# 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) $\left(\frac{-3}{2}, \frac{-1}{2}\right)$

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

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

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

(iii) $(0, -7)$

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

**Q3.** Find the coordinates of the images of the following points under reflection in the origin:

(i) $(2, -5)$

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

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

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

(iii) $(0,0)$

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

**Q4.** The image of point P under reflection in the x-axis is $(5,-2)$ writedown 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 $P(2,5)$ 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". writedown a single transformation that maps p onto p".

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

∴ coordinates 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 x-axis.

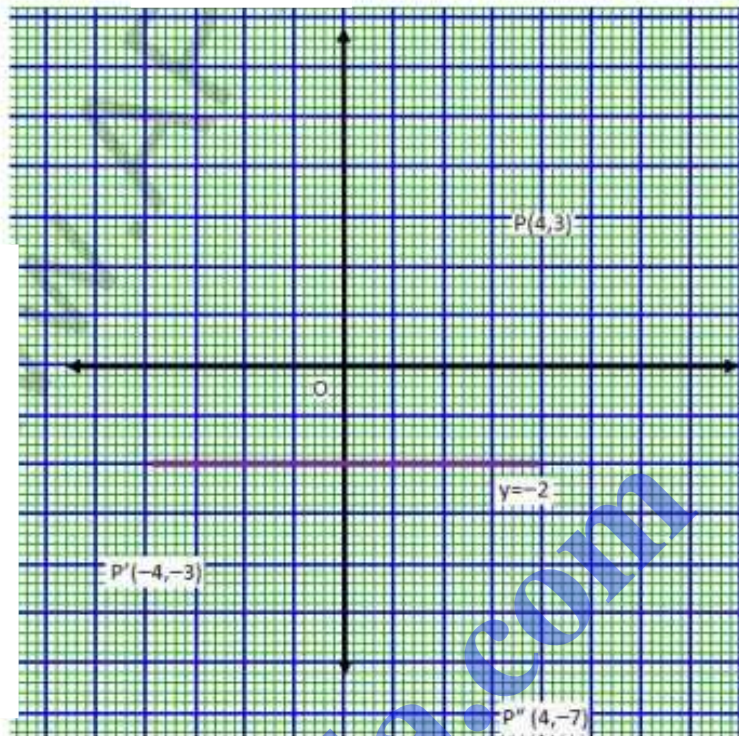Q10. write down the co-ordinates of the image of the point (3,-2) when:

(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 coordinates of P under reflection in the Line $y=-2$.
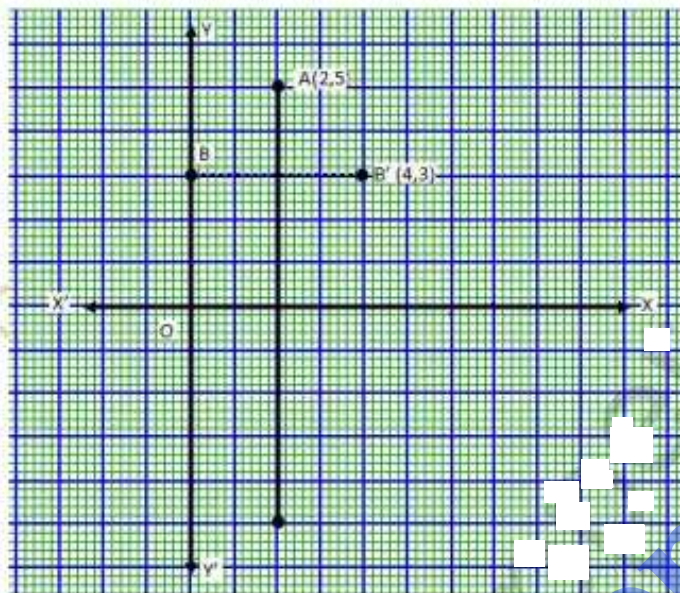
Sol.



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 coordinates 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 $P'(5,-2)$
∴ $a = 5$, $b = 2$.

