Solution

ARITHMETIC PROGRESSION WS 2

Class 10 - Mathematics

1. From the given information, we can have
   $a_2 - a_1 = \sqrt{6} - \sqrt{3}$
   $a_3 - a_2 = \sqrt{9} - \sqrt{6} = 3 - \sqrt{6}$
   $a_4 - a_3 = \sqrt{12} - \sqrt{9} = 2\sqrt{3} - 3 \;\; (since \sqrt{12} = \sqrt{2 \times 2 \times 3} = 2\sqrt{3})$
   since $a_{k+1} - a_k$ is not the same for all values of k.
   Hence, it is not an AP.
2. We have $a_1 = \sqrt{3}, a_2 = \sqrt{12}, a_3 = \sqrt{27}, \text{ and } a_4 = \sqrt{48}$
   $a_2 - a_1 = \sqrt{12} - \sqrt{3} = 2\sqrt{3} - \sqrt{3} = \sqrt{3}$
   $a_3 - a_2 = \sqrt{27} - \sqrt{12} = 3\sqrt{3} - 2\sqrt{3} = \sqrt{3}$
   $a_4 - a_3 = \sqrt{48} - \sqrt{27} = 4\sqrt{3} - 3\sqrt{3} = \sqrt{3}$
   Clearly, the difference of successive terms is same, therefore given list of numbers forms an AP.
3. From the given numbers, we can have
   $a_2 – a_1$ = 10 – 4 = 6
   $a_3 – a_2$ = 16 – 10 = 6
   $a_4 – a_3$ = 22 – 16 = 6
   i.e., $a_{k+1} – a_k$ is the same every time
   So, the given list of numbers forms an AP with the common difference d = 6.
   The next two terms are:
   22 + 6 = 28 and
   28 + 6 = 34
4. Here a_1 = a
   a_2 = 2a + 1
   a_3 = 3a + 2
   a_4 = 4a + 3
   a_2 - a_1 = a + 1
   a_3 - a_2 = a + 1
   a_4 - a_3 = a + 1
   As difference of successive terms are equal therefore it is an A.P with common difference $\sqrt{3}$
   Next three term will be:
   4a + 3 + a + 1, 4a + 3 + 2(a + 1), 4a + 3 + 3(a + 1)
   5a + 4, 6a + 5, 7a + 6
5. Given A.P is: 1.8,2.0,2.2,2.4,...
   common difference = 2.0 - 1.8 = 0.2
   Now, 5th term = 2.4 +0.2 = 2.6
   6th term = 2.6 + 0.2 = 2.8
6. a = 4, d = -3
   First term = a = 4
   Second term = 4 + d = 4 + (-3) = 1
   Third term = 1 + d = 1 + (-3) = -2
   Fourth term = $-2 + d = -2 + (-3) = -5$
   Hence, four first terms of the AP are 4, 1, -2, -5.
7. Given equation is 10, 10 + 2^5, 10 + 2^6, 10 + 2^7, ...
   Here,
   First term (a) = 10
   a_1 = 10 + 25

a_2 = 10 + 26

a_3 = 10 + 27

Now, for the given to sequence to be an A.P,

Common difference (d) = a_1 - a = a_2 - a_1

Here,

a_2 - a_1 = 10 + 2^6 - 10 - 2^5 = 64 - 32 = 32

Also,

a_3 - a_2 = 10 + 27 - 10 - 26 = 128 - 64 = 64

Since a_1 - a $\neq$ a_2 - a_1

Hence, the given sequence is not an A.P

8. Let the n^{th} term of a given progression be given by

   T_n = an+ b, where a and b are constants.

   Then, T_{n-1} = a(n - 1) + b = [(an + b) - a].

   Therefore, T_n-T_{n-1}= (an + b) - [(an + b - a] = a, which is a constant.

   Hence, the given progression is an Arithmetic progression.
9. This given progression $\sqrt{20}, \sqrt{45}, \sqrt{80}, \sqrt{125}, \ldots\ldots$

   This sequence can be re-written as :

   $2\sqrt{5}, 3\sqrt{5}, 4\sqrt{5}, 5\sqrt{5}, \ldots\ldots$

   Clearly, $3\sqrt{5} - 2\sqrt{5} = 4\sqrt{5} - 3\sqrt{5} = 5 - 4\sqrt{5} = \sqrt{5}$ (Constant)

   Thus, each term differs from its preceding term by $\sqrt{5}$. So, the qiven progression is an A.P.

