

## Exercise 12(B)

1. Attempt this question on graph paper.

(a) Plot A (3, 2) and B (5, 4) on graph paper. Take 2 cm = 1 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:

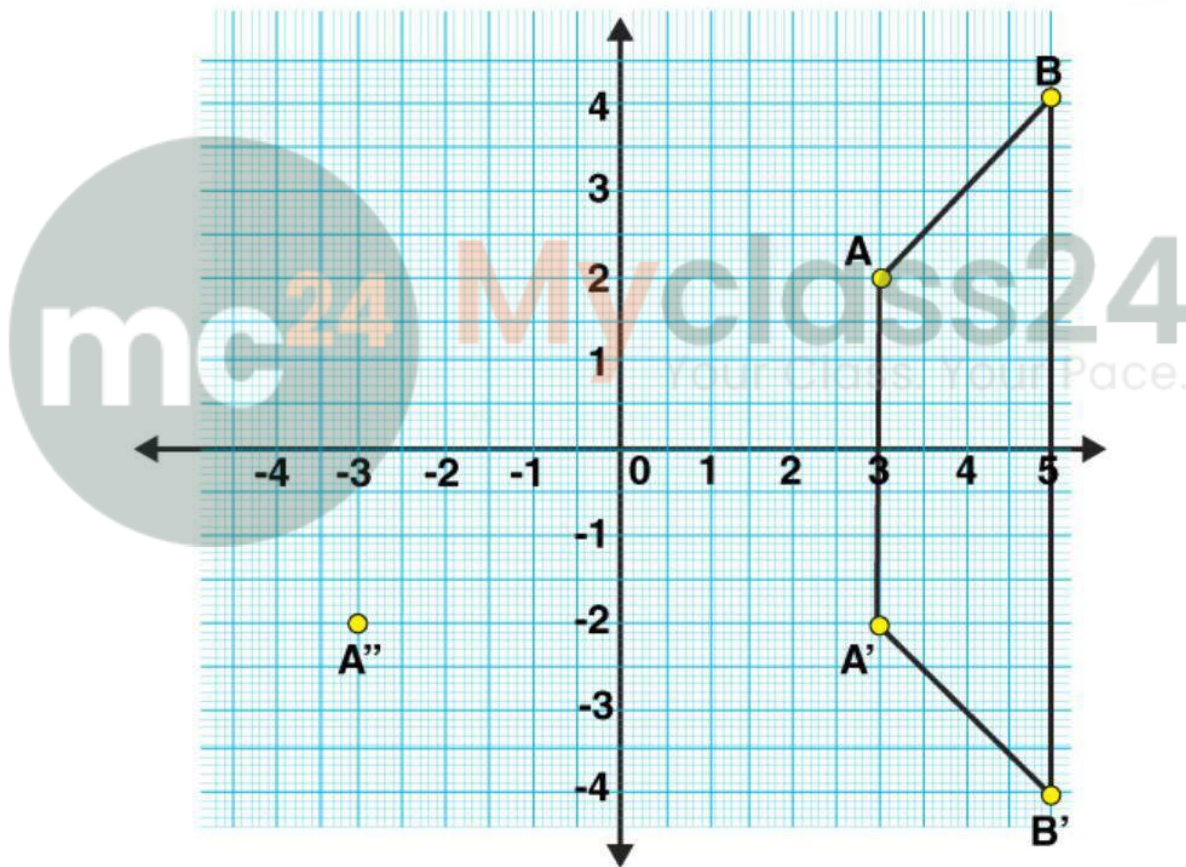
(i) the geometrical name of the figure ABB'A';

(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 the graph, it's clearly seen that ABB'A' is an isosceles trapezium.

(ii) The measure of angle ABB' is  $45^\circ$ .

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

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

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.

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

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

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

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

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

(ii) P' = Image of P (3, 4) in  $L_1 = (3, -4)$

And, Q' = Image of Q (-5, -2) in  $L_1 = (-5, 2)$

(iii) P'' = Image of P (3, 4) in  $L_2 = (-3, 4)$

And, Q'' = Image of Q (-5, -2) in  $L_2 = (5, -2)$

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

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

P' (5, -2) = reflection of P (a, b) in x-axis.

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

Thus, 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.

**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 that, reflection of a point (x, y) in y-axis is (-x, y).

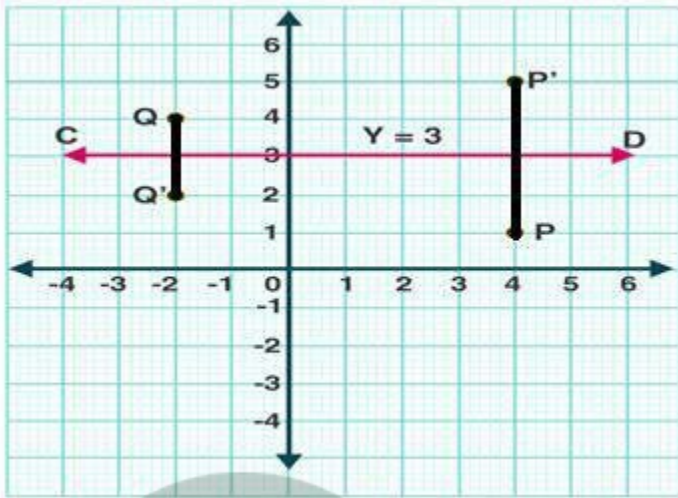
So, the point (-2, 0) when reflected in y-axis is mapped to (2, 0).

