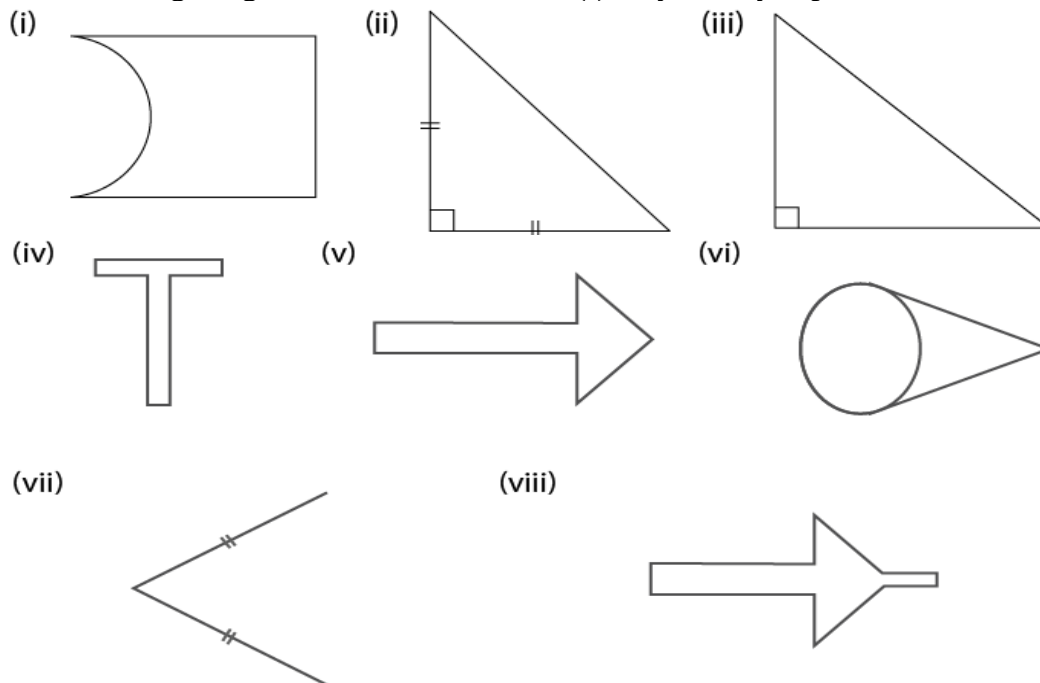


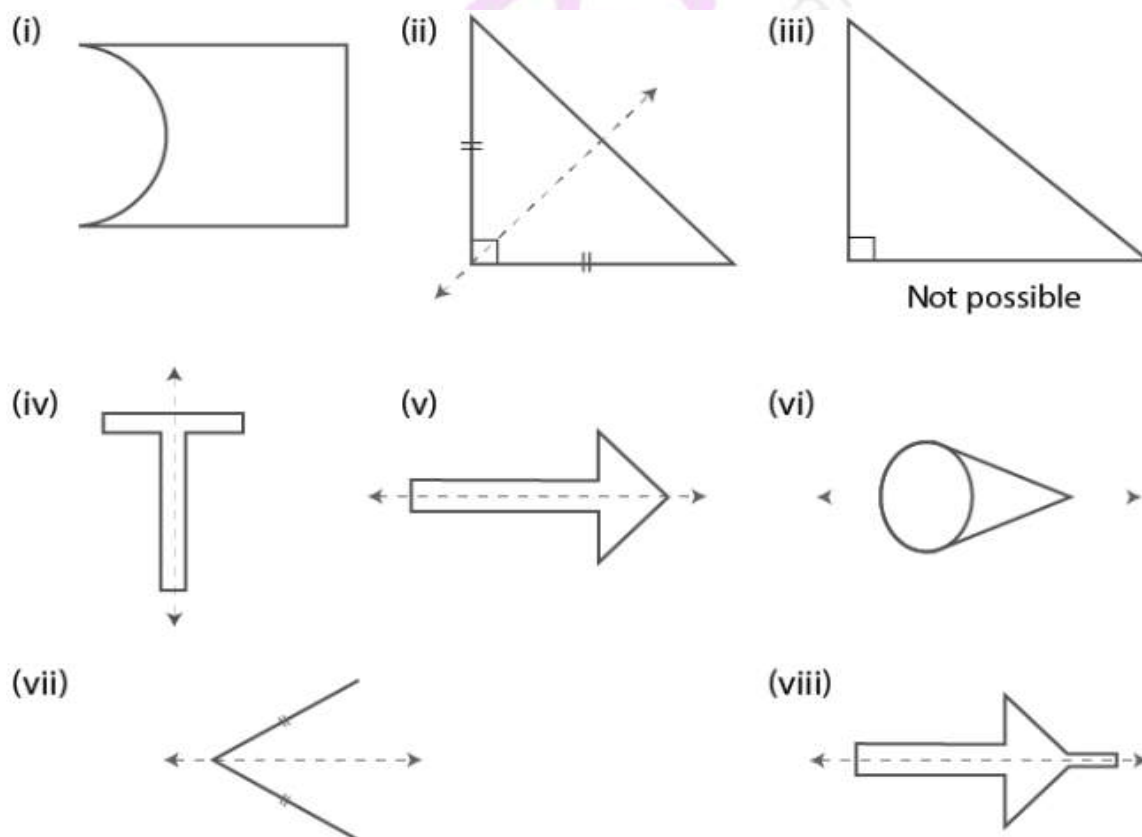
EXERCISE 17A

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1. For each figure, given below, draw the line (s) of symmetry, if possible:



Solution:



2. Write capital letters A to Z of English alphabet and in each case, if possible, draw the largest number of lines of symmetry.

Solution:

Yes, the line (s) of symmetry is possible in the alphabets mentioned below. It is not possible for other alphabets.