   First term = $2\sqrt{5} = \sqrt{20}$

   Common difference = $\sqrt{5}$

   Next term of the A.P = $5\sqrt{5} + \sqrt{5} = 6\sqrt{5} = \sqrt{180}$
10. Given equation is a + b, (a + 1) + b, (a + 1) + (b + 1), (a + 2) + (b + 1), (a + 2) + (b + 2)

    Here,

    First term (a) = a + b

    a_1 = (a + 1) + b

    a_2 = (a + 1) + (b + 1)

    Now, for the given to sequence to be an A.P,

    Common difference (d) = a_1 - a = a_2 - a_1

    Here,

    a_1 - a = a + 1 + b - a - b = 1

    Also,

    a_2 - a_1 = a + 1 + b + 1 - a - 1 - b = 1

    Since a_1 - a = a_2 - a_1

    Hence, the given sequence is an A.P and its common difference is d = 1
11. As per the question:

    a_1 = 2

    $a_2 = \frac{5}{2}$

    a_3 = 3

    $a_4 = \frac{7}{2}$

    now check the common difference (d)

    $a_2 - a_1 = \frac{5}{2} - 2 = \frac{1}{2}$

    $a_3 - a_2 = 3 - \frac{5}{2} = \frac{1}{2}$

    $a_4 - a_3 = \frac{7}{2} - 3 = \frac{1}{2}$

    we can see that the common difference is the same everywhere, so the given series forms an AP.

    now next three terms are: $a_5 = \frac{7}{2} + \frac{1}{2} = 4$

$a_6 = 4 + \frac{1}{2} = \frac{9}{2}$
$a_7 = \frac{9}{2} + \frac{1}{2} = 5$

12. Given

    nth term of A.P. is $a_n = 6n-5$

    Form $n = 1, a_1 = 6(1)-5 = 1$

    $n = 2$, $a_2 = 6(2)-5 = 7$

    ∴Commondifference,d = $a_2 - a_1$

    = 7−1 = 6
13. From the given numbers,we can have

    $a_2 – a_1 = 1 – 1 = 0$

    $a_3 – a_2 = 1 – 1 = 0$

    $a_4 – a_3 = 2 – 1 = 1$

    Here, $a_2 – a_1 = a_3 – a_2$ but $a_3 – a_2 \neq a_4 – a_3$

    So, the given list of numbers does not form an AP. Thus we cannot find two terms.
14. First three terms of AP are:

    a + d, a + 2d, a + 3d

    $\sqrt{2}$, $\sqrt{2} + \frac{1}{\sqrt{2}}$, $\sqrt{2} + \frac{2}{\sqrt{2}}$

    $\sqrt{2}$, $\frac{3}{\sqrt{2}}$, $\frac{4}{\sqrt{2}}$
15. The given series is:

    9,15,21,27,....

    Here, $a_1 = 9$,$a_2 = 15$,$a_3 = 21$

    Here a_2-a_1 = 15-9 = 6 and a_3-a_2 = 21-15 = 6

    We found that $a_3 - a_2 = a_2 - a_1 = 6$

    Therefore the given series is an AP where a=9 and d=6

    The term next to 27 = 27+ d = 27+6 = 33
16. We may write the given terms as

    $\sqrt{9 \times 2}$, $\sqrt{25 \times 2}$, $\sqrt{49 \times 2}$,...

    i.e., $3\sqrt{2}$, $5\sqrt{2}$, $7\sqrt{2}$, ...

    Clearly, $(5\sqrt{2} - 3\sqrt{2})$ = $(7\sqrt{2} - 5\sqrt{2})$ = $2\sqrt{2}$

    So, the given progression is an A.P with common difference $2\sqrt{2}$

    It is clear that the next term is $9\sqrt{2}$ = $\sqrt{9 \times 9 \times 2}$ = $\sqrt{162}$
17. from the given sequence, we can have

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

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

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

    since $a_{k+1} - a_k$ i.e. the common difference is the same for all values of k

    Hence, the given sequence forms an AP.

