

Reflection

REFLECTION

EXERCISE - 10.1

Q1. Find the co-ordinates of the images of the following points under reflections in the x -axis.

(i) $(2, -5)$

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

(ii) $(-\frac{3}{2}, -\frac{1}{2})$

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

(iii) $(-7, 0)$

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

Q2. Find the co-ordinates of the images of the following points under reflection in the y -axis.

(i) $(2, -5)$

Image of $(2, -5) = (-2, -5)$.

(ii) $(-\frac{3}{2}, \frac{1}{2})$

Image of $(-\frac{3}{2}, \frac{1}{2}) = (\frac{3}{2}, \frac{1}{2})$

(iii) $(0, -7)$

Image of $(0, -7) = (0, -7)$

Q3. Find the co-ordinates of the images of the following points under reflection in the origin:

(i) $(2, -5)$

Image of $(2, -5) = (-2, 5)$

(ii) $(-\frac{3}{2}, -\frac{1}{2})$

Image of $(-\frac{3}{2}, -\frac{1}{2}) = (\frac{3}{2}, \frac{1}{2})$

(iii) $(0,0)$

Image of $(0,0) = (0,0)$.

Q4. The image of point P under reflection in the x-axis is $(5, -2)$ write down the coordinates of P.

Sol. Coordinates of P under x-axis will be $(5, 2)$

Q5. A point P is reflected in the x-axis, coordinates of its image are $(8, -6)$

(i) find the coordinates of P. (ii) find the coordinates of the image of P under reflection in the y-axis.

Sol. (i) Coordinates of P under x-axis will be $(8, 6)$

(ii) Coordinates of P under y-axis will be $(-8, 6)$

Q6. A point P is reflected in the origin. coordinates of its image are $(2, -5)$, find: (i) the coordinates of P (ii) the coordinates of the image of P in the x-axis.

Sol. (i) The coordinates of P will be $(-2, 5)$

(ii) Coordinates of P in the x-axis will be $(-2, -5)$

Q7. (i) The point P $(2, 3)$ is reflected in the line $x = 4$ to the point P'. Find the coordinates of the point P'.

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

Q9. The point $P(-4, -5)$ on the reflection in y -axis is mapped on P' . The point P' on reflection in the origin is mapped on P'' . Find the coordinates of P' and P'' . Write down a single transformation that maps P onto P'' .

Sol. P' is the image of point $P(-4, -5)$ in y -axis.
 \therefore coordinates of P' will be $(4, -5)$. Again P'' is the image of P' under reflection in origin will be $(-4, 5)$.
 \therefore The single transformation that maps P onto P'' is x -axis.

Q10. Write down the co-ordinates of the image of the point $(3, -2)$ when:

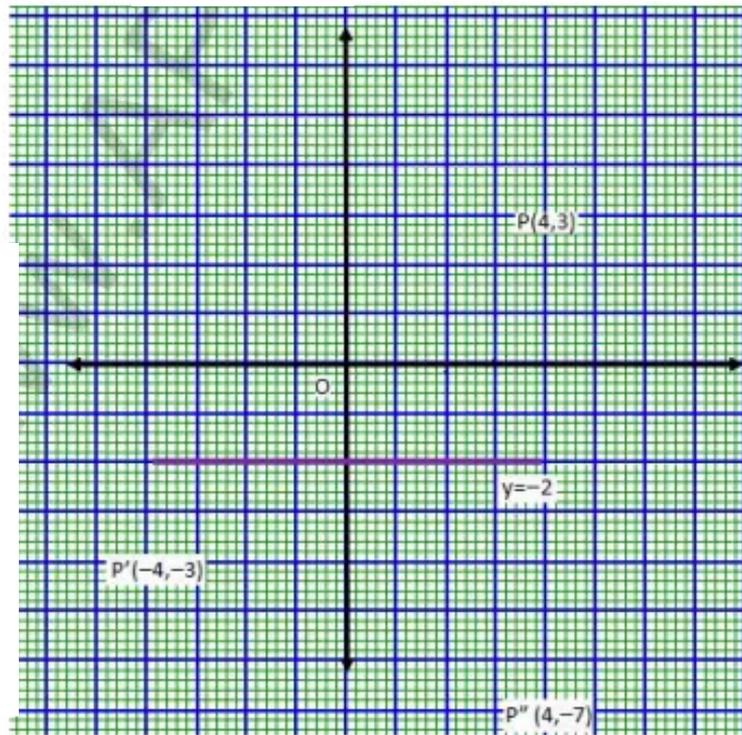
- (i) reflected in the x -axis
- (ii) reflected in the y -axis
- (iii) reflected in the x -axis followed by reflected in y -axis.
- (iv) reflected in the origin.

