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MATHS

ARITHMETIC PROGRESSION

Part – 4

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Exercise : 5.2

Q.12 Two APs have the same common difference. The difference between their 100th terms is 100, what is the difference between their 1000th terms?

Soln.

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

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

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$$a_{100} = a + 99d \quad \text{—(1)}$$

$$-A_{100} = -A - 99d \quad \text{—(2)}$$

$$a_{100} - A_{100} = a - A \quad \text{—(3)}$$

$$\frac{a_{100} - A_{100}}{100} = a - A \quad \text{—(4)}$$

$$a_{1000} = a + 999d$$

$$-A_{1000} = -A - 999d$$

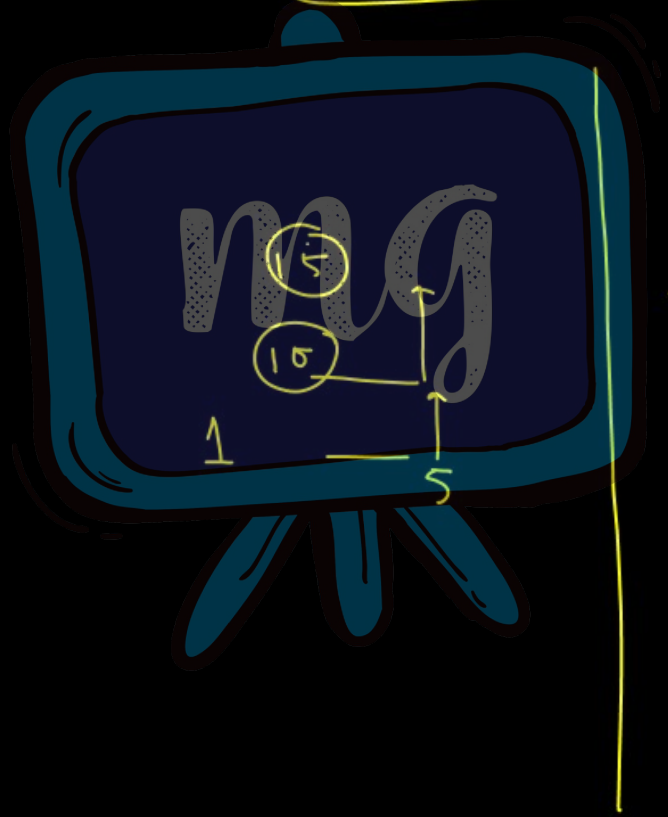
$$a_{1000} - A_{1000} = a - A \quad \text{—(5)}$$

By eq (4) and eq (5)

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$a_{1050} - A_{1050} = 100$





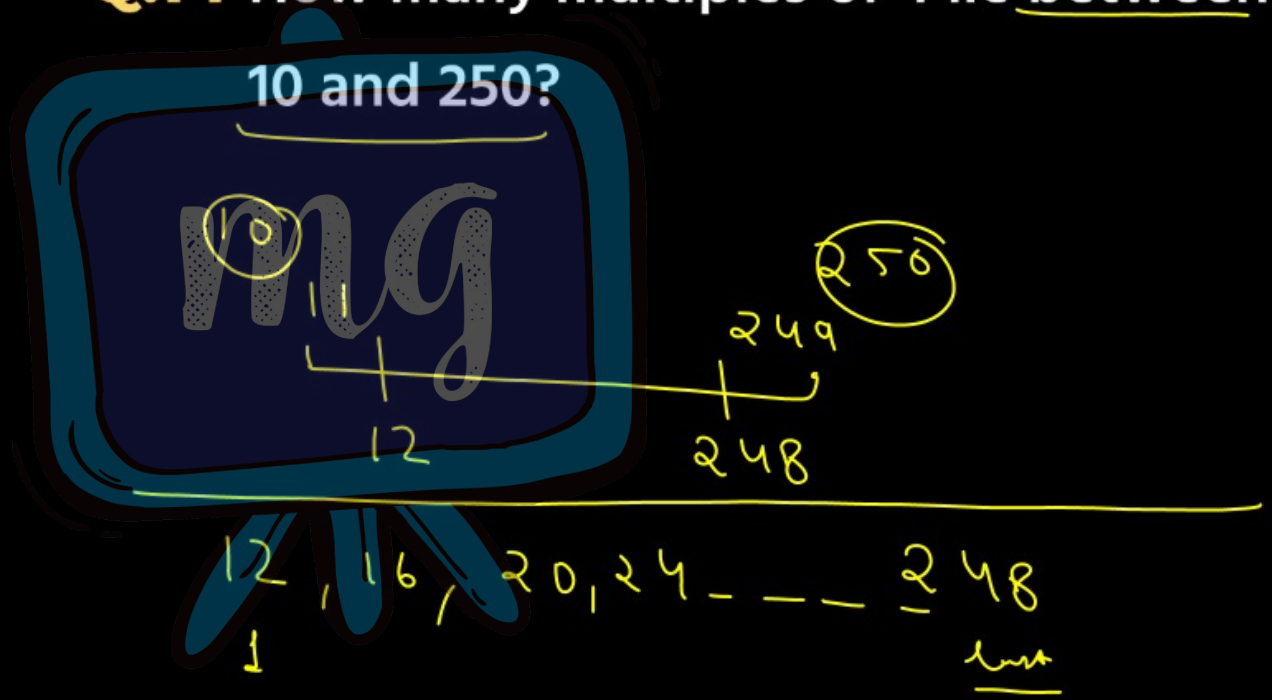
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Exercise : 5.2

