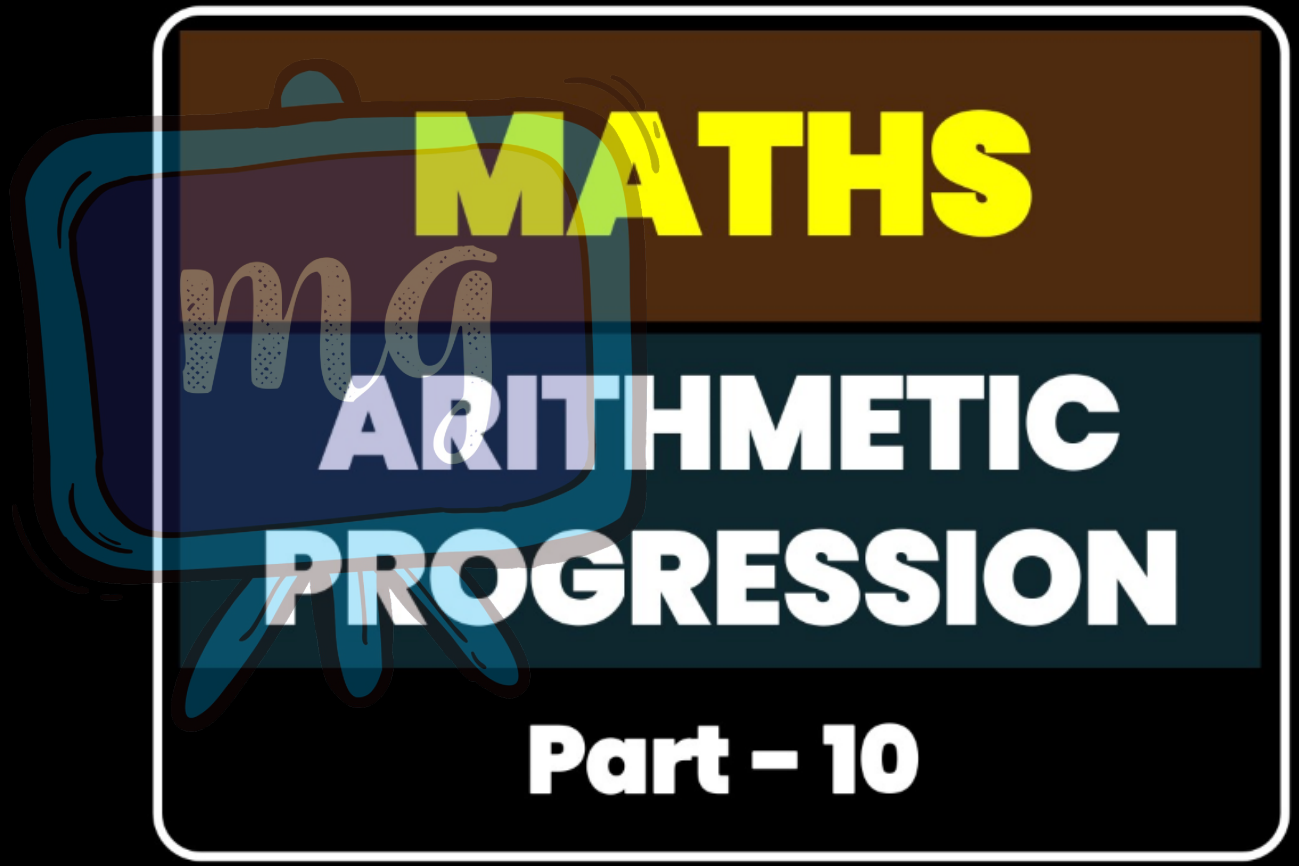
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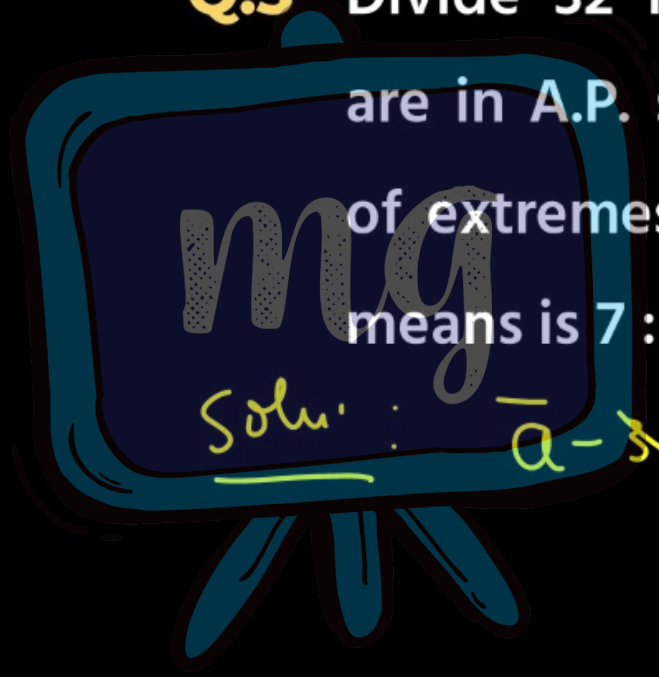


