Objective

(A) To find the mid-point of a line segment and the perpendicular bisector of a line segment by using paper folding.

Material Required

Tracing papers, geometry box, a pair of scissors.

Theory

Definition of mid-point and perpendicular bisector.

Definition of Mid-point: A point that divides the line segment into two equal parts is known as a mid-point of a line segment. M is the mid-point of AB.

Concept of perpendicular bisector: A-line which is perpendicular to the given line segment and divides into two equal parts is known as the perpendicular bisector of the given line segment.
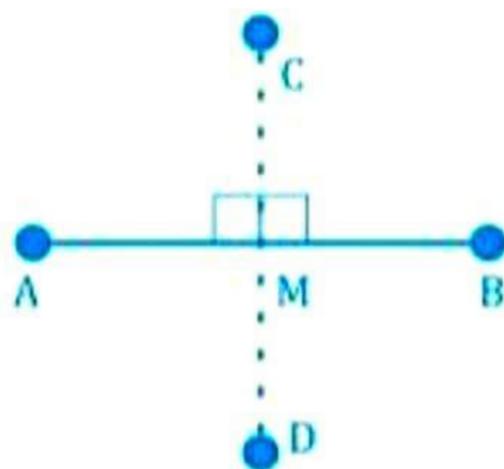
(CD ins perpendicular bisector of AB)

Procedure

1. Take a square sheet of tracing paper and draw a line segment PQ of the desired length as shown in fig. (i).
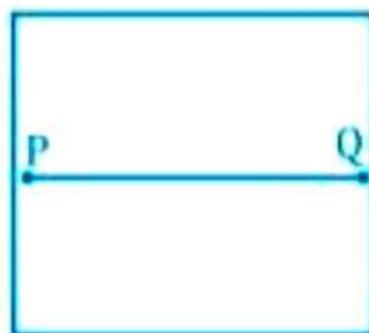

fig. (i)

2. Fold this sheet along the middle in such a way that point P falls on point Q fig. (ii).
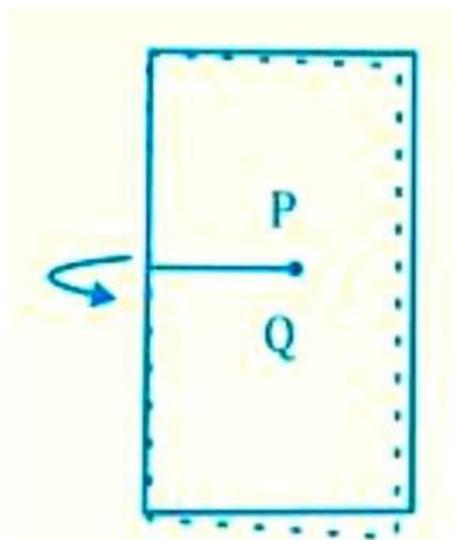
fig. (ii)

3. Press the paper properly, so that a crease is obtained. Unfold the paper and draw the dotted line over the crease.

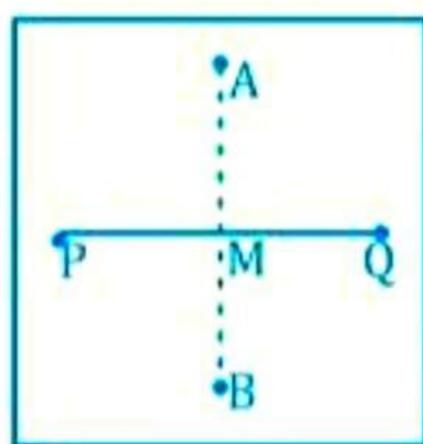   Name its AB as shown. Name the point of intersection of line AB and PQ as M fig. (iii).

fig. (iii)

Observation

This point M is the mid-point of line segment PQ and the crease obtained is the perpendicular bisector of PQ.

Objective

(B) To draw a perpendicular at a point lying on the line segment and from a point lying outside the line segment.

Material Required

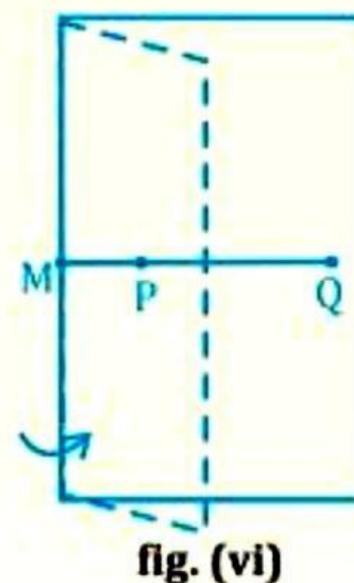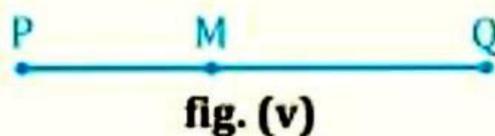Tracing papers, geometry box, a pair of scissors.

Procedure

1. Take a piece of tracing paper and draw a line segment PQ of the desired length as shown in fig. (iv).
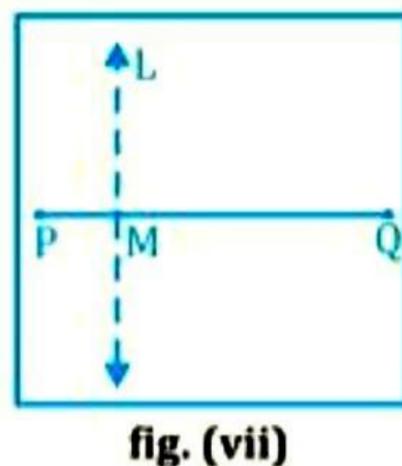

fig. (iv)

2. Take any point M on the line segment PQ, now fold the paper in such away that PM falls on MQ as shown in fig. (v) and fig. (vi) and press the paper.

fig. (v)

fig. (vi)

3. Open the paper, a crease is formed at M. Draw a dotted line on this crease with pencil and name it as ML fig.(vii).

fig. (vii)

In the same way, a perpendicular can be drawn from the point outside the line segment. Hence point M lies outside the line segment PQ.