Q.14 How many multiples of 4 lie between 10 and 250?



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

$$248 = 12 + (n-1)\,4$$

$$248 - 12 = (n-1)\,4$$

$$236 = (n-1)\,4$$

$$\frac{236}{4} = (n-1)$$

$$59 = (n-1)$$

$$59 + 1 = n$$

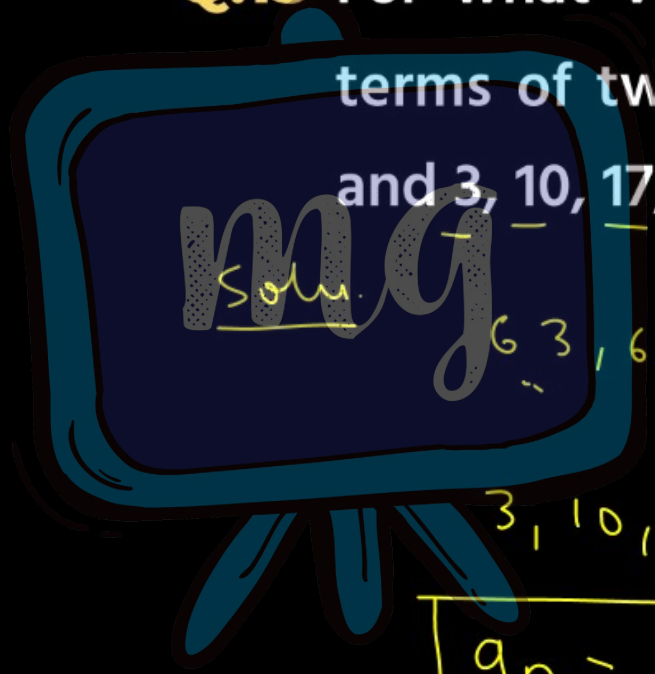
$$n = 60$$

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Exercise : 5.2

Q.15 For what value of n, are the n^{th} terms of two APs: 63, 65, 67, . . . and 3, 10, 17, . . . equal?



Solu.

63, 65, 67 ------ n

3, 10, 17 ------ n

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

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

$a_n = 63 + (n-1)2$

$a_n = 63 + 2n - 2$

$a_n = 61 + 2n$

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

$A_n = 3 + (n-1)7$

$A_n = 3 + 7n - 7$

$= 3 - 7 + 7n$

$A_n = 7n - 4$

$a_n = A_n$

$61 + 2n = 7n - 4$

$61 + 4 = 7n - 2n$

$65 = 5n$

$\frac{65}{5} = n$

$13 = n$

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Exercise : 5.2

Q.18 The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.

