

Reflection

Exercise 12A

Question 1.

Complete the following table:

Point	Transformation	Image
(5, -7)		(-5, 7)
(4, 2)	Reflection in x-axis	
	Reflection in y-axis	(0, 6)
(6, -6)		(-6, 6)
(4, -8)		(-4, -8)

Solution:

Point	Transformation	Image
(5, -7)	Reflection in origin	(-5, 7)
(4, 2)	Reflection in x-axis	(4, -2)
(0, 6)	Reflection in y-axis	(0, 6)
(6, -6)	Reflection in origin	(-6, 6)
(4, -8)	Reflection in y-axis	(-4, -8)

Question 2.

A point P is its own image under the reflection in a line l. Describe the position of point P with respect to the line l.

Solution:

Since, the point P is its own image under the reflection in the line l. So, point P is an invariant point.

Hence, the position of point P remains unaltered.

Question 3.

State the co-ordinates of the following points under reflection in x-axis:

- (i) (3, 2)
- (ii) (-5, 4)
- (iii) (0, 0)

Solution:

- (i) (3, 2)

The co-ordinate of the given point under reflection in the x-axis is (3, -2).

(ii) (-5, 4)

The co-ordinate of the given point under reflection in the x-axis is (-5, -4).

(iii) (0, 0)

The co-ordinate of the given point under reflection in the x-axis is (0, 0).

Question 4.

State the co-ordinates of the following points under reflection in y-axis:

(i) (6, -3)

(ii) (-1, 0)

(iii) (-8, -2)

Solution:

(i) (6, -3)

The co-ordinate of the given point under reflection in the y-axis is (-6, -3).

(ii) (-1, 0)

The co-ordinate of the given point under reflection in the y-axis is (1, 0).

(iii) (-8, -2)

The co-ordinate of the given point under reflection in the y-axis is (8, -2).

Question 5.

State the co-ordinates of the following points under reflection in origin:

(i) (-2, -4)

(ii) (-2, 7)

(iii) (0, 0)

Solution:

(i) (-2, -4)

The co-ordinate of the given point under reflection in origin is (2, 4).

(ii) (-2, 7)

The co-ordinate of the given point under reflection in origin is (2, -7).

(iii) (0, 0)

The co-ordinate of the given point under reflection in origin is (0, 0).

Question 6.

State the co-ordinates of the following points under reflection in the line $x = 0$:

(i) (-6, 4)

(ii) (0, 5)

(iii) (3, -4)

Solution:

(i) (-6, 4)

The co-ordinate of the given point under reflection in the line $x = 0$ is (6, 4).

(ii) (0, 5)

The co-ordinate of the given point under reflection in the line $x = 0$ is (0, 5).

(iii) (3, -4)

The co-ordinate of the given point under reflection in the line $x = 0$ is (-3, -4).

Question 7.

State the co-ordinates of the following points under reflection in the line $y = 0$:

(i) (-3, 0)

(ii) (8, -5)

(iii) (-1, -3)

Solution:

(i) (-3, 0)

The co-ordinate of the given point under reflection in the line $y = 0$ is (-3, 0).

(ii) (8, -5)

The co-ordinate of the given point under reflection in the line $y = 0$ is (8, 5).

(iii) (-1, -3)

The co-ordinate of the given point under reflection in the line $y = 0$ is (-1, 3).

Question 8.

A point P is reflected in the x-axis. Co-ordinates of its image are (-4, 5).

(i) Find the co-ordinates of P.

(ii) Find the co-ordinates of the image of P under reflection in the y-axis.

Solution:

(i) Since, $M_x(-4, -5) = (-4, 5)$

So, the co-ordinates of P are (-4, -5).

(ii) Co-ordinates of the image of P under reflection in the y-axis (4, -5).

Question 9.

A point P is reflected in the origin. Co-ordinates of its image are (-2, 7).

(i) Find the co-ordinates of P.

(ii) Find the co-ordinates of the image of P under reflection in the x-axis.

Solution:

(i) Since, $M_o(2, -7) = (-2, 7)$

So, the co-ordinates of P are (2, -7).

(ii) Co-ordinates of the image of P under reflection in the x-axis (2, 7).

Question 10.

The point (a, b) is first reflected in the origin and then reflected in the y-axis to P'. If P' has co-ordinates (4, 6); evaluate a and b.

Solution:

$$M_O(a, b) = (-a, -b)$$

$$M_y(-a, -b) = (a, -b)$$

Thus, we get the co-ordinates of the point P' as $(a, -b)$. It is given that the co-ordinates of P' are $(4, 6)$.

On comparing the two points, we get, $a = 4$ and $b = -6$

Question 11.

The point $P(x, y)$ is first reflected in the x -axis and reflected in the origin to P' . If P' has co-ordinates $(-8, 5)$; evaluate x and y .

Solution:

$$M_x(x, y) = (x, -y)$$

$$M_O(x, -y) = (-x, y)$$

Thus, we get the co-ordinates of the point P' as $(-x, y)$. It is given that the co-ordinates of P' are $(-8, 5)$.

On comparing the two points, we get, $x = 8$ and $y = 5$

Question 12.

The point $A(-3, 2)$ is reflected in the x -axis to the point A' . Point A' is then reflected in the origin to point A'' .

(i) Write down the co-ordinates of A'' .

(ii) Write down a single transformation that maps A onto A'' .

Solution:

(i) The reflection in x -axis is given by $M_x(x, y) = (x, -y)$.

$A' =$ reflection of $A(-3, 2)$ in the x -axis $= (-3, -2)$.

The reflection in origin is given by $M_O(x, y) = (-x, -y)$.

$A'' =$ reflection of $A'(-3, -2)$ in the origin $= (3, 2)$

(ii) The reflection in y -axis is given by $M_y(x, y) = (-x, y)$.

The reflection of $A(-3, 2)$ in y -axis is $(3, 2)$.

Thus, the required single transformation is the reflection of A in the y -axis to the point A'' .

Question 13.

The point $A(4, 6)$ is first reflected in the origin to point A' . Point A' is then reflected in the y -axis to the point A'' .

(i) Write down the co-ordinates of A'' .

(ii) Write down a single transformation that maps A onto A'' .

Solution:

(i) The reflection in origin is given by $M_O(x, y) = (-x, -y)$.



$A' =$ reflection of $A(4, 6)$ in the origin $= (-4, -6)$
The reflection in y-axis is given by $M_y(x, y) = (-x, y)$.
 $A'' =$ reflection of $A'(-4, -6)$ in the y-axis $= (4, -6)$

(ii) The reflection in x-axis is given by $M_x(x, y) = (x, -y)$.
The reflection of $A(4, 6)$ in x-axis is $(4, -6)$.

Thus, the required single transformation is the reflection of A in the x-axis to the point A'' .

Question 14.

The triangle ABC , where A is $(2, 6)$, B is $(-3, 5)$ and C is $(4, 7)$, is reflected in the y-axis to triangle $A'B'C'$. Triangle $A'B'C'$ is then reflected in the origin to triangle $A''B''C''$.

- (i) Write down the co-ordinates of A'' , B'' and C'' .
- (ii) Write down a single transformation that maps triangle ABC onto triangle $A''B''C''$.

Solution:

(i) Reflection in y-axis is given by $M_y(x, y) = (-x, y)$
 $\therefore A' =$ Reflection of $A(2, 6)$ in y-axis $= (-2, 6)$
Similarly, $B' = (-3, 5)$ and $C' = (-4, 7)$

Reflection in origin is given by $M_o(x, y) = (-x, -y)$
 $\therefore A'' =$ Reflection of $A'(-2, 6)$ in origin $= (2, -6)$
Similarly, $B'' = (-3, -5)$ and $C'' = (4, -7)$

(ii) A single transformation which maps triangle ABC to triangle $A''B''C''$ is reflection in x-axis.

Question 15.

P and Q have co-ordinates $(-2, 3)$ and $(5, 4)$ respectively. Reflect P in the x-axis to P' and Q in the y-axis to Q' . State the co-ordinates of P' and Q' .

Solution:

Reflection in x-axis is given by $M_x(x, y) = (x, -y)$
 $P' =$ Reflection of $P(-2, 3)$ in x-axis $= (-2, -3)$

Reflection in y-axis is given by $M_y(x, y) = (-x, y)$
 $Q' =$ Reflection of $Q(5, 4)$ in y-axis $= (-5, 4)$
Thus, the co-ordinates of points P' and Q' are $(-2, -3)$ and $(-5, 4)$ respectively.