Sol. coordinates of the given points are $(3, -2)$.

- (i) coordinates of the image reflected in the x -axis will be $(3, 2)$.
- (ii) coordinates of the image reflected in the y -axis will be $(-3, -2)$.
- (iii) coordinates of the point reflected in x -axis followed by reflected in y -axis will be $(3, -2)$
- (iv) coordinates of the point reflected in the origin will be $(-3, 2)$.

- Q12. If $P'(-4, -3)$ is the image of the point P under reflection in the origin, find (i) the co-ordinates of P (ii) the co-ordinates of P under reflection in the line $y = -2$.

Sol.

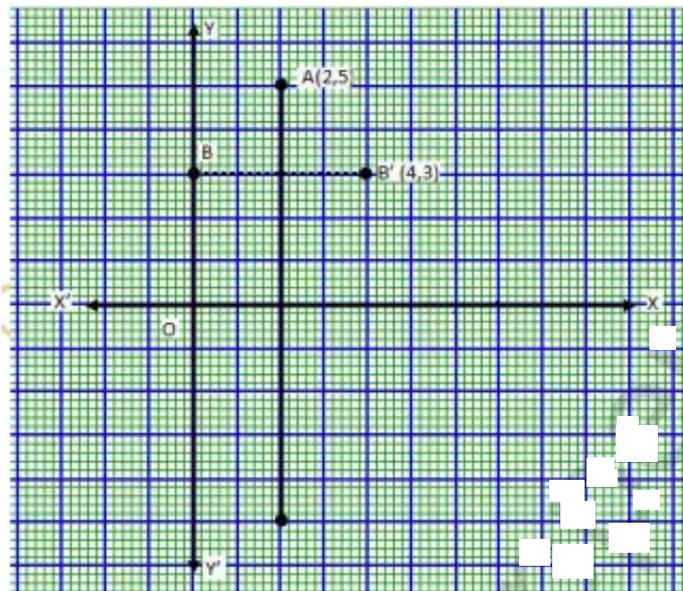


14. (i) point $P(a, b)$ is reflected in the x -axis to $P'(5, -2)$.
 write down the values of a & b .
 (ii) P'' is the image of P when reflected in the y -axis.
 write down the co-ordinates of P'' .
 (iii) Name a single transformation that maps P' to P'' .

- Sol. (i) Image of $P(a, b)$ reflected in the x -axis to $P'(5, -2)$
 $\therefore a = 5, b = 2$.
 (ii) co-ordinates of P'' will be $(-5, -2)$
 (iii) The single transformation that maps P' to P''
 is origin.

- Q15. points A and B have coordinates $(2, 5)$ 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'

Sol.



