

Two Identical Rectangles Link At One Corner At Drawn On The Coordinates Axes Give The Coordinates For

Two Identical Rectangles Link At One Corner At Drawn On The Coordinates Axes Give The Coordinates For

Understanding geometric figures and their positions on coordinate axes is fundamental in mathematics, especially in coordinate geometry. When dealing with rectangles, a common problem involves determining the coordinates of their vertices, especially when the rectangles are identical and linked at one corner. This scenario is not only relevant for academic purposes but also has practical applications in fields such as architecture, engineering, and computer graphics.

In this comprehensive guide, we explore the problem of two identical rectangles linked at one corner on a coordinate plane. We will analyze how to determine their coordinates, understand the geometric relationships involved, and provide step-by-step solutions with illustrative examples. This article aims to serve as an SEO-optimized resource for students, educators, and professionals seeking clarity on this topic.

Understanding the Problem: Linking Two Rectangles at a Common Corner

What Does It Mean for Two Rectangles to Be Identical and Linked at One Corner?

In the context of coordinate geometry, two rectangles are considered identical if they have the same dimensions (length and width). When these rectangles are linked at one corner, it indicates that they share a common vertex, and their placement on the coordinate plane is such that this vertex acts as a junction point. The problem typically involves finding the coordinates of all vertices based on known information, such as the position of one rectangle and the linking corner.

Basic Setup and Assumptions

- The coordinate plane includes the x-axis and y-axis, with both axes extending infinitely in both directions.

- The rectangles are aligned with the axes, meaning their sides are parallel to the axes.
- The rectangles are identical in size and shape.
- The linking point is a common vertex where both rectangles meet.
- The known coordinate of the linking corner helps determine the other vertices.

Step-by-Step Approach to Find Coordinates of the Rectangles

Step 1: Define the Known Data

- Coordinates of the linking corner: Let's denote this point as (x_0, y_0) .
- Dimensions of the rectangles: Length (along x-axis) as L and Width (along y-axis) as W .
- Orientation: Assume the rectangles are aligned with axes; otherwise, additional angles would need to be considered.

Step 2: Establish the Vertices of the First Rectangle

Suppose the first rectangle has its bottom-left vertex at (x_1, y_1) . If the linking corner is at (x_0, y_0) , then:

- The linking corner could be at any of the rectangle's vertices, but commonly, it is at the bottom-left, bottom-right, top-left, or top-right vertex.
- For simplicity, assume the linking corner is at the bottom-left vertex of the first rectangle.

Thus, the vertices of the first rectangle are:

1. Bottom-left: (x_0, y_0)
2. Bottom-right: $(x_0 + L, y_0)$
3. Top-left: $(x_0, y_0 + W)$
4. Top-right: $(x_0 + L, y_0 + W)$

Step 3: Determine the Position of the Second Rectangle

Since the rectangles are linked at one corner and are identical, the second rectangle shares the linking vertex with the first. Depending on how the rectangles are linked, their positions will differ.

Scenario A: Rectangles Linked at Adjacent Sides

- The second rectangle shares the linking corner at (x_0, y_0) .
- It extends in a different direction, for example, to the right or upward.

Suppose the second rectangle is attached to the right of the first, sharing the corner at (x_0, y_0) . Its vertices are:

1. Bottom-left: (x_0, y_0)
2. Bottom-right: $(x_0 + L, y_0)$
3. Top-left: $(x_0, y_0 + W)$
4. Top-right: $(x_0 + L, y_0 + W)$

But since the rectangles are identical and linked at one corner, the second rectangle could be positioned either horizontally or vertically relative to the first.

Scenario B: Rectangles Linked at Diagonal or Opposite Sides

- The second rectangle could be positioned diagonally or on opposite sides, requiring coordinate calculations based on the linking point.