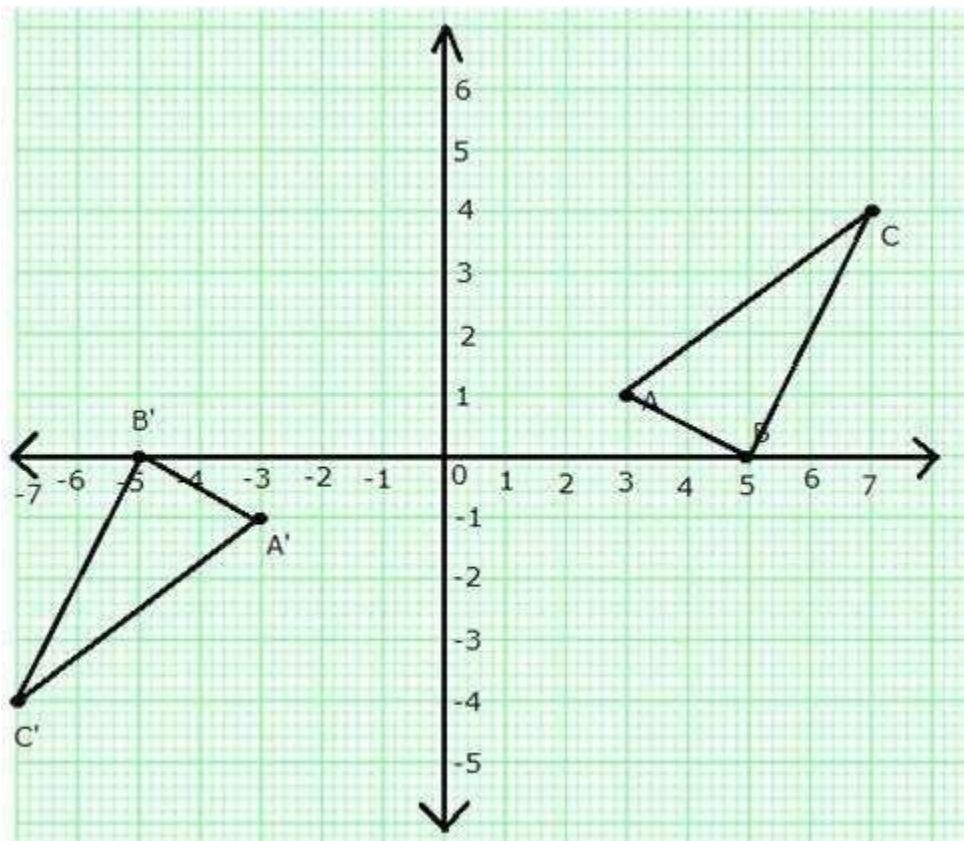
Question 16.

On a graph paper, plot the triangle ABC, whose vertices are at points A (3, 1), B (5, 0) and C (7, 4).

On the same diagram, draw the image of the triangle ABC under reflection in the origin O (0, 0).

Solution:

The graph shows triangle ABC and triangle A'B'C' which is obtained when ABC is reflected in the origin.

**Question 17.**

Find the image of point (4, -6) under the following operations:

- (i) $M_x \cdot M_y$ (ii) $M_y \cdot M_x$
- (iii) $M_O \cdot M_x$ (iv) $M_x \cdot M_O$
- (v) $M_O \cdot M_y$ (vi) $M_y \cdot M_O$

Write down a single transformation equivalent to each operation given above. State whether:

- (a) $M_O \cdot M_x = M_x \cdot M_O$
- (b) $M_y \cdot M_O = M_O \cdot M_y$

Solution:

(i) $M_x \cdot M_y (4, -6) = M_x (-4, -6) = (-4, 6)$

Single transformation equivalent to $M_x \cdot M_y$ is M_0 .

(ii) $M_y \cdot M_x (4, -6) = M_y (4, 6) = (-4, 6)$

Single transformation equivalent to $M_y \cdot M_x$ is M_0 .

(iii) $M_0 \cdot M_x (4, -6) = M_0 (4, 6) = (-4, -6)$

Single transformation equivalent to $M_0 \cdot M_x$ is M_y .

(iv) $M_x \cdot M_0 (4, -6) = M_x (-4, 6) = (-4, -6)$

Single transformation equivalent to $M_x \cdot M_0$ is M_y .

(v) $M_0 \cdot M_y (4, -6) = M_0 (-4, -6) = (4, 6)$

Single transformation equivalent to $M_0 \cdot M_y$ is M_x .

(vi) $M_y \cdot M_0 (4, -6) = M_y (-4, 6) = (4, 6)$

Single transformation equivalent to $M_x \cdot M_0$ is M_x .

From (iii) and (iv), it is clear that $M_0 \cdot M_x = M_x \cdot M_0$.

From (v) and (vi), it is clear that $M_y \cdot M_0 = M_0 \cdot M_y$.

Question 18.

Point A (4, -1) is reflected as A' in the y-axis. Point B on reflection in the x-axis is mapped as B' (-2, 5). Write down the co-ordinates of A' and B.

Solution:

Reflection in y-axis is given by $M_y (x, y) = (-x, y)$

A' = Reflection of A(4, -1) in y-axis = (-4, -1)

Reflection in x-axis is given by $M_x (x, y) = (x, -y)$

B' = Reflection of B in x-axis = (-2, 5)

Thus, B = (-2, -5)

Question 19.

The point (-5, 0) on reflection in a line is mapped as (5, 0) and the point (-2, -6) on reflection in the same line is mapped as (2, -6).

(a) Name the line of reflection.

(b) Write down the co-ordinates of the image of (5, -8) in the line obtained in (a).

Solution:

(a) We know that reflection in the line $x = 0$ is the reflection in the y-axis.

It is given that:

Point (-5, 0) on reflection in a line is mapped as (5, 0).



Point $(-2, -6)$ on reflection in the same line is mapped as $(2, -6)$.

Hence, the line of reflection is $x = 0$.

(b) It is known that $M_y(x, y) = (-x, y)$

Co-ordinates of the image of $(5, -8)$ in the line $x = 0$ are $(-5, -8)$.

Exercise 12B

Question 1.

Attempt this question on graph paper.

(a) Plot $A(3, 2)$ and $B(5, 4)$ on graph paper. Take $2\text{ cm} = 1\text{ unit}$ on both the axes.

(b) Reflect A and B in the x -axis to A' and B' respectively. Plot these points also on the same graph paper.

(c) Write down:

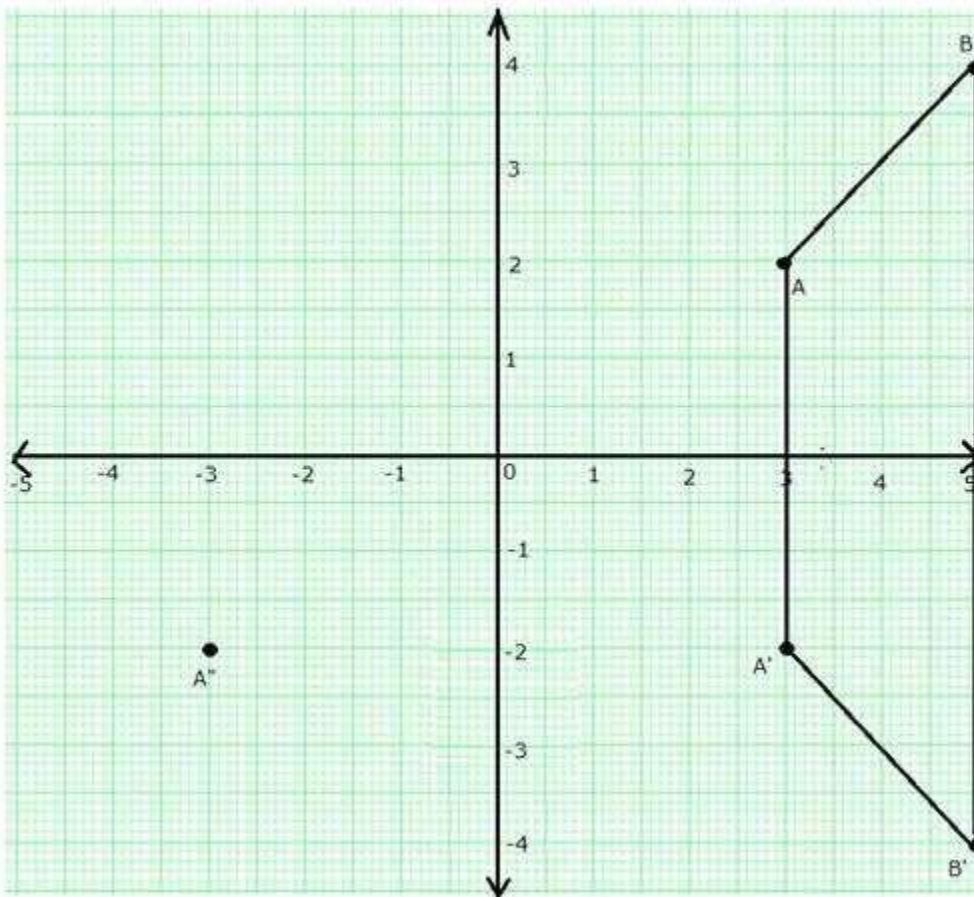
(i) the geometrical name of the figure $ABB'A'$;

(ii) the measure of angle ABB' ;

(iii) the image of A'' of A , when A is reflected in the origin.