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PREVIOUS YEAR QUESTIONS

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Q.3 Divide 32 into four parts which are in A.P. such that the product of extremes is to the product of means is 7 : 15.



Solu :

$$\bar{a}-3d+\bar{a}-d+\bar{a}+d+\bar{a}+3d$$

$$4a = 32$$

$$\boxed{a = 8}$$

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$a-3d$, $a-d$, $a+d$, $a+3d$

Product of means

Product of Extremes

$$\frac{(a-d)(a+d)}{(a-3d)(a+3d)} = \frac{15}{7}$$

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$$= \frac{(8-d)(8+d)}{(8-3d)(8+3d)} = \frac{15}{7}$$

$$= \frac{[8^2 - d^2]}{[8^2 - 9d^2]} = \frac{15}{7}$$

$$= 7[64 - d^2] = 15(64 - 9d^2)$$

$$= 7 \times 64 - 7d^2 = 15 \times 64 - 15 \times 9d^2$$

$$= 15 \times 9d^2 - 7d^2 = 15 \times 64 - 7 \times 64$$

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$15 \times 9d^2 - 7d^2 = 15 \times 64 - 7 \times 64$

$d^2[15 \times 9 - 7] = 64[8]$

$d^2[135 - 7] = 2^6 \times 2^3$

$d^2[128] = 2^2$

2^7

$d^2 = 2^2$

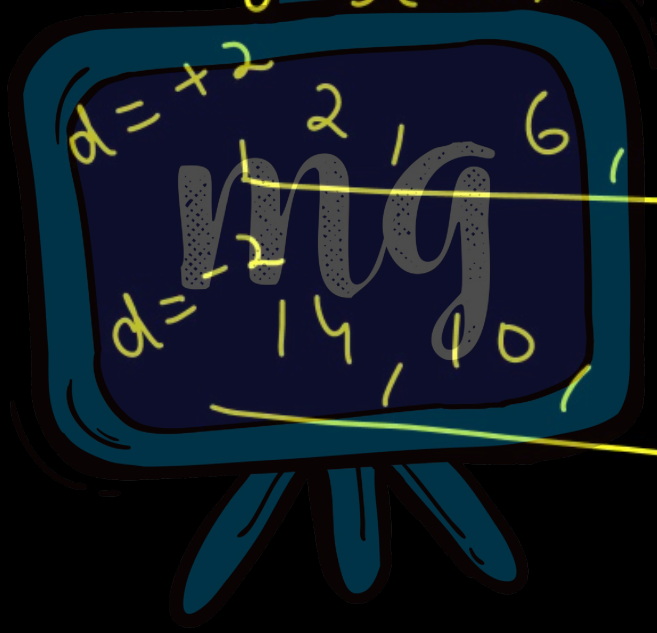
$d = \pm 2$

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$a-3d,\ a-d,\ a+d,\ a+3d$

$8-3(2),\ 8-2,\ 8+2,\ 8+3(2)$



$d=+2$

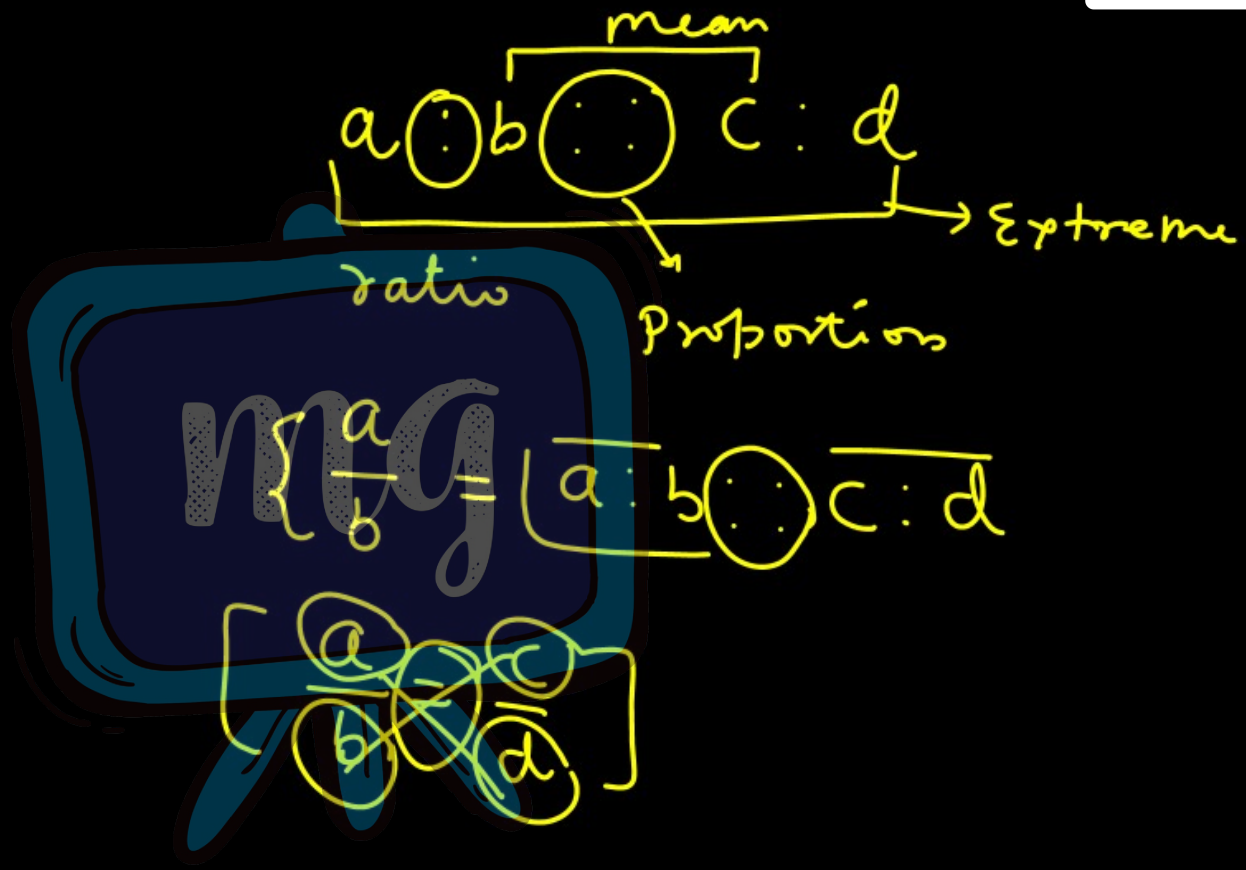
$2,\ 6,\ 10,\ 14$

$d=-2$

$14,\ 10,\ 6,\ 2$

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PREVIOUS YEAR QUESTIONS

Q.4 Show that $(a - b)^2$, $(a^2 + b^2)$ and $(a + b)^2$ are in AP.

