

CLASS 10 MATHEMATICS

CH-5 ARITHMETIC PROGRESSION (AP)

EX-5.1

Q4. Which of the following are APs? If they form an A.P. find the common difference d and write three more terms.

(i) 2, 4, 8, 16 ...

ANSWER:

given,

2, 4, 8, 16 ...

Here, the common difference is;

$$a_2 - a_1 = 4 - 2 = 2$$

$$a_3 - a_2 = 8 - 4 = 4$$

$$a_4 - a_3 = 16 - 8 = 8$$

Since, $a_{n+1} - a_n$ or the common difference is not the same every time.

Therefore, the given series are not forming an A.P.

(ii) 2, $5/2$, 3, $7/2$...

ANSWER:

Given, 2, 5/2, 3, 7/2

Here,

$$a_2 - a_1 = 5/2 - 2 = 1/2$$

$$a_3 - a_2 = 3 - 5/2 = 1/2$$

$$a_4 - a_3 = 7/2 - 3 = 1/2$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = 1/2$ and the given series are in A.P.

The next three terms are;

$$a_5 = 7/2 + 1/2 = 4$$

$$a_6 = 4 + 1/2 = 9/2$$

$$a_7 = 9/2 + 1/2 = 5$$

(iii) -1.2, -3.2, -5.2, -7.2 ...

ANSWER:

Given

, -1.2, -3.2, -5.2, -7.2 ...

Here,

$$a_2 - a_1 = (-3.2) - (-1.2) = -2$$

$$a_3 - a_2 = (-5.2) - (-3.2) = -2$$

$$a_4 - a_3 = (-7.2) - (-5.2) = -2$$

Since, $a_{n+1} - a_n$ or common difference is same every time.

Therefore, $d = -2$ and the given series are in A.P.

Hence, next three terms are;

$$a_5 = -7.2 - 2 = -9.2$$

$$a_6 = -9.2 - 2 = -11.2$$

$$a_7 = -11.2 - 2 = -13.2$$

(iv) -10, -6, -2, 2 ...

ANSWER:

given,

-10,-6,-2,2

Here, the terms and their difference are;

$$a_2 - a_1 = (-6) - (-10) = 4$$

$$a_3 - a_2 = (-2) - (-6) = 4$$

$$a_4 - a_3 = (2) - (-2) = 4$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = 4$ and the given numbers are in A.P.

Hence, next three terms are;

$$a_5 = 2 + 4 = 6$$

$$a_6 = 6 + 4 = 10$$

$$a_7 = 10 + 4 = 14$$

(v) 3, $3 + \sqrt{2}$, $3 + 2\sqrt{2}$, $3 + 3\sqrt{2}$

ANSWER:

GIVEN,

3, $3 + \sqrt{2}$, $3 + 2\sqrt{2}$, $3 + 3\sqrt{2}$

Here,

$$a_2 - a_1 = 3 + \sqrt{2} - 3 = \sqrt{2}$$

$$a_3 - a_2 = (3 + 2\sqrt{2}) - (3 + \sqrt{2}) = \sqrt{2}$$

$$a_4 - a_3 = (3 + 3\sqrt{2}) - (3 + 2\sqrt{2}) = \sqrt{2}$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = \sqrt{2}$ and the given series forms a A.P.

Hence, next three terms are;

$$a_5 = (3+\sqrt{2}) + \sqrt{2} = 3+4\sqrt{2}$$

$$a_6 = (3+4\sqrt{2}) + \sqrt{2} = 3+5\sqrt{2}$$

$$a_7 = (3+5\sqrt{2}) + \sqrt{2} = 3+6\sqrt{2}$$

(vi) 0.2, 0.22, 0.222, 0.2222

ANSWER:

GIVEN,

$$3, 3+\sqrt{2}, 3+2\sqrt{2}, 3+3\sqrt{2}$$

Here,

$$a_2 - a_1 = 0.22 - 0.2 = 0.02$$

$$a_3 - a_2 = 0.222 - 0.22 = 0.002$$

$$a_4 - a_3 = 0.2222 - 0.222 = 0.0002$$

Since, $a_{n+1} - a_n$ or the common difference is not same every time.

Therefore, and the given series doesn't forms a A.P.

(vii) 0, -4, -8, -12 ...

ANSWER:

GIVEN, 0, -4, -8, -12 ...

Here,

$$a_2 - a_1 = (-4) - 0 = -4$$

$$a_3 - a_2 = (-8) - (-4) = -4$$

$$a_4 - a_3 = (-12) - (-8) = -4$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = -4$ and the given series forms a A.P.

Hence, next three terms are;

$$a_5 = -12 - 4 = -16$$

$$a_6 = -16 - 4 = -20$$

$$a_7 = -20 - 4 = -24$$

(viii) $-1/2, -1/2, -1/2, -1/2 \dots$

ANSWER:

GIVEN, $-1/2, -1/2, -1/2, -1/2 \dots$

Here,

$$a_2 - a_1 = (-1/2) - (-1/2) = 0$$

$$a_3 - a_2 = (-1/2) - (-1/2) = 0$$

$$a_4 - a_3 = (-1/2) - (-1/2) = 0$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = 0$ and the given series forms a A.P.

