



CLASS – 10

MATHEMATICS

CH – 5

Arithmetic

Progressions

CBSE Board

Previous Year Questions – 1

Shubham Tiwari

A.P.

1, 4, 7, 10, 13, 16 - - -

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

$$a_{10} = a + 9d$$

$$= 1 + 9(4-1)$$

$$= 1 + 9 \times 3$$

$$a_{10} = 1 + 27 = 28$$

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

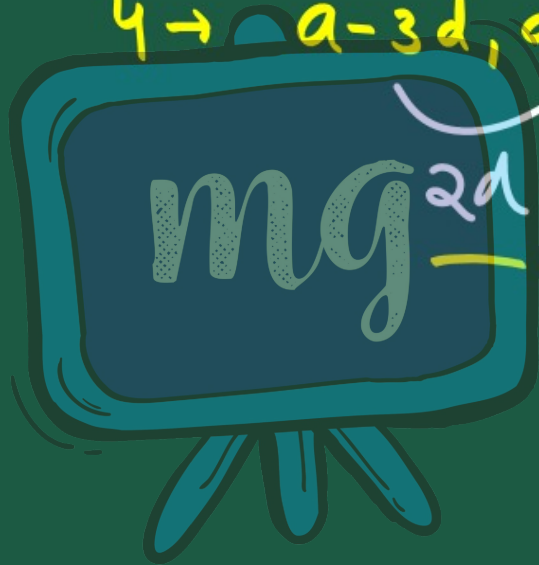
1, 4, 7, 10, ... $\frac{10^{\text{th}}}{}$

1 + 4 + 7 + 10 + ... + a_{10}

$$S_{10} = \frac{10}{2} [2 \times 1 + 9 \times 3] \quad \left| \quad \frac{29 \times 5}{145} \right.$$
$$\frac{10}{2} [2 + 27]$$

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

$$4 \rightarrow a-3d, a-d, a+d, a+3d$$



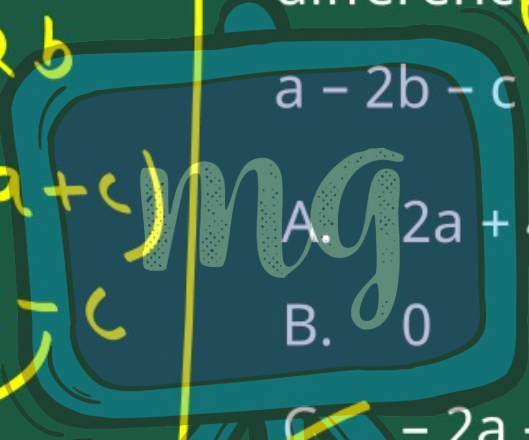
$2d$

$2d$

$2d$

1. If a, b, c form an A.P. with common difference d , then the value of $a - 2b - c$ is equal to (CBSE 2023)

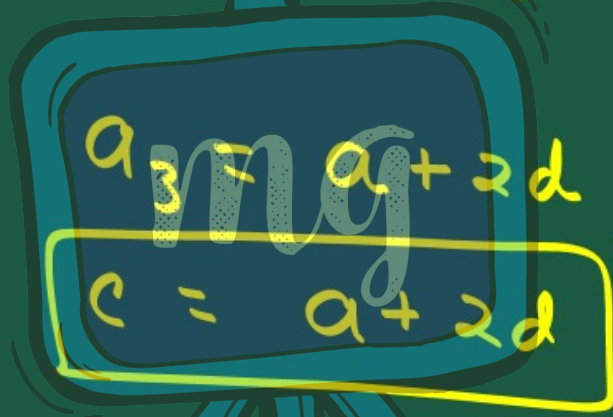
$$\begin{aligned} & a - c - 2b \\ & a - c - (a + c) \\ & a - c - a - c \\ & = -2c \end{aligned}$$



- A. $2a + 4d$
- B. 0
- C. $-2a - 4d$
- D. $-2a - 3d$

$$2b = a + c$$

$\frac{a, b, c}{a_1, a_2, a_3}$


$$a_3 = a + 2d$$
$$c = a + 2d$$

$$\begin{aligned} -2c &= -2(a + 2d) \\ &= \underline{-2a - 4d} \end{aligned}$$

2. The next term of the A.P.

$$\sqrt{7}, \sqrt{28}, \sqrt{63} \text{ is}$$

(CBSE 2023)

