

Maths Chapter 10 Reflection Ex 10

Question 1.

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

(i) (2, -5)

(ii) $-32, -12$

(iii) (-7, 0)

Solution:

Co-ordinates of the images of the points under reflection in the x-axis will be

(i) Image of (2, -5) will be (2, 5)

(ii) Image of $-\frac{3}{2}, -\frac{1}{2}$ will be $-\frac{3}{2}, \frac{1}{2}$

(iii) Image of (-7, 0) will be (-7, 0)

Question 2.

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

(i) (2, -5)

(ii) $-32, 12$

(iii) (0, -7)

Solution:

Co-ordinates of the image of the points under reflection in the y-axis

(i) Image of (2, -5) will be (-2, -5)

(ii) Image of $-\frac{3}{2}, \frac{1}{2}$ will be $\frac{3}{2}, \frac{1}{2}$

(iii) Image of (0, -7) will be (0, -7)

Question 3.

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

(i) (2, -5)

(ii) $-32, -12$

(iii) (0, 0)

Solution:

Co-ordinates of the image of the points under reflection in the y-axis

(i) Image of (2, -5) will be (-2, 5)

(ii) Image of $\frac{-3}{2}$, $\frac{-1}{2}$ will be $\frac{3}{2}$, $\frac{1}{2}$

(iii) Image of (0, 0) will be (0, 0)

Question 4.

The image of a point P under reflection in the x-axis is (5, -2). Write down the coordinates of P.

Solution:

As the image of a point (5, -2) under x – axis is P

∴ Co-ordinates of P will be (5, 2)

Question 5.

A point P is reflected in the x-axis. Co-ordinates of its image are (8, -6).

(i) Find the co-ordinates of P.

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

Solution:

The co-ordinates of image of P which is reflected in x-axis are (8, - 6), then

(i) Co-ordinates of P will be (8, 6)

(ii) Co-ordinates of image of P under reflection in the y-axis will be (- 8, 6)

Question 6.

A point P is reflected in the origin. Co-ordinates of its image are (2, -5). Find

(i) the co-ordinates of P.

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

Solution:

The co-ordinates of image of a point P which is reflected in origin are (2, - 5), then

(i) Co-ordinates of P will be (- 2, 5)

(ii) Co-ordinates of the image of P in the x- axis will be (- 2, - 5)

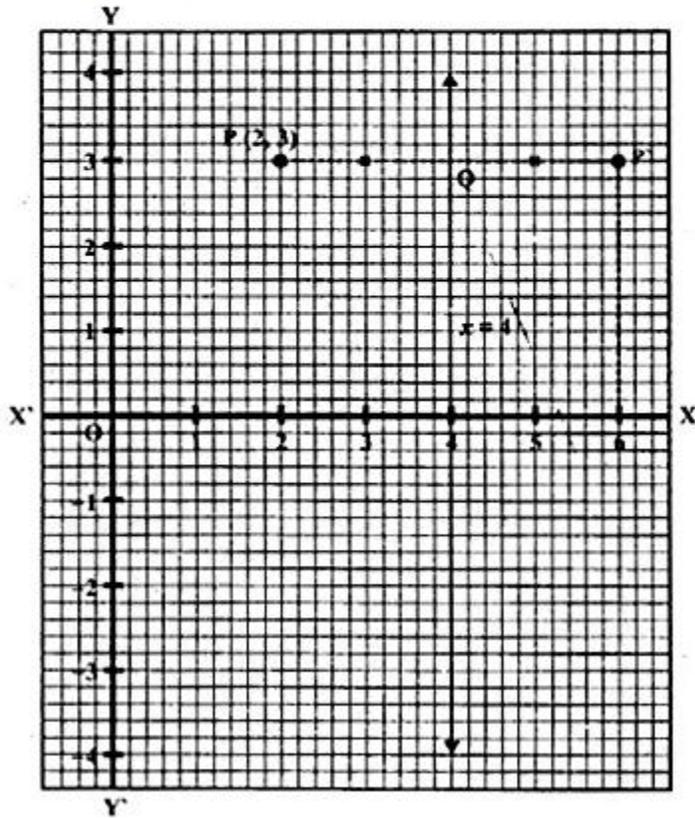
Question 7.

(i) The point P (2, 3) is reflected in the line x = 4 to the point P'. Find the co-ordinates of the point P'.

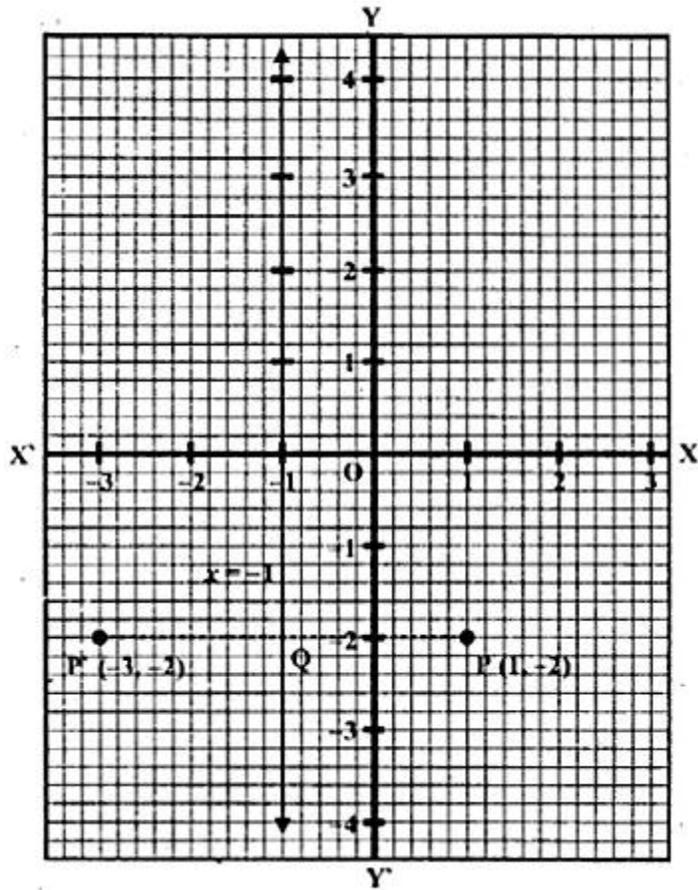
(ii) Find the image of the point P (1, -2) in the line x = -1.