Hence, next three terms are;

$$a_5 = (-1/2) - 0 = -1/2$$

$$a_6 = (-1/2) - 0 = -1/2$$

$$a_7 = (-1/2) - 0 = -1/2$$

(ix) $1, 3, 9, 27 \dots$

ANSWER:

GIVEN, $1, 3, 9, 27 \dots$

Here,

$$a_2 - a_1 = 3 - 1 = 2$$

$$a_3 - a_2 = 9 - 3 = 6$$

$$a_4 - a_3 = 27 - 9 = 18$$

Since, $a_{n+1} - a_n$ or the common difference is not same every time.

Therefore, and the given series doesn't form a A.P.

(x) $a, 2a, 3a, 4a \dots$

ANSWER:

GIVEN, $a, 2a, 3a, 4a \dots$

Here,

$$a_2 - a_1 = 2a - a = a$$

$$a_3 - a_2 = 3a - 2a = a$$

$$a_4 - a_3 = 4a - 3a = a$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = a$ and the given series forms a A.P.

Hence, next three terms are;

$$a_5 = 4a + a = 5a$$

$$a_6 = 5a + a = 6a$$

$$a_7 = 6a + a = 7a$$

(xi) $a, a^2, a^3, a^4 \dots$

ANSWER:

GIVEN, $a, a^2, a^3, a^4 \dots$

Here,

$$a_2 - a_1 = a^2 - a = a(a-1)$$

$$a_3 - a_2 = a^3 - a^2 = a^2(a-1)$$

$$a_4 - a_3 = a^4 - a^3 = a^3(a-1)$$

Since, $a_{n+1} - a_n$ or the common difference is not same every time.

Therefore, the given series doesn't forms a A.P.

(xii) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \dots$

ANSWER:**GIVEN, $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \dots$** **Here,**

$$a_2 - a_1 = \sqrt{8} - \sqrt{2} = 2\sqrt{2} - \sqrt{2} = \sqrt{2}$$

$$a_3 - a_2 = \sqrt{18} - \sqrt{8} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$$

$$a_4 - a_3 = 4\sqrt{2} - 3\sqrt{2} = \sqrt{2}$$

Since, $a_{n+1} - a_n$ or the common difference is same every time.

Therefore, $d = \sqrt{2}$ and the given series forms a A.P.

Hence, next three terms are;

$$a_5 = \sqrt{32} + \sqrt{2} = 4\sqrt{2} + \sqrt{2} = 5\sqrt{2} = \sqrt{50}$$

$$a_6 = 5\sqrt{2} + \sqrt{2} = 6\sqrt{2} = \sqrt{72}$$

$$a_7 = 6\sqrt{2} + \sqrt{2} = 7\sqrt{2} = \sqrt{98}$$

(xiii) $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12} \dots$ **ANSWER:****GIVEN, $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12} \dots$** **Here,**

$$a_2 - a_1 = \sqrt{6} - \sqrt{3} = \sqrt{3} \times \sqrt{2} - \sqrt{3} = \sqrt{3}(\sqrt{2} - 1)$$

$$a_3 - a_2 = \sqrt{9} - \sqrt{6} = 3 - \sqrt{6} = \sqrt{3}(\sqrt{3} - \sqrt{2})$$

$$a_4 - a_3 = \sqrt{12} - \sqrt{9} = 2\sqrt{3} - \sqrt{3} \times \sqrt{3} = \sqrt{3}(2 - \sqrt{3})$$

Since, $a_{n+1} - a_n$ or the common difference is not same every time.

Therefore, the given series doesn't form a A.P.

(xiv) 12, 32, 52, 72 ...**ANSWER:**

GIVEN, 12, 32, 52, 72 ...

Here,

$$a_2 - a_1 = 32 - 12 = 20$$

$$a_3 - a_2 = 52 - 32 = 20$$

$$a_4 - a_3 = 72 - 52 = 20$$

Since, $a_n - a_{n-1}$ or the common difference is same every time.

Therefore, the given series forms a A.P.

The next three terms are

$$a_5 = a_4 + d = 92$$

$$a_6 = a_5 + d = 112$$

$$a_7 = a_6 + d = 132$$

12, 32, 52, 72, 92, 112, 132 are in AP

(xv) 12, 52, 72, 73 ...

ANSWER:

Given, 12, 52, 72, 73....

Here,

$$a_2 - a_1 = 52 - 12 = 40$$

$$a_3 - a_2 = 72 - 52 = 20$$

$$a_4 - a_3 = 73 - 72 = 1$$

Since, $a_n - a_{n-1}$ or the common difference isn't same every time.

Therefore, the series isn't AP

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