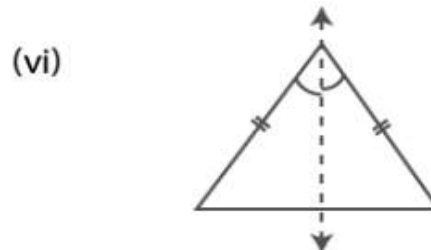
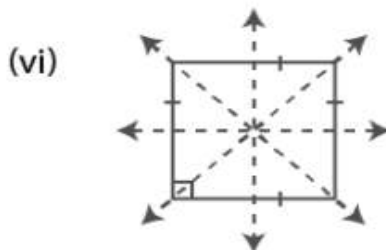
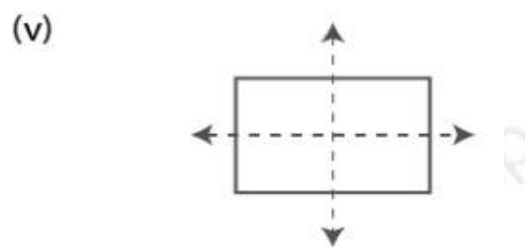
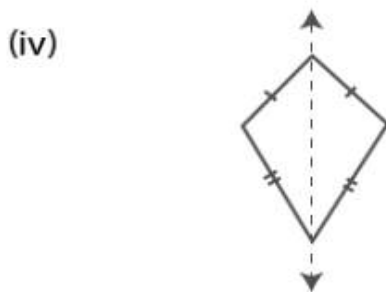
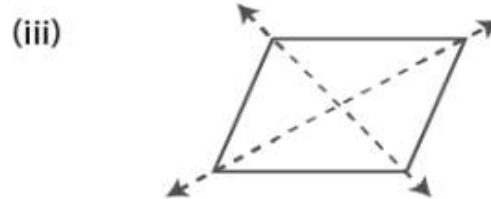
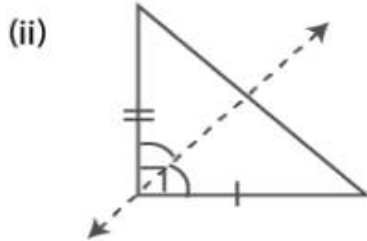
3. By drawing a free hand sketch of each of the following, draw in each case, the line (s) of symmetry, if any:

- a scalene triangle
- an isosceles right angled triangle
- a rhombus
- a kite shaped figure
- a rectangle
- a square

(vii) an isosceles triangle

Solution:

(i) Not possible



4. Draw a triangle with :

(i) no line of symmetry,

(ii) only one line of symmetry,

(iii) exactly two lines of symmetry,

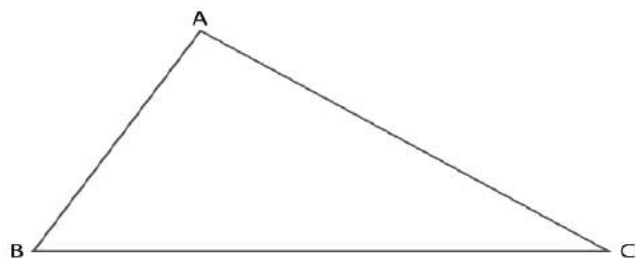
(iv) exactly three lines of symmetry,

(v) more than three lines of symmetry.

In each case, if possible, represent the line (s) of symmetry by dotted lines. Also, write the special name of the triangle drawn.

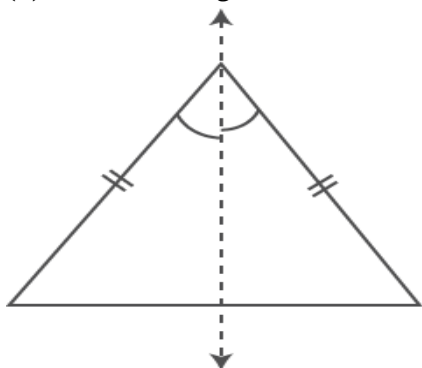
Solution:

(i) Scalene triangle has no line of symmetry.



Scalene triangle

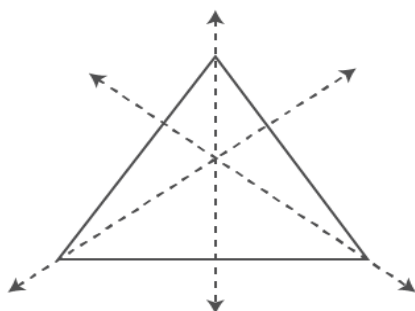
(ii) Isosceles triangle has one line of symmetry.



(Isosceles triangle)

(iii) Not possible.

(iv) Equilateral triangle has three lines of symmetry.



(Equilateral triangle)

(v) Not possible.

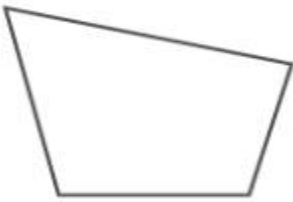
5. Draw a quadrilateral with :

- (i) no line of symmetry.**
- (ii) only one line of symmetry.**
- (iii) exactly two lines of symmetry.**
- (iv) exactly three lines of symmetry.**
- (v) exactly four lines of symmetry.**
- (vi) more than four lines of symmetry.**

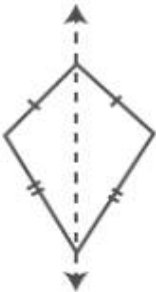
In each case, if possible, represent the line (s) of symmetry by dotted lines. Also, write the special name of the quadrilateral drawn.

Solution:

(i)

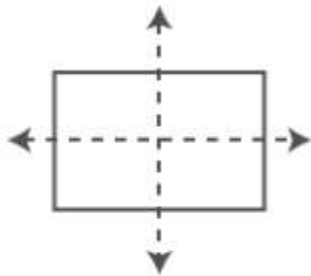


(ii)

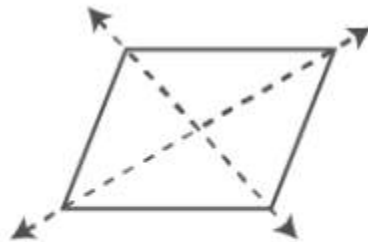


(Kite-shaped)

(iii)



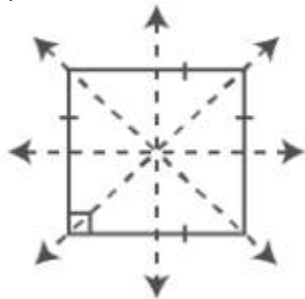
(Rectangle)



(Rhombus)

(iv) It is not possible.

