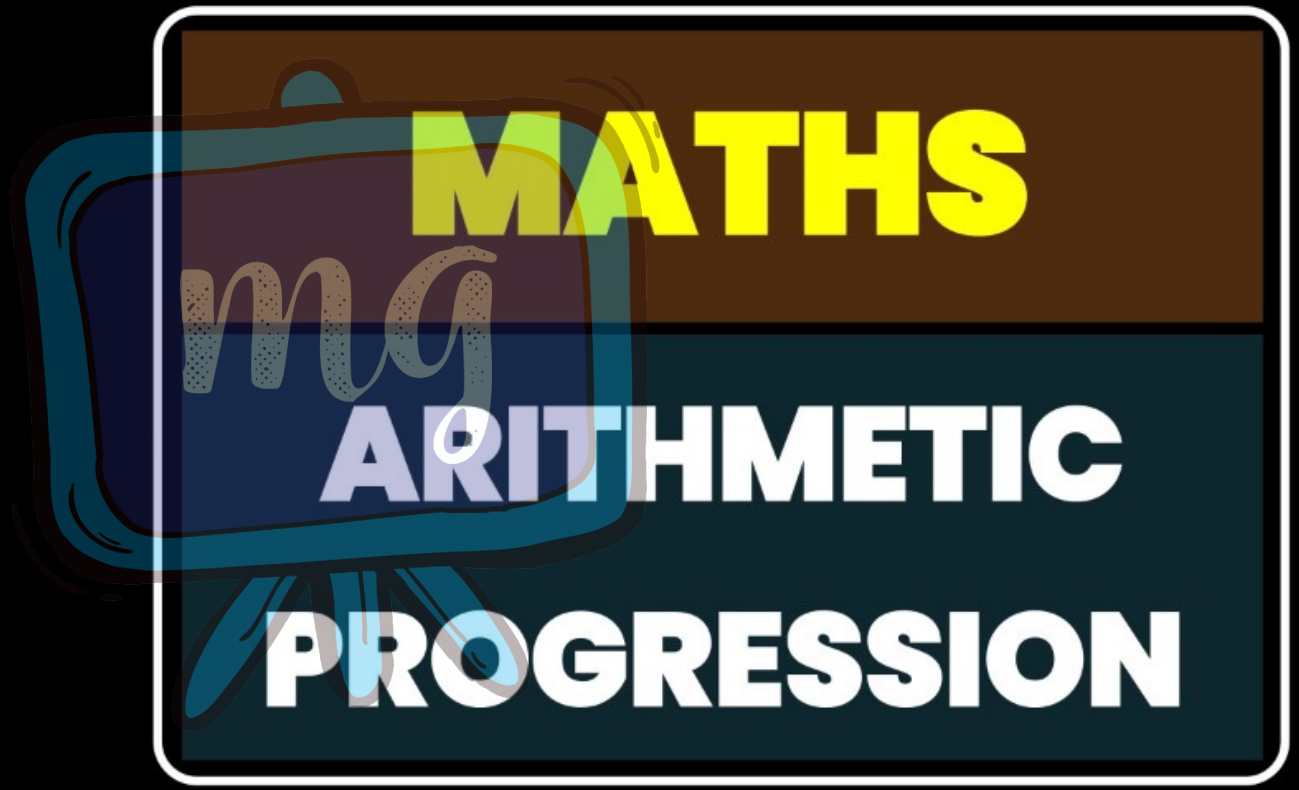
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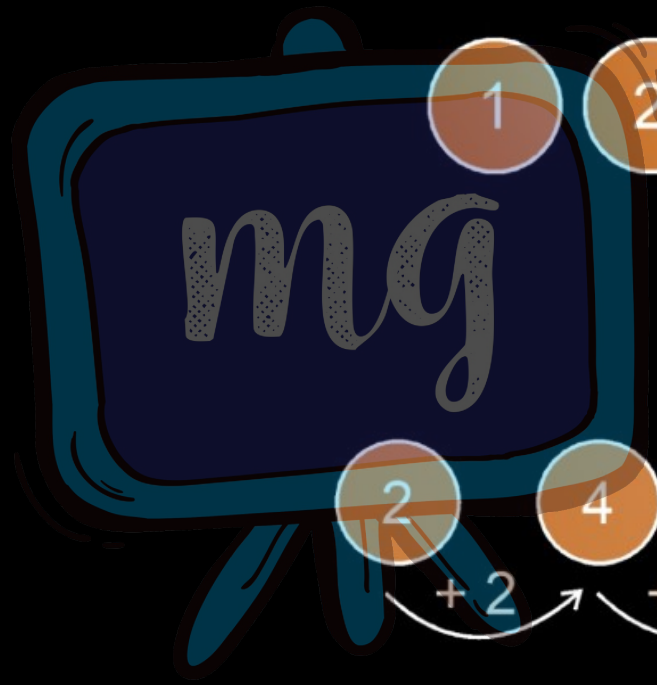
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1 2 3 4 5 , 6 , 7 , 8