(iv) the single transformation that maps A' to A'' .

Solution:



(c)

(i) From graph, it is clear that $ABB'A'$ is an isosceles trapezium.

(ii) The measure of angle ABB' is 45° .

(iii) $A'' = (-3, -2)$

(iv) Single transformation that maps A' to A'' is the reflection in y-axis.

Question 2.

Points $(3, 0)$ and $(-1, 0)$ are invariant points under reflection in the line L_1 ; points $(0, -3)$ and $(0, 1)$ are invariant points on reflection in line L_2 .

(i) Name or write equations for the lines L_1 and L_2 .

(ii) Write down the images of the points $P(3, 4)$ and $Q(-5, -2)$ on reflection in line L_1 .

Name the images as P' and Q' respectively.

(iii) Write down the images of P and Q on reflection in L_2 . Name the images as P'' and Q'' respectively.

(iv) State or describe a single transformation that maps P' onto P'' .

Solution:

(i) We know that every point in a line is invariant under the reflection in the same line.

Since points $(3, 0)$ and $(-1, 0)$ lie on the x-axis.

So, $(3, 0)$ and $(-1, 0)$ are invariant under reflection in x-axis.

Hence, the equation of line L_1 is $y = 0$.

Similarly, $(0, -3)$ and $(0, 1)$ are invariant under reflection in y-axis.

Hence, the equation of line L_2 is $x = 0$.

(ii) $P' = \text{Image of } P(3, 4) \text{ in } L_1 = (3, -4)$

$Q' = \text{Image of } Q(-5, -2) \text{ in } L_1 = (-5, 2)$

(iii) $P'' = \text{Image of } P(3, 4) \text{ in } L_2 = (-3, 4)$

$Q'' = \text{Image of } Q(-5, -2) \text{ in } L_2 = (5, -2)$

(iv) Single transformation that maps P' onto P'' is reflection in origin.

Question 3.

(i) Point $P(a, b)$ is reflected in the x-axis to $P'(5, -2)$. Write down the values of a and b .

(ii) P'' is the image of P when reflected in the y-axis. Write down the co-ordinates of P'' .

(iii) Name a single transformation that maps P' to P'' .

Solution:

(i) We know $M_x(x, y) = (x, -y)$

$P'(5, -2) = \text{reflection of } P(a, b) \text{ in x-axis.}$

Thus, the co-ordinates of P are $(5, 2)$.

Hence, $a = 5$ and $b = 2$.



- (ii) P'' = image of $P(5, 2)$ reflected in y -axis = $(-5, 2)$
(iii) Single transformation that maps P' to P'' is the reflection in origin.

Question 4.

The point $(-2, 0)$ on reflection in a line is mapped to $(2, 0)$ and the point $(5, -6)$ on reflection in the same line is mapped to $(-5, -6)$.

- (i) State the name of the mirror line and write its equation.
(ii) State the co-ordinates of the image of $(-8, -5)$ in the mirror line.

Solution:

- (i) We know reflection of a point (x, y) in y -axis is $(-x, y)$.
Hence, the point $(-2, 0)$ when reflected in y -axis is mapped to $(2, 0)$.
Thus, the mirror line is the y -axis and its equation is $x = 0$.
(ii) Co-ordinates of the image of $(-8, -5)$ in the mirror line (i.e., y -axis) are $(8, -5)$.

Question 5.

The points $P(4, 1)$ and $Q(-2, 4)$ are reflected in line $y = 3$. Find the co-ordinates of P' , the image of P and Q' , the image of Q .

Solution:

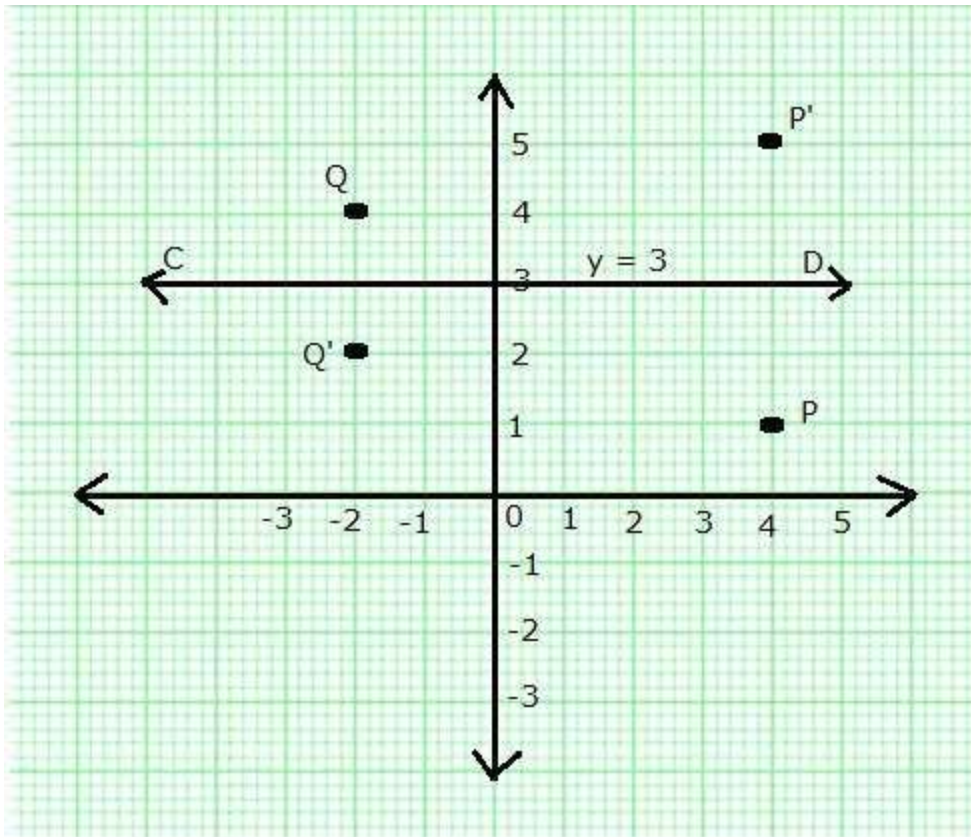
The line $y = 3$ is a line parallel to x -axis and at a distance of 3 units from it.
Mark points $P(4, 1)$ and $Q(-2, 4)$.

From P , draw a straight line perpendicular to line CD and produce. On this line mark a point P' which is at the same distance above CD as P is below it.
The co-ordinates of P' are $(4, 5)$.

Similarly, from Q , draw a line perpendicular to CD and mark point Q' which is at the same distance below CD as Q is above it.

The co-ordinates of Q' are $(-2, 2)$.





Question 6.

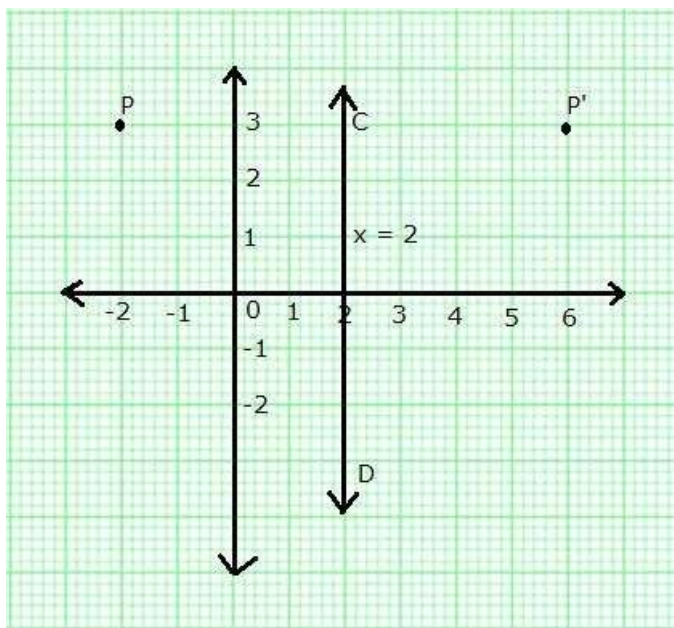
A point P (-2, 3) is reflected in line $x = 2$ to point P'. Find the coordinates of P'.

Solution:

The line $x = 2$ is a line parallel to y-axis and at a distance of 2 units from it.
Mark point P (-2, 3).

From P, draw a straight line perpendicular to line CD and produce. On this line mark a point P' which is at the same distance to the right of CD as P is to the left of it.

