{32}{18}$

$\frac{1331}{999} < \frac{1334}{996}$ ↑↑

$\frac{6993}{4532} > \frac{6132}{4654}$ ↓↓

(ii) When Numerator is equal.

जब अंश बराबर हो।

$\frac{9}{4}, \frac{9}{7}, \frac{9}{10}, \frac{9}{13}$

D ↑↓ Value ↓↑

L 4, 7, 10, 13 S

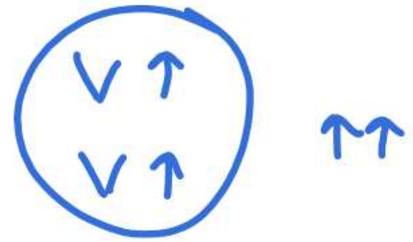
Fraction with smaller denominator will be greatest and vice-versa.

छोटे हर वाला भिन्न सबसे बड़ा होगा और इसका विपरीत सही होगा।

(iii) If we increase N^r and decrease D^r, then resultant fraction will be greater.

यदि हम N^r को बढ़ाते हैं और D^r को घटाते हैं, तो परिणामी भिन्न अधिक होगा।

e.g. (i) $\frac{3}{7} < \frac{5}{6}$



(iii) If we increase N^r and decrease D^r, then resultant fraction will be greater.

यदि हम N^r को बढ़ाते हैं और D^r को घटाते हैं, तो परिणामी भिन्न अधिक होगा।

(ii) $\frac{101}{236} < \frac{103}{234}$

N ↑ D ↓ ↑↑

(iii) If we increase N^r and decrease D^r, then resultant fraction will be greater.

यदि हम N^r को बढ़ाते हैं और D^r को घटाते हैं, तो परिणामी भिन्न अधिक होगा।

(iii) $\frac{339}{237} < \frac{347}{231}$

N↑ D↓ ↑↑

(iv) If we decrease N^r and increase D^r then resultant fraction will be smaller.

यदि हम N^r को घटाएँ और D^r को बढ़ाएँ तो परिणामी भिन्न छोटा हो जाएगा।

e.g. (i) $\frac{7}{11} > \frac{6}{13}$

(iv) If we decrease N^r and increase D^r then resultant fraction will be smaller.

यदि हम N^r को घटाएँ और D^r को बढ़ाएँ तो परिणामी भिन्न छोटा हो जाएगा।

(ii) $\frac{101}{236} > \frac{99}{247}$

(iv) If we decrease N^r and increase D^r then resultant fraction will be smaller.

यदि हम N^r को घटाएँ और D^r को बढ़ाएँ तो परिणामी भिन्न छोटा हो जाएगा।

(iii) $\frac{334}{229} > \frac{329}{235}$

(v) If we increase N^r and D^r together or we decrease N^r and D^r together than the resultant fraction can be increase or decrease or will have no change that can be determined by using percentage change.

यदि हम N^r और D^r को एक साथ बढ़ाते हैं या हम N^r और D^r को एक साथ घटाते हैं तो परिणामी भिन्न बढ़ या घट सकता है या इसमें कोई परिवर्तन नहीं होगा जिसे प्रतिशत परिवर्तन का उपयोग करके निर्धारित किया जा सकता है।

$\frac{14}{123} \times 100\% = 11\%$

$\frac{30}{234} \times 100\% = 12\%$

e.g. (i) $\frac{123}{237}$ & $\frac{137}{267}$ (11% ↑, 12% ↑)

N ↑ D ↑ V ↓

$\frac{123}{237} > \frac{137}{267}$

(v) If we increase N^r and D^r together or we decrease N^r and D^r together than the resultant fraction can be increase or decrease or will have no change that can be determined by using percentage change.

यदि हम N^r और D^r को एक साथ बढ़ाते हैं या हम N^r और D^r को एक साथ घटाते हैं तो परिणामी भिन्न बढ़ या घट सकता है या इसमें कोई परिवर्तन नहीं होगा जिसे प्रतिशत परिवर्तन का उपयोग करके निर्धारित किया जा सकता है।

$\frac{69}{423} \times 100\% = 20\% \downarrow$

$\frac{64}{322} \times 100\% = 20\% \uparrow$

(ii) $\frac{423}{322} \xrightarrow{20\% \downarrow} \frac{492}{389}$

$\frac{423}{322} > \frac{492}{389}$ ($20\% \uparrow$)

N ↑ D ↑ V ↓

(v) If we increase N^r and D^r together or we decrease N^r and D^r together than the resultant fraction can be increase or decrease or will have no change that can be determined by using percentage change.

यदि हम N^r और D^r को एक साथ बढ़ाते हैं या हम N^r और D^r को एक साथ घटाते हैं तो परिणामी भिन्न बढ़ या घट सकता है या इसमें कोई परिवर्तन नहीं होगा जिसे प्रतिशत परिवर्तन का उपयोग करके निर्धारित किया जा सकता है।

$\frac{247}{431} < \frac{228}{387}$

(iii) $\frac{247}{437} < \frac{228}{387}$

19 — 10% ↓

So — 10% ↑

N ↓ V ↑

D ↓ V ↑

(v) If we increase N^r and D^r together or we decrease N^r and D^r together than the resultant fraction can be increase or decrease or will have no change that can be determined by using percentage change.

यदि हम N^r और D^r को एक साथ बढ़ाते हैं या हम N^r और D^r को एक साथ घटाते हैं तो परिणामी भिन्न बढ़ या घट सकता है या इसमें कोई परिवर्तन नहीं होगा जिसे प्रतिशत परिवर्तन का उपयोग करके निर्धारित किया जा सकता है।

$\frac{743}{829} > \frac{691}{789}$

(iv) $\frac{743}{829}$ $\frac{691}{789}$

S2 S1↑ S1↓ 40

N↓ V↓

D↓ V↑

CONCEPT-05

(Ladder Fractions)

53. $1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{4}{1+\cfrac{1}{5}}}}=?$

$+ \quad + \quad +$

4 5 9 14 23

ans $= \frac{23}{14}$

(a) $\frac{21}{17}$

(b) $\frac{17}{13}$

(c) $\frac{23}{14}$

(d) $\frac{23}{15}$

Confusion

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{2}{3}}}}$$

Soln

2 3 5 8 13 21

$ans = \frac{21}{13}$

$$y = \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{2}{3}}}}$$

2 3 5 8 13

$ans = \frac{8}{13}$

Types of Questions

$$\rightarrow x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{2}{3}}}$$

$$\rightarrow x = 1 - \cfrac{1}{1 - \cfrac{1}{1 - \cfrac{2}{3}}}$$

$$\rightarrow x = 1 + \cfrac{1}{1 - \cfrac{1}{1 + \cfrac{2}{3}}}$$

$$\rightarrow x = 1 + \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{4}}}$$

$$\rightarrow x = 1 + \cfrac{1}{2 - \cfrac{1}{3 - \cfrac{1}{4}}}$$

$$\rightarrow x = 1 + \cfrac{1}{2 + \cfrac{3}{4 - \cfrac{5}{6}}}$$

$$\rightarrow x = 1 + \cfrac{1}{a + \cfrac{1}{b + \cfrac{1}{c + \cfrac{1}{4}}}} = \frac{21}{24}$$

