Topic

Arithmetic Progression

Objective

To verify that the given sequence is an arithmetic progression by paper cutting and pasting method.

Arithmetic progression

A sequence is known as an arithmetic progression (sequence) if the difference between the term and its predecessor always remains constant.

Previous Knowledge Required

Understanding the concept of an arithmetic progression.

Material Required

Colored papers, a pair of scissors, fevicol, geometry box, sketch pens, drawing sheets.

Procedure

1. Take a given sequence of numbers that says $A_1, A_2, A_3, ...$
2. Cut a rectangular strip from the coloured paper of width 1 cm and length A_1 cm.
3. Repeat the procedure by cutting rectangular strips of same width 1 cm and lengths A_2, A_3 ...cm.
4. Take a graph paper and paste these rectangular strips adjacent to each other in order on graph paper.

   [A] Consider a sequence 1, 4, 7, 10, 13.

   (i) Take different colour strips of lengths 1 cm, 4 cm, 7 cm, 10 cm, 13 cm and all of the same width 1 cm (say).

   (ii) Arrange and paste these strips in order on a graph paper as shown in fig. (i).

   [B] Consider a sequence 1, 4, 8, 10, 11.

   (i) Take different colour strips of lengths 1 cm, 4 cm, 8 cm, 10 cm, 11 cm and all of the same width 1 cm (say).

   (ii) Arrange and paste these strips in order on a graph paper as shown in fig. (ii).

[A] For sequence 1, 4, 7, 10, 13

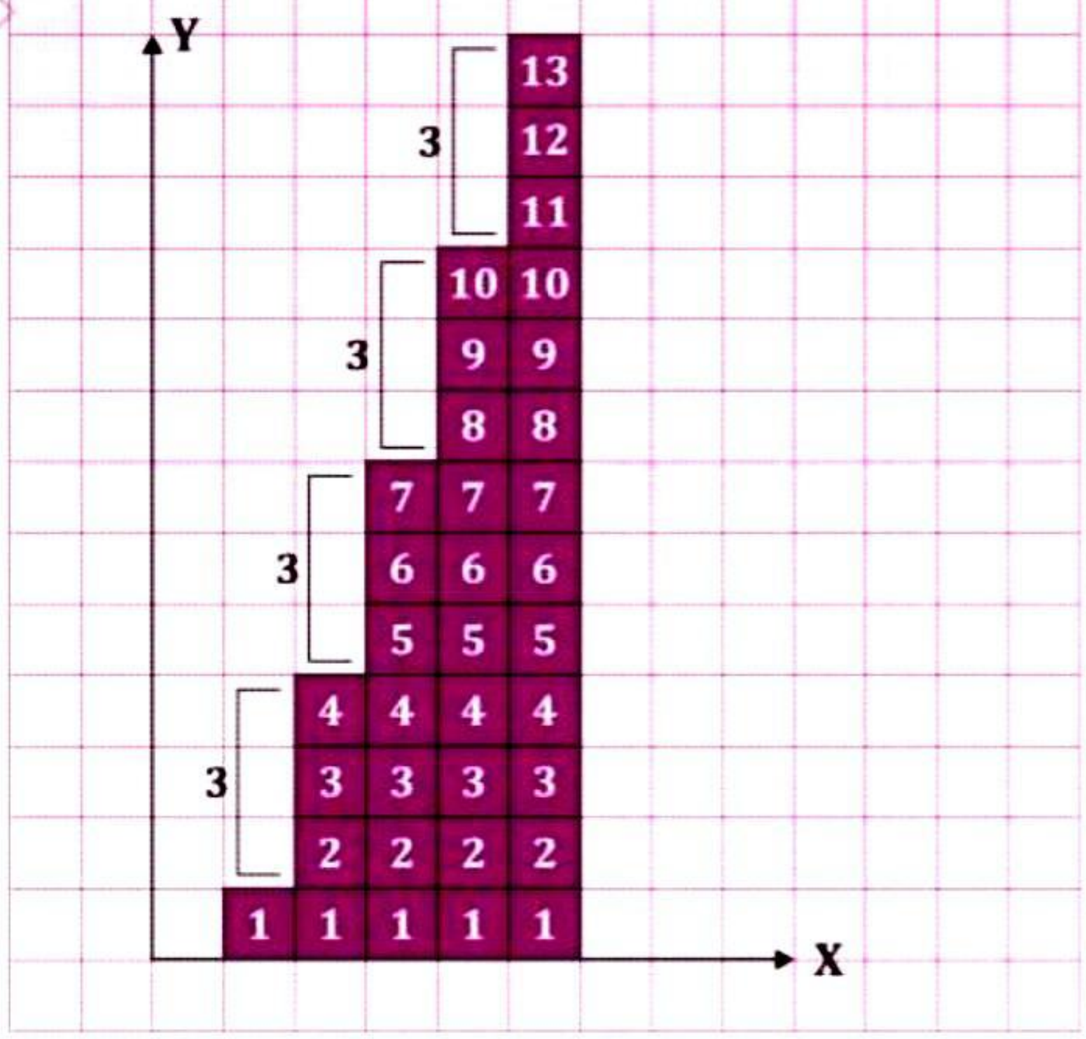


Fig.(i)

