

EXERCISE 26A

For each equation given below; name the dependent and independent variables.

$$(i) y = \frac{4}{3}x - 7$$

$$(ii) x = 9y + 4$$

$$(iii) x = \frac{5y + 3}{2}$$

$$(iv) y = \frac{1}{7}(6x + 5)$$

Solution:

(i)

$$y = \frac{4}{3}x - 7$$

y is the dependent variable
x is the independent variable

(ii) $x = 9y + 4$

x is the dependent variable
y is the independent variable

(iii)

$$x = \frac{5y + 3}{2}$$

x is the dependent variable
y is the independent variable

(iv)

$$y = \frac{1}{7}(6x + 5)$$

y is the dependent variable
x is the independent variable

1. Plot the following points on the same graph paper:

(i) (8, 7)

(ii) (3, 6)

(iii) (0, 4)

(iv) (0, -4)

(v) (3, -2)

(vi) (-2, 5)

(vii) (-3, 0)

(viii) (5, 0)

(ix) (-4, -3)

Solution:

Consider the points as

(i) (8, 7) = A

(ii) (3, 6) = B

(iii) (0, 4) = C

(iv) (0, -4) = D

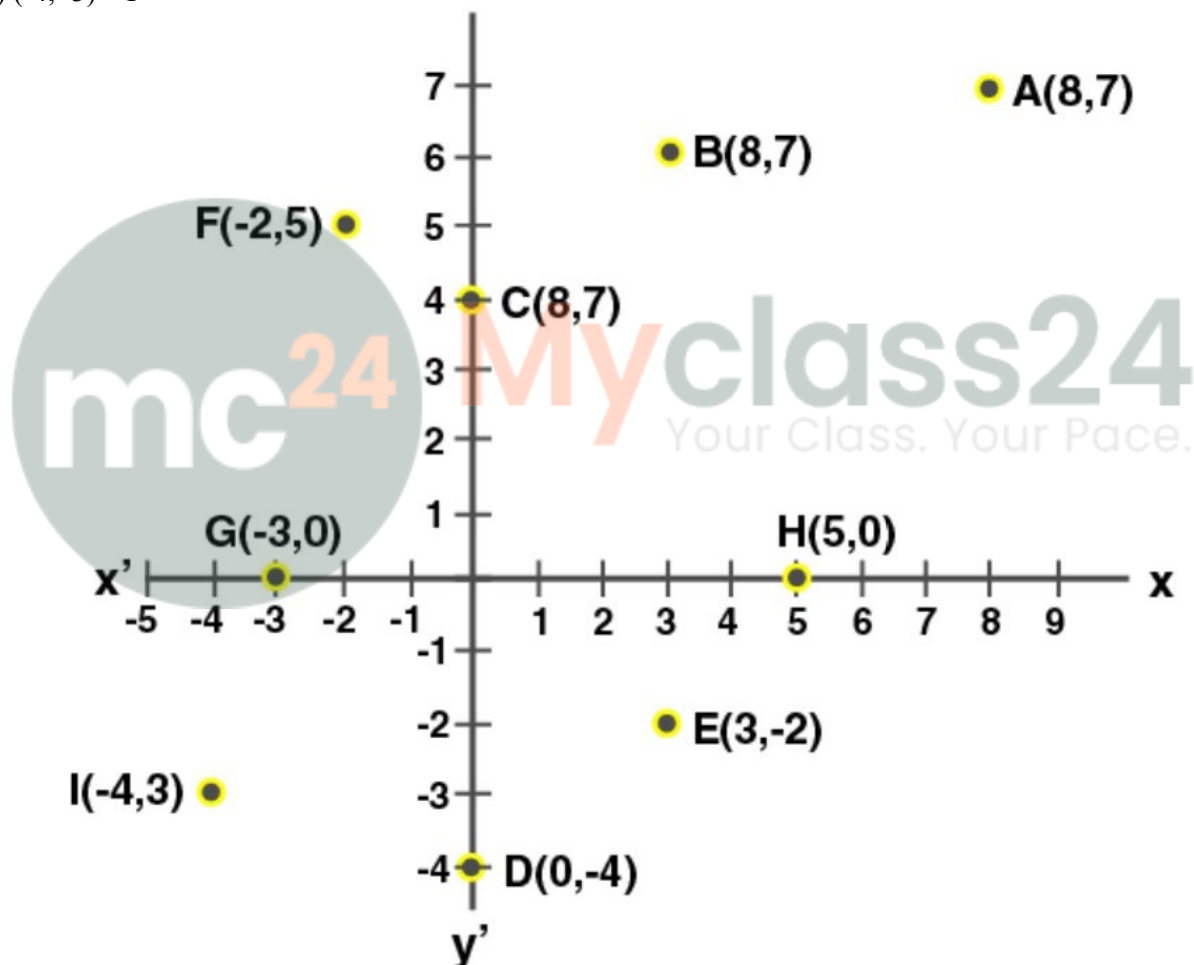
(v) (3, -2) = E

(vi) (-2, 5) = F

(vii) (-3, 0) = G

(viii) (5, 0) = H

(ix) (-4, -3) = I

**2. Find the values of x and y if:**(i) $(x - 1, y + 3) = (4, 4)$ (ii) $(3x + 1, 2y - 7) = (9, -9)$ (iii) $(5x - 3y, y - 3x) = (4, -4)$ **Solution:**

