Geometry and Algebra

Objectives

1. State and apply the distance formula.
2. State and apply the general equation of a circle.
3. State and apply the slope formula.
4. Determine whether two lines are parallel, perpendicular, or neither.
5. Understand the basic properties of vectors.
6. State and apply the midpoint formula.

13-1 *The Distance Formula*

Some of the terms you have used in your study of graphs are reviewed below.

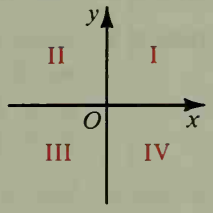
Origin: Point O

Axes: x-axis and y-axis

Quadrants: Regions I, II, III, and IV

Coordinate plane: The plane of the x-axis and the y-axis

The arrowhead on each axis shows the positive direction.



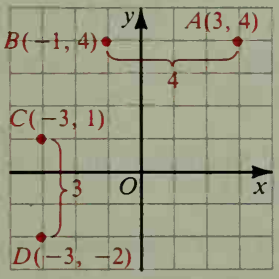
You can easily find the distance between two points that lie on a horizontal line or on a vertical line.

The distance between A and B is 4.
Using the x-coordinates of A and B:

$|3 - (-1)| = 4$, or $|(-1) - 3| = 4$

The distance between C and D is 3.
Using the y-coordinates of C and D:

$|1 - (-2)| = 3$, or $|(-2) - 1| = 3$



When two points do not lie on a horizontal or vertical line, you can find the distance between the points by using the Pythagorean Theorem.

Example 1 Find the distance between points $A(4, -2)$ and $B(1, 2)$.

Solution Draw the horizontal and vertical segments shown. The coordinates of T are $(1, -2)$. Then $AT = 3$, $BT = 4$, $(AB)^2 = 3^2 + 4^2 = 25$, and $AB = 5$.