[B] For sequence 1, 4, 8, 10, 11

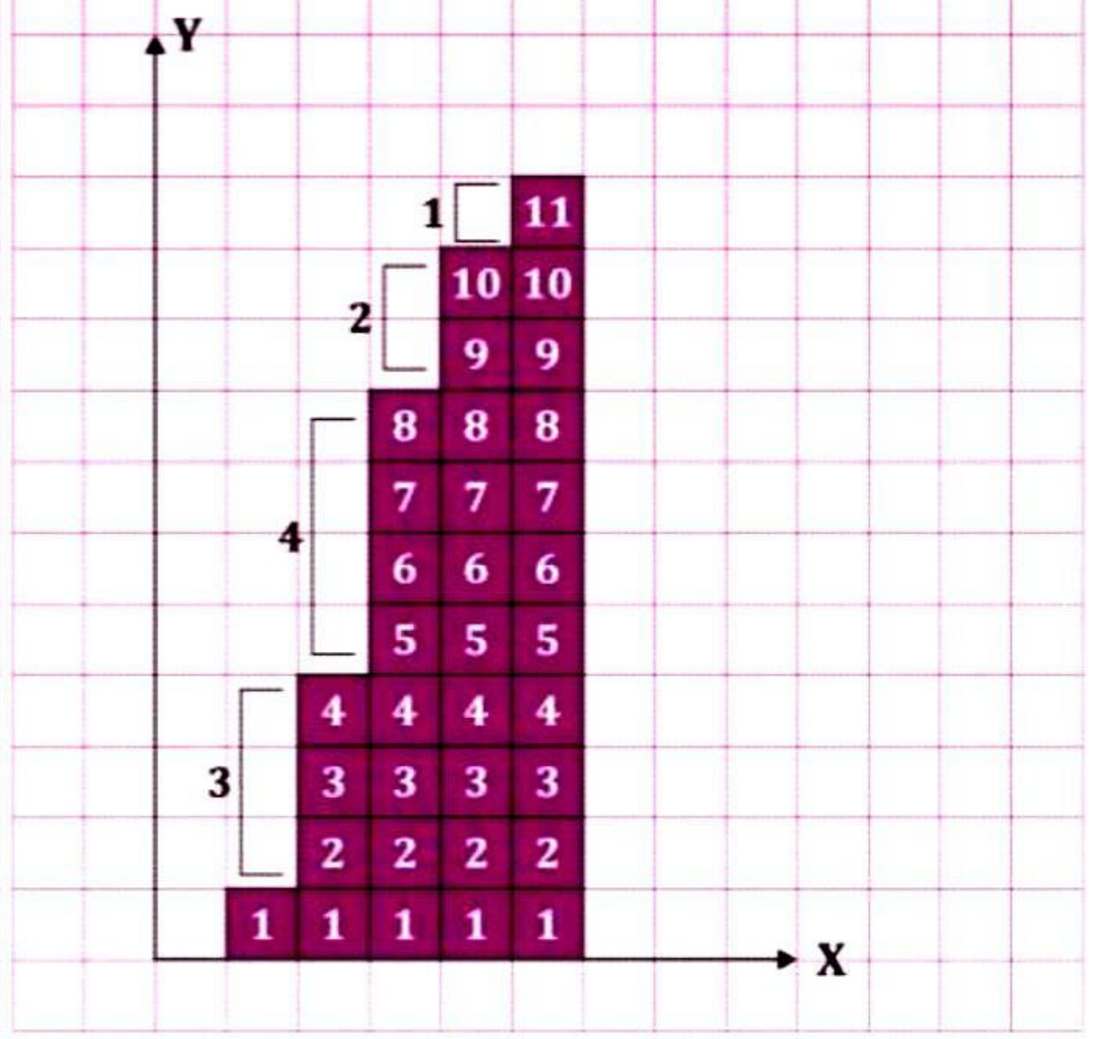


Fig.(ii)

Observation

We observe from fig. (i) that the adjoining strips have a common difference in heights i.e. 3 cm and a ladder is formed in which the adjoining steps are constant. Hence it isan arithmetic progression. In Fig. (ii) the adjoining strips don't have a common difference in heights and thus the adjoining steps of the ladder are not constant. Hence it is not an arithmetic progression.

