

## Application

## Locating Points

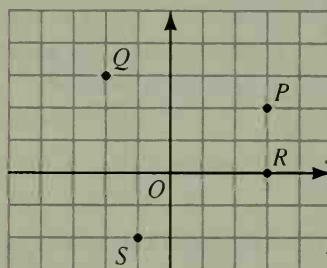
Suppose you lived in an area with streets laid out on a grid. If you lived in a house located at point  $P$  in the diagram at the right below, you could tell someone where you lived by saying:

From the crossing at the center of town,  
go three blocks east and two blocks north.

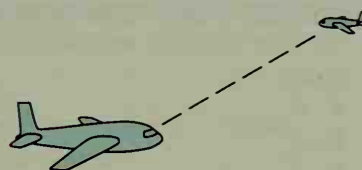
A friend of yours living at  $Q$  might say she lives two blocks west and three blocks north of the town center.



Mathematicians make such descriptions shorter by using a grid system and *coordinates*. They use  $(3, 2)$  for your house at point  $P$ , and  $(-2, 3)$  for your friend's house at  $Q$ . Point  $O$  at the center of town is  $(0, 0)$ . Points  $R$  and  $S$  are  $(3, 0)$  and  $(-1, -2)$ .



This grid system is not always the easiest way to describe a position. If you were a pilot and saw another airplane while flying, it would be difficult to give its position in this system. However, you might say the other plane is 4 km away at 11 o'clock, with 12 o'clock being straight ahead.



Mathematicians sometimes find it convenient to describe a point by a distance and an angle. Rotation in a clockwise direction is represented by a negative angle. Counter-clockwise rotation is represented by a positive angle. A complete rotation, all the way around once, is  $360^\circ$  (or  $-360^\circ$ ). The labeled points in the diagram at the right are described as shown below.

A	$(3, 60^\circ)$
B	$(2, 120^\circ)$
C	$(1.5, 210^\circ)$ or $(1.5, -150^\circ)$
D	$(3, 315^\circ)$ or $(3, -45^\circ)$