Step 4: Calculating Coordinates in Different Linking Scenarios

- Linked at a corner and extending along axes:

Suppose the second rectangle is attached to the right side of the first rectangle, sharing the corner at (x_0, y_0) . The second rectangle's vertices are:

- Bottom-left: $(x_0 + L, y_0)$
- Bottom-right: $(x_0 + 2L, y_0)$
- Top-left: $(x_0 + L, y_0 + W)$
- Top-right: $(x_0 + 2L, y_0 + W)$

- Linked at a corner and extending upward:

Vertices:

- Bottom-left: $(x_0, y_0 + W)$
- Bottom-right: $(x_0 + L, y_0 + W)$
- Top-left: $(x_0, y_0 + 2W)$
- Top-right: $(x_0 + L, y_0 + 2W)$

Step 5: Developing General Formulas

To generalize, if the rectangles are linked at a corner (x_0, y_0) , and the second rectangle extends along a certain direction, the vertices can be expressed as:

- Extension to the right:

- Bottom-left: (x_0, y_0)
- Bottom-right: $(x_0 + L, y_0)$
- Top-left: $(x_0, y_0 + W)$
- Top-right: $(x_0 + L, y_0 + W)$

- Extension upward:
- Bottom-left: (x_0, y_0)
- Bottom-right: $(x_0 + L, y_0)$
- Top-left: $(x_0, y_0 + W)$
- Top-right: $(x_0 + L, y_0 + W)$
- Extension diagonally or in other directions:

Adjust the coordinates accordingly by adding or subtracting L and W in the x and y directions.

Practical Examples with Coordinates

Example 1: Linking at the Origin $(0,0)$

Suppose the rectangles are 4 units long and 3 units wide, linked at the origin.

- Coordinates of the first rectangle:
 1. $(0, 0)$ - bottom-left
 2. $(4, 0)$ - bottom-right
 3. $(0, 3)$ - top-left
 4. $(4, 3)$ - top-right
- For the second rectangle attached to the right:
 1. $(4, 0)$ - shared corner
 2. $(8, 0)$
 3. $(4, 3)$
 4. $(8, 3)$
- For the second rectangle attached above:
 1. $(0, 3)$
 2. $(4, 3)$
 3. $(0, 6)$
 4. $(4, 6)$

Example 2: Linking at a Non-Origin Point

Suppose the linking corner is at $(2, 1)$, with rectangle dimensions of 5 units by 2 units.

- First rectangle vertices:
 1. $(2, 1)$ - bottom-left
 2. $(7, 1)$ - bottom-right
 3. $(2, 3)$ - top-left
 4. $(7, 3)$ - top-right
- Second rectangle extending to the left:

1. $(-3, 1)$
2. $(2, 1)$
3. $(-3, 3)$
4. $(2, 3)$

- Or extending upward:

1. $(2, 3)$
2. $(7, 3)$
3. $(2, 5)$
4. $(7, 5)$

Applications and Relevance of Coordinate Geometry in Linking Rectangles

In Architecture and Design

Architects often use coordinate geometry to plan layouts, ensuring that rooms or structures align correctly. When designing linked rectangular spaces, knowing how to calculate vertices based on a linking point is essential for precise construction.

In Computer Graphics and Visualization

Rendering scenes involving linked rectangles, such as UI components or objects within a virtual environment, relies heavily on coordinate calculations to position elements accurately.

In Engineering and Structural Analysis

Engineers analyze how components like beams or panels connect at joints, which can be modeled as linked rectangles on a coordinate plane, facilitating stress analysis and structural integrity assessments.

Summary and Key Takeaways

- Two identical rectangles linked at one corner

Frequently Asked Questions

What are the key steps to find the coordinates of two identical rectangles linked at one corner on the

coordinate axes?

First, identify the coordinates of the initial rectangle, then determine the position of the second rectangle so that it shares one corner with the first. Use geometric transformations like translation or rotation to ensure both rectangles are identical and connected at a single corner. Finally, write down the coordinates of all vertices for both rectangles.

How do you ensure the rectangles are identical when drawing them on the coordinate axes?

To make the rectangles identical, use the same length and width measurements for both. When plotting, replicate the vertex coordinates of the first rectangle for the second, applying any necessary translation or rotation to position them correctly while sharing one corner.

What are common coordinate configurations for two rectangles linked at one corner on the axes?

Common configurations involve placing the first rectangle in a standard position, such as with vertices at $(0,0)$, $(a,0)$, (a,b) , $(0,b)$, and then positioning the second rectangle so that one of its vertices coincides with a corner of the first, such as at $(a,0)$ or $(0,b)$, with identical dimensions.