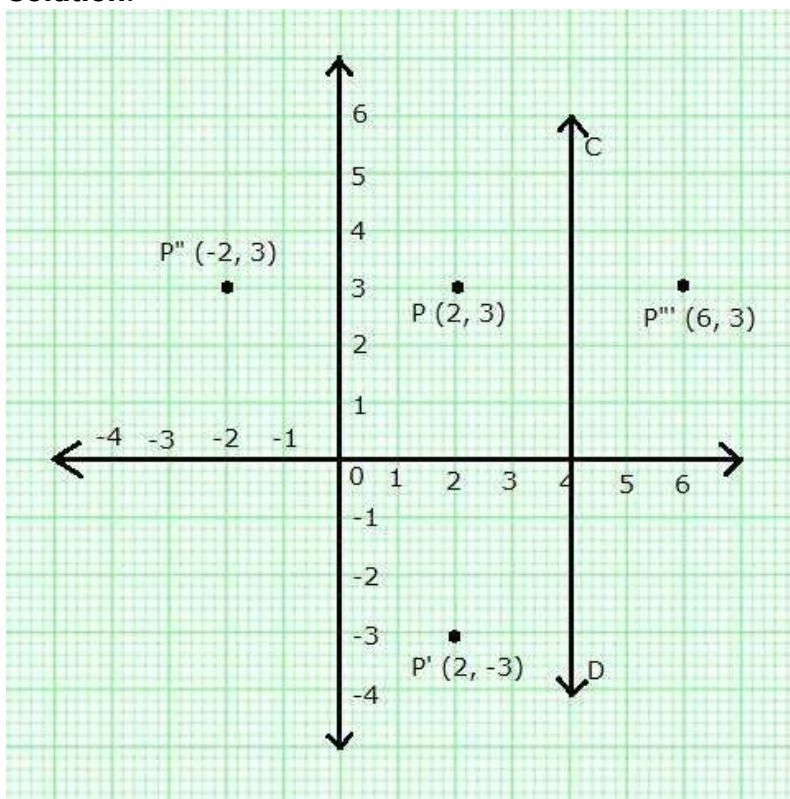
The co-ordinates of P' are (6, 3).



Question 7.

A point $P(a, b)$ is reflected in the x -axis to $P'(2, -3)$. Write down the values of a and b . P'' is the image of P , reflected in the y -axis. Write down the co-ordinates of P'' . Find the co-ordinates of P''' , when P is reflected in the line, parallel to y -axis, such that $x = 4$.

Solution:



A point $P(a, b)$ is reflected in the x -axis to $P'(2, -3)$.
We know $M_x(x, y) = (x, -y)$

Thus, co-ordinates of P are $(2, 3)$. Hence, $a = 2$ and $b = 3$.

P'' = Image of P reflected in the y -axis = $(-2, 3)$

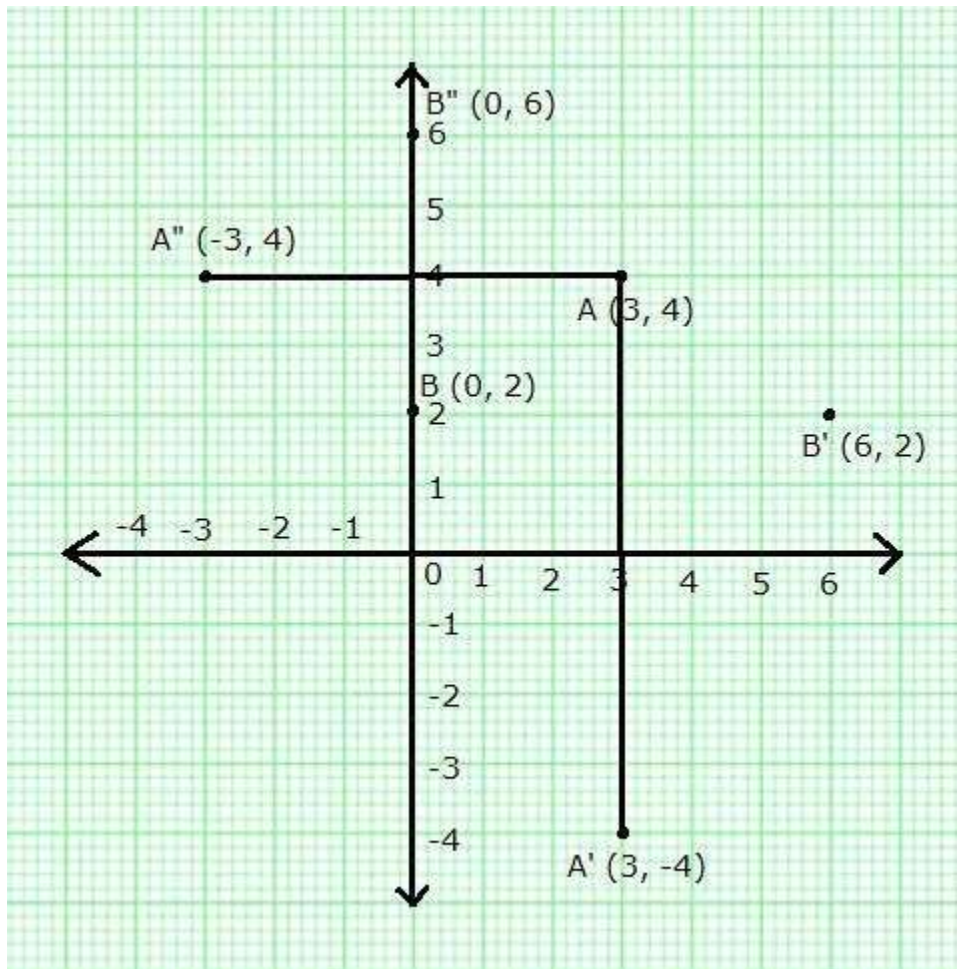
P''' = Reflection of P in the line $(x = 4) = (6, 3)$

Question 8.

Points A and B have co-ordinates $(3, 4)$ and $(0, 2)$ respectively. Find the image:

- (a) A' of A under reflection in the x -axis.
- (b) B' of B under reflection in the line AA' .
- (c) A'' of A under reflection in the y -axis.
- (d) B'' of B under reflection in the line AA'' .

Solution:



(a) A' = Image of A under reflection in the x -axis = $(3, -4)$

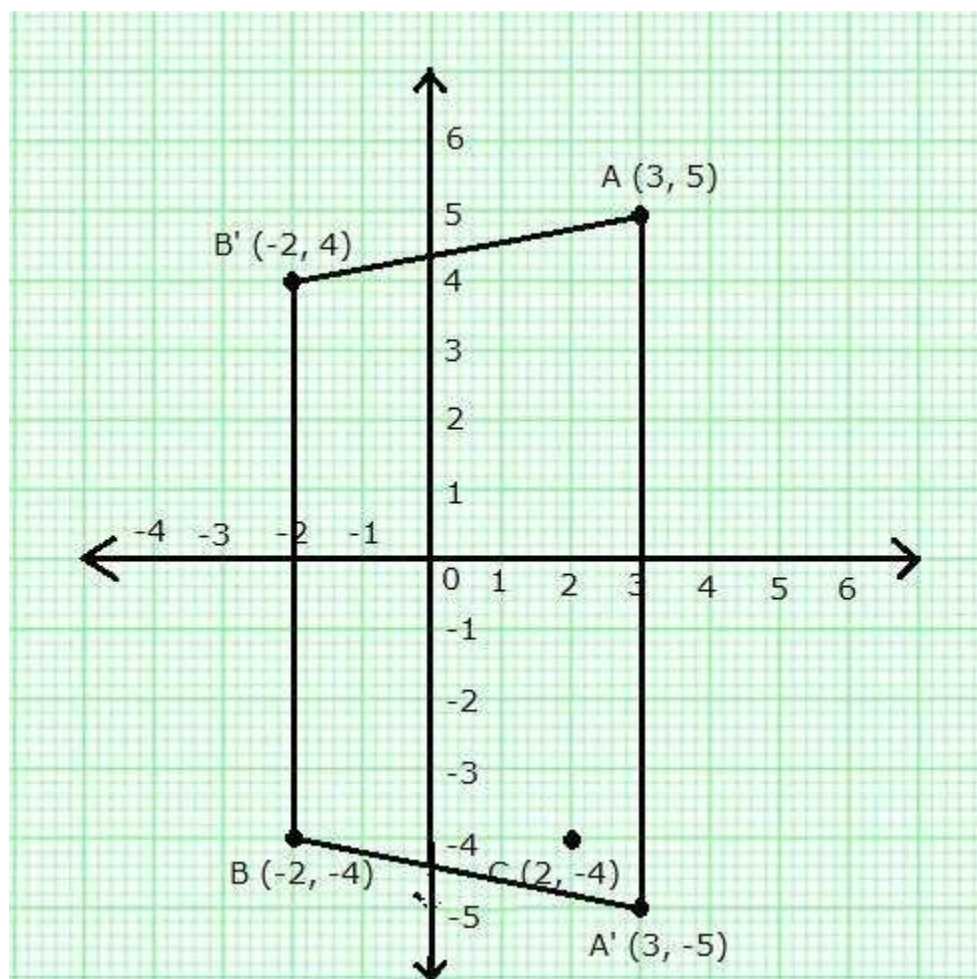
(b) B' = Image of B under reflection in the line $AA' = (6, 2)$

- (c) A'' = Image of A under reflection in the y-axis = $(-3, 4)$
(d) B'' = Image of B under reflection in the line AA'' = $(0, 6)$

Question 9.