    Now the next three terms are:

    a_5 = a + 4d = a + 4a = 5a

    a_6 = a + 5d = a + 5a = 6a

    a_7 = a + 6d = a + 6a = 7a

    Next three terms are: 5a, 6a and 7a
18. Here: $a_2 - a_1 = -4 - 0 = -4$

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

    $a_4 - a_3 = -12 + 8 = -4$, since $a_{k+1} - a_k$ is same for all values of k

    Hence, this is an AP.

    The next three terms can be calculated as follows:

    a_5 = a + 4d = 0 + 4(- 4) = -16

    a_6 = a + 5d = 0 + 5(- 4) = - 20

$a_7 = a + 6d = 0 + 6(- 4) = - 24$

Thus, the next three terms are: -16, -20 and -24

19. Given sequence is 12, 2, -8, -18

    Here,

    First term (a) = 12

    $a_2 = 2$

    $a_3 = -8$

    Now, for the given sequence, we must have

    Common difference (d) = $a_1 - a = a_2 - a_1$

    Here,

    $a_1 - a = 2 - 12 = - 10$

    $a_2 - a_1 = -8 - 2 = -10$

    Since $a_1 - a = a_2 - a_1$

    Hence, the given sequence is an A.P with the common difference d = -10

20. The given sequence is 0, - 4, - 8, - 12, ...

    Here, the first term, $a_1 = 0$

    Second term, $a_2 = - 4$

    $a_3 = - 8$

    Now, common difference = $a_2 - a_1 = - 4 - 0 = - 4$

    Also, $a_3 - a_2 = - 8 - (- 4) = - 8 + 4 = - 4$

    Since, the common difference is same.

    Hence the terms are in Arithmetic progression with a common difference, d = - 4.

21. We know that if P is the principal and r% per annum is the rate of interest, compounded annually, then the amount A_n at the end of n years is given $A_n = P\left(1 + \frac{r}{100}\right)^n$

    Here, P = ₹100 and r = 4.

    $\therefore A_n = \left[100(1 + \frac{4}{100}\right)^n] = 100 \times \left(\frac{26}{25}\right)^n = 100 \times (1.04)^n$.

    Thus, the amount of money in the account at the end of different years is given by

    ₹100×1.04, ₹$100 \times (1.04)^2$, ₹$100 \times (1.04)^3$,.....

    or, ₹104, ₹108.16, ₹112.48,.....

    Clearly, it is not forming an A.P.

22. $3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, \ldots.$

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

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

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

    i.e. $a_{k+1} - a_k$ is the same every time.

    So, the given list of numbers forms an AP with the common differenced d = $\sqrt{2}$

    The next three terms are:

    $(3 + 3\sqrt{2}) + \sqrt{2} = 3 + 4\sqrt{2},\ (3 + 4\sqrt{2}) + \sqrt{2} = 3 + 5\sqrt{2}$ and $(3 + 5\sqrt{2}) + \sqrt{2} = 3 + 6\sqrt{2}$

23. If $a_{k+1} - a_k$ is same for different values of k, then the series is in the form of an AP.

    here, we have $a_1 = 2$, $a_2 = 4$, $a_3 = 8$ and $a_4 = 16$

    $a_4 - a_3 = 16 - 8 = 8$

    $a_3 - a_2 = 8 - 4 = 4$

    $a_2 - a_1 = 4 - 2 = 2$

    Here, $a_{k+1} - a_k$ i.e. the common difference is not same for all values of k

    Hence, the given series does not form an AP.

24. Here, it is given that all terms are same, so the common difference (d) = 0

    since $a_{k+1} - a_k$ is the same for all values of k

Hence, it forms an AP.

The next three terms will be the same, i.e. $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}$

25. $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \ldots$

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

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

$a_4 - a_3 = \sqrt{32} - \sqrt{18} = 4\sqrt{2} - 3\sqrt{2} = \sqrt{2}$

i.e. $a_{k+1} - a_k$ is the same every time.

So, the given list of numbers forms an AP with the common difference d = $\sqrt{2}$.