We know that two ordered pairs are equal.

$$(i) (x - 1, y + 3) = (4, 4)$$

It can be written as

$$x - 1 = 4 \text{ and } y + 3 = 4$$

$$x = 5 \text{ and } y = 1$$

$$(ii) (3x + 1, 2y - 7) = (9, -9)$$

It can be written as

$$3x + 1 = 9 \text{ and } 2y - 7 = -9$$

$$3x = 8 \text{ and } 2y = -2$$

$$x = 8/3 \text{ and } y = -1$$

$$(iii) (5x - 3y, y - 3x) = (4, -4)$$

It can be written as

$$5x - 3y = 4 \dots\dots (1)$$

$$y - 3x = -4 \dots\dots (2)$$

By multiplying equation (2) by 3

$$3y - 9x = -12 \dots\dots (3)$$

Now add equations (1) and (3)

$$(5x - 3y) + (3y - 9x) = 4 + (-12)$$

$$-4x = -8$$

$$x = 2$$

Substituting the value of x in equation (2)

$$y - 3x = -4$$

$$y = 3x - 4$$

$$y = 3(2) - 4$$

$$y = 2$$

Therefore, $x = 2$ and $y = 2$.

3. Use the graph given alongside, to find the coordinates of point (s) satisfying the given condition:

(i) The abscissa is 2.

(ii) The ordinate is 0.

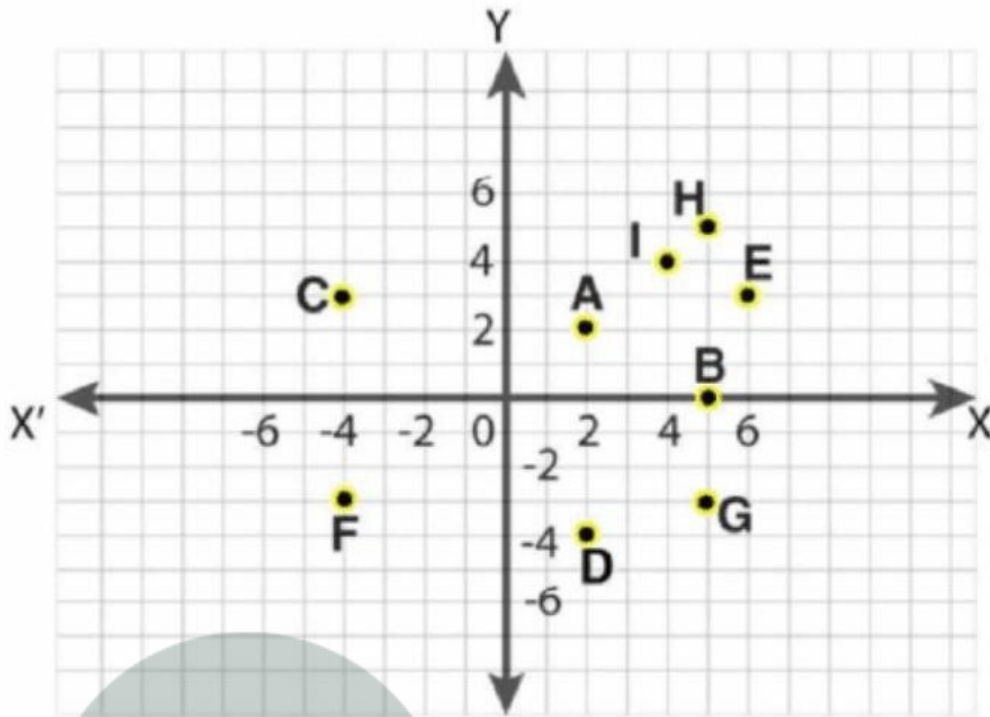
(iii) The ordinate is 3.

(iv) The ordinate is -4.

(v) The abscissa is 5.

(vi) The abscissa is equal to the ordinate.

(vii) The ordinate is half of the abscissa.

**Solution:**

(i) The abscissa is 2.

Based on the graph,

The co-ordinate of the point A is given by (2, 2).

(ii) The ordinate is 0.

Based on the graph,

The co-ordinate of the point B is given by (5, 0).

(iii) The ordinate is 3.

Based on the graph,

The co-ordinates of the points C and E are given by (-4, 3) and (6, 3).

(iv) The ordinate is -4.

Based on the graph,

The co-ordinate of the point D is given by (2, -4).

(v) The abscissa is 5.

Based on the graph,

The co-ordinates of the points H, B and G are given by (5, 5), (5, 0) and (5, -3).

(vi) The abscissa is equal to the ordinate.

Based on the graph,

The co-ordinates of the points I, A and H are given by (4, 4), (2, 2) and (5, 5).

(vii) The ordinate is half of the abscissa.

Based on the graph,
The co-ordinate of the point E is given by (6, 3).

4. State true or false:

- (i) The ordinate of a point is its x co-ordinate.
- (ii) The origin is in the first quadrant.
- (iii) The y-axis is the vertical number line.
- (iv) Every point is located in one of the four quadrants.
- (v) If the ordinate of a point is equal to its abscissa; the point lies either in the first quadrant or in the second quadrant.
- (vi) The origin (0, 0) lies on the x-axis.
- (vii) The point (a, b) lies on the y-axis if $b = 0$.

