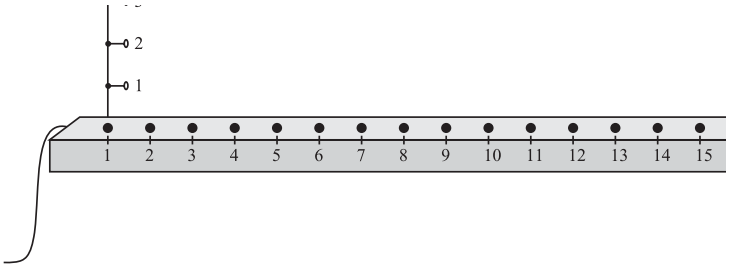

Activity 21

The square roots of natural numbers

Objective

Obtain a line segment corresponding to the square roots of natural numbers using graduated strips.

Pre-requisite knowledge

1. Knowledge of Pythagoras theorem, i.e., in any right angled triangle the square of the hypotenuse side is equal to the sum of the squares of the base and the perpendicular.
2. Expressing a given number as the sum of the squares of the two numbers.

Material Required

Two wooden strips, nails, thread.

Procedure

1. Take a wooden strip and make a scale on it (call this strip as A).
2. Make a hole on each mark as shown in Fig 21 (a).
3. Put a thread attached at the zeroth position on scale A.
4. Take another wooden strip and make a scale on it. Fix nails on it as shown in Fig 21 (b) (call this strip as B).
5. Now fix the scale B on horizontal scale A as shown in Fig 21 (c) i.e., scale A is fixed on scale B at point O.
6. For determining the line corresponding to $\sqrt{2}$:

   Insert scale B, in the hole 1 on scale A. Tie the thread to number one on scale B. This forms a triangle with base and height as one unit. Using Pythagoras theorem, the length of the thread is $\sqrt{2}$. Measure the length of the thread on scale A.

Observations

1. The students observe that the length corresponding to $\sqrt{2}$, is approximately 1.41 cm.
2. They also understand that, to determine the corresponding length for $\sqrt{13}$, they should insert scale B into scale A at 3 and tie the thread to 2 on scale B.
3. By using Pythagoras theorem, the length of the thread is $\sqrt{(3^2 + 2^2)} = \sqrt{13}$.

   They can measure it on scale A; which is 3.6 cm.

Learning Outcomes

1. The students learn to find corresponding line segment for square roots of natural numbers.
2. They can see these irrational numbers represented geometrically.

Remark

Teachers can take any irrational number and perform such activity for determining the line segment corresponding to the number.

