Activity - 4 $\left(25/11/13\right)$

Arithmetic Progression - I

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

Pre-requisite knowledge

1. Definition of an arithmetic progression

Procedure
1. Take a given sequence of numbers say $a_1, a_2, a_3 \ldots$.
2. Cut a rectangular strip from a coloured paper of width $k = 1$ cm (say) and length a_1 cm.
3. Repeat this procedure by cutting rectangular strips of the same width $k = 1$cm and lengths $a_2, a_3, a_4, \ldots$ cm.
4. Take 1 cm squared paper and paste the rectangular strips adjacent to each other in order.

A] Let the sequence be 1, 4, 7, 10, ...
Take strips of lengths 1 cm, 4 cm, 7 cm and 10 cm, all of the same width say 1 cm. Arrange the strips in order as shown in Fig 2(a). Observe that the adjoining strips have a common difference in heights. (In this example it is 3 cm.)

B] Let another sequence be 1, 4, 6, 9, ...
Take strips of lengths 1 cm, 4 cm, 6 cm and 9 cm all of the same width say 1 cm. Arrange them in an order as shown in Fig 2(b). Observe that in this case the adjoining strips do not have the same difference in heights.

So, from the figures, it is observed that if the given sequence is an arithmetic progression, a ladder is formed in which the difference between the heights of adjoining steps is constant. If the sequence is not an arithmetic progression, a ladder is formed in which the difference between adjoining steps is not constant.

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

Remark
The teacher may point out that in this activity taking width of the strips to be constant is not essential but convenient for visual simplicity of the ladder.

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