Solution:

- (i) False
- (ii) False
- (iii) True
- (iv) True
- (v) False
- (vi) True
- (vii) False

5. In each of the following, find the co-ordinates of the point whose abscissa is the solution of the first equation and ordinate is the solution of the second equation:

$$(i) 3 - 2x = 7; 2y + 1 = 10 - 2\frac{1}{2}y$$

$$(ii) \frac{2a}{3} - 1 = \frac{a}{2}; \frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

$$(iii) 5x - (5 - x) = \frac{1}{2}(3 - x); 4 - 3y = \frac{4 + y}{3}$$

Solution:

(i)

$$3 - 2x = 7; 2y + 1 = 10 - 2\frac{1}{2}y$$

We know that

$$3 - 2x = 7$$

$$3 - 7 = 2x$$

$$-4 = 2x$$

$$x = -2$$

Similarly

$$2y + 1 = 10 - 2\frac{1}{2}y$$

$$2y + 1 = 10 - 5/2 y$$

By cross multiplication

$$4y + 2 = 20 - 5y$$

$$4y + 5y = 20 - 2$$

$$9y = 18$$

$$y = 2$$

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

(ii)

$$\frac{2a}{3} - 1 = \frac{a}{2}; \frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

We know that

$$2a/3 - 1 = a/2$$

$$2a/3 - a/2 = 1$$

Taking LCM

$$(4a - 3a)/6 = 1$$

$$a = 6$$

Similarly

$$\frac{15 - 4b}{7} = \frac{2b - 1}{3}$$

By taking LCM

$$45 - 12b = 14b - 7$$

$$45 + 7 = 14b + 12b$$

$$52 = 26b$$

$$b = 2$$

Hence, the co-ordinates of the point are (6, 2)

(iii)

$$5x - (5 - x) = \frac{1}{2}(3 - x); 4 - 3y = \frac{4 + y}{3}$$

We know that

$$5x - (5 - x) = \frac{1}{2}(3 - x)$$

It can be written as

$$(5x + x) - 5 = \frac{1}{2}(3 - x)$$

By cross multiplication

$$12x - 10 = 3 - x$$

$$12x + x = 3 + 10$$

$$13x = 13$$

$$x = 1$$

Similarly

$$4 - 3y = \frac{4 + y}{3}$$

By cross multiplication

$$12 - 9y = 4 + y$$

$$12 - 4 = y + 9y$$

$$8 = 10y$$

$$y = 8/10$$

$$y = 4/5$$

Hence, the co-ordinates of the point are $(1, 4/5)$.

6. In each of the following, the co-ordinates of the three vertices of a rectangle ABCD are given. By plotting the given points; find, in each case, the co-ordinates of the fourth vertex:

(i) A $(2, 0)$, B $(8, 0)$ and C $(8, 4)$.

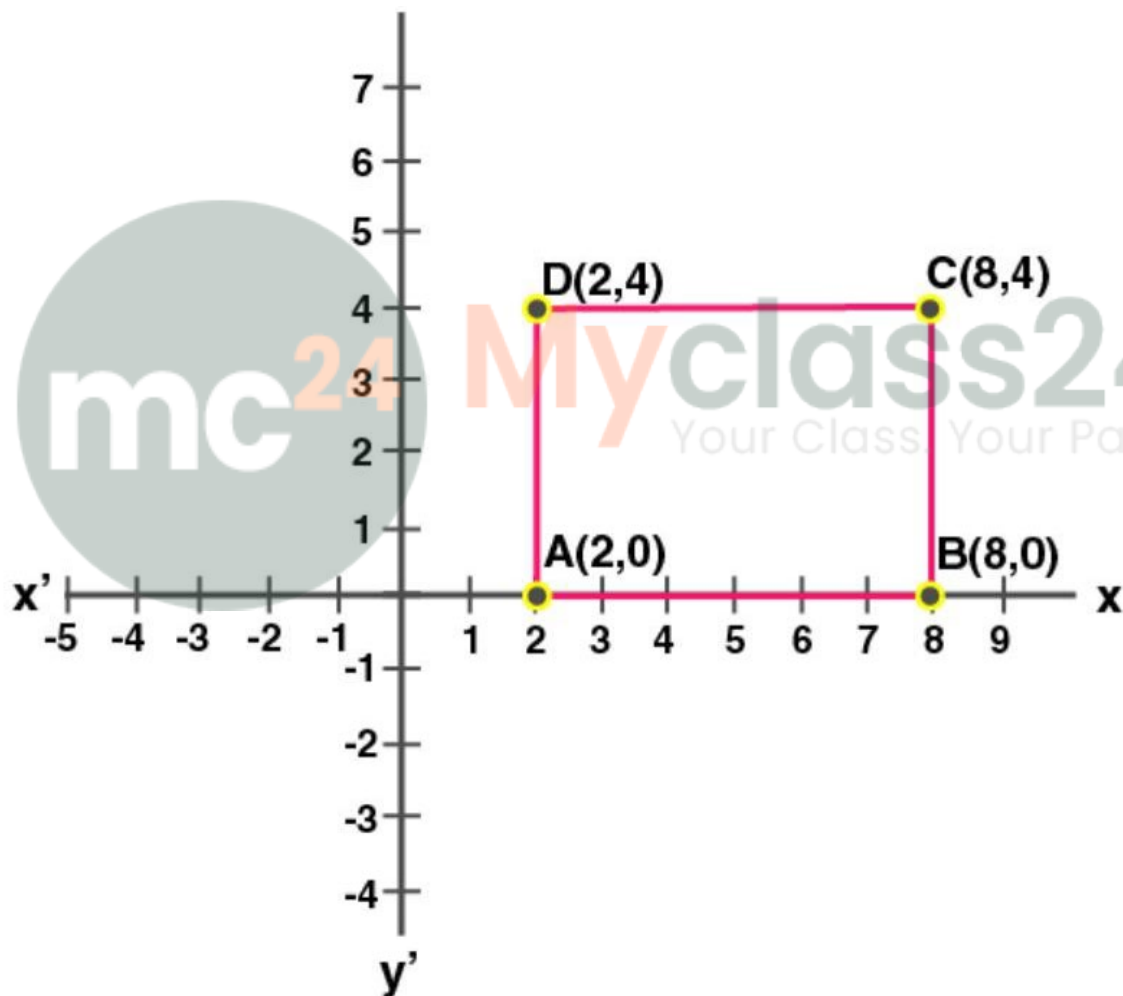
(ii) A $(4, 2)$, B $(-2, 2)$ and D $(4, -2)$.

