

Lab Manual in Mathematics

Class – 9th

Activity Book

PSEB

Scheme of Evaluation

Time : 2 hours

Year-end Evaluation of activities : 10 marks

The break up of 10 marks could be as under :

- (i) Evaluation of two activities out of four : $4 \times 2 = 8$ marks
- (ii) Viva : 2 marks

List of activities

1. To represent irrational number ($\sqrt{2}, \sqrt{3}, \sqrt{5}, \dots \dots \dots$) so on on the number line.
2. To draw the graph of given a point on graph paper when its coordinate are given.
3. To find the relationship between the angles made by transversal with two parallel lines.
4. To verify that sum of any two sides of a triangle is always greater than the third side.
5. To find the area of any triangle, using a geoboard.
6. To verify the mid point theorem for a triangle, using paper cutting and pasting.
7. To obtain a parallelogram by cutting and a folding paper.
8. To show that the area of a parallelogram is product of its base and height, using paper cutting and pasting.
9. To show that the figure obtained by joining the mid points of the consecutive sides of any quadrilateral is a parallelogram.
10. To carry out the following paper folding activities : Finding –
 - the mid point of a line segment.
 - the perpendicular bisector of a line segment.
 - the bisector of an angle.
 - the median of a triangle.

Important :

The year-end assessment of practical skills will be done during an organized session in small groups as per the convenience of the schools. All the activities given in the document, every student may be asked to complete these activities during the academic year. He/she should be asked to maintain a proper activity record for this work done during the year. The activities should be preferably carried out individually and not in a group as it helps the each student to build interest and confidence in learning the subject.

With Best Wishes

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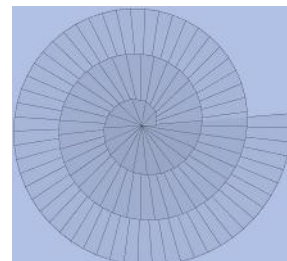
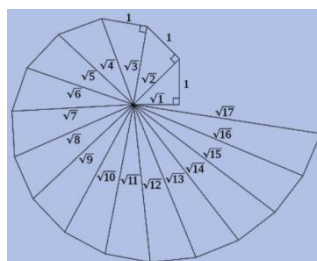
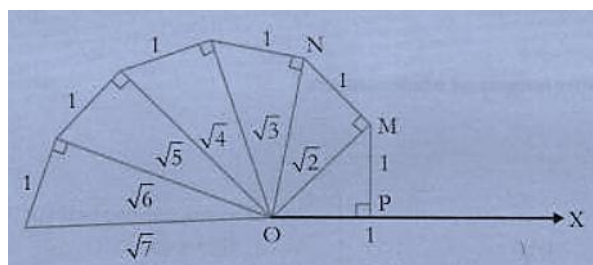
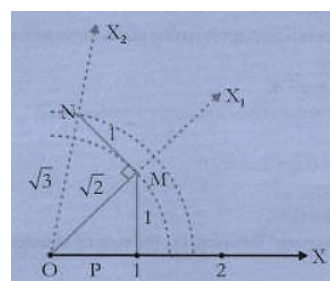
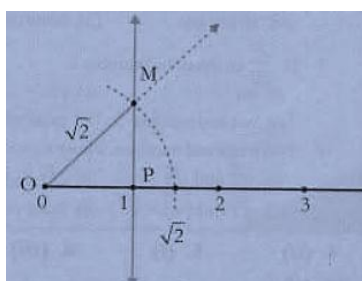
ACTIVITY -1

To represent irrational number($\sqrt{2}, \sqrt{3}, \sqrt{5}, \dots \dots \dots$ so on .) on the number line.

Pre-requisite knowledge : In right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Material required : Paper, pencil, gum, geometry box, scissor etc.

Procedure : Perform the activity as shown in following diagrams with help of your Math Teacher.



Learning Outcome : (i) It is possible to represent all irrational numbers on number line.

(ii) We get a square root spiral pattern in this way if we represent other irrational number on number line.

