Coordinate Geometry

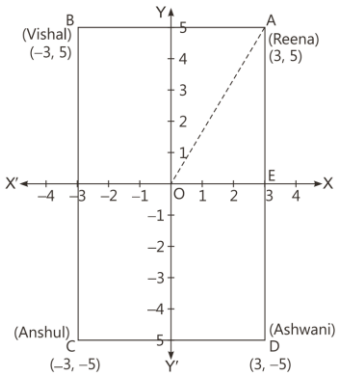
Case Study Based Questions

Case Study 1

A new year party is organised by Anil on 31st December. Anil invites some of his friends to have some fun and wants to enjoy the delicious food. Among all of the friends, four friends Reena, Vishal, Anshul and Ashwani are standing at positions A (3, 5), B (− 3, 5), C (− 3, — 5) and D (3, -5) respectively.

On the basis of the above information, solve the following questions:

Q1. The position of given points are shown below. The perimeter of this figure is:



a. 30 b. 32 c. 16 d. 20

Q 2. Anshul stands on the quadrant:

a. II b. I c. III d. IV

Q 3. The distance between Reena and Vishal is:

a. 10 b. 0 c. 6 d. 8

Q 4. Area of rectangle ABCD is:

a. 50 sq. units b. 60 sq. units
c. 65 sq. units d. 55 sq. units

Q 5. The distance of Reena from origin is:

a. $\sqrt{34}$ units b. $\sqrt{30}$ units

c. $\sqrt{39}$ units d. $\sqrt{29}$ units

Solutions

1. (b) In rectangle ABCD,
length (l), AD = 5 + 5 = 10 units
and breadth (b), CD = 3 + 3 = 6 units
$\therefore$ Perimeter of a rectangle ABCD = $2(l + b)$
$= 2(10 + 6) = 2 \times 16 = 32$ units.
So, option (b) is correct.

2. (c) Since, Anshul stands at the point C(– 3, – 5).
It is clear from the graph that point C lies in III quadrant.
So, option (c) is correct.

3. (c) The distance between Reena and Vishal is
$AB = |-3| + 3 = 3 + 3 = 6$
So, option (c) is correct.

4. (b) Area of rectangle ABCD = length × breadth
$= 10 \times 6 = 60$ sq. units
So, option (b) is correct.

5. (a) The distance of Reena from origin is

$$OA = \sqrt{(OE)^2 + (AE)^2}$$

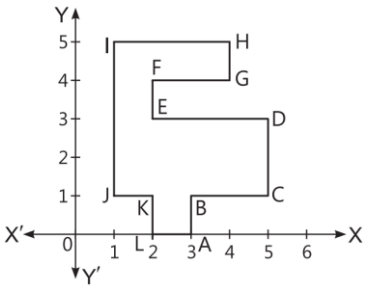
[Using Pythagoras theorem]

$$= \sqrt{(3)^2 + (5)^2} = \sqrt{9 + 25} = \sqrt{34} \text{ units}$$

So, option (a) is correct.

Case Study 2

Municipality constructed a zig-zag cycle track so that the person enjoys the ride of bicycle as well as make himself fit and healthy. It starts from point A to B then B to C..... and so, on and finally returns at the starting point A, which is as shown in the figure.



On the basis of the above information, solve the following questions:

Q 1. The coordinates of point B are:

a. (1, 3) b. (3, 1) c. (-1, -3) d. (-1, 3)

Q 2. Points E and F has same:

a. y-coordinate

b. x-coordinate

c. x and y-coordinate

d. x-coordinate or y-coordinate

Q 3. The distance between points C and D is:

a. 5 units b. 2 units c. 4 units d. 6 units

Q 4. The ordinate of point I is:

a. 5 b. 4 c. 3 d. 6

Q 5. The distance between points B and D is:

a. 2 b. $\sqrt{2}$ c. $2\sqrt{2}$ d. 3

Solutions

1. (b) The distance of point B from Y-axis is 3 units in positive direction of X-axis and the distance of B from X-axis is 1 unit in positive direction of Y-axis.

Hence, coordinates of point B are (3, 1).

So, option (b) is correct.

2. (b) It is clear from the figure that EF is parallel to Y-axis.

Hence both points have same x-coordinate.

So, option (b) is correct.

3. (b) The distance between points C and D is 2 units.

So, option (b) is correct.

4. (a) The ordinate of point I is 5.