A. $\sqrt{70}$
B. $\sqrt{80}$
C. $\sqrt{97}$
D. $\sqrt{112}$

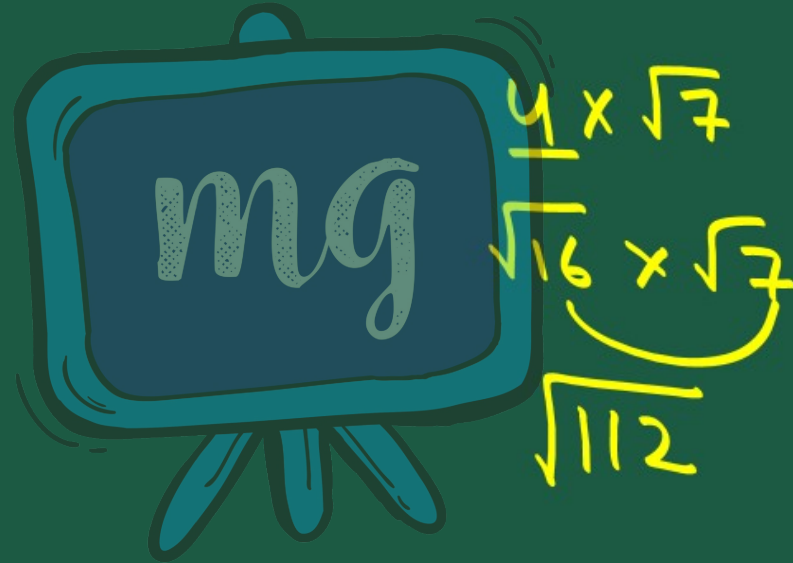
(1) $\sqrt{7}$ (2)

(3) $\sqrt{7 \times 9}$
 $3\sqrt{7}$

B. $\sqrt{80}$
D. $\sqrt{112}$

$$\begin{aligned}\sqrt{28} &= \sqrt{7 \times 4} \\ &= 2\sqrt{7}\end{aligned}$$

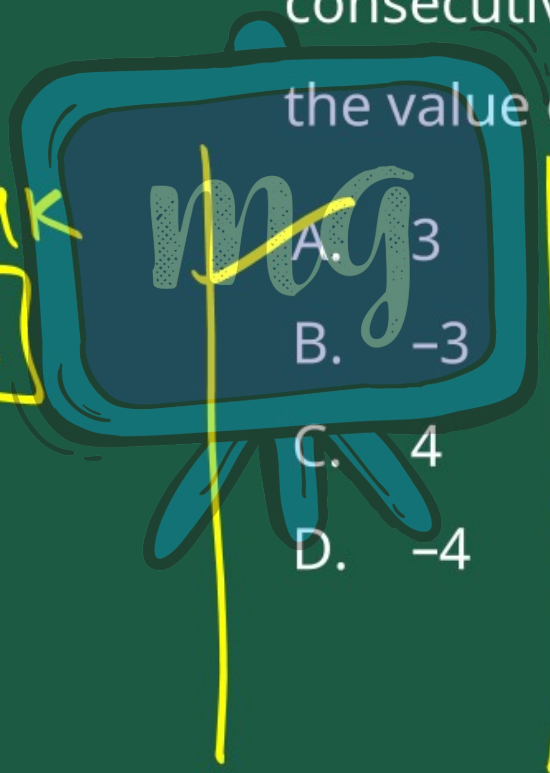
$$\sqrt{7}, 2\sqrt{7}, 3\sqrt{7}, \underline{4\sqrt{7}}$$



