

ACTIVITY

Square Root Spiral

Objective

To make a square root spiral by using paper folding.

Material Required

Tracing paper, pencil, geometry box.

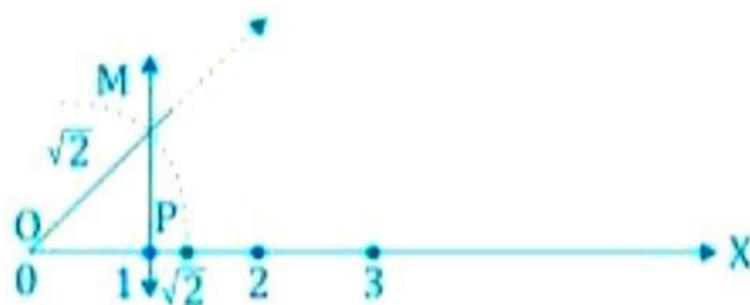
Theory

1. In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.
2. e.g., $\sqrt{2} = \sqrt{(1^2 + 1^2)}$. By using this Concept, we will represent irrational numbers on a number line by paper folding.

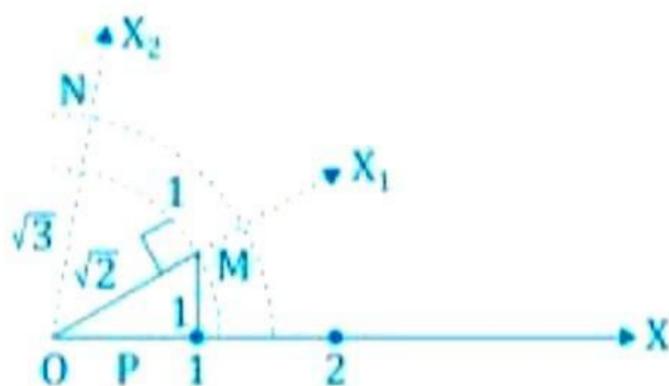
Procedure

To represent $\sqrt{2}$ on a number line.

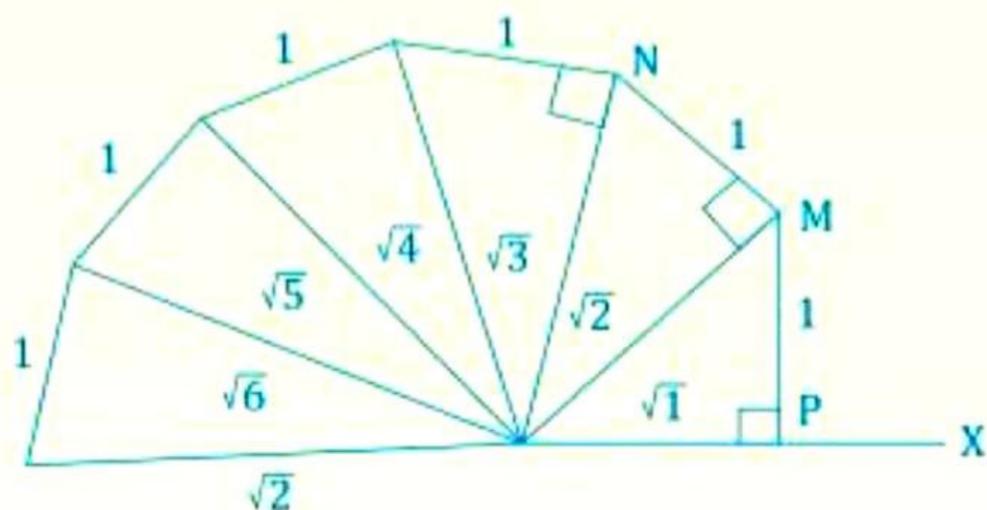
1. Draw a line OX on the tracing paper. Mark point O on one end and mark point 0, 1, 2, 3, ... at equal distances of 1 unit by paper folding.
2. Fold the paper along the line that passes through the point marked '1' and perpendicular to the line OX, i.e., fold the paper in such a way that point 'O' coincides with point '2'. Make a crease and unfold it. From the point marked '1', draw a line of length 1 unit moving along the crease. Mark the point as M such that PM = 1 unit. Join OM, clearly $OM = \sqrt{2}$ units.