[CBSE 2020]

Solu: $(a-b)^2, (a^2+b^2), (a+b)^2$

$a_1 = (a-b)^2$

$a_2 = a^2+b^2$

$a_3 = (a+b)^2$

$d_1 = a_2 - a_1$

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$$d_1 = a_2 - a_1$$

$$= a^2 + b^2 - (a-b)^2$$

$$= a^2 + b^2 - [a^2 + b^2 - 2ab]$$

$$= a^2 + b^2 - a^2 - b^2 + 2ab$$

$$\boxed{d_1 = 2ab}$$

$$d_2 = a_3 - a_2$$

$$= (a+b)^2 - [a^2 + b^2]$$

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$$d_2 = (a+b)^2 - (a^2+b^2)$$

$$= a^2 + b^2 + 2ab - a^2 - b^2$$

$$\boxed{d_2 = 2ab}$$

$$\boxed{d_1 = d_2 = d = 2ab}$$

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PREVIOUS YEAR QUESTIONS

Q.5 The sum of three numbers in A.P. is 12 and the sum of their cubes is 288. Find the numbers. [CBSE 2016]

Solu. $a-d$, a, $a+d$

$a-d+a+a+d=12$

$3a=12$

$\boxed{a=4}$

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$\Rightarrow (a-b)^3 + a^3 + (a+b)^3 = 288$

$\Rightarrow (4-b)^3 + (4)^3 + (4+b)^3 = 288$

$\Rightarrow (4-b)^3 + (4+b)^3 = 288 - 64$

$\Rightarrow \boxed{224}$

$a^3+b^3 = (a+b)(a^2+b^2-ab)$

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$$(4-b)^3 + (4+b)^3$$

$$= [(4-b)+(4+b)]\left[(4+b)^2 + (4-b)^2 - [(4+b)(4-b)]\right]$$

$$= (8)\left[16 + b^2 + 8b + 16 + b^2 - 8b - (16 - b^2)\right]$$

$$= 8\left[32 + 2b^2 - 16 + b^2\right]$$

$$8\left[16 + 3b^2\right] = 224$$

✓

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$$8\left[16 + 3b^2\right] = 224$$

$$16 + 3b^2 = \frac{224}{8}$$

$$16 + 3b^2 = 28$$

$$3b^2 = 28 - 16$$

$$3b^2 = 12$$

$$b^2 = 4$$

$$b = \pm 2$$

$a-b, a, a+b$

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PREVIOUS YEAR QUESTIONS

Q.6 The sum of the first three numbers in an arithmetic progression is 18. If the product of the first and third term is 5 times the common difference, find the three numbers.

Solu | $a-d, a, a+d$ | [CBSE 2019]

$a-d+a+a+d = 18$

$3a = 18$ | $a = 6$

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$a = 6$

$(a-d)(a+d) = 5d$

$(6-d)(6+d) = 5d$

$36 - d^2 = 5d$

$= d^2 + 5d - 36 = 0$

$0 = d^2 + 9d - 4d - 36 = 0$

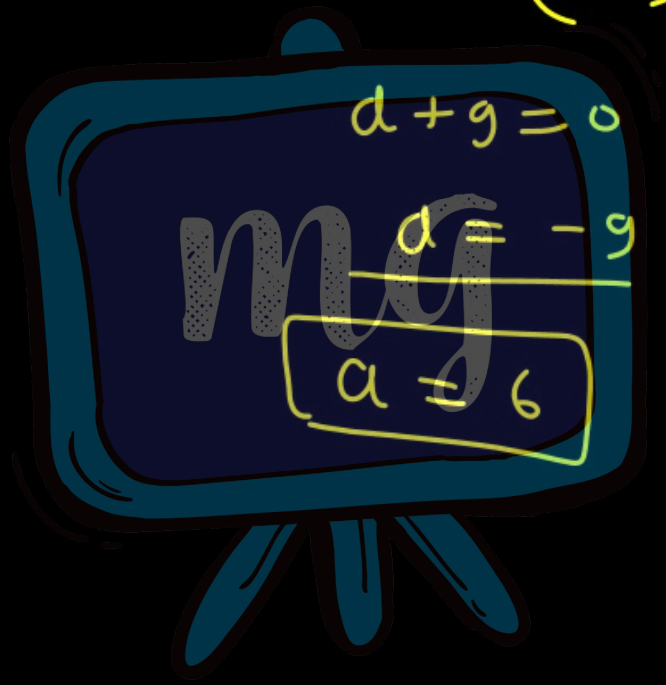
$= d[d+9] - 4[d+9] = 0$

$= (d+9)(d-4) = 0$

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$(a+9)(a-4)=0$



$a-4=0$

$a=4$

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PREVIOUS YEAR QUESTIONS

Q.7 The sum of first six terms of an arithmetic progression is 42. The ratio of its 10^{th} term to its 30^{th} term is 1 : 3. Calculate the first and the thirteenth term of the A.P.