Can you provide an example of coordinates for two identical rectangles linked at one corner on the axes?

Yes. For example, rectangle 1 has vertices at $(0,0)$, $(4,0)$, $(4,3)$, $(0,3)$. If linked at the corner $(4,0)$, the second rectangle could have vertices at $(4,0)$, $(8,0)$, $(8,3)$, $(4,3)$, sharing the corner $(4,0)$.

How does changing the position of one rectangle affect the coordinates of the linked rectangle?

Moving one rectangle via translation shifts all its vertices uniformly. To keep them linked at a corner, the second rectangle's position must be adjusted so that its designated corner coincides with the shared point, maintaining identical dimensions but changing other vertex coordinates accordingly.

What considerations should be made when plotting these rectangles on the coordinate axes to ensure accuracy?

Ensure the dimensions are consistent, accurately plot the shared corner point, and verify that the rectangles are correctly linked at that point. Use grid lines and coordinate labels for precision, and double-check measurements and vertex placements to confirm they are identical and properly connected.

Additional Resources

Rectangles Linked at One Corner: A Geometric Exploration via Coordinate Axes

Understanding geometric figures and their properties is fundamental in fields ranging from mathematics and engineering to computer graphics and design. When studying the behavior of shapes such as rectangles on coordinate axes, visualizing how these figures interact—especially when linked at a single corner—is both intriguing and instructive. In this article, we delve deeply into the concept of "Two Identical Rectangles Linked at One Corner at Drawn on the Coordinate Axes," providing detailed coordinates, geometric insights, and practical applications.

Introduction to Rectangles on Coordinate Axes

Before examining the specific scenario of two identical rectangles linked at one corner, it's essential to establish foundational concepts:

- **Coordinate Axes System:** A two-dimensional plane defined by the x-axis (horizontal) and y-axis (vertical). Any point can be represented as (x, y) .
- **Rectangles in Coordinate Geometry:** Defined by four vertices, with sides aligned parallel to the axes (axis-aligned rectangles), making calculations and visualization straightforward.
- **Linked Rectangles:** When two rectangles share a common vertex or side, their positioning relative to each other influences properties such as area, perimeter, and symmetry.

Scenario Description: Two Identical Rectangles Linked at One Corner

Imagine drawing two identical rectangles on the Cartesian plane. These rectangles are positioned such that they share exactly one corner point—meaning they touch at only one vertex, with no overlapping sides or interior areas.

Key characteristics:

- Both rectangles are identical in size, with the same length and width.
- They are positioned in the plane such that one vertex of each rectangle coincides at a single point.
- The arrangement forms a composite figure, which can resemble an 'L'-shape or other configurations depending on their placement.

Visual Representation:

While a visual diagram would be ideal, conceptualizing this setup involves imagining two rectangles placed in such a way that:

- One rectangle is anchored at the origin $(0,0)$.
- The second rectangle is positioned so that it shares exactly one corner

with the first, say at point (a, b) .

- The rectangles do not overlap except at the shared corner.

Determining Coordinates for the Rectangles

To analyze this configuration comprehensively, establishing the exact coordinates of their vertices is crucial. Let's define parameters:

- Let length = L
- Let width = W
- Both rectangles are identical, with vertices labeled systematically.

Coordinate Setup for the First Rectangle

Suppose the first rectangle is positioned in the lower-left quadrant, anchored at the origin:

- Vertex A: $(0, 0)$ - bottom-left corner
- Vertex B: $(L, 0)$ - bottom-right corner
- Vertex C: (L, W) - top-right corner
- Vertex D: $(0, W)$ - top-left corner

This straightforward placement makes calculations and visualizations easier.

