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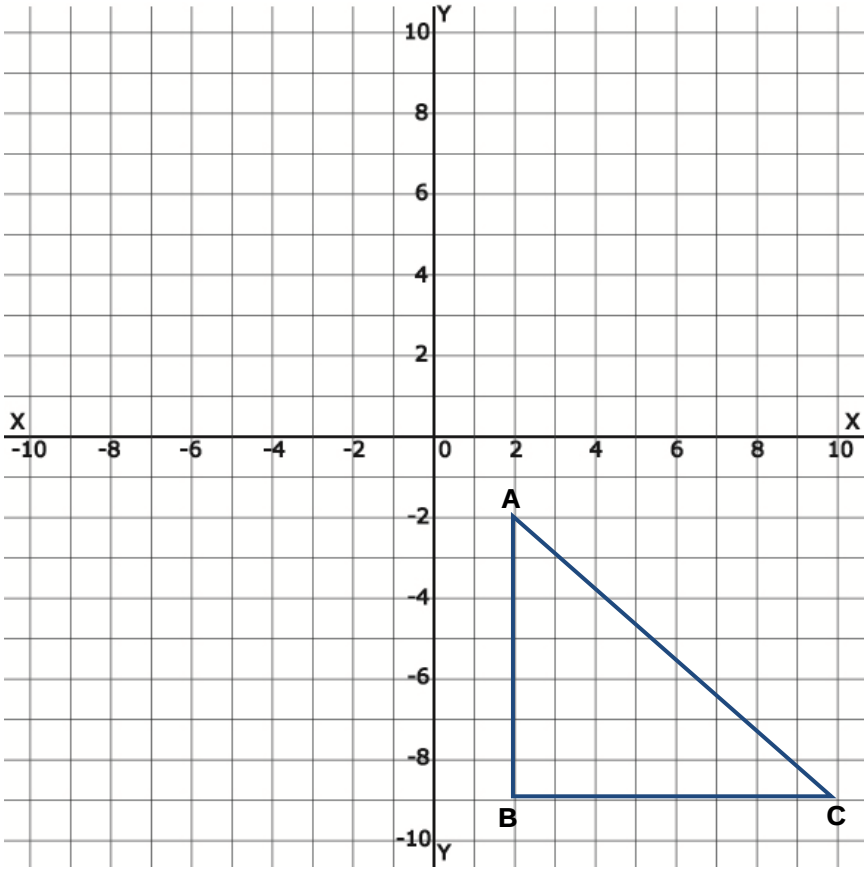
Area and Perimeter in the Coordinate Plane Problems - Guided Lesson Explanation

Explanation#1

Step 1) Area of a triangle = ½ x base x height

Identify the coordinates of all points.



To find the area of Δ*ABC*, first find its base and height. Then, use the formula for the area of a triangle.

Step 2: Find the base.

Any side of the triangle can be the base, but $\overline{BC}$ is the best choice. Since B (2,-9) and C (10,-9) have the same y-coordinate, $\overleftrightarrow{BC}$ is a horizontal line. So, it is straightforward to calculate BC.

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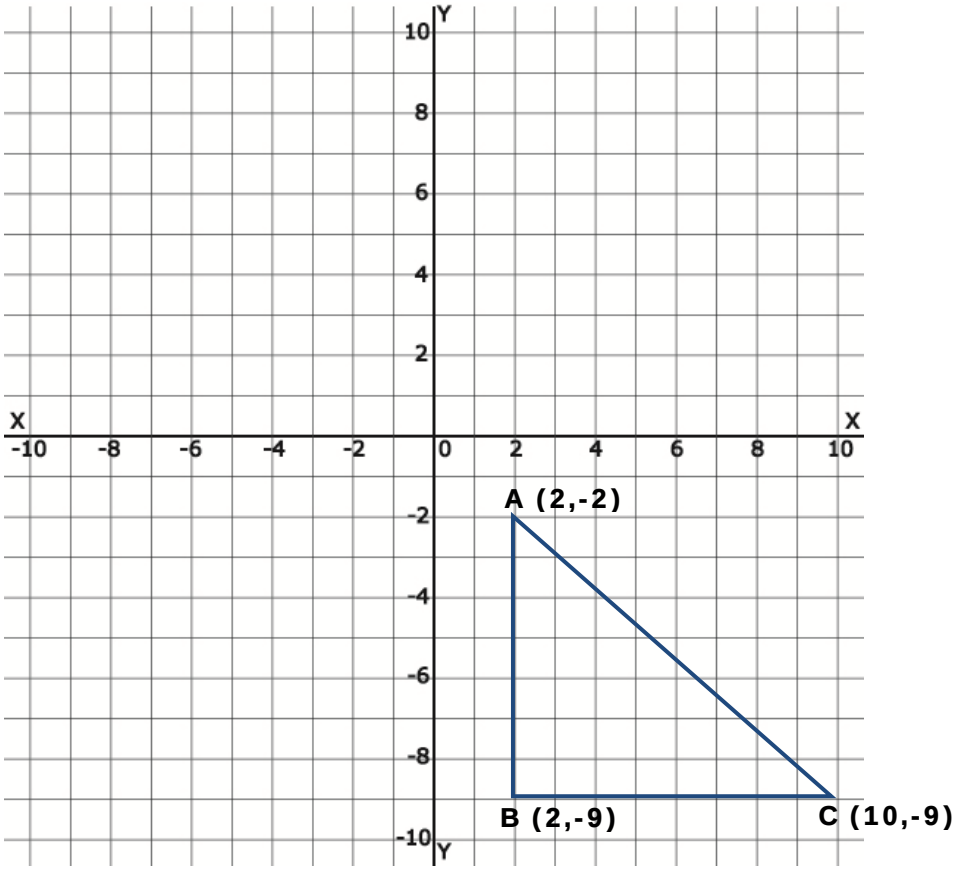

