

Warm-up!

A) In what quadrant is the polar point $\left(-8, \frac{11\pi}{6}\right)$

B) A complex number is represented by a point in the complex plane with coordinates $(-5, 5)$. Which one of the following is one way to express the complex number using its polar coordinates?

- $\left(5\sqrt{2} \cos\left(-\frac{3\pi}{4}\right)\right) + i\left(5\sqrt{2} \sin\left(-\frac{3\pi}{4}\right)\right)$
- $\left(5 \cos\left(-\frac{3\pi}{4}\right)\right) + i\left(5 \sin\left(-\frac{3\pi}{4}\right)\right)$
- $\left(5\sqrt{2} \cos\left(\frac{3\pi}{4}\right)\right) + i\left(5\sqrt{2} \sin\left(\frac{3\pi}{4}\right)\right)$
- $\left(5 \cos\left(\frac{3\pi}{4}\right)\right) + i\left(5 \sin\left(\frac{3\pi}{4}\right)\right)$

C) What is the midline, period, and amplitude of the graph of $y = 6 + 3 \sin(2x)$.

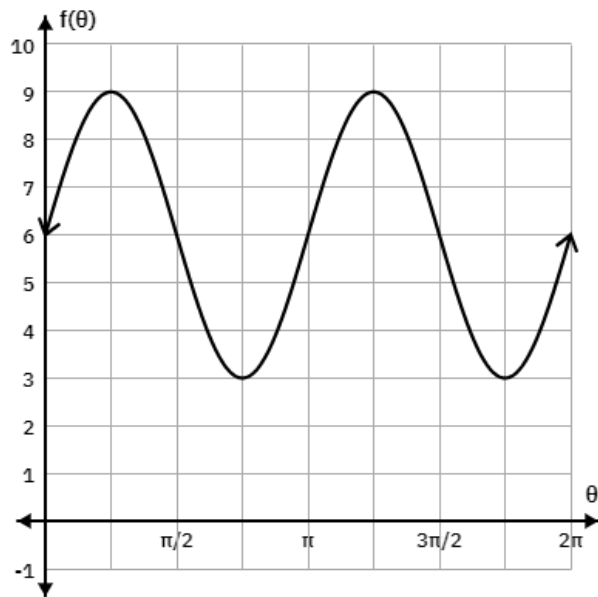
Advanced Trig Day 6:

- (3.14) Converting rectangular graphs to polar graphs
- (3.15) Polar Rate of Change

Homework: Polar Graphs Worksheet

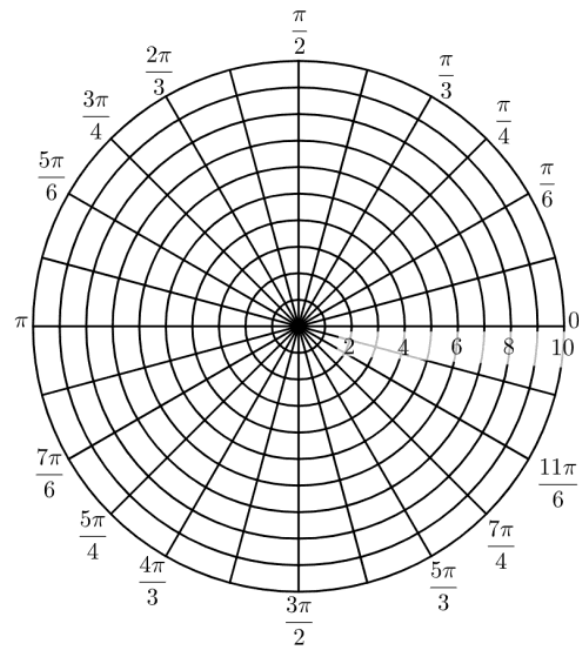
We are used to seeing the relationship between two variables illustrated with a rectangular graph. But we can also illustrate the relationship between two variables with a polar graph.