(v)



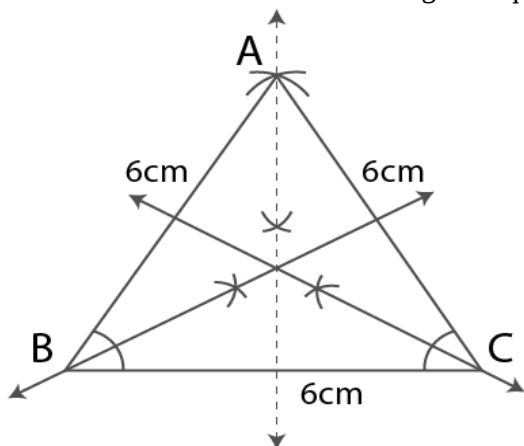
(vi) It is not possible.

6. Construct an equilateral triangle with each side 6 cm. In the triangle drawn, draw all the possible lines of symmetry.

Solution:

Steps of Construction

1. Construct a line segment $BC = 6$ cm.
 2. Taking B and C as centres and 6 cm radius construct two arcs which intersect each other at the point A.
 3. Now join AB and AC.
- $\triangle ABC$ is the required equilateral triangle.
4. Construct the angle bisectors of $\angle A$, $\angle B$ and $\angle C$ which are the lines of symmetry.
- These are three in number as the triangle is equilateral.

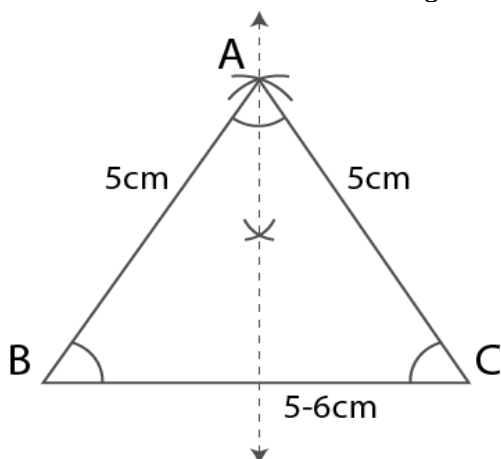


7. Construct a triangle ABC in which $AB = AC = 5$ cm and $BC = 5.6$ cm. If possible, draw its line (s) of symmetry.

Solution:

Steps of Construction

1. Construct a line segment $BC = 5.6$ cm.
 2. Taking B and C as centres and 5 cm radius construct two arcs which intersect each other at the point A.
 3. Now join AB and AC.
- $\triangle ABC$ is the required isosceles triangle.
4. Construct the bisector of $\angle A$ which is the line of symmetry.
- These are one in number as the triangle is isosceles.



8. Construct a triangle PQR such that $PQ = QR = 5.5$ cm and angle $PQR = 90^\circ$. If possible, draw its lines of symmetry.

Solution:

It is given that

angle $PQR = 90^\circ$

$\angle P = \angle R$

Since the opposite sides are equal we get

$\angle P + \angle R = 90^\circ$

Here $\angle P = \angle R = 90/2 = 45^\circ$

Steps of Construction

1. Construct a line segment $QR = 5.5$ cm.

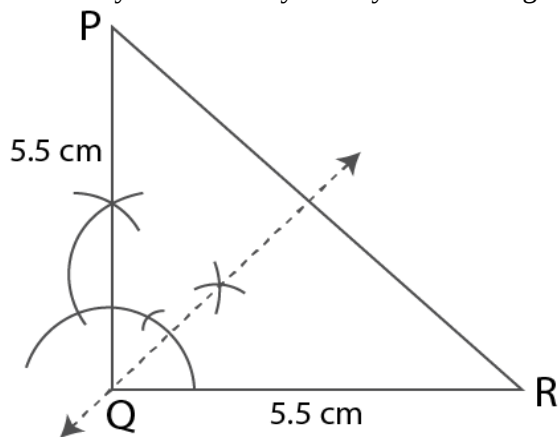
2. At the point Q construct a ray which makes an angle 90° and cut off $QP = 5.5$ cm.

3. Now join PR.

$\triangle PQR$ is an isosceles triangle.

4. Construct an angle bisector of $\angle PQR$ which is the line of symmetry.

It has only one line of symmetry as the triangle is isosceles.

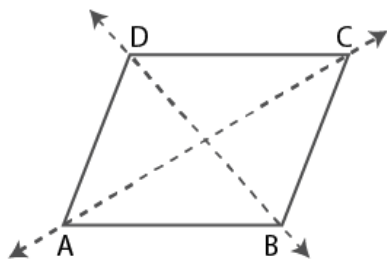


9. If possible, draw a rough sketch of a quadrilateral which has exactly two lines of symmetry.

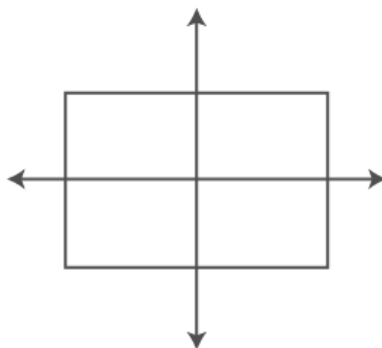
Solution:

It is given that the quadrilateral has exactly two lines of symmetry.

So it must be a rhombus or a rectangle.