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

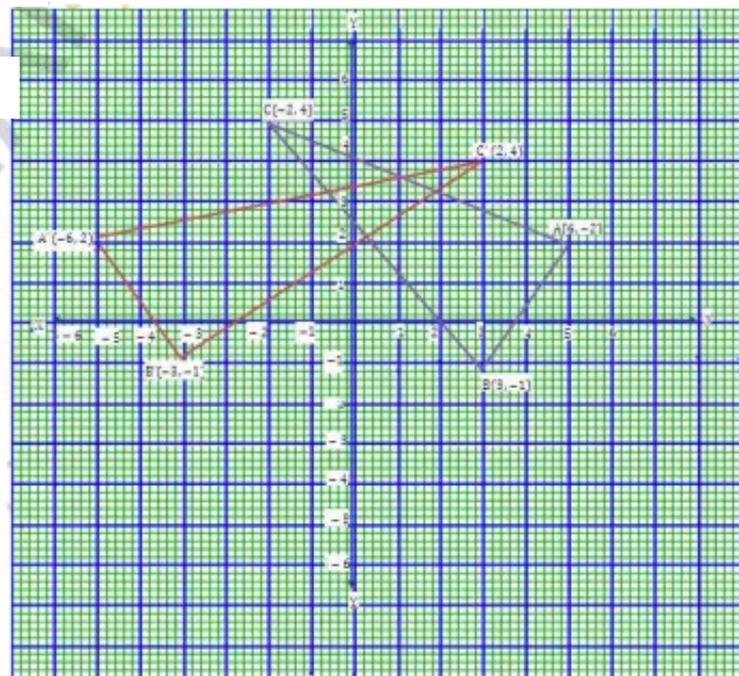
- (i) coordinates of A' , the image of A reflected in the x-axis will be $(2, -5)$.
 (ii) coordinates of B' , the image of B reflected in the line AA' will be $(4, 3)$

- Q16. plot the point $A(2, -3)$, $B(-1, 2)$ 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?

Sol. The point $A(2, -3)$, $B(-1, 2)$ 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 & C reflected in x-axis will be $A'(2, 3)$, $B'(-1, -2)$, $C'(0, 2)$ respectively and are joined to form another $\Delta A'B'C'$
 \therefore Yes, these two triangles are congruent.

Q17. 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.

Sol. The coordinates of the images of A, B & C reflected on y -axis be $A'(-6, 2)$, $B'(-3, -1)$ & $C'(2, 4)$. By joining these points, we find that $\Delta A'B'C'$ is also a right angled triangle.



Q18. 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 a single transformation that maps ABC onto $A''B''C''$.

Sol. The co-ordinates of $\triangle ABC$ are $A(1, 2)$, $B(4, 8)$, $C(6, 8)$ which are reflected in x -axis as $A', B' \& C'$

\therefore The coordinates of $A'(1, -2)$, $B'(4, -8)$ and $C'(6, -8)$ $A', B' \& C'$ are again reflected in origin to form a $\triangle A''B''C''$.

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

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

Q19. The image of a point P on reflection in line L is point P' . Describe the location of the line L .

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

Q20. Given two points P and Q and that (1) the image of P on reflection in 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 (iii) the origin.

Sol. Q is the image of P on reflection in y -axis and midpoint of PQ is invariant on reflection in x -axis.

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

(ii) The line perpendicular bisector of line

Segment PQ is the y-axis.

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

Q21. The point $(-3, 0)$ on reflection in a line is mapped as $(3, 0)$ and the point $(0, -3)$ on reflection in the same line is mapped as $(-2, -3)$.

(i) Name the mirror line.

(ii) Write down the coordinates of the image of $(-3, -4)$ in the mirror line.