The next three terms are:

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

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

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

26. $a_2 = 26$

$a_{15} = -26$

$a_2 = a_1 + d$

$26 = a_1 + d$

$-26 = a_1 + 14d$

$+ \quad - \quad -$

$52 = -13d$

d = -2

Now, put d = -2 in $a_2 = a_1 + d$

$26 = a_1 - 2$

$a_1 = 28$

hence, the required AP is 28, 26, 24,...

27. -5, -1, 3, 7...

First term = a= -5

Common difference (d) = Second term -First term

= Third term - Second term and so on.

Therefore, Common difference (d) = -1 - (-5)= -1+5 =4

28. $a_1 = \sqrt{3}, a_2 = \sqrt{6}, a_3 = \sqrt{9}$

$d_1 = \sqrt{6} - \sqrt{3} = \sqrt{3}(\sqrt{2} - 1)$

$d_2 = \sqrt{9} - \sqrt{6} = 3 - \sqrt{6}$

Since $d_1 \neq d_2$

Hence, it is not an AP.

29. Given sequence is 1.0, 1.7, 2.4, 3.1, ...

Here,

First term (a) = 1.0

$a_1 = 1.7$

$a_2 = 2.4$

Now, for the given sequence to be an A.P,

Common difference (d) = $a_1 - a = a_2 - a_1$

Here,

$a_2 - a = 1.7 - 1.0 = 0.7$

Also,

$a_3 - a_2 = 2.4 - 1.7 = 0.7$

Since $a_1 - a = a_2 - a_1$

Hence, the given sequence is an A.P and its common difference is d = 0.7

30. $(2x + 1) - (x + 3) = (x - 7) - (2x + 1)$

or, $2x + 1 - x - 3 = x - 7 - 2x - 1$

or, $x - 2 = -x - 8$

or, $x + x = -8 + 2$

or, $2x = -6$
or,$x = -3$

31. From the given numbers, we can have
$a_2 - a_1 = 3 - 1 = 2$
$a_3 - a_2 = 9 - 3 = 6$
$a_4 - a_3 = 27 - 9 = 18$
since $a_{k+1} - a_k$ i.e. the common difference is not same for all values of k
Hence, it is not an AP. So, we can not find next three terms.

32. According to the question, we have
1st term = a and common difference = 3
$\therefore$ b = a + 3, c = a + 2(3) = a + 6
d = a + 3(3) = a + 9,
e = a + 4(3) = a + 12
Now, e - c = (a + 12) - (a + 6) = 6

33. We know that if a, b, c are three consecutive terms of an A.P., then
b - a = c - b i.e. 2b = a + c
Thus, if $k^2 + 4k + 8$, $2k^2 + 3k + 6$ and $3k^2 + 4k + 4$ are three consecutive terms of an A.P., then
$a = k^2 + 4k + 8$, $b = 2k^2 + 3k + 6$, $c = 3k^2 + 4k + 4$
2b = a + c
$2(2k^2 + 3k + 6) = (k^2 + 4k + 8) + (3k^2 + 4k + 4)$
$\Rightarrow 4k^2 + 6k + 12 = k^2 + 4k + 8 + 3k^2 + 4k + 4$
$\Rightarrow 4k^2 + 6k + 12 = 4k^2 + 8k + 12$
$\Rightarrow 2k = 0$
$\Rightarrow k = 0$.

34. Given sequence is p, p + 90, p + 180, p + 270, ... where, $p = (999)^{999}$
Here,
First term (*a*) = p
$a_1 = p + 90$
$a_2 = p + 180$
Now, for the given sequence to be an A.P,
Common difference (d) = $a_1 - a = a_2 - a_1$
Here,
$a_2 - a = p + 90 - p = 90$
Also,
$a_3 - a_2 = p + 180 - p - 90 = 90$
Since $a_1 - a = a_2 - a_1$
Hence, the given sequence is an A.P and its common difference is d = 90