So, option (a) is correct.

5. (c) The distance between points B and D is

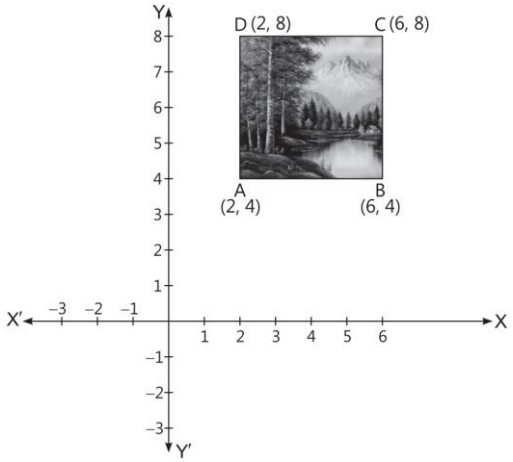
$$BD = \sqrt{(BC)^2 + (CD)^2}$$

$$= \sqrt{(2)^2 + (2)^2} = 2\sqrt{1+1} = 2\sqrt{2}$$

So, option (c) is correct.

Case Study 3

Vivek wants to purchase a painting for drawing room. First of all, he puts a grid on the wall so that he could hang a painting on that area. The corner points of the grid are A (2, 4); B (6, 4); C (6, 8) and D (2, 8).



On the basis of the above information, solve the following questions:

Q1. The shape of the painting is a:

a. rectangle b. square

c. trapezium d. parallelogram

Q2. The area of given figure is:

a. 6 sq. units b. 8 sq. units

c. 16 sq. units d. 12 sq. units

Q3. The coordinates of intersection point of diagonals are:

a. (6, 4) b. (4, 6)

c. (-4, 6) d. (2, 2)

Q4. The perimeter of a square is:

a. 14 units b. 12 units

c. 16 units d. 18 units

Q5. The image of a point D (2, 8) with respect to X-axis is:

a. (−2, −8) b. (-2, 8)

c. (8, 2) d. (2, -8)

Solutions

1. (b) From figure, AB = CD = 4

and AD = BC = 4

$AC = \sqrt{(AB)^2 + (BC)^2} = \sqrt{(4)^2 + (4)^2} = 4\sqrt{2}$

Similarly, $BD = 4\sqrt{2}$

Since, all sides and diagonals of a figure are equal.

So, ABCD forms a square.

So, option (b) is correct.

2. (c) The area of given figure = Area of square

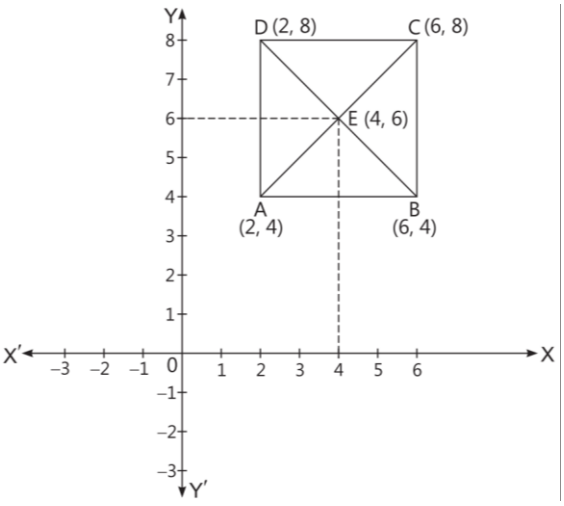
$= (Side)^2$

$= (4)^2$

= 16 sq. units

So, option (c) is correct.

3. (b) The intersection point of two diagonals is E.



$\therefore$ The coordinates of E are (4, 6).

So, option (b) is correct.

4. (c) The perimeter of a square = 4(side)

$= 4 \times 4 = 16$ units.

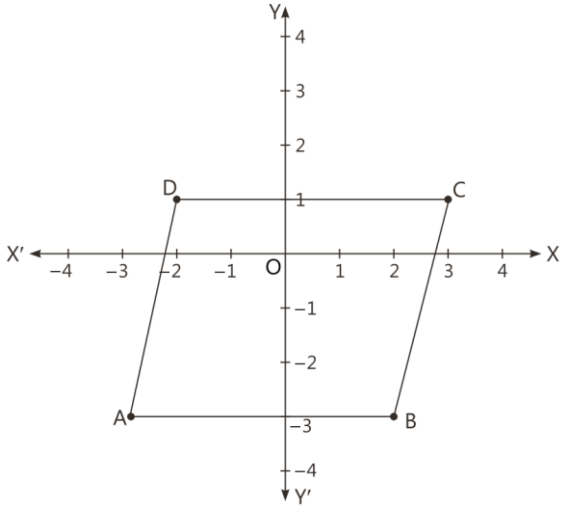
So, option (c) is correct.

