EXERCISE 5.2

Which of the following form an AP? Justify your answer.
(i) –1, –1, –1, –1,...
Solution:

We have $a_1 = -1$, $a_2 = -1$, $a_3 = -1$ and $a_4 = -1$
$a_2 - a_1 = 0$
$a_3 - a_2 = 0$
$a_4 - a_3 = 0$
Clearly, the difference of successive terms is same, therefore given list of numbers from an AP.

(ii) 0, 2, 0, 2,...
Solution:

We have $a_1 = 0$, $a_2 = 2$, $a_3 = 0$ and $a_4 = 2$
$a_2 - a_1 = 2$
$a_3 - a_2 = -2$
$a_4 - a_3 = 2$
Clearly, the difference of successive terms is not same, therefore given list of numbers does not form an AP.

(iii) 1, 1, 2, 2, 3, 3...
Solution:

We have $a_1 = 1$, $a_2 = 1$, $a_3 = 2$ and $a_4 = 2$
$a_2 - a_1 = 0$
$a_3 - a_2 = 1$
Clearly, the difference of successive terms is not same, therefore given list of numbers does not form an AP.

(iv) 11, 22, 33...
Solution:

We have $a_1 = 11$, $a_2 = 22$ and $a_3 = 33$
$a_2 - a_1 = 11$
$a_3 - a_2 = 11$
Clearly, the difference of successive terms is same, therefore given list of numbers form an AP.

(v) 1/2,1/3,1/4, ...
Solution:

We have $a_1 = ½$, $a_2 = 1/3$ and $a_3 = ¼$
$a_2 - a_1 = -1/6$
$a_3 - a_2 = -1/12$
Clearly, the difference of successive terms is not same, therefore given list of numbers does not form an AP.

(vi) 2, 2^2, 2^3, 2^4, ...
Solution:

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.

(vii) √3, √12, √27, √48, ...
Solution:

We have,
$a_1 = \sqrt{3}$, $a_2 = \sqrt{12}$, $a_3 = \sqrt{27}$ 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 from an AP.

2. Justify whether it is true to say that –1, -3/2, –2, 5/2,... forms an AP as $a_2 – a_1 = a_3 – a_2$.
Solution:

False
$a_1 = -1$, $a_2 = -3/2$, $a_3 = -2$ and $a_4 = 5/2$
$a_2 – a_1 = -3/2 – (-1) = - ½$
$a_3 – a_2 = - 2 – (- 3/2) = - ½$
$a_4 – a_3 = 5/2 – (-2) = 9/2$
Clearly, the difference of successive terms in not same, all though, $a_2 - a_1 = a_3 - a_2$ but $a_4 - a_3 \neq a_3 - a_2$ therefore it does not form an AP.

3. For the AP: –3, –7, –11, ..., can we find directly $a_{30} – a_{20}$ without actually finding a_{30} and a_{20}? Give reasons for your answer.
Solution:

True
Given
First term, a = - 3
Common difference, $d = a_2 - a_1 = - 7 - (- 3) = - 4$
$a_{30} - a_{20} = a + 29d - (a + 19d)$
= 10d
= - 40
It is so because difference between any two terms of an AP is proportional to common difference of that AP

4. Two APs have the same common difference. The first term of one AP is 2 and that of the other is 7. The difference between their 10th terms is the same as the difference between their 21st

terms, which is the same as the difference between any two corresponding terms. Why?
Solution:

Suppose there are two AP's with first terms a and A
And their common differences are d and D respectively
Suppose n be any term
$a_n = a + (n - 1)d$
$A_n = A + (n - 1)D$
As common difference is equal for both AP's
We have D = d
Using this we have
$A_n - a_n = a + (n - - 1)d - [A + (n - 1)D]$
$= a + (n - 1)d - A - (n - 1)d$
$= a – A$
As a - A is a constant value
Therefore, difference between any corresponding terms will be equal to a - A.