$a+b+c = ?$

→ Miscellaneous

Type 1:

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{2}{3}}}$$

Basic

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{3 + \cfrac{1}{5}}}$$

$$= 1 + \cfrac{1}{1 + \cfrac{5}{16}}$$

$$= 1 + \cfrac{5}{21}$$

$$= \cfrac{26}{21}.$$

Type 1:

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{2}{3}}}$$

Trick

		+	+	+
2	3	5	8	13

$$\text{ans} = \frac{13}{8} \checkmark$$

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{4}{5}}}}$$

Trick

		+	+	+	+
4	5	9	14	23	34

$$\text{ans} = \frac{37}{23} \checkmark$$

54. The value of $1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{2}{3}}}}}$

2 3 5 8 13 21 34

+ + + + +

Ans = $\frac{34}{21}$

(a) $\frac{21}{13}$

(b) $\frac{17}{2}$

(c) $\frac{34}{21}$

(d) $\frac{8}{5}$

55. Find the value of x in the following equation:

निम्नलिखित समीकरण में x का मान ज्ञात कीजिए:

$$\left[1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5}}}\right] \div 1\frac{6}{11} = \frac{x}{2}$$

1 5 6 11 17

$\left[\frac{17}{11}\right] \div \frac{17}{11} = \frac{x}{2}$

$\Rightarrow 1 = \frac{x}{2}$

$\Rightarrow 2 = x$

NTPC CBT-2 17/06/2022 (Shift-3)

(a) 2 (b) 1

(c) $\frac{1}{2}$ (d) $\frac{2}{3}$

56. If $\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{x}}}} = \frac{5}{8}$, then what is the value of x?

Hold

यदि $\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{x}}}} = \frac{5}{8}$, हो, तो x का मान क्या है?

(a) 1
(b) 2
(c) 3
(d) 4

Type 2:

$$x = 1 - \cfrac{1}{1 - \cfrac{1}{1 - \cfrac{3}{4}}}$$

3 4 1 −3 −4

$$\text{ans} = \frac{\pm 4}{\pm 3} = \frac{4}{3}$$

$$x = 1 - \cfrac{1}{1 - \cfrac{1}{1 - \cfrac{6}{11}}}$$

6 11 5 −6 −11

$$\text{ans} = \frac{\pm 11}{\pm 6} = \frac{11}{6}$$

57. Find the value of $1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{2}}}}$

$\frac{-}{\cdot}$ $\frac{-}{\cdot}$ $\frac{-}{\cdot}$ $\frac{-}{\cdot}$

2 3 1 -2 -3 -1

ans = $\frac{+1}{+3} = \frac{1}{3}$

(a) $\frac{2}{3}$

(b) $-\frac{1}{3}$

(c) $\frac{1}{3}$

(d) $-\frac{2}{3}$

$$x = 1 - \cfrac{1}{1 - \cfrac{1}{1 - \cfrac{1}{1 - \cfrac{2}{9}}}}$$

$$2 \quad 9 \quad 7 \quad -2 \quad -9 \quad -7$$

$7 - 9 = -2$

$-2 - 7 = -9$

$-9 - (-2) = -9 + 2 = -7$

$$\text{ans} = \frac{\pm 7}{+9} = \frac{7}{9}$$

Type 3:

$$x = 1 + \cfrac{1}{1 - \cfrac{1}{1 + \cfrac{1}{1 - \frac{6}{7}}}}$$

Ans

$$- \quad + \quad - \quad +$$

$$6 \quad 7 \quad 1 \quad 8 \quad 7 \quad 15$$

$$\text{ans} = \frac{15}{7}$$

58. $1+\cfrac{1}{1-\cfrac{1}{1+\cfrac{1}{1-\cfrac{1}{1+\frac{1}{3}}}}}=?$

+ − + − +

1 3 4 1 5 4 9

ans = $\frac{9}{4}$

(a) $\frac{1}{2}$ (b) $\frac{11}{7}$

(c) $\frac{3}{4}$ (d) $\frac{9}{4}$

$$x = 1 + \cfrac{1}{1 + \cfrac{1}{1 - \cfrac{1}{1 + \cfrac{1}{1 - \cfrac{2}{5}}}}}$$

Ans

$$2 \quad 5 \quad 3 \quad 8 \quad 5 \quad 13 \quad 18$$

$$\text{Ans} = \frac{18}{13} \checkmark$$

Type 4:

$$x = 1 + \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{4}}}$$

Sol^n

$+3 \quad +2 \quad +1$

$1 \;\; 4 \;\; 13 \;\; 30 \;\; 43$

$$\text{ans} = \frac{43}{30}$$

$$x = 1 + \cfrac{1}{2 + \cfrac{1}{4 + \cfrac{1}{3 + \cfrac{2}{5}}}}$$

$+3 \quad +4 \quad +2 \quad +1$

$2 \;\; 5 \;\; 17 \;\; 73 \;\; 163 \;\; 236$

$$\text{ans} = \frac{236}{163}$$

59. What will the value after simplifying this continued fraction?

इस निरंतर भिन्न को सरल बनाने के बाद मान क्या होगा?

$$\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}$$

1 ±4 (+2) 9 (+3) 31 (+2) 71

ans = 31/71

NTPC CBT-1, 03/02/2021 (Shift-02)

(a) 43/5

(b) 43/19

(c) 5/19

(d) 19/43

59. What will the value after simplifying this continued fraction?

इस निरंतर भिन्न को सरल बनाने के बाद मान क्या होगा?

$$\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}$$

$$= \cfrac{1}{2+\cfrac{1}{3+\cfrac{4}{9}}}$$

$$= \cfrac{1}{2+\cfrac{1}{\frac{31}{9}}}$$

$$= \cfrac{1}{\frac{71}{31}} = \frac{31}{71}$$

NTPC CBT-1, 03/02/2021 (Shift-02)

(a) $\frac{43}{5}$

(b) $\frac{43}{19}$

(c) $\frac{5}{19}$

(d) $\frac{19}{43}$

60. If $A+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3}}}=\cfrac{9}{10}$, then the value of A is:

यदि $A+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3}}}=\cfrac{9}{10}$, है, तो A का मान है:

