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MATHS

ARITHMETIC PROGRESSION

Part – 5

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Previous Year Questions

Q.6 For what value of n are the n^{th} terms of the following two A.P's the same ?

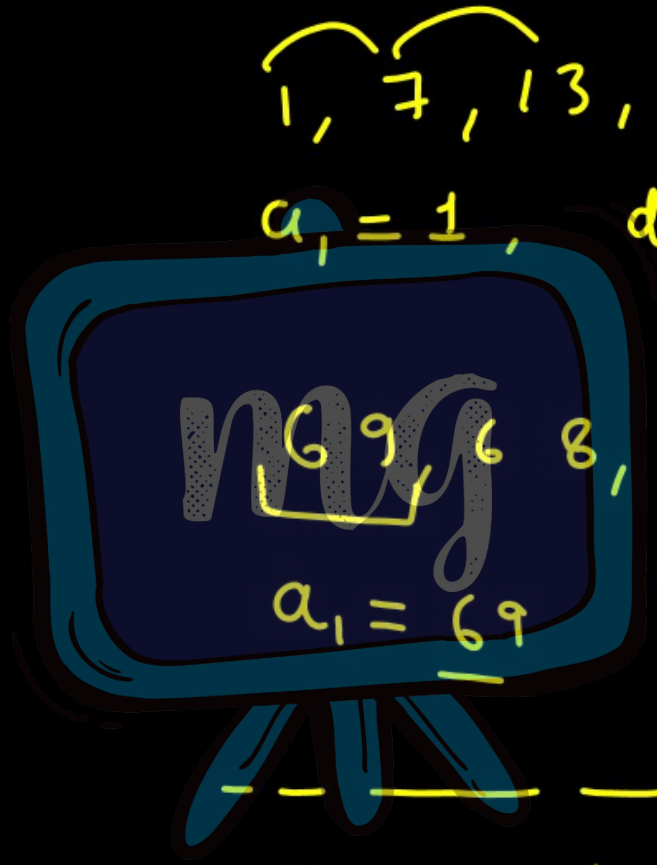
[CBSE 2006C]

(i) 1, 7, 13, 19, ...

(ii) 69, 68, 67, ...

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1, 7, 13, - -

$a_1 = 1$, $d = 6$

69, 68, 67 - - -

$a_1 = 69$

$d = -1$

$a_n = a + (n-1)d$

$= 1 + (n-1)6$

$1 + 6n - 6$

$a_n = 6n - 5$

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$A_n = A + (n-1)D$

$A_n = 69 + (n-1)(-1)$

$= 69 + -n + 1$

$A_n = 70 - n$

$A_n = a_n$

$70 - n = 6n - 5$

$70 + 5 = 7n$

$75 = 7n$

$\frac{75}{7} = n$

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Previous Year Questions

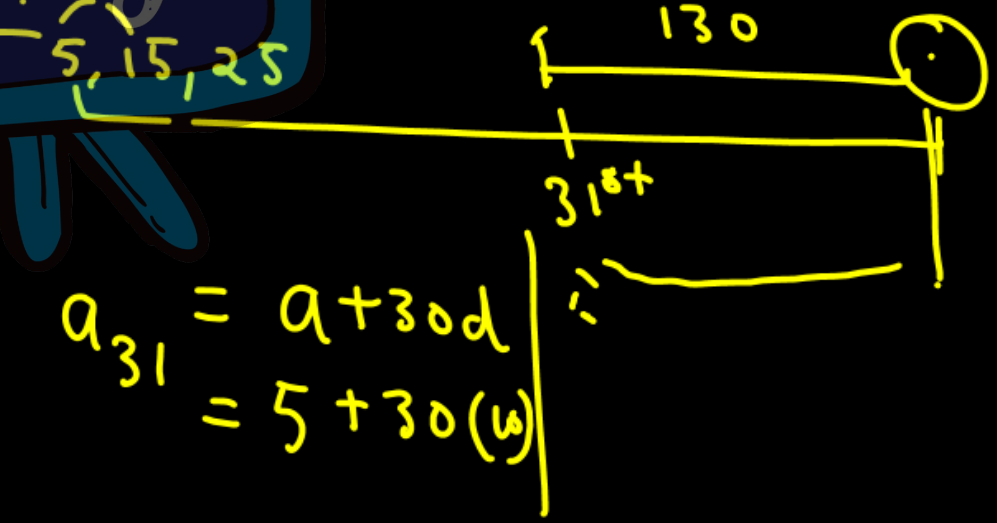
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Q.7 Which term of the arithmetic progression 5, 15, 25, ... Will be 130 more than its 31st term ?