2 4 6 8 10

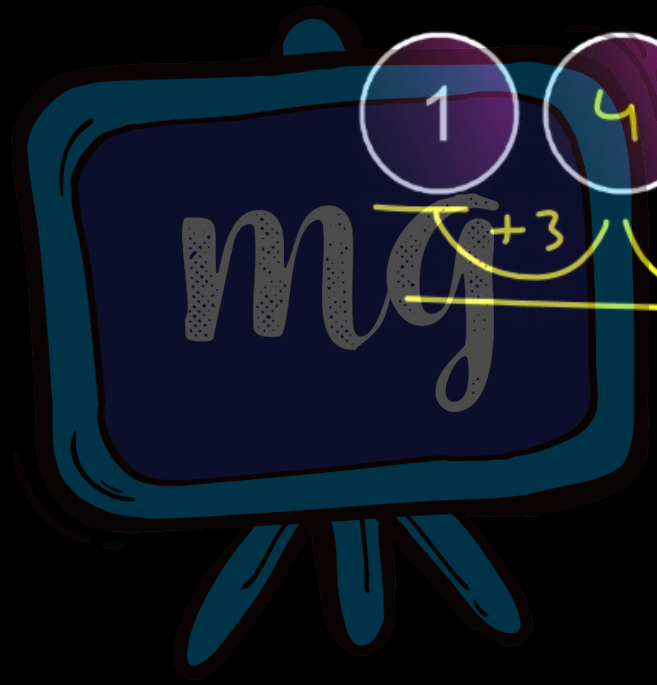
+2 +2 +2 +2

12 14 16 18 ——

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1 4 7 10 13 16

+3 +3 +3 +3 +3

52nd

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Consider the following lists of numbers :

(i) 100, 70, 40, 10, . . . −30, −30, −30, −20

(ii) −3, −2, −1, 0, . . . 1, 2, 3

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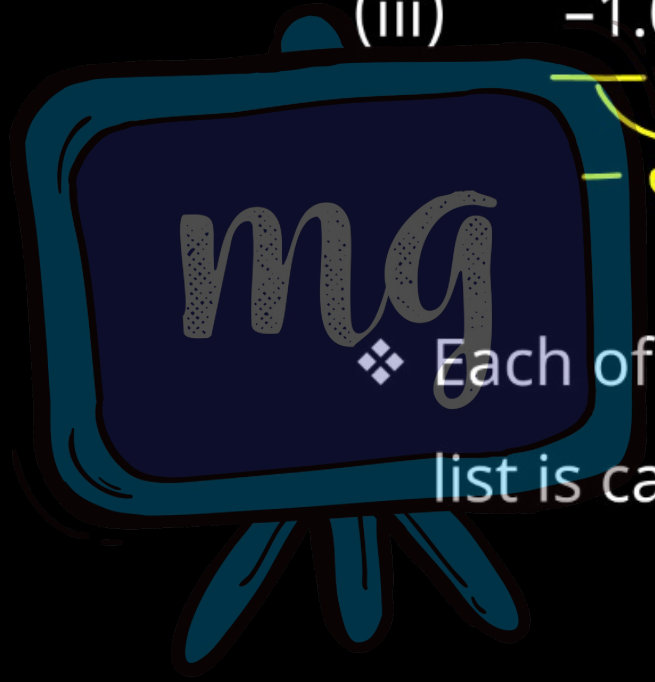
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(iii) $-1.0, -1.5, -2.0, -2.5, \ldots -3.0$

-0.5 -0.5 -0.5

-3.5

-4.0



❖ Each of the numbers in the list is called a term.

