

 \equiv 1. Progression \equiv

Lecture - 1



Q.1If the ratio of sum of n terms of two A.P's is (3n + 8) : (7n + 15), then the ratio of 12^{th} terms is(A) 16 : 7(B) 7 : 16(C) 7 : 12(D) 12 : 5



[B]	
Proper Method	Short Trick
$\frac{\mathbf{S}_{n}}{\mathbf{S}_{n}'} = \frac{3\mathbf{n}+8}{7\mathbf{n}+15}$	$\frac{\mathbf{S}_{n}}{\mathbf{S'}_{n}} = \frac{3n+8}{7n+15}$
$\Rightarrow \frac{\frac{n}{2}[2a_1 + (n-1)d_1]}{\frac{n}{2}[2a_2 + (n-1)d_2]} = \frac{3n+8}{7n+15}$	Then $\frac{T_n}{T'_n} = \frac{3(2n-1)+8}{7(2n-1)+15}$
	$\frac{T_{12}}{T'_{12}} = \frac{7}{16}$
$\Rightarrow \frac{a_1 + \left(\frac{n-1}{2}\right)d_1}{a_2 + \left(\frac{n-1}{2}\right)d_2} = \frac{3n+8}{7n+15}$	
$put \frac{n-1}{2} = 11 \therefore n = 23$	
$\Rightarrow \frac{a_1 + 11d_1}{a_2 + 11d_2} = \frac{3.23 + 8}{7.23 + 15} = \frac{77}{176} = \frac{7}{16}$	



Sol.

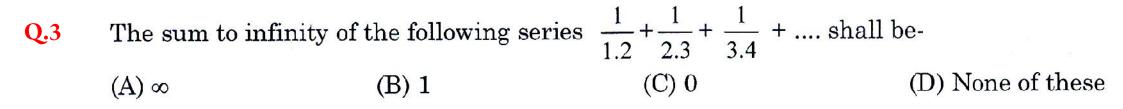
Q.2If the ratio of the sum of n terms of two AP's is 2n : (n + 1), then ratio of their 8th terms is(A) 15:8(B) 8:13(C) n:(n-1)(D) 5:17



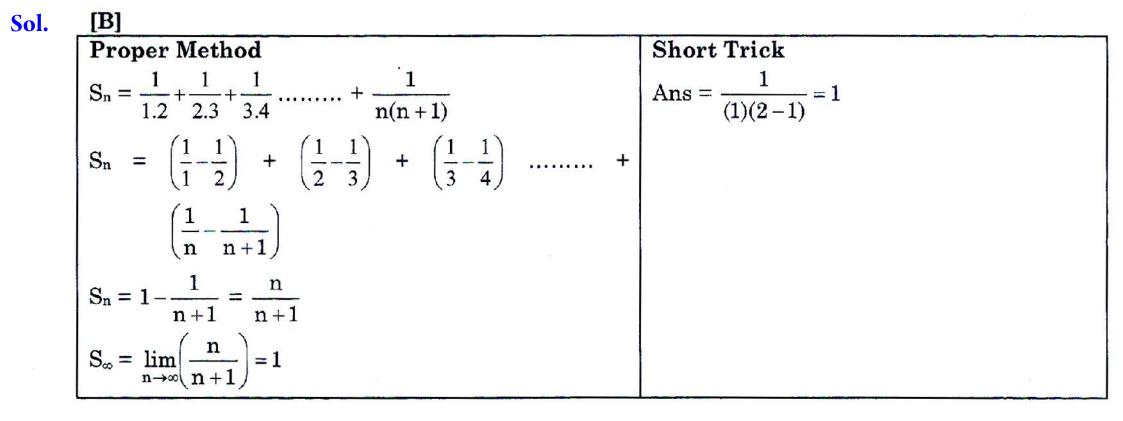
[A]	
Proper Method	Short Trick
$\frac{S_n}{S'_n} = \frac{2n}{n+1}$	$\frac{S_n}{S'_n} = \frac{2n}{n+1}$
$\Rightarrow \frac{\frac{n}{2}[2a_1 + (n-1)d_1]}{\frac{n}{2}[2a_2 + (n-1)d_2]} = \frac{2n}{n+1}$	$\Rightarrow \frac{T_n}{T'_n} = \frac{2(2n-1)}{(2n-1)+1}$
	$\frac{T_8}{T_8'} = \frac{15}{8}$
$\Rightarrow \frac{a_1 + \left(\frac{n-1}{2}\right)d_1}{a_2 + \left(\frac{n-1}{2}\right)d_2} = \frac{2n}{n+1}$	
$put \frac{n-1}{2} = 7 \therefore n = 15$	
$\Rightarrow \frac{a_1 + 7d_1}{a_2 + 7d_2} = \frac{2(15)}{15 + 1} = \frac{15}{8}$	

Sol.