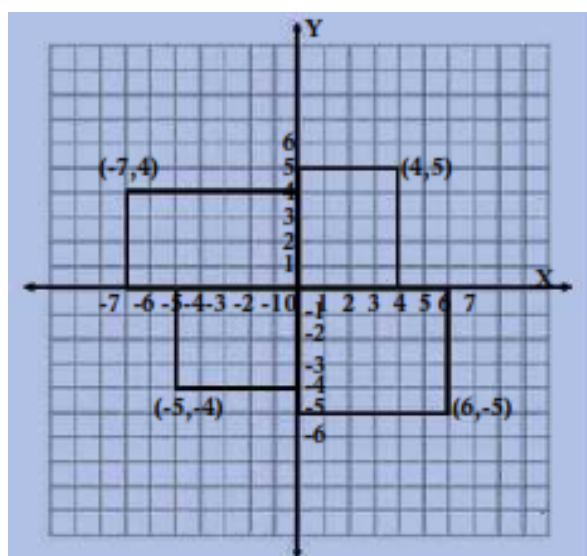
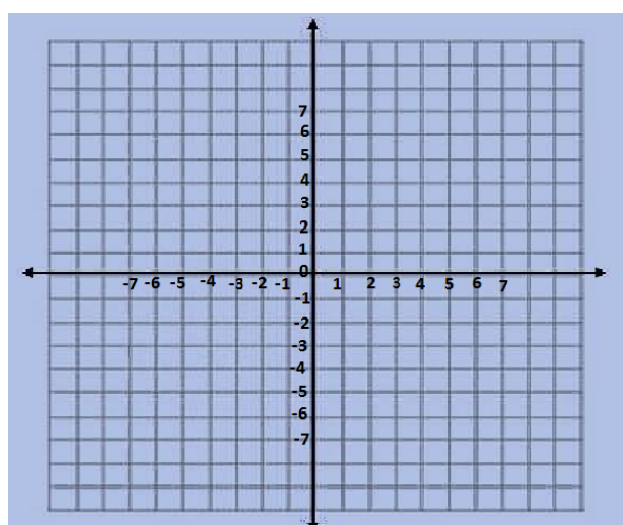
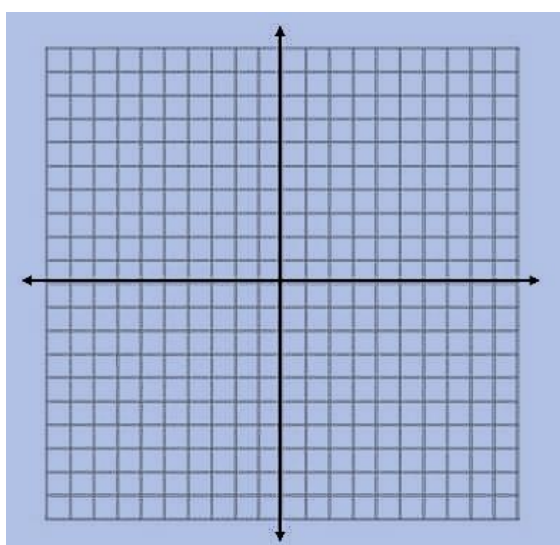
ACTIVITY -2

To draw the graph of given a point on graph paper when its coordinate are given.

Pre-requisite knowledge : The students must be known about Cartesian system

Material required : Graph paper, pencil, scale, geometry box etc.

Procedure : Perform the activity as shown in following diagrams with help of your Math Teacher.



Learning Outcome : We are now able to locate the position of a point on graph paper as per given coordinates.

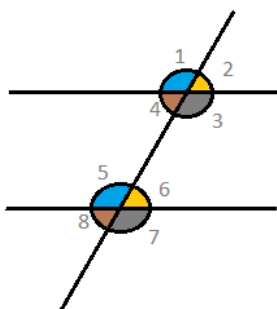
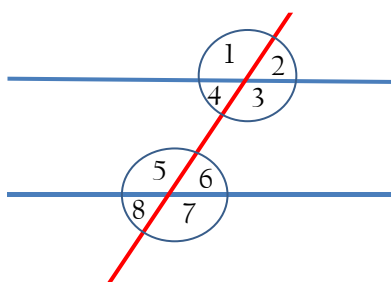
ACTIVITY -3

To find the relationship between the angles made by transversal with two parallel lines.