(iii) A $(-4, -6)$, C $(6, 0)$ and D $(-4, 0)$.

(iv) B $(10, 4)$, C $(0, 4)$ and D $(0, -2)$.

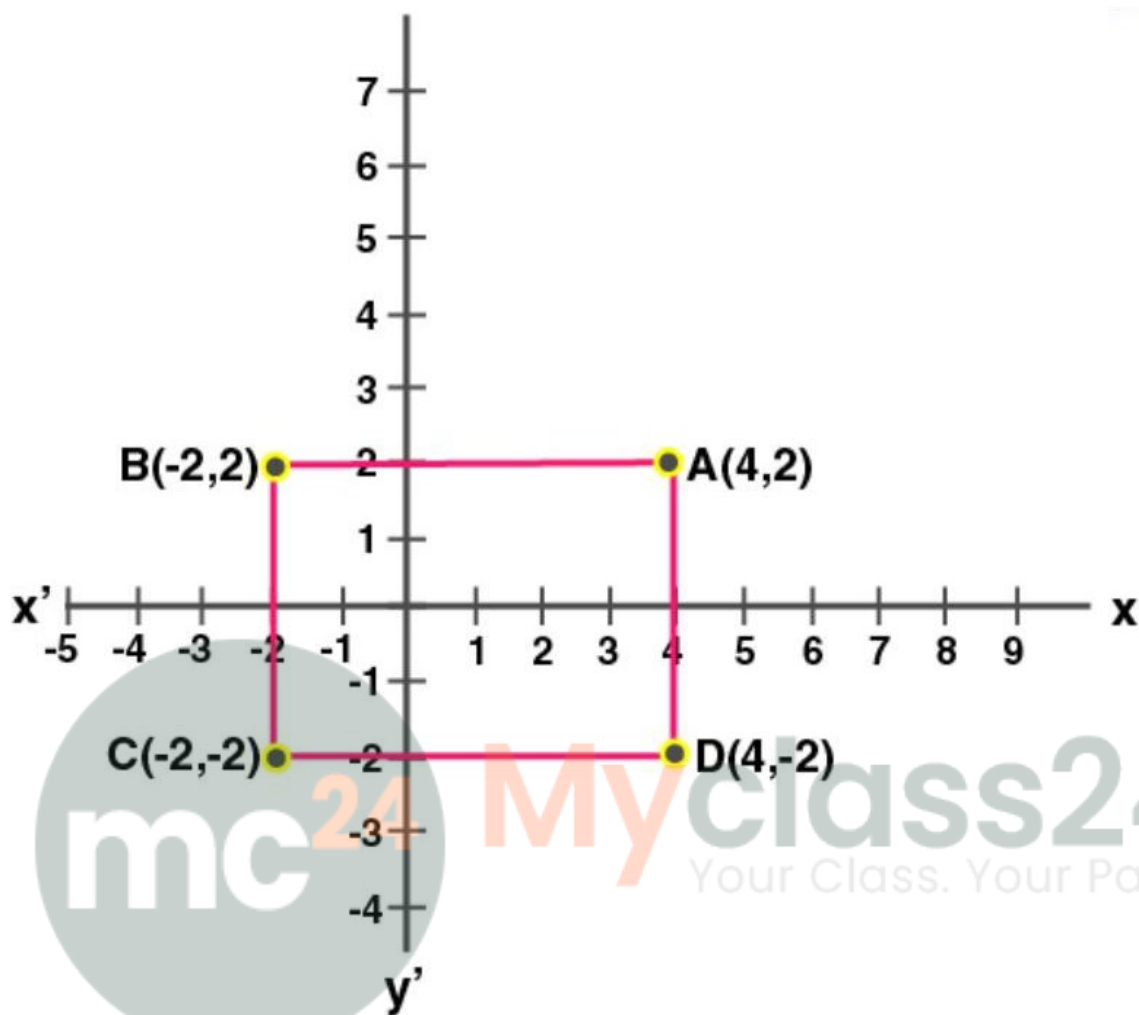
Solution:

