

1. Convert from Rectangular to Polar Coordinates then graph

Q1 A  $(-3, 3\sqrt{3})$   $(6, 120^\circ)$

$r = \sqrt{(-3)^2 + (3\sqrt{3})^2} = 6$

$\theta = \tan^{-1}(3\sqrt{3}/-3) = 120^\circ$

Q4 B  $(4, -4\sqrt{3})$   $(8, 300^\circ)$

$r = \sqrt{4^2 + (-4\sqrt{3})^2} = 8$

$\theta = \tan^{-1}(-4\sqrt{3}/4) = 300^\circ$

C  $(0, -5)$   $(5, 270^\circ)$

$r = \sqrt{0^2 + (-5)^2} = 5$

$\theta = \tan^{-1}(-5/0) = \text{undefined} \rightarrow 270^\circ$

Q1 D  $(-\sqrt{3}, 1)$   $(2, 150^\circ)$

$r = \sqrt{(-\sqrt{3})^2 + 1^2} = 2$

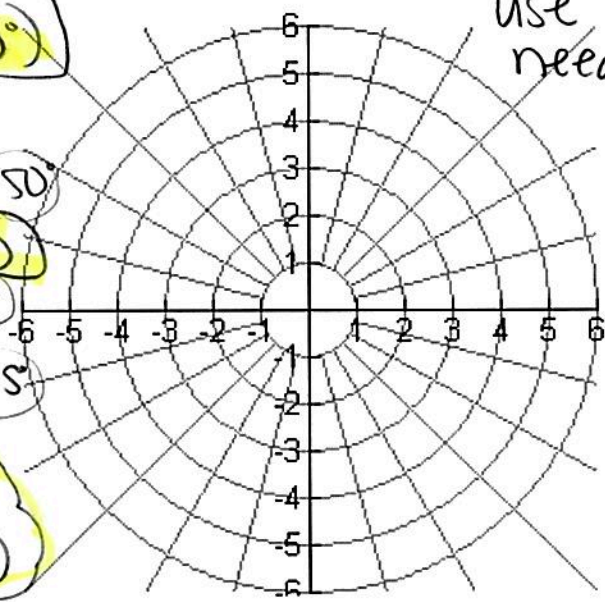
$\theta = \tan^{-1}(1/-\sqrt{3}) = 150^\circ$

Q4 E  $(5, -5)$   $(2\sqrt{5}, 315^\circ)$

$r = \sqrt{5^2 + (-5)^2} = 2\sqrt{5}$

$\theta = \tan^{-1}(-5/5) = 315^\circ$

$r = \sqrt{x^2 + y^2}$   
 $\theta = \tan^{-1}(y/x)$



Use if needed!