$$f(\theta) = 6 + 3 \sin(2\theta)$$

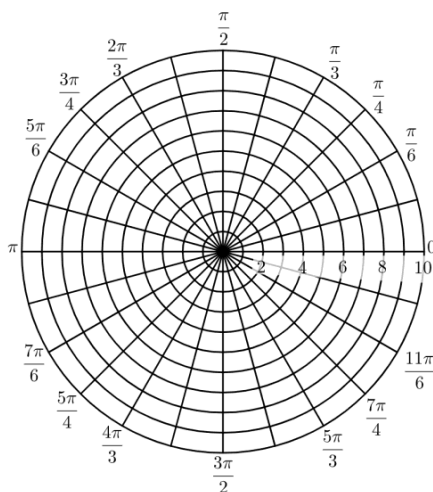
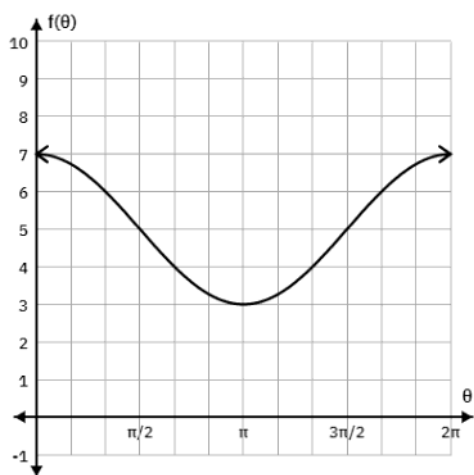


θ	$f(\theta)$
0	6
$\frac{\pi}{4}$	9
$\frac{\pi}{2}$	6
$\frac{3\pi}{4}$	3
π	6
$\frac{13\pi}{12}$	7.5
$\frac{5\pi}{4}$	9
$\frac{17\pi}{12}$	7.5
$\frac{3\pi}{2}$	6
$\frac{19\pi}{12}$	4.5
$\frac{7\pi}{4}$	3
2π	6

$$r = f(\theta)$$



Consider $f(\theta) = 5 + 2 \cos(\theta)$. Pick convenient points from the rectangular representation of this relationship. Plot points on the polar graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



From $0 \leq \theta \leq 2\pi$, over what interval is r ...
Positive and increasing?

Positive and decreasing?

Negative and increasing?

Negative and decreasing?

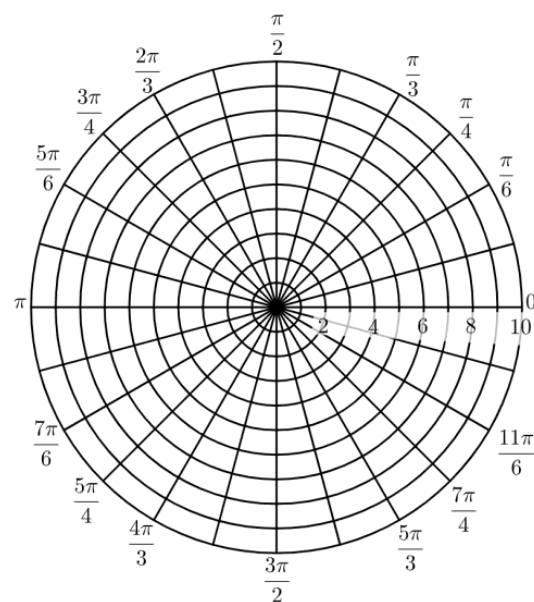
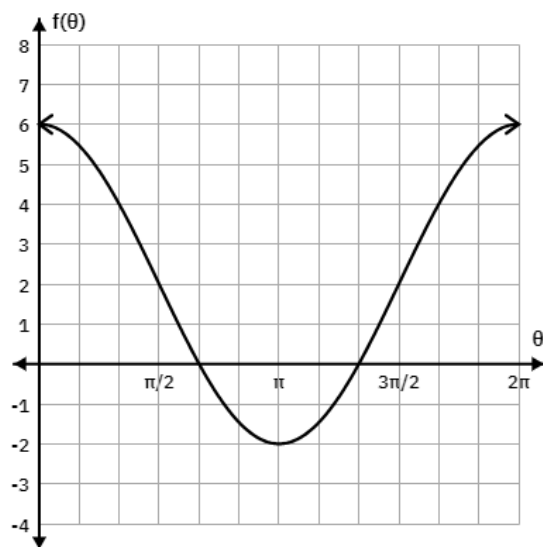
Consider $f(\theta) = 2 + 4 \cos(\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.

