Student: _____ **Date:** _____	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 9.2 Classwork Day 1

1. Transform the polar equation to an equation in rectangular coordinates. Then identify and graph the equation.

$\theta = \frac{3\pi}{4}$

What is the slope-intercept form of the equation in rectangular form?

_____

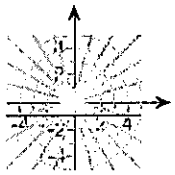
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

What is the graph of this equation?

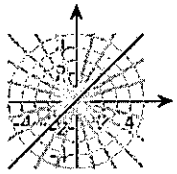
- ○ **A.** A line in quadrants II and III
- ○ **B.** A line in quadrants III and IV
- ○ **C.** A line in quadrants I and III
- ○ **D.** A line in quadrants II and IV

Select the graph of $\theta = \frac{3\pi}{4}$.

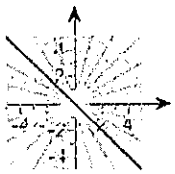
○ **A.**



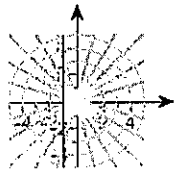
○ **B.**



○ **C.**



○ **D.**



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2. Identify and graph the polar equation.

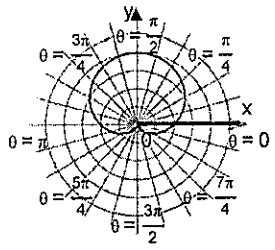
$r = 6 + 6 \sin \theta$

What type of curve does the equation represent?

- ◯ **A.** a limacon with inner loop
- ◯ **B.** a limacon without inner loop
- ◯ **C.** a cardioid
- ◯ **D.** a rose curve

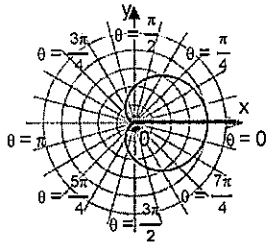
Which of the following is a graph of $r = 6 + 6 \sin \theta$?

◯ **A.**



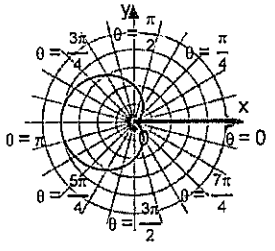
[−15,15,3] [−15,15,3]

◯ **B.**



[−15,15,3] [−15,15,3]

◯ **C.**



[−15,15,3] [−15,15,3]

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3. Identify and graph the polar equation.

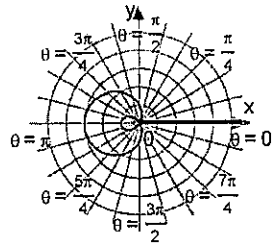
$r = 2 + 4 \cos \theta$

What type of curve does the equation represent?

- ◯ **A.** a rose curve
- ◯ **B.** a limacon without inner loop
- ◯ **C.** a lemniscate
- ◯ **D.** a limacon with inner loop

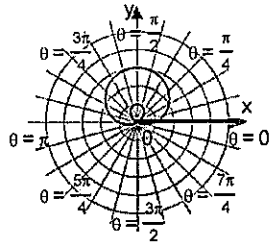
Which of the following is the graph of $r = 2 + 4 \cos \theta$?

◯ **A.**



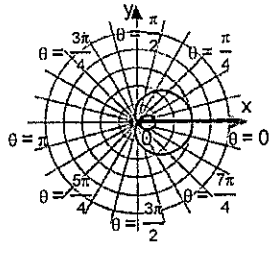
[−10,10,2] [−10,10,2]

◯ **B.**



[−10,10,2] [−10,10,2]

◯ **C.**



[−10,10,2] [−10,10,2]

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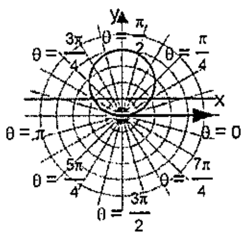
4. Graph r = 8 **cos** θ and r = 2 **sec** θ on the same polar grid. Find the polar coordinates of the point(s) of intersection on the graph.

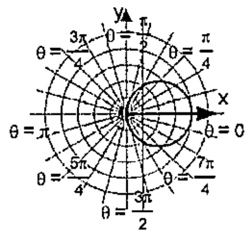
Choose the correct graph below. The function r = 8 **cos** θ is graphed in blue and the function r = 2 **sec** θ is graphed in red. Note that the r grid lines occur in increments of 2.