2. Graph then, Convert from Polar to Rectangular Coordinates.

F  $(1, \frac{\pi}{2})$   $(0, -1)$

$x = 1 \cos(\pi/2) = 0$

$y = 1 \sin(\pi/2) = 1$

I  $(2, \frac{\pi}{4})$   $(\sqrt{2}, \sqrt{2})$

$x = 2 \cos(\pi/4) = \sqrt{2}$

$y = 2 \sin(\pi/4) = \sqrt{2}$

G  $(6, 120^\circ)$   $(-3, 3\sqrt{3})$

$x = 6 \cos(120^\circ) = -3$

$y = 6 \sin(120^\circ) = 3\sqrt{3}$

J  $(3, \pi)$   $(-3, 0)$

$x = 3 \cos(\pi) = -3$

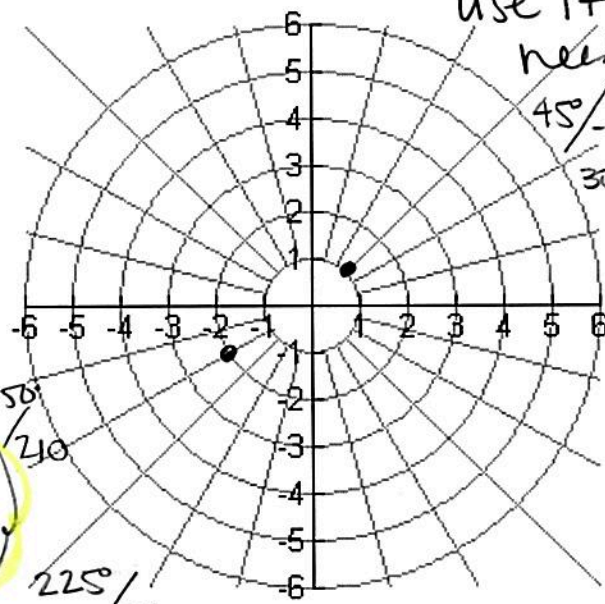
$y = 3 \sin(\pi) = 0$

H  $(4, -270^\circ)$   $(0, 4)$

$x = 4 \cos(-270^\circ) = 0$

$y = 4 \sin(-270^\circ) = 4$

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



Use if needed!

3. Give 3 additional coordinates for the points given.

A)  $(1, 45^\circ)$   
 $(-1, 225^\circ)$   
 $(-1, -135^\circ)$   
 $(1, -315^\circ)$

B)  $(2, 210^\circ)$   
 $(-2, 30^\circ)$   
 $(2, -150^\circ)$   
 $(-2, -330^\circ)$

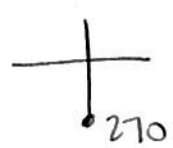
4. Find where the two polar graphs intersect.

A)  $r = 3; r = 2 - \sin \theta$

$3 = 2 - \sin \theta$

$1 = -\sin \theta$

$\sin \theta = -1$



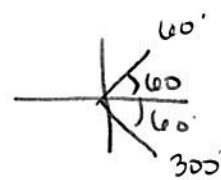
$(3, -270^\circ)$

B)  $r = 4; r = 3 + 2 \cos \theta$

$4 = 3 + 2 \cos \theta$

$1 = 2 \cos \theta$

$\cos \theta = \frac{1}{2}$

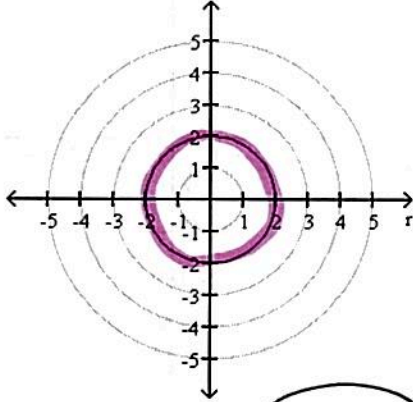


$(4, 60^\circ)$  &  $(4, 300^\circ)$

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

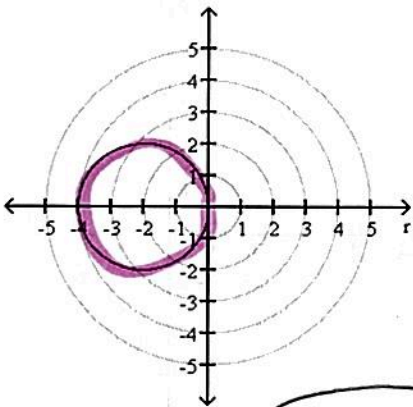
The graph of a polar equation is given. Select the polar equation for the graph.

1)



- A)  $r = 4 \cos \theta$   
 B)  $r = 2$   
 C)  $r \sin \theta = 2$   
 D)  $r = 4 \sin \theta$

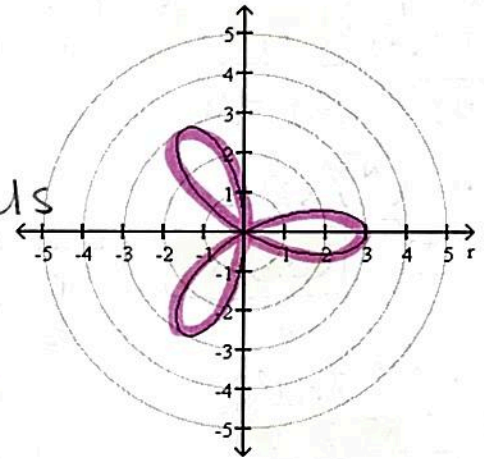
2)