Solution:

- (i) (a) Draw axis XOX' and YOY' and take 1 cm = 1 unit.
 (b) Plot point $P(2, 3)$ on it.
 (c) Draw a line $x = 4$ which is parallel to y -axis.
 (d) From P , draw a perpendicular on $x = 4$, which intersects $x = 4$ at Q .
 (e) Produce PQ to P' , such that $QP' = QP$.
 $\therefore P'$ is the reflection of P in the line $x = 4$
 Co-ordinates of P' are $(6, 3)$



- (ii) (a) Draw axis XOX' and YOY' and take 1 cm = 1 unit.
 (b) Plot the point $P(1, -2)$ on it.
 (c) Draw a line $x = -1$ which is parallel to y -axis.
 (d) From P , draw a perpendicular on the line $x = -1$, which meets it at Q .
 (e) Produce PQ to P' such that $PQ = QP'$
 P' is the image or reflection of P in the line $x = -1$
 Co-ordinates of P' are $(-3, -2)$
 Co-ordinates of P' are $(-3, -2)$



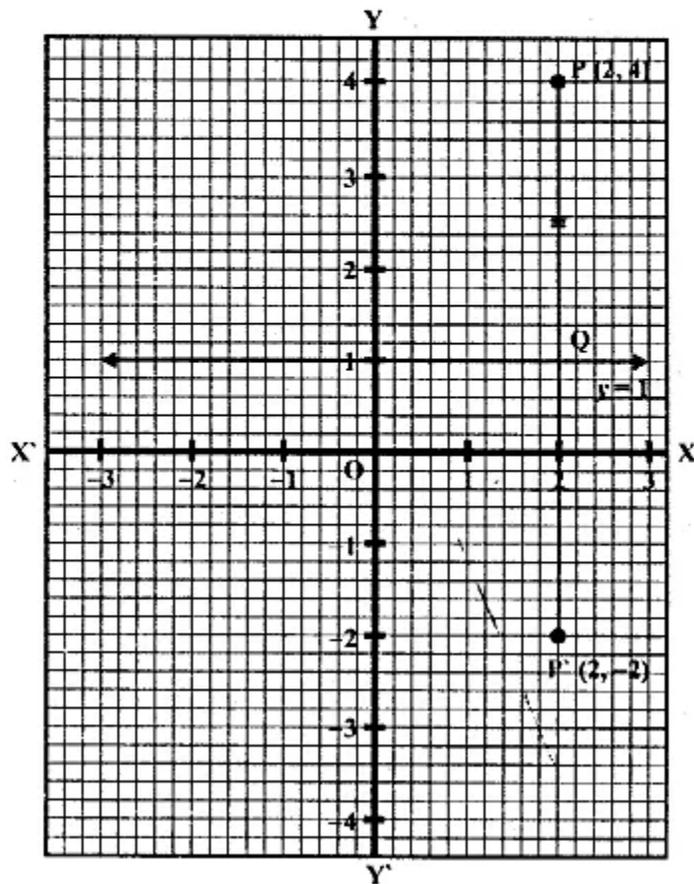
Question 8.

(i) The point $P (2, 4)$ on reflection in the line $y = 1$ is mapped onto P' . Find the co-ordinates of P' .

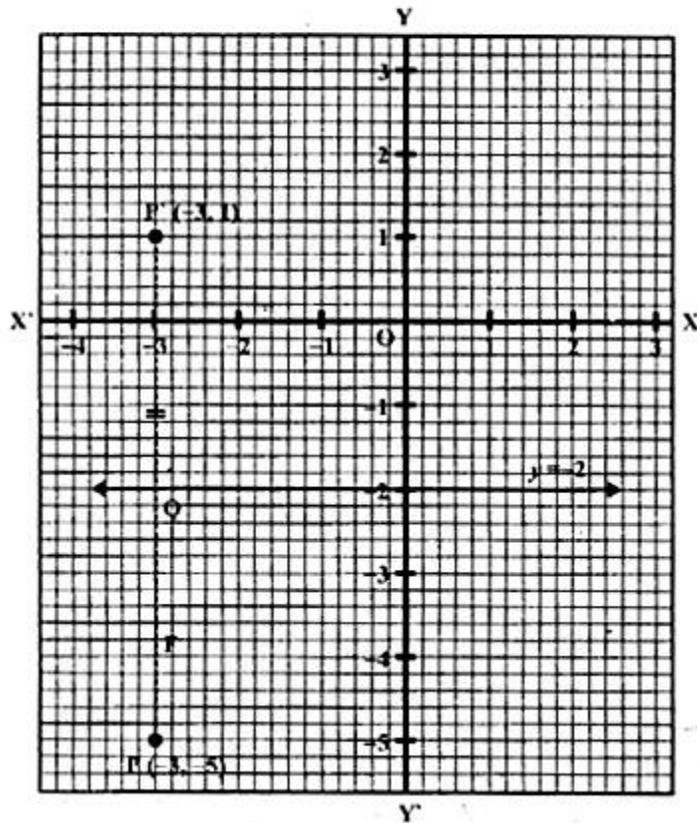
(ii) Find the image of the point $P (-3, -5)$ in the line $y = -2$.

Solution:

- (i) (a) Draw axis XOX' and YOY' and take $1\text{ cm} = 1\text{ unit}$.
(b) Plot point $P(2, 4)$ on it.
(c) Draw a line $y = 1$, which is parallel to x -axis.
(d) From P , draw a perpendicular on $y = 1$ meeting it at Q .
(e) Produce PQ to P' such that $QP' = PQ$.
 P' is the reflection of P whose co-ordinates are $(2, -2)$



- (ii) (a) Draw axis XOX' and YOY' and take 1 cm = 1 unit.
 (b) Plot point $P(-3, -5)$ on it.
 (c) Draw a line $y = -2$ which is parallel to the x-axis.
 (d) From P , draw a perpendicular on $y = -2$ which meets it at Q .
 (e) Produce PQ to P' such that $QP' = PQ$.
 Then P' is the image of P , whose co-ordinates are $(-3, 1)$.



Question 9.

The point $P(-4, -5)$ on reflection in y -axis is mapped on P' . The point P' on reflection in the origin is mapped on P'' . Find the co-ordinates of P' and P'' . Write down a single transformation that maps P onto P'' .

Solution:

P' is the image of point $P(-4, -5)$ in y -axis

\therefore Co-ordinates of P' will be $(4, -5)$

Again P'' is the image of P' under reflection in origin will be $(-4, 5)$.

The single transformation that maps P onto P'' is the x -axis

Question 10.

Write down the co-ordinates of the image of the point (3, -2) when:

(i) reflected in the x-axis

(ii) reflected in the y-axis

(iii) reflected in the x-axis followed by a reflection in the y-axis

(iv) reflected in the origin. (2000)

Solution:

Co-ordinates of the given points are (3, -2).