Over what interval is r ...
Positive and increasing?

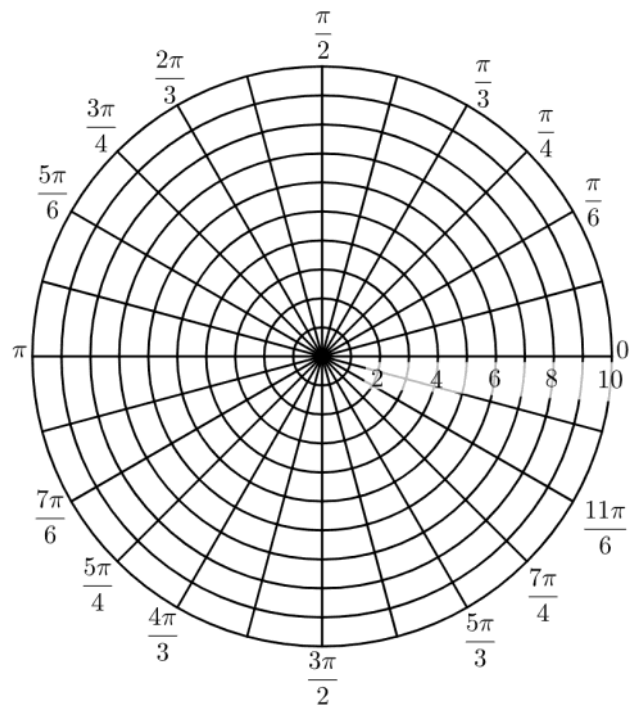
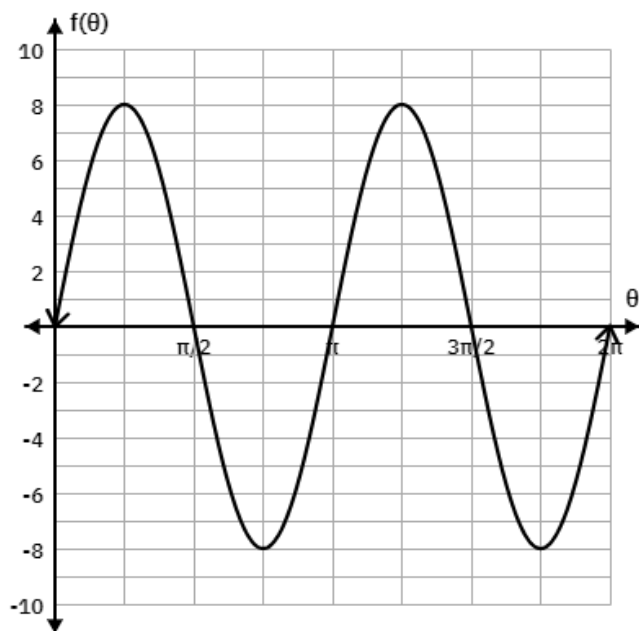
Positive and decreasing?

Negative and increasing?