- (i) Plot the points A $(3, 5)$ and B $(-2, -4)$. Use 1 cm = 1 unit on both the axes.
(ii) A' is the image of A when reflected in the x-axis. Write down the co-ordinates of A' and plot it on the graph paper.
(iii) B' is the image of B when reflected in the y-axis, followed by reflection in the origin. Write down the co-ordinates of B' and plot it on the graph paper.
(iv) Write down the geometrical name of the figure $AA'BB'$.
(v) Name the invariant points under reflection in the x-axis.

Solution:



- (i) The points A $(3, 5)$ and B $(-2, -4)$ can be plotted on a graph as shown.
(ii) A' = Image of A when reflected in the x-axis = $(3, -5)$
(iii) C = Image of B when reflected in the y-axis = $(2, -4)$
 B' = Image when C is reflected in the origin = $(-2, 4)$

(iv) Isosceles trapezium

(v) Any point that remains unaltered under a given transformation is called an invariant.
Thus, the required two points are $(3, 0)$ and $(-2, 0)$.

Question 10.

The point $P (5, 3)$ was reflected in the origin to get the image P' .

(a) Write down the co-ordinates of P' .

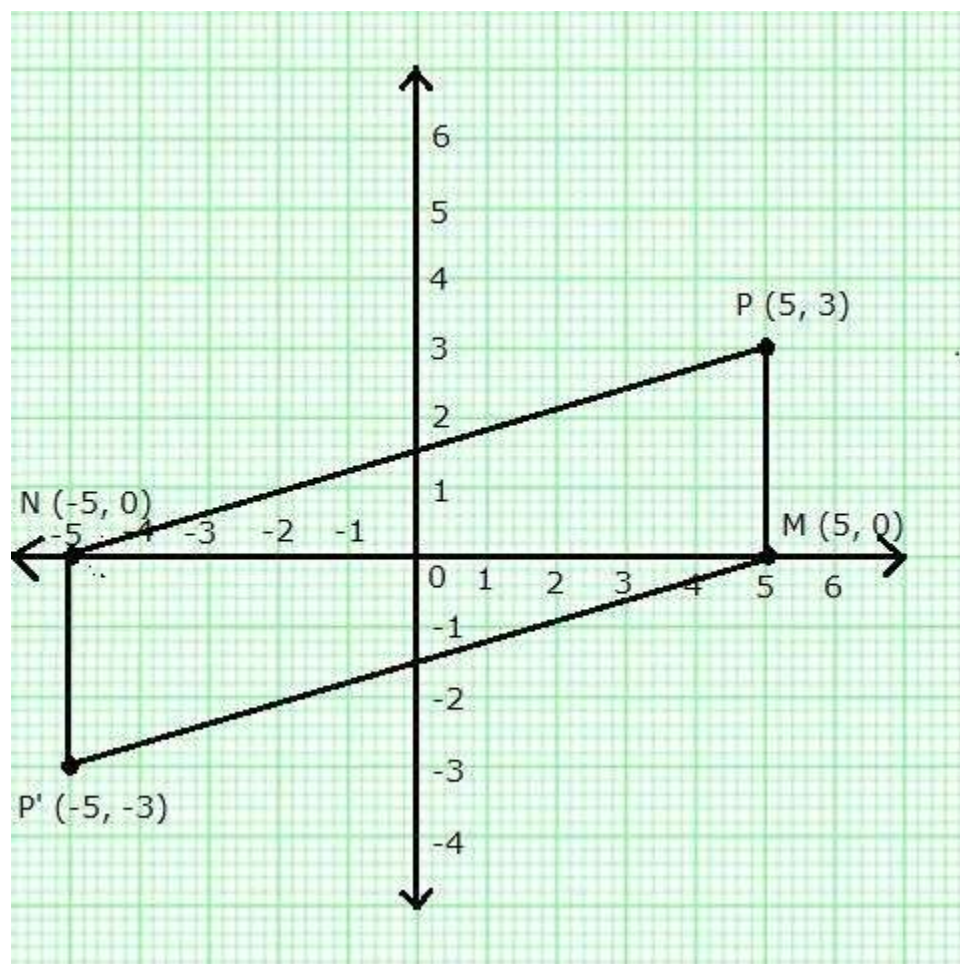
(b) If M is the foot of the perpendicular from P to the x -axis, find the co-ordinates of M .

(c) If N is the foot of the perpendicular from P' to the x -axis, find the co-ordinates of N .

(d) Name the figure $PMP'N$.

(e) Find the area of the figure $PMP'N$.

Solution:



(a) Co-ordinates of $P' = (-5, -3)$

(b) Co-ordinates of $M = (5, 0)$

(c) Co-ordinates of $N = (-5, 0)$

(d) $PMP'N$ is a parallelogram.

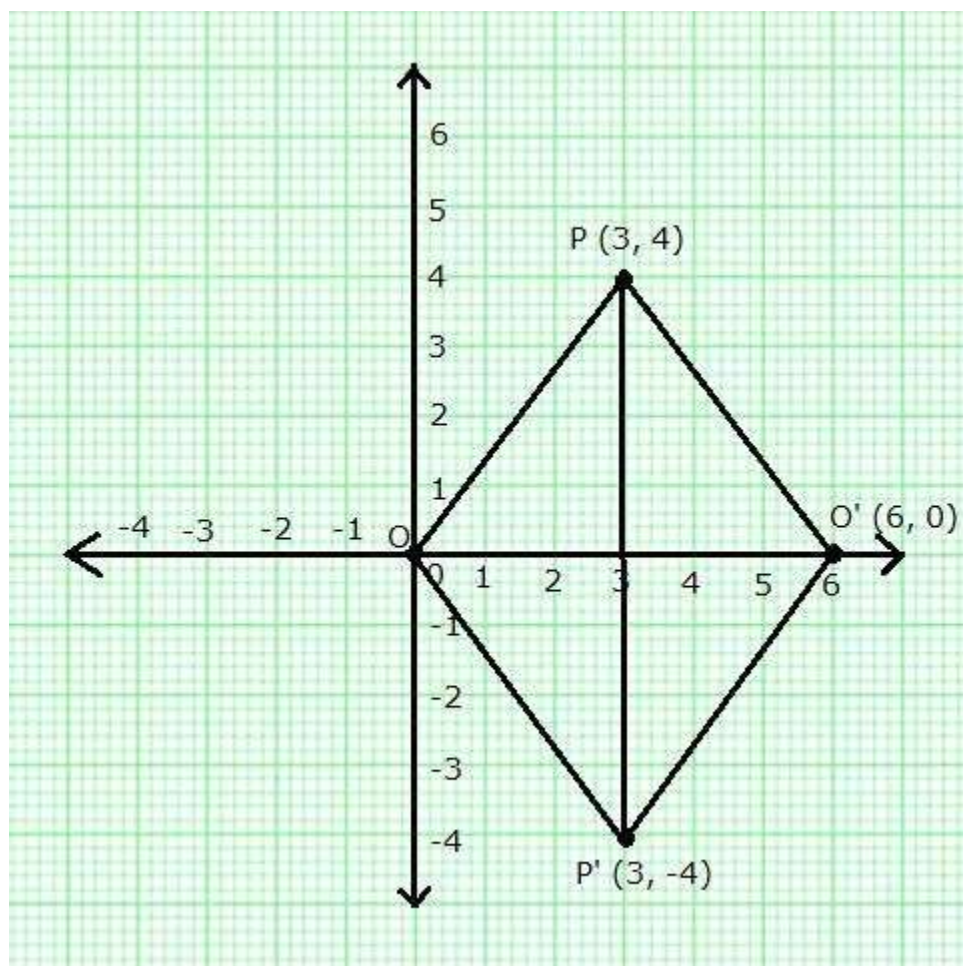
(e) Area of $\triangle PMP'N = 2$ (Area of $\triangle PMN$)
 $= 2 \times \frac{1}{2} \times 10 \times 3$
 $= 30$ sq. units

Question 11.

The point $P(3, 4)$ is reflected to P' in the x -axis; and O' is the image of O (the origin) when reflected in the line PP' . Write:

- (i) the co-ordinates of P' and O' .
- (ii) the length of the segments PP' and OO' .
- (iii) the perimeter of the quadrilateral $POP'O'$.
- (iv) the geometrical name of the figure $POP'O'$.