BC is the absolute value of the difference in the x-coordinates of B (2,-9) and C (10,-9). So, BC = (10-2) = 8.

Step 3) Find the height.

The height of ΔABC is the length of the altitude between A (2,-2) and $\overleftrightarrow{BC}$.

Since A (2,-2) and B (2,-9) have the same x-coordinate, the altitude lies on the vertical line, $\overleftrightarrow{AB}$. So, the height is just AB = (-9--2) = 7.

Step 4) Finally, plug the values of the base and height into the formula for the area of a triangle.

Area of a triangle = $\frac{1}{2}$.b.h

= $\frac{1}{2}$(8)(7) Plug in b= 8 and h= 7

=$\frac{56}{2}$ Multiply

= 28 Simplify

So, the area of ΔUVW is 28 square units.

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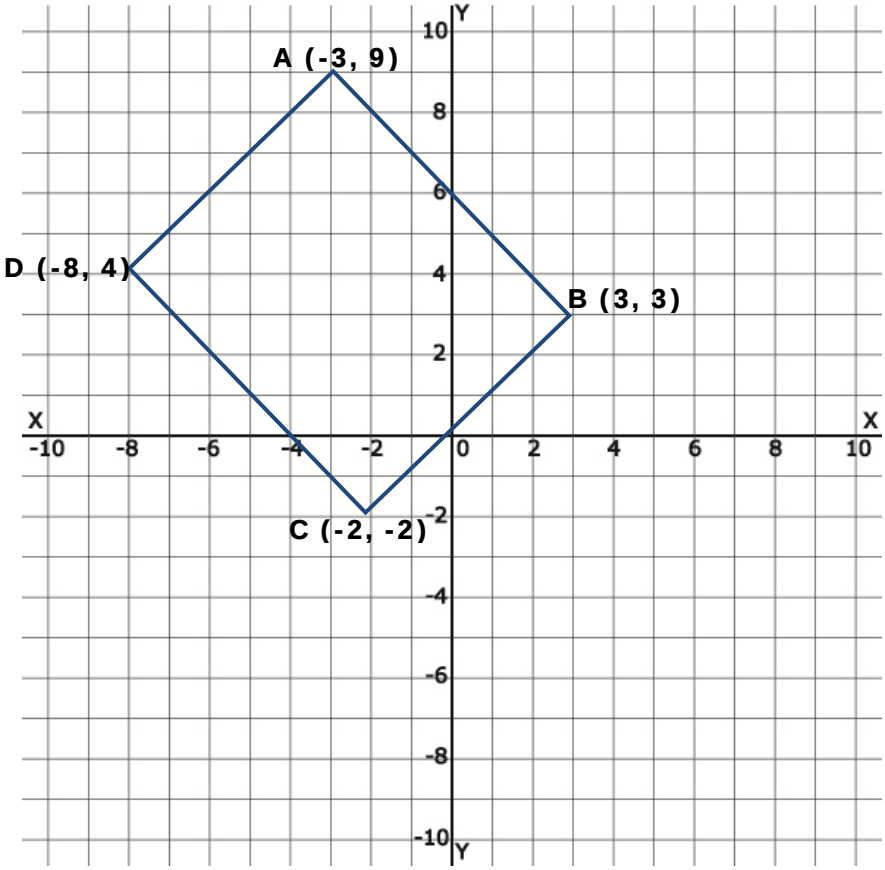
Explanation # 2

Step 1) Look the graph of rectangle ABCD to find the coordinates of the vertices.