Rhombus



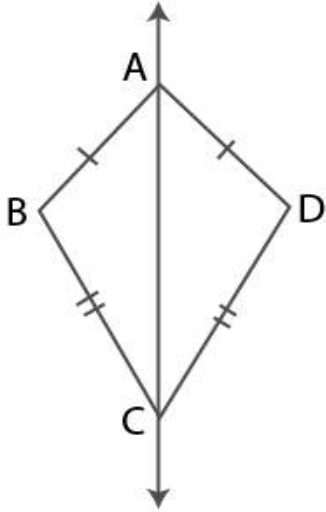
Rectangle

10. A quadrilateral ABCD is symmetric about its diagonal AC. Name the sides of this quadrilateral which are equal.

Solution:

It is given that

A quadrilateral ABCD is symmetric about its diagonal AC



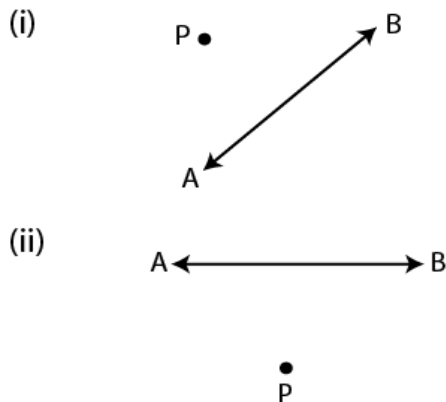
It is kite shaped.

Therefore, side $AB = AD$ and $BC = DC$.

EXERCISE 17B

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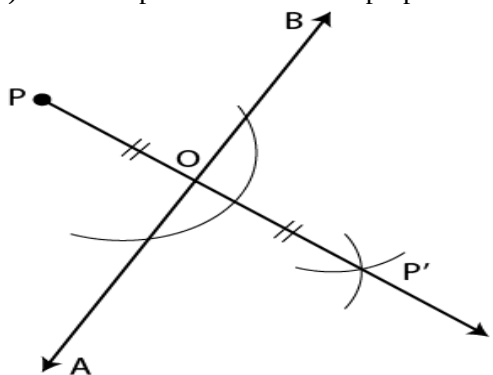
1. In each figure, given below, find the image of the point P in the line AB:



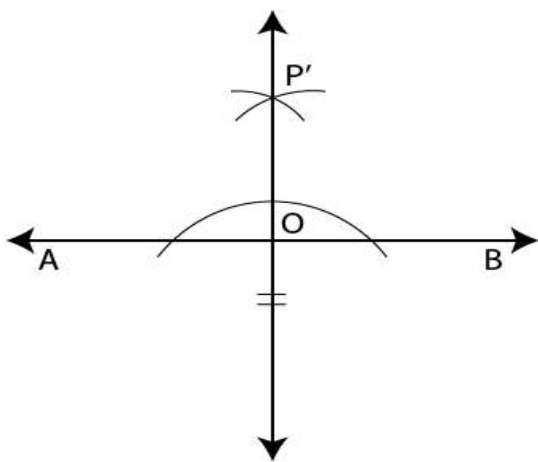
Solution:

Steps of Construction

(i) From the point P construct a perpendicular to the given line AB which meets it at the point O.

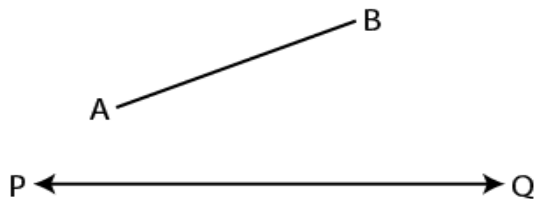


(ii) Produce PO at the point P' such that $OP' = PO$.
Here P' is the required image of P in AB.

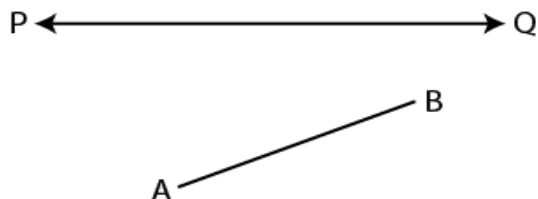


2. In each figure, given below, find the image of the line segment AB in the line PQ:

(i)

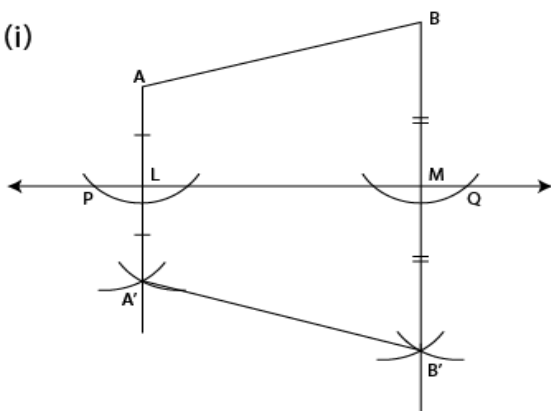


(ii)

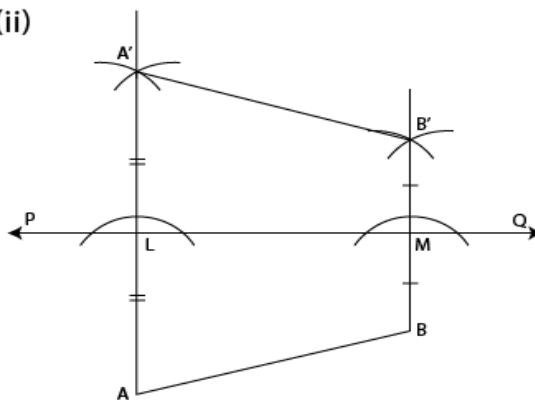


Solution:

(i)



(ii)



Steps of Construction

(i) From the points A and B construct perpendiculars on PQ which intersects PQ at the points L and M.

(ii) Produce AL to the point A' such that $AL = LA'$ and produce BM to B' such that $BM = MB'$. A'B' is the image of the line segment AB in PQ.