Solution:



- (i) Co-ordinates of P' and O' are $(3, -4)$ and $(6, 0)$ respectively.
- (ii) $PP' = 8$ units and $OO' = 6$ units.
- (iii) From the graph it is clear that all sides of the quadrilateral $POP'O'$ are equal.
In right $\triangle PO'Q$,

$$PO' = \sqrt{(4)^2 + (3)^2} = 5 \text{ units}$$

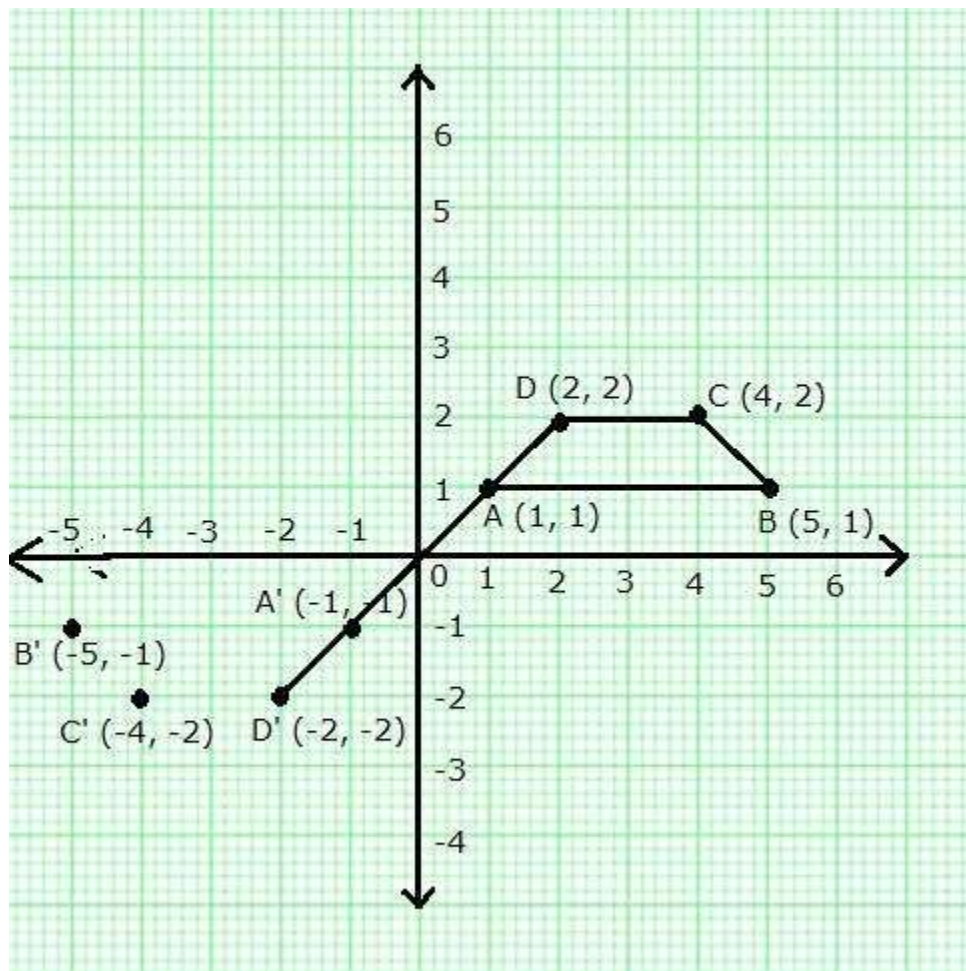
So, perimeter of quadrilateral $POP'O' = 4 PO' = 4 \times 5 \text{ units} = 20 \text{ units}$

(iv) Quadrilateral $POP'O'$ is a rhombus.

Question 12.

A (1, 1), B (5, 1), C (4, 2) and D (2, 2) are vertices of a quadrilateral. Name the quadrilateral ABCD. A, B, C, and D are reflected in the origin on to A', B', C' and D' respectively. Locate A', B', C' and D' on the graph sheet and write their co-ordinates. Are D, A, A' and D' collinear?

Solution:



Quadrilateral ABCD is an isosceles trapezium.

Co-ordinates of A', B', C' and D' are A'(-1, -1), B'(-5, -1), C'(-4, -2) and D'(-2, -2) respectively. It is clear from the graph that D, A, A' and D' are collinear.

Question 13.

P and Q have co-ordinates (0, 5) and (-2, 4).

- (a) P is invariant when reflected in an axis. Name the axis.
- (b) Find the image of Q on reflection in the axis found in (i).
- (c) (0, k) on reflection in the origin is invariant. Write the value of k.
- (d) Write the co-ordinates of the image of Q, obtained by reflecting it in the origin followed by reflection in x-axis.

Solution:

(a) Any point that remains unaltered under a given transformation is called an invariant. It is given that P (0, 5) is invariant when reflected in an axis. Clearly, when P is reflected in the y-axis then it will remain invariant. Thus, the required axis is the y-axis.

(b) The co-ordinates of the image of Q (-2, 4) when reflected in y-axis is (2, 4).

(c) (0, k) on reflection in the origin is invariant. We know the reflection of origin in origin is invariant. Thus, $k = 0$.

(d) Co-ordinates of image of Q (-2, 4) when reflected in origin = (2, -4)

Co-ordinates of image of (2, -4) when reflected in x-axis = (2, 4)

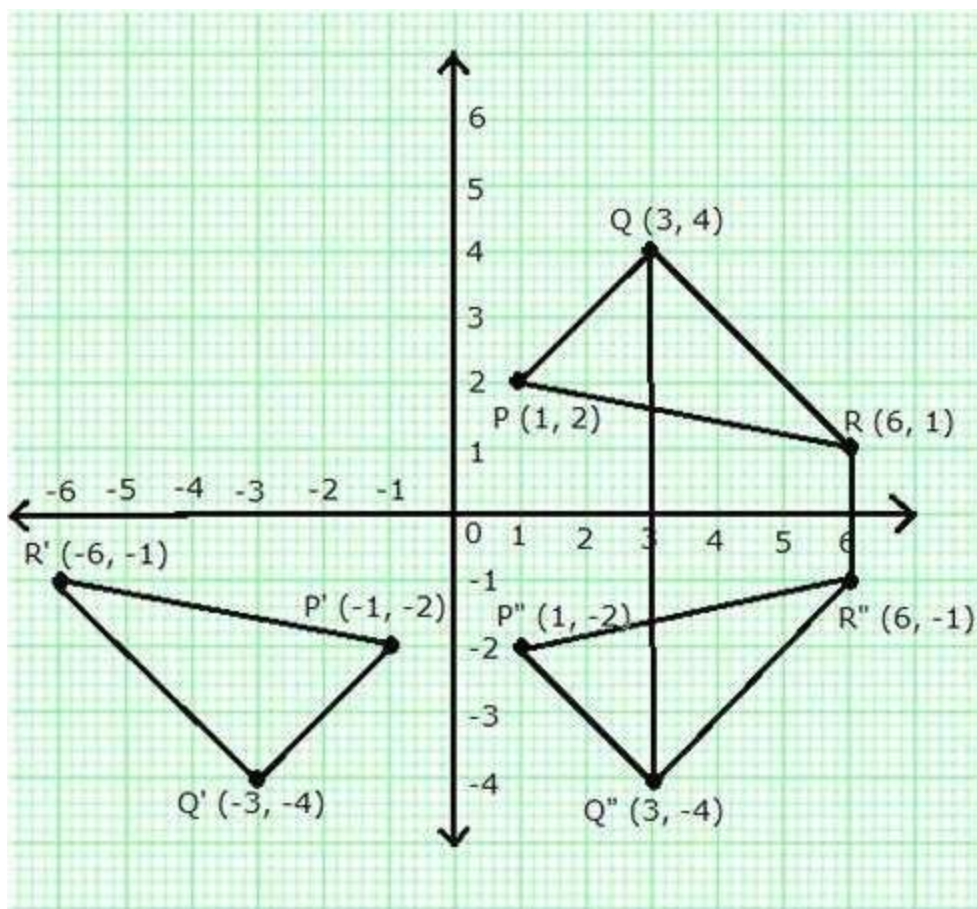
Thus, the co-ordinates of the point are (2, 4).

Question PQ.

The points P (1, 2), Q (3, 4) and R (6, 1) are the vertices of PQR.

- (a) Write down the co-ordinates of P', Q' and R', if P'Q'R' is the image of PQR, when reflected in the origin.
- (b) Write down the co-ordinates of P'', Q'' and R'', if P''Q''R'' is the image of PQR, when reflected in the x-axis.
- (c) Mention the special name of the quadrilateral QRR''Q'' and find its area.

Solution:



- (a) The co-ordinates of P', Q' and R' are (-1, 2), (-3, 4) and (-6, 1) respectively.
 (b) The co-ordinates of P'', Q'' and R'' are (1, -2), (3, -4) and (6, -1) respectively.
 (c) The quadrilateral QRR''Q'' is an isosceles trapezium.

$$\text{Area of } QRR''Q'' = \frac{1}{2} (RR'' + QQ'') \times \text{Height} \\ = \frac{1}{2} (2 + 8) \times 3 = 15 \text{ sq units}$$

Question 14.

- (i) The point P (2, -4) is reflected about the line $x = 0$ to get the image Q. Find the co-ordinates of Q.
 (ii) The point Q is reflected about the line $y = 0$ to get the image R. Find the co-ordinates of R.
 (iii) Name the figure PQR.
 (iv) Find the area of figure PQR.