(i) Co-ordinates of the image reflected in x- axis will be (3, 2)

(ii) Co-ordinates of the image reflected in y- axis will be (-3, -2)

(iii) Co-ordinates of the point reflected in x- axis followed by reflection in the y-axis will be (-3, 2)

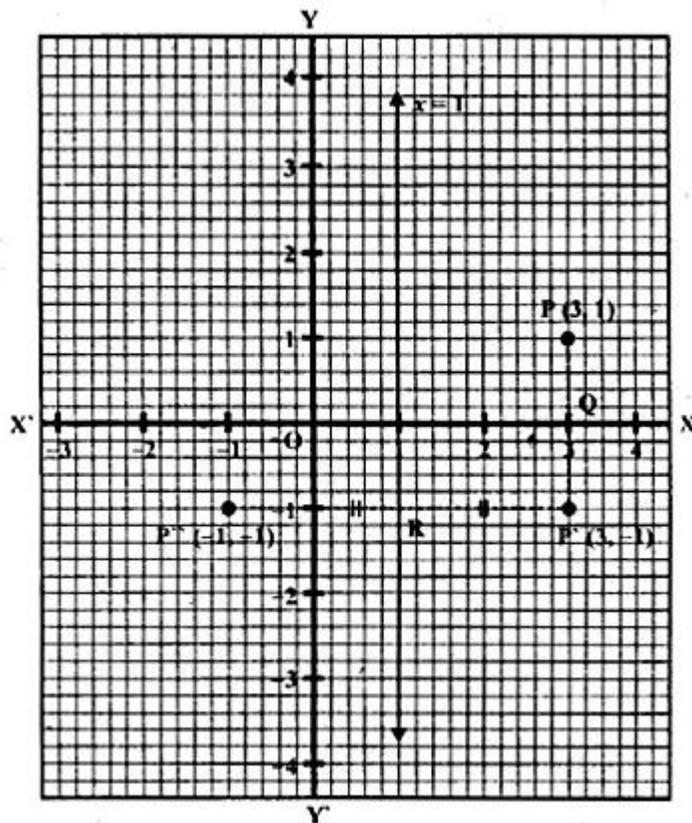
(iv) Co-ordinates of the point reflected in the origin will be (-3, 2)

Question 11.

Find the co-ordinates of the image of (3, 1) under reflection in x-axis followed by a reflection in the line $x = 1$.

Solution:

- (i) Draw axis XOX' and YOY' taking 1 cm = 1 unit.
- (ii) Plot a point $P(3, 1)$.
- (iii) Draw a line $x = 1$, which is parallel to y -axis.
- (iv) From P , draw a perpendicular on x -axis meeting it at Q .
- (v) Produce PQ to P' such that $QP' = PQ$, then P' is the image of P in x -axis. Then co-ordinates of P' will be $(3, -1)$
- (vi) From P' , draw a perpendicular on $x = 1$ meeting it at R .
- (vii) Produce $P'R$ to P'' such that $RP'' = P'R$
 $\therefore P''$ is the image of P' in the line $x = 1$
 Co-ordinates of P'' are $(-1, -1)$



Question 12.

If $P'(-4, -3)$ is the image of a point P under reflection in the origin, find

(i) the co-ordinates of P .

(ii) the co-ordinates of the image of P under reflection in the line $y = -2$.

Solution:

(i) Reflection of P is P' (-4, -3) in the origin

∴ Co-ordinates of P will be (4, 3)

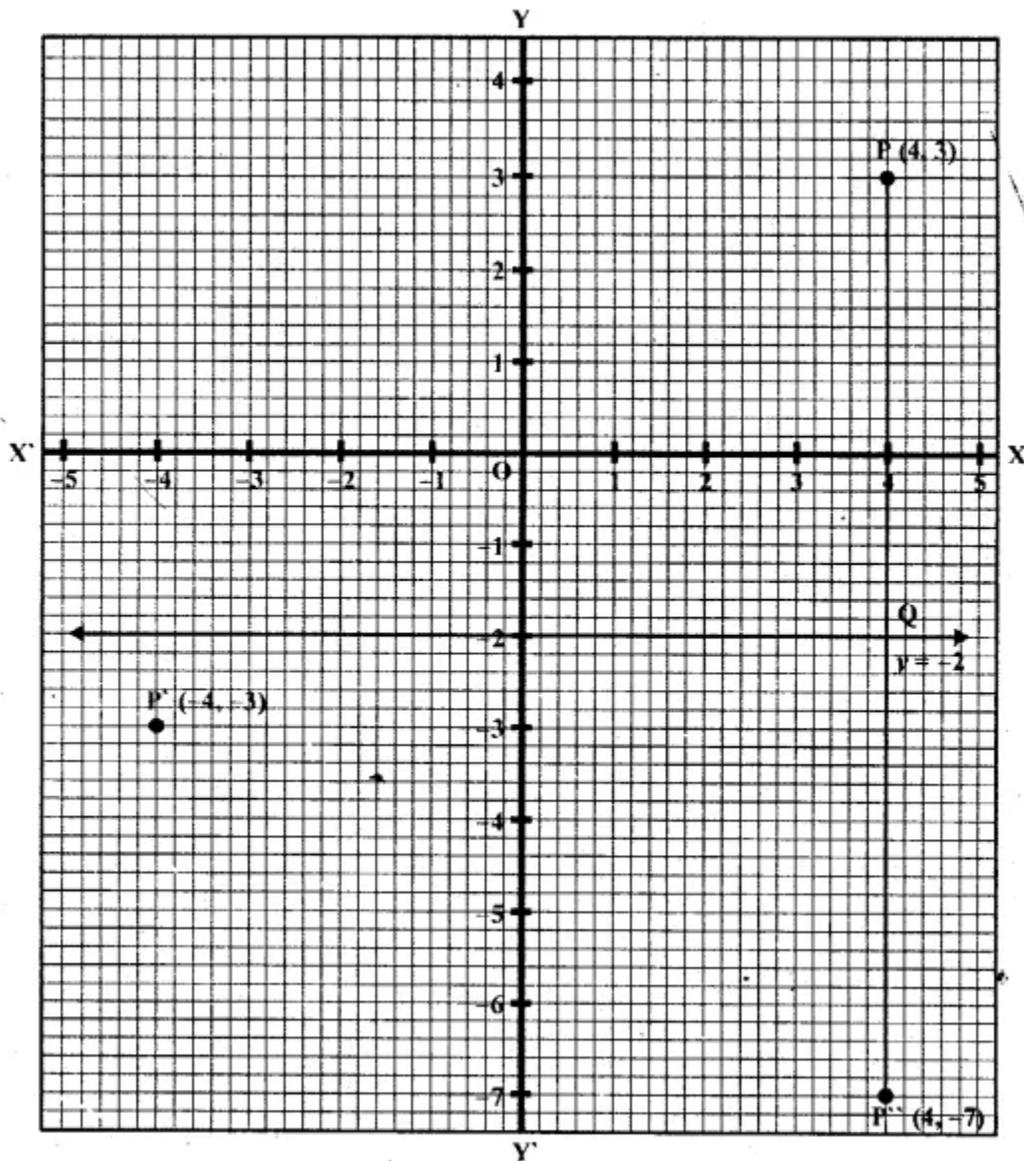
Draw a line $y = -2$, which is parallel to x-axis

(ii) From P, draw a perpendicular on $y = -2$ meeting it at Q

Produce PQ to P'' such that $QP'' = PQ$

∴ P'' will be the image of P in the line $y = -2$

∴ Co-ordinates of P'' will be (4, -7)



Question 13.