$4 \times \sqrt{7}$
 $\sqrt{16} \times \sqrt{7}$
 $\sqrt{112}$

3. If $k + 2$, $4k - 6$ and $3k - 2$ are three consecutive terms of an A.P., then the value of k is (CBSE 2023)

$$12 = 4k$$
$$\boxed{3 = k}$$



- A. 3
- B. -3
- C. 4
- D. -4

$$a + c = 2b$$
$$k + 2 + 3k - 2 = 2(4k - 6)$$
$$4k = 8k - 12$$
$$12 = 8k - 4k$$

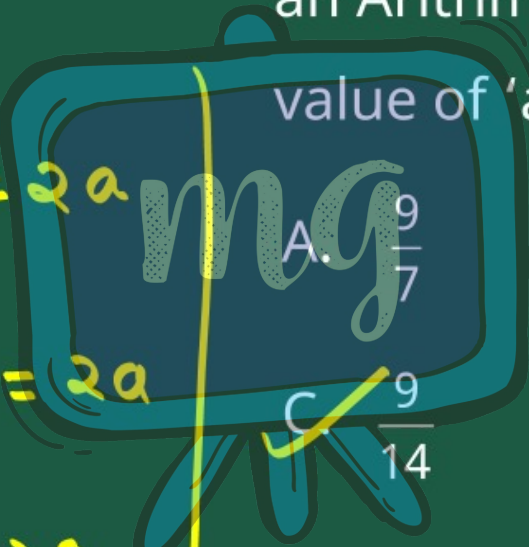
4. If $-\frac{5}{7}$, a , 2 are consecutive terms in an Arithmetic Progression, then the value of 'a' is (CBSE 2020)

$$-\frac{5}{7} + 2 = 2a$$

$$\frac{-5 + 14}{7} = 2a$$

$$\frac{9}{7} = 2a$$

$$a = \frac{9}{14}$$



B. $\frac{19}{7}$

D. $\frac{19}{14}$

5. Which of the following is not an A.P.?

(CBSE 2020)

Handwritten solution for the question "Which of the following is not an A.P.?"

Option A: $-1.2, 0.8, 2.8, \dots$ ✓
Common difference: $0.8 - (-1.2) = 2$, $2.8 - 0.8 = 2$

Option B: $3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, \dots$ ✓
Common difference: $(3 + \sqrt{2}) - 3 = \sqrt{2}$, $(3 + 2\sqrt{2}) - (3 + \sqrt{2}) = \sqrt{2}$, $(3 + 3\sqrt{2}) - (3 + 2\sqrt{2}) = \sqrt{2}$

Option C: $\frac{4}{3}, \frac{7}{3}, \frac{9}{3}, \frac{12}{3}, \dots$ ✗
Common difference: $\frac{7}{3} - \frac{4}{3} = 1$, $\frac{9}{3} - \frac{7}{3} = \frac{2}{3}$, $\frac{12}{3} - \frac{9}{3} = 1$

Option D: $\frac{-1}{5}, \frac{-2}{5}, \frac{-3}{5}, \dots$ ✓
Common difference: $\frac{-2}{5} - \frac{-1}{5} = -\frac{1}{5}$, $\frac{-3}{5} - \frac{-2}{5} = -\frac{1}{5}$

Handwritten calculations for Option C:
 $\frac{4}{3}, \frac{7}{3}, \frac{9}{3}, \frac{12}{3}, \dots$
 $\frac{7}{3} - \frac{4}{3} = 1$
 $\frac{9}{3} - \frac{7}{3} = \frac{2}{3}$
 $\frac{12}{3} - \frac{9}{3} = 1$
 $-2 - (-1) = -2 + 1 = -1$

6. The value of x for which $2x$, $(x + 10)$ and $(3x + 2)$ are the three consecutive terms of an A.P., is

(CBSE 2020)

$$3x = 18$$

$$x = 6$$

- A. 6
- B. -6
- C. 18
- D. -18

$$a + c = 2b$$

$$2x + 3x + 2 = 2(x + 10)$$

$$5x + 2 = 2x + 20$$

$$3x = 20 - 2 = 18$$

7. The first term of an A.P. is p and the common difference is q , then its

10th term is

(CBSE 2020)

$$a_{10} = a + 9d$$
$$= p + 9q$$

A. $q + 9p$

B. $p - 9q$

C. $p + 9q$

D. $2p + 9q$

$$a = p$$

$$d = q$$

8. Find the common difference of the Arithmetic Progression (A.P.)

$$\frac{1}{a}, \frac{3-a}{3a}, \frac{3-2a}{3a}, \dots \quad (a \neq 0)$$

(CBSE 2019)