Soln. $a_4 + a_8 = 24$ — (1)

$a+3d + a+7d = 24$

$a_6 + a_{10} = 44$ — (2)

$a+5d + a+9d = 44$

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$$a + 3d + a + 7d = 24$$

$$2a + 10d = 24$$

$$2(a + 5d) = 12 \quad \text{—(1)}$$

$$a + 5d + a + 9d = 44$$

$$2a + 14d = 44$$

$$2(a + 7d) = 22$$

$$a + 5d = 12$$

$$2d = 10$$

$$\boxed{d = 5}$$

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$a + 5d = 12$

$a + 5 \times 5 = 12$

$a + 25 = 12$

$a = 12 - 25$

$\boxed{a = -13}$

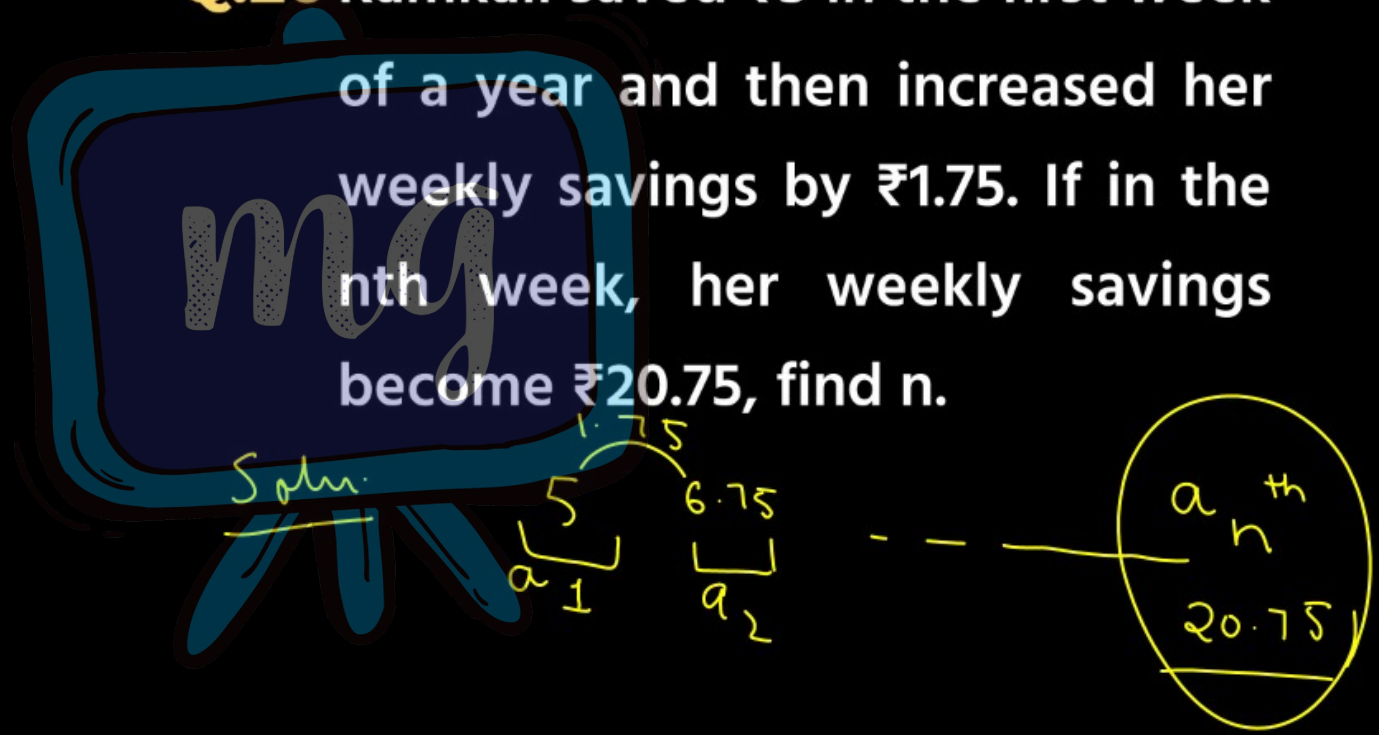
$-13, -8, -3, - - - -$

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Exercise : 5.2

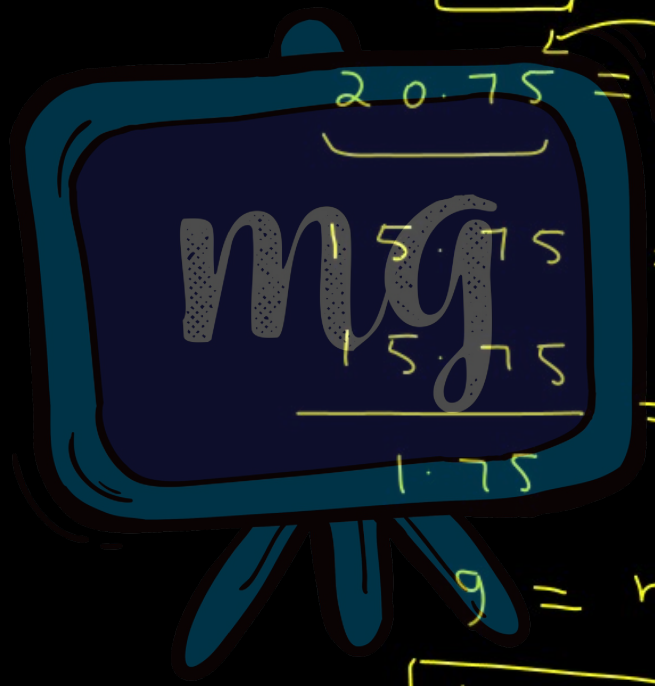
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Q.20 Ramkali saved ₹5 in the first week of a year and then increased her weekly savings by ₹1.75. If in the nth week, her weekly savings become ₹20.75, find n.