(i) A $(2, 0)$, B $(8, 0)$ and C $(8, 4)$



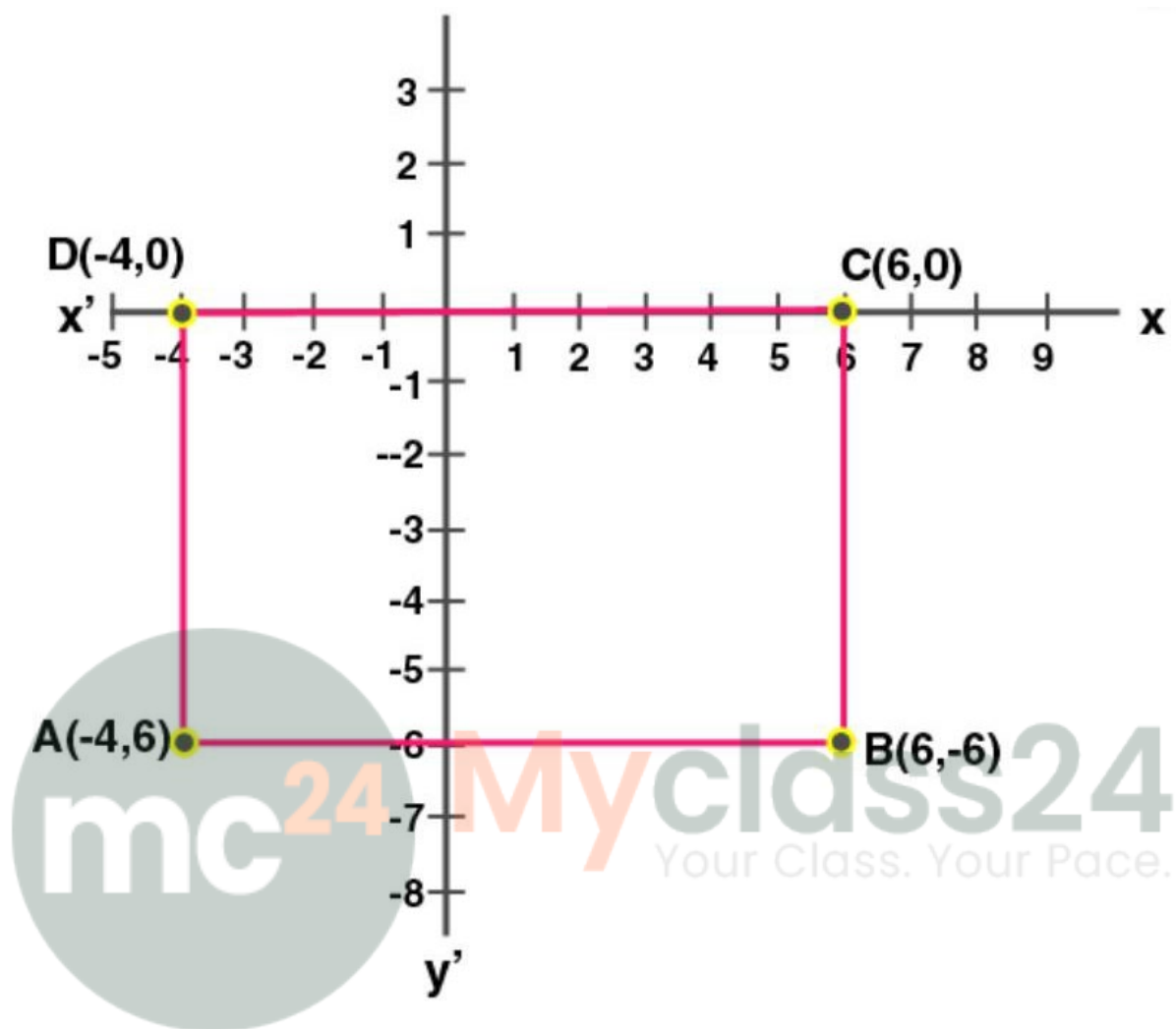
From the graph the co-ordinates of the fourth vertex is D $(2, 4)$.

(ii) A $(4, 2)$, B $(-2, 2)$ and D $(4, -2)$.