Solution:

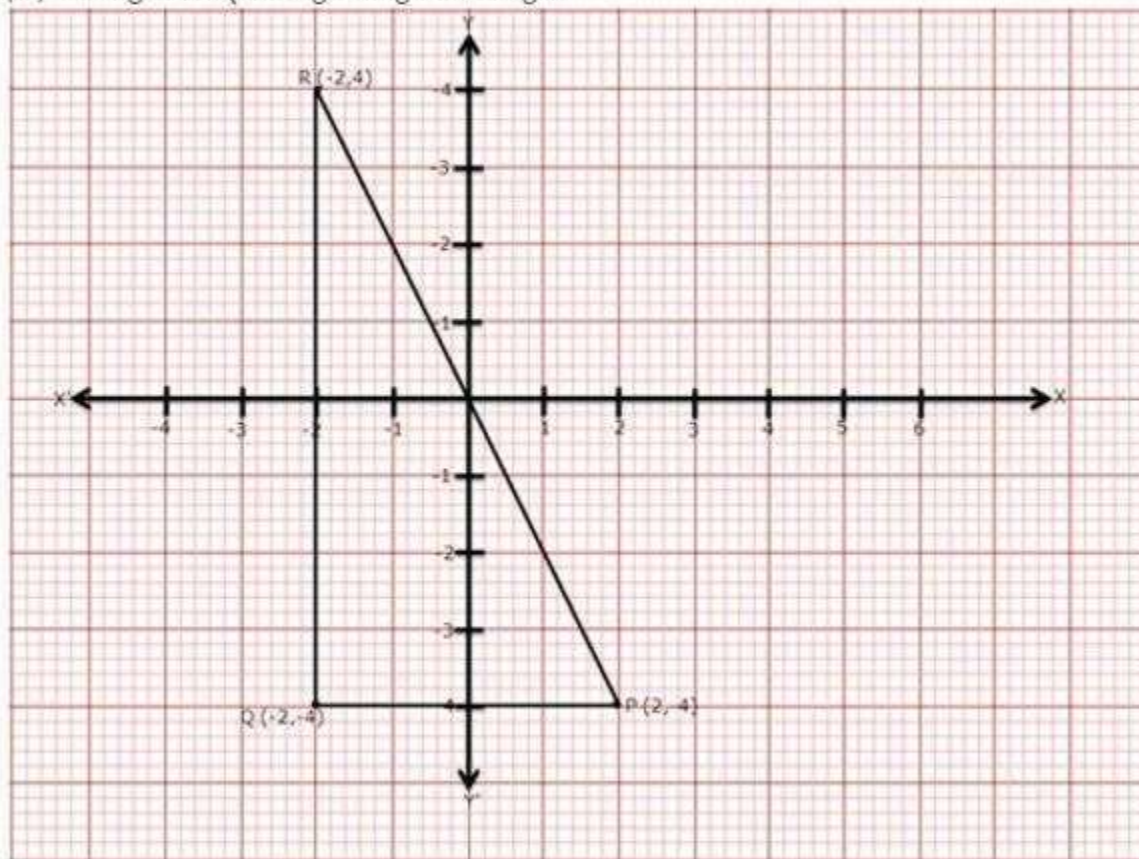
(i) P (2, -4) is reflected in ($x = 0$) y-axis to get Q.

$$P(2, -4) \xrightarrow{My} Q(-2, -4)$$

(ii) Q (-2, -4) is reflected in ($y = 0$) x-axis to get R.

$$Q(-2, -4) \xrightarrow{Mx} R(-2, 4)$$

(iii) The figure PQR is right angled triangle.



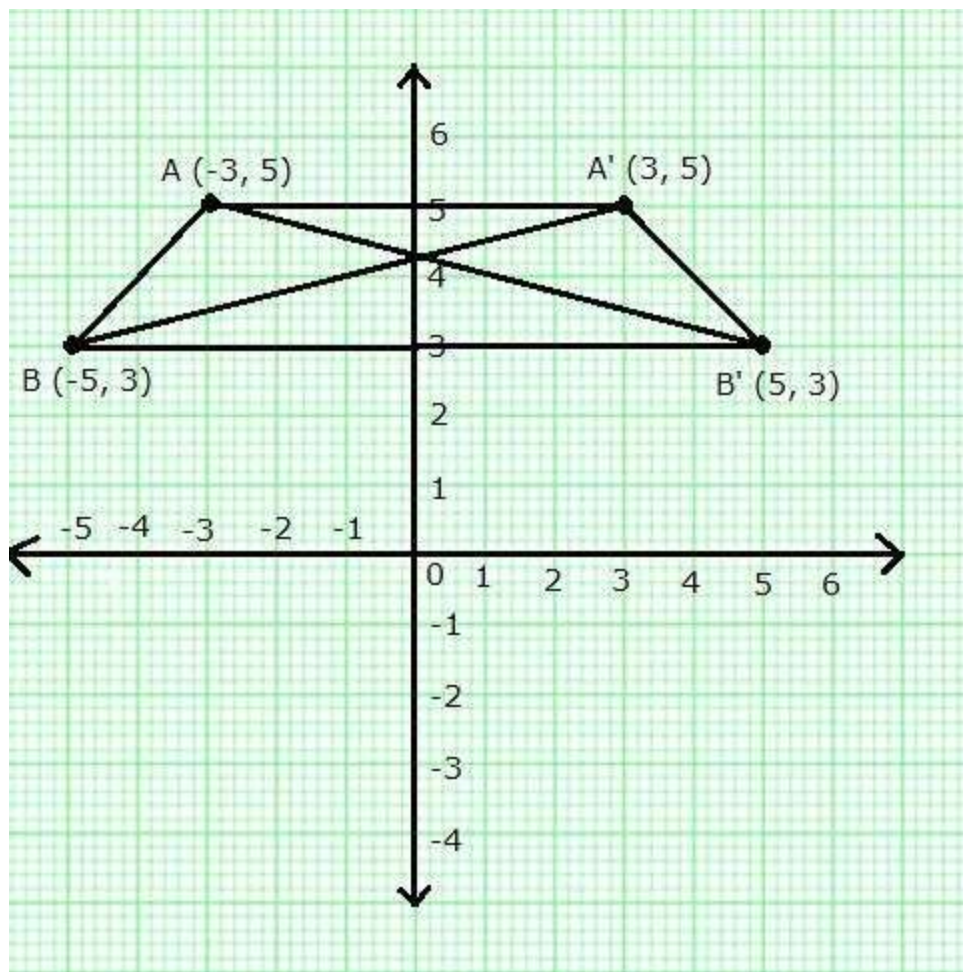
$$(iv) \text{Area of } \triangle PQR = \frac{1}{2} \times PQ \times QR = \frac{1}{2} \times 4 \times 8 = 16 \text{ sq. units}$$

Question PQ.

A' and B' are images of A (-3, 5) and B (-5, 3) respectively on reflection in y-axis. Find:

- (a) the co-ordinates of A' and B'.
- (b) Assign special name of quadrilateral AA'B'B.
- (c) Are AB' and BA' equal in length?

Solution:



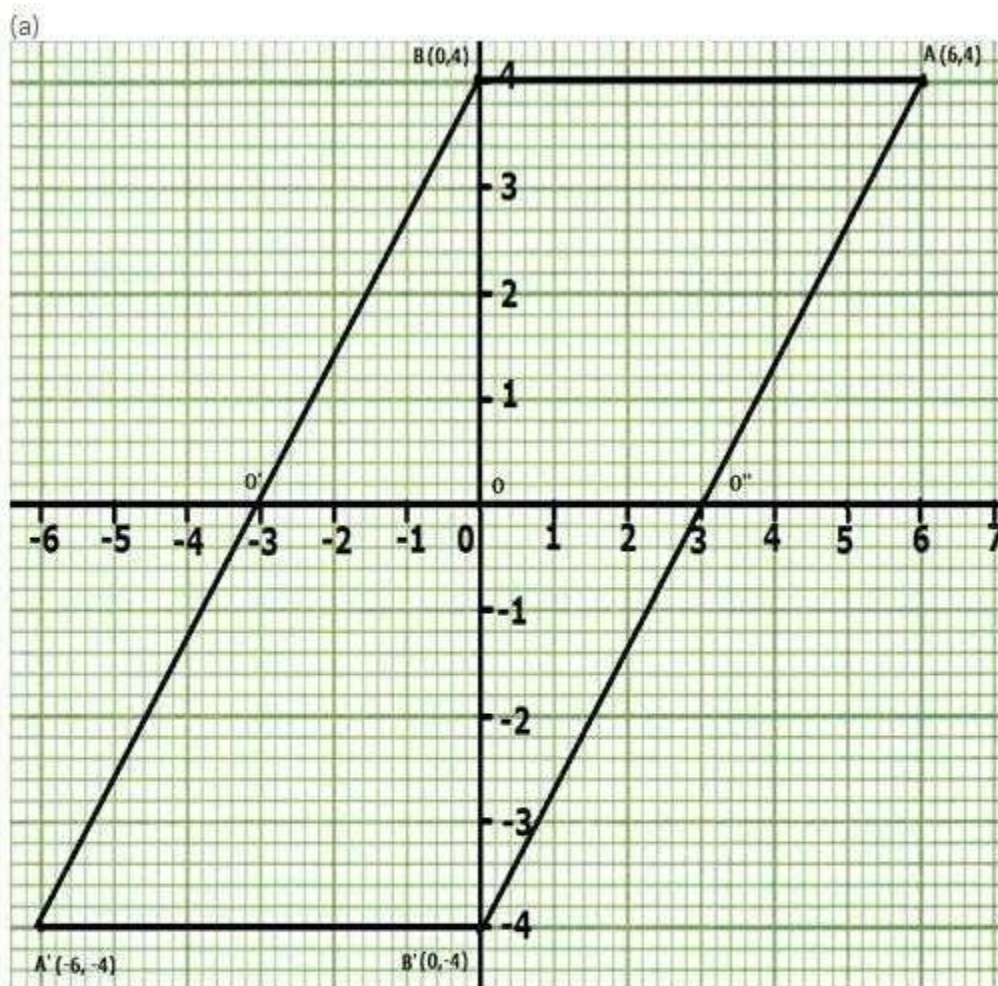
- (a) The co-ordinates of A' and B' are (3, 5) and (5, 3).
- (b) Quadrilateral AA'B'B is an isosceles trapezium.
- (c) Yes, AB' and BA' are equal in length.