Solu.

$$d = a_n - a_{n-1}$$

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

$$d = a_3 - a_2$$

$$d = \frac{3 - 2a - (3 - a)}{3a}$$


$$d = \frac{3 - 2a - 3 + a}{3a}$$

$$d = \frac{-a}{3a} = -\frac{1}{3}$$

9. Find a and b so that the numbers
a, 7, b, 23 are in A.P.

(CBSE Term II, 2022)

Solu.

$$d = a_4 - a_3 = a_3 - a_2$$
$$a_1, 7, 15$$
$$d = 15 - 7$$
$$d = 8$$
$$23 - b = b - 7$$
$$23 + 7 = 2b$$
$$30 = 2b$$
$$15 = b$$

$$a = 7 - d$$

$$a_2 = a + d$$

$$a_2 - d = a$$

$$7 - 8 = a$$

$$-1 = a$$

10. Show that $(a - b)^2$, $(a^2 + b^2)$ and $(a + b)^2$ are in A.P.

(CBSE 2020)

Soln.

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

a_1 , a_2 , a_3

$d_1 = a_2 - a_1$

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

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

$\cancel{a^2} + \cancel{b^2} - \cancel{a^2} - \cancel{b^2} + 2ab$

$d_2 = a_3 - a_2$

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

$= \cancel{a^2} + \cancel{b^2} + 2ab - \cancel{a^2} - \cancel{b^2}$

$$d_1 = d_2 = 2ab$$

Hence it is an A.P.

11. For the A.P.; a_1, a_2, a_3, \dots . If $\frac{a_4}{a_7} = \frac{2}{3}$,
then find $\frac{a_6}{a_8}$.

(CBSE Term II, 2022)

Soln.

$$\frac{a_4}{a_7} = \frac{2}{3} \quad \text{--- (1)}$$

$$3a_4 = 2a_7$$

$$3(a+3d) = 2(a+6d)$$

$$3a+9d = 2a+12d$$

$$3a + 9d = 2a + 12d$$

$$3a - 2a = 12d - 9d$$

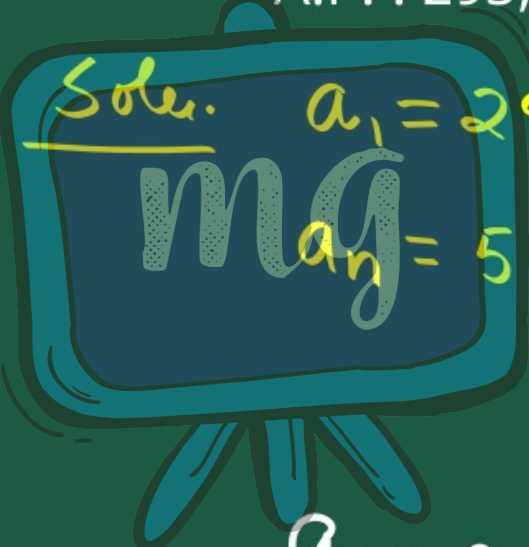
$$a = 3d$$

$$\frac{a_6}{a_8} = \frac{a + 5d}{a + 7d} = \frac{3d + 5d}{3d + 7d}$$

$$= \frac{8d}{10d} = \frac{8}{10} = \frac{4}{5}$$

12. Find the number of terms of the
A.P. : 293, 285, 277, ..., 53.

(CBSE Term II, 2022)



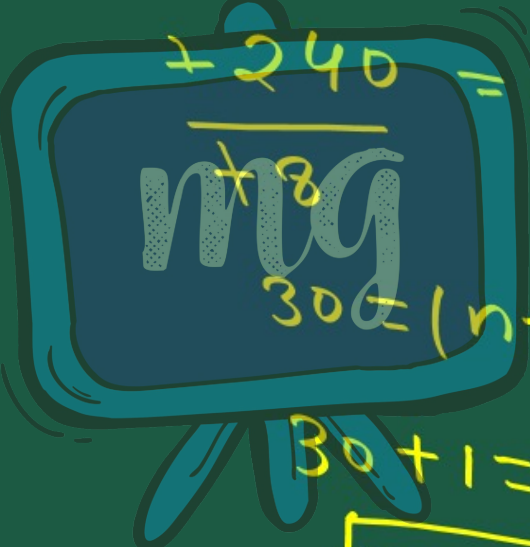
Solu. $a_1 = 293, a_2 = 285$
 $a_n = 53, d = 285 - 293$
 $d = -8$