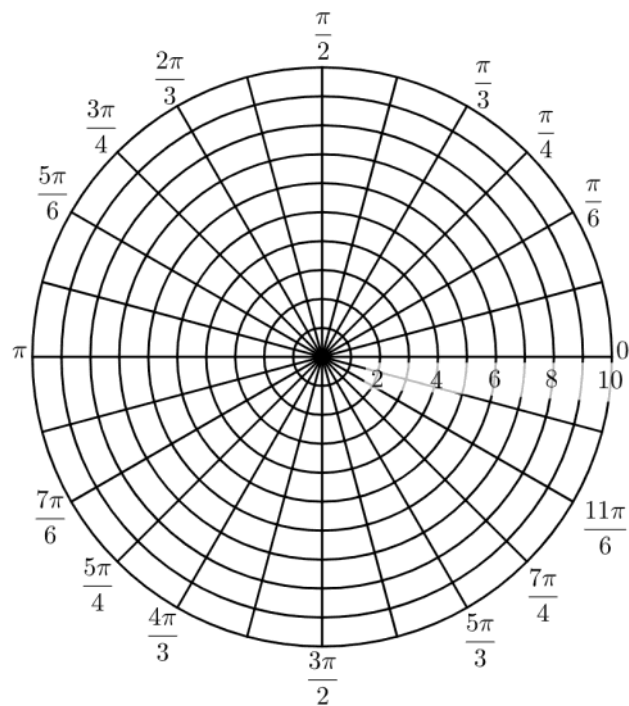
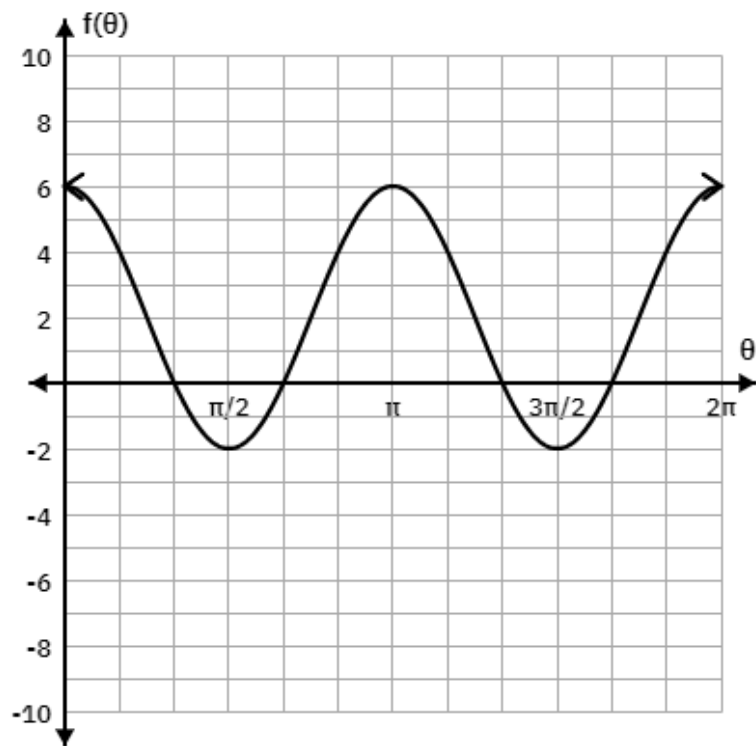
Negative and decreasing?



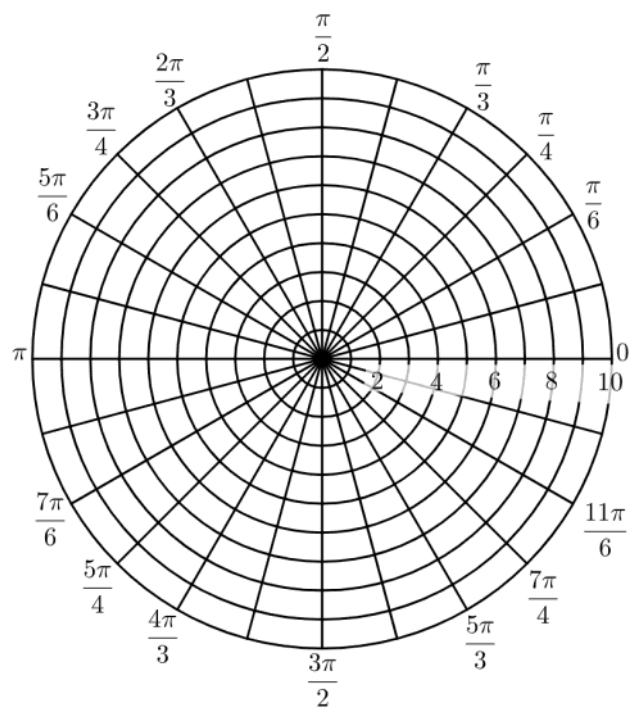
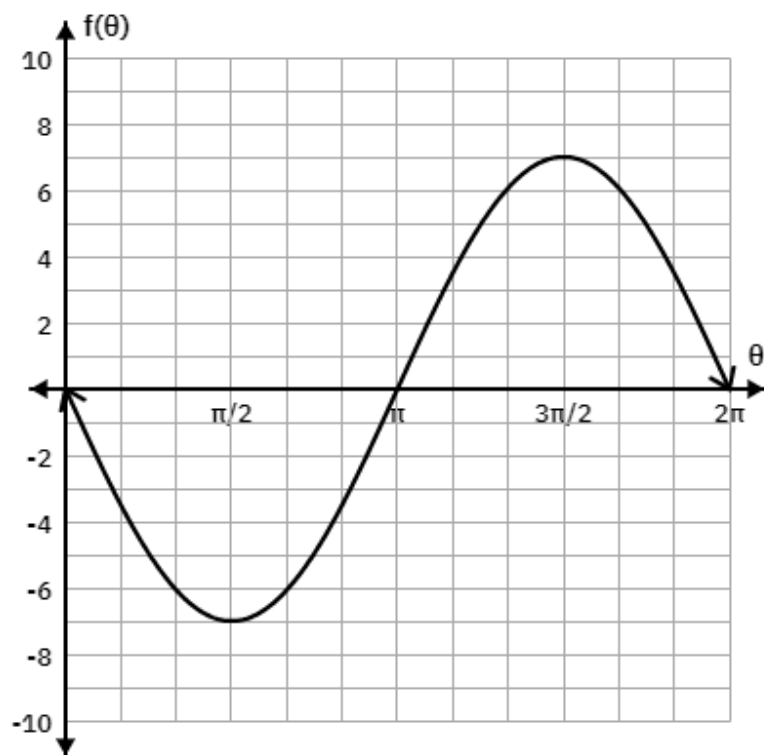
Consider $f(\theta) = 8 \sin(2\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



