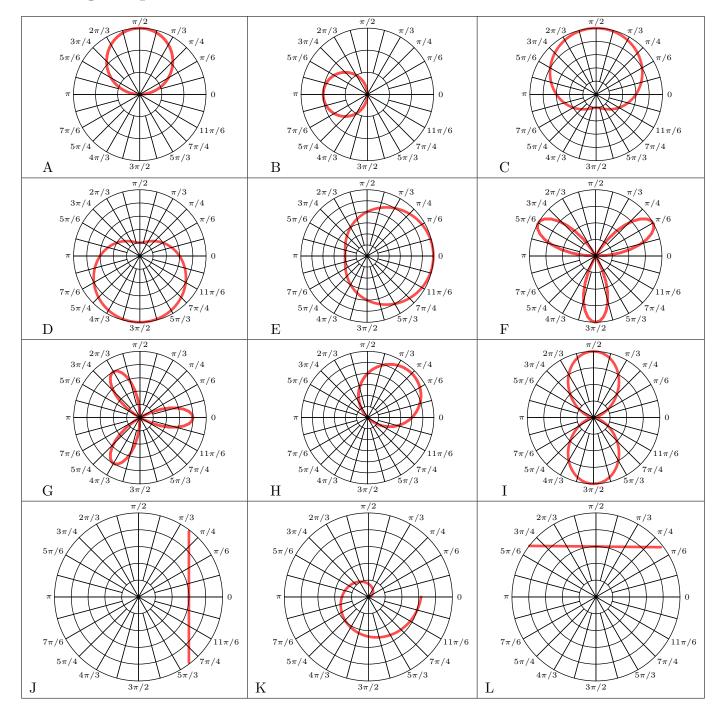
Matching – 1 pt each



1.
$$r = 3\sec(\theta)$$

2.
$$r = 4\cos(3\theta)$$

3.
$$r = 4\sin(\theta) + \cos(\theta)$$

4.
$$r = -2\cos(\theta)$$

5.
$$r = 3 + 2\sin(\theta)$$

6.
$$r = 4\sin(3\theta)$$

7.
$$r = 4 + 2\cos(\theta)$$

8.
$$r = 3 - 2\sin(\theta)$$

9.
$$r = 4\sin^2(\theta)$$

10.
$$r = 3\sin(\theta)$$

11.
$$r = 3\csc(\theta)$$

12.
$$r = \theta/2$$

Multiple Choice - 2 pts each

Work must be shown for credit.

- 1. Convert the polar coordinate to rectangular coordinates: $(-2, 2\pi/3)$
 - A. $(1, \sqrt{3})$
 - B. $(1, 1/\sqrt{3})$
 - C. $(1, -\sqrt{3})$
 - D. $(\sqrt{3}, 1)$
 - E. $(-1, 1/\sqrt{3})$
- 2. Convert the polar coordinate to rectangular coordinates: $(4, -\pi/2)$
 - A. (4,0)
 - B. (-4,0)
 - C. (0, -4)
 - D. (0,4)
 - E. (4, -4)
- 3. Convert the rectangular coordinate to polar coordinates: $(15, 5\sqrt{3})$
 - A. $(10\sqrt{3}, \frac{\pi}{3})$
 - B. $(10\sqrt{3}, \frac{\pi}{4})$
 - C. $(10\sqrt{3}, \frac{\pi}{6})$
 - D. $(10\sqrt{3}, \frac{\pi}{3})$
 - E. $(\sqrt{30}, \frac{\pi}{6})$
- 4. Convert the rectangular coordinate to polar coordinates: (-12, -12)
 - A. $(12\sqrt{2}, \frac{3\pi}{4})$
 - B. $(12\sqrt{2}, -\frac{3\pi}{4})$
 - C. $(12\sqrt{2}, -\frac{\pi}{4})$
 - D. $(2\sqrt{12}, \frac{3\pi}{4})$
 - E. $(2\sqrt{12}, -\frac{5\pi}{4})$

- 5. Convert the rectangular equation to polar: $x^2 + y^2 = 16$
 - A. $r = 16\sin\theta$
 - B. $r = \frac{16}{2\sin\theta}$
 - C. r = 4
 - D. r = 16
 - E. $r = 4\sin\theta$
- 6. Convert the rectangular equation to polar: 2xy = 1

A.
$$r = \frac{1}{2(\sin\theta + \cos\theta)}$$

- B. $r^2 = \frac{1}{2}\sec(\theta)\cot(\theta)$
- C. $r^2 = \frac{1}{2\sin\theta\cos\theta}$
- D. $r = \frac{1}{2\sin(2\theta)}$
- E. $r^2 = 1 2\sin(\theta)\cos(\theta)$
- 7. Convert the polar equation to rectangular: $\theta = 2\pi/3$

A.
$$y = -\sqrt{3}x$$

B.
$$y = \sqrt{3}x$$

C.
$$x + y = \sqrt{3}$$

D.
$$y = -(1/\sqrt{3})x$$

- E. None of the above
- 8. Convert the polar equation to rectangular: $r = \frac{2}{1 + \sin \theta}$

A.
$$x^2 - y^2 = (x + y)$$

B.
$$x^2 + y^2 = (y - 2)^2$$

C.
$$x^2 + xy - y^2 = 4$$

D.
$$x^2 + y^2 + y = 4$$

E.
$$x^2 + y^2 + y = 8$$

5.		

- 9. Find the intersection points of $r = 3\cos\theta$ and $r = \sqrt{3}\sin\theta$
 - A. $\{\pi/3, 5\pi/6\}$
 - B. $\{4\pi/3, 7\pi/3\}$
 - C. $\{5\pi/6, 11\pi/6\}$
 - D. $\{2\pi/3, 4\pi/3\}$
 - E. $\{\pi/3, 4\pi/3\}$

9. _____

Free Response Section

Calculator Active

A remote control drone is flying in the air and casts a shadow onto an xy plane below. Its shadow on the xy-plane has position (x(t), y(t)) at time $t \ge 0$ with

$$\frac{dx}{dt} = \sqrt{3t}$$
 and $\frac{dy}{dt} = 3\cos\left(\frac{t^2}{2}\right)$

The particle is at position (2,4) at time t=4.

1. Find the acceleration vector at time t = 4.

2. Find the y-coordinate of the position of the shadow at time t=0.

3. On the interval $0 \le t \le 4$, at what time does the speed of the shadow first reach 3.5 ?

4. Find the total distance traveled by the shadow over the time interval $0 \le t \le 4$.