A Point P (a, b) is reflected in the x-axis to P' (2, -3), write down the values of

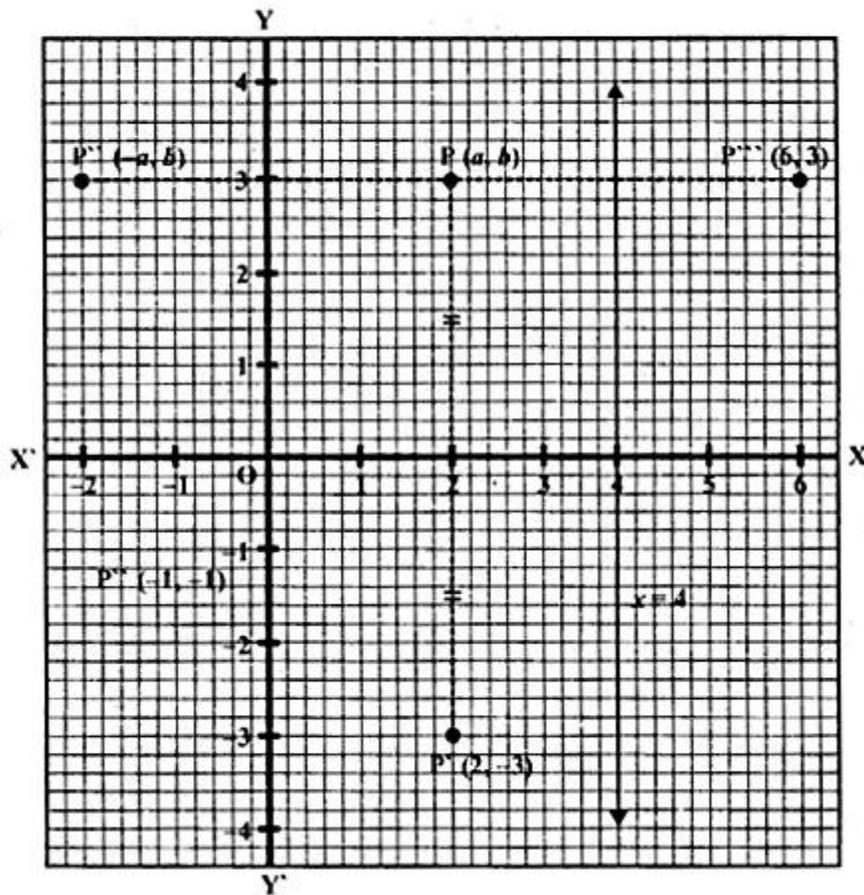
a and b. P'' is the image of P , when reflected in the y -axis. Write down the co-ordinates of P'' . Find the co-ordinates of P''' , when P is reflected in the line parallel to y -axis such that $x = 4$. (1998)

Solution:

P' (2, -3) is the reflection of P (a, b) in the x -axis

∴ Co-ordinates of P' will be P' (a, - b) but P' is (2, -3)

Comparing $a = 2, b = 3$



∴ Co-ordinates of P will be (2, 3)

P'' is the image of P when reflected in y -axis

∴ Co-ordinate of P'' will be (- 2, 3)

Draw a line $x = 4$, which is parallel to y -axis

and P''' is the image of P when it is reflected in the line $x = 4$,

then P''' is its reflection Co-ordinates of P''' will be (6, 3).

Question 14.

(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'' . (1997)

Solution:

(i) Image of P (a, b) reflected in the x -axis to P' ($5, -2$)

$\therefore a = 5$ and $b = 2$

(ii) P'' is the image of P when reflected in the y -axis

\therefore its co-ordinates will be $(-5, -2)$.

(iii) The single transformation that maps P' to P'' is the origin.

Question 15.

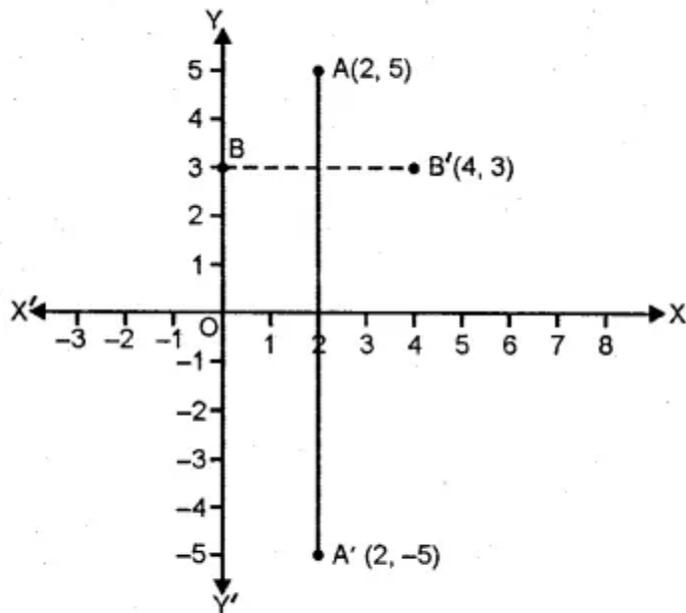
Points A and B have co-ordinates $(2, 5)$ and $(0, 3)$. Find

(i) the image A' of A under reflection in the x -axis.

(ii) the image B' of B under reflection in the line AA' .

Solution:

Co-ordinates of A are $(2, 5)$ and of B are $(0, 3)$



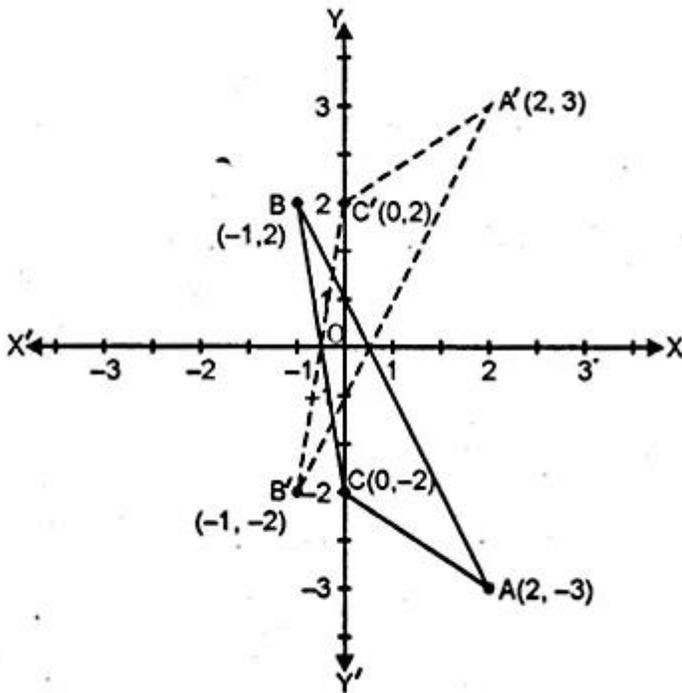
(i) Co-ordinates of A' , the image of A reflected in the x -axis will be $(2, -5)$

(ii) Co-ordinates of B' , the image of B under reflection in the line AA' will be $(4, 3)$.