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

$$20.75 = 5 + (n-1)(1.75)$$

$$15.75 = (n-1)(1.75)$$

$$\frac{15.75}{1.75} = (n-1)$$

$$9 = n-1$$

$$\boxed{10 = n}$$

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Previous Year Questions

Q.1 Write the first five terms of the following sequence whose n^{th} term is :

(i) $a_n = 3n + 2$

$a_1 = 3(1) + 2$

$= 5$

$a_2 = 3(2) + 2$

$a_2 = 8$

$a_3 = 3(3) + 2$

$a_3 = 11$

$a_4 = 3(4) + 2$

$a_4 = 14$

$a_5 = 3(5) + 2$

$a_5 = 17$

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Previous Year Questions

Q.2 Find the indicated terms in the following sequence whose n^{th} term is :

(i) $a_n = 5n - 4$; a_{12} and a_{15}

$a_n = 5n - 4$

$a_{12} = 5(12) - 4$

$a_{12} = 56$

$a_{15} = 5(15) - 4$

$= 75 - 4$

$a_{15} = 71$

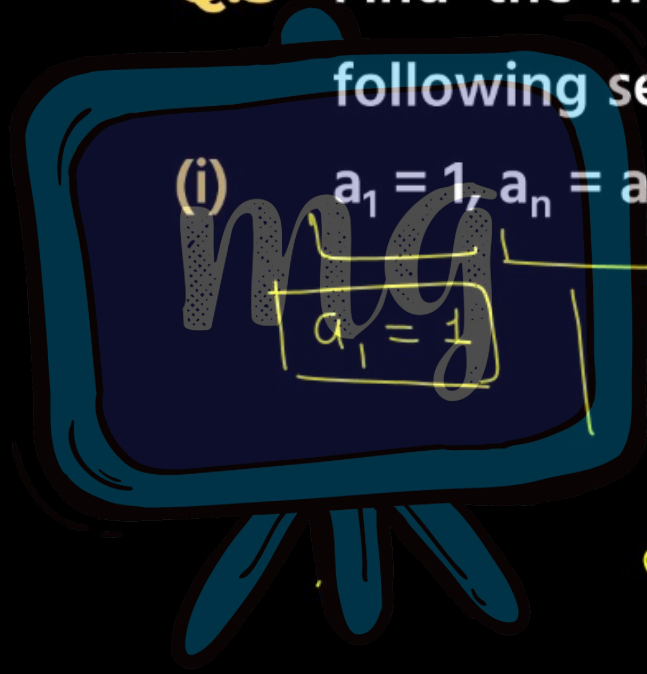
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Previous Year Questions