Q.4
$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots$$
 up to ∞ terms is-
(A) $\frac{1}{2}$ (B) 1 (C) $\frac{1}{3}$ (D) None

P

Sol. [C]
Proper Method

$$S_{n} = \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{(3n-2)(3n+1)}$$

$$S_{n} = \frac{1}{3} \left[\frac{4-1}{1.4} + \frac{7-4}{4.7} + \dots + \frac{(3n+1)-(3n-2)}{(3n+1)(3n-2)} \right]$$

$$S_{n} = \frac{1}{3} \left[\left(\frac{1}{1} - \frac{1}{4} \right) + \left(\frac{1}{4} - \frac{1}{7} \right) + \left(\frac{1}{7} - \frac{1}{10} \right) + \dots + \left(\frac{1}{3n-2} - \frac{1}{3n+1} \right) \right]$$

$$S_{n} = \frac{1}{3} \left[1 - \frac{1}{3n+1} \right] \Rightarrow S_{\infty} = \lim_{n \to \infty} \frac{1}{3} \left[1 - \frac{1}{3n+1} \right]$$



Q.5If A.M. between p and q (p \ge q) is two times the GM, then p : q is-(A) 1 : 1(B) 2 : 1(C) $(2 + \sqrt{3}) : (2 - \sqrt{3})$ (D) 3 : 1



C 1	
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ol.	[C]	
	Proper Method	Short Trick
	Let AM of p and q is A and G.M of p and q is G then	A.M = 2
	$A = \frac{p+q}{2}, G = \sqrt{pq}$	G.M = 1
	Given that $\frac{A}{G} = \frac{2}{1}$	$\frac{p}{q} = \frac{2+\sqrt{3}}{2-\sqrt{3}}$
	$\Rightarrow \frac{p+q}{2\sqrt{pq}} = \frac{2}{1}$	
	Using componendo & dividendo	
	$\Rightarrow \frac{p+q+2\sqrt{pq}}{p+q-2\sqrt{pq}} = \frac{2+1}{2-1}$	
	$\Rightarrow \left(\frac{\sqrt{p} + \sqrt{q}}{\sqrt{p} - \sqrt{q}}\right)^2 = \frac{3}{1}$	
	$\Rightarrow \frac{\sqrt{p} + \sqrt{q}}{\sqrt{p} - \sqrt{q}} = \frac{\sqrt{3}}{1}$	
	\Rightarrow again using componendo & dividendo	
	$\Rightarrow \frac{(\sqrt{p} + \sqrt{q}) + (\sqrt{p} - \sqrt{q})}{(\sqrt{p} + \sqrt{q}) - (\sqrt{p} - \sqrt{q})} = \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$	
8	$\Rightarrow \frac{\sqrt{p}}{\sqrt{q}} = \frac{\sqrt{3}+1}{\sqrt{3}-1}$	
	$\Rightarrow \frac{\sqrt{q}}{\sqrt{q}} = \frac{1}{\sqrt{3} - 1}$ $\Rightarrow \frac{p}{q} = \frac{2 + \sqrt{3}}{2 - \sqrt{3}}$	



Q.6 If the arithmetic mean of two numbers a, b; a > b > 0 is five times their geometric mean, then $\frac{a+b}{a-b}$ is equal to -(A) $\frac{7\sqrt{3}}{12}$ (B) $\frac{3\sqrt{2}}{4}$ (C) $\frac{\sqrt{6}}{2}$ (D) $\frac{5\sqrt{6}}{12}$



Sol.

15	[D]		
	Proper Method	Short Trick	
	Let AM of a and b is A and a.m of a and b is G then	A.M _ 5	
	$A = \frac{a+b}{2}, G = \sqrt{ab}$	$\overline{\text{G.M}} = \overline{1}$ a 5 + $\sqrt{24}$	
	Given that $\frac{A}{G} = \frac{5}{1}$	$\frac{a}{b} = \frac{5 + \sqrt{24}}{5 - \sqrt{24}}$	
	$\Rightarrow \frac{a+b}{2\sqrt{ab}} = \frac{5}{1}$	$\frac{a+b}{a-b} = \frac{5\sqrt{6}}{12}$	
	Using compounds & dividends		
	$\Rightarrow \frac{a+b+\sqrt{ab}}{a+b-2\sqrt{ab}} = \frac{5+1}{5-1}$		
	$\Rightarrow \left(\frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} - \sqrt{b}}\right)^2 = \frac{6}{4}$		
	$\Rightarrow \frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} - \sqrt{b}} = \frac{\sqrt{6}}{2}$		
	\Rightarrow again using compounds & dividends		
	$\Rightarrow \frac{(\sqrt{a} + \sqrt{b}) + (\sqrt{a} - \sqrt{b})}{(\sqrt{a} + \sqrt{b}) - (\sqrt{a} - \sqrt{b})} = \frac{\sqrt{6} + 2}{\sqrt{6} - 2}$		
	$\Rightarrow \frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{6}+2}{\sqrt{6}-2}$		
	$\Rightarrow \frac{a}{b} = \frac{12 + 4\sqrt{6}}{12 - 4\sqrt{6}}$		
	$\Rightarrow \frac{a+b}{a-b} = \frac{12}{8\sqrt{6}} = \frac{5\sqrt{6}}{12}$		
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Q.7 The fractional value of 0.125 is-(Å) 125/999 (B) 23/990

(C) 61/550

(D) None of these



[A] Proper Method	Short Trick
Let	$0.125 = \frac{125 - 0}{125} = \frac{125}{125}$
$x = 0. \overline{125}$	$0.123 - \frac{1}{999} - \frac{1}{999}$
$\therefore x = 0.125125125$	
$\therefore 1000 \text{ x} = 125.125125125$	
Now (ii) – (i); 999 x = 125	
$\therefore x = 125/999$	