Question 16.

Plot the points A $(2, -3)$, B $(-1, 2)$ and C $(0, -2)$ on the graph paper. Draw the

triangle formed by reflecting these points in the x-axis. Are the two triangles congruent?



Solution:

The points $A(2, -3)$, $B(-1, 2)$ and $C(0, -2)$ has been plotted on the graph paper as shown and are joined to form a triangle ABC . The co-ordinates of the images of A , B and C reflected in x-axis will be $A'(2, 3)$, $B'(-1, -2)$, $C'(0, 2)$ respectively and are joined to form another $\Delta A'B'C'$

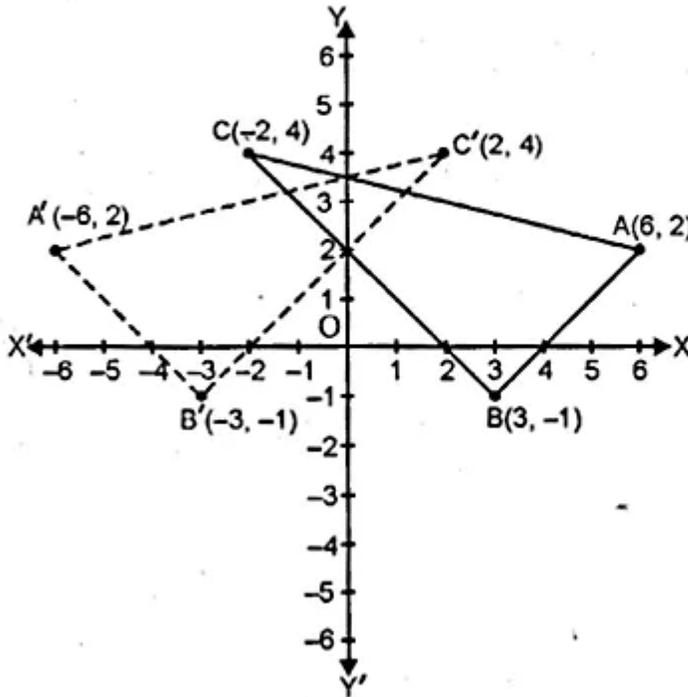
Yes, these two triangles are congruent.

Question 17.

The points $(6, 2)$, $(3, -1)$ and $(-2, 4)$ are the vertices of a right-angled triangle. Check whether it remains a right-angled triangle after reflection in the y-axis.

Solution:

Let $A(6, 2)$, $B(3, -1)$ and $C(-2, 4)$ be the points of a right-angled triangle then the co-ordinates of the images of A, B, C reflected in y -axis be $A'(-6, 2)$, $B'(-3, -1)$ and $C'(2, 4)$.



By joining these points, we find that $\Delta A'B'C'$ is also a right angled triangle.

Question 18.

The triangle ABC where $A(1, 2)$, $B(4, 8)$, $C(6, 8)$ is reflected in the x -axis to triangle $A'B'C'$. The triangle $A'B'C'$ is then reflected in the origin to triangle $A''B''C''$. Write down the co-ordinates of A'', B'', C'' . Write down a single transformation that maps ABC onto $A''B''C''$.

Solution:

The co-ordinates of ΔABC are $A(1, 2)$, $B(4, 8)$, $C(6, 8)$ which are reflected in x -axis as A', B' and C' .

\therefore The co-ordinates of $A'(1, -2)$, $B'(4, -8)$ and $C'(6, -8)$.

A', B' and C' are again reflected in origins to form an $\Delta A''B''C''$.

\therefore The co-ordinates of A'' will be $(-1, 2)$, $B''(-4, 8)$ and $C''(-6, 8)$

The single transformation that maps ABC onto $A''B''C''$ is y -axis.

Question 19.

The image of a point P on reflection in a line l is point P'. Describe the location of the line l.

Solution:

The line will be the right bisector of the line segment joining P and P'.

Question 20.

Given two points P and Q, and that (1) the image of P on reflection in the y-axis is the point Q and (2) the midpoint of PQ is invariant on reflection in x-axis. Locate

(i) the x-axis

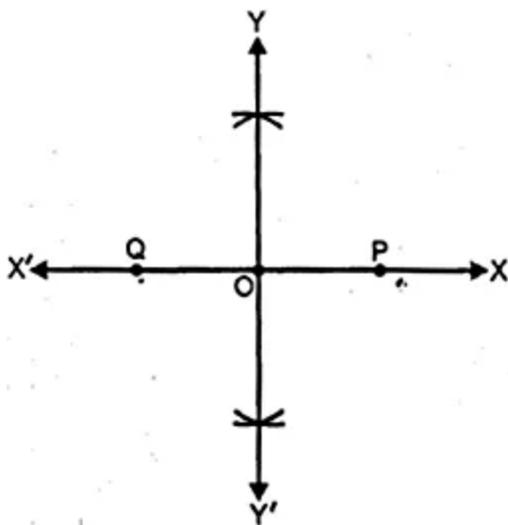
(ii) the y-axis and

(iii) the origin.

Solution:

Q is the image of P on reflection in y-axis

and mid point of PQ is invariant on reflection in x-axis



(i) x-axis will be the line joining the points P and Q.

(ii) The line perpendicular bisector of line segment PQ is the y-axis.

(iii) The origin will be the mid point of line segment PQ.

Question 21.

The point (-3, 0) on reflection in a line is mapped as (3, 0) and the point (2, -3) on reflection in the same line is mapped as (-2, -3).

(i) Name the mirror line.

(ii) Write the co-ordinates of the image of (-3, -4) in the mirror line.

Solution:

The point $(-3,0)$ is the image of point $(3, 0)$

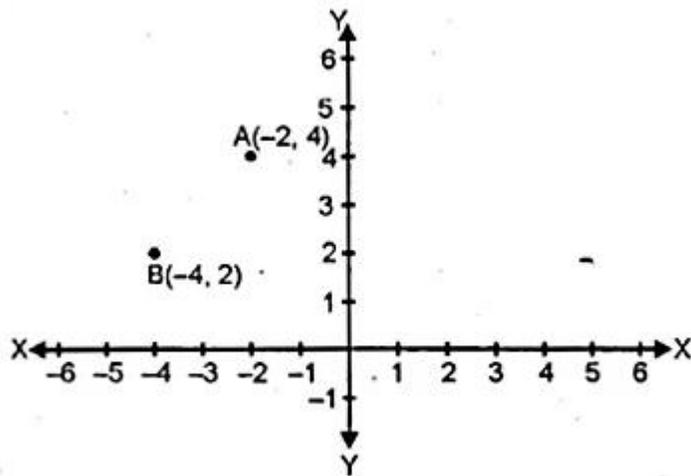
and point $(2, -3)$ is image of point $(-2, -3)$ reflected on the same line.