Coordinate Setup for the Second Rectangle

To link the second rectangle at a single corner, say at point (a, b) , we have several options depending on the arrangement:

Case 1: Shared Corner at the Bottom-Left of Second Rectangle

Position the second rectangle so that its bottom-left vertex coincides with the corner (a, b) :

- Vertex E: (a, b) - shared corner
- Vertex F: $(a + L, b)$ - extends horizontally
- Vertex G: $(a + L, b + W)$ - extends upward
- Vertex H: $(a, b + W)$ - completes the rectangle

Coordinates:

- E: (a, b)
- F: $(a + L, b)$
- G: $(a + L, b + W)$
- H: $(a, b + W)$

Case 2: Shared Corner at the Top-Right of Second Rectangle

Alternatively, position the second rectangle so that its top-right vertex coincides with the shared point:

- Vertex E: (a, b)
- Vertex F: $(a - L, b)$
- Vertex G: $(a - L, b - W)$
- Vertex H: $(a, b - W)$

Geometric Properties and Analysis

Understanding the placement and coordinates of these rectangles allows for calculation of various properties:

Area

Since the rectangles are identical:

- Area of one rectangle: $(A = L \times W)$

Perimeter

- Perimeter of one rectangle: $(P = 2(L + W))$

Shared Corner Implications

- The shared vertex acts as a hinge point, influencing the overall shape.
- The total area of the combined figure depends on the relative positioning and whether they overlap or just touch at the corner.
- If they only touch at the corner, the combined area is simply twice that of one rectangle.

Coordinates and Positioning Variations

By adjusting the parameters a and b , you can explore various arrangements:

- Adjacent placement: Where rectangles share a side instead of just a corner.
- Diagonal placement: Where rectangles are positioned diagonally, sharing a corner at (a, b) .
- Overlap considerations: When the rectangles are moved closer, overlapping occurs, affecting area calculations.

Practical Applications and Visualizations

Analyzing such arrangements is not purely academic; it has practical implications:

- Design and Architecture: Planning modular units or tiles that fit together with shared corners.
- Computer Graphics: Rendering composite shapes with precise coordinate manipulations.

- Robotics and Path Planning: Navigating objects around shared vertices or corners.
- Mathematical Puzzles: Understanding arrangements and constraints involving geometric figures.

Visualizing these configurations can be greatly enhanced using graphing tools like Desmos, GeoGebra, or CAD software. By plotting the vertices with given coordinates, one can see the relationships and test different placements.

Example: Specific Coordinates for a Concrete Illustration

Suppose:

- $L = 4$
- $W = 2$
- The first rectangle is at the origin:
- $A(0,0)$, $B(4,0)$, $C(4,2)$, $D(0,2)$
- The second rectangle shares the corner at $(4,0)$:
- $E(4,0)$, $F(8,0)$, $G(8,2)$, $H(4,2)$

In this configuration:

- The rectangles are placed side-by-side horizontally.
- The shared corner is at $(4,0)$, which coincides with B and E.
- Coordinates are explicitly known, enabling precise calculation of areas, perimeters, and spatial relationships.

Conclusion: The Significance of Coordinate-Based Geometric Configurations

The exploration of two identical rectangles linked at one corner on the coordinate axes exemplifies the richness of geometric analysis using coordinate geometry. By defining exact coordinates, we gain clarity in understanding arrangements, constraints, and properties. This approach is vital across disciplines, offering a rigorous framework to analyze, design, and optimize complex structures.

Whether for theoretical mathematics, practical engineering, or creative design, mastering the coordinate-based placement of shapes like rectangles opens numerous avenues for innovation. The ability to assign precise coordinates and manipulate shapes accordingly ensures a high level of control and insight—making this a fundamental skill for students, educators, and professionals alike.

In essence, the detailed coordinate analysis and geometric insights presented in this article serve as a comprehensive guide for understanding how two

identical rectangles can be linked at a single corner within the Cartesian plane, providing foundational knowledge and practical tools for further exploration.

Two Identical Rectangles Link At One Corner At Drawn On The Coordinates Axes Give The Coordinates For

Two Identical Rectangles Link At One Corner At Drawn On The Coordinates Axes Give The Coordinates For

Related Articles

- [When Considering The Content Of A Comprehensive Business Plan, An Entrepreneur Should Think First And](#)
- [2. Calculate The Rate Constant, K, Using The Slope Of The Linear Regression Line For Your Linear Curve](#)
- [WRITE ABOUT A THEME: INTERACTIONS A Human Pancreatic Cell Obtains O₂ , And Necessary Molecules Such As](#)

[Back to Home](#)