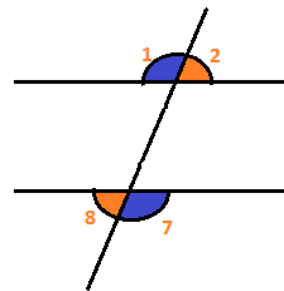
Pre-requisite knowledge : Students must be known about corresponding, Alternate angles and Interior angles on same side etc.

Material required : Paper, pencil, gum, geometry box, scissor etc.

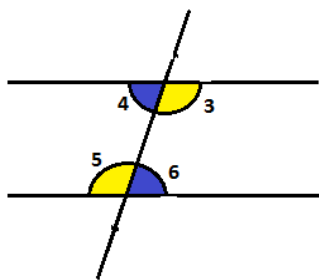
Procedure : Perform the activity as shown in following diagrams with help of your Math Teacher.



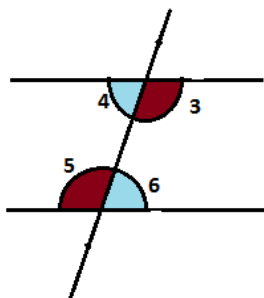
Same coloured angles are corresponding angles



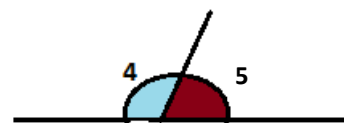
Same Coloured angles are Exterior Alternate Angles



Same Coloured angles are Interior Alternate Angles



Different Coloured angles are interior angles on same side



Sum of interior angles on same side = 180°

Observation : Corresponding angles are equal, interior alternate angles are equal, exterior alternate angles are equal and sum of the interior angles on same side is 180° .

Learning Outcome : By means of activity, we learn that angle made a transversal with two parallel lines has been found.

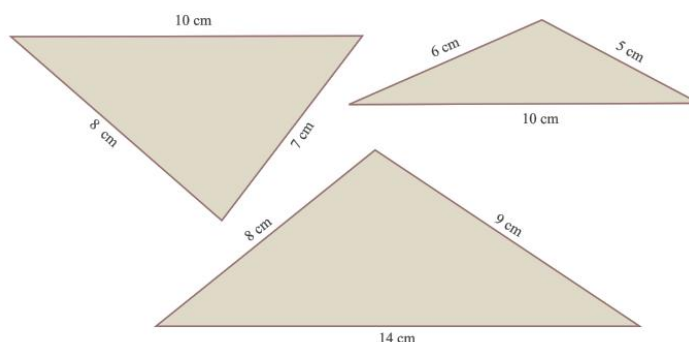
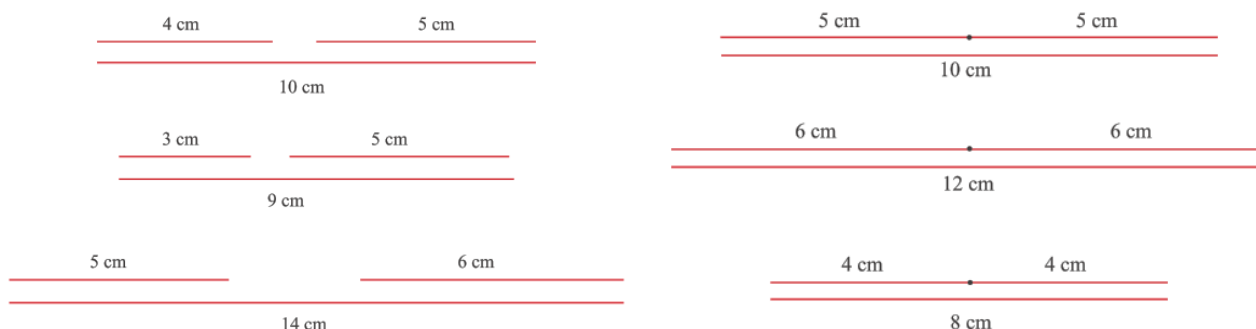
ACTIVITY -4

To verify that sum of any two sides of a triangle is always greater than the third side.

Pre-requisite knowledge : Measurements and comparison of line segments.

Material Required : Chart paper, pencil, ruler and broom sticks.

Procedure : Let sticks of different lengths (as shown in figs below) and arranged them as below :



Observations : Observe the lengths that form the triangles in above Figures. The students will notice that a triangle is possible only if the sum of any two sides of a triangle is greater than the third side.