3. Fold the paper along the line (fold on point M in such a way that point O joined with any point lie on OX_1) that passes through point M and perpendicular to OM at M. Make a crease and unfold it. From the point, M, draw a line of 1 unit moving upward, along the crease. Mark the point as N such that $MN = 1$ unit. Join ON, where $ON = \sqrt{3}$.



4. Keep this process continues to get $\sqrt{4}, \sqrt{5}, \sqrt{6}, \dots, \dots, \dots$



Result

In this way, we get a square root spiral pattern by using paper folding.

Learning Outcome

On the same plane, different irrational numbers can be represented on the number line by paper folding method.

By using Pythagoras' theorem students will be able to construct a square root spiral by paper folding method.

Activity Time

Represent square root of 7 and 9 by constructing a square root spiral.

Viva Voce

Q1. Define a rational number.

Ans: A number that can be expressed in the form of p/q , where $q \neq 0$ and p, q are integers, is called a rational number.

Q2. Define an irrational number.

Ans: A number that cannot be expressed in the form of p/q , where $q \neq 0$ and p, q are integers, is called an irrational number.

Q3. Define a real number.

Ans: A number that may be either rational or irrational is called a real number.

Q4. How many rational and irrational numbers lie between any two real numbers?

Ans: There are infinite rational and irrational numbers that lie between any two real numbers.

Q5. In which triangle, Pythagoras theorem is applicable?

Ans: Right-angled triangle.

Q6. Give some examples of irrational numbers.

Ans: Some examples of irrational numbers are $\sqrt{5}, 3 - \sqrt{7}, 2\pi$ etc.

Q7. Can we represent the reciprocal of zero on the number line?

Ans: No, because reciprocal of zero is an undefined term, so we cannot represent it on the number line.

Q8. Is it possible that we make a square root spiral of negative numbers?

Ans: No.

Multiple Choice Questions

- Q 1.** A rational number between $\frac{-2}{3}$ and $\frac{3}{2}$ is:
(a) $\frac{12}{5}$ (b) $\frac{5}{12}$ (c) $\frac{-4}{5}$ (d) $\frac{5}{4}$
- Q 2.** The simplest form of a rational number $\frac{177}{413}$ is:
(a) $\frac{7}{13}$ (b) $\frac{2}{59}$ (c) $\frac{3}{7}$ (d) $\frac{3}{5}$
- Q 3.** The vulgar fraction of $3.\overline{13}$ is given by:
(a) $\frac{99}{310}$ (b) $\frac{310}{99}$ (c) $\frac{101}{11}$ (d) $\frac{29}{9}$
- Q 4.** The irrational number between 2 and $\sqrt{5}$ is:
(a) $2\sqrt{5}$ (b) $2\sqrt{\sqrt{5}}$ (c) $(10)^{\frac{1}{2}}$ (d) $\sqrt{2\sqrt{5}}$
- Q 5.** If m and n are non-negative integers, the denominator of a terminating decimal is of the form:
(a) $2^n \times 3^n$ (b) $3^m \times 5^n$ (c) $2^n \times 3^m$ (d) $2^m \times 5^n$
- Q 6.** The product of irrational numbers $5\sqrt{3}$ and $21\sqrt{3}$ is given by:
(a) 325 (b) 315 (c) 335 (d) 345
- Q 7.** The difference between a rational number and an irrational number is:
(a) May be a rational number. (b) Always a rational number.
(c) An irrational number. (d) An integer.
- Q 8.** Rationalization of $\frac{1}{\sqrt{7}-2}$ is:
(a) $\frac{1}{2}\sqrt{7} + \frac{2}{3}$ (b) $\sqrt{7} + \frac{2}{3}$ (c) $\frac{1}{3}\sqrt{7} + \frac{1}{3}$ (d) $\frac{1}{3}\sqrt{7} + \frac{2}{3}$
- Q 9.** The simplest form of the expression $\left(\frac{625}{81}\right)^{-1/2}$
(a) $\frac{125}{27}$ (b) $\frac{27}{125}$ (c) $\frac{9}{25}$ (d) $\frac{25}{9}$
- Q 10.** The fifth root of 243 is given by:
(a) 9 (b) -9 (c) -3 (d) 3

ANSWER KEY

1.(b) 2.(c) 3.(b) 4.(d) 5.(d) 6.(b) 7.(c) 8.(d) 9.(c) 10.(d)