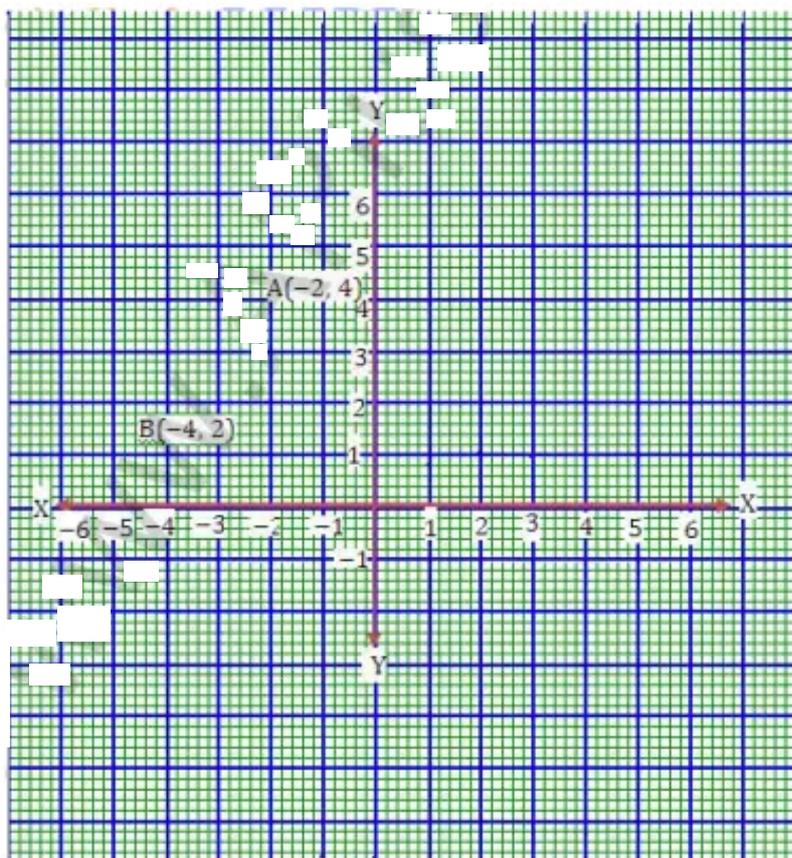
Sol. (i) It is clear that the mirror line will be y-axis.

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

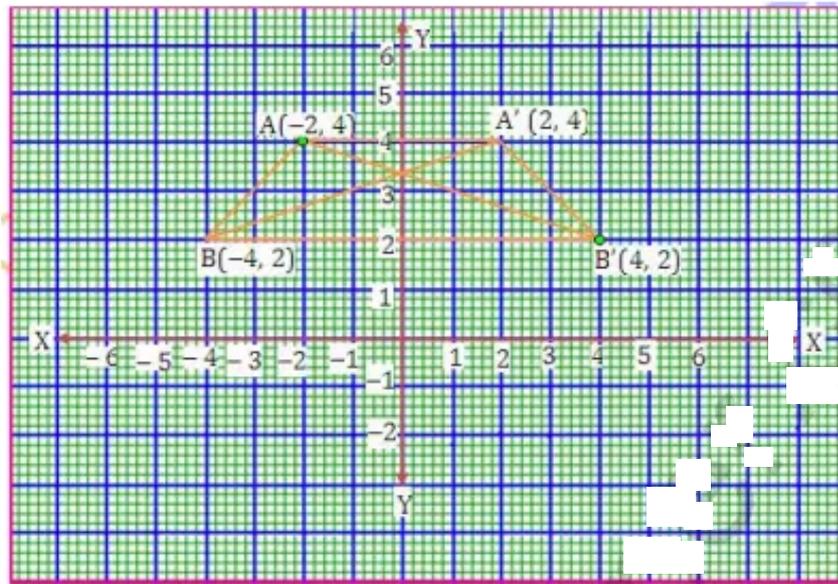
Q22. $A(-2, 4)$ and $B(-4, 2)$ are reflected in the y-axis.

If A' & B' are images of A & B respectively, find

(i) the coordinates of A' and B' (ii) Assign special name to quad. $AA'B'B$. (iii) state whether $AB' = BA'$



