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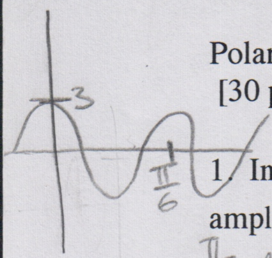
Polar Quiz Analysis 2016-17 Polar Troller Hannah Kim

[30 points] Period: B



1. In Trig last year you learned that the period of the function $y = 3\cos(12x)$ is $\frac{\pi}{6}$ and that the amplitude is 3. Explain how both of these connect to the graph of $r = 3\cos(12\theta)$ in polar. [3]

The amplitude, 3, represents the height of the rectangular wave & length of the polar petal. Period, in both of them, is the distance & rotation needed to make a full wave or petal I then repeats itself.

Amp

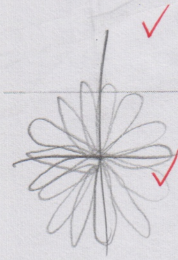
$\frac{2\pi}{12} = \frac{\pi}{6}$

period

amp 3 ✓ period $\cancel{\frac{\pi}{6}}$ -1

2. Consider the polar rose $r = 5\sin(15\theta)$

✓ a) How many visible petals will there be? 15 [2]



✓ b) Will there be a petal along the positive y axis, negative y-axis, both or neither? negative y [2]

$r = 5\sin(15 \cdot \frac{\pi}{2})$

$= 5\sin(\frac{15\pi}{2}) = 5\sin\frac{3\pi}{2} = -5$

$(-5, \frac{\pi}{2})$ and $(5, \frac{3\pi}{2})$ are the same point

$r = 5\sin(15 \cdot \frac{3\pi}{2})$

$= 5\sin(\frac{45\pi}{2})$

$= 5\sin\frac{\pi}{2}$

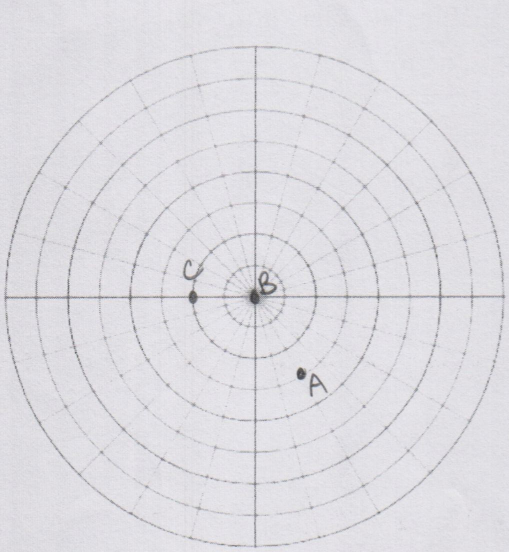
$= 5(\frac{\pi}{2})$

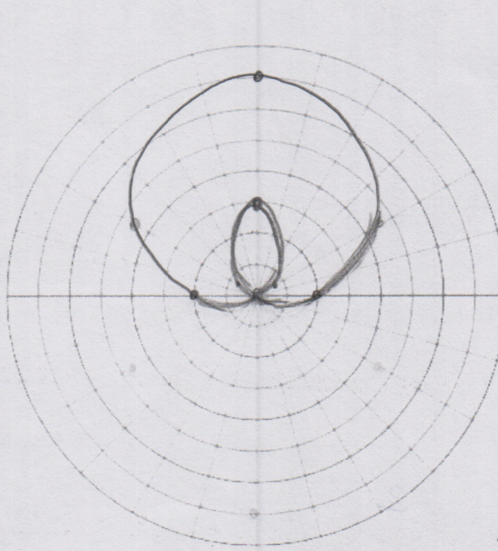
$= 5$

✓ c) The line of symmetry for the first petal in Quadrant I, is at $\theta =$ $\frac{\pi}{30}$ [2]

✓ 3. On the polar graph paper below left plot and label the 3 points: [3]

A: $(-3, -\frac{4\pi}{3})$ B: $(0, \frac{\pi}{3})$ C: $(-2, 0)$





$-2 + 5\sin(-\frac{\pi}{6})$

$-2 + 5 \cdot -\frac{1}{2}$

$-2 + -\frac{5}{2}$

$-\frac{9}{2}$

✓ 4. Above right, accurately graph $r = -2 + 5\sin\Theta$. [5]

$r = -2 + 5\sin(\frac{3\pi}{2})$

$-7 = -2 + -5$

$-2 + 5\sin\frac{\pi}{6}$

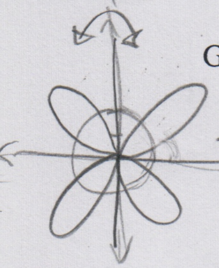
$-2 + 5\frac{1}{2}$

$-2 + \frac{5}{2}$

-1

5. Roughly graph the system of equations r = 2 and $r = 4sin2\Theta$ below, and clearly state all of the solutions to the system as ordered pairs in numerical order (in radians). Show all work.

Symmetry



Graph: [6]

$2 = 4\sin 2\theta$

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

$2\theta = \frac{\pi}{6}$ $\quad 2\theta = \frac{5\pi}{6}$

$\theta = \frac{\pi}{12}$ $\quad \theta = \frac{5\pi}{12}$

$\pi - \cancel{\frac{5\pi}{12}} =$ $\quad \pi - \frac{\pi}{12} =$

$\frac{7\pi}{12}$ $\quad \frac{11\pi}{12}$

$-\frac{\pi}{12}$ $\quad -\frac{5\pi}{12}$ $\quad -\frac{7\pi}{12}$ $\quad -\frac{11\pi}{12}$

flip this a lot

Solutions: $(2, \frac{\pi}{12}), (2, \frac{5\pi}{12}), (2, \frac{7\pi}{12}), (2, \frac{11\pi}{12}), (2, \frac{13\pi}{12}), (2, \frac{17\pi}{12}),$
$(2, \frac{19\pi}{12}), (2, \frac{23\pi}{12})$

6. Convert the point (-5, -5) into polar coordinates in radians. [2]

$\left(\sqrt{(-5)^2+(-5)^2}, \tan^{-1}\left(\frac{-5}{-5}\right)\right)$

$\boxed{\left(5\sqrt{2}, \frac{5\pi}{4}\right)}$

7. Convert the point $(r, \Theta) = (-2, 5\pi/6)$ into simplified rectangular form. [2]

$\left(-2\cos\frac{5\pi}{6}, -2\sin\frac{5\pi}{6}\right)$

$\left(\cancel{-2} \cdot \frac{-\sqrt{3}}{\cancel{2}}, \cancel{-2} \cdot \frac{1}{\cancel{2}}\right)$ $\quad \boxed{(\sqrt{3}, -1)}$

8. Convert the hyperbola $r^2 = 20/sin2\theta$ into rectangular. [3]

$r^2 = \frac{20}{\sin 2\theta}$

$r^2 = \frac{20}{2\cos\theta \sin\theta}$

$r^2 \cos\theta \sin\theta = 20$

$xy = 20$

$\boxed{y = \frac{20}{x}}$ $\quad -1$

/~1