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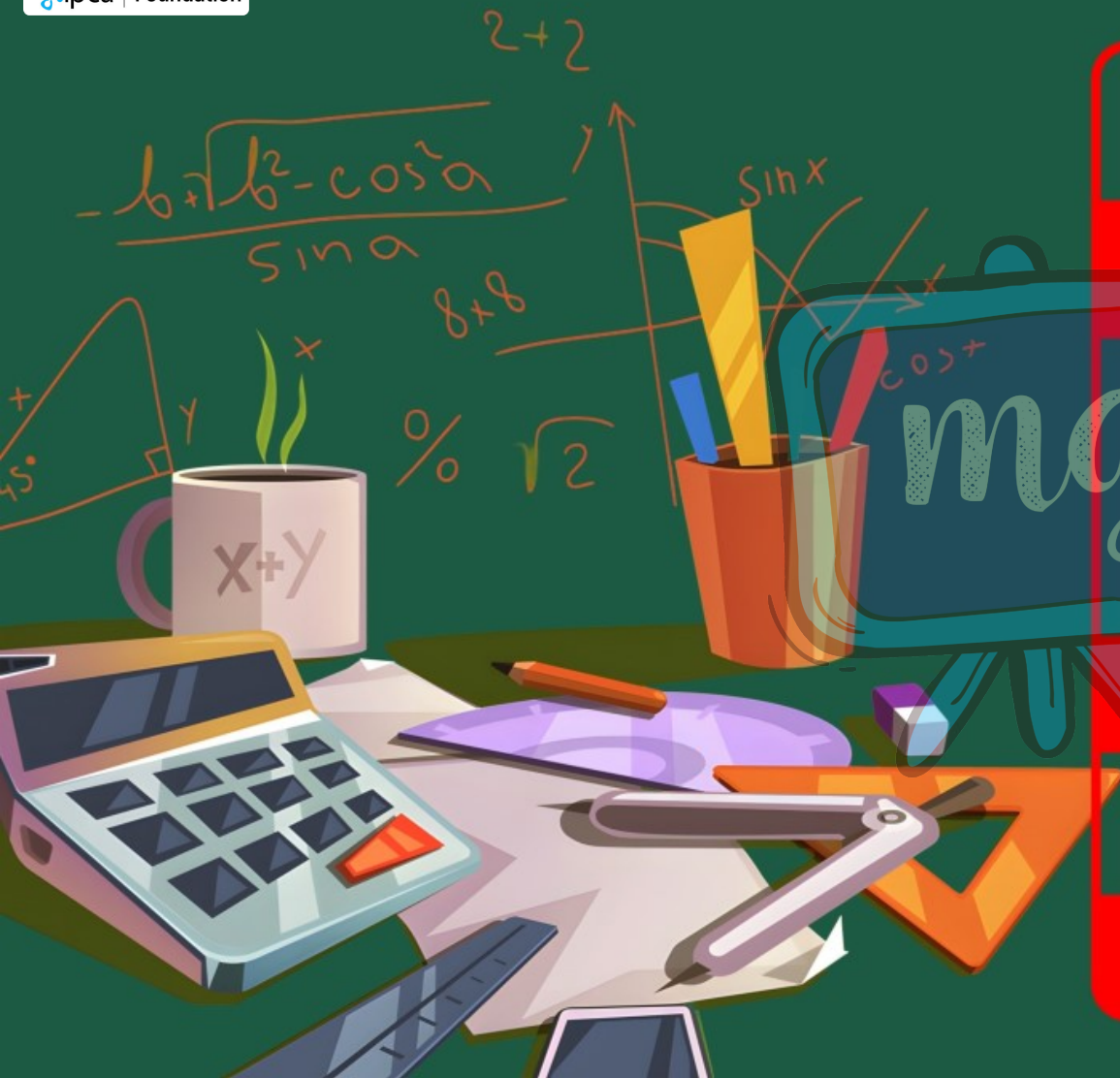
missiongyan