To find the area and perimeter of rectangle ABCD, first calculate its length and width. Then, plug these values into the formulas for the area and perimeter of a rectangle.

Step 2: Find the length.

Either pair of parallel sides of the rectangle can represent the length. So, pick a pair of parallel sides.

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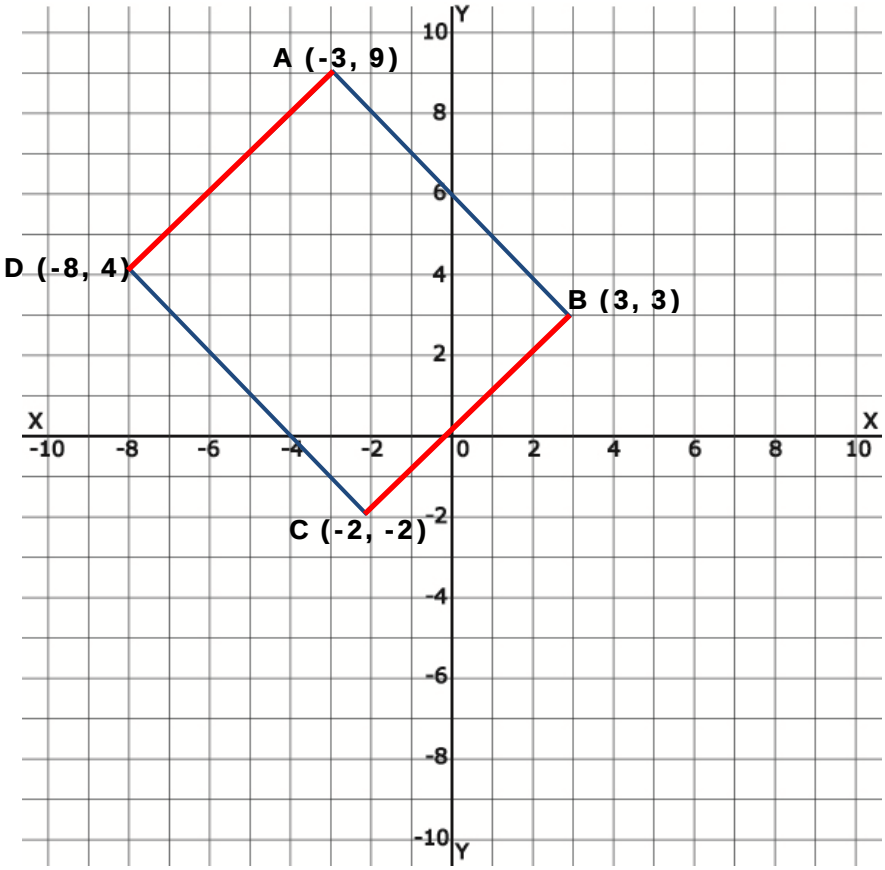

The distance between the vertices A (-3, 9) and D (-8, 4) is the length.

To calculate AD, use the distance formula. Plug in A (-3, 9) for (x1, x2) and D (-8, 4) for (y1, y2) and simplify.

CB=$\sqrt{(x2-x1)^2+(y2-y1)^2}$ Distance formula

=$\sqrt{(9--3)^2+(4--8)^2}$

=$\sqrt{(12)^2+(12)^2}$

=$\sqrt{144+144}$

=$\sqrt{288}$

=16.97

So the length is 16.97.