SSC CPO 03/10/2023 (Shift-3)

(a) $\frac{3}{10}$ (b) $\frac{2}{5}$

(c) $\frac{1}{10}$ (d) $\frac{1}{5}$

1 ± 3 (×, +2) 7 (×, +1) 10

ans = $\frac{7}{10}$

$A+\frac{7}{10}=\frac{9}{10}$

$\Rightarrow A=\frac{9}{10}-\frac{7}{10}$

$\Rightarrow A=\frac{2}{10}=\frac{1}{5}$

61. Simplify: $15+\cfrac{1}{6+\cfrac{1}{8+\cfrac{1}{10}}}$

×8 +6 ×15
1 ± 10 81 ± 496 7521

ans = $\frac{7521}{496}$

CRPF HCM 01/03/2023 (Shift - 02)

(a) $15\frac{81}{496}$ (b) $15\frac{71}{186}$

(c) $15\frac{81}{472}$ (d) $15\frac{31}{374}$

62. $2+\cfrac{1}{2-\cfrac{1}{3-\cfrac{1}{4-\cfrac{1}{4}}}}=?$

$1-4-15-41\pm67\times2\times3\times4\times2$ (175)

$\text{Ans} = \frac{175}{67}$

$= 2\frac{41}{67}$

CRPF HCM 28/02/2023 (Shift - 01)

(a) $\frac{41}{67}$

(b) $2\frac{15}{41}$

(c) $2\frac{41}{67}$

(d) $\frac{15}{41}$

63. Find the value of the following

निम्नलिखित का मान ज्ञात कीजिए।

$$4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}$$

1 ±4 (×+2) 9 ±31 (+3) 40 (+1)

$= \frac{40}{31}$

ans $= 4-\frac{5}{\frac{40}{31}}$

$= 4-\frac{8\times 31}{40_8}$

$= 4-\frac{31}{8}$

$= \frac{1}{8}$

(a) $\frac{1}{4}$ (b) $\frac{1}{8}$

(c) $\frac{2}{4}$ (d) $\frac{3}{7}$

63. Find the value of the following

निम्नलिखित का मान ज्ञात कीजिए।

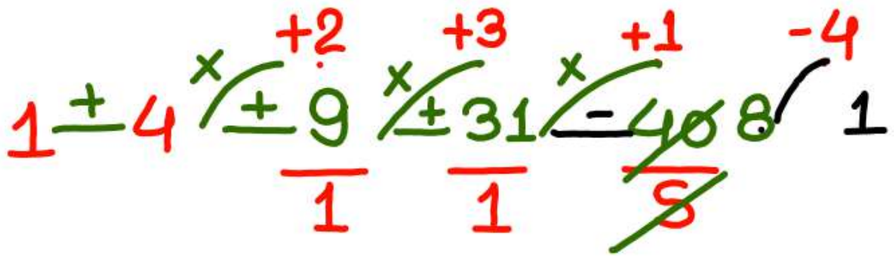
$$4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}$$

(a) $\frac{1}{4}$

(b) $\frac{1}{8}$

(c) $\frac{2}{4}$

(d) $\frac{3}{7}$

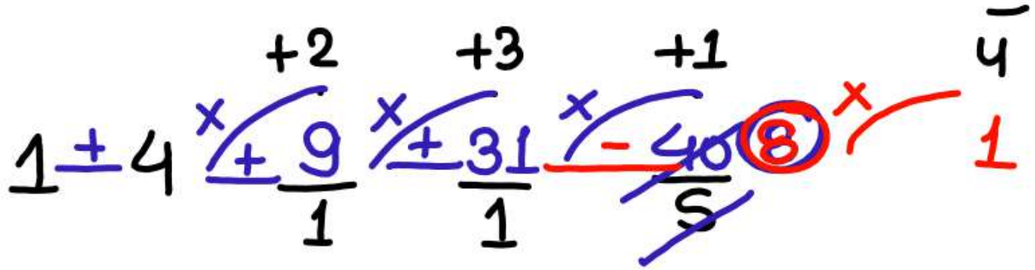


ans = $\frac{1}{8}$

63. Find the value of the following

निम्नलिखित का मान ज्ञात कीजिए।

$$4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{4}}}}$$



ans = $\frac{1}{8}$

(a) $\frac{1}{4}$

(b) $\frac{1}{8}$

(c) $\frac{2}{4}$

(d) $\frac{3}{7}$

64. The value of/का मान कितना होगा?

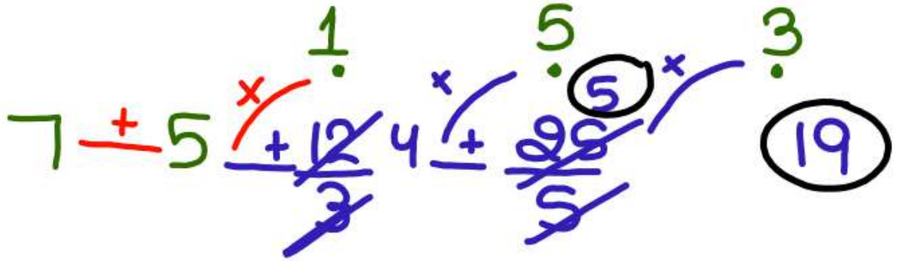
$$\frac{3\frac{1}{7}+3\frac{1}{2}}{3\frac{1}{4}-3\frac{1}{7}} \div \frac{1}{3+\frac{1}{2+\frac{1}{2-\frac{1}{2}}}} \text{ is :}$$

ICAR Mains, 10/07/2023 (Shift-2)

(a) 213.50 (b) 209.25

(c) 225.15 (d) 232.35

65. $3+\cfrac{5}{5+\cfrac{3}{1+\cfrac{7}{5}}}=?$



Ans = $\frac{19}{5}$

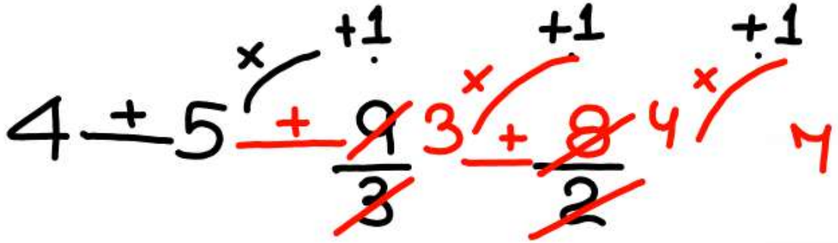
(a) $\frac{9}{13}$

(b) $\frac{13}{9}$

(c) $\frac{11}{2}$

(d) $\frac{19}{5}$

66. $\cfrac{1}{1+\cfrac{2}{1+\cfrac{3}{1+\cfrac{4}{5}}}}$ =?



ans = $\frac{4}{7}$

(a) $\frac{7}{4}$

(b) $\frac{4}{7}$

(c) $\frac{11}{14}$

(d) $\frac{12}{5}$

Basic

67. $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c}}} = \cfrac{13}{29}$ find a – b + c=?