CLASS – 10

MATHEMATICS

CH – 5
Arithmetic Progressions

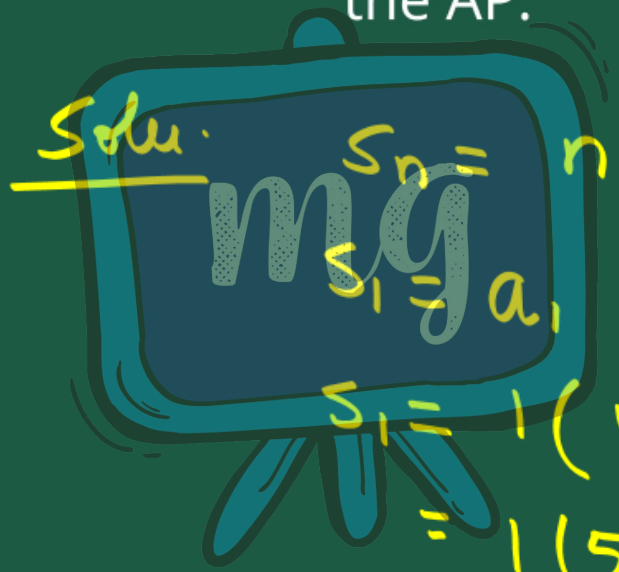
CBSE Board

Previous Year Questions – 3

Shubham Tiwari

24. In an AP if $S_n = n(4n + 1)$ then find the AP.

(CBSE Term II, 2021-22)



Solu. $S_n = n(4n+1)$

$S_1 = a_1$

$S_1 = 1(4(1)+1)$

$= 1(5)$

$S_1 = 5$

$\boxed{a_1 = 5}$

$S_2 = a_1 + a_2$

$S_n = n(4n+1)$

$S_2 = 2(4(2)+1)$

$= 2(9)$

$S_2 = 18$

$a_1 + a_2 = 18$

$5 + a_2 = 18$

$a_2 = 18 - 5$

$\boxed{a_2 = 13}$

$d = a_2 - a_1$

$= 13 - 5$

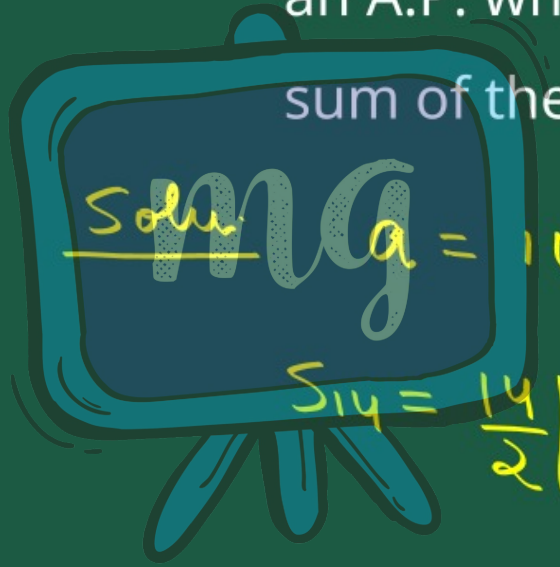
$\boxed{d = 8}$

Now the AP.

5, 13, 21 - - - -

25. Find the common difference 'd' of an A.P. whose first term is 10 and sum of the first 14 terms is 1505.

(CBSE Term II, 2021-22)