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

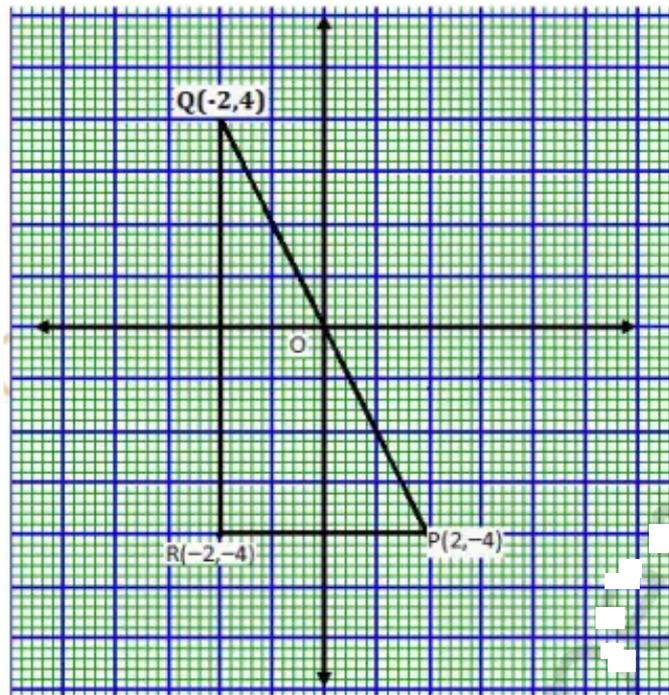


- (i) coordinates of A' are $(2, 4)$ and B' are $(4, 2)$.
- (ii) the quadrilateral $AA'B'B$ is an isosceles trapezium.
- (iii) yes, $AB' = BA'$.

Q23. Use graph paper for this question.

- (i) the point $P(x, -4)$ is reflected about the line $x=0$ to get the image Q . find the coordinates of the 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 the figure PQR .

Sol.

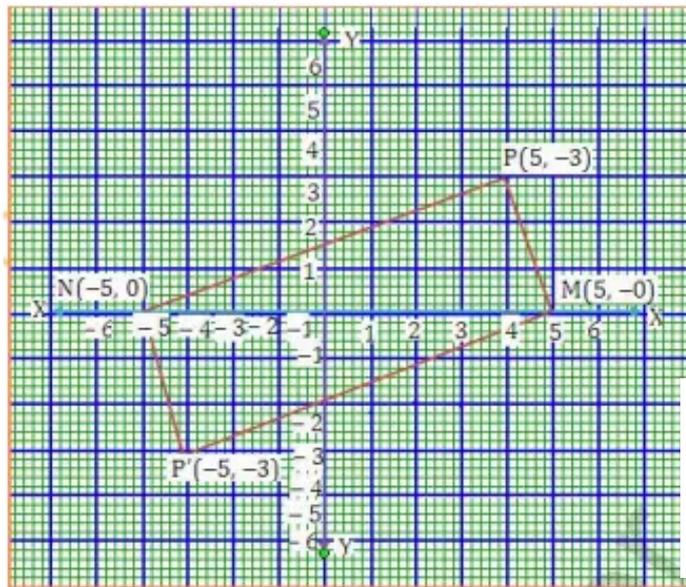


- (i) The co-ordinates of Q are $(-2, 4)$.
- (ii) The co-ordinates of R are $(-2, -4)$.
- (iii) The figure obtained is right angled triangle.
- (iv) Area of right angled triangle PQR is 16 sq. units.

Q24. Use graph paper for this question. The point $P(5, 3)$ reflected in the origin to get the image P' .

- (i) Write the coordinates of P' .
- (ii) If M is the foot of perpendicular from P to the x-axis, find the co-ordinates of M.
- (iii) If N is the foot of 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 $PMP'N$.

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



- (i) Coordinates of P' will be $(-5, -3)$
- (ii) Coordinates of M will be $(5, 0)$.
- (iii) Coordinates of N will be $(-5, 0)$
- (iv) By joining the points, the figure $PMP'N$ is a parallelogram.
- (v) Area of the parallelogram = $2 \times$ area of $\triangle MPN$.