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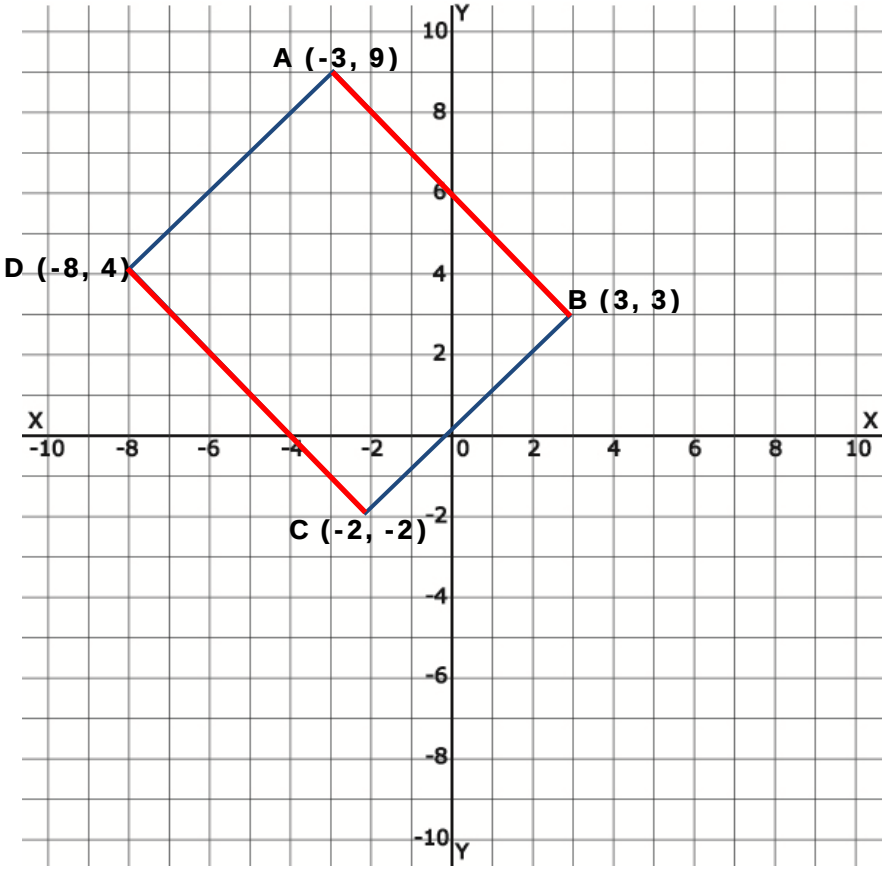
Step 3) Find the width.

Look the other pair of parallel sides.



The distance between the vertices A (-3, 9) and B (3, 3) is the width.

To calculate AB, use the distance formula. Plug in A (-3, 9) for (x1, x2) and B (3, 3) for (y1, y2) and simplify.

AB=$\sqrt{(x2-x1)^2+(y2-y1)^2}$ Distance formula

=$\sqrt{(9--3)^2+(3-3)^2}$

=$\sqrt{(12)^2+(0)^2}$

=$\sqrt{144+0}$

=$\sqrt{144}$

= 12

So, the width is 13

Step 4) Find the area and perimeter.

Finally, plug in the values for the length and width into the formulas for the area and perimeter of a rectangle.

Area of a rectangle= l.w

= (16.97) (12)

= 203.64

Perimeter of a rectangle = 2l + 2w

= 2(16.97) + 2(12)

= 33.94 + 24

= 57.94

So, the area and perimeter of rectangle ABCD are 203.64 square units and 57.94 units, respectively.

Explanation#3

Step 1) Area of a triangle = ½ x base x height

Identify the coordinates of all points.

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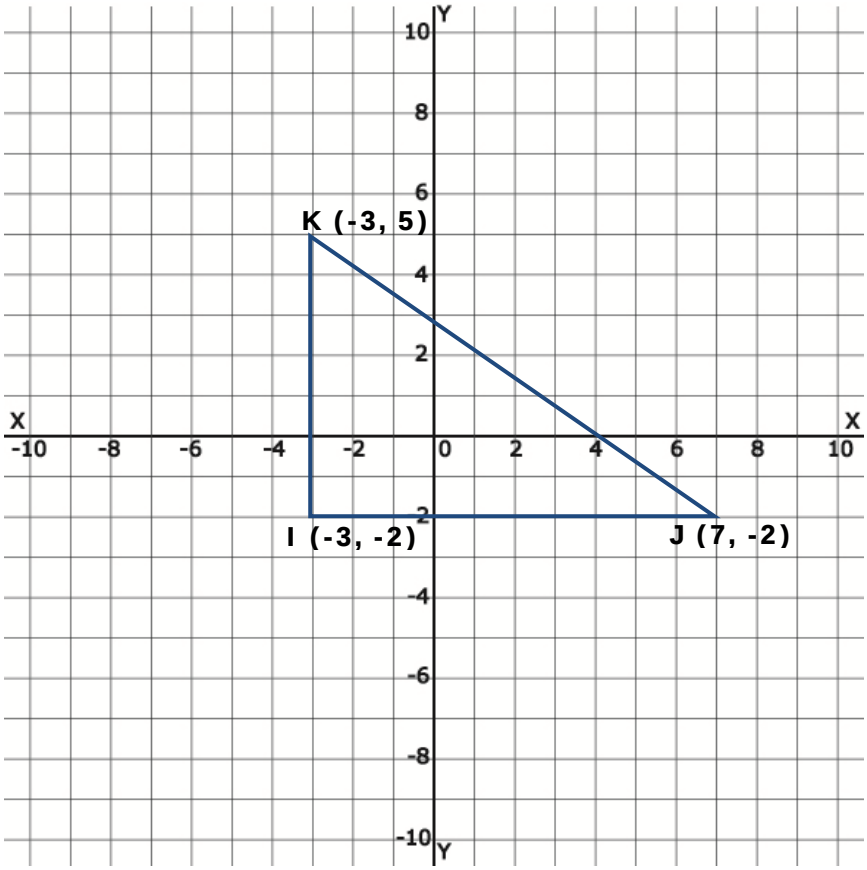