(i) It is clear that the mirror line will be y -axis.

(ii) The co-ordinates of the image of the point $(-3, -4)$ reflected in the same line i.e. y -axis will be $(3, -4)$.

Question 22.

A $(-2, 4)$ and B $(-4, 2)$ are reflected in the y -axis. If A' and B' are images of A and B respectively, find



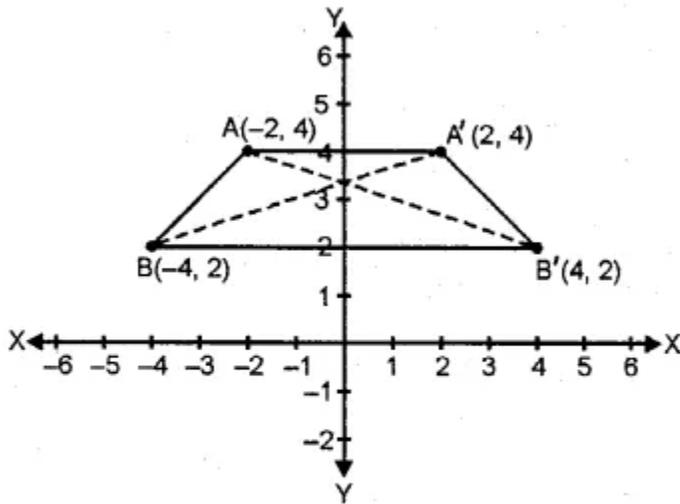
(i) the co-ordinates of A' and B' .

(ii) Assign a special name to a quad. $AA'B'B$.

(iii) State whether $AB' = BA'$.

Solution:

A (-2, 4) and B (-4, 2) are reflected in y-axis as A' and B'.



- (i) Co-ordinates of A' are (2, 4) and of B are (4, 2).
- (ii) The quadrilateral AA' B' B is an isosceles trapezium.
- (iii) yes, $AB' = BA'$

Question 23.

Use graph paper for this question.

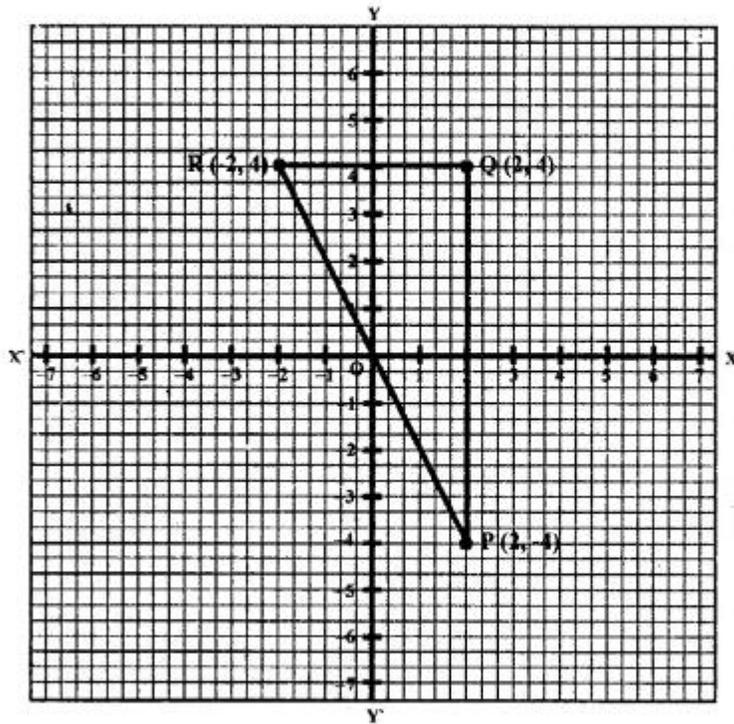
- (i) The point P (2, -4) is reflected about the line $x = 0$ to get the image Q. Find the co-ordinates of Q.
- (ii) Point Q is reflected about the line $y = 0$ to get the image R. Find the co-ordinates of R.
- (iii) Name the figure PQR.
- (iv) Find the area of figure PQR. (2007)

Solution:

(i) Since the point Q is the reflection of the point P (2, -4) in the line $x = 0$, the co-ordinates of Q are (2, 4).

(ii) Since R is the reflection of Q (2, 4) about the line $y = 0$, the co-ordinates of R are (-2, 4).

(iii) Figure PQR is the right angled triangle PQR.



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

Question 24.

Use graph paper for this question. The point P (5, 3) was reflected in the origin to get the image P'.

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

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

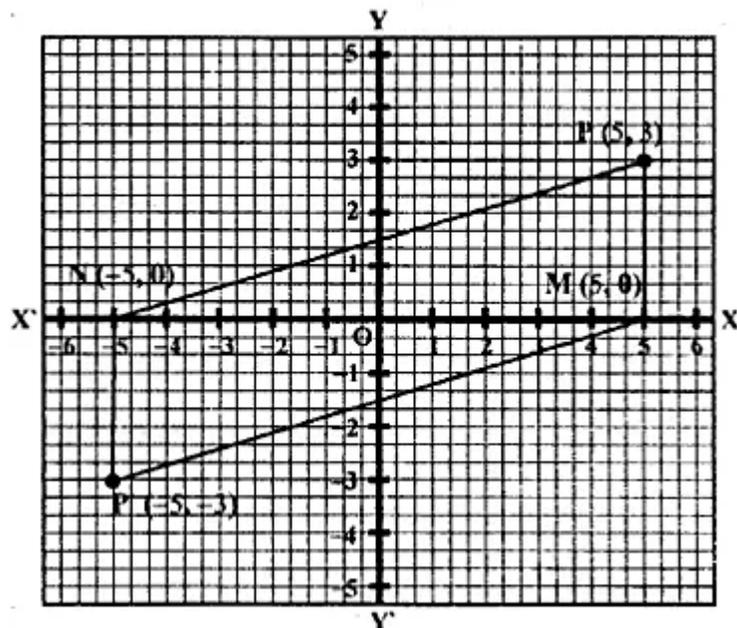
(iii) If N is the foot of the perpendicular from P' to the x-axis, find the co-ordinates of N.

(iv) Name the figure PMP'N.

(v) Find the area of the figure PMP'N. (2001)

Solution:

P' is the image of point P (5, 3) reflected in the origin.



(i) Co-ordinates of P' will be (-5, -3).

(ii) M is the foot of the perpendicular from P to the x-axis.

Co-ordinates of M will be (5, 0)

(iii) N is the foot of the perpendicular from P' to x-axis.

