

I. Convert to rectangular coordinates.

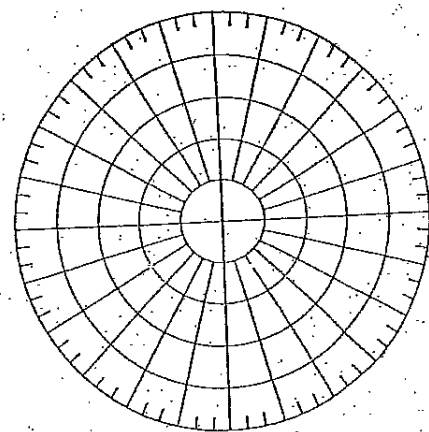
1. $\left(1, \frac{\pi}{6}\right)$ 2. $\left(3, \frac{7\pi}{4}\right)$ 3. $(-4, 315^\circ)$ 4. $(7, 160^\circ)$
 5. $\left(-6, \frac{3\pi}{4}\right)$ 6. $\left(4, \frac{7\pi}{4}\right)$ 7. $\left(3, \frac{5\pi}{3}\right)$ 8. $(-11, 25^\circ)$
 9. $\left(2, \frac{7\pi}{6}\right)$

II. Convert to polar coordinates. Express exact values for r . [$r > 0$ and $0 \leq \theta < 360^\circ$]

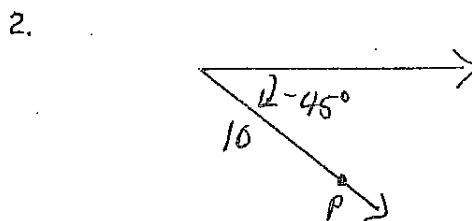
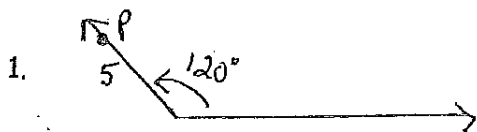
1. $(-5, 12)$ 2. $(3, 5)$ 3. $(2, -10)$ 4. $(-6, 1)$
 5. $(-6, -8)$ 6. $(2, -1)$ 7. $(3, -2)$ 8. $(-4, -6)$
 9. $(5, 1)$

III. Graph and label these points on the polar grid.

- A $(1, 0)$ B $\left(2, \frac{\pi}{2}\right)$ C $\left(3, \frac{2\pi}{3}\right)$
 D $\left(-1, \frac{\pi}{3}\right)$ E $\left(-3, \frac{5\pi}{6}\right)$ F $(2, 315^\circ)$
 G $(-2, 180^\circ)$ H $(1, 330^\circ)$ I $\left(-1, \frac{\pi}{6}\right)$



IV. Name 4 *different* pairs of polar coordinates for P. [Recall the four combinations.]



V. Identify each polar equation by name.

1. $r^2 = 9 \sin 2\theta$

2. $r = 3 + 3 \sin \theta$

3. $r = 5 \cos 6\theta$

4. $r = 1 + 5 \cos \theta$

5. $r = 3 \sin 5\theta$

6. $r = 3\theta$

7. $r = 9 \cos 2\theta$

8. $r^2 = 16 \cos 2\theta$

9. $r = 3 + 2 \cos \theta$

10. $r = 5 \cos 10\theta$

11. $r = \frac{6}{\theta}$

12. $r = 6 + 9 \sin \theta$

VI. In Part V, # 1 - 12, state the number of petals for each *rose* graph.

VII. In Part VI, #1 -12, determine whether or not there is a loop in each *limaçon* graph.