Solu. $a = 10$ | $S_{14} = 1505$

$S_{14} = \frac{14}{2}[2a + (14-1)d]$

$\left\{S_n = \frac{n}{2}[2a + (n-1)d]\right.$

$$S_{14} = 7[20 + 13d]$$

$$1505 = 7[20 + 13d]$$

$$\frac{1505}{7} = 20 + 13d$$

$$215 = 20 + 13d$$

$$215 - 20 = 13d$$

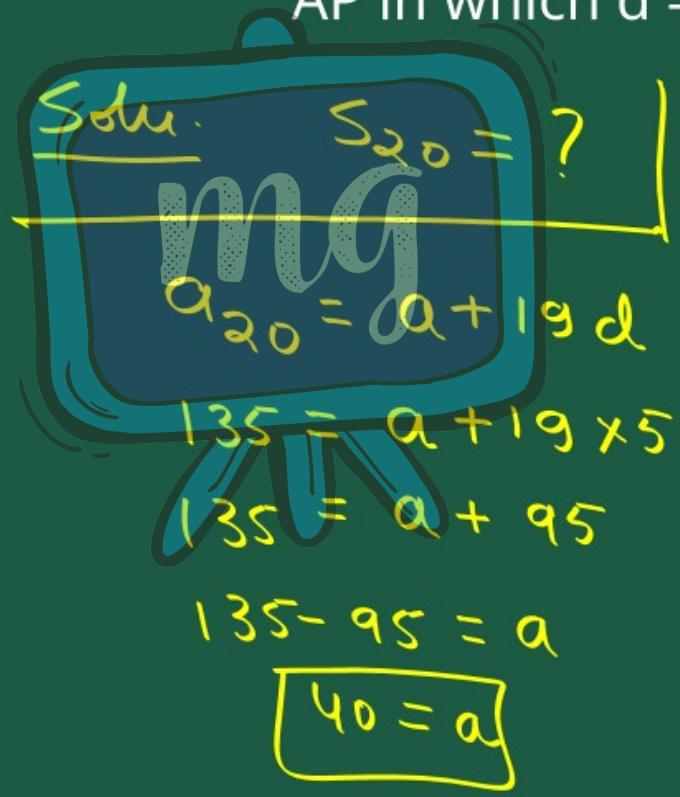
$$195 = 13d$$

$$\frac{\cancel{195}}{\cancel{13}} = d$$

$$\boxed{15 = d}$$

26. Find the sum of first 20 terms of an AP in which d = 5 and a_{20} = 135.

(CBSE Term II, 2021-22)



Solu. $S_{20} = ?$

$a_{20} = 135$

$d = 5$

$a_{20} = a + 19d$

$135 = a + 19 \times 5$

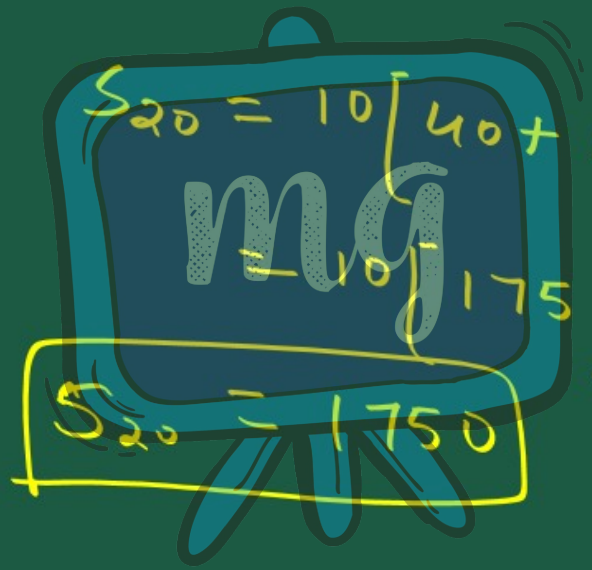
$135 = a + 95$

$135 - 95 = a$

$40 = a$

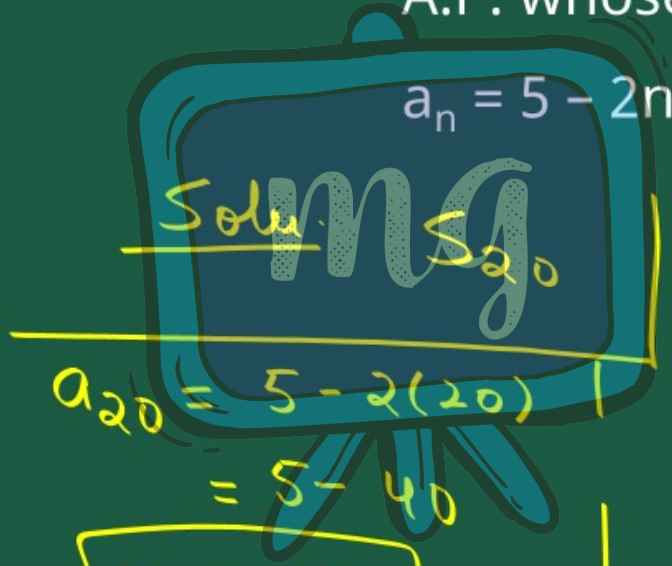
$$S_{20} = \frac{20}{2}\left[a + a_{20}\right]$$

$$\left\{S_n = \frac{n}{2}\left[a + l\right]\right\}$$



27. Find the sum of first 20 terms of an A.P. whose n^{th} term is given as $a_n = 5 - 2n$.

(CBSE Term II, 2021-22)



