

Tools for Instruction

Understand the Coordinate Plane

Objective Locate ordered pairs in the first quadrant of the coordinate plane.

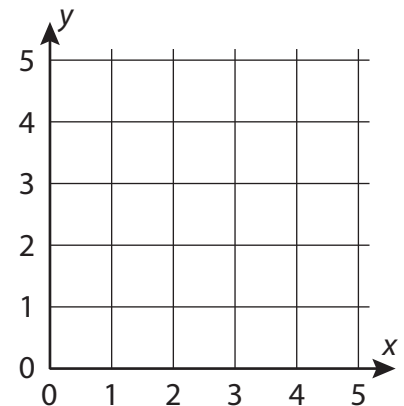
Materials 2 number cubes (numbered 0–5), masking tape or grid display on a board with magnets

Students are first introduced to coordinate geometry through learning the related terminology and how to plot and identify points in the first quadrant. This activity builds on students' knowledge of parallel and perpendicular lines and experience with horizontal and vertical number lines, to teach students vocabulary such as origin, x-axis, y-axis, coordinates, and ordered pairs and graphing and identification of ordered pairs. A firm mastery of the coordinate plane will help students later when they begin constructing scatter plots and using the coordinate plane to study geometric concepts such as symmetry and transformations and algebra concepts such as graphing equations and functions.

Step by Step 30–45 minutes

1 Construct the first quadrant of the coordinate plane.

- Use masking tape to construct a large 5-by-5 grid on the floor, or construct a grid with safe tape on a magnetic surface.
- Draw arrows at the top of the left side and on the right of the bottom side. Label 0 through 5 on each axis from left to right and bottom to top, respectively.
- Discuss the parallel and perpendicular lines that make up the grid. Say: *The two rays that make up the axes are perpendicular. The horizontal lines are parallel to the bottom ray, and all vertical lines are parallel to the ray on the left.*
- Explain that the lines represent two overlapping number line systems, horizontal and vertical, and that the grid lines can be used to show locations.



2 Define coordinate terminology.

- Point to the origin. Say: *The origin is the point where the two rays intersect.* Explain that the origin is used to represent the “beginning” as evidenced by the labels of “0.” Label the origin.
- Explain that a horizontal or vertical line that goes through the origin is called an *axis*. Then explain that the horizontal axis is known as the *x-axis*. Label it as “*x*.”
- Have the student identify the other “axis” going through the origin (the vertical ray). Explain that this is generally known as the *y-axis* and label the ray with a “*y*.”
- Explain that the whole grid system is known as a *coordinate plane*. Define *coordinate* as a number representing a location, and reference the origin as having coordinates of 0, or (0, 0).
- Ask the student which axis shows *x*-coordinates. Repeat for *y*-coordinates.

3 Locate points for ordered pairs.

- Write (2, 0) on the board. Label the 2 as the *x*-coordinate and 0 as the *y*-coordinate. Point out that the coordinates are given in alphabetical order to help the student remember that the first number is *x* and the second number is *y*.

- Move to the 2 on the x -axis. Explain that the location of 2 on the axis is the point $(2, 0)$ because you moved 2 units in the horizontal direction and 0 units in the vertical direction.
- Write $(0, 3)$ on the board. Have the student move to the point. Explain that the first number represents a move of 0 units in the direction of the x -axis and the second represents a move of 3 units along the y -axis.
- Write $(1, 2)$ on the board. Have the student identify the x - and y -coordinates. Lead the student to identify the x -coordinate as 1 and the y -coordinate as 2. Guide the student to start at the origin, and then move first according to the x -coordinate, and then according to the y -coordinate. Enforce the idea that everywhere along the vertical line through 1 represents an x -coordinate of 1.
- Let the student use two number cubes to write and plot other ordered pairs on the grid.

4 Identify ordered pairs of plotted points.

- Stand at or point to the point $(3, 1)$. Ask the student to identify where the vertical line crosses the x -axis, and then where the horizontal line crosses the y -axis. Help the student to conclude that the vertical line crosses the x -axis at 3, and the horizontal line crosses the y -axis at 1. Ask the student to write the ordered pair $(3, 1)$ at the point.
- Repeat for $(1, 1)$, $(5, 0)$, and $(2, 4)$.

Check for Understanding

Have the student use the display grid or draw a grid himself. Plot an ordered pair on the grid, such as $(3, 4)$. Ask the student to label the axes, origin, and the point.

For the student who struggles, use the chart below to help pinpoint where extra help may be needed.

If you observe...	the student...	Then try...
the student marks the point $(4, 3)$	may have trouble understanding the directions indicated by the axes.	showing the student that the “ x direction” is to the right and the “ y direction” is up. Then move his finger 3 units in the x direction followed by 4 units in the y direction.
the student writes one of the coordinates correctly, but not the other one	may have trouble understanding how to use the intersections of the vertical and horizontal gridlines.	having the student highlight the lines through $x = 4$ and $y = 3$, and then note the intersection of the lines.