5. (d) The image of a point D(2, 8) with respect to *X*-axis is (2, – 8).

So, option (d) is correct.

Case Study 4

Four friends Aakansha, Prabhat, Puneet and Lalit are sitting in a park at points A, B, C and D respectively. This park has been divided into small squares by drawing equally distanced horizontal and vertical lines. Consider XOX' and YOY' as coordinate axes.



On the basis of the above information, solve the following questions:

Q1. Find the coordinates of B.

Q2. In which quadrant, point A is located?

Q3. Find the image of a point A with respect to Y-axis.

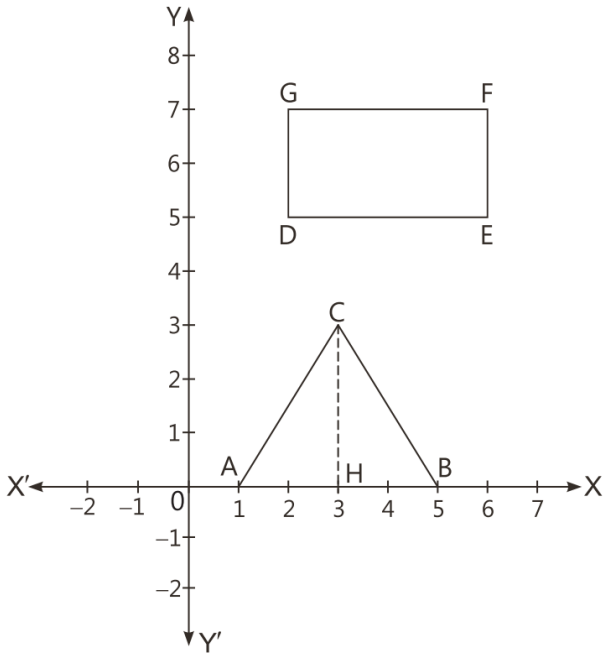
Q4. Find the area of figure.

Solutions

1. The perpendicular distance of B from y is 2 in positive direction and perpendicular distance of B from X-axis is 3 in negative direction of Y-axis.
   Hence, coordinates of B are $(2, -3)$.
2. Point A is located in III quadrant.
3. The coordinate of point A is $(-3, -3)$. The image of a point A$(-3, -3)$ with respect to Y-axis $(3, -3)$.
4. Now, length of AB $= |-3| + 2$
   $= 3 + 2 = 5$
   Height = perpendicular distance of D from AB
   $= 4$
   $\therefore$ Area of parallelogram = length $\times$ height
   $= 5 \times 4 = 20$ sq. units

Case Study 5

Annie Besant school provides good and quality education. The school also provides playing facilities to students for which they created two playground one is in the shape of rectangle and the other one is triangular in shape, which is as shown below.



On the basis of the above information, solve the following questions:

Q1. Find the altitude of the triangle ABC.

Q2. Find the area of a triangle ABC.

Q3. Find the coordinate of point F.

Q4. Find the perimeter of a rectangle DEFG.

Q5. Find the length of diagonal of a rectangle.

Solutions

1. The altitude of the triangle ABC is HC = 3 units

2. The area of a triangle ABC $= \frac{1}{2} \times AB \times HC$

$= \frac{1}{2} \times 4 \times 3$

$= 6$ sq. units

3. The perpendicular distance from point F to the *Y* and *X*-axes are 6 and 7.

Hence, coordinates of point F are (6, 7).

4. Length of rectangle DE = 6 – 2 = 4

and width of rectangle GD = 7 – 5 = 2

$\therefore$ Perimeter of a rectangle = 2 (length + width)

$= 2\ (4 + 2) = 12$ units

5. Length of diagonal $= \sqrt{(DE)^2 + (EF)^2}$

$= \sqrt{(4)^2 + (2)^2}$

$= \sqrt{16 + 4} = \sqrt{20}$

$= 2\sqrt{5}$ units