(a) 1 (b) 2

(c) 0 (d) 3

$\frac{13}{29}$

$= \cfrac{1}{\frac{29}{13}} = \cfrac{1}{2+\frac{3}{13}} = \cfrac{1}{2+\cfrac{1}{\frac{13}{3}}}$

$= \cfrac{1}{2+\cfrac{1}{4+\frac{1}{3}}} = \cfrac{1}{a+\cfrac{1}{b+\frac{1}{c}}}$

a=2 b=4 c=3

Ans= 2-4+3

= 1

M-1

67. $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c}}} = \cfrac{13}{29}$ find a – b + c=?

(a) 1 (b) 2

(c) 0 (d) 3

13) 29 (2 → a
26
3) 13 (4 → b
12
1) 3 (3 → c
3
0

Ans = 2 - 4 + 3

= 1

67. $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c}}} = \cfrac{13}{29}$ find a – b + c=?

(a) 1 (b) 2

(c) 0 (d) 3

m-2

$\frac{29}{13} = 2 + \frac{3}{13}$ (a = 2)

$\frac{13}{3} = 4 + \frac{1}{3}$ (b = 4)

$\frac{3}{1} = 3 + 0$ (c = 3)

ans = 2 − 4 + 3

= 1

68. $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d}}}} = \cfrac{17}{60}$ find a + b + c + d =?

(a) 11 (b) 12

(c) 13 (d) 14

17)60(3 → a
51
9)17(1 → b
9
8)9(1 → c
8
1)8(8 → d
-8
0

Ans = 3+1+1+8
= 13

$\frac{60}{17} = 3 + \frac{9}{17}$ (a)

$\frac{17}{9} = 1 + \frac{8}{9}$ (b)

$\frac{9}{8} = 1 + \frac{1}{8}$ (c)

$\frac{8}{1} = 8 + 0$ (d)

ans = 3+1+1+8

= 13

68. $\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d}}}} = \frac{17}{60}$ **find a + b + c + d =?**

(a) 11 (b) 12

(c) 13 (d) 14

69. $$\cfrac{1}{a+\cfrac{1}{2b+\cfrac{1}{3c+\cfrac{1}{d}}}} = \frac{30}{43}$$ find a + b + c + d = ?

(a) 10 (b) 11

(c) 7 (d) None

30)43(1=a
30
13)30(2=2b
26
4)13(3=3c
12
1)4(4=d
4
X

ans = a+b+c+d
= 1+1+1+4
= 7

70. If a, b, c, d are integers such that

$$\cfrac{1}{a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d}}}} = \frac{29}{154}, \text{ then } a + b + c + d = ?$$

(a) 12 (b) 13

(c) 14 (d) 15

$\frac{154}{29} = 5 + \frac{9}{29}$ (a)

$\frac{29}{9} = 3 + \frac{2}{9}$ (b)

$\frac{9}{2} = 4 + \frac{1}{2}$ (c)

$\frac{2}{1} = 2 + 0$ (d)

Ans = 5+3+4+2

= 14

$$\frac{53}{45} = 1 + \frac{8}{45}$$ (a)

$$\frac{45}{8} = 5 + \frac{5}{8}$$ (b)

$$\frac{8}{5} = 2 - \frac{2}{5}$$ (c)

$$\text{ans} = 4a + b + 3c$$
$$= 4 + 5 + 6$$
$$= 15$$

71. If $\frac{45}{53} = \cfrac{1}{a + \cfrac{1}{b + \cfrac{1}{c - \frac{2}{5}}}}$, where a, b and c are positive integers, then what is the value of (4a + b + 3c)?

SSC CGL TIER - II 15/11/2020

(a) 5 (b) 4

(c) 6 (d) 7

$$\frac{8}{5} \Big/ \begin{matrix} 1 + \frac{3}{5} \\ 2 - \frac{2}{5} \end{matrix}$$

$\frac{79}{29} = \overset{x}{(2)} + \frac{21}{29}$

$\frac{29}{21} = \overset{y}{(1)} + \frac{2x4}{21}$

$\frac{21}{4} = \overset{z}{(5)} + \frac{1}{4}$

$2x+3y-z$
$= 4+3-5$
$= 2$

72. If $\cfrac{1}{x+\cfrac{1}{y+\cfrac{2}{z+\cfrac{1}{4}}}} = \frac{29}{79}$, where x, y and y are natural numbers, then the value $(2x + 3y - z)$ is:

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(a) 1 (b) 4
(c) 0 (d) 2

CONCEPT-06

(Continuous Fraction Series सतत भिन्नात्मक श्रेणी)

$\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \ldots \frac{96}{99} \times \frac{99}{100}$

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

73. $\left[\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\left(1-\frac{1}{6}\right)\ldots\left(1-\frac{1}{99}\right)\left(1-\frac{1}{100}\right)\right]$

(a) $\frac{2}{99}$

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

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

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

Q. $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\text{----}\left(1-\frac{1}{50}\right)$

Ans $\frac{1}{\cancel{2}} \times \frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{3}}{4} \times \text{--} \text{--} \times \frac{49}{50}$

$= \frac{1}{50}$

74. The sum of

$$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots..+\frac{1}{n(n+1)}$$ is:

$$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots..+\frac{1}{n(n+1)}$$ का योग है-

NTPC CBT-1, 02/03/2021 (Shift-03)

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

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

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

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

$\frac{n-1}{}$ (Trick)

put $n=1$

$\frac{2}{1}$ $\frac{1\times 2}{2}$ $\frac{1}{2}$

74. The sum of

$$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots\ldots+\frac{1}{n(n+1)}$$ is:

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

$= \left(\frac{1}{1}-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+\ldots+\frac{1}{n}-\frac{1}{(n+1)}\right)$

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

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

$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots\ldots+\frac{1}{n(n+1)}$ का योग है-

NTPC CBT-1, 02/03/2021 (Shift-03)

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

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

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

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

Q. $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + - - - + \frac{1}{10\times11}$

M-1 (Basic)

$\frac{1}{1\times2} + \frac{1}{2\times3} + - - - + \frac{1}{10\times11}$

$= \left(\frac{1}{1} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + / \cdot - / + \left(\frac{1}{10} - \frac{1}{11}\right)$