Learning Outcomes : The students learn that with any three line segments, you cannot always construct a triangle. The given lengths must satisfy that the sum of any two sides of a triangle is always greater than the third side.

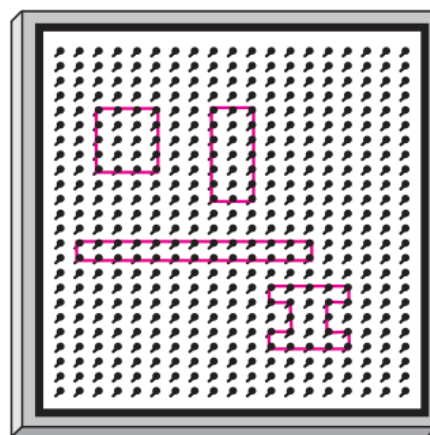
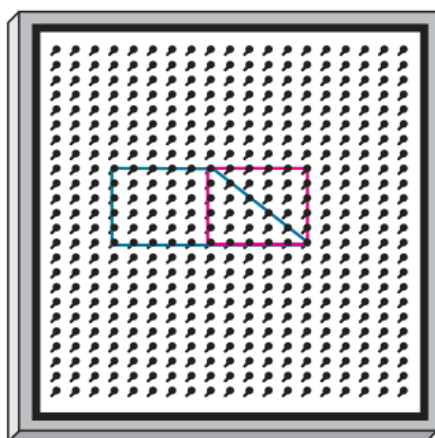
ACTIVITY -5

To find the area of any triangle, using a geoboard.

Pre-requisite knowledge : Basic understanding about names and properties of the shapes.

Material required : Wooden board , nails with small heads, hammer, rubber bands, marking pen.

Procedure : Take a wooden square base. Mark an array of 10×10 dots on this wooden base. Fix nails on these equidistant dots as shown in Fig. Practice making various geometric figures using rubber bands on the geoboard.



Number of complete square inside shape = a

Number of squares greater than half inside shape = b

Number of half squares inside shape = c

$$\text{Area of Shape} = a + b + \frac{1}{2} \times c$$

Observations : Students observe that the area of any shape is equal to the number of unit squares in the space occupied by that shape.

Learning outcomes : Students learn the concept of area as number of unit squares in the space occupied by the shape.

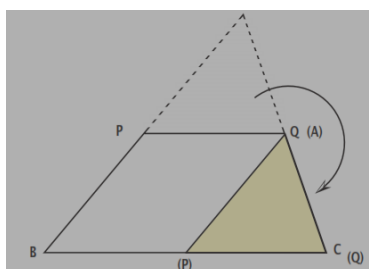
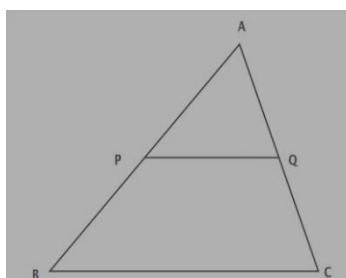
ACTIVITY -6

To verify the mid point theorem for a triangle, using paper cutting and pasting.

Pre-requisite knowledge : Two lines are parallel if for a transversal cutting them, the corresponding angles are equal.

Material Required : Coloured paper, scissors, gum, geometry box .

Procedure : Cut and paste as follow :



Observations : P is seen to be the mid point of BC by paper folding method .

Learning Outcome : Line segment joining the mid points of any two sides of a triangle is parallel to the third side and is equal to half of it.