35. Here
$a_1 = 0$
$a_2 = \frac{1}{4}$
$a_3 = \frac{1}{2}$
$a_4 = \frac{3}{4}$
$a_2 - a_1 = \frac{1}{4} - 0 = \frac{1}{4}$
$a_3 - a_2 = \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$
$a_4 - a_3 = \frac{3}{4} - \frac{1}{2} = \frac{1}{4}$
As the difference of successive terms are equal therefore it is an AP with common difference $\frac{1}{4}$
Next three terms will be
$\frac{3}{4} + \frac{1}{4}, \frac{3}{4} + 2\left(\frac{1}{4}\right), 3 + 3\left(\frac{1}{4}\right)$
$1, \frac{5}{4}, \frac{3}{2}$

36. Here

$a_1 = a + b$

$a_2 = (a + 1) + b$

$a_3 = (a + 1) + (b + 1)$

$a_2 - a_1 = (a + 1) + b - (a + b) = 1$

$a_3 - a_2 = (a + 1) + (b + 1) - (a + 1) - b = 1$

As difference of successive terms are equal therefore its an A.P with common difference 1.

Therefore, next three terms will be

(a + 1) + (b + 1) + 1, (a + 1) + (b + 1) + 1(2), (a + 1) + (b + 1) + 1(3)

(a + 2) + (b + 1), (a + 2) + (b + 2), (a + 3) + (b + 2)

37. $a_2 - a_1 = k - \frac{2}{3}$

$a_3 - a_2 = \frac{5}{8} - k$

If $\frac{2}{3}$, k, $\frac{5}{8}$ are the three consecutive terms of an AP, then

$a_2 - a_1 = a_3 - a_2$

$\Rightarrow k - \frac{2}{3} = \frac{5}{8} - k$

$\Rightarrow k + k = \frac{5}{8} + \frac{2}{3}$

$\Rightarrow 2k = \frac{31}{24}$

$\Rightarrow k = \frac{31}{48}$

Hence, the required value of k is $\frac{31}{48}$.

38. Here, $a_1 = a = -1.25$, d = -0.25

First term, a = -1.25

Second term, $a_2 = -1.25 + d = -1.25 + (-0.25) = -1.50$

Third term = -1.50 + d = -1.50 + (-0.25) = -1.75

Fourth term = -1.75 + d = -1.75 + (-0.25) = -2.00

Hence, first four terms of the given AP are -1.25, -1.75, -2.00

39. a = -2, d = 0

First term = a = -2

Second term = -2 + d = -2 + 0 = -2

Third term = -2 + d = -2 + 0 = -2

Fourth term = -2 + d = -2 + 0 = -2

Hence, first four terms of the given AP are -2, -2, -2, -2 respectively.

40. Given equation is 1^2, 5^2, 7^2, 73 ....

Here,

First term (a) = 1^2

Second term, $a_1 = 52$

Third term, $a_2 = 72$

Now, for the given to sequence to be an A.P,

Common difference (*d*) = $a_1 - a = a_2 - a_1$

Here,

$a_2 - a_1 = 5^2 - 1^2 = 25 - 1 = 24$

Also,

$a_3 - a_2 = 7^2 - 5^2 = 49 - 25 = 24$

Since $a_1 - a = a_2 - a_1$

Hence, the given sequence is an A.P with the common difference d = 24

41. Here we have

$a_1 = 5$

$a_2 = \frac{14}{3}$

$a_3 = \frac{13}{3}$

$a_4 = 4$

$a_2 - a_1 = \frac{14}{3} - 5 = \frac{-1}{3}$
$a_3 - a_2 = \frac{13}{3} - \frac{14}{3} = \frac{-1}{3}$
$a_4 - a_3 = 4 - \frac{13}{3} = -\frac{1}{3}$
As the difference of successive terms are equal therefore it is an AP with a common difference $-\frac{1}{3}$

next three terms will be
$4 + \left(-\frac{1}{3}\right), 4 + 2\left(-\frac{1}{3}\right), 4 + 3\left(-\frac{1}{3}\right)$
Or $\frac{11}{3}, \frac{10}{3}, 3$

42. $a_n = \frac{n(n+1)(2n+1)}{6}$
$a_1 = \frac{1(1+1)[2(1)+1)}{6}$
$= \frac{1(2)[2+1)}{6}$
$= \frac{2(3)}{6}$
$= \frac{6}{6}$
$a_1 = 1$

$a_2 = \frac{2(2+1)[2(2)+1)}{6}$
$= \frac{2(3)[4+1)}{6}$
$= \frac{6(5)}{6}$
$a_2 = 5$

$a_3 = \frac{3(3+1)[2(3)+1)}{6}$
$= \frac{3(4)[6+1)}{6}$
$a_3 = 14$

$a_2 - a_1 = 4$

$a_3 - a_2 = 9$

$4 \neq 9$
hence,the sequence does not form an ap.