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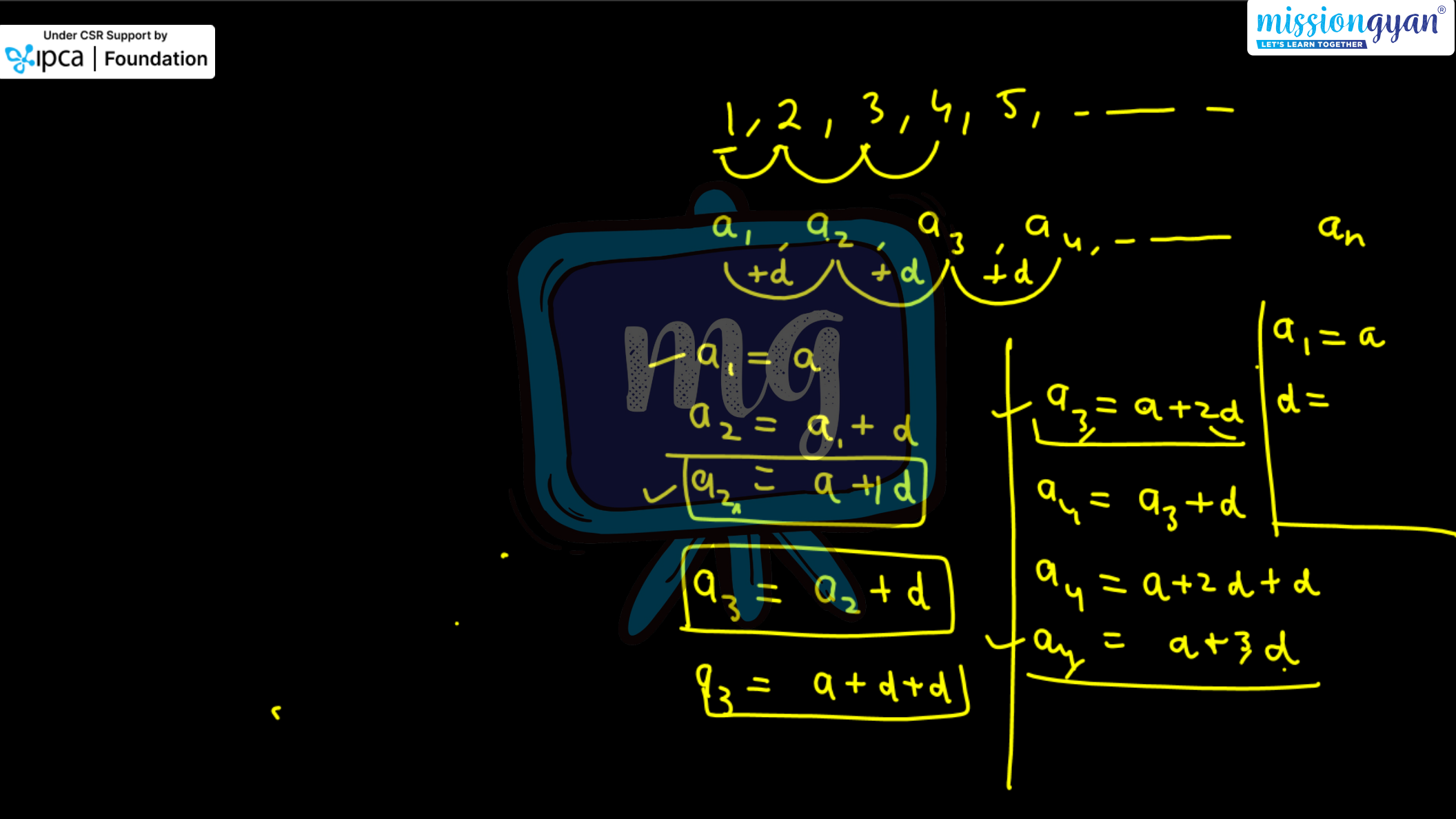
Arithmetic Progressions

- An arithmetic progression is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term.

- This fixed number is called the common difference of the AP.
- It can be positive, negative or zero.