3. Complete the following table:

Point	Reflection		
	x-axis	y-axis	origin
(i) (8, 2)			
(ii) (5, 6)			
(iii) (4, -5)			
(iv) (6, -2)			
(v) (-3, 7)			
(vi) (-4, 5)			
(vii) (-2, -7)			
(viii) (-6, -3)			
(ix) (4, 0)			
(x) (-7, 0)			
(xi) (0, -6)			
(xii) (0, 8)			
(xiii) (0, 0)			

Solution:

Point	Reflection		
	x-axis	y-axis	origin
(i) (8, 2)	(8, -2)	(-8, 2)	(-8, -2)
(ii) (5, 6)	(5, -6)	(-5, 6)	(-5, -6)
(iii) (4, -5)	(4, 5)	(-4, -5)	(-4, 5)
(iv) (6, -2)	(6, 2)	(-6, -2)	(-6, 2)
(v) (-3, 7)	(-3, -7)	(3, 7)	(3, -7)
(vi) (-4, 5)	(-4, -5)	(4, 5)	(4, -5)
(vii) (-2, -7)	(-2, 7)	(2, -7)	(2, 7)
(viii) (-6, -3)	(-6, 3)	(6, -3)	(6, 3)
(ix) (4, 0)	(4, 0)	(-4, 0)	(-4, 0)
(x) (-7, 0)	(-7, 0)	(7, 0)	(7, 0)
(xi) (0, -6)	(0, 6)	(0, -6)	(0, 6)
(xii) (0, 8)	(0, -8)	(0, -8)	(0, -8)
(xiii) (0, 0)	(0, 0)	(0, 0)	(0, 0)

4. A point P (7, 3) is reflected in x-axis to point P'. The point P' is further reflected in y-axis to point P".

Find:

(i) the co-ordinates of P'

(ii) the co-ordinates of P"

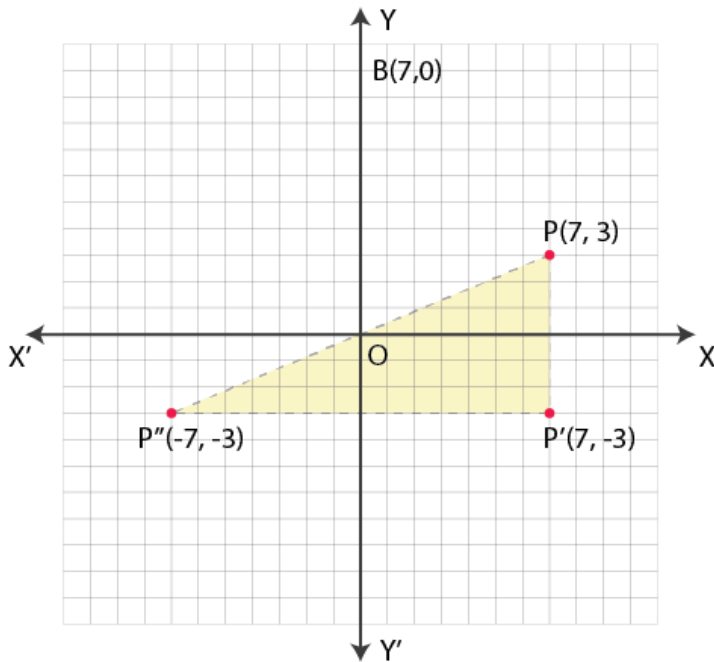
(iii) the image of P (7, 3) in origin.

Solution:

(i) The image of point P (7, 3) when reflected in x-axis is P' whose co-ordinates will be (7, -3).

(ii) The image of point P' (7, -3) when reflected in y-axis P" whose co-ordinates will be (-7, -3).

(iii) The image of point P (7, 3) in the origin is P" whose co-ordinates are (-7, -3).

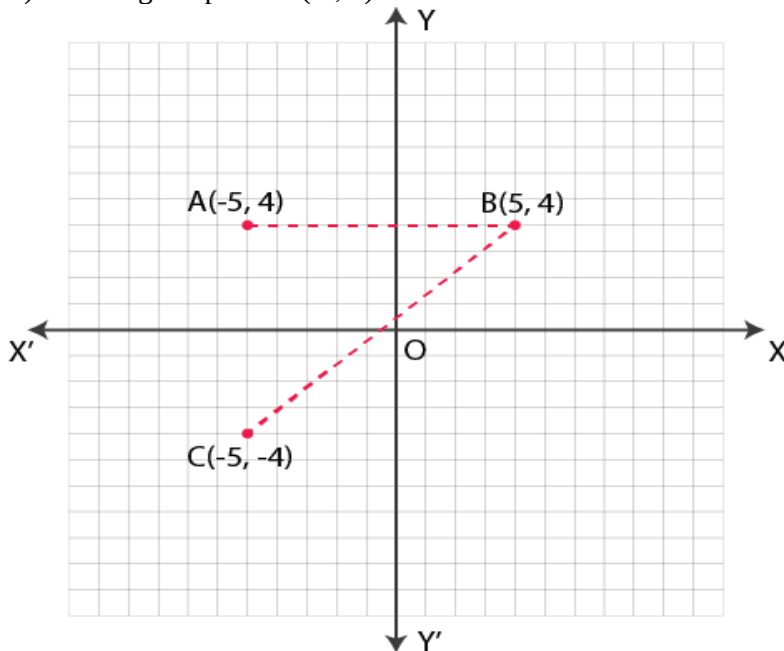


5. A point A (- 5, 4) is reflected in y-axis to point B. The point B is further reflected in origin to point C. Find:

- (i) the co-ordinates of B
- (ii) the co-ordinates of C
- (iii) the image of A (- 5, 4) in x-axis.

Solution:

- (i) The image of point A (-5, 4) when reflected in y-axis is B whose co-ordinates will be (5, 4).
- (ii) The image of point B (5, 4) when reflected in origin is C whose co-ordinates will be (-5, -4).
- (iii) The image of point A (-5, 4) in x-axis is C whose co-ordinates are (-5, -4).