43. We have $a_1 = 2$, $a_2 = 2^2$, $a_3 = 2^3$ and $a_4 = 2^4$

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

$a_3 - a_2 = 2^3 - 2^2 = 8 - 4 = 4$

Clearly, the difference of successive terms is not same, therefore given list of numbers does not form an AP.

44. Given sequence is -225, -425, -625, -825, ...
Here,
First term (a) = −225
$a_1 = -425$

$a_2 = -625$

Now, for the given to sequence to be an A.P,
Common difference (d) = $a_2 - a_1 = a_3 - a_2$
Here,
$a_2 - a_1$ = -425 - (-225) = -200
Also,
$a_3 - a_2$ = -625 - (-425) = -200
Since $a_2 - a_1 = a_3 - a_2$
Hence, the given sequence is an A.P and its common difference is d = -200

45. $a_1 = \sqrt{5}$
$a_2 = \sqrt{20} = 2\sqrt{5}$

$d = a_2 - a_1$
$= 2\sqrt{5} - \sqrt{5}$
$d = \sqrt{5}$

$a_4 = a_1 + 3d$

$= \sqrt{5} + 3\sqrt{5}$

$= 4\sqrt{5}$

$= \sqrt{80}$

$a_5 = a_1 + 4d$

$= \sqrt{5} + 4\sqrt{5}$

$= 5\sqrt{5}$

$= \sqrt{125}$

hence, next two of A.P are $\sqrt{80}$ and $\sqrt{125}$

46. From the given numbers,we can have

$a_2 – a_1 = 2 – (–2) = 2 + 2 = 4$

$a_3 – a_2 = –2 – 2 = –4$

As $a_2 – a_1 \neq a_3 – a_2$, i.e. the common difference is not same, so the given list of numbers does not form an AP. Thus, we cannot find the next two terms.

47. a = 4 and d = - 3.

$a_1 = 4 + (-3) = 1$

$a_2 = 4 + 2(-3) = -2$

$a_3 = 4 + 3(-3) = -5$

$a_4 = 4 + 4(-3) = -8$

Therefore the A.P. is 4,1,-2,-5,-8,...

48. Given AP is 1, -2, -5, -8............

Common difference = (-2) - (1)

= -2 - 1 = -3

Now, 5^{th} term = -8 - 3 = -11

6^{th} term = -11 - 3 = -14

7^{th} term = -14 -3 = -17

8^{th} term = -17 - 3 = -20

49. Here, it is given that the exponent is increasing in each subsequent term:

$a_4 = a_4$, $a_3 = a_3$, $a_2 = a_2$, $a_1 = a_1$

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

$a_3 - a_2 = a_3 - a_2$

$a_4 - a_3 = a_4 - a_3$

Since, the common difference is not same, since $a_{k+1} - a_k$ is not same for all values of k

Hence, the given sequence does not forms an AP. So,we can not find next three terms.

50. We have given the numbers as follows: 1^2, 5^2, 7^2, 73.....

now find

$a_2 - a_1 = 5^2 - 1 = 25 - 1 = 24$

$a_3 - a_2 = 7^2 - 5^2 = 49 - 25 = 24$

$a_4 - a_3 = 73 - 7^2 = 73 - 49 = 24$

As, the common difference is the same. The sequence is in A.P.

Next three terms are:$a_5 = a_4 + d = 73 + 24 = 97$

$a_6 = a_5 + d = 97 + 24 = 121$

$a_7 = a_6 + d = 121 + 24 = 145$

51. a = -1 and d = $\frac{1}{2}$

Let the series be a_1, a_2, a_3, a_4.............