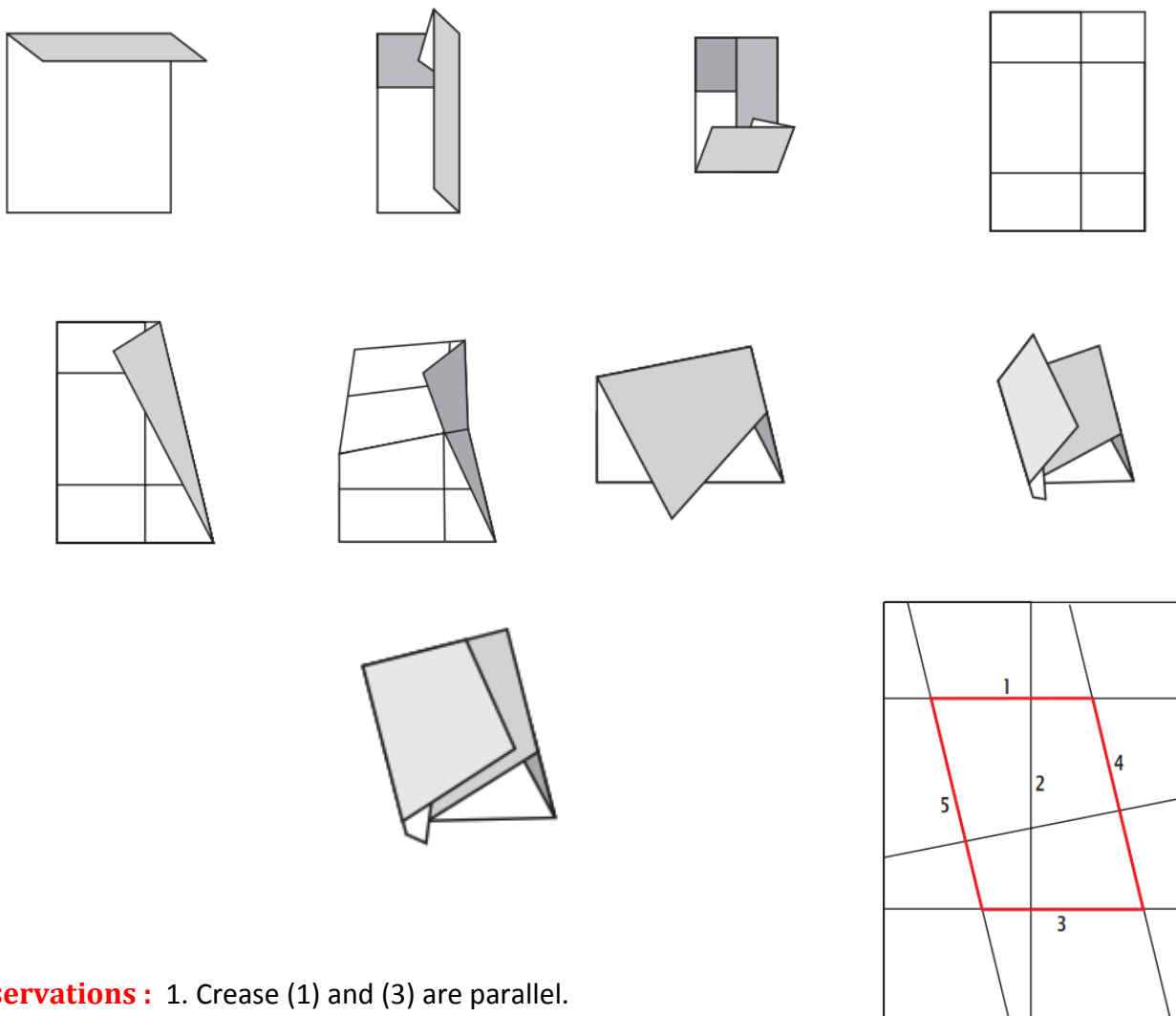
ACTIVITY -7

To obtain a parallelogram by cutting and a folding paper.

Pre-requisite knowledge : To know that, a parallelogram is a quadrilateral in which the pair of opposite sides are parallel.

Material required : Rectangular sheet of paper

Procedure : Take a rectangular sheet of paper and fold it as shown below :



- Observations :**
1. Crease (1) and (3) are parallel.
 2. Crease (4) and (5) are parallel.
 3. The enclosed figure is parallelogram.

Learning outcomes : The students learn to make a line parallel to a given line and a parallelogram by paper folding.