Hence, the mirror line is the y-axis and its equation is  $x = 0$ .

(ii) The co-ordinates of the image of  $(-8, -5)$  in the mirror line (i.e., y-axis) are  $(8, -5)$ .

**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.

Let's mark the points P  $(4, 1)$  and Q  $(-2, 4)$ .

Now from P, draw a straight line perpendicular to line CD and produce. Mark a point P' on this line which is at the same distance above CD as P is below it.

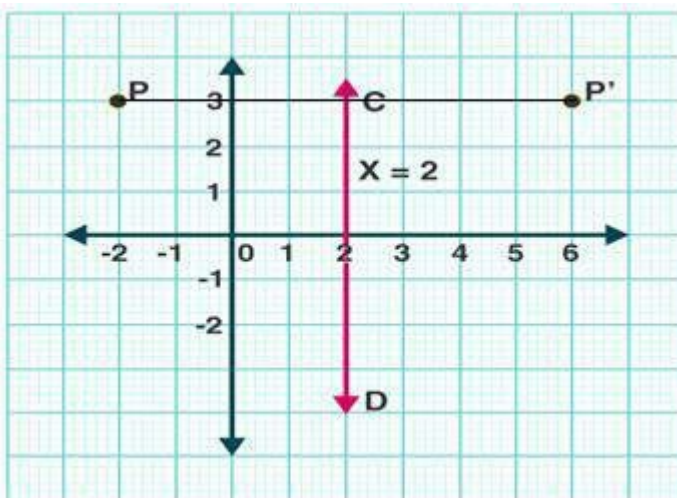
Thus, the co-ordinates of P' are  $(4, 5)$ .

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.

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

**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.

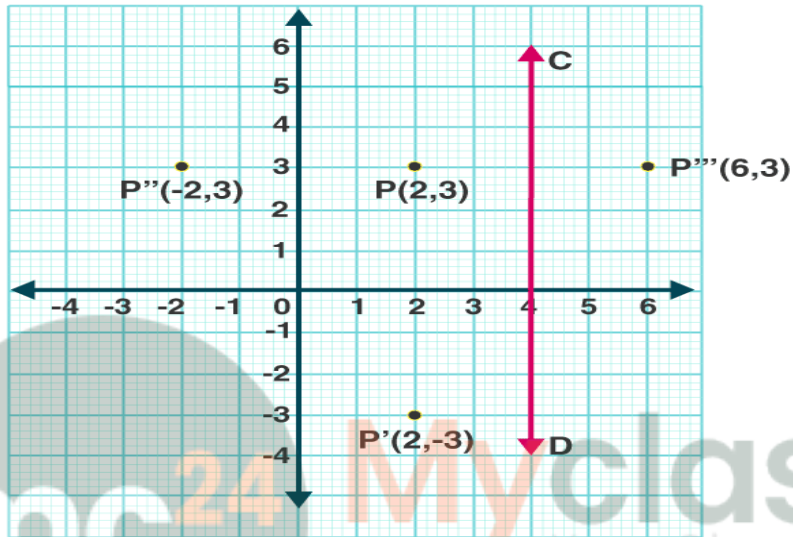
Let's mark the point P  $(-2, 3)$ .

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

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

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

Hence, the co-ordinates of P are (2, 3).

And thus,  $a = 2$  and  $b = 3$ .

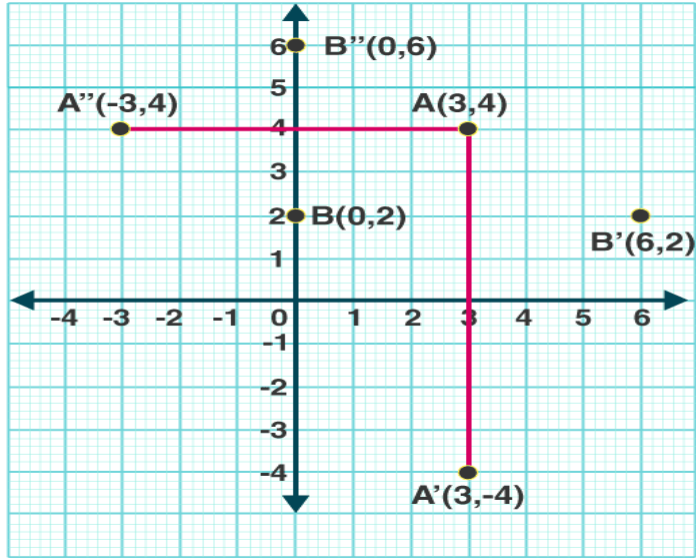
$P'' =$  Image of P reflected in the y-axis = (-2, 3)

$P''' =$  Reflection of P in the line ( $x = 4$ , a line parallel to y-axis and at a distance of 4 units from it) = (6, 3)

**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  $AA'$  ( $x = 3$ ) =  $(6, 2)$
- (c)  $A''$  = Image of  $A$  under reflection in the  $y$ -axis =  $(-3, 4)$
- (d)  $B''$  = Image of  $B$  under reflection in the line  $AA''$  ( $y = 4$ ) =  $(0, 6)$

mc

24

Myclass24  
Your Class. Your Pace.