$a_1 = a = -1$

$a_2 = a + d = -1 + \frac{1}{2} = -\frac{1}{2}$

$a_3 = a + 2d = -\frac{1}{2} + \frac{1}{2} = 0$

$a_4 = a_3 + d = 0 + \frac{1}{2} = \frac{1}{2}$

Series will be $-1, -\frac{1}{2}, 0, \frac{1}{2}$ ....

52. First three terms of AP are :

a, a + d, a + 2d

- 5, - 5 + 1 (- 3), - 5 + 2 (- 3)

- 5, - 8, - 11

53. Here we are given that 8x+4,6x-2 and 2x+7 are in AP

Here

a_1=8x+4,a_2=6x-2 and a_3=2x+7

Then common difference $d = a_2 - a_1 = a_3 - a_2$

⇒(6x - 2) - (8x + 4) = (2x + 7) - (6x - 2)

⇒6x - 2 - 8x - 4 = 2x + 7 - 6x + 2

⇒-2x - 6 = -4x + 9

⇒-2x + 4x = 9 + 6

⇒2x = 15

$\Rightarrow x = \frac{15}{2}$

54. First three terms of AP are :

a + d, a + 2d, a + 3d

$\frac{1}{2} + \left(-\frac{1}{6}\right), \left(\frac{1}{2}\right) + 2\left(-\frac{1}{6}\right), \left(\frac{1}{2}\right) + 3\left(-\frac{1}{6}\right)$

$\frac{1}{3}, \frac{1}{6}, 0$

55. We need to find out whether the given sequences is an A.P or not and then find its common difference.

$\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8} \ldots\ldots$

Here,

first term (a) = $\frac{1}{2}$

a_2 = $\frac{1}{4}$

a_3 = $\frac{1}{6}$

Now, for the given to sequence to be an A.P,

Here

$a_2 - a = \frac{1}{4} - \frac{1}{2}$

= $\frac{1-2}{4}$ = $\frac{-1}{4}$

$a_3 - a_2 = \frac{1}{6} - \frac{1}{4} = -\frac{1}{12}$

Since a_2 - a $\neq$ a_3 - a_2

Hence, the given sequence is not an A.P.

56. Given sequence is 3, 3, 3, 3, ...

Here,

First term (*a*) = 3

a_1 = 3

a_2 = 3

Now, for the given to sequence to be an A.P,

Common difference (*d*) = a_1 - a = a_2 - a_1

Here,

a_1 - a = 3 - 3 = 0

Also,

a_2 - a_1 = 3 - 3 = 0

Since a_1 - a = a_2 - a_1

Hence, the given sequence is an A.P and its common difference is d = 0.

57. No

Let 0 be the nth term of given AP such that, a_n = 0.

Given that first term a = 31, common difference, d = 28 – 31 = - 3

The nth term of an AP, is

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

$0 = 31 + (n - 1)(- 3)$

$n - 1 = \frac{-31}{-3}$

$n = 1 + \frac{31}{3} = \frac{34}{3}$

Since, n should be positive integer. So, 0 is not a term of the given AP.

58. From the given numbers, we have

$a_2 – a_1 = –1 – 1 = –2$

$a_3 – a_2 = –3 – (–1) = – 3 + 1 = –2$

$a_4 – a_3 = –5 – (–3) = – 5 + 3 = –2$

i.e., $a_{k + 1} – a_k$ is the same every time

So, the given list of numbers forms an AP with the common difference d = –2

The next two terms are:

-5 + (-2) = -7 and

-7 + (-2) = -9

59. -1.2, -3.2, -5.2, -7.2, ...

$a^2 - a^1 = -3.2 - (-1.2) = -3.2 + 1.2 = -2.0$

$a^3 - a^2 = -5.2 - (-3.2) = -5.2 + 3.2 = -2.0$

$a^4 - a^3 = -7.2 - (-5.2) = -7.2 + 5.2 = -2.0$

i.e. $a_{k+1} - a_k$ is the same everytime, So, the given list of numbers form an AP with the common differenced d = -2.0

The next three terms are:

-7.2 + (-2.0) = -9.2

-9.2 + (-2.0) = -11.2

and -11.2 + (-2.0) = -13.2

60. 3, 1, -1, -3...