[CBSE 2009]

Solu $\frac{a_{10}}{a_{30}} = \frac{1}{3}$

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$$a + a+d + a+2d + a+3d + a+4d + a+5d = 42$$

$$6a + 15d = 42$$

$$3[2a + 5d] = 42$$

$$2a + 5d = 14 \quad \text{— (1)}$$

$$\frac{a+9d}{a+29d} = \frac{1}{3}$$

$$3a + 27d = a + 29d$$

$$2a = 2d$$

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$2a + 5d = 14$

$2a + 5a = 14$

$7a = 14$

$a = 2$

$d = 2$

$a = 2$ | $a_{13} = ?$

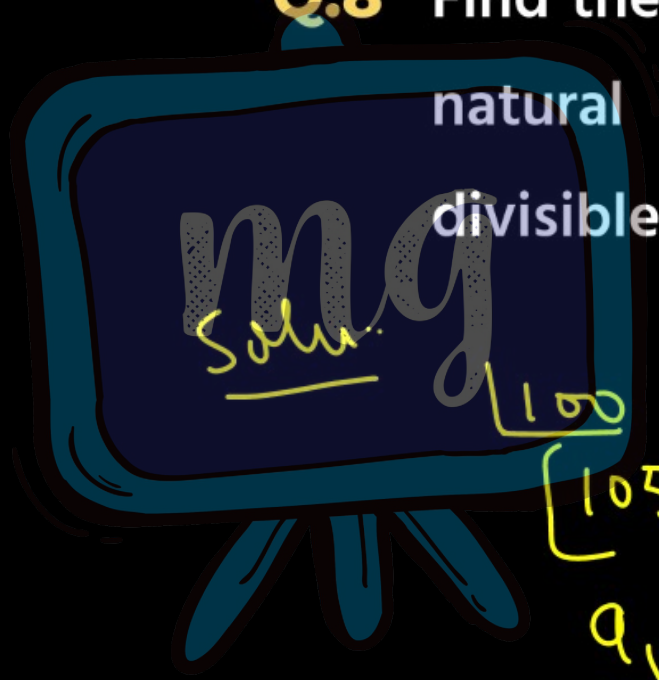
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PREVIOUS YEAR QUESTIONS

Q.8 Find the sum of all three digit natural numbers, which are divisible by 7.

[CBSE 2006C]



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

$994 = 105 + (n-1)7$

$994 - 105 = (n-1)7$

$\frac{889}{7} = (n-1)$

$127 = (n-1)$

$128 = n$

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PREVIOUS YEAR QUESTIONS

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Q.9 If the ratio of the 11^{th} term of an A.P. to its 18^{th} term is 2 : 3, find the ratio of the sum of first five terms to the sum of its first 10 terms.

[CBSE 2017]

Solu:

$$\frac{a_{11}}{a_{18}} = \frac{2}{3}$$

$$\frac{S_5}{S_{10}} = ?$$

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$$\frac{a_{11}}{a_{18}} = \frac{2}{3}$$

$$\frac{a+10d}{a+17d} = \frac{2}{3}$$

$$\Rightarrow 3(a+10d) = 2(a+17d)$$

$$3a + 30d = 2a + 34d$$

$$\boxed{a = 4d}$$

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$$\frac{S_5}{S_{10}} = \frac{\cancel{5}/\cancel{2}\,[2a + 4d]}{2\cancel{5}/\cancel{2}\,[2a + 9d]}$$



$$= \frac{1}{2}\left[\frac{8d + 4d}{8d + 9d}\right]$$

$$= \frac{1}{2}\left[\frac{\cancel{12}\,d}{\cancel{17}\,d}\right] = \frac{6}{17}$$

$\therefore$