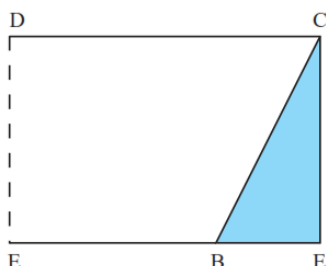
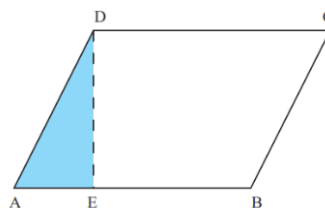
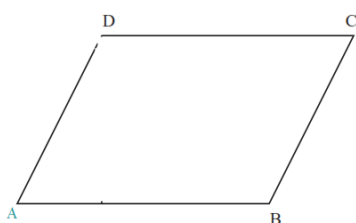
ACTIVITY -8

To show that the area of a parallelogram is product of its base and height, using paper cutting and pasting.

Pre-requisite knowledge : Formula for the area of a rectangle

Material Required : Glazed paper, pencil, a scissors, gum.

Procedure : Make a parallelogram by paper folding and cut out the parallelogram with the help of a scissors as shown in following figs :



Observations : Area of parallelogram ABCD = area of rectangle $EE'CD$ = (length \times breadth) = $EE' \times CE'$

\therefore Area of parallelogram = base \times height.

Learning Outcomes : We learn that geometrically how the formula for the area of parallelogram (base \times height) works.

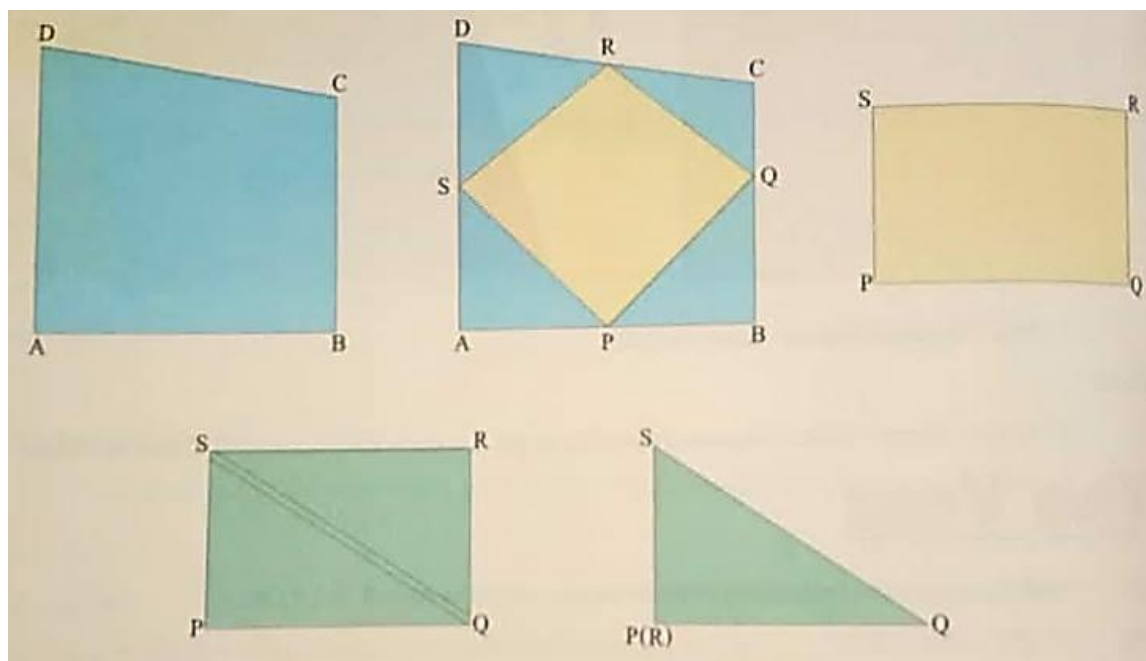
ACTIVITY -9

To show that the figure obtained by joining the mid points of the consecutive sides of any quadrilateral is a parallelogram.

Pre-requisite knowledge : If in a quadrilateral a pair of opposite sides are equal and parallel, then it is a parallelogram.

Material required : Coloured paper, a pair of scissors, gum.

Procedure : Proceed activity as shown below :



Observations : Since $PQ = SR$ and $SP = RQ$ so PQRS is a parallelogram.

Learning outcome : We learn that a parallelogram can be obtained from any quadrilateral by joining the mid-points of its sides.

ACTIVITY -10

To carry out the following paper folding activities : Finding -

- the mid point of a line segment.
- the perpendicular bisector of a line segment.
- the bisector of an angle.
- the median of a triangle.

