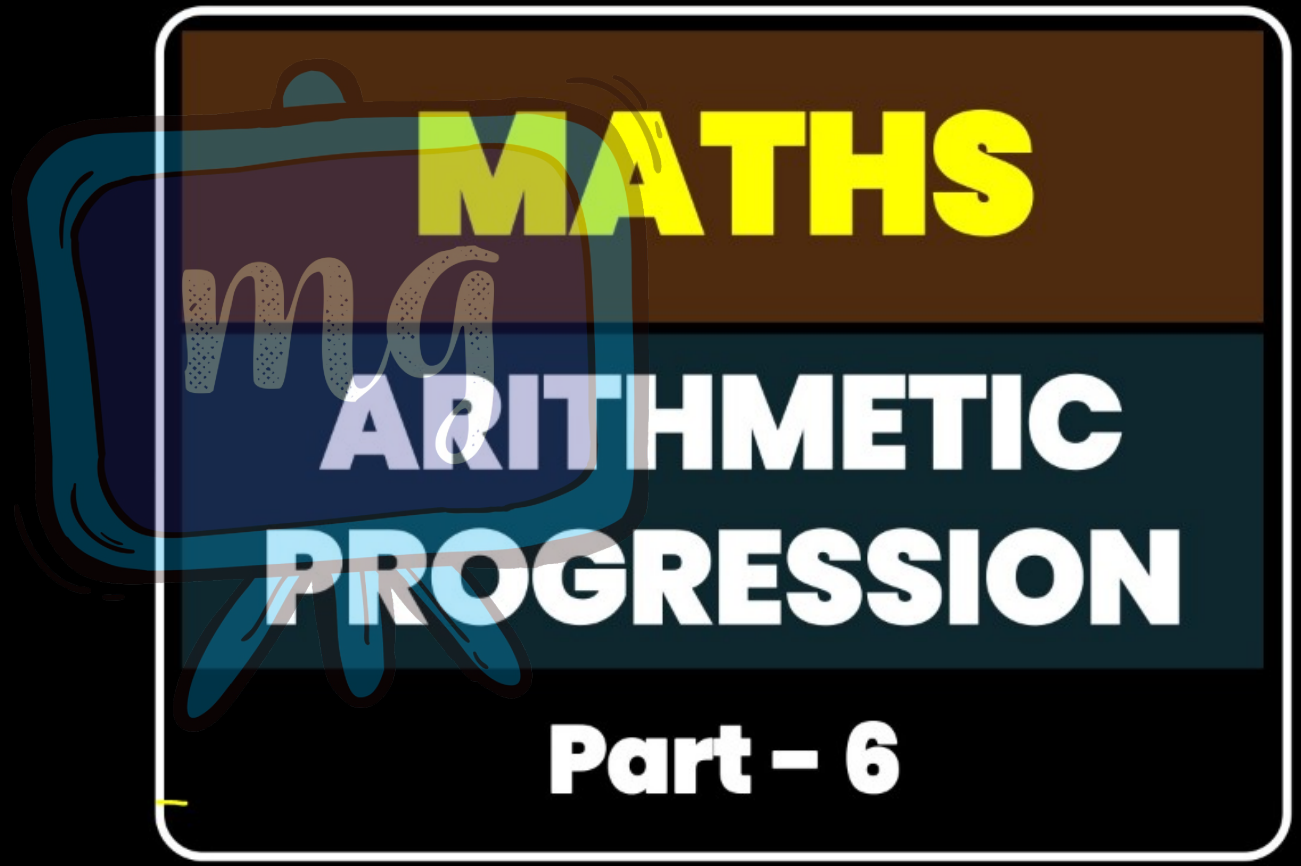
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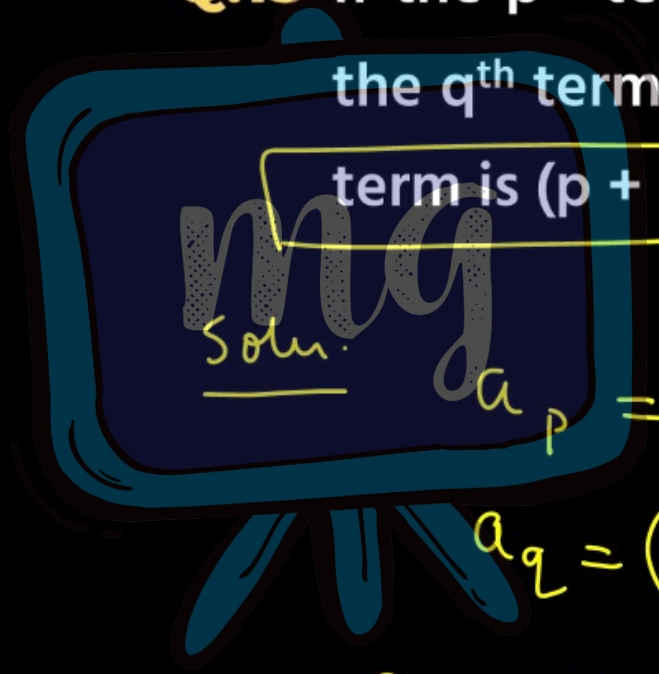
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Previous Year Questions