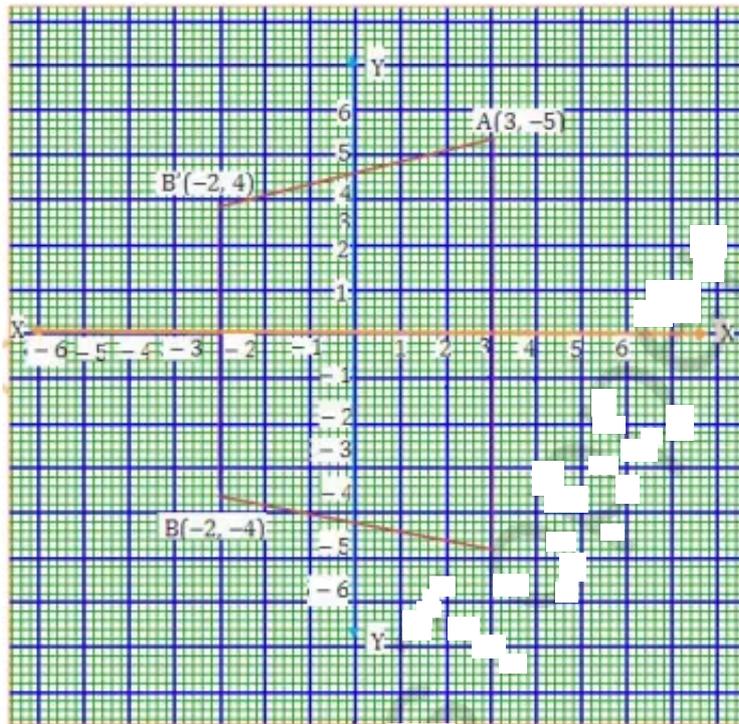
$$= 2 \times \frac{1}{2} \times MN \times PM = MN \times PM = 10 \times 3 = 30 \text{ sq. units}$$

Q25. Use graph paper for this question:

- (i) plot the points $A(3, 5)$ and $B(-2, -4)$. Use
- (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 coordinates of B' and plot it on the graph
- (iv) write down the geometrical name of the figure $AA'B'B'$.

(v) Name two invariant points under reflection in the x -axis.

sol. (i) on the graph paper plot the points $A(3, 5)$ and $B(-2, -4)$.



(ii) Coordinates of A' are $(3, -5)$

(iii) Coordinates of B' will be $(-2, 4)$

(iv) The figure $AA'B'B'$ is an isosceles trapezium.

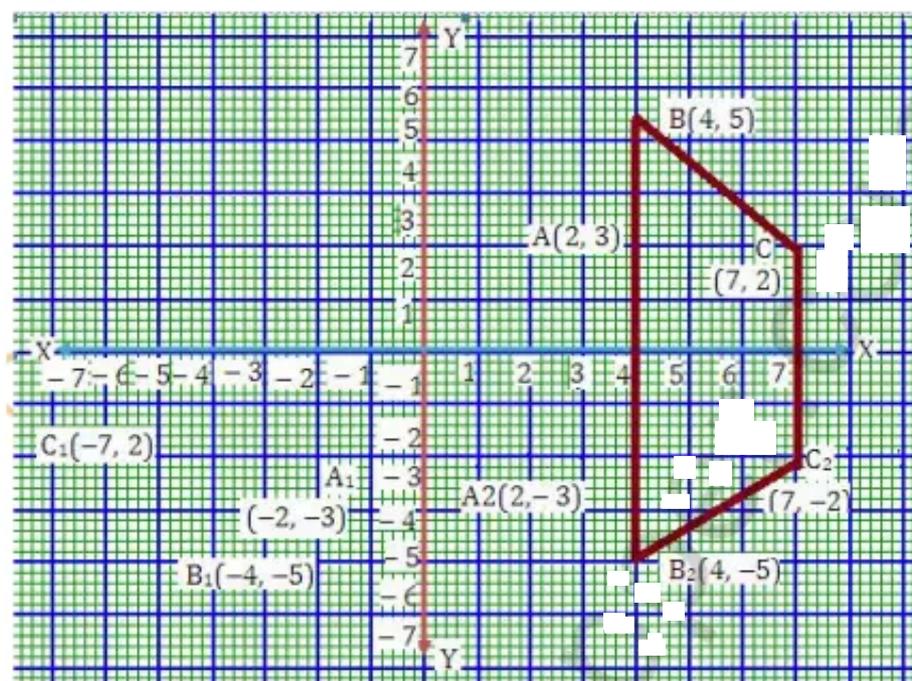
(v) The invariant points under reflection in the x -axis are $(3, 0)$ and $(-2, 0)$.