Co-ordinates of N will be (-5, 0).

(iv) By joining the points, the figure PMP'N is a parallelogram.

(v) Area of the parallelogram = 2 x area of Δ MPN

$$= 2 \times \frac{1}{2} \times MN \times PM = MN \times PM$$

$$= 10 \times 3 = 30 \text{ sq. units.}$$

Question 25.

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

(i) Reflect A and B in the origin to get the images A' and B'.

(ii) Write the co-ordinates of A' and B'.

(iii) State the geometrical name for the figure ABA'B'.

(iv) Find its perimeter.

Solution:

(i) A (6, 4), B (0, 4)

(ii) A (6, 4) $\xrightarrow{\text{origin}}$ A' (-6, -4)

B (0, 4) $\xrightarrow{\text{origin}}$ B' (0, -4)

(iii) ABA'B' is a parallelogram

$$(iv) AB' = \sqrt{(AB)^2 + (BB')^2} = \sqrt{(6)^2 + (8)^2}$$

$$= \sqrt{36+64} = \sqrt{100} = 10 \text{ units}$$

Perimeter = Sum of all sides = 6 + 10 + 6 + 10 = 32 units

Question 26.

Use graph paper to answer this question

(i) Plot the points A (4, 6) and B (1, 2).

(ii) If A' is the image of A when reflected in x-axis, write the co-ordinates of A'.

(iii) If B' is the image of B when B is reflected in the line AA', write the co-ordinates of B'.

(iv) Give the geometrical name for the figure ABA'B'. (2009)

Solution:

(i) Plotting the points A (4, 6) and B (1, 2) on the given graph.

(ii) A' = (4, -6)

(iii) B' = (7, 2)

(iv) In the quadrilateral ABA'B', we have AB = AB' and A'B = A'B'

Hence, ABA'B' is a kite.

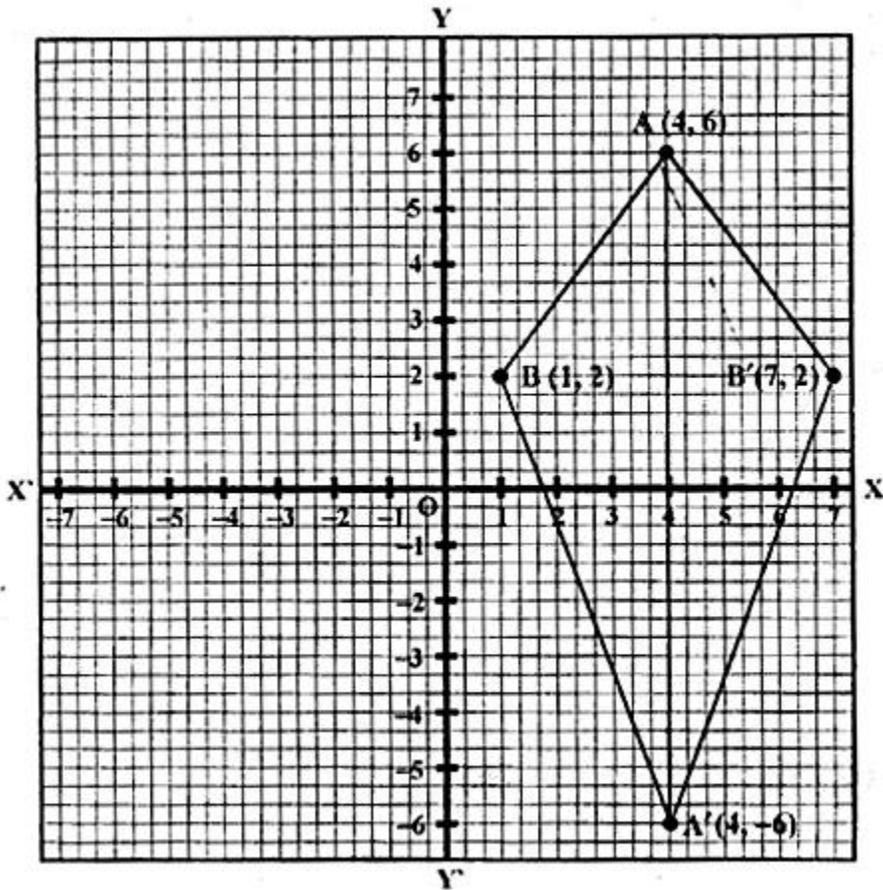
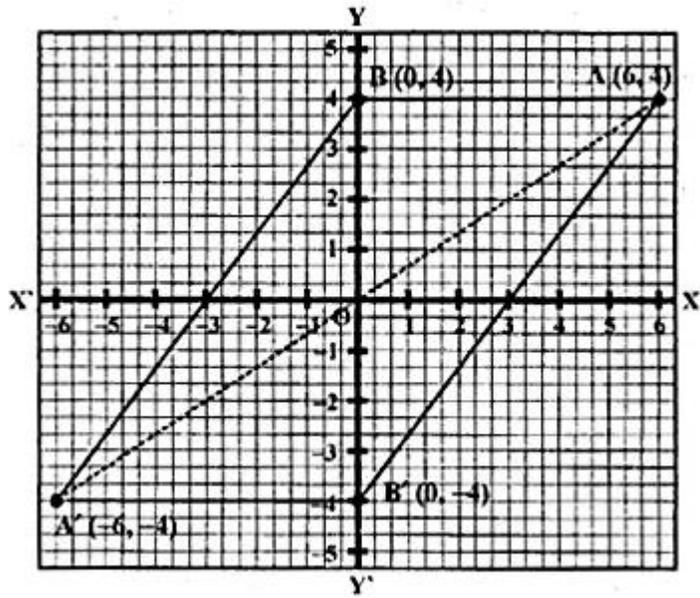
Question 27.

The points A (2, 3), B (4, 5) and C (7, 2) are the vertices of $\triangle ABC$. (2006)

(i) Write down the co-ordinates of A1, B1, C1 if $\triangle A1B1C1$ is the image of $\triangle ABC$ when reflected in the origin.

(ii) Write down the co-ordinates of A2, B2, C2 if $\triangle A2B2C2$ is the image of $\triangle ABC$ when reflected in the x-axis.

(iii) Assign the special name to the quadrilateral BCC2B2 and find its area.