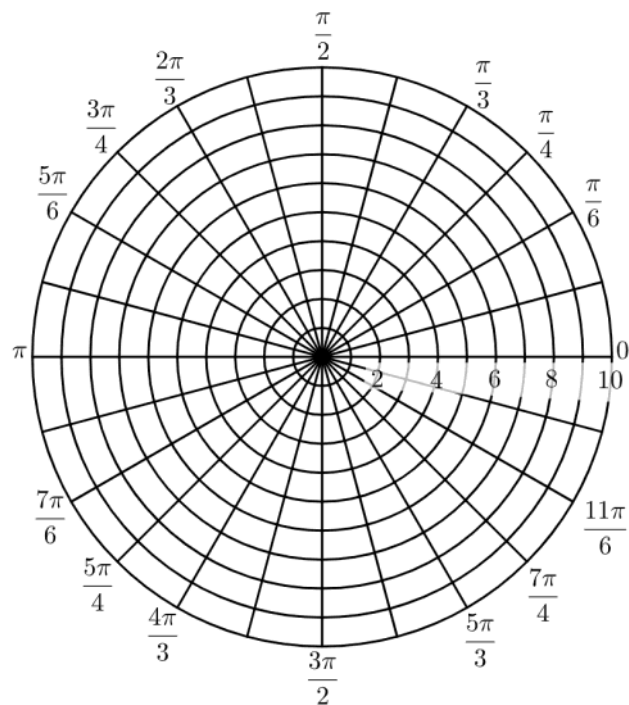
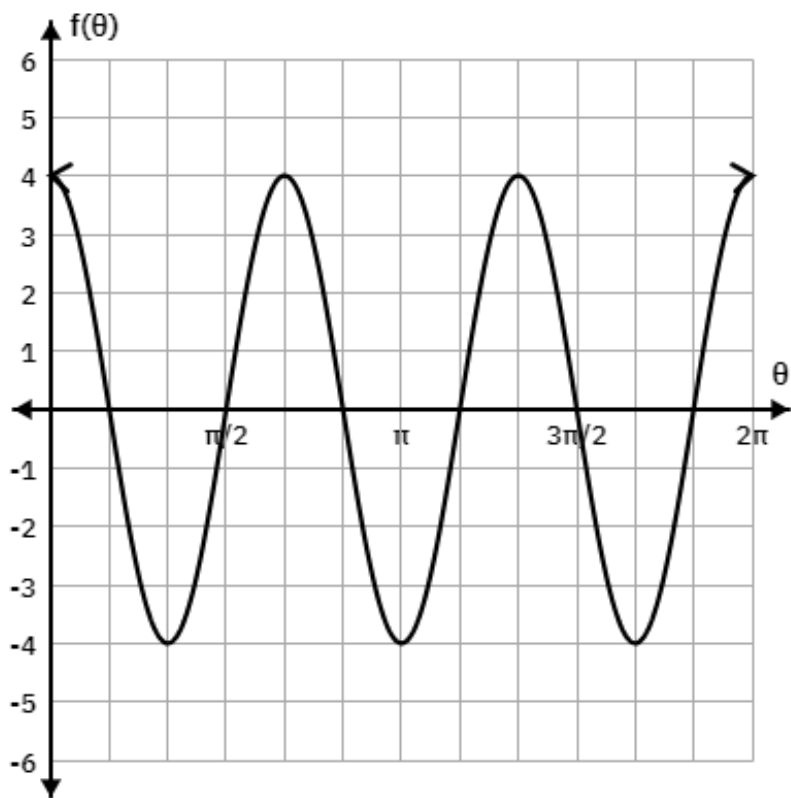
Consider $f(\theta) = 2 + 4 \cos(2\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



