

# Summation series:

$$\sum n = \frac{n(n+1)}{2} = 1+2+3+4+\dots+n \quad \sum_{10} = \frac{10 \times 11}{2} = 55$$

$$\sum n^2 = \frac{n(n+1)(2n+1)}{6} = 1^2+2^2+3^2+\dots+n^2 \quad 1^2+2^2+3^2+\dots+10^2 = \frac{10 \times 11 \times 21}{6}$$

Square

$$\sum n^3 = \left[ \frac{n(n+1)}{2} \right]^2 = 1^3+2^3+3^3+\dots+n^3$$

$$\sum n(n+1) = \frac{n(n+1)(n+2)}{3} = 1 \times 2 + 2 \times 3 + 3 \times 4 + \dots + n(n+1)$$

$$\sum n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4} = 1 \times 2 \times 3 + 2 \times 3 \times 4 + \dots + n(n+1)(n+2)$$

$$\underline{1 \times 2} + \underline{2 \times 3} + \underline{3 \times 4} + \dots + \underline{50 \times 51} = \frac{50 \times 51 \times 52}{3}$$

$$\sum n(n+1) = \frac{n(n+1)(n+2)}{3}$$

$$\underline{1 \times 2 \times 3} + \underline{2 \times 3 \times 4} + \underline{3 \times 4 \times 5} + \dots + \underline{100 \times 101 \times 102} = \frac{100 \times 101 \times 102 \times 103}{4}$$

coaching center

a) Sum of first 'n' <sup>natural</sup> even numbers =  $n(n+1)$   
<sub>सम</sub>

b) Sum of first 'n' odd numbers =  $n^2$   
<sub>विषम</sub>

c) Solve  $1+2+3+4+\dots+49+50+49+\dots+4+3+2+1$   
 $\rightarrow 50^2 = 2500$

c)  $1+2+1 = 4$

$1+2+3+2+1 = 9$

$1+2+3+4+3+2+1 = 16$

a)  $2+4+6+8+\dots+2n$

$= 2(1+2+3+\dots+n)$

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

b)

1<sup>st</sup>  $\rightarrow$  Sum 1

2  $\rightarrow 1+3 = 4$

3  $\rightarrow 1+3+5 = 9$

n  $\rightarrow n^2$

23. Given that  $1^2 + 2^2 + 3^2 + \dots + 20^2 = 2870$ , the value of  $(2^2 + 4^2 + 6^2 + \dots + 40^2)$  is

दिया हुआ है  $1^2 + 2^2 + 3^2 + \dots + 20^2 = 2870$  तो  $(2^2 + 4^2 + 6^2 + \dots + 40^2)$  का मान पता करें:

~~a) 11480~~

~~b) 5740~~

c) 28700

d) 2870

$$(2^2 + 4^2 + 6^2 + 8^2)$$
$$2^2(1^2 + 2^2 + 3^2 + \dots)$$

4 16 36

~~X~~  $2(1^2 + 2^2 + 3^2 + \dots + 20^2)$

$$2^2(1^2 + 2^2 + 3^2 + \dots + 20^2)$$

$$= 4 \times 2870$$

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24. Given  $1^3 + 2^3 + 3^3 + \dots + 10^3 = 3025$  then  $2^3 + 4^3 + 6^3 + \dots + 20^3$  is equal to

अगर  $1^3 + 2^3 + 3^3 + \dots + 10^3 = 3025$  है तो  $2^3 + 4^3 + 6^3 + \dots + 20^3$  पता करें:

a) 6050

b) 9075

c) 12100

d) 24200

$$\underbrace{2 \times 2 \times 2}_{1 \ 1 \ 1} + \underbrace{4 \times 4 \times 4}_{2 \ 2 \ 2} + \underbrace{6 \times 6 \times 6}_{3 \ 3 \ 3} + \dots + 20 \times 20 \times 20$$

$$2^3 [1^3 + 2^3 + 3^3 + \dots + 10^3]$$

$$= 8 \times 3025 = 24200$$

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25. Find  $1^2 + 3^2 + 5^2 + \dots + 17^2$ .

a) 1700

~~b) 969~~

c) 1785

d) 980

$$\begin{aligned} & \left[ 1^2 + 2^2 + 3^2 + \dots + 17^2 \right] - \left[ 2^2 + 4^2 + 6^2 + \dots + 16^2 \right] \\ &= \sum 17^2 - 2^2 \left[ 1^2 + 2^2 + 3^2 + \dots + 8^2 \right] \\ &= \frac{\cancel{17} \times \cancel{18} \times \overset{3}{35}}{\cancel{6}} - 4 \times \frac{\overset{4}{8} \times \overset{3}{9} \times \cancel{17}}{\cancel{6}} \\ &= 17 \times 3 (35 - 16) \\ &= 17 \times 3 \times 19 \\ &= 51 \times 19 = 969 \end{aligned}$$

26. What is the value of  $14^3 + 16^3 + 18^3 + \dots + 30^3$ ?

$14^3 + 16^3 + 18^3 + \dots + 30^3$  का मान क्या है?