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Q.3 Find the next five terms of the following sequence given by:

(i) $a_1 = 1, a_n = a_{n-1} + 2, n \geq 2$



$a_n = a_{n-1} + 2$

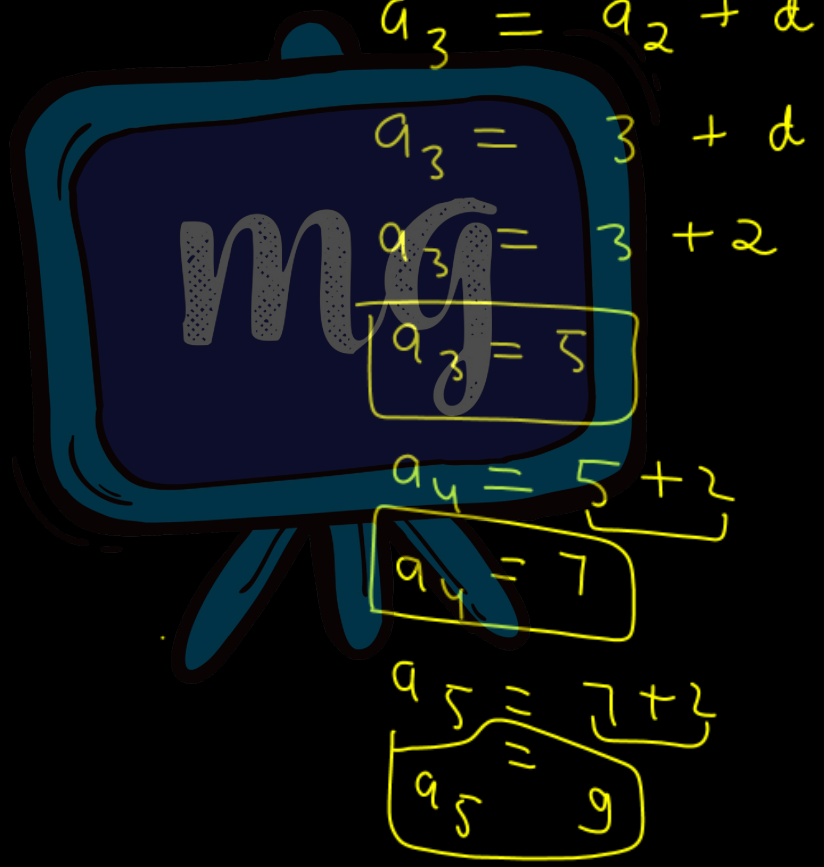
$a_2 = a_1 + 2$

$a_2 = 1 + 2$

$a_2 = 3$

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Previous Year Questions

Q.4 Write the sequence with n^{th} term:

(i) $a_n = 9 - 5n$

$a_1 = 9 - 5(1)$

$a_1 = 9 - 5$

$a_1 = 4$

$a_2 = 9 - 5(2)$

$a_2 = 9 - 10$

$a_2 = -1$

$a_3 = 9 - 5(3)$

$a_3 = 9 - 15$

$a_3 = -6$

$4, -1, -6$

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Previous Year Questions

Q.5 The n^{th} term of an A.P. is 6n + 2. Find the common difference.

[CBSE 2008]

Soln.

$a_n = 6n + 2$

$a_1 = 6(1) + 2$

$= 6 + 2$

$a_1 = 8$

$a_2 = 6(2) + 2$

$a_2 = 14$

$d = a_{k+1} - a_k$

$d = a_2 - a_1$

$d = 14 - 8 = 6$

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Previous Year Questions

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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, ...

$a_1 = 1$ | $a_2 = 7$

$d = 6$

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

$a = 69$ | $d = -1$

$a_n = 1 + (n-1)6$

$= 1 + 6n - 6$

$= 6n - 5$

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

$= 69 + (-n) + 1$

$= 70 - n$

$6n - 5 = 70 - n$

$7n = 75$