[CBSE 2006C, 2017]

Soln. 10

5, 15, 25



$a_{31} = a + 30d$

$= 5 + 30(10)$

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$a_{31} = a + 30d$

$= 5 + 30(10)$

$= 5 + 300$

$a_{31} = 305$

$a_{31} + 130 = a_n$

$305 + 130 = a_n$

$435 = a_n$

$435 = a + (n-1)d$

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$$435 = 5 + (n-1)10$$

$$435 - 5 = (n-1)10$$

$$430 = (n-1)10$$

$$\frac{430}{10} = (n-1)$$

$$43 = (n-1)$$

$$44 = n$$

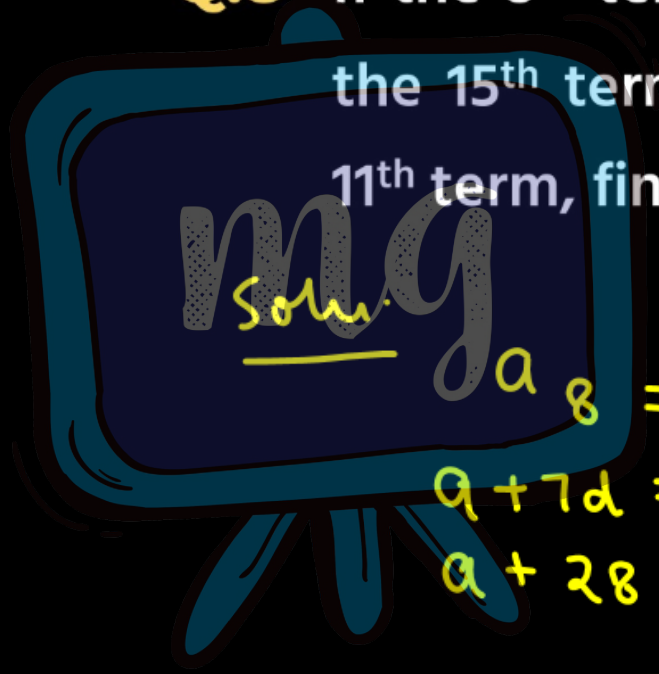
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Previous Year Questions

Q.8 If the 8^{th} term of an A.P. is 31 and the 15^{th} term is 16 more than the 11^{th} term, find the A.P.

[CBSE 2006C]



Soln.

$a_8 = 31$ — (1)

$a + 7d = 31$

$a + 28 = 31$

$a_{15} = a_{11} + 16$

$a + 14d = a + 10d + 16$

$4d = 16$

$d = 4$

$a = 3$

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$a = 3$

$d = 4$



3, 7, 11, 15 – ——

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Previous Year Questions

Q.9 If the 10^{th} term of an A.P. is 52 and 17^{th} term is 20 more than the 13^{th} term, find the A.P.

[CBSE 2006C]

Soln.

$a_{10} = 52$

$a + 9d = 52$

$a + 9(5) = 52$

$a = 52 - 45$

$a = 7$

$a_{17} = a_{13} + 20$

$a_{17} - a_{13} = 20$

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$$a + 16d - (a + 12d) = 20$$

$$a + 16d - a - 12d = 20$$

$$4d = 20$$

$$\boxed{d = 5}$$

$$a = 7$$

$$7, 12, 17, 22, 27 \text{ ——}$$

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Previous Year Questions

Q.10 The sum of 5^{th} and 9^{th} terms of an A.P. is 72 and the sum of 7^{th} and 12^{th} terms is 97. Find the A.P.

[CBSE 2009]

Sol.

$$a_5 + a_9 = 72$$

$$a + 4d + a + 8d = 72$$

$$\boxed{2a + 12d = 72} \quad \text{— (1)}$$

$$a + 6d = 36$$

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$$a_7 + a_{12} = 97$$

$$a + 6d + a + 11d = 97$$

$$2a + 17d = 97$$

$$-\ 2a + 12d = -\ 72$$

$$5d = 25$$

$$d = 5$$

$$a + 6d = 36$$

$$a + 30 = 36$$

$$a = 6$$

6, 11, 16 — —

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Previous Year Questions

Q.11 If five times the fifth term of an A.P. is equal to 8 times its eight term, show that its 13th term is zero.

Soln

(5) $a_5 = (8)\, a_8$

$a_m = n\, a_n$

$a_{m+n} = 0$

$a_{5+8} = 0$

$a_{13} = 0$

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$5\,a_5 = 8\,a_8$

$5(a+4d) = 8(a+7d)$

$5a + 20d = 8a + 56d$

$= 8a + 56d - 5a - 20d$

$= 3a + 36d$

$0 = 3(a+12d)$

$0 = a + 12d \Rightarrow a_{13} = 0$

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Previous Year Questions

Q.12 Find the middle term of the A.P. 6, 13, 20, ..., 216.