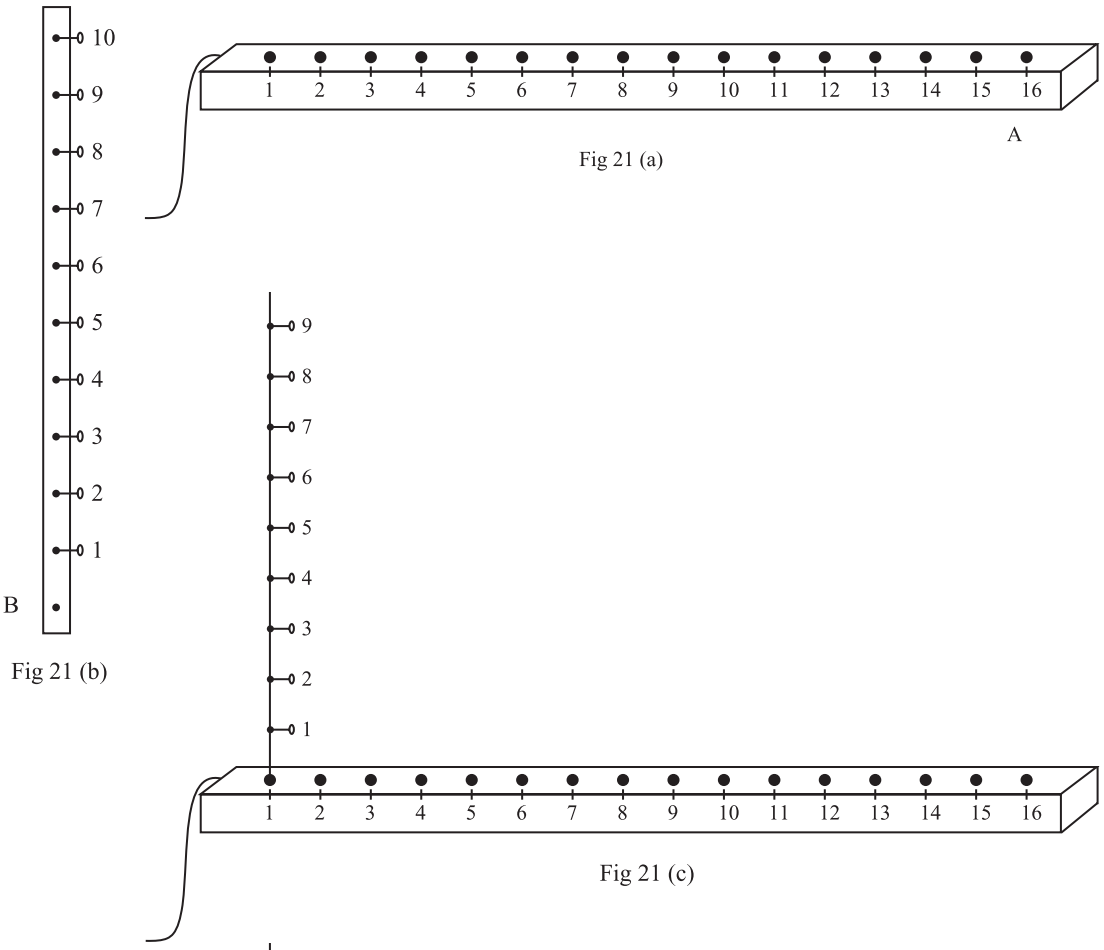

Fig 21 (a)

Fig 21 (b)

Fig 21 (c)

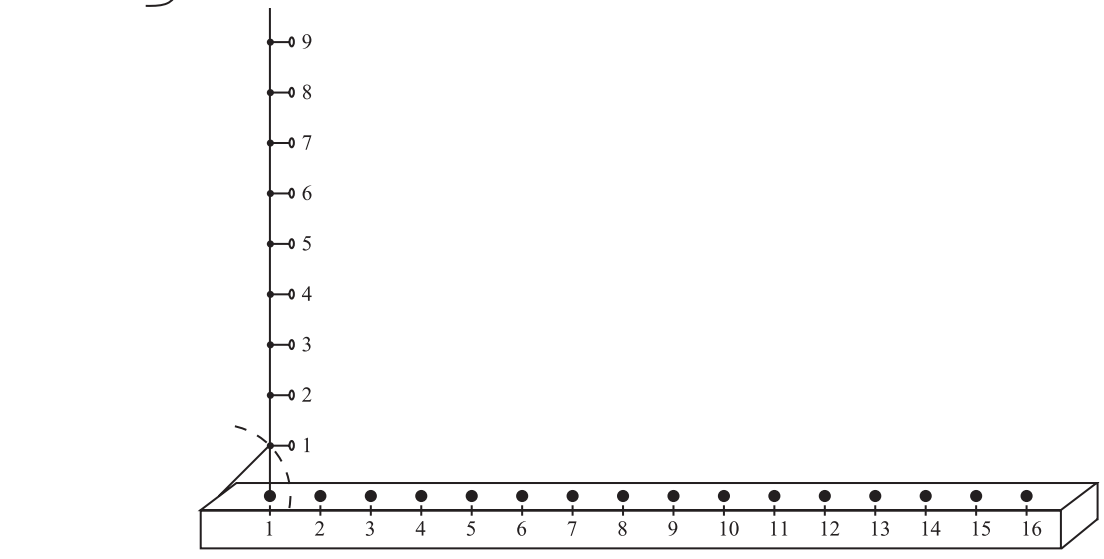

Fig 21 (d)