Sol: S_{20}

$a_{20} = 5 - 2(20)$

$= 5 - 40$

$a_{20} = -35$

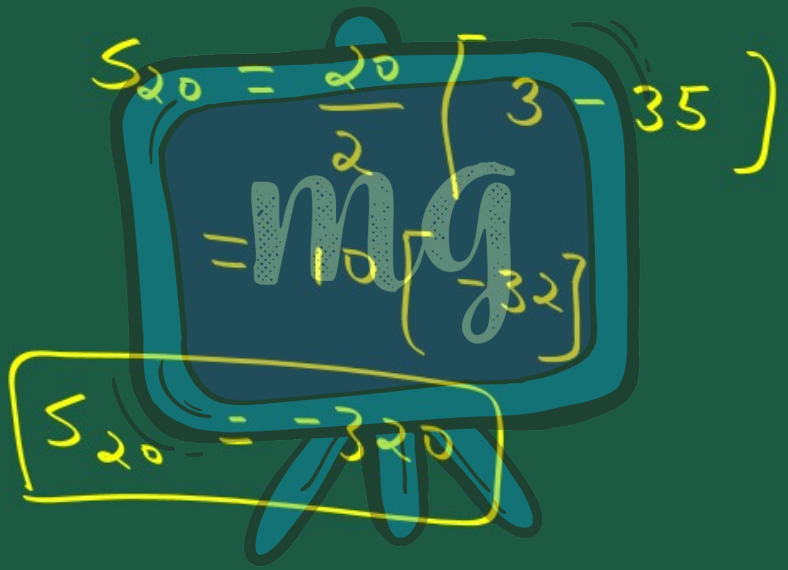
$a_n = 5 - 2n$

$a_1 = 5 - 2(1)$

$= 5 - 2$

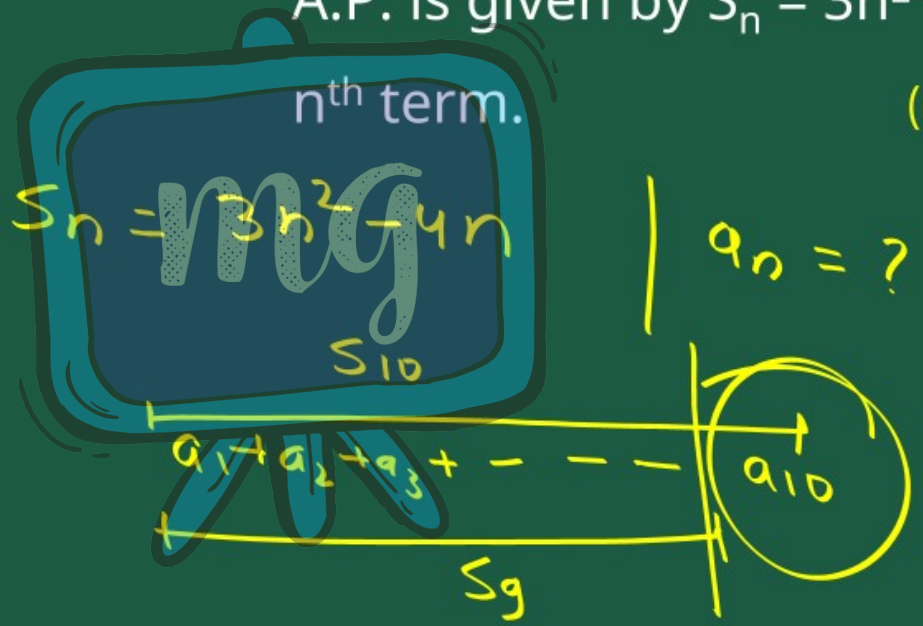
$a_1 = 3$

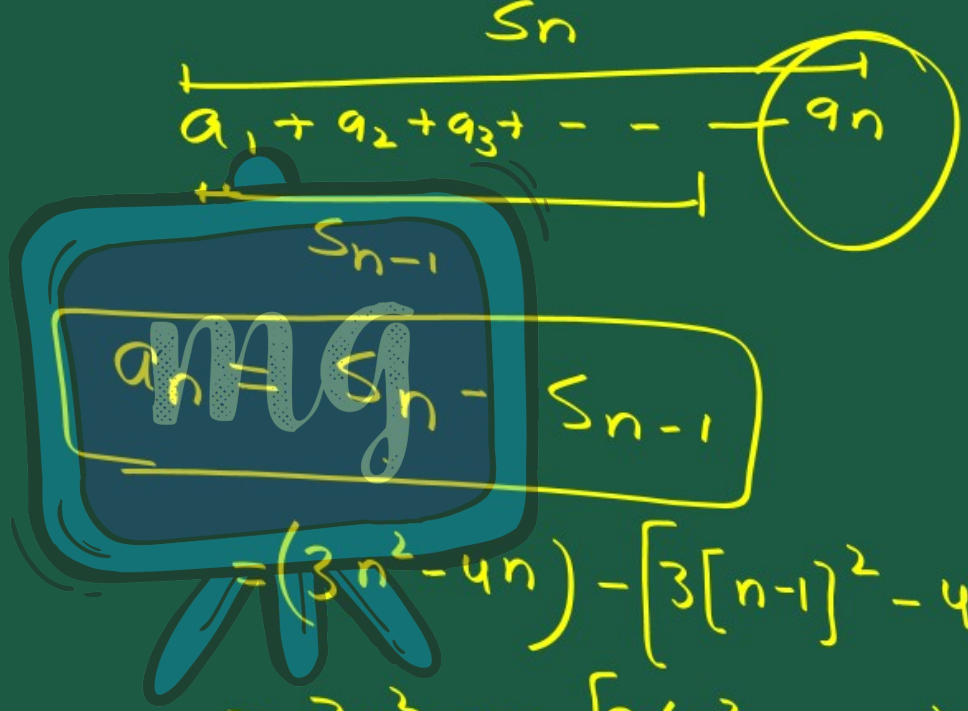
$$S_n = \frac{n}{2}\left[a + l\right]$$



28. If S_n the sum of first n terms of an A.P. is given by $S_n = 3n^2 - 4n$ find the n^{th} term.

(CBSE Delhi 2019)





$$a_n = S_n - S_{n-1}$$

$$= (3n^2 - 4n) - [3[n-1]^2 - 4(n-1)]$$

$$= 3n^2 - 4n - [3(n^2 + 1 - 2n) - 4n + 4]$$

$$= 3n^2 - 4n - 3n^2 - 3 + 6n + 4n - 4$$

29. The sum of first 15 terms of an A.P. is 750 and its first term is 15. Find its 20^{th} term. (CBSE 2023)

$S_{15} = 750 \mid a = 15 \mid a_{20} = ?$

$S_n = \frac{n}{2}[a + a_n]$

$S_{15} = \frac{15}{2}[a + a_{15}]$

$750 = \frac{15}{2}[15 + a_{15}]$

$\frac{750}{50} = \frac{15}{2}$

$100 = 15 + a_{15}$

$100 - 15 = a_{15}$

$85 = a_{15}$

$a_{15} = a + 14d$

$85 = 15 + 14d$

$85 - 15 = 14d$

$70 = 14d$

$\frac{70}{14} = d$

$5 = d$

$a_{20} = a + 19d$

$a_{20} = 15 + 19 \times 5$

$a_{20} = 15 + 95$

$a_{20} = 110$

30. Rohan repays his total loan of ₹1,18,000 by paying every month starting with the first instalment of ₹ 1,000. If he increase the instalment by ₹ 100 every month, what amount will be paid by him in the 30th instalment? What amount of loan has he paid after 30th instalment?

