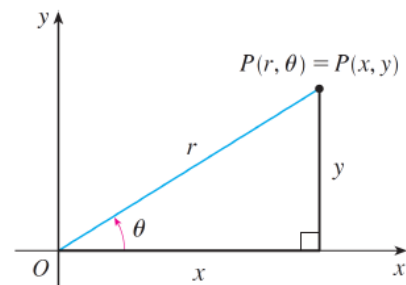


Polar Coordinates

In a Cartesian coordinate system we identify each point in the plane according to a unique ordered pair of real numbers (x, y) .

We can also locate a point according to its distance from the origin (pole) and rotation from the positive x-axis (polar axis). As illustrated in the diagram to the right, if $P(x, y)$ is a point in the plane r units from the pole and a rotation θ from the polar axis, then the ordered pair (x, y) can also be identified by (r, θ) . These coordinates are called the **polar coordinates** of P .



CONVERTING FROM POLAR COORDINATES (r, θ) TO RECTANGULAR COORDINATES (x, y) :

- Find x using $x = r \cos \theta$ (Since $\cos \theta = \frac{x}{r}$)
- Find y using $y = r \sin \theta$ (Since $\sin \theta = \frac{y}{r}$)
- The rectangular coordinates are (x, y)

Example 1: Converting from Polar Coordinates to Rectangular Coordinates

Sketch a diagram and convert the following polar coordinates to *exact* rectangular coordinates.

- a. $(6, 135^\circ)$ b. $(-5, \frac{5\pi}{3})$ c. $(7, -150^\circ)$

Solution:

<p>a. $(6, 135^\circ)$</p> <p>$(x, y) = \underline{\hspace{2cm}}$</p>	<p>b. $(-5, \frac{5\pi}{3})$</p> <p>$(x, y) = \underline{\hspace{2cm}}$</p>	<p>c. $(7, -150^\circ)$</p> <p>$(x, y) = \underline{\hspace{2cm}}$</p>
---	---	--