$= \frac{1}{1} - \frac{1}{11}$

$= \frac{10}{11}$

Trick

$\text{ans} = \frac{1}{\text{diff}} [1^{st} - \text{last}]$

$= \frac{1}{1}\left[\frac{1}{1} - \frac{1}{11}\right]$

$= 1\left\{\frac{10}{11}\right]$

$= \frac{10}{11}$

Q. $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \dots + \frac{1}{10\times11}$

Q. $\frac{1}{1\times3} + \frac{1}{3\times5} + \frac{1}{5\times7} + \dots + \frac{1}{15\times17}$

Q. $\frac{1}{1\times2\times3} + \frac{1}{2\times3\times4} + \frac{1}{3\times4\times5} + \dots + \frac{1}{10\times11\times12}$

Q. $\frac{1}{1\times2\times3\times4} + \frac{1}{2\times3\times4\times5} + \frac{1}{3\times4\times5\times6} + \dots + \frac{1}{10\times11\times12\times13}$

Q. Misc.

$$\frac{1}{3} + \frac{1}{15} + \frac{1}{35} + - - - + \frac{1}{255}$$

Q. $\frac{1}{1\times3} + \frac{1}{3\times5} + \frac{1}{5\times7} + - \quad - \quad \text{——} + \frac{1}{15\times17}$

$$\text{ans} = \frac{1}{2}\left[\frac{1}{1} - \frac{1}{17}\right]$$

$$= \frac{1}{2} \times \frac{16}{17} 8$$

$$= \frac{8}{17}$$

75. $\frac{1}{11\times12}+\frac{1}{12\times13}+\frac{1}{13\times14}+\ldots\ldots+\frac{1}{80\times81}$

(a) $\frac{69}{890}$ (b) $\frac{70}{891}$

(c) $\frac{71}{790}$ (d) $\frac{72}{891}$

Ans $= \frac{1}{\text{diff}}\left[1^{st} - \text{last}\right]$

$= \frac{1}{1}\left[\frac{1}{11}-\frac{1}{81}\right]$

$= \frac{81-11}{891} = \frac{70}{891}$

76. $\frac{1}{1\times4}+\frac{1}{4\times7}+\frac{1}{7\times10}+\ldots\ldots+\frac{1}{97\times100}$

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

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

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

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

Ans $= \frac{1}{3}\left[\frac{1}{1}-\frac{1}{100}\right]$

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

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

(a) $\frac{21}{509}$ (b) $\frac{18}{409}$

~~(c)~~ $\frac{25}{301}$ (d) $\frac{29}{31}$

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

$= \frac{1}{4}\left(\frac{903-3}{3\times903}\right) = \frac{1}{4}\times\frac{900}{3\times903} = \frac{25}{301}$

25 ~~100~~ ~~300~~

78. $\frac{1}{4\times9}+\frac{1}{9\times14}+\frac{1}{14\times19}+\ldots\ldots+\frac{1}{99\times104}$

P.G.W

(a) $\frac{7}{104}$

(b) $\frac{9}{100}$

(c) $\frac{5}{104}$

(d) $\frac{8}{105}$

Q. $\frac{1}{1\times2\times3} + \frac{1}{2\times3\times4} + \frac{1}{3\times4\times5} + \dots + \frac{1}{10\times11\times12}$

M-1 (Basic)

$$= \frac{1}{2}\left[\left(\frac{1}{1\times2} - \frac{1}{2\times3}\right) + \left(\frac{1}{2\times3} - \frac{1}{3\times4}\right) + \dots + \left(\frac{1}{10\times11} - \frac{1}{11\times12}\right)\right]$$

$$= \frac{1}{2}\left[\frac{1}{1\times2} - \cancel{\frac{1}{2\times3}} + \cancel{\frac{1}{2\times3}} - \cancel{\frac{1}{3\times4}} + \dots + \cancel{\frac{1}{10\times11}} - \frac{1}{11\times12}\right]$$

$$= \frac{1}{2}\left[\frac{1}{1\times2} - \frac{1}{11\times12}\right]$$

Trick = $\frac{1}{\text{diff}}\left[1^{st} - \text{last}\right]$

Q. $\frac{1}{1\times2\times3} + \frac{1}{2\times3\times4} + - - - - + \frac{1}{10\times11\times12}$

$$\text{ans} = \frac{1}{2}\left[\frac{1}{1\times2} - \frac{1}{11\times12}\right]$$

$$= \frac{1}{2}\left[\frac{132-2}{2\times132}\right]$$

$$= \frac{1}{2}\times\frac{130}{2\times132} \Rightarrow 65$$

$$= \frac{65}{264}$$

79. $\frac{1}{1\times2\times3}+\frac{1}{2\times3\times4}+\frac{1}{3\times4\times5}+\ldots\ldots+\frac{1}{98\times99\times100}$

CGL Mains

(a) $\frac{4949}{19800}$

(b) $\frac{1980}{49490}$

(c) $\frac{9898}{19800}$

(d) $\frac{1980}{47490}$

$$\text{ans} = \frac{1}{2}\left[\frac{1}{1\times2}-\frac{1}{99\times100}\right]$$

$$= \frac{1}{2}\left(\frac{9900-2}{2\times9900}\right) = \frac{1}{2}\times\frac{9898}{2\times9900} = \frac{4949}{19800}$$

80. Which of the following statement is true?

H.W

I. $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots\ldots\ldots\frac{1}{110}<\frac{5}{6}$

1X2 2X3

II. $\frac{1}{3}+\frac{1}{15}+\frac{1}{35}+\ldots\ldots\ldots\frac{1}{143}>\frac{7}{13}$

SSC CHSL 13/03/2023 (Shift-04)

(a) Only I
(b) Both I and II
(c) Only II
(d) Neither I nor II

81. If $x = \frac{1}{12.13} + \frac{1}{13.14} + \frac{1}{14.15} \ldots\ldots + \frac{1}{23.24}$, $y = \frac{1}{36.37} + \frac{1}{37.38} + \frac{1}{38.39} \ldots\ldots + \frac{1}{71.72}$ then $\frac{x}{y}$ is equal to:

(a) $\frac{1}{3}$

(b) $\frac{1}{24}$

(c) $\frac{1}{72}$

(d) 3

ans $= \frac{1}{4}\left[\frac{1}{1\times3} - \frac{1}{11\times13}\right]$

$= \frac{1}{4}\left[\frac{1}{3} - \frac{1}{143}\right]$

$= \frac{1}{4} \times \frac{140}{3\times143} = \frac{35}{429}$

82. $\frac{1}{1\times3\times5} + \frac{1}{3\times5\times7} + \ldots\ldots + \frac{1}{9\times11\times13}$