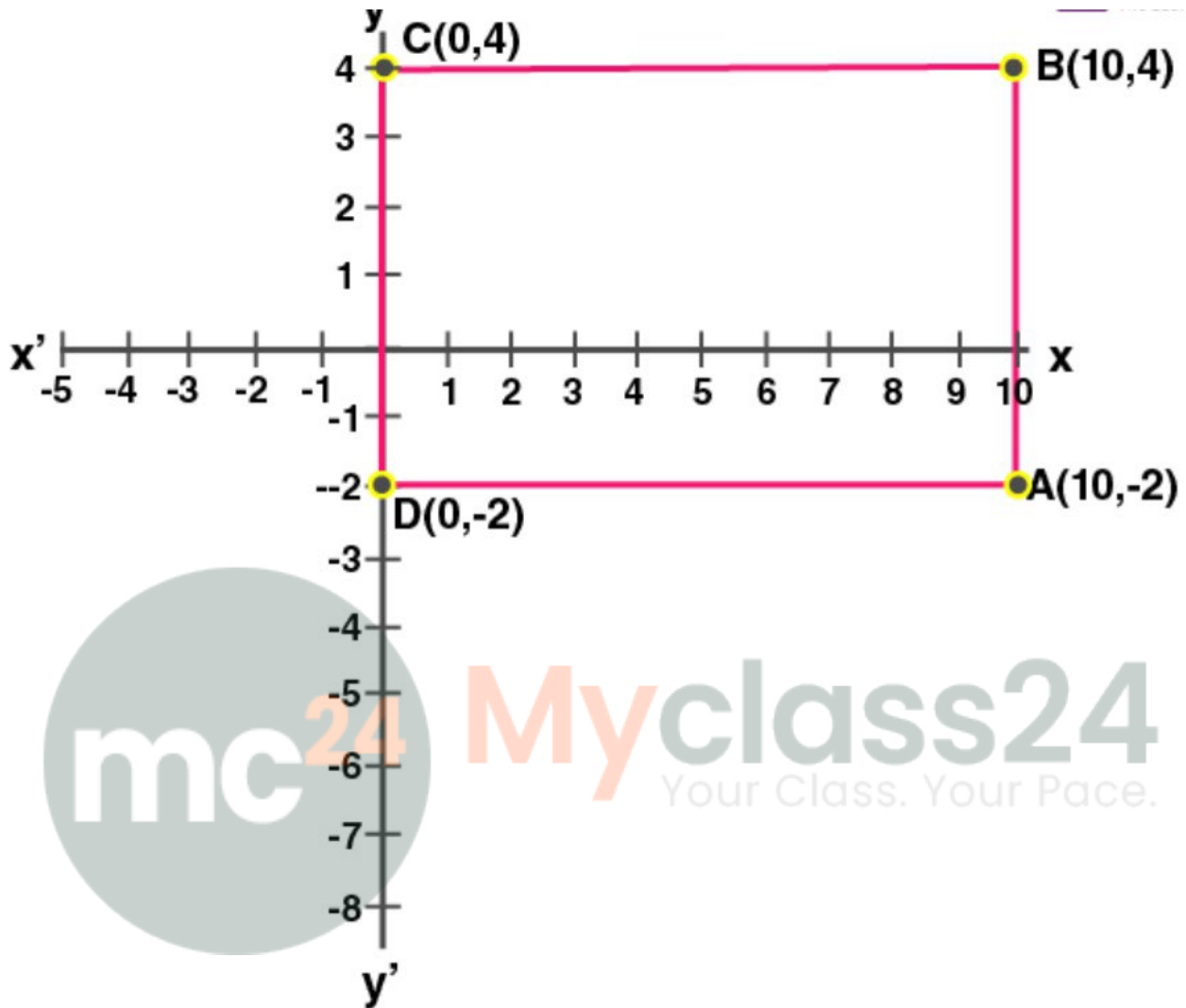
From the graph the co-ordinates of the fourth vertex is C (-2, 2).

(iii) A (-4,-6), C (6, 0) and D (-4, 0).



From the graph the co-ordinates of the fourth vertex is B (6, -6).

(iv) B (10, 4), C (0, 4) and D (0, -2)



From

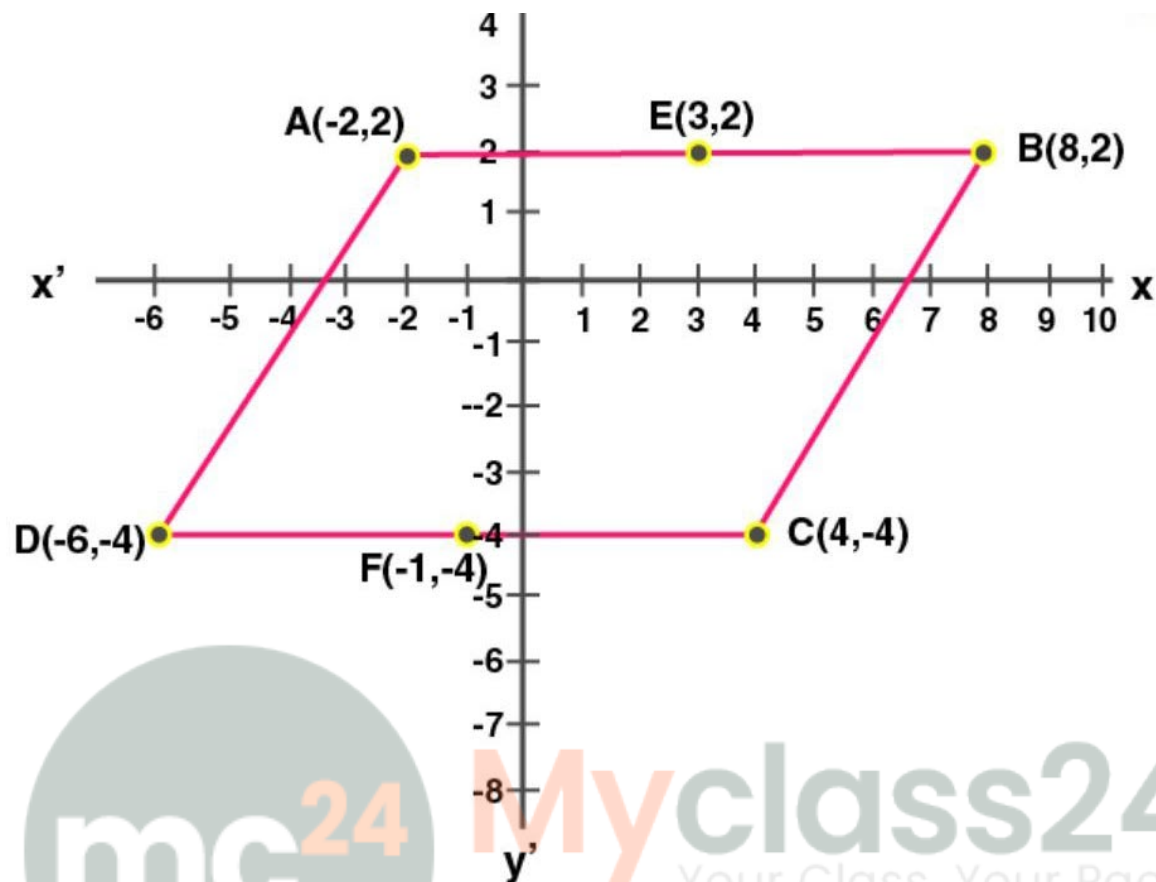
the graph the co-ordinates of the fourth vertex is A (10, -2).