Q.15 If the p^{th} term of an A.P. is q and the q^{th} term is p, prove that its n^{th} term is $(p + q - n)$.

[CBSE 2008, 2017, 2023]



Soln.

$a_p = q$

$a_q = p$

$[a_n = p + q - n]$

$a_p = a + (p-1)d$

$q = a + (p-1)d$

$a_q = a + (q-1)d$

$p = a + (q-1)d$

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$$a_p = q$$

$$q = a + (p-1)\,d$$

$$p = a + (q-1)\,d$$

$$q - p = d\,[(p-1) - (q-1)]$$

$$= d\,[p - 1 - q + 1]$$

$$\therefore q - p = d\,[p - q]$$

$$-1\,[p - q] = d\,[p - q]$$

$$d = -1$$

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$$q = a + (P-1)d$$

$$q = a + (P-1)(-1)$$

$$q = a + (-P+1)$$

$$q + P - 1 = a$$

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

$$a_n = (q + P - 1) + (n-1)(-1)$$

$$= q + P - 1 - n + 1$$

$$a_n = q + P - n$$

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Previous Year Questions

Q.16 If m times the m^{th} term of an A.P. is equal to n times its n^{th} term, show that the $(m + n)^{th}$ term of the A.P. is zero.

[CBSE 2008, 2019]

Soln.

$$m \times a_m = n \times a_n$$

$$m\left[a + (m-1)d\right] = n\left[a + (n-1)d\right]$$

$$am + (m-1)md = an + (n-1)nd$$

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$$a_m + (m-1)md = a_n + n(n-1)d$$

$$a_m - a_n = n(n-1)d - m(m-1)d$$

$$a(m-n) = d[n^2 - n - m^2 + m]$$

$$= d[(m-n) - (m^2 - n^2)]$$

$$a(m-n) = d[(m-n) - (m-n)(m+n)]$$

$$a(m-n) = d(m-n)[1 - (m+n)]$$

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$$a = d[1-(m+n)] \quad -(1)$$

$$a_{m+n} = a + [(m+n)-1]\,d$$

$$= d[1-(m+n)] + d[(m+n)-1]$$

$$= -d[(m+n)-1] + d[(m+n)-1]$$

$$a_{m+n} = 0$$

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Previous Year Questions

Q.17 If p^{th}, q^{th} and r^{th} terms of an A.P. are a, b, c respectively, then show that

[CBSE 2016]

$a_p = a$

$a_q = b$

$a_r = c$

$=$

$\Rightarrow$

$a_p = a$

$a + (p-1)d = a$

$a + (q-1)d = b$

$a + (r-1)d = c$

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$$a + (p-1)d = a$$
$$a + (q-1)d = b$$
$$a + (r-1)d = c$$

$$a(q-r) + b(r-p) + c(p-q) = 0$$

$$a + (q-1)d = b$$
$$a + (r-1)d = c$$

$$d[q - r + 1] = b - c$$

$$d[q - r] = b - c$$

$$(q-r) = \frac{b-c}{d}$$

$$(r-p) = \frac{c-a}{d}$$

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$$(p-q)\,d = a-b$$

$$p-q = \frac{(a-b)}{d}$$

$$a\left[\frac{b-c}{d}\right] + b\left[\frac{c-a}{d}\right] + c\left[\frac{a-b}{d}\right]$$