○ A.



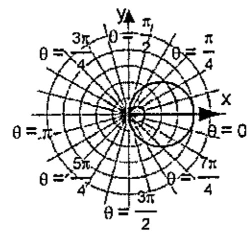
[− 12, 12] by [− 12,12]

○ B.



[− 12, 12] by [− 12,12]

○ C.



[− 12, 12] by [− 12,12]

Find the polar coordinates of the point(s) of intersection on the graph.

○ A. $\left(4,\frac{\pi}{4}\right), \left(4,\frac{5\pi}{4}\right)$

○ B. $\left(4,\frac{\pi}{3}\right), \left(4,\frac{5\pi}{3}\right)$

○ C. $\left(4\sqrt{2},\frac{\pi}{4}\right), \left(4\sqrt{2},\frac{7\pi}{4}\right)$

○ D. $\left(4\sqrt{2},\frac{\pi}{3}\right), \left(4\sqrt{2},\frac{7\pi}{3}\right)$

○ E. There are no intersection points.

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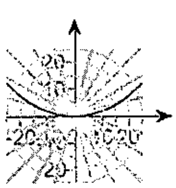
5. Graph the polar equation of a parabola.

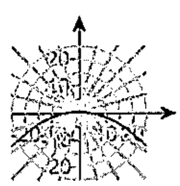
$$r = \frac{7}{1 - \cos\theta}$$

Which graph represents the equation?

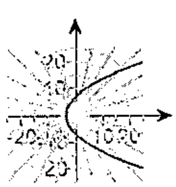
○ A.



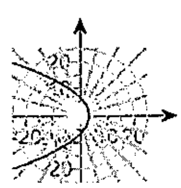
○ B.



○ C.



○ D.



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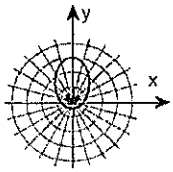
6. Graph the polar equation.

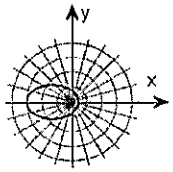
$$r = \frac{3}{4 - 3\cos\theta} \text{ (ellipse)}$$

Choose the correct graph below.

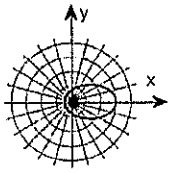
○ A.



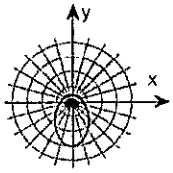
○ B.



○ C.



○ D.



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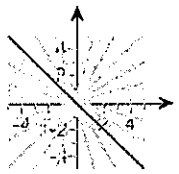
1. $y = -x$

D. A line in quadrants II and IV



C.

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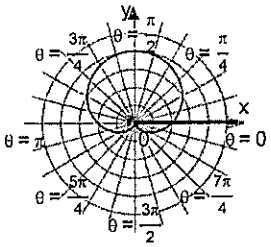
2. C. a cardioid



A. $[-15,15,3]$ $[-15,15,3]$

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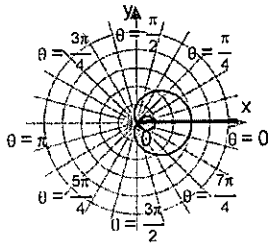
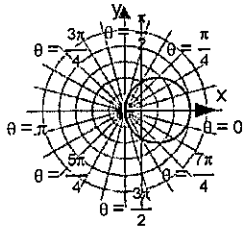
3. D. a limacon with inner loop



C. $[-10,10,2]$ $[-10,10,2]$

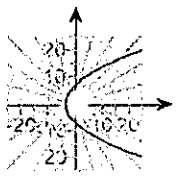
4.



B. $[-12, 12]$ by $[-12,12]$

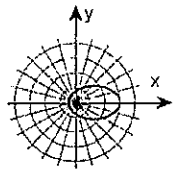
B. $\left(4,\frac{\pi}{3}\right), \left(4,\frac{5\pi}{3}\right)$

5.



C.

6.

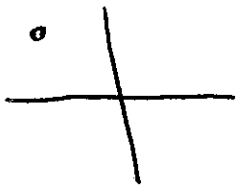


C.