	Fig. (i)	Fig. (ii)
Observation	There is a common difference in heights i.e., 3 cm	Don't have a common difference in heights
Result	It is an AP.	Not an AP.

Result

Sequence **[A]** is an AP because the common difference between the term and its predecessor remains constant.

Sequence **[B]** is not an AP because the common difference between the term and its predecessor does not remain constant.

Learning outcome

Students will learn the meaning of an arithmetic progression by relating it to an activity that involves visualization.

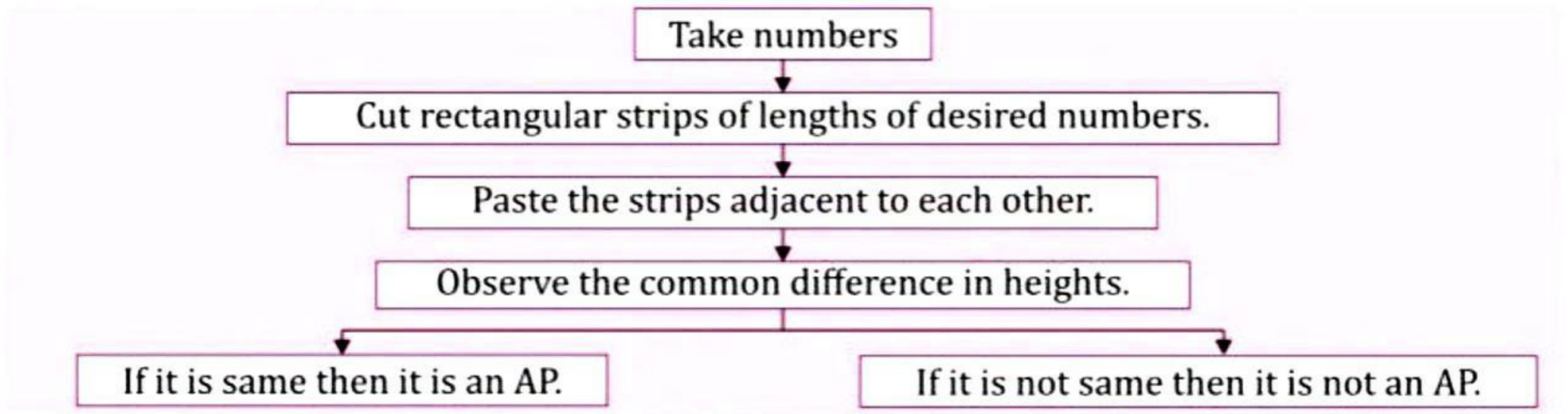
Activity time

Verify experimentally whether the following sequences are AP or not.

(i) 2, 4, 6, 8, 10 **(ii)** 3, 5, 6, 7, 11

(iii) 1, 5, 9, 13, 17 **(iv)** 4, 7, 9, 10, 12

Activity at a Glance



VIVA VOCE

Q 1. What is the common difference for an AP?

Ans. The difference between a term and its predecessor is called as the common difference in an AP.

Q 2. s the sequence of odd natural numbers an AP?

Ans. Yes

Q 3. What does $l_n - l_{n-1}$ represent for an AP, where l_n and l_{n-1} represent consecutive terms of an AP?

Ans. Common difference

Q 4. Are the numbers 2, 4, 7, 10, 11 in AP?

Ans. No

Q 5. What is the common difference of a sequence of multiples of 4?

Ans. 4

MULTIPLE CHOICE QUESTIONS

Q 1. The nth term of an AP is:

(a) $a + (n-1)d$ (b) $a - (n-1)d$ (c) $a - (n + 1)d$ (d) None of these

Q 2. 20th term of the series 4, 7, 10,..... is:

(a) 51 (b) 59 (c) 61 (d) 62

Q 3. Which sequence forms an AP?

(a) $3, 3 + \sqrt{2},\ 3 + 2\sqrt{2}$ (b) $3, 3 + \sqrt{2},\ 3 + 2$

(c) $3, 3 + \sqrt{2},\ 3 - 2\sqrt{2}$ (d) None of these

Q 4. If $a = 7$ and $d = 3$, then a_8:

(a) 27 (b) 26 (c) 25 (d) 28

Q 5. The 30th term of the AP 10, 7, 4 is:

(a) 97 (b) 77 (c) −77 (d) −87

Answer Key

1.(a)	2.(c)	3.(a)	4.(d)	5.(c)