(a) $\frac{35}{429}$

(b) $\frac{35}{439}$

(c) $\frac{25}{329}$

(d) $\frac{25}{329}$

83. $\frac{1}{1\times2\times3\times4}+\frac{1}{2\times3\times4\times5}+\ldots\ldots+\frac{1}{6\times7\times8\times9}$

(a) $\frac{83}{1512}$

(b) $\frac{84}{1513}$

(c) $\frac{83}{1415}$

(d) $\frac{84}{1413}$

84. $\frac{1}{1\times3\times5\times7}+\frac{1}{3\times5\times7\times9}+\ldots\ldots+\frac{1}{11\times13\times15\times17}$

(a) $\frac{20}{1991}$

(b) $\frac{22}{1989}$

(c) $\frac{25}{1990}$

(d) $\frac{27}{1991}$

85. $\frac{1}{4\times11\times18}+\frac{1}{11\times18\times25}+\frac{1}{18\times25\times32}+\ldots\ldots+\frac{1}{67\times74\times81}$

(a) $\frac{425}{263736}$ 19-8=11

(b) $\frac{425}{253737}$

(c) $\frac{424}{253737}$

(d) $\frac{425}{253736}$ 18-8=10

ans $=\frac{1}{14}\left[\frac{1}{4\times11}-\frac{1}{74\times81}\right]$

$=\frac{1}{7\cancel{14}}\left[\frac{\cancel{37}4\times81-\cancel{2}4\times11}{4\times11\times74\times81}\right]$

$=\frac{1}{7}\times\frac{(2997-22)}{4\times11\times74\times81}$

$=\frac{1}{7}\times\frac{2975}{4\times11\times74\times81}$ (425)

$=$

ans = $\frac{1}{14}\left[\frac{1}{4\times11} - \frac{1}{74\times81}\right]$

$= \frac{1}{14}\frac{(74\times81 - 4\times11)}{4\times11\times74\times81}$

85. $\frac{1}{4\times11\times18} + \frac{1}{11\times18\times25} + \frac{1}{18\times25\times32} + \ldots\ldots + \frac{1}{67\times74\times81}$

(a) $\frac{425}{263736}$

(b) $\frac{425}{253737}$

(c) $\frac{424}{253737}$

(d) $\frac{425}{253736}$ 18-8

86. $\frac{1}{1\times2\times3\times4\times5} + \frac{1}{2\times3\times4\times5\times6} + \ldots\ldots\ldots + \frac{1}{10\times11\times12\times13\times14}$

(a) $\frac{10009}{960960}$

(b) $\frac{10009}{960970}$

(c) $\frac{10019}{960961}$

(d) $\frac{10018}{960961}$

Ans $= \frac{1}{4}\left[\frac{1}{1\times2\times3\times4} - \frac{1}{11\times12\times13\times14}\right]$

$= \frac{1}{4}\left[\frac{1}{24} - \frac{1}{24024}\right]$

$= \frac{1}{4}\left(\frac{1001-1}{24024}\right)$

$= \frac{1}{4}\times\frac{1000}{24024}\ \frac{250}{}\ \frac{125}{12012}$

Ans $= \frac{125}{12012}$

87. $\frac{5}{2^2.3^2} + \frac{7}{3^2.4^2} + \frac{9}{4^2.5^2} + \frac{11}{5^2.6^2} + \frac{13}{6^2.7^2} + \frac{15}{7^2.8^2} + \frac{17}{8^2.9^2} + \frac{19}{9^2.10^2}$ is equal to.

(a) $\frac{1}{100}$ (b) $\frac{6}{25}$

(c) $\frac{101}{100}$ (d) 1

$\frac{5}{4\times9} + \frac{7}{9\times16} + \ldots + \frac{19}{81\times100}$

ans = $\frac{1}{4} - \frac{1}{100}$

$= \frac{25-1}{100} = \frac{24}{100} \frac{6}{25}$

Note:- $\frac{|b-a|}{a \times b} + \frac{|c-b|}{b \times c} + \frac{|d-c|}{c \times d} + - - - - - + \frac{|y-x|}{x \times y}$

Trick

$$\frac{1}{a} - \frac{1}{y}$$

88. $\frac{4}{3\times7}+\frac{6}{7\times13}+\frac{8}{13\times21}+\frac{10}{21\times31}+\frac{12}{31\times43}$

(a) $\frac{39}{128}$ (b) $\frac{40}{129}$

(c) $\frac{41}{130}$ (d) $\frac{42}{135}$

Ans: $\frac{1}{3}-\frac{1}{43}$

$=\frac{43-3}{3\times43}$

$=\frac{40}{129}$

$\left(\frac{1}{1\times3\times5}+\frac{1}{3\times5\times7}+\text{---}+10\text{ terms}\right)$

$\left(\frac{1}{1\times4}+\frac{1}{4\times7}+\text{---}+10\text{ terms}\right)$

89. $\frac{1}{1\times3\times5}+\frac{1}{1\times4}+\frac{1}{3\times5\times7}+\frac{1}{4\times7}+\frac{1}{5\times7\times9}+$

$\frac{1}{7\times10}+\text{.....+ upto 20 terms}$

(a) $\frac{6179}{15275}$ (b) $\frac{6070}{14973}$ ✓

(c) $\frac{7191}{15174}$ (d) $\frac{5183}{16423}$

$$= \left\{\frac{1}{1\times3\times5}+\frac{1}{3\times5\times7}+\text{---}+\frac{1}{19\times21\times23}\right\}+\left\{\frac{1}{1\times4}+\frac{1}{4\times7}+\text{---}+\frac{1}{28\times31}\right\}$$

$$= \frac{1}{4}\left\{\frac{1}{1\times3}-\frac{1}{21\times23}\right\}+\frac{1}{3}\left\{\frac{1}{1}-\frac{1}{31}\right\}$$

$$= \frac{1}{4}\left(\frac{161-1}{483}\right)+\frac{1}{2}\times\frac{10}{31}$$

$$= \frac{1}{4}\times\frac{40}{483}+\frac{10}{31}$$

$$\frac{40}{483}+\frac{10}{31}$$

$$= \frac{1240+4830}{14973}$$

$$= \frac{6070}{14973}$$ ✓

$\frac{1}{2\times5} + \frac{1}{5\times8} + \cdots + \frac{1}{299\times302}$

ans: $\frac{1}{3}\left[\frac{1}{2} - \frac{1}{302}\right]$

$= \frac{1}{3}\times\left(\frac{151-1}{302}\right)$

$= \frac{1}{3}\times\frac{150}{302}\ 25$

$= \frac{25}{151}$

90. $a_1 = \frac{1}{2\times5}$, $a_2 = \frac{1}{5\times8}$, $a_3 = \frac{1}{8\times11}$