9.2 classwork day 1

① transform $\theta = \frac{3\pi}{4}$ to rectangular

$\tan\theta = \tan 3\pi/4$

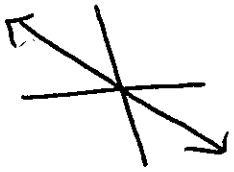


$\frac{Y}{X} = -1$

$Y = -X$

D line in Q2 & Q4

C

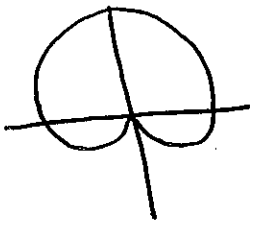


9.2 classwork day 1 continued

② $r = 6 + 6\sin\theta$

* if $a = b$, cardioid
* $\pm\sin$ (up/down), $\pm\cos$ (left/right)

Graph A

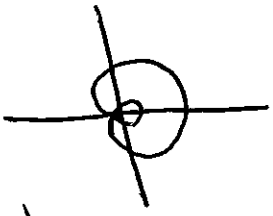


Cardioid

③ $r = 2 + 4\cos\theta$

$a < b$, limaçon with inner loop D

Graph C



* cos opens right
* $-\cos$ opens left

9.2

classwork day 1 continued

(4) $r = 8\cos\theta$ $\qquad$ $r = 2\sec\theta$

$r = 8\left(\frac{x}{r}\right)$ $\qquad$ $r = 2\left(\frac{r}{x}\right)$

$r^2 = 8x$ $\qquad$ $x = 2$

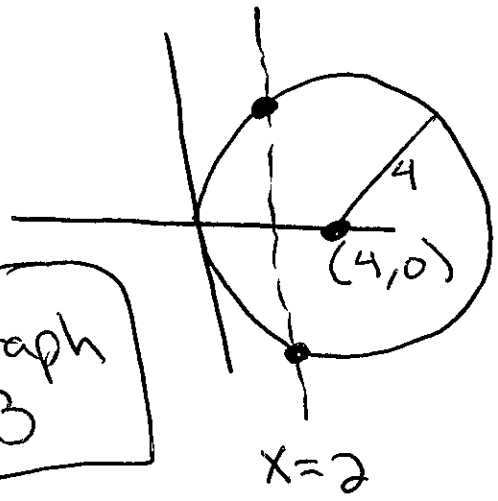
$x^2 + y^2 = 8x$ $\qquad$ vertical line

$x^2 - 8x + y^2 = 0$

$x^2 - 8x + \boxed{16} + y^2 = \boxed{16}$

$(x-4)^2 + y^2 = 16$

$r = 4$, center $(4,0)$



Graph B

when $x = 2$

$(2-4)^2 + y^2 = 16$

$y^2 = 12$

$y = \pm 2\sqrt{3}$

$\theta = \tan^{-1}\left(\frac{2\sqrt{3}}{2}\right)$

$\theta = \pi/3$

$\theta = \tan^{-1}\left(-\frac{2\sqrt{3}}{2}\right)$

$\theta = 5\pi/3$

B $\quad (4, \pi/3), (4, 5\pi/3)$

9.2 classwork day 1 continued

(5) $r = \frac{7}{1-\cos\theta}$

$r(1-\cos\theta) = 7$

$r - r\cos\theta = 7$

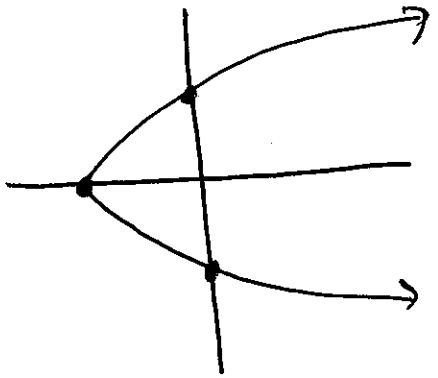
$\sqrt{x^2+y^2} - x = 7$

$\sqrt{x^2+y^2} = x+7$

$x^2+y^2 = x^2+14x+49$

$y^2 = 14x+49$

$y = \pm\sqrt{14x+49}$ * $x \geq -3.5$



* use graphing calculator

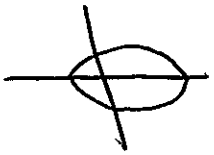
Graph C

9.2 classwork day 1 continued

⑥ $r = \frac{3}{4 - 3\cos\theta}$

* use calculator

Graph C



* you can have $r = \sqrt{x^2 + y^2}$

$r\cos\theta = x$

and complete the square

to get an ellipse.