(CBSE 2023)

1000, 1100, 1200

$a = 1000 \mid d = 100 \mid a_{30} = ?$

$a_{30} = a + 29d$

$= 1000 + 29(100)$

$= 1000 + 2900$

$a_{30} = 3900$

$$S_{30} = \frac{n}{2}[a + l]$$

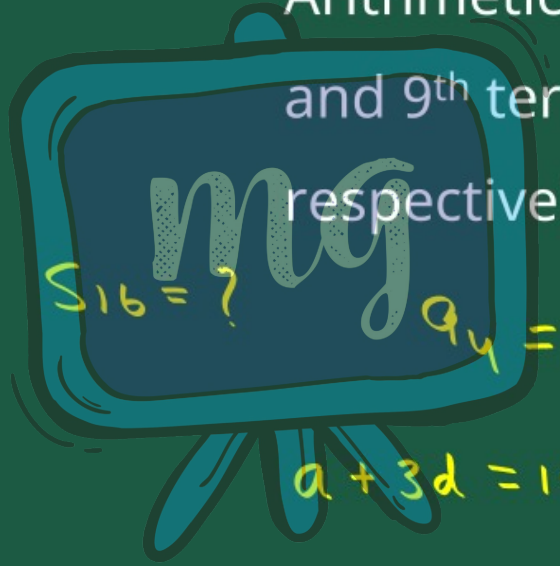
$$= \frac{30}{2}[1000 + 3900]$$

$$= 15[4900]$$

$$\boxed{S_{30} = 73,500}$$

On 30th installment he has paid 3900 Rs and a sum 73,500 upto 30 installments.

31. Find the sum of first 16 terms of an Arithmetic Progression whose 4^{th} and 9^{th} terms are 15 and 30 respectively. (CBSE 2020)



$S_{16} = ?$

$a_4 = 15$ | $a_9 = 30$

$a + 3d = 15$ — (1) | $a + 8d = 30$ — (2)

eq (2) − eq (1)

$a + 8d = 30$

$a + 3d = 15$

$5d = 15$

$d = 3$

$a + 3d = 15$

$a + 3 \times 3 = 15$

$a + 9 = 15$

$a = 6$

$S_n = \frac{n}{2}[2a + (n-1)d]$

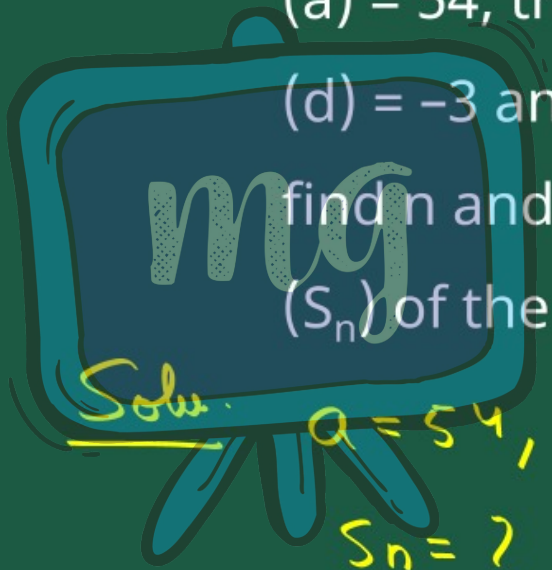
$S_{16} = \frac{16}{2}[2 \times 6 + (16-1)3]$

$= 8[12 + 45]$

$= 8[57]$

$S_{16} = 456$

32. In an A.P. given that the first term (a) = 54, the common difference (d) = –3 and the n^{th} term $(a_n) = 0$, find n and the sum of first n terms (S_n) of the A.P. (CBSE 2020)



Solu. $a = 54, \; d = -3 \mid a_n = 0$

$S_n = ? \quad \mid n = ?$

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

$$0 = 54 + (n-1)(-3)$$

$$-54 = (n-1)(-3)$$

$$\frac{+54}{+3} = (n-1)$$

$$18 = (n-1)$$

$$18 + 1 = n$$

$$\boxed{19 = n}$$

$$S_{19} = \frac{19}{2}\left[2a + (19-1)d\right]$$

$$= \frac{19}{2}\left[2 \times 54 + 18\,(-3)\right]$$

$$= \frac{19}{2}\left[2 \times 54 - 54\right]$$

$$= \frac{19}{2} \times (54)$$

$$= 19 \times \frac{54}{2}$$

$$S_{19} = 19 \times 27$$