First term = a= 3,

Common difference (d) = Second term - first term = Third term - second term and so on

Therefore, Common difference (d) = 1 - 3 = -2

61. a = 10, d = 10

First term a = 10

Second term = 10 + d = 10 + 10 = 20

Third term = 20 + d = 20 + 10 = 30

Fourth term = 30 + d = 30 + 10 = 40

Hence, first four terms of the given AP are 10, 20, 30, 40

62. We have,

Total strength of students in the auditorium = 1000

Number of students left the auditorium when first batch of 25 students leaves the auditorium = 1000 - 25 = 975

Number of students left in the auditorium when second batch of 25 students leaves the auditorium = 975 - 25 = 950

Number of students left in the auditorium when third batch of 25 students leaves the auditorium = 950 - 25 = 925 and so on.

Thus, the number of students left in the auditorium at different stages are 1000, 975, 950, 925,...

Clearly, it is an A.P. with first term 1000 and common difference = 25.

63. Here, $\frac{1}{x+2}$, $\frac{1}{x+3}$ and $\frac{1}{x+5}$ are in Arithmetic progression

Since it is in AP, the common difference is constant

$T_2 - T_1 = T_3 - T_2$

$\frac{1}{x+3} - \frac{1}{x+2} = \frac{1}{x+5} - \frac{1}{x+3}$

$\frac{(x+2-x-3)}{(x+3)(x+2)} = \frac{(x+3-x-5)}{(x+5)(x+3)}$

$\Rightarrow \frac{-1}{(x+2)} = \frac{-2}{x+5}$

$\Rightarrow$ -x - 5 = -2x - 4

$\implies$ -x+2x=-4+5

$\Rightarrow$ x = -4 + 5

$\Rightarrow$ x = 1

64. Here

$a_1 = \sqrt{3}$

$a_2 = 2\sqrt{3}$

$a_3 = 3\sqrt{3}$

$a_4 = 4\sqrt{3}$

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

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

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

As difference of successive terms are equal therefore it is an AP with common difference $\sqrt{3}$ next three terms will be

$4\sqrt{3} + \sqrt{3}, 4\sqrt{3} + 2\sqrt{3}, 4\sqrt{3} + 3\sqrt{3}$

Or $5\sqrt{3}, 6\sqrt{3}, 7\sqrt{3}$

65. Given, numbers a, 7, b, 23 are in A.P.

$\therefore$ 7 - a = b - 7 = 23 - b ...[A.P. has equal common difference]

By equating, b - 7 = 23 - b

$\Rightarrow$ 2b = 30

$\Rightarrow$ b = 15

Now, equating 7 - a = b - 7

$\Rightarrow$ 7 - a = 15 - 7 ...[Putting the value of a]

$\Rightarrow$ - a = 1

$\Rightarrow$ a = -1

Hence, a = -1 and b = 15.

66. -10, -6, -2, 2, ...

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

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

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

i.e. $a_{k+1} - a_k$ is the same every time.

So, the given lists of numbers form an AP with the common difference d = 4.

The next three terms are:

2 + 4 = 6, 6 + 4 = 10 and 10 + 4 = 14

67. Simple interest = $\frac{\text{Prinicipal} \times \text{rate} \times \text{time}}{100}$

$= \frac{1000 \times 10 \times t}{100}$

= 100t

So, the amount of money in the account of Varun at the end of every year is

1000, (1000 + 100 $\times$ 1), (1000 + 100 $\times$ 2), (1000 + 100$\times$ 3), …

i.e., 1000, 1100, 1200, 1300, …

which forms an A.P, with common difference , d = 1100 – 1000 = 100

68. To find the next four terms, we need to find 'a' and 'd' .

0, -3, -6, -9.............

First term, a = 0

Common difference d = (-3) - (0)

= -3 - 0

= -3

5^{th} term = a + 4d = 0 + 4×(-3)= -12

6^{th} term = a +5d = 0+ 5×(-3)= -15

7^{th} term = a +6d= 0+ 6×(-3)= -18

8^{th} term = a +7d =0 + 7×(-3) = -21.

Therefore, the common difference is -3 and the next four terms are -12,-15,-18,-21.