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

$$53 = 293 + (n-1)(-8)$$

$$53 - 293 = (n-1)(+8)$$

$$+ 240 = (n-1)(-8)$$



Handwritten work on a chalkboard:

$$\begin{array}{r} + 8 \\ \hline 30 = (n-1) \end{array}$$
$$30 + 1 = n$$
$$31 = n$$

13. For what value of 'n', are the n^{th} terms of the A.P's : 9, 7, 5, ... and 15, 12, 9, ... the same?

$a_1, a_2, a_3, \dots, a_n$
9, 7, 5, ..., a_n

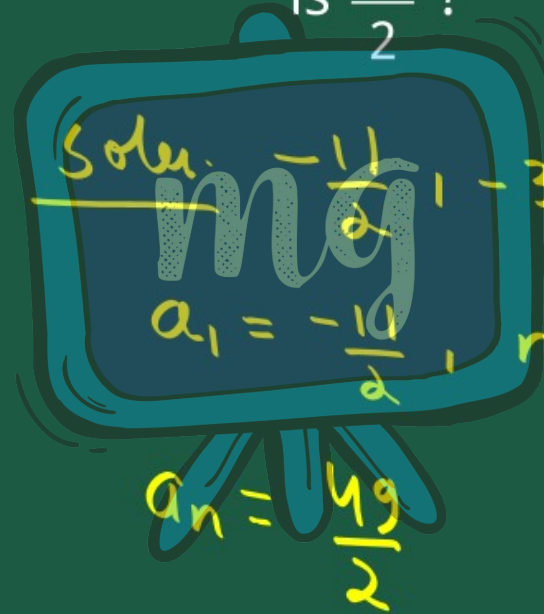
$$\begin{aligned} a_n &= a + (n-1)d \\ &= 9 + (n-1)(-2) \\ &= 9 - 2n + 2 \end{aligned}$$

(CBSE Term II, 2022)
 $A_1, A_2, A_3, \dots, A_n$
15, 12, 9, ..., A_n

$$\begin{aligned} A_n &= A + (n-1)D \\ A_n &= 15 + (n-1)(-3) \\ A_n &= 15 - 3n + 3 \end{aligned}$$

14. Which term of the A.P. $-\frac{11}{2}, -3, -\frac{1}{2}, \dots$
is $\frac{49}{2}$?

(CBSE Term II, 2022)



$$\begin{aligned} &-\frac{11}{2}, -3, -\frac{1}{2}, \dots, \frac{49}{2} \\ &d = -3 - \left(-\frac{11}{2}\right) \\ &= -3 + \frac{11}{2} \\ &= \frac{-6 + 11}{2} = \frac{5}{2} \end{aligned}$$

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

$$\frac{49}{2} = \frac{11}{2} + (n-1)\left(\frac{5}{2}\right)$$

$$49 = 11 + (n-1)5$$

$$49 + 11 = (n-1)5$$

$$\frac{60}{5} = (n-1)$$

$$12 = (n-1)$$

$$12 + 1 = n$$

$$\boxed{13 = n}$$

$$a + 2d = 5$$

$$a + 2(1) = 5$$

$$a + 2 = 5$$

$$a = 5 - 2$$

$$a = 3$$

Hence the AP is

3, 4, 5, 6, 7, ...

16. If the 9th term of an A.P. is zero, then show that its 29th term is double of its 19th term.

Soln. $a_9 = 0$
 $a + 8d = 0$

$a = -8d$

(CBSE 2019)

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

$a_{29} = a + 28d$
 $= -8d + 28d$

$a_{29} = 20d$

$$2 a_{19} = 2 \times (a + 18d)$$

$$= 2(-8d + 18d)$$

$$= 2(10d)$$

$$2 a_{19} = 20d$$

Hence $a_{29} = 2 a_{19}$