(ii) coordinates 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'
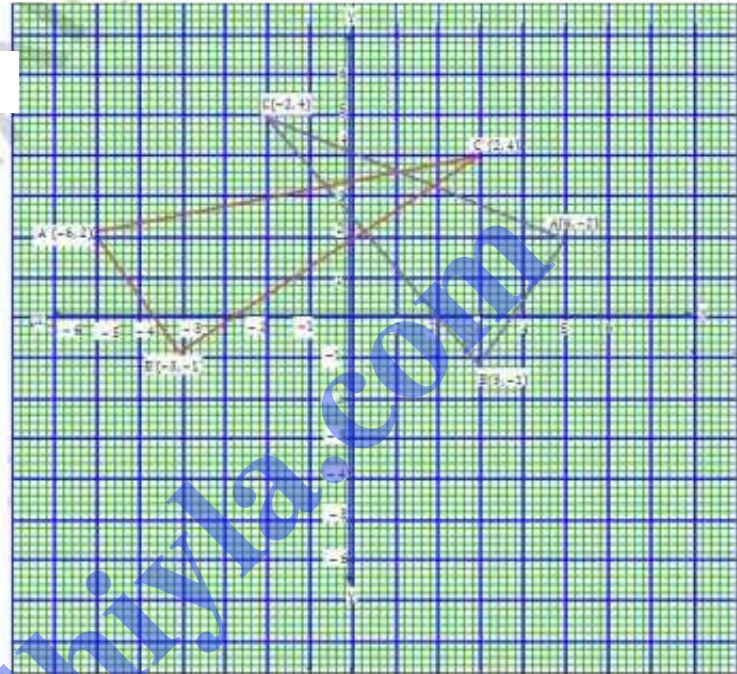
**Sol.**



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 △A'B'C'
∴ Yes, these two triangles are Congruent.

Q17. The points $(6, 2)$, $(3, -1)$ and $(-2, 4)$ are the variables 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 $\triangle A'B'C'$ 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 of 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'

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

A', B' & C' are again reflected in origin to form a $\triangle A"B"C"$.

∴ The Coordinates of A"(-1,2), B"(-4,8) and C"(-6,8)

∴ 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 mid point 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 $(2,-3)$ on reflection in the Same Line is mapped as $(-2,-3)$.

(i) Name the mirror Line.

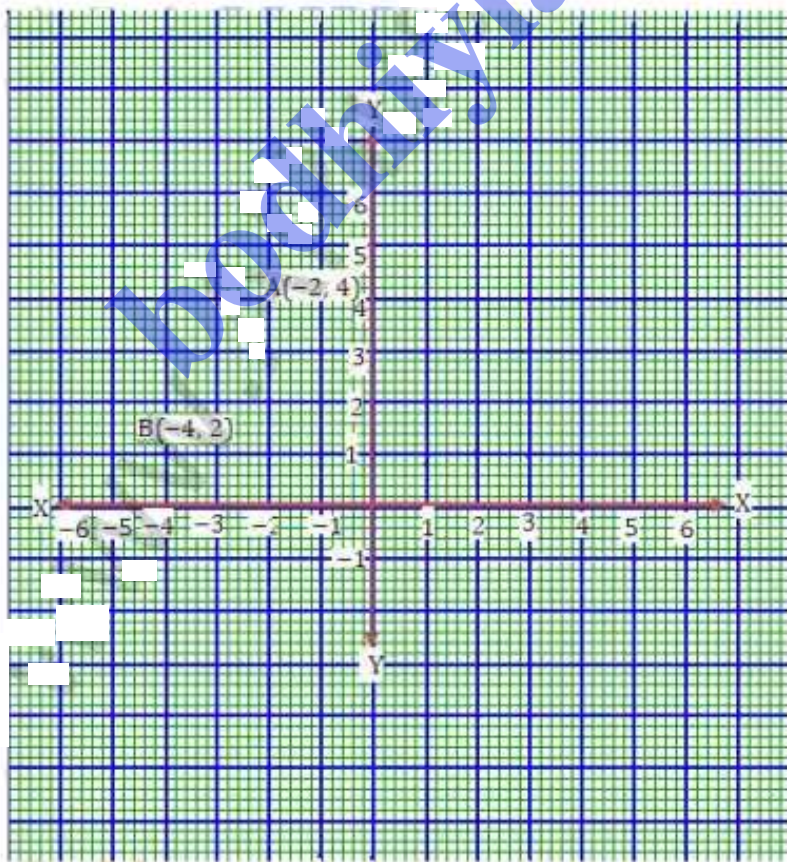(ii) write down the coordinates of the image of $(-3,-4)$ in the mirror Line.