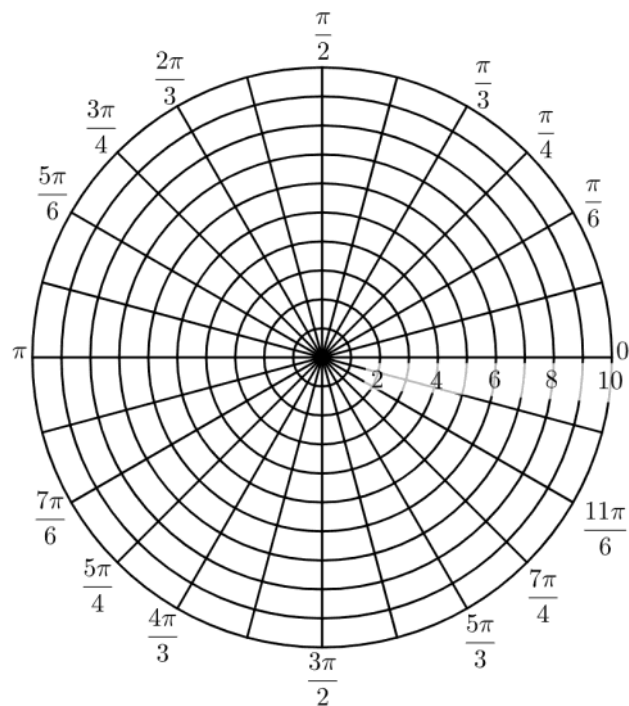
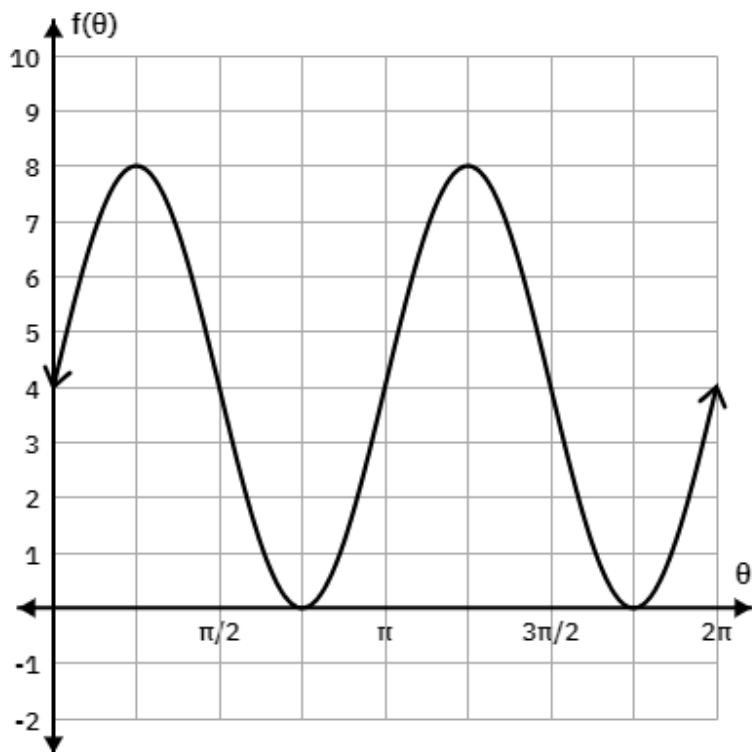
Consider $f(\theta) = -7 \sin(\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