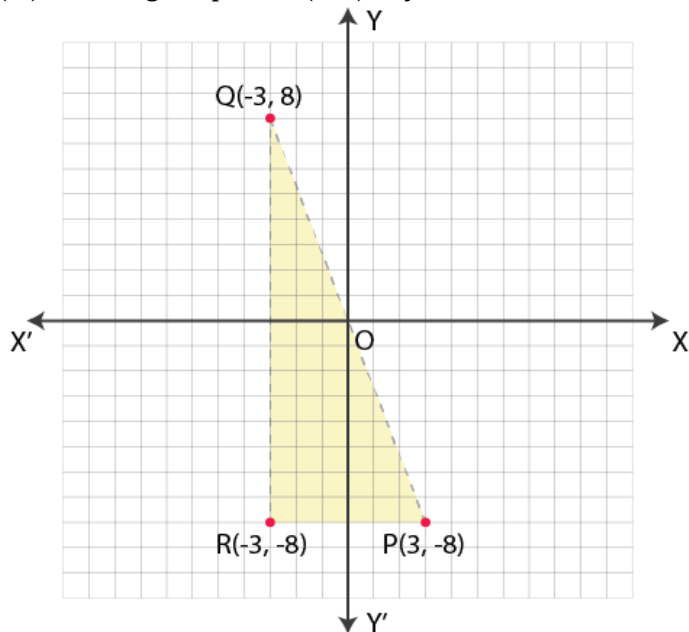
6. The point P (3, -8) is reflected in origin to point Q. The Point Q is further reflected in x-axis to point R.

Find:

- (i) the co-ordinates of Q
- (ii) the co-ordinates of R
- (iii) the image of P (3, -8) in y-axis.

Solution:

- (i) The image of point P (3, -8) when reflected in origin is Q whose co-ordinates will be (-3, 8).
- (ii) The image of point Q (-3, 8) when reflected in x-axis is R whose co-ordinates will be (-3, -8).
- (iii) The image of point P (3, -8) in y-axis is R whose co-ordinates are (-3, -8).

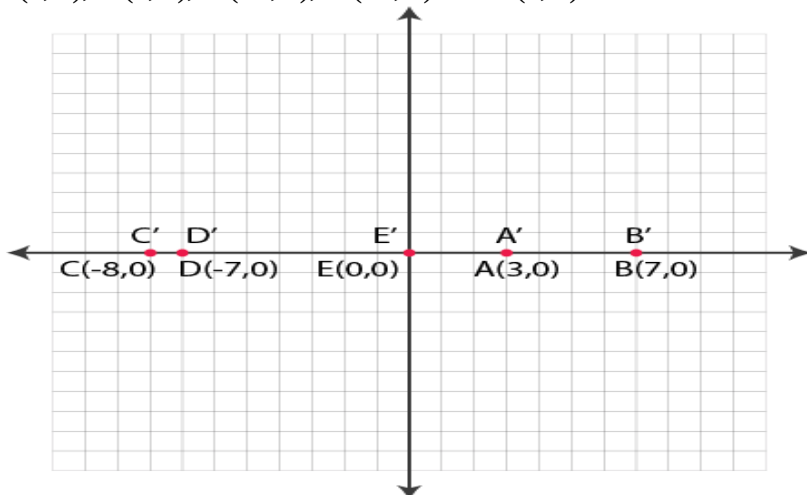


7. Each of the points A (3, 0), B (7, 0), C (-8, 0), D (-7, 0) and E (0, 0) is reflected in x-axis to points A', B', C', D' and E' respectively. Write the co-ordinates of each of the image points A', B', C', D' and E'.

Solution:

The points given are:

A (3, 0), B (7, 0), C (-8, 0), D (-7, 0) and E (0, 0)



The images will be reflected in x-axis

$A' (3, 0)$, $B' (7, 0)$, $C' (-8, 0)$, $D' (-7, 0)$ and $E' (0, 0)$ as the points lie on x-axis.

8. Each of the points A (0, 4), B (0, 10), C (0, -4), D (0, -6) and E (0, 0) is reflected in y-axis to points A', B', C', D' and E' respectively. Write the co-ordinates of each of the image points A', B', C', D' and E'.

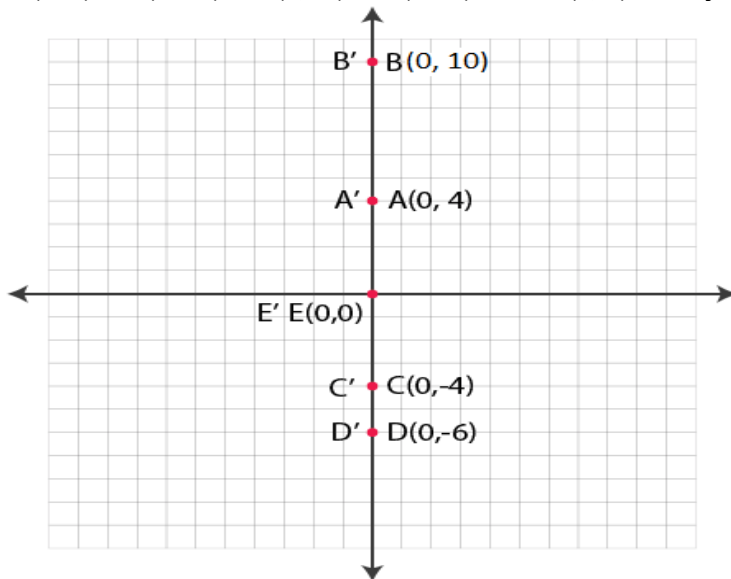
Solution:

The points given are

A (0, 4), B (0, 10), C (0, -4), D (0, -6) and E (0, 0) which are reflected on y-axis

The co-ordinates of their images will be

$A' (0, 4)$, $B' (0, 10)$, $C' (0, -4)$, $D' (0, -6)$ and $E' (0, 0)$ as they lie on y-axis.



9. Each of the points A (0, 7), B (8, 0), C (0, -5), D (-7, 0) and E (0, 0) are reflected in origin to points A', B', C', D' and E' respectively. Write the co-ordinates of each of the image points A', B', C', D' and E'.