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

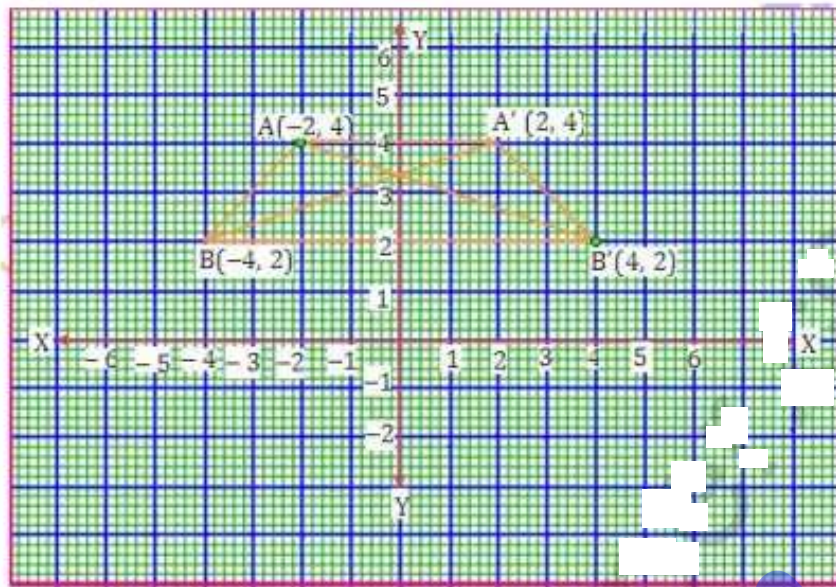(ii) The coordinates of image the point $(-3,-4)$ reflected in the same Line i.e, y-axis will be $(3,-4)$.

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'
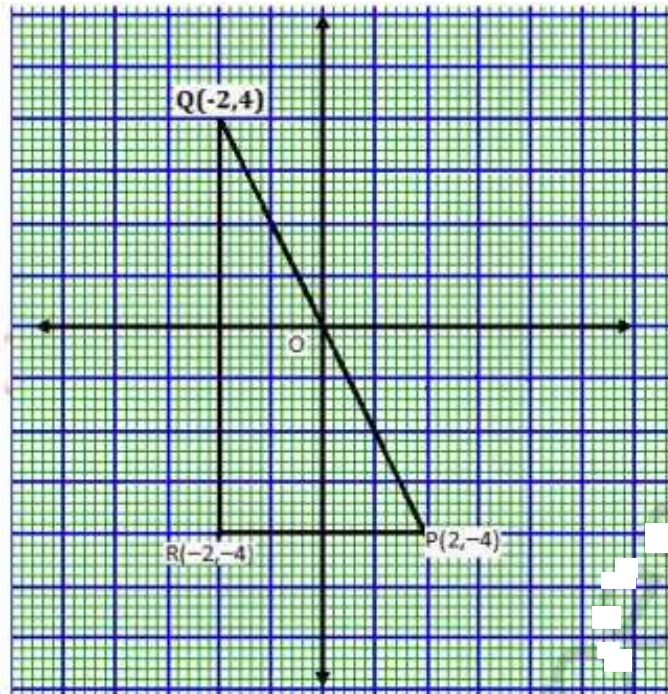


(i) coordinates of A' are $(2, 4)$ and B' are $(4, 2)$.

(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.