Q26. The points $A(2, 3)$, $B(4, 5)$ and $C(7, 2)$ are the vertices of $\triangle ABC$.

(i) write down the coordinates of A_1 , B_1 , C_1 is the image of $\triangle ABC$ when reflected in the origin.

(ii) write the coordinates of A_2 , B_2 , C_2 if $\triangle A_2B_2C_2$ is the image of $\triangle ABC$ when reflected in the x -axis.

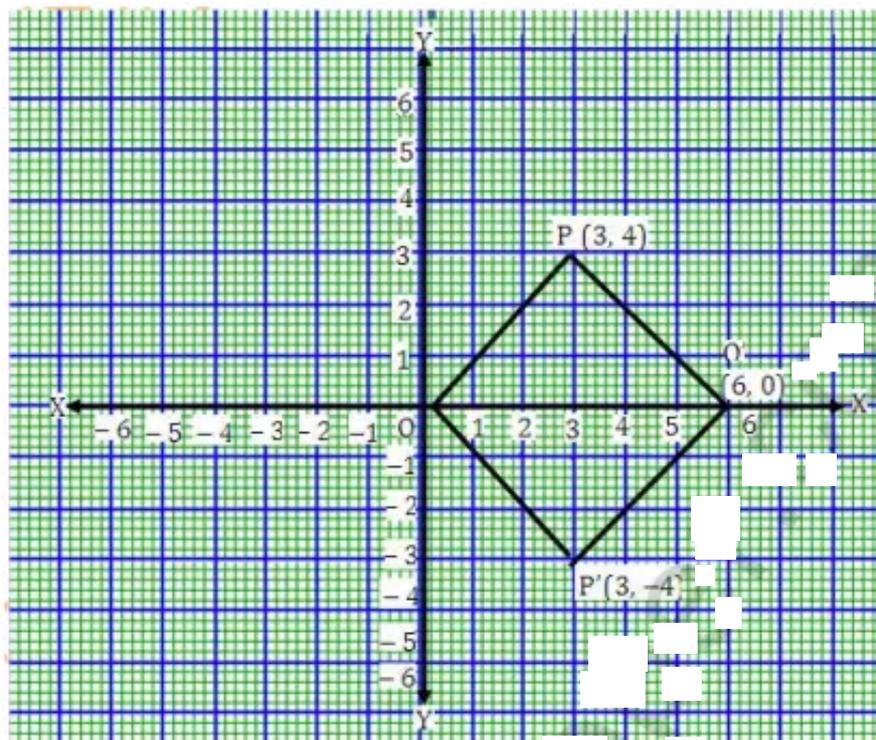
(iii) Assign the special name to the quadrilateral BCC_2B_2 and find its area.



- sol. (i) Coordinates of $A_1(-2, -3)$, $B_1(-4, -5)$, $C_1(-7, -2)$
 (ii) Coordinates of $A_2(2, -3)$, $B_2(4, -5)$, $C_2(7, -2)$
 (iii) BCC_2B_2 is an isosceles trapezium and its
 Area = $\frac{1}{2}(BB_2 + CC_2) \times 3 = \frac{1}{2}(10 + 4) \times 3$
 = 21 sq. units.

- Q27. 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 coordinates of P' and O'
 (ii) The length of segments PP' and OO'
 (iii) The perimeter of the quadrilateral $POP'O'$.

sol.



- (i) coordinates of P' are $(3, -4)$ and coordinates of O' are $(6, 0)$.
- (ii) length of $PP' = 8$ units and $OO' = 6$ units.
- (iii) perimeter of $POP'O'$ is $= 4 \times \sqrt{(OO')^2 + (PO)^2}$
 $= 4 \sqrt{3^2 + 4^2} = 4 \sqrt{25} = 20$ units.

Q28. Use a graph paper for this question, P and Q have coordinates $(0, 5)$ and $(-2, 4)$.

- (i) P is invariant when reflected in 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 .