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$a_{10} = a + 9d$

$a_{15} = a + 14d$

$a_{22} = a + 21d$

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

2, 4, 6, 8, 10 - - - - -

2

$a_{15} = a + 14d$

$= 2 + 14(2)$

$a_{15} = 30$

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General form of an AP

- If the first term is a and the common difference is d, then the general form of an AP is :

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

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$a_n = 3 + 4n$

$a_1 = ? \rightarrow 7$

$d = ? \rightarrow 4$

$a_1 = 3 + 4(1)$

$= 3 + 4$

$a_1 = 7$

$a_{15} = a + 14d$

$= 7 + 14 \times 4$

$= 63$

$a_2 = 3 + 4(2)$

$= 3 + 8$

$a_2 = 11$

$d = a_2 - a_1$

$d = 11 - 7$

$d = 4$

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Formula for Common Difference (d)

- For an AP $a_1, a_2, \ldots, a_n$, we have

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

where a_{k+1} and a_k are the $(k+1)^{th}$ and the k^{th} terms respectively.

$d = a_7 - a_1$ | $d = a_8 - a_2$

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Finite AP

- An AP with only a finite number of terms is called a finite AP.
- These arithmetic progressions have a last term.

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Example of Calender



1 2 3 4 5

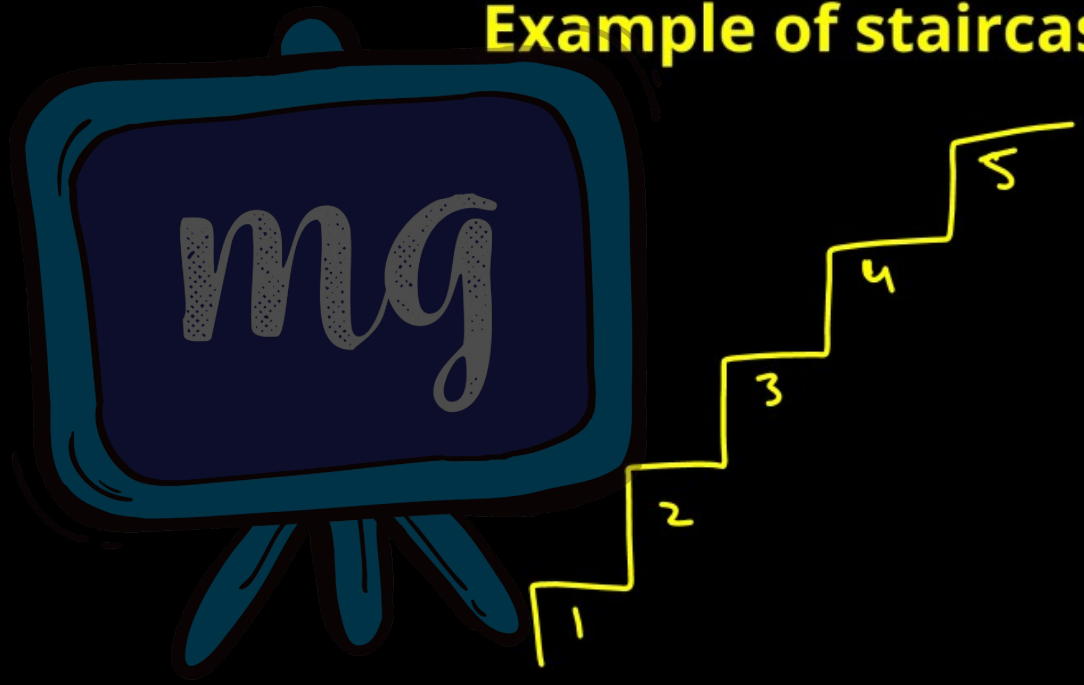
28 29 30 31

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Example of staircase



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Infinite AP

- An AP which does not have a last term is called an infinite AP.
- For example, the list of even/ odd numbers is an infinite AP.
- 2, 4, 6, 8, 10, 12, ...
- 1, 3, 5, 7, 9, 11, ...

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Example : 1

For the AP : $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}, \ldots$

write the first term a and the common difference d.

$a = \frac{3}{2}$

$d = -1$

$a = \frac{3}{2}$

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

$d = a_2 - a_1$

$= \frac{1}{2} - \frac{3}{2} = -1$

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Example : 2

Which of the following list of numbers form an AP? If they form an AP, write the next two terms :

(i) 4, 10, 16, 22, . . . 28, 34

6 6 6

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(ii) 1, – 1, – 3, – 5, . . .