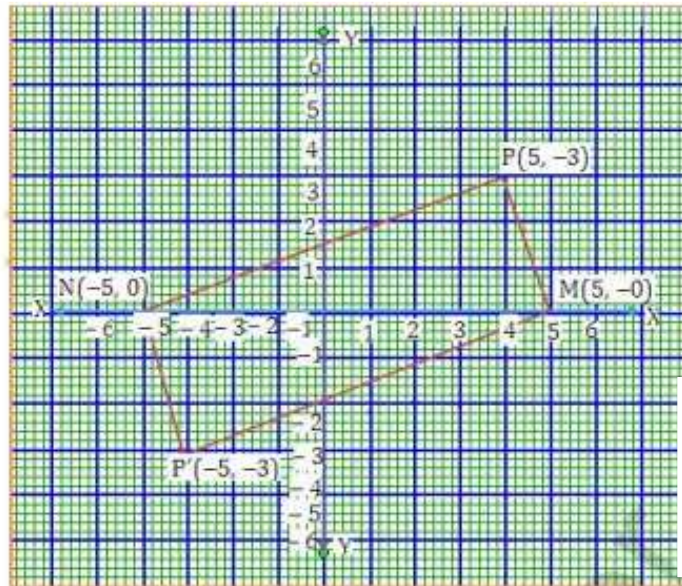(iii) Name the figure PQR.

(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.
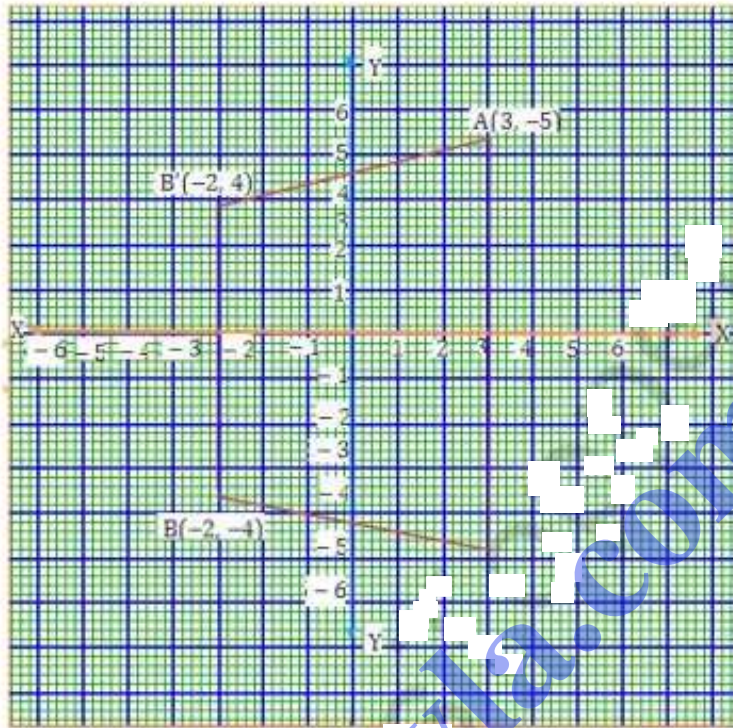
(v) Area of the parallelogram = 2 × area of △MPN.

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

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. writedown 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. writedown the coordinates of B' and plot it on the graph

(iv) writedown the geometrical name of the figure AA'BB'.