$$\frac{1}{d}\left[ab - ac + bc - ab + ac - bc\right]$$

$$\frac{1}{d}(0) = 0$$

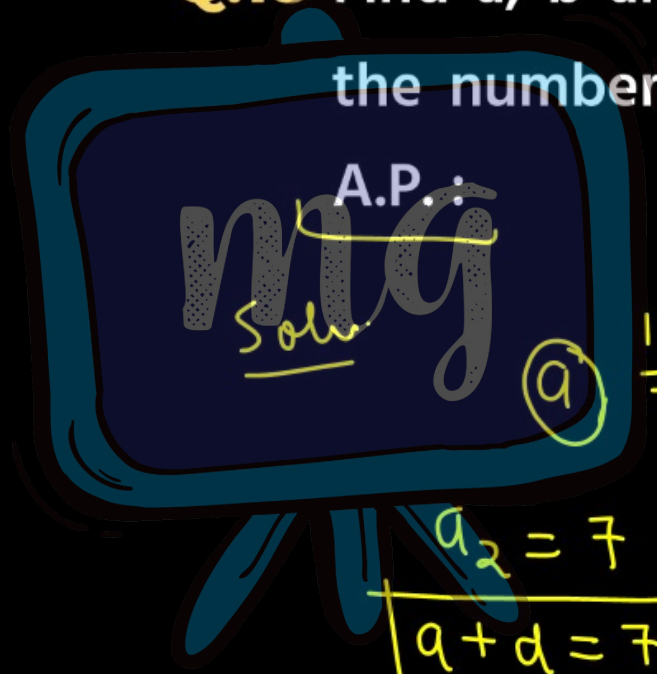
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Previous Year Questions

Q.18 Find a, b and c if it is given that the numbers a, 7, b, 23, c. are in A.P. :

[NCERT Exemplar]



a, 7, b, 23, c.

$a_2 = 7$

$a + d = 7$

$a_4 = 23$

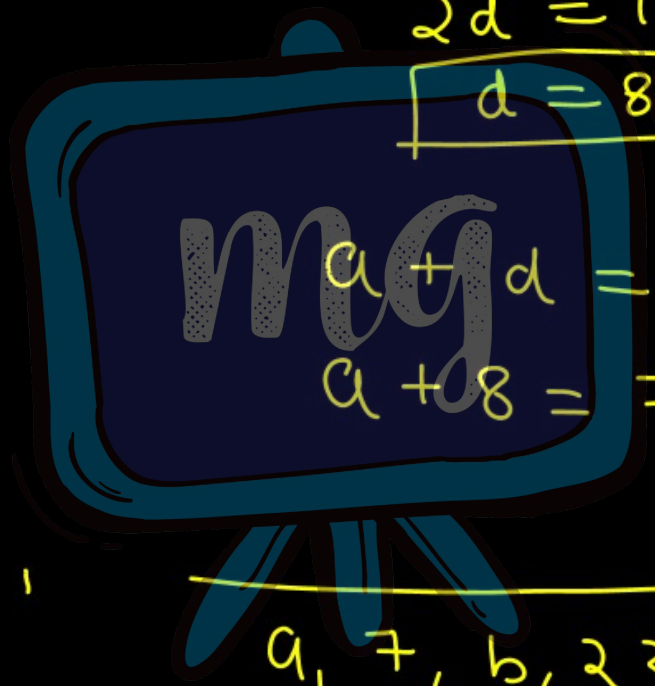
$a + 3d = 23$

$-a - d = -7$

$2d = 16$

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$2d = 16$

$d = 8$

$a + d = 7$

$a + 8 = 7$

$a = 7 - 8$

$a = -1$

$a, 7, b, 23, c$

$-1, 7, 15, 23, 31$

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Previous Year Questions

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Q.19 If the 5^{th} term of an A.P. is 31 and 25^{th} term is 140 more than the 5^{th} term, find the A.P.

[CBSE 2015]

Solu. $a_5 = 31$

$a_{25} = a_5 + 140$

$a_{25} = 31 + 140$

$a_{25} = 171$

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$a_5 = 31$

$a + 4d = 31$

$a + 24d = 171$

$+20d = +140$

$d = 140/20$

$d = 7$

$a + 4d = 31$

$a + 4(7) = 31$

$a + 28 = 31$

$a = 3$

3, 10, 17, 24

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Previous Year Questions

Q.20 If the seventh term of an A.P. is 1/9 and its ninth term is 1/7, find its $(63)^{rd}$ term.