Solution:

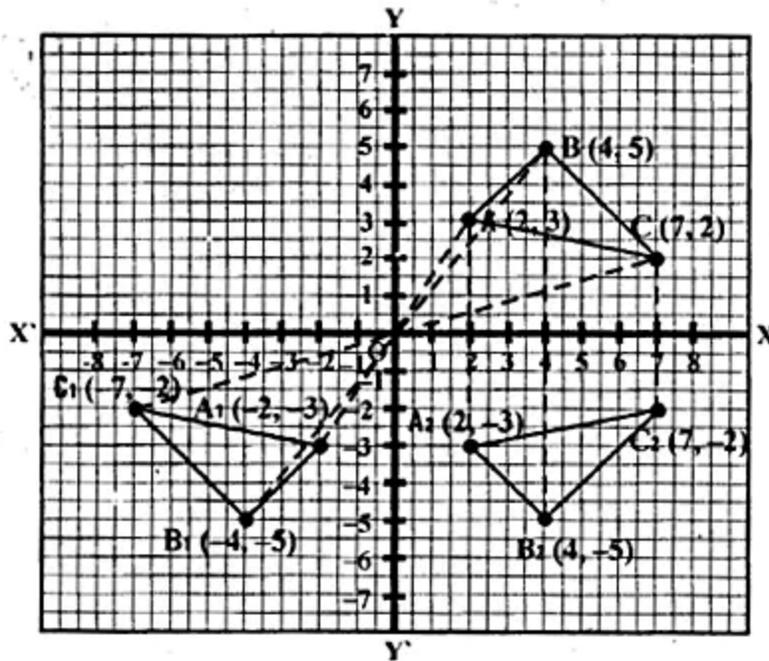
Points A (2, 3), B (4, 5) and C (7, 2) are the vertices's of ΔABC .

A₁, B₁ and C₁ are the images of A, B and C reflected in the origin.

(i) Co-ordinates of A₁ = (-2, -3) of B₁ (-4, -5) and of C₁ (-7, -2).

(ii) Co-ordinates of A₂, B₂ and C₂ the images of A, B and C when reflected in x-axis are A₂ (2, -3), B₂ (4, -5), C₂ (7, -2)

(iii) The quadrilateral formed by joining the points, BCC₂B₂ is an isosceles trapezium and its area



(iii) The quadrilateral formed by joining the points, BCC₂B₂ is an isosceles trapezium and its area

$$= \frac{1}{2} (BB_2 + CC_2) \times 3 = \frac{1}{2} (10 + 4) \times 3$$

$$= \frac{1}{2} \times 14 \times 3 = 21 \text{ sq. units}$$

Question 28.

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

(i) the co-ordinates of P' and O',

(ii) the length of segments PP' and OO'.

(iii) the perimeter of the quadrilateral POP'O'.

Solution:

P' is the image of P (3, 4) reflected in x-axis

and O' is the image of O the origin in the line P'P.

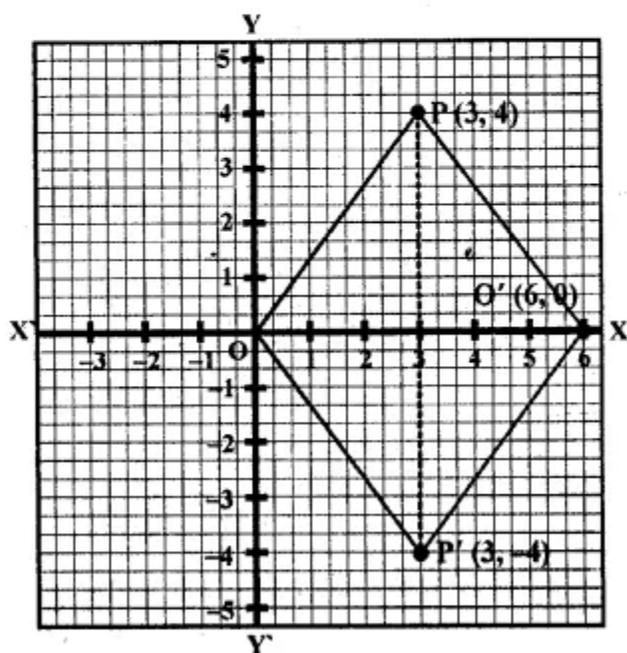
(i) Co-ordinates of P' are (3, -4)

and co-ordinates of O' reflected in PP' are (6, 0)

(ii) Length of PP' = 8 units and OO' = 6 units

(iii) Perimeter of POP'O' is

$$4 \times OP = 4 \times \sqrt{(OQ)^2 + (PQ)^2} = 4\sqrt{3^2 + 4^2}$$



$$= 4\sqrt{(9 + 16)} = 4 \times \sqrt{25} = 4 \times 5 = 20 \text{ units}$$

Question 29.

Use a graph paper for this question. (Take 10 small divisions = 1 unit on both axes). P and Q have co-ordinates (0, 5) and (-2, 4).

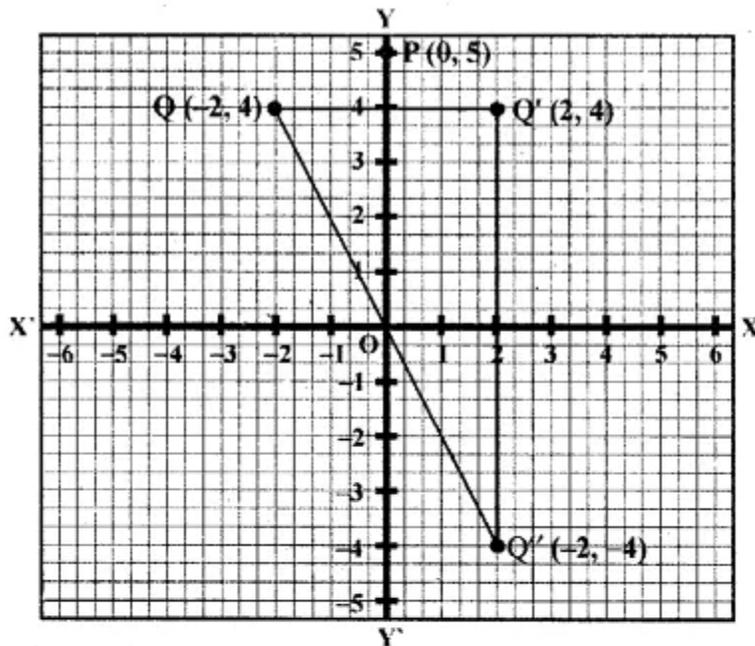
(i) P is invariant when reflected in an axis. Name the axis.

(ii) Find the image of Q on reflection in the axis found in (i).

(iii) (0, k) on reflection in the origin is invariant. Write the value of k.

(iv) Write the co-ordinates of the image of Q, obtained by reflecting it in the origin followed by a reflection in x-axis. (2005)

Solution:



(i) Two points $P(0, 5)$ and $Q(-2, 4)$ are given. As the abscissa of P is 0,

it is invariant when reflected in the y -axis.

(ii) Let Q' be the image of Q on reflection in the y -axis.

Co-ordinates of Q' will be $(2, 4)$

(iii) $(0, k)$ on reflection in the origin is invariant.

Co-ordinates of image will be $(0, 0)$. $k = 0$

(iv) The reflection of Q in the origin is the point Q''

and its co-ordinates will be $(2, -4)$

and reflection of $Q''(2, -4)$ in the x -axis is $(2, 4)$ which is the point Q'