4. On tracing paper, as shown fig.(viii). Fold the paper along line PQ in such a way that its two opposite corners come close together as shown in fig.(ix). Press it and mark the image of point M. Name its M', unfold the paper.

5. Join M and M'. MM' is perpendicular to PQ fig.(x).

fig. (viii)

fig. (ix)

fig. (x)
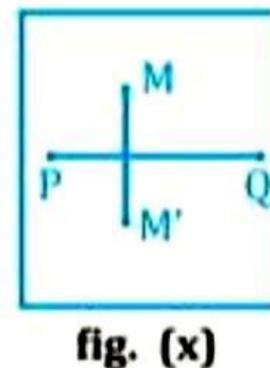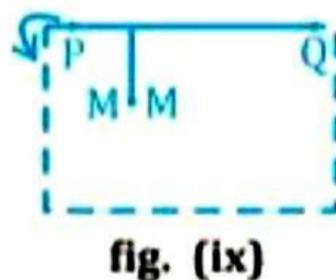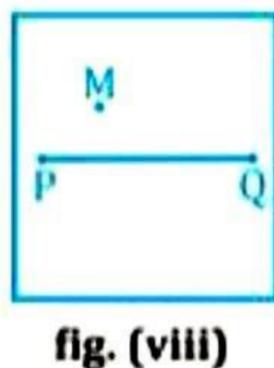
Result

In this way, we find the mid-point of a line segment and perpendicular bisector of a line segment.

Learning Outcome

By paper folding activity, students will be able to find the mid-point, perpendicular bisector of any line segment and draw a perpendicular from any point lying on or outside the line segment.

Activity Time

1. Take any triangle and draw perpendiculars from the opposite vertex to corresponding side of a triangle.
2. Take any triangle and find the mid-points of three sides by paper folding activity.
3. Take any quadrilateral and find the mid-points of four sides by paper folding activity.

Viva Voce

Q1. Is it possible to find the mid–point of a line of 9.7 cm with a ruler?

Ans: No. Because the least count of the ruler is 0.1 cm.

Q2. Which of the following has two end points?

Ans: A line segment

Q3. If a line segment of length 10 cm is divided by a perpendicular bisector, then what will be the length of each part of the line segment?

Ans: 5 cm.

Q4. When constructing a line parallel to a given line, you will be?

Ans: Copying an angle.

Q5. What does the word bisect mean?

Ans: To cut something into two congruent pieces or in half.

Q6. What do you mean by a centroid?

Ans: The centroid is the center point of the object.

Q7. Which of the following has a definite length?

Ans: Line segment

Multiple Choice Questions

Q 1. Triangle formed by joining the mid–points of an equilateral triangle is a/an:

(a) Right triangle   (b) Isosceles triangle   (c) Equilateral triangle   (d) None of these

Q 2. A line segment joining mid–points of any two sides in parallel to the third side in the triangle and half in the length of the third side by the theorem of:

(a) Proportionality theorem   (b) Mid–point theorem

(c) Pythagoras theorem   (d) None of these

Q 3. If M is mid–point of hypotenuse PR of a right-angled triangle PQR right-angled at Q then:

(a) $MP = MR$ (b) $MQ = MR$ (c) $MQ = MP$ (d) All of (a), (b), (c)

Q 4. The figure formed by joining the mid–points of the sides of a quadrilateral ABCD, taken in order, is a square only if,

(a) ABCD is a rhombus

(b) Diagonals of ABCD are equal

(c) Diagonals of ABCD are equal and perpendicular

(d) Diagonals of ABCD are perpendicular

Q 5. D and E are the mid–points of the sides AB and AC respectively of △ ABC. DE is produced to F. To prove that CF is equal and parallel to OA, we need an additional:

(a) ∠DAE = ∠EFC   (b) AE = EF   (c) DE = EF   (d) ∠ADE = ∠ECF

Q 6. The quadrilateral formed by joining the mid–points of the sides of a quadrilateral PQRS,

taken in order, is a rectangle, if:

(a) PQRS is a rectangle

(b) PQRS is a parallelogram

(c) Diagonals of PQRS are equal

(d) Diagonals of PQRS are equal

Q 7. **The figure obtained by joining the mid–points of the sides of a rhombus, taken in order is:**

(a) A rhombus   (b) A rectangle   (c) A square   (d) Any parallelogram

Q 8. **D and E are the mid–points of the sides AB and AC of △ ABC and O is any point on side BC. O is joined to A. If P and Q are the mid–points of OB and OC respectively, then △ EQP is:**

(a) A square   (b) A rectangle   (c) A rhombus   (d) A parallelogram

Q 9. **Quadrilateral formed by joining the mid–points of any quadrilateral is always:**

(a) Rectangle   (b) Square   (c) Rhombus   (d) Parallelogram

Q 10. **In a △ ABC, AB = 3 cm, BC = 4 cm and A = 5 cm. If D and E are mid–points of AB and BC respectively, then the length of DE is:**

(a) 1.5 cm   (b) 2 cm   (c) 2.5 cm   (d) 3.5 cm

ANSWER KEY

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