then, $a_1 + a_2 + \ldots + a_{100} + ?$

(a) $\frac{25}{151}$ **(b)** $\frac{30}{157}$

(c) $\frac{1}{4}$ **(d)** $\frac{9}{55}$

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

$a_{100} = 2 + 99\times3$

$= 299$

$\frac{1}{1\times3}+\frac{1}{3\times5}+\cdots+\frac{1}{19\times21}$

91. $\frac{1}{2^2-1}+\frac{1}{4^2-1}+\frac{1}{6^2-1}+\cdots+\frac{1}{20^2-1}$

$= \frac{1}{2}\left[\frac{1}{1}-\frac{1}{21}\right]$

$= \frac{1}{2}\times\frac{20}{21}^{10}$

$= \frac{10}{21}$

(a) $\frac{9}{19}$

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

(c) $\frac{11}{19}$

(d) $\frac{10}{21}$

92. $\frac{1}{7^2-3^2}+\frac{1}{13^2-3^2}+\frac{1}{19^2-3^2}+\ldots.+\frac{1}{49^2-3^2}$

(a) $\frac{1}{26}$ (b) $\frac{3}{52}$

(c) $\frac{1}{13}$ (d) $\frac{3}{26}$

$$\frac{1}{4\times10}+\frac{1}{10\times16}+\text{---}+\frac{1}{46\times52}$$

$$=\frac{1}{6}\left\{\frac{1}{4}-\frac{1}{52}\right\}$$

$$=\frac{1}{6}\left(\frac{13-1}{52}\right)=\frac{1}{6}\times\frac{12}{52}\,2_{6}=\frac{1}{26}$$

* $2\frac{1}{3} = 2+\frac{1}{3} = \frac{7}{3}$

* $a\frac{b}{c} = a+\frac{b}{c}$

CONCEPT-07

($a\frac{b}{c}$ Types of numbers

प्रकार की संख्याएं)

(a) If denominator of a number same as multiplier

यदि किसी संख्या का हर उसके गुणज के समान हो तो

93. The value of $99\frac{95}{99} \times 99$ is

(a) 9798 (b) 9997

(c) 9898 (d) 9896

M.1 (Basic)

93. The value of $99\frac{95}{99} \times 99$ is

(a) 9798 (b) 9997

(c) 9898 (d) 9896

$$99\frac{95}{99} \times 99$$

$$= \left(99 + \frac{95}{99}\right) \times 99$$

$$= 99 \times 99 + \frac{95}{99} \times 99$$

$$= 9801 + 95$$

$$= 9896$$

93. The value of $99\frac{95}{99} \times 99$ is

(a) 9798 **(b) 9997**

(c) 9898 **(d) 9896**

Trick

$$99\frac{95}{99} \times 99$$

$$= \left\{99 + \frac{95}{99}\right\} \times 99$$

$$= \left\{99 + \frac{95+4}{99}\right\} \times 99$$

$$= (99+1)99$$

$$= 9900 - 4 = 9896$$

93. The value of $99\frac{95}{99} \times 99$ is

(a) 9798 (b) 9997

(c) 9898 (d) 9896

Trick

ans: 9900 − 4

= 9896

94. $999\frac{98}{99} \times 99$ is equal to:

(a) 98999 (b) 99899

(c) 99989 (d) 99998

ans = 99000 − 1

= 98999

95. $999\frac{994}{999} \times 999$

(a) 908999 (b) 999099

(c) 998995 (d) 989095

ans = 999000 − 5

= 998995

(b) If difference between numerator and denominator is 1.

यदि अंश और हर के बीच का अंतर 1 हो तो

96. $\frac{1}{8} + 999\frac{791}{792} \times 99$

(a) 89000
(b) 88900
(c) 95900
(d) 99000

$\frac{7}{8} = 1 - \frac{1}{8}$

$\frac{8}{9} = 1 - \frac{1}{9}$

96. $\frac{1}{8} + 999\frac{791}{792} \times 99$

(a) 89000 (b) 88900

(c) 95900 (d) 99000

$= \frac{1}{8} + \left(999 + \frac{791}{792}\right) \times 99$

$= \frac{1}{8} + \left(999 + 1 - \frac{1}{792}\right) \times 99$

$= \frac{1}{8} + \left(1000 - \frac{1}{792}\right) \times 99$

$= \frac{1}{8} + \left(99000 - \frac{1}{792} \times \frac{99}{8}\right) = \frac{1}{8} + 99000 - \frac{1}{8}$

$\frac{7}{8} = 1 - \frac{1}{8}$

$\frac{8}{9} = 1 - \frac{1}{9}$

96. $\frac{1}{8} + 999\frac{791}{792} \times 99$

(a) 89000 (b) 88900

(c) 95900 (d) 99000

ans = 9900

97. Find the value of $\frac{1}{5} + 999\frac{494}{495} \times 99$

(a) 90000 (b) 99000

(c) 90900 (d) 99990

Basic

$$\frac{1}{5} + \left(999 + \frac{494}{495}\right) \times 99$$

$$= \frac{1}{5} + \left(999 + 1 - \frac{1}{495}\right) \times 99$$

$$= \frac{1}{5} + \left(1000 - \frac{1}{495}\right) \times 99$$

$$= \frac{1}{5} + 99000 - \frac{1}{495} \times \frac{99}{5}$$

$$\frac{1}{5} + 99000 - \frac{1}{5}$$

97. Find the value of $\frac{1}{5} + 999\frac{494}{495} \times 99$

(a) 90000 (b) 99000

(c) 90900 (d) 99990

Ans= 99000

$$0.\ \frac{1}{2} + \left(999\frac{197}{198}\right) \times 99 = 99000$$

$$0.\ \frac{1}{3} + \left(999\frac{296}{297}\right) \times 99 = 99000$$

$$0\ \ \frac{1}{4} + \left(999\frac{395}{396}\right) \times 99 = 99000$$

98. $\frac{1}{7}+\left(999\frac{692}{693}\right)\times 99$ is equal to:

(a) 1

(b) 99000

(c) 99800

(d) 99900

ans = 99000

99. $999\frac{1}{5} + 999\frac{2}{5} + \ldots\ldots\ldots + 999\frac{4}{5}$

(a) 3798 (b) 3998

(c) 3899 (d) 9939

$= 999 + \frac{1}{5} + 999 + \frac{2}{5} + 999 + \frac{3}{5} + 999 + \frac{4}{5}$