[CBSE 2015]

Solu: 6, 13, 20, ---, 216

a_n

$a_n = a + (n-1)d$

$216 = 6 + (n-1)7$

$216 - 6 = (n-1)7$

$210 = (n-1)7$

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$210 = (n-1)\,7$

$\frac{210}{7} = (n-1)$

$30 = n-1$

$31 = n$

$\frac{n+1}{2} = m$

$\frac{31+1}{2} = m$

$16 = m$

$a_m = a + (m-1)d$

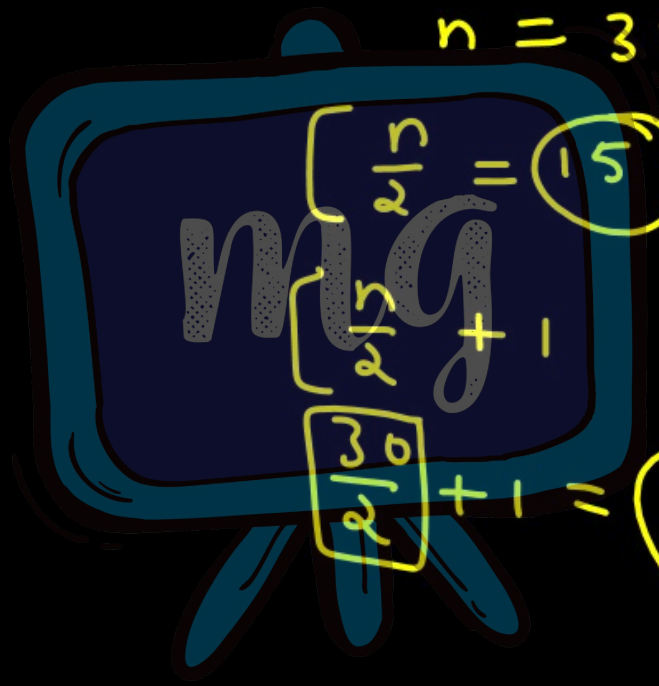
$a_{16} = a + 15d$

$= 6 + 15(7)$

$a_{16} = 6 + 105 = 111$

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if n = even

$n = 30$

$\left[\frac{n}{2}\right] = 15 = m_1$

$\left[\frac{n}{2}\right] + 1$

$\left[\frac{30}{2}\right] + 1 = 16 = m_2$

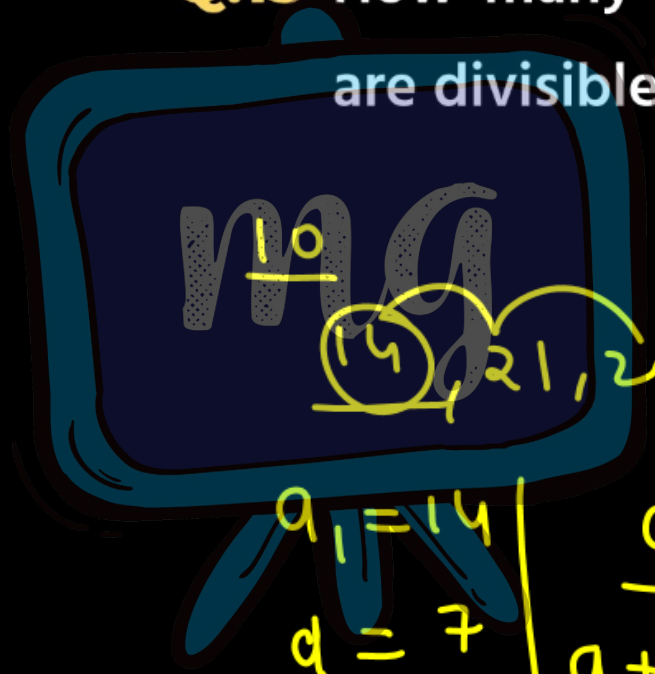
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Previous Year Questions

Q.13 How many number of two digits are divisible by 7 ?

[CBSE 2019]



10, 14, 21, 28, ... 98, 99

$a_1 = 14$

$d = 7$

$a_n = 98$

$a + (n-1)d = 98$

$14 + (n-1)7 = 98$

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$$14 + (n-1)7 = 98$$

$$(n-1)7 = 98 - 14$$

$$(n-1)7 = 84$$

$$(n-1) = \frac{84}{7}$$

$$n - 1 = 12$$

$$\boxed{n = 13}$$

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Previous Year Questions

Q.14 If the m^{th} term of an A.P. be 1/n and n^{th} t term be 1/m, then show that its $(mn)^{th}$ term is 1.

[CBSE 2017]

$a_m = \frac{1}{n}$

$a_n = \frac{1}{m}$

$a_{mn} = 1$

$a_{m+n} = 0$

$m a_m = n a_n$

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$a_m = \frac{1}{n}$ | $a_n = \frac{1}{m}$

$a + (m-1)d = \frac{1}{n}$ | $a + (n-1)d = \frac{1}{m}$

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

$-\quad -$

$d\left[(m-1) - (n-1)\right] = \frac{1}{n} - \frac{1}{m}$

$d\left[m - 1 - n + 1\right] = \frac{m-n}{mn}$

$d\,(m-n) = \frac{m-n}{mn}$ | $\boxed{d = \frac{1}{mn}}$

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$$a + (n-1)\,d = \frac{1}{m}$$

$$a + (n-1)\,\frac{1}{mn} = \frac{1}{m}$$

$$a + n\times\frac{1}{mn} - \frac{1}{mn} = \frac{1}{m}$$

$$a + \frac{1}{m} - \frac{1}{mn} = \frac{1}{m}$$

$$a = \frac{1}{mn}$$

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