Question 15.

Using a graph paper, plot the point A (6, 4) and B (0, 4).

- (a) Reflect A and B in the origin to get the image A' and B'.
- (b) Write the co-ordinates of A' and B'.
- (c) State the geometrical name for the figure ABA'B'.
- (d) Find its perimeter.

Solution:



(b) Co-ordinates of $A' = (-6, -4)$

Co-ordinates of $B' = (0, -4)$

(c) $ABA'B'$ is a parallelogram.

(d) In $\triangle BA'B'$, $BB' = 8$ units, $A'B' = 6$ units

$$\therefore BA' = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10 \text{ units}$$

$$\Rightarrow B'A = 10 \text{ units}$$

$$AB = A'B' = 6 \text{ units}$$

$$\therefore \text{Perimeter of } ABA'B' = AB + BA' + A'B' + B'A = 6 + 10 + 6 + 10 = 32 \text{ units}$$

Question 16.

Use graph paper for this question. (Take 2 cm = 1 unit along both x and y axis. Plot the points O (0, 0), A (-4, 4), B (-3, 0) and C (0, -3)

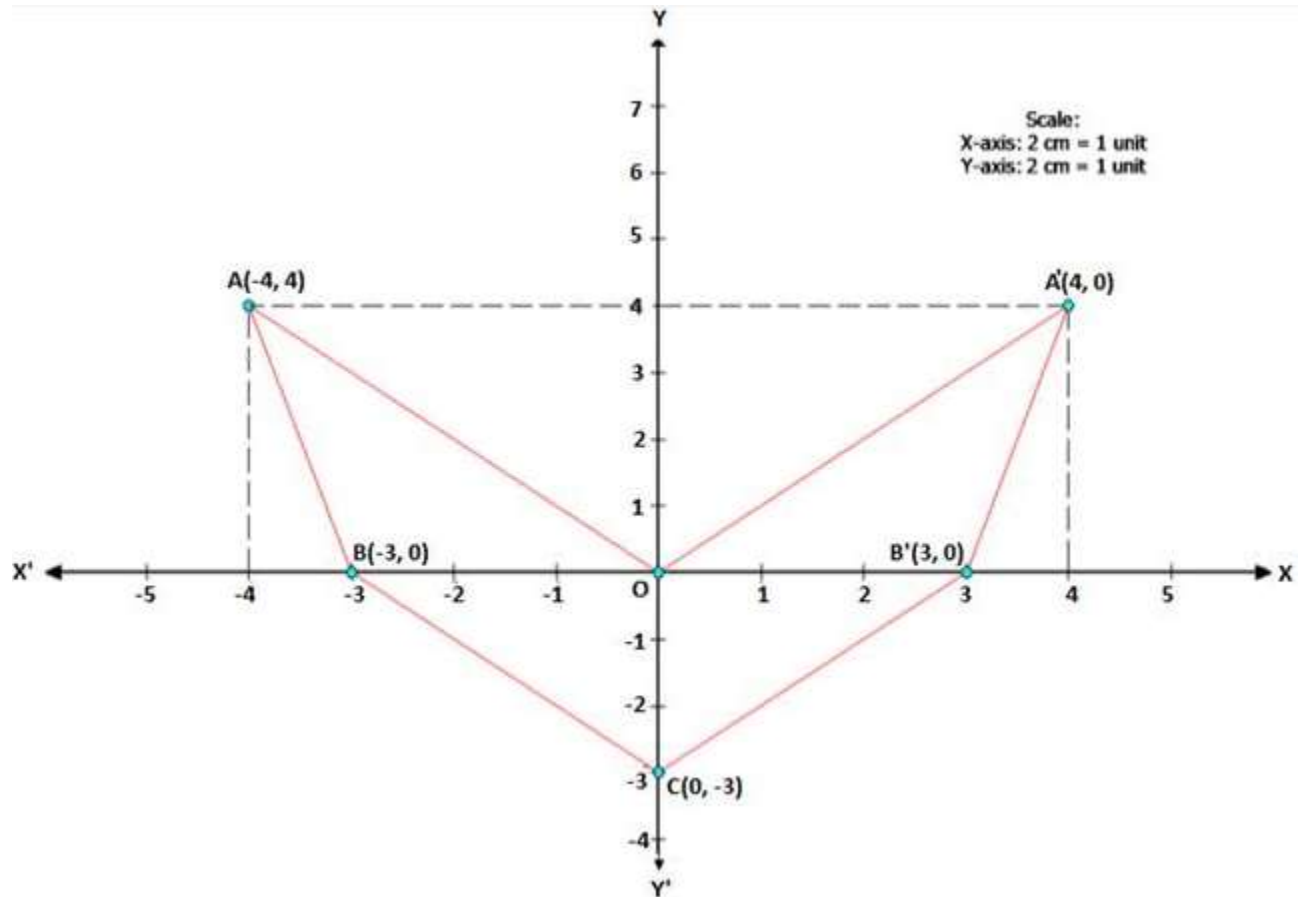
(i) Reflect points A and B on the y-axis and name them A' and B' respectively. Write

down their coordinates.

(ii) Name the figure $OACB'A'$.

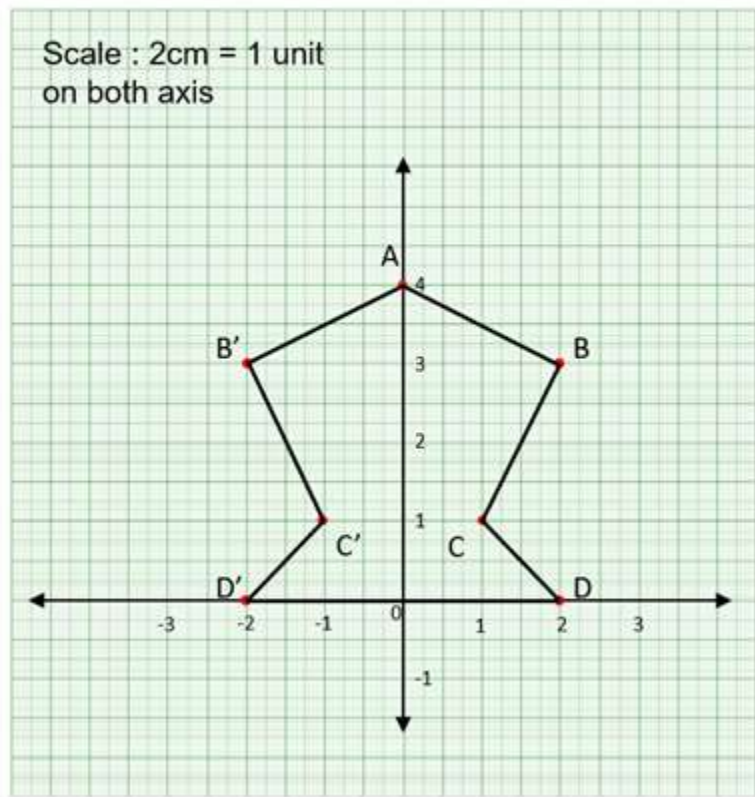
(iii) State the line of symmetry of this figure.

Solution:



1. $A' = (4, 4)$ AND $B' = (3, 0)$
2. The figure is an arrow head.
3. The y-axis i.e. $x = 0$ is the line of symmetry of figure $OACB'A'$.

Question 17.



- (i) Plotting A(0, 4), B(2, 3), C(1, 1) and D(2, 0).
- (ii) Reflected points B'(-2, 3), C'(-1, 1) and D'(-2, 0).
- (iii) The figure is symmetrical about $x = 0$