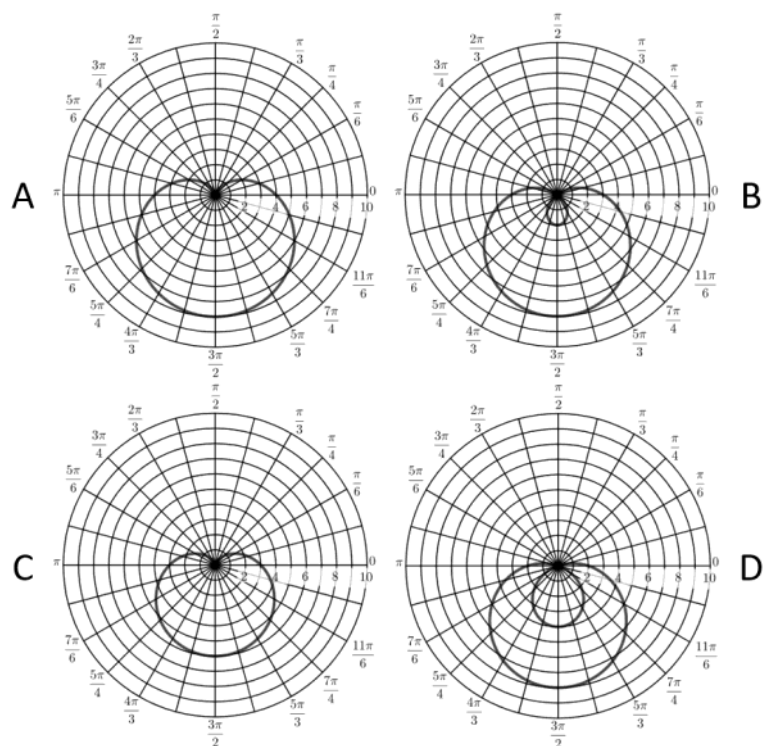
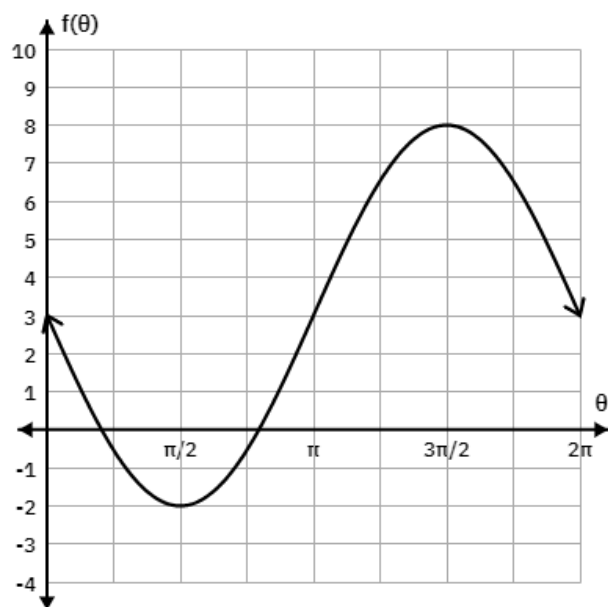
Consider $f(\theta) = 4 \cos(3\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