[CBSE 2014]

Solu:

$a_7 = \frac{1}{9}$

$a + 6d = \frac{1}{9}$

$a_9 = \frac{1}{7}$

$a + 8d = \frac{1}{7}$

$a + 6d = \frac{1}{9}$

$- \quad - \quad -$

$2d =$

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$2d = \frac{1}{7} - \frac{1}{9}$

$2d = \frac{2}{63}$

$d = \frac{1}{63}$

$a_{63} = a + 62d$

$= \frac{1}{63} + 62 \times \frac{1}{63}$

$= \frac{1}{63} + \frac{62}{63} = \frac{63}{63} = 1$

$a + 6d = \frac{1}{9}$

$a + \frac{2}{6} \times \frac{1}{21} = \frac{1}{9}$

$a = \frac{1}{9} - \frac{2}{21}$

$a = \frac{7 - 6}{63}$

$a = \frac{1}{63}$

$a_{63} = 1$

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Previous Year Questions

Q.21 Which term of the A.P. 3, 15, 27, 39, ... Will be 120 more than its 21st term ?

[CBSE 2009]

Solu: $a = 3$

$d = 12$

$a_{21} = a + 20d$

$= 3 + 20(12)$

$a_{21} = 243$

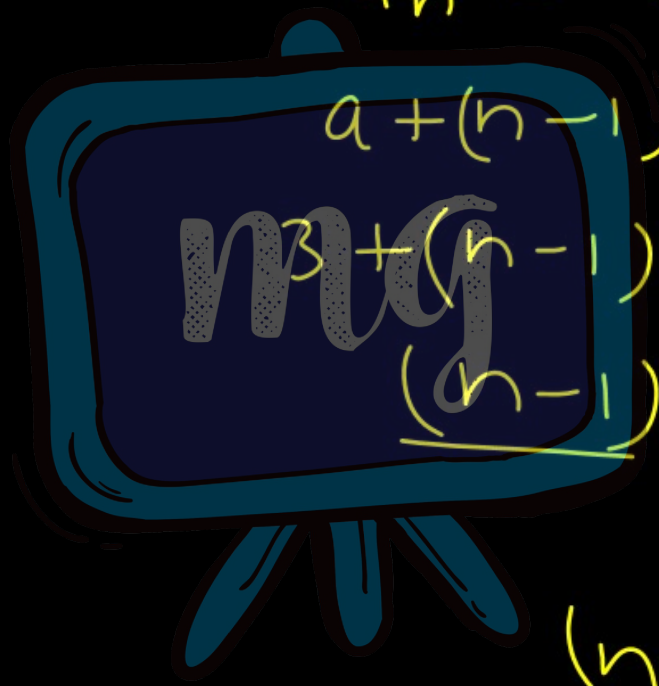
$= a_{21} + 120$

$= 243 + 120$

$= 363$

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$$a_n = 343$$

$$a + (n-1)d = 363$$

$$3 + (n-1)12 = 363$$

$$(n-1)12 = 363 - 3$$

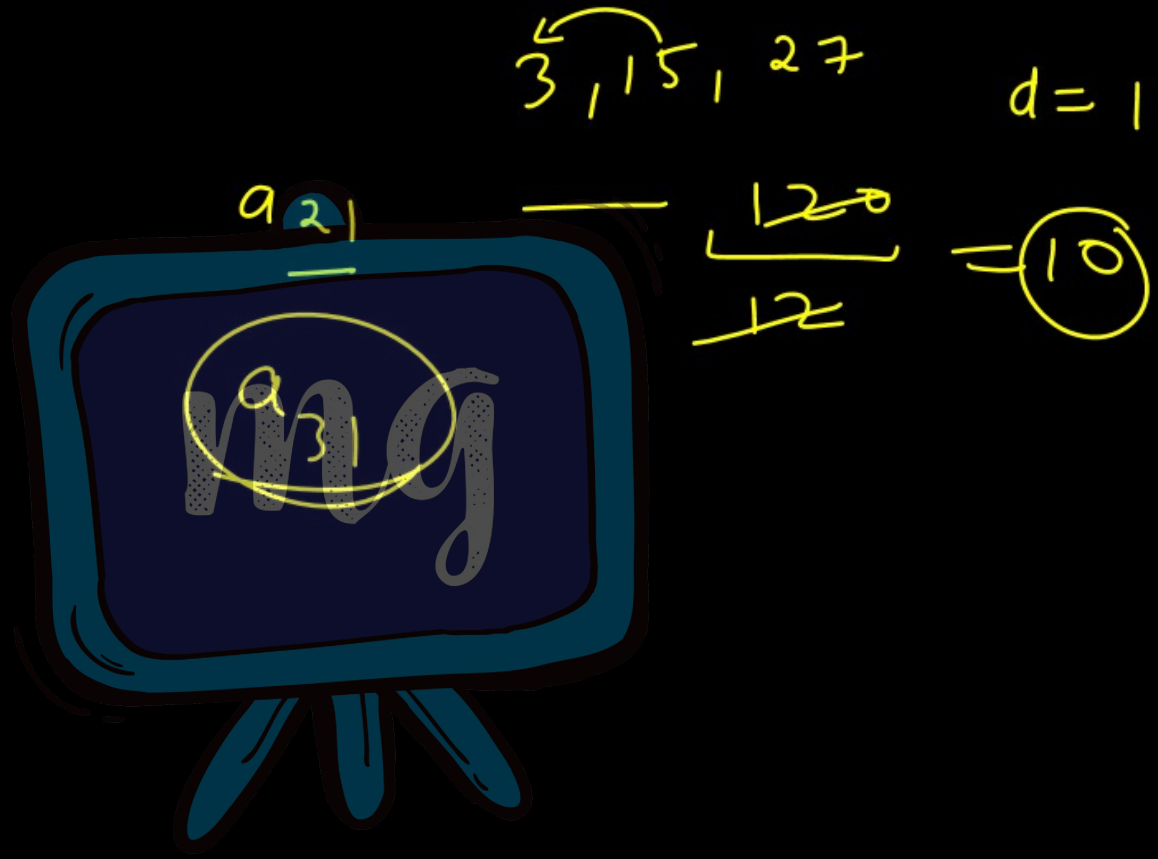
$$= 360$$

$$(n-1) = 30$$

$$\boxed{n = 31}$$