7. A (-2, 2), B (8, 2) and C (4, -4) are the vertices of a parallelogram ABCD. By plotting the given points on a graph paper; find the co-ordinates of the fourth vertex D. Also, form the same graph, state the co-ordinates of the mid-points of the sides AB and CD.

Solution:

It is given that

A (2, -2), B (8, 2) and C (4, -4) are the vertices of the parallelogram ABCD



By joining A, B, C and D we get the parallelogram ABCD.

From the graph, we get D (-6, 4)

Using the graph,

The co-ordinates of the mid-point of AB is E (3, 2)

The co-ordinates of the mid-point of CD is F (-1, -4)

8. A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD. Use the graphical method to find the co-ordinates of the fourth vertex B. Also, find:

(i) The co-ordinates of the mid-point of BC;

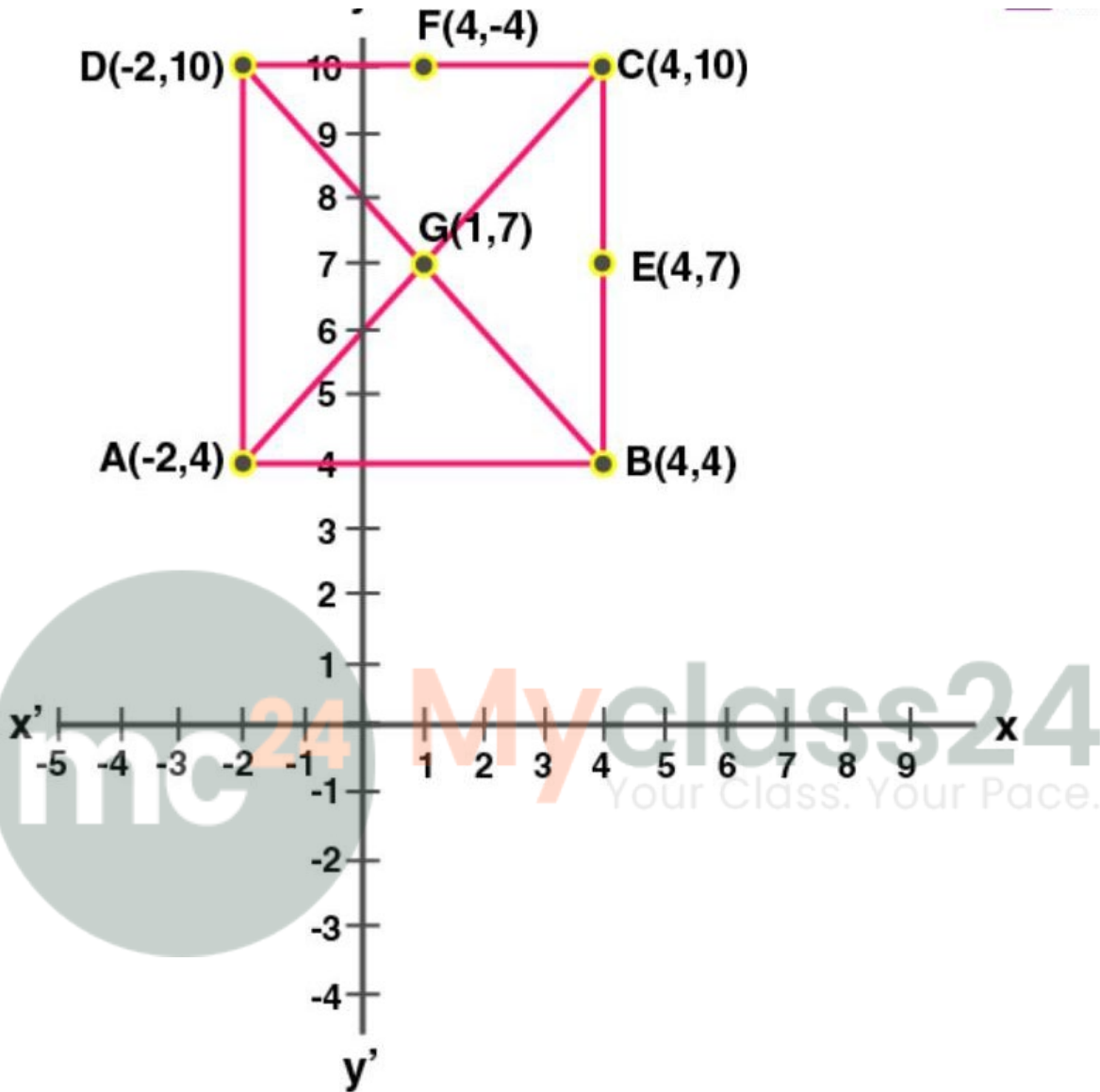
(ii) The co-ordinates of the mid-point of CD and

(iii) The co-ordinates of the point of intersection of the diagonals of the square ABCD.

