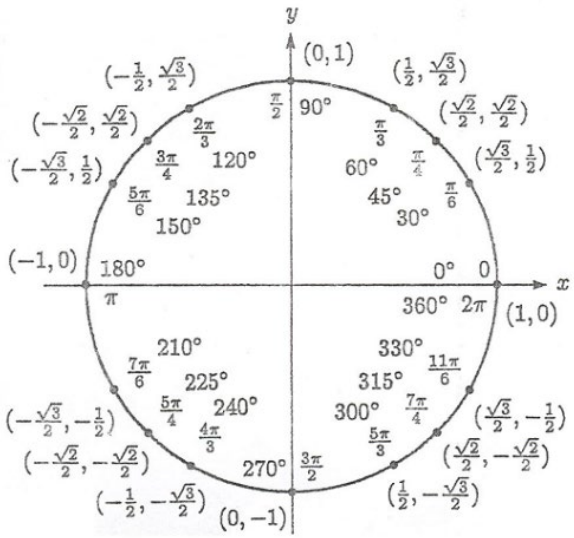
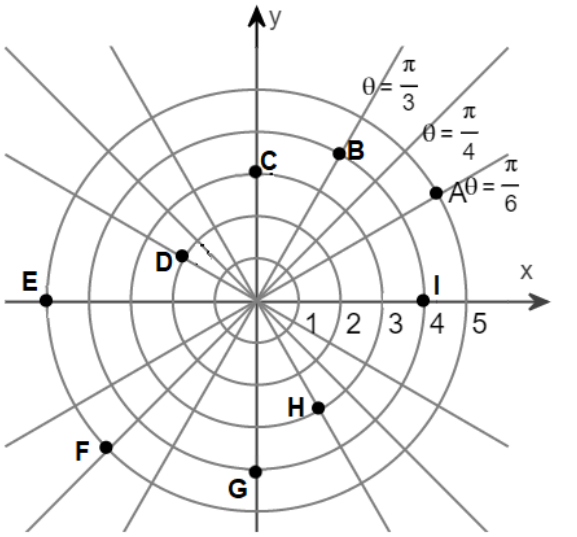
Polar ⇔ Rectangular





1. Write a pair of polar coordinates (r, θ) and a pair of rectangular coordinates (x, y) for the points **A** through **I**. ***Give exact values. Report θ in radians please.*** Utilize the unit circle for efficiency.
No trig function should be in your answer. Only one polar coordinate (of your choice) need be reported.

A. $r =$ **5**, $\theta =$ $\frac{\pi}{6}$ and $x =$ $\frac{5}{2}\sqrt{3}$, $y =$ $\frac{5}{2}$

B. $r =$ **4**, $\theta =$ $\frac{\pi}{3}$ and $x =$ **2**, $y =$ $2\sqrt{3}$

C. $r =$ **3**, $\theta =$ $\frac{\pi}{2}$ and $x =$ **0**, $y =$ **3**

D. $r =$ **2**, $\theta =$ $\frac{5\pi}{6}$ and $x =$ $-\sqrt{3}$, $y =$ **1**

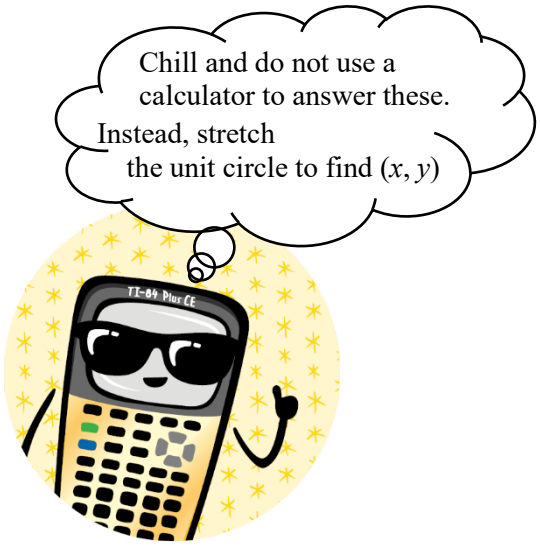
E. $r =$ **5**, $\theta =$ π and $x =$ **−5**, $y =$ **0**

F. $r =$ **5**, $\theta =$ $\frac{5\pi}{4}$ and $x =$ $-\frac{5}{2}\sqrt{2}$, $y =$ $-\frac{5}{2}\sqrt{2}$

G. $r =$ **4**, $\theta =$ $\frac{3\pi}{2}$ and $x =$ **0**, $y =$ **−4**

H. $r =$ **3**, $\theta =$ $\frac{5\pi}{3}$ and $x =$ $\frac{3}{2}$, $y =$ $-\frac{3}{2}\sqrt{3}$

I. $r =$ **4**, $\theta =$ 2π and $x =$ **4**, $y =$ **0**



Express in the polar coordinates. There are many correct answers. Only one is required. Give **exact** values. Report θ in **radians** please. Utilize the unit circle for efficiency. No trig function should be in your answer.

2. $x = 4, y = -4 \Leftrightarrow r =$ $4\sqrt{2}$, $\theta =$ $\frac{7\pi}{4}$

3. $x = -\sqrt{3}, y = 0 \Leftrightarrow r =$ $\sqrt{3}$, $\theta =$ π

4. $x = 5, y = -10\sqrt{3} \Leftrightarrow r =$ 10, $\theta =$ $\frac{5\pi}{3}$

5. $x = -6\sqrt{3}, y = 3 \Leftrightarrow r =$ 6, $\theta =$ $\frac{7\pi}{6}$

6. $x = -7\sqrt{2}, y = -7\sqrt{2} \Leftrightarrow r =$ 14, $\theta =$ $\frac{5\pi}{4}$

7. $x = 0, y = -7\sqrt{2} \Leftrightarrow r =$ $7\sqrt{2}$, $\theta =$ $\frac{3\pi}{2}$

8. *Describe the properties of all point(s) which have the same coordinates in both the Cartesian and Polar Coordinate system.*
This is true when $\theta = 0$.