Pre-requisite knowledge : Meaning of the basic geometrical terms such as perpendicular bisector, angle bisector and median.

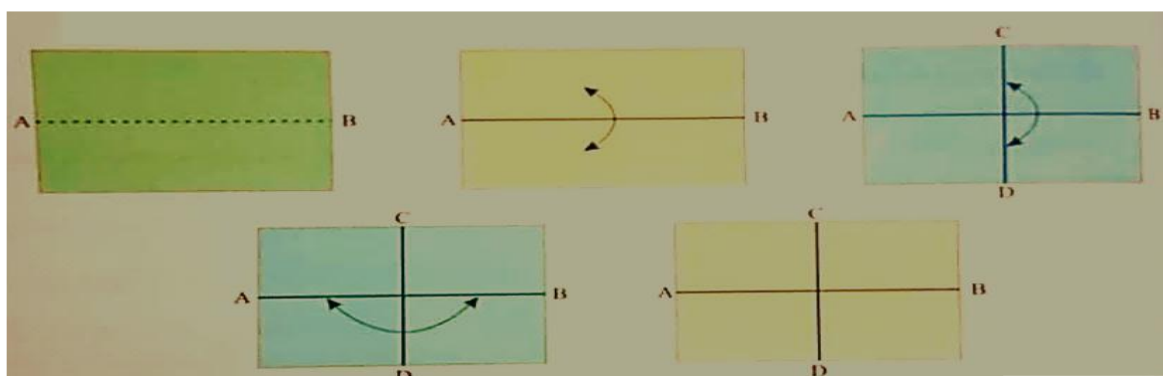
Materials required : Rectangular sheets of coloured paper, a pair of scissors.

Procedure :

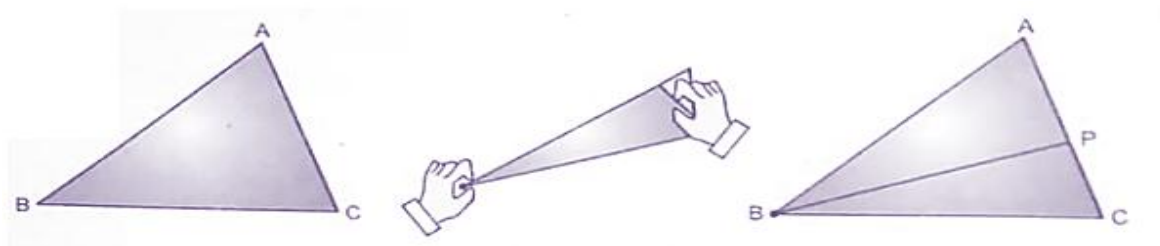
To find the mid point of a line segment :



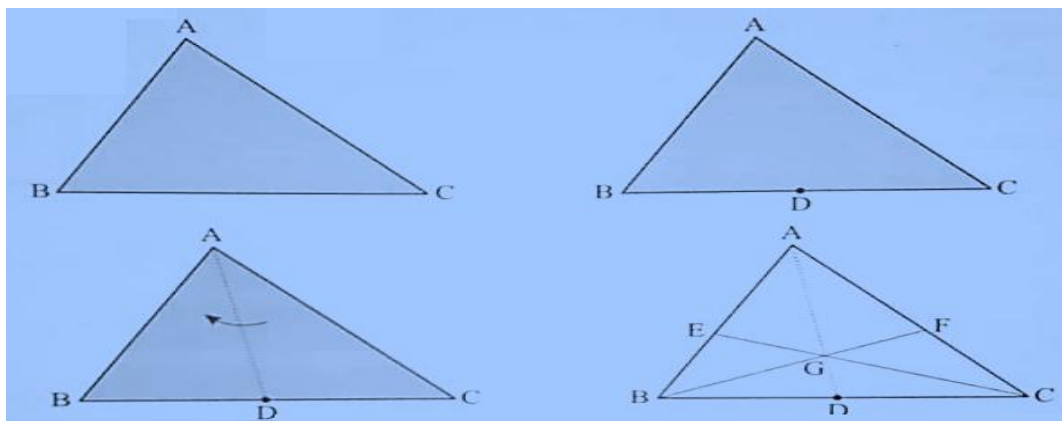
To find the perpendicular bisector of a line segment :



