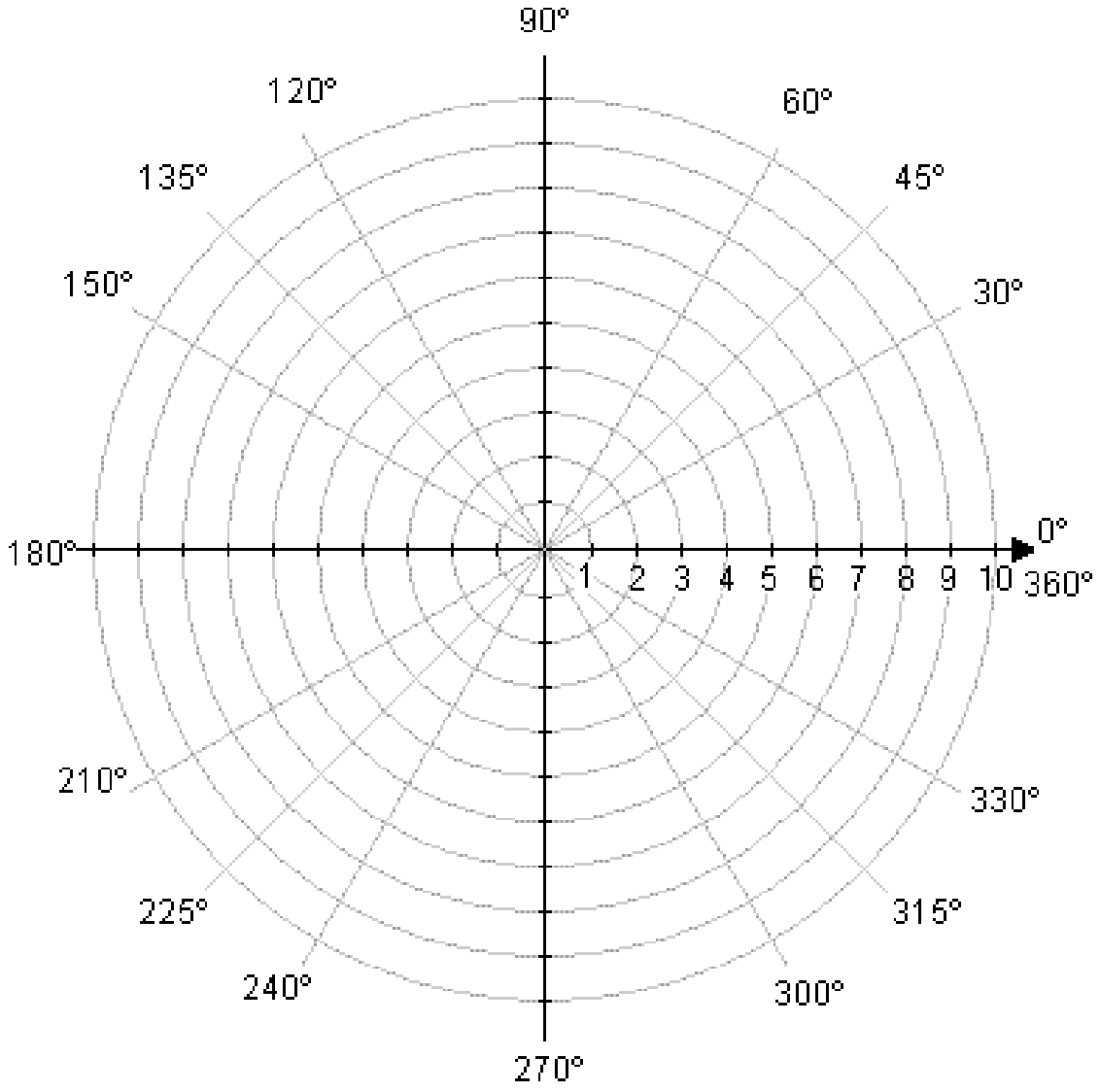
Sec. 6.3 Polar Coordinates

Components of Polar Coordinates: (r, θ)



Ex 1. Plot each point.

A = (1, 45°)

B = (2, π/6)

C = (−2, π/6)

D = (3, 120°)

E = (−3, 120°)

F = (−2, −150°)

Ex. 2: Find three other coordinates (to have two positive and two negative) for point C and E from example 1.

BTWN: $-360° < \Theta < 360°$ or $-2\pi < \Theta < 2\pi$

Keep degrees in degrees and radians in radians (as given).

$C = (-2, \pi/6)$ $E = (-3, 120°)$

Converting Polar to Rectangular

(r, θ) ⟶ (x, y)

$$\cos\theta = \frac{x}{r} \quad \text{and} \quad \sin\theta = \frac{y}{r}$$

$$x = r\cos\theta \qquad y = r\sin\theta$$

Ex.3: Convert to rectangular form:

a) (2, 30°)

b) (4, 120°)

Converting Rectangular to Polar

(x, y) ⟶ (r, θ)

$$r^2 = x^2 + y^2 \qquad \tan\theta = \frac{y}{x}$$

$$r = \pm\sqrt{x^2 + y^2}$$

Ex.4: Convert to polar form. Find two sets of polar coordinates for the point for $0 \le \theta < 2\pi$.

a) (0, - 5) b) (- 3, - 3) c) (√3, - 1)

An equation in terms of r and θ is called a polar equation.

Ex.5: Change the polar equation to a rectangular equation.

(only in terms of x and y, use identities where necessary)

a) $r = 2\cos\theta$ b) $\theta = 5\pi/3$ c) $r = \sin 2\theta$

Ex.6: Change the rectangular equation to a polar equation (in terms of r and θ).

a) $x^2 + y^2 = 16$

b) y = 4

c) 4x + 7y – 2 = 0