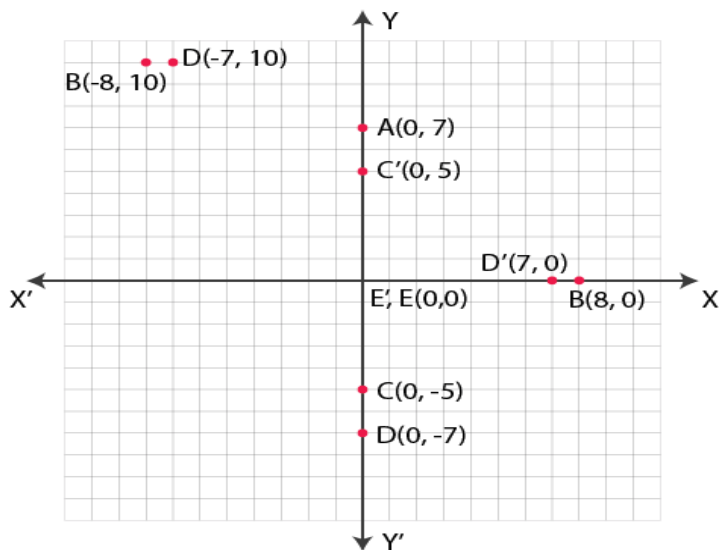
Solution:

It is given that

A (0, 7), B (8, 0), C (0, -5), D (-7, 0) and E (0, 0) are reflected in origin

The co-ordinates of their images will be

$A' (0, -7)$, $B' (-8, 0)$, $C' (0, 5)$, $D' (7, 0)$ and $E' (0, 0)$

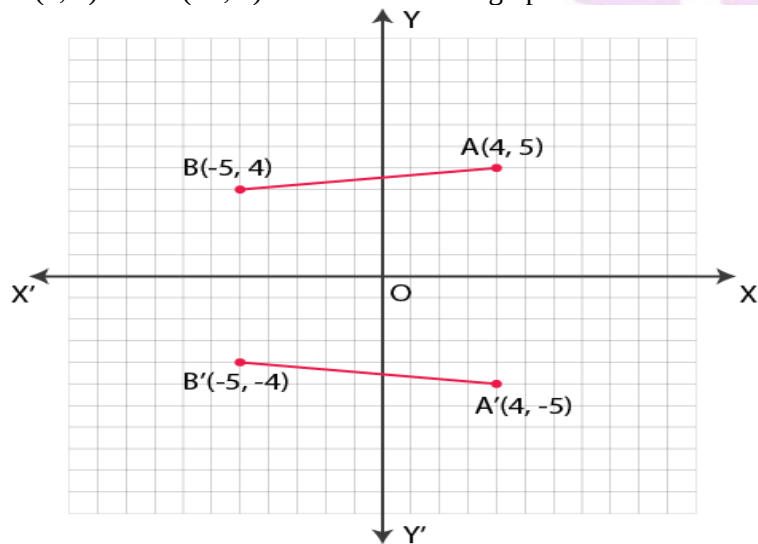


10. Mark points A (4, 5) and B (- 5, 4) on a graph paper. Find A', the image of A in x-axis and B', the image of B in x-axis. Mark A' and B' also on the same graph paper. Join AB and A' B' and find if $AB = A' B'$?

Solution:

It is given that

A (4, 5) and B (- 5, 4) are marked on the graph.



The image of A in x-axis A (4, -5) and the image of B in x-axis is B' (-5, -4) which are plotted on the same graph. AB and A'B' are joined.

Here $AB = A' B'$.

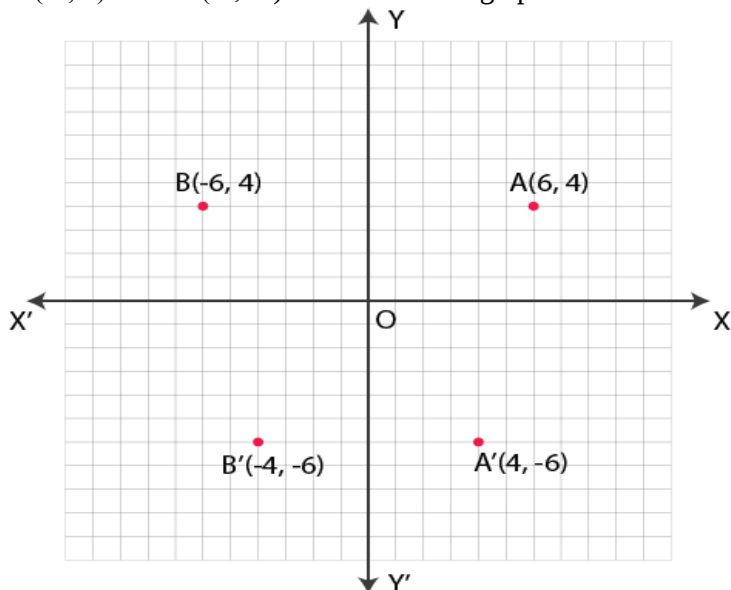
11. Mark points A (6, 4) and B (4, - 6) on a graph paper. Find A', the image of A in y-axis and B', the image of B in y-axis. Mark A' and B' also on the same graph paper.

Solution:

The points given are

A (6, 4) and B (4, - 6)

The images of A and B in y-axis are
 $A'(-6, 4)$ and $B'(-4, -6)$ as shown in the graph



12. Mark points A (- 6, 5) and B (- 4, - 6) on a graph paper. Find A' , the image of A in origin and B' , the image of B in origin. Mark A' and B' also on the same graph paper. Join AB and $A'B'$ and find if $AB = A'B'$?

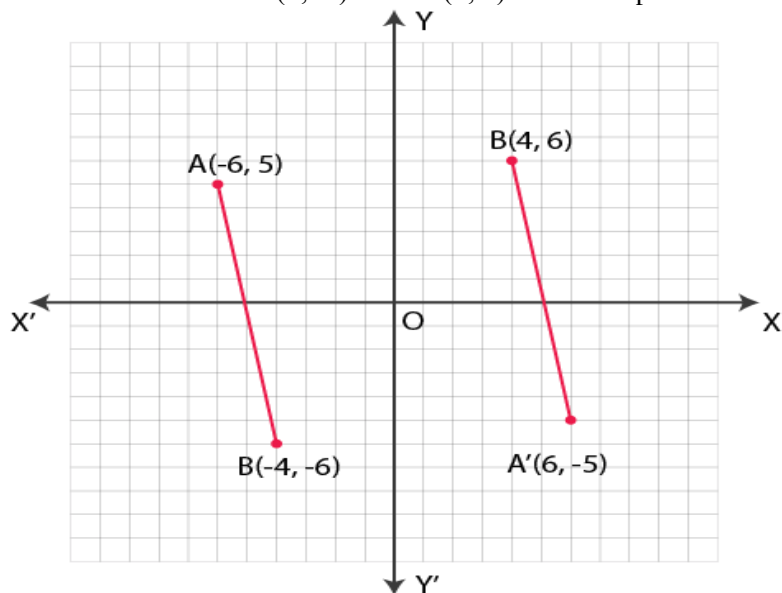
Solution:

The points given are

A (- 6, 5) and B (- 4, - 6)

The images of A and B in the origin are A' and B'

The co-ordinates are $A'(6, -5)$ and $B'(4, 6)$ which are plotted in the graph.