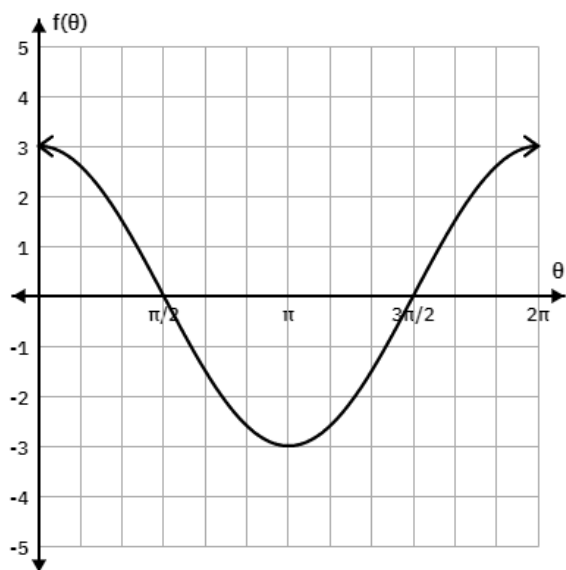
Consider $f(\theta) = 4 + 4 \sin(2\theta)$. Let's analyze where the relationship is positive vs negative and increasing vs decreasing in order to graph $r = f(\theta)$ in polar. Guess the shape of the polar graph.



On the left is the rectangular graph of the function $f(\theta) = 3 - 5 \sin(\theta)$. Which graph on the right is the graph of the polar function $r = f(\theta)$?

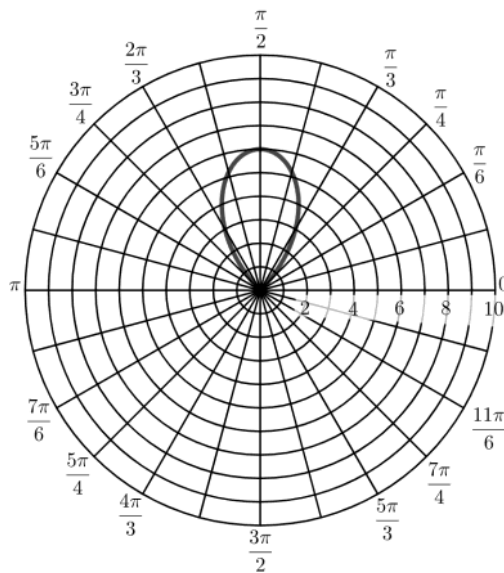
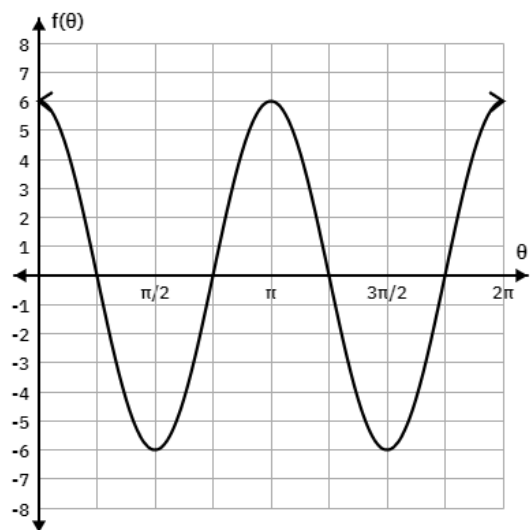


A polar function is given by $r = f(\theta) = 3 \cos(\theta)$. A rectangular graph of $f(\theta)$ is given below. As θ increases on the interval $\frac{\pi}{2} < \theta < \pi$, which of the following is true about the points on the polar graph of $r = f(\theta)$ in the xy -plane?



- (A) The points on the polar graph are above the x -axis and are getting closer to the origin.
- (B) The points on the polar graph are below the x -axis and are getting farther from the origin.
- (C) The points on the polar graph are below the x -axis and are getting closer to the origin.
- (D) The points on the polar graph are above the x -axis and are getting farther from the origin.

The rectangular graph of $f(\theta) = 6 \cos(2\theta)$ is given on the left. In the middle is the polar graph $r = f(\theta)$ for $a \leq \theta \leq b$. Which of the following could be the values of a and b ?



- (A) $a = \frac{\pi}{4}$ and $b = \frac{3\pi}{4}$
- (B) $a = 0$ and $b = \pi$
- (C) $a = \frac{5\pi}{4}$ and $b = \frac{7\pi}{4}$
- (D) $a = \pi$ and $b = 2\pi$