(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 A'BB' is an isosceles trapezium.
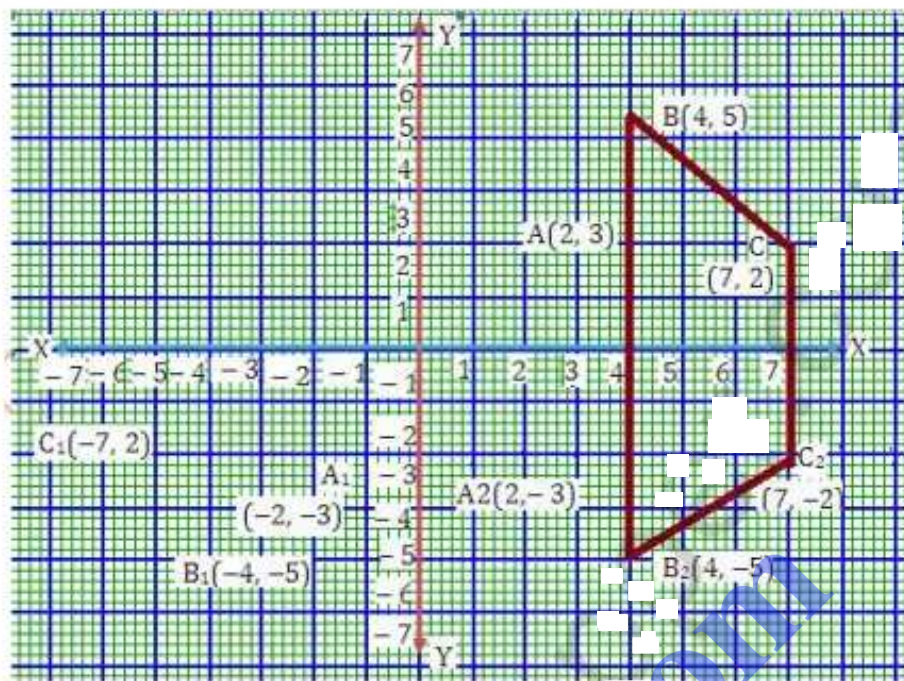(v) The invariant points under reflection in the x-axis are (3,0) and (-2,0).

Q26. The points A(2,3), B(4,5) and C(7,2) are the vertices of ΔABC.
(i) write down the coordinates of $A_1$, $B_1$, $C_1$ is the image of ΔABC when reflected in the origin.
(ii) write the coordinates of $A_2$, $B_2$, $C_2$ if $ΔA_2B_2C_2$ is the image of ΔABC when reflected in the x-axis
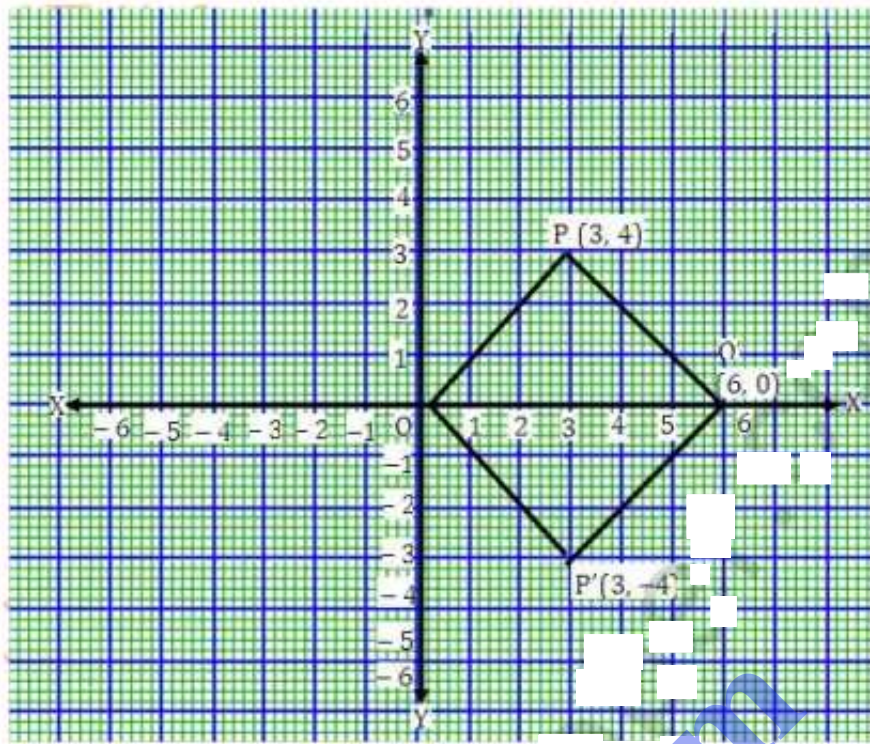
(iii) Assign the special name to the quadrilateral $BCC_2B_2$ and find its area.



**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

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

$$= 21 \text{ sq. units.}$$

**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' ar $(6, 0)$.

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

(iii) perimeter of POP'O' is $= 4 \times \sqrt{(OQ)^2 + (PQ)^2}$

$= 4\sqrt{3^2 + 4^2} = 4\sqrt{25} = 20$ 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 $k$.