To find the bisector of an angle :

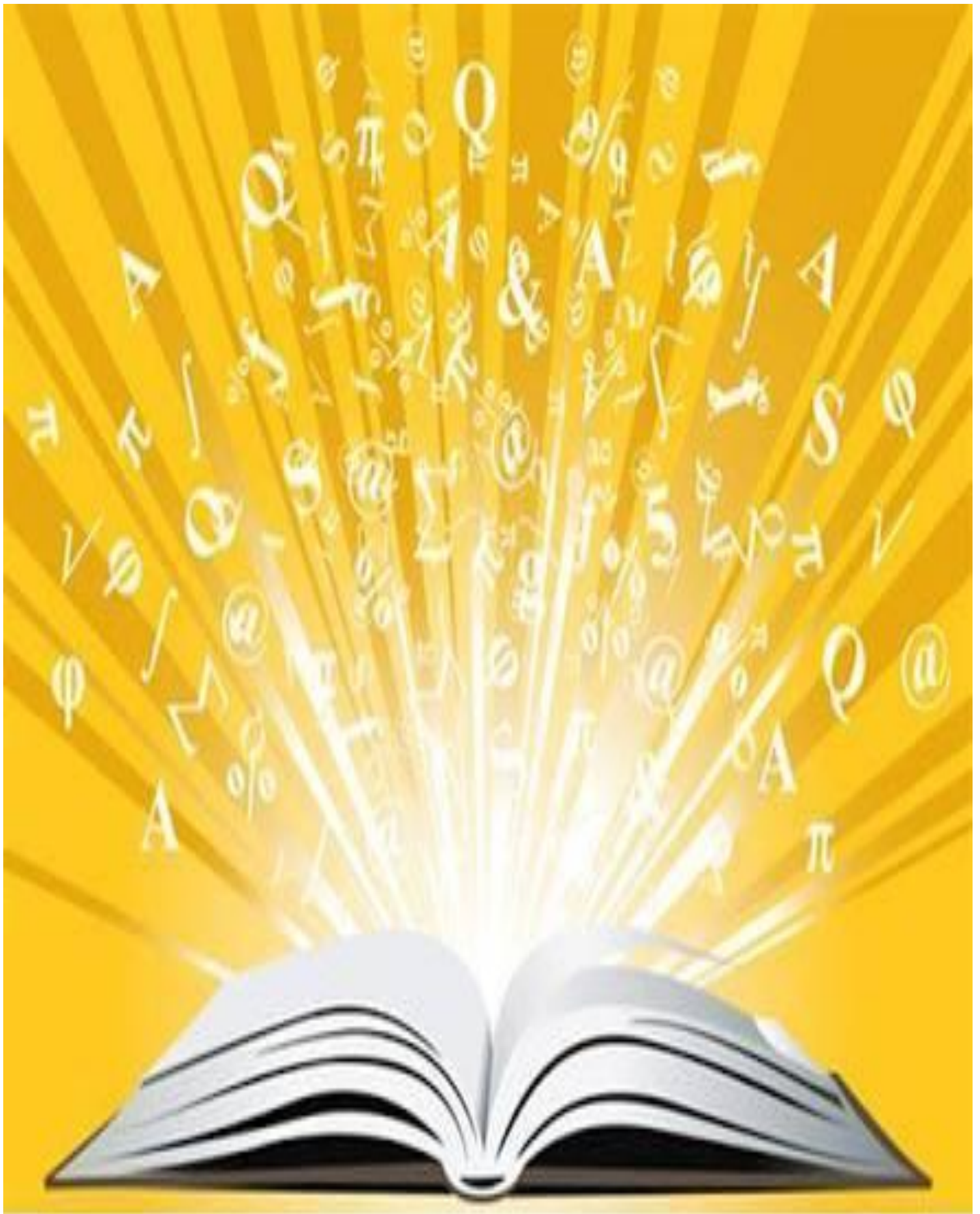


To find the median of a triangle :



Observations : In some cases the students may like to verify the results obtained in this activity by actual measurement.

Learning Outcomes : Students are exposed to the basic features of paper folding. They will appreciate that several geometrical constructions can be carried out very simply by paper folding.



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