~~a) 134576~~   b) 120212   ~~c) 115624~~   ~~d) 111672~~

$$2^3 (7^3 + 8^3 + 9^3 + \dots + 15^3)$$

$$= 2^3 \left( \sum_{k=7}^{15} k^3 - \sum_{k=1}^{6} k^3 \right)$$

59

(72)

$$= 8 \left( \frac{15 \times 16 \times 15 \times 16}{2 \times 2} - \frac{6 \times 7 \times 6 \times 7}{2 \times 2} \right)$$

$$= 8 \times 3 \times 3 (1600 - 49)$$

$$= 8 \times 9 \times 1551$$

27. What is the sum of first 20 terms of the following series?

$$\underbrace{1 \times 2} + \underbrace{2 \times 3} + \underbrace{3 \times 4} + 4 \times 5 + \dots + \underline{20 \times 21}$$

दी गई श्रृंखला के पहले 20 पदों के योग क्या है?

$$1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \dots$$

- a) 3160    b) 2940    c) 3240    d) 3080 ✓

$$3080 = \frac{20 \times 21 \times 22}{3}$$

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# Comparison of fractions:

write in  $\frac{1}{n}$  form

1. Cross Multiplication
2. Just approximate it
3. Change in Numerator and denominator
4. Observing pattern

$$\frac{7}{41} > \frac{15}{87}$$

609 < 615

$$\frac{6}{107} > \frac{12}{231}$$

$\frac{6^1}{17 \sim} > \frac{12^1}{19 \sim}$

$$\frac{6}{107} \times 2 = \frac{12}{214}$$

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28. Which of the following statement(s) is/are TRUE?

निम्नलिखित में से कौन सा/से कथन सत्य है/हैं?

~~I.  $\frac{31}{36} < \frac{21}{308} < \frac{7}{225}$  32 ~~~

~~II.  $99\frac{1}{7} + 99\frac{2}{7} + 99\frac{3}{7} + \dots + 99\frac{6}{7} = 279$~~

~~a) Only I~~

b) Only II

c) Neither I nor II

d) Both I and II

$(100-1) \downarrow$   
 $99 \times 6 + \frac{6 \times 7}{7 \times 2}$   
 $= 600 - 6 + 3$

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29. Which of the following statement(s) is/are TRUE?

निम्नलिखित में से कौन सा/से कथन सत्य है/हैं?

$$21 + \frac{5}{4} - \frac{3}{10}$$

$$21 + \frac{3819}{1020} = \frac{439}{20}$$

$$\frac{1}{119} < \frac{1}{102} < \frac{1}{101}$$

I.  $\frac{11\frac{1}{2} + 17\frac{3}{4} - 5\frac{1}{5} - 2\frac{1}{10}}{9} = \frac{439}{20}$

II.  $\frac{1078}{149} > \frac{1127}{155} > \frac{1219}{159}$

III.  $\frac{149}{151} > \frac{153}{155} > \frac{157}{159}$

- a) Only I      b) Only II      c) Only III      d) None is true

$\frac{3333}{3} < \frac{501}{4}$

$\frac{3}{1} > \frac{15}{6}$

$\frac{151}{149} > \frac{155}{153} > \frac{159}{157}$

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30. Which of the following statement(s) is/are TRUE?

निम्नलिखित में से कौन सा/से कथन सत्य है/हैं?

$$\frac{1}{23} < \frac{1}{15} < \frac{1}{14}$$

I.  $\frac{3}{71} < \frac{5}{91} < \frac{7}{99}$

II.  $\frac{11}{135} > \frac{12}{157} > \frac{13}{181}$

a) Only I

b) Only II

c) Both I and II

d) Neither I nor II

$$\frac{1}{12} > \frac{1}{13} > \frac{1}{13}$$

13 14

$$13 \overline{) 181} \\ \underline{13} \\ 51 \\ \underline{52}$$

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3). Arrange the given ratios in descending order  
15 : 7, 5 : 11 and 21 : 77. in

दिए गए अनुपातों को अवरोही क्रम में व्यवस्थित करें  
15 : 7, 5 : 11 and 21 : 77.

a)  $21 : 77 > 5 : 11 > 15 : 7$

b)  $15 : 7 > 5 : 11 > 21 : 77$

c)  $15 : 7 > 21 : 77 > 5 : 11$

d)  $5 : 11 > 15 : 7 > 21 : 77$

$$\frac{15}{7} > \frac{5}{11} > \frac{21}{77}$$

$\frac{3 \times 5}{7} > \frac{5}{11} > \frac{3 \times 7}{7 \times 11}$

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95, 96, 97, 98  
1, 2, 3, 4

$$P = \frac{2}{1 \times 3} = \frac{2}{3} \quad 66661$$

$$Q = \frac{3}{2 \times 4} = \frac{3}{8} \quad 3751$$

$$R = \frac{1}{3} \quad 33331$$

32. If  $P = \frac{96}{95 \times 97}$ ,  $Q = \frac{97}{96 \times 98}$  and  $R = \frac{1}{97}$ , then which of the following is TRUE?

यदि  $P = \frac{96}{95 \times 97}$ ,  $Q = \frac{97}{96 \times 98}$  तथा  $R = \frac{1}{97}$  हैं, तो निम्नलिखित में से कौन सा सत्य है?

- a)  $P < Q < R$
- ~~b)  $R < Q < P$~~
- c)  $Q < P < R$
- d)  $R < P < Q$