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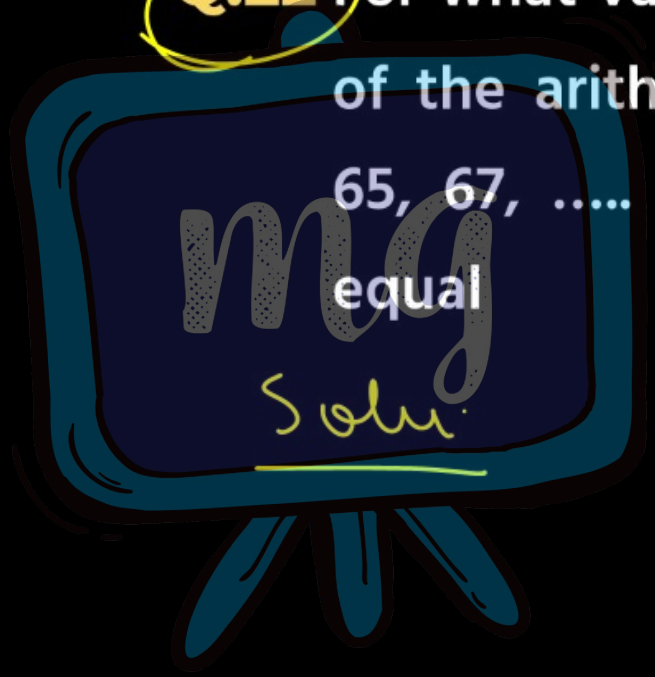
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Previous Year Questions

Q.22 For what value of n, the n^{th} terms of the arithmetic progression 63, 65, 67, ... and 3, 10, 17, ... are equal

[CBSE 2008]



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Previous Year Questions

Q.23 The sum of the 5th and the 7th terms of an A.P. is 52 and the 10th term is 46. Find the A.P.

[NCERT Exemplar]

Soln.

$a_5 + a_7 = 52$

$a + 4d + a + 6d = 52$

$2a + 10d = 52$

$\boxed{a + 5d = 26}$

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$a + 9d = 46$

$a + 5d = 26$

$4d = 20$

$\boxed{d = 5}$

$a + 9d = 46$

$a + 45 = 46$

$\boxed{a = 1}$

1, 6, 11, 16

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Previous Year Questions

Q.24 If 9^{th} term of an A.P. is zero, prove that its 29^{th} term is double the 19^{th} term.

[NCERT Exemplar]

Solu:

$a_9 = 0$

$a + 8d = 0$

$a = -8d$

Prove

$a_{29} = 2\, a_{19}$

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$a + 28d$

$-8d + 28d$

$20d$

mg

LHS = RHS.

$2\ a_{19}$

$2(a + 18d)$

$2(-8d + 18d)$

$2(10d)$

$20d$