$= 999 \times 4 + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5}$

$= 3996 + \frac{10}{5} 2$

$= 3998$

99. $999\frac{1}{5} + 999\frac{2}{5} + \ldots\ldots 999\frac{3}{5} \ldots + 999\frac{4}{5}$

(a) 3798 (b) 3998

(c) 3899 (d) 9939

$= 999 \times 4 + \frac{10}{5} 2$

$= 3996 + 2$

$= 3998$

100. Find the value of

$$777\frac{1}{5}+777\frac{2}{5}+777\frac{3}{5}+777\frac{4}{5}$$

$$777\frac{1}{5}+777\frac{2}{5}+777\frac{3}{5}+777\frac{4}{5}$$ का मान ज्ञात कीजिए।

NTPC CBT-1, 03/03/2021 (Shift-01)

(a) 3110
(b) 3018
(c) 3000
(d) 3108

$777\times4+\frac{10}{8}2$

$=3108+2$

$=3110$

CONCEPT-08

(Some Standard Formulae for Addition

जोड़ के लिए कुछ सामान्य सूत्र)

- **Sum of first 'n' natural numbers**

  प्रथम **n** प्राकृतिक संख्या का योगफल

$$1 + 2 + 3 + \ldots\ldots\ldots + n = \frac{n(n+1)}{2}$$

	Sum
* Natural no. $(1+2+3+\_\_\_+n)$	$\frac{n(n+1)}{2}$
* Squar " $(1^2+2^2+3^2+\_\_\_+n^2)$	$\frac{n(n+1)(2n+1)}{6}$
* Cube " $(1^3+2^3+3^3+\_\_\_+n^3)$	$\left[\frac{n(n+1)}{2}\right]^2$
* Odd " $(1+3+5+\_\_\_)$	n^2
* even " $(2+4+6+8+\_\_\_)$	$n(n+1)$

} for first n numbers.

- **Sum of the squares of first 'n' natural numbers.**

  प्रथम n प्राकृतिक संख्याओं के वर्गों का योगफल

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

- **Sum of square of n odd/even number/n** विषम/सम संख्याओं के वर्गों का योग = $\frac{n(n+1)(n+2)}{6}$ **where n is last odd/even number/**जहाँ **n** अंतिम विषम/सम संख्या है।

- **Sum of the cubes of first 'n' natural numbers.**

प्रथम n प्राकृतिक संख्याओं के घनों का योगफल

$$1^3 + 2^3 + 3^3 + \ldots\ldots\ldots + n^3 = \left\{ n\frac{(n+1)}{2} \right\}^2$$

- **Sum of even integers/सम पूर्णांकों का योगफल**

  $2 + 4 + 6 \ldots\ldots\ldots + 2n = n(n + 1)$

- **Sum of odd integers/विषम पूर्णांकों का योगफल**

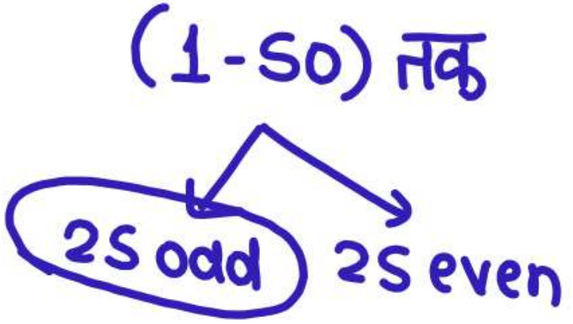
  $1 + 3 + 5 + \ldots\ldots\ldots\ldots (2n - 1) = n^2$

101. What is sum of odd numbers from 1 to 50?

1 से 50 तक विषम संख्याओं का योग क्या है?

(a) 625 **(b) 650**

(c) 667 **(d) 670**



$\text{Ans} = (25)^2$

$= 625$

Q. what is sum of first 10 odd numbers.

$(1+3+5+7+9+11+13+15+17+19)$

$$ans = n^2 = (10)^2 = 100$$

Q. what is sum of first 20 odd numbers.

$$ans = (20)^2$$
$$= \underline{\underline{400}}$$

102. What is sum of first 50 odd numbers?

प्रथम 50 विषम संख्याओं का योग क्या है?

(a) 2500 **(b) 2600**

(c) 2700 **(d) 2800**

ans = $(50)^2$

= 2500

Q. $1^2+2^2+3^2+- - - +10^2$

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

$= \frac{10 \times 11 \times 21}{6}$

$= 385$ ✓

Q. $4^2+5^2+6^2+- - - +10^2$

(1 से 10 तक) − (1 से 3 तक)

Soln $(1^2+2^2+3^2+- - - +10^2)-(1^2+2^2+3^2)$

$= \frac{10 \times 11 \times 21}{6} - \frac{3 \times 4 \times 7}{6}$

$= 385 - 14$

$= 371$

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

103. $7^2 + 8^2 + ...+ 12^2 = ?$

(a) 459 (b) 559

(c) 567 (d) 570

$(1^2+2^2+3^2+. \_ \_ +12^2) - (1^2+2^2+. \_ \_ \_ +6^2)$

$= \frac{12 \times 13 \times 25}{6} - \frac{6 \times 7 \times 13}{6}$

$= 650 - 91$

$= 559$

104. Find the value of $21^2 + 22^2 + 23^2 ..... + 30^2$

$21^2 + 22^2 + 23^2 ..... + 30^2$ का मान ज्ञात कीजिए।

H.W

(a) 6855 (b) 6585

(c) 5865 (d) 8565

Q $1^3+2^3+3^3+---+10^3$

Soln $\left[\frac{n(n+1)}{2}\right]^2$

$= \left(\frac{5}{\frac{10}{2}\times 11}\right)^2$

$= (55)^2$

$= 3025$

Q. $4^3+5^3+6^3+---+10^3$

Soln (1 से 10 तक) − (1 से 3 तक)

$= \left(\frac{5}{\frac{10}{2}\times 11}\right)^2 - \left(\frac{3\times \cancel{4}^{2}}{\cancel{2}}\right)^2$

$= 3025 - 36$

$= 2989$

$\left[\frac{n(n+1)}{2}\right]^2$

105. $9^3 + 10^3 + \ldots\ldots + 14^3 + 15^3$

(a) 12104 (b) 12105

(c) 13104 (d) 14104

Ans: (1 से 15 तक) − (1 से 8 तक)

$= \left(\frac{15 \times 16^8}{2}\right)^2 - \left(\frac{8^4 \times 9}{2}\right)^2$

$= (120)^2 - (36)^2$

$= 84 \times 156$

$= 13104$