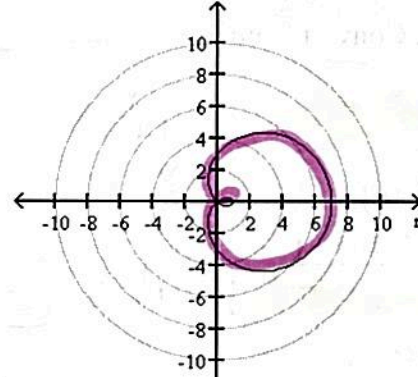
- A)  $r = -4 \sin \theta$   
 B)  $r = -4 \cos \theta$   
 C)  $r = -2$   
 D)  $r \sin \theta = -2$

3)

3 petals  
 $n=3$

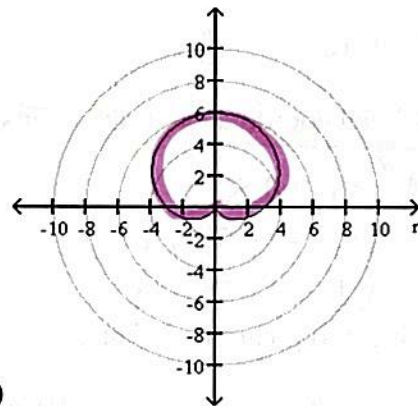


- A)  $r = 3$   
 B)  $r = 3 + \cos(3\theta)$   
 C)  $r = 3 \cos(3\theta)$   
 D)  $r = 3 \sin(\theta)$

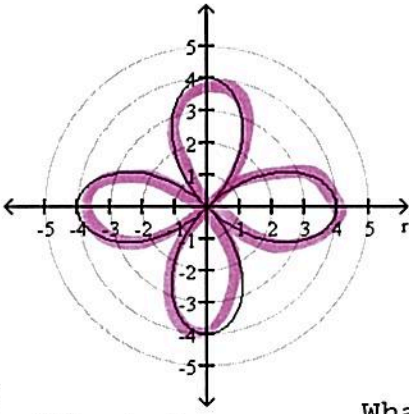


- A)  $r = 3 + 4 \cos \theta$   
 B)  $r = 7 \cos \theta$   
 C)  $r = 3 + 4 \sin \theta$   
 D)  $r = -7$

5)



- A)  $r = 6$   
 B)  $r = 7 \cos \theta$   
 C)  $r = 3 + 3 \sin \theta$   
 D)  $r = 3 + 4 \cos \theta$

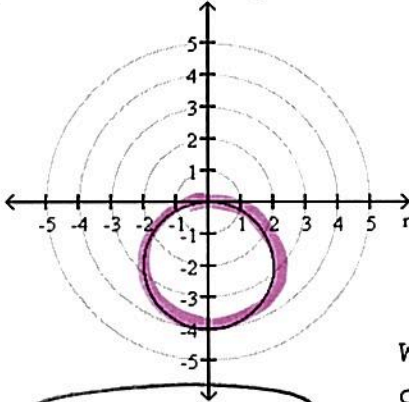


- 6)
- A) lemniscate
  - B) limaçon with loop
  - C) rose
  - D) cardioid

What is the equation of this polar graph?

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

7) Describe the following off-center circle:



- A) negative sine graph
- B) positive sine graph
- C) negative cosine graph
- D) positive cosine graph

$$r = -4 \sin \theta$$

What is the equation of this polar graph?

8) For the following rose equation, determine the number of petals and the length of each petal:

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

- A) 7 petals, each 3 units long
- B) 3 petals, each 4 units long
- C) 8 petals, each 3 units long
- D) 4 petals, each 3 units long

$a = 3 \rightarrow$  length of petal  
 $n = 4 \rightarrow 2(4) = 8$  petals

9) For the following rose equation, determine the number of petals and the length of each petal:

$$r = 9 \sin(7\theta)$$

- A) 14 petals, each 9 units long
- B) 7 petals, each 9 units long
- C) 9 petals, each 7 units long
- D) 18 petals, each 7 units long

$a = 9 \rightarrow$  length of petal  
 $n = 7 \rightarrow 7$  petals

10) For the following lemniscate equation, determine the length of each petal:

$$r = 9 \sin(2\theta)$$

- A) each is 9 units long
- B) each is 2 units long
- C) each is 4 units long
- D) each is 3 units long