Solution:

It is given that

A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD.



From the graph, we get B (4, 4)

Using the graph,

The co-ordinates of the mid-point of BC is E (4, 7)

The co-ordinates of the mid-point of CD is F (1, 10)

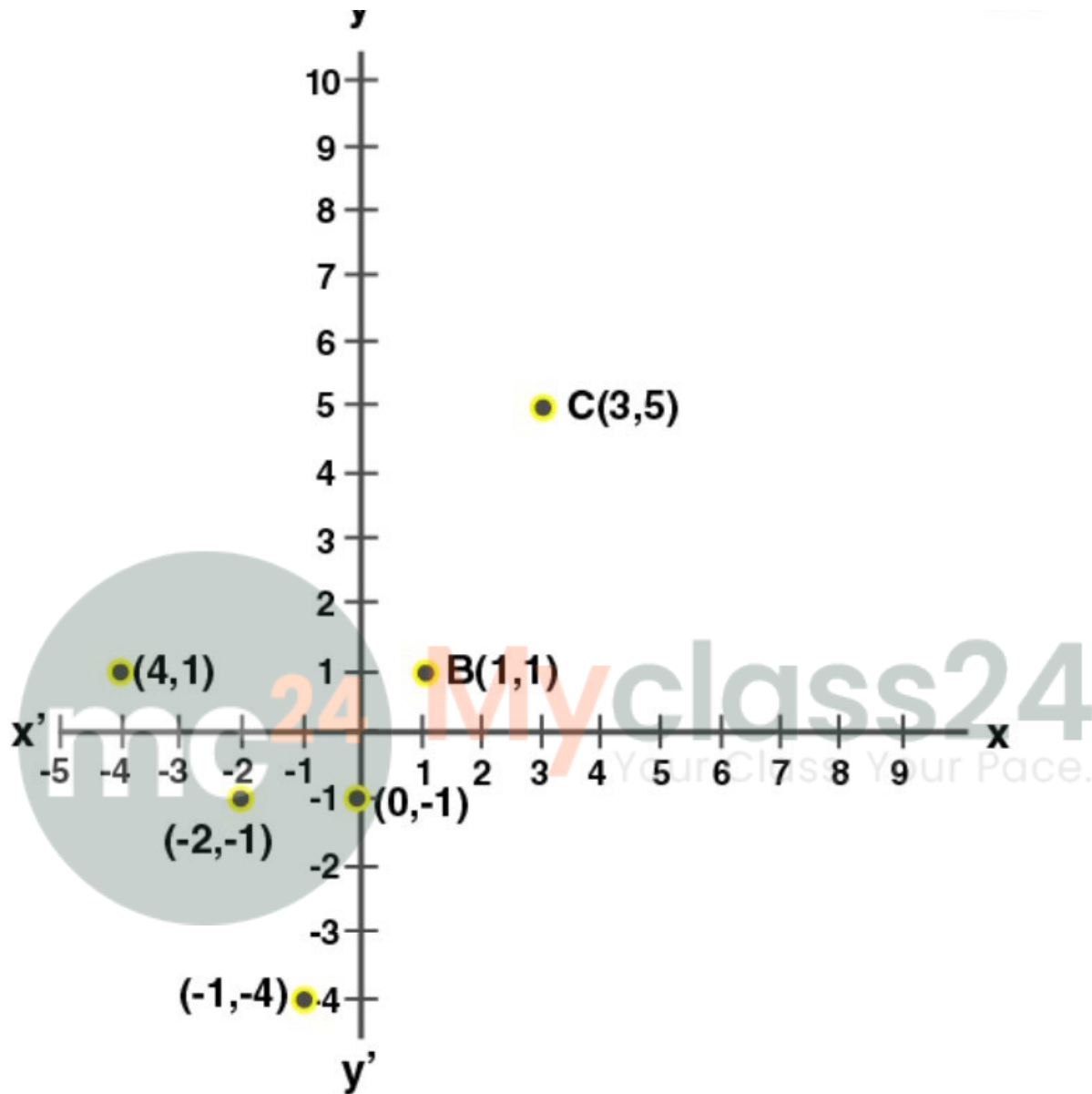
The co-ordinates of the diagonals of the square is G (1, 7)

9. By plotting the following points on the same graph paper. Check whether they are collinear or not:

(i) (3, 5), (1, 1) and (0, -1)

(ii) (-2, -1), (-1, -4) and (-4, 1)

Solution:



After

- plotting the points, we clearly see from the graph that
- (i) A (3, 5), B (1, 1) and C (0, -1) are collinear
 - (ii) P (-2, -1), Q (-1, -4) and R (-4, 1) are non-collinear.