$d = -1 - 1 = -2$

$d = -3 + 1 = -2$

$d = -5 + 3 = -2$

$a_5 = a_4 + d$

$= -5 - 2 = -7$

$a_6 = a_5 + d$

$= -7 - 2 = -9$

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(iii) $-2, 2, -2, 2, -2, \ldots$

6

$2 - (-2)$

$= 2 + 2 = 4$

This sequence is not an AP.

1

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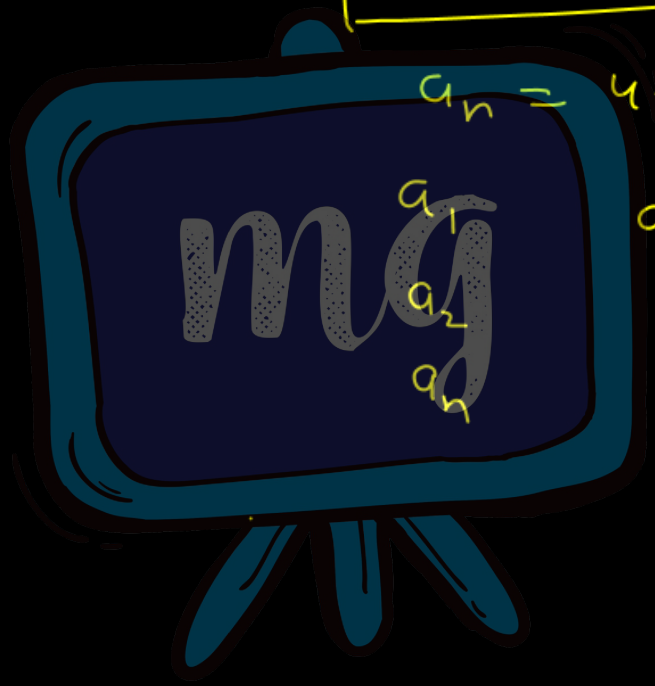
(iv) 1, 1, 1, 2, 2, 2, 3, 3, 3, . . .



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



$a_n = 4 + 3n$

a_1

d

a_2

a_n

$d = a_3 - a_2$

$d = a_7 - a_6$

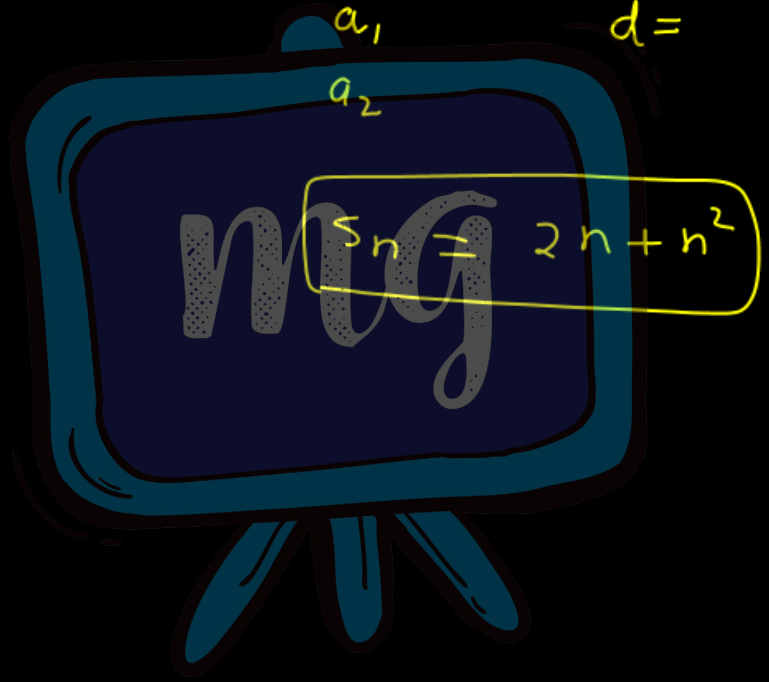
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$a_n = 2n + n^2$

a_1 $\quad d =$ $\quad a_7$

a_2



$S_n = 2n + n^2$