Join AB and $A'B'$.
Here $AB = A'B'$.

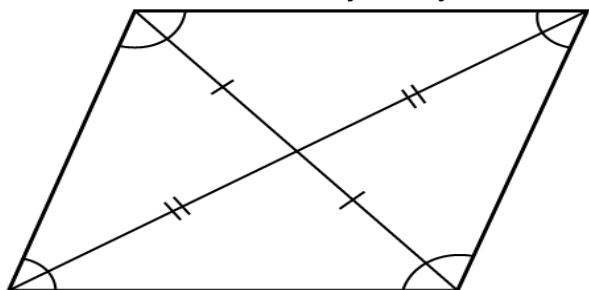
EXERCISE 17C

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1. How many lines of symmetry does a rhombus have?

Solution:

A rhombus has two lines of symmetry.



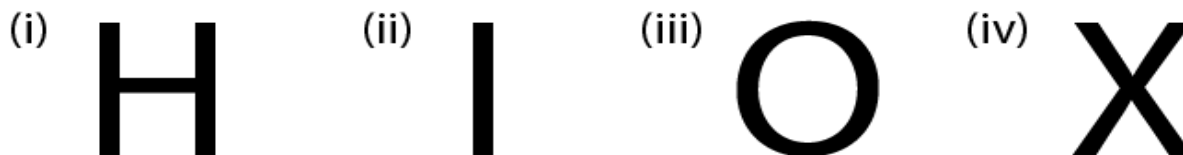
2. What is the order of rotational symmetry of a rhombus?

Solution:

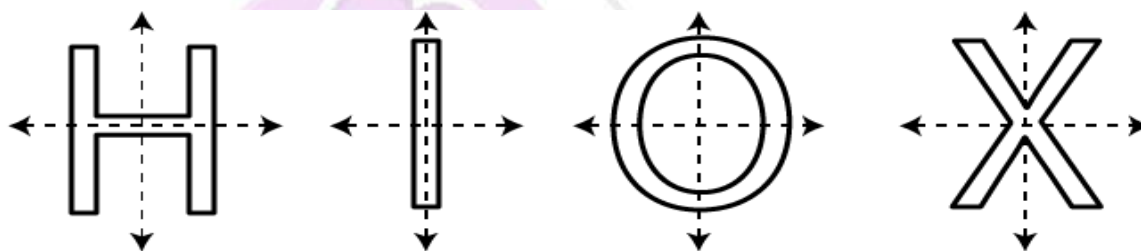
The number of times a shape appears exactly the same during full rotation is called the order of rotational symmetry.

The order of rotational symmetry of a rhombus is 2.

3. Show that each of the following figures has two lines of symmetry and a rotational symmetry of order 2.



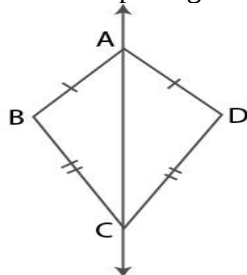
Solution:



4. Name a figure that has a line of symmetry but does not have any rotational symmetry.

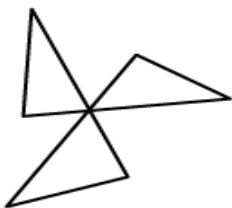
Solution:

A kite shaped figure has one line of symmetry and no rotational symmetry.

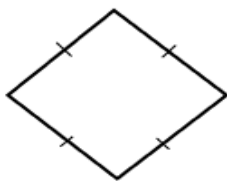


5. In each of the following figures, draw all possible lines of symmetry and also write the order of rotational symmetry:

(i)



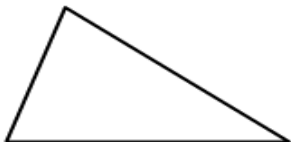
(ii)



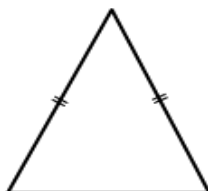
(iii)



(iv)



(v)



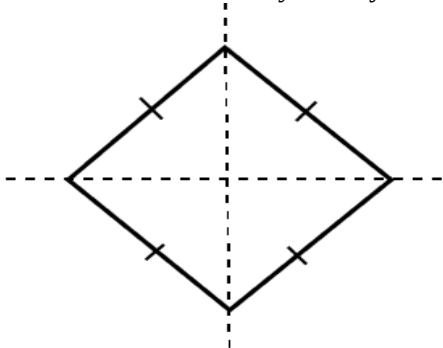
Solution:

(i) No line of symmetry

The order of rotational symmetry is 3.

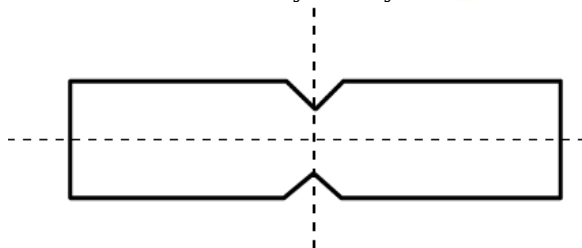
(ii) 2 line of symmetry

The order of rotational symmetry is 2.



(iii) 2 line of symmetry

The order of rotational symmetry is 2.



(iv) No line of symmetry

The order of rotational symmetry is 0.

(v) 1 line of symmetry

The order of rotational symmetry is 0.