To find the area of ΔIJK, first find its base and height. Then, use the formula for the area of a triangle.

Step 2: Find the base.

Any side of the triangle can be the base, but $\overline{IJ}$ is the best choice. Since I (-3,-2) and J (-2, 7) have the same y-coordinate, $\overleftrightarrow{IJ}$ is a horizontal line. So, it is straightforward to calculate IJ.

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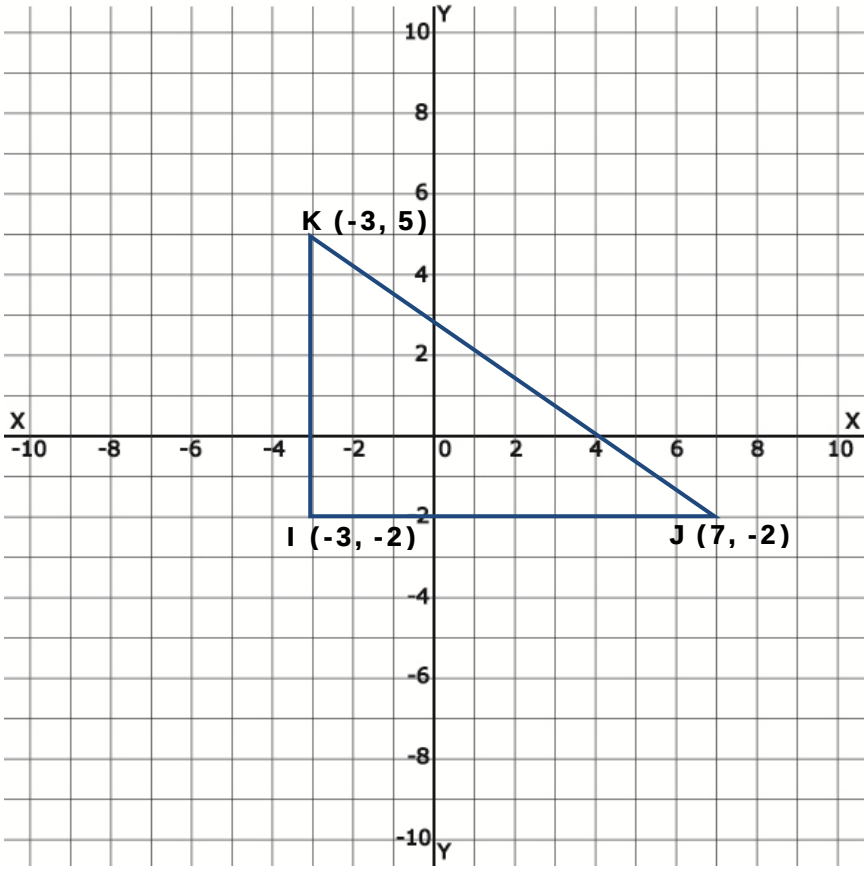

IJ is the absolute value of the difference in the x-coordinates of I (-3,-2) and J (7,-2). So, IJ = (7--3) = 10.

Step 3) Find the height.

The height of ΔIJK is the length of the altitude between K (-3, 5) and I

Since K (-3, 5) and I (-3,-2) have the same x-coordinate, the altitude lies on the vertical line, $\overleftrightarrow{KI}$. So, the height is just KI = (5--2) = 7.

Step 4) Finally, plug the values of the base and height into the formula for the area of a triangle.

Area of a triangle = $\frac{1}{2}$.b.h

= $\frac{1}{2}$(10) (7) Plug in b= 8 and h= 7

=$\frac{70}{2}$ Multiply

= 35 Simplify

So, the area of ΔIJK is 35 square units.