POLAR REVIEW
Part 2

Name the shape. Then convert each polar equation to its rectangular form.

1) $r = -2\sin\theta$

Circle

$r^2 = -2r\sin\theta$

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

$x^2 + y^2 + 2y + 1 = 1$

$\boxed{x^2 + (y+1)^2 = 1}$

2) $r = -2\cos\theta + 2\sin\theta$

Circle

$r^2 = -2r\cos\theta + 2r\sin\theta$

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

$x^2 + 2x + 1 + y^2 - 2y + 1 = 2$

$\boxed{(x+1)^2 + (y-1)^2 = 2}$

3) $r = 2\cos\theta$

Circle

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

$x^2 + y^2 = 2x$

$x^2 - 2x + 1 + y^2 = 1$

$\boxed{(x-1)^2 + y^2 = 1}$

4) $r = 4\cos\theta + 2\sin\theta$

Circle

$r^2 = 4r\cos\theta + 2r\sin\theta$

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

$x^2 - 4x + 4 + y^2 - 2y + 1 = 1 + 4$

$\boxed{(x-2)^2 + (y-1)^2 = 5}$

5. $r = \frac{3}{1+\sin(\theta)}$

parabola

$r(1 + \sin\theta) = 3$

$r + r\sin\theta = 3$

$\sqrt{x^2+y^2} + y = 3$

$x^2 + y^2 = (3-y)^2$

$x^2 + y^2 = 9 - 6y + y^2$

$x^2 = 9 - 6y$

$x^2 - 9 = -6y$

$\boxed{-\frac{1}{6}x^2 + \frac{3}{2} = y}$

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

parabola

$r(1 + \cos\theta) = 2$

$r + r\cos\theta = 2$

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

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

$x^2 + y^2 = 4 - 4x + x^2$

$y^2 = 4 - 4x$

$y^2 - 4 = -4x$

$\boxed{-\frac{1}{4}y^2 + 1 = x}$

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7. $r = \frac{3}{2\cos(\theta) - 4\sin(\theta)}$ **(slope intercept form)**

Line

$r(2\cos\theta - 4\sin\theta) = 3$
$2r\cos\theta - 4r\sin\theta = 3$
$2x - 4y = 3 \leftarrow$ standard form
$-4y = -2x + 3$
$\boxed{y = \frac{1}{2}x - \frac{3}{4}}$

8. $r = \frac{4}{3\sin(\theta) + 4\cos(\theta)}$ **(slope intercept form)**

$r(3\sin\theta + 4\cos\theta) = 4$
$3r\sin\theta + 4r\cos\theta = 4$
$3y + 4x = 4 \leftarrow$ standard form
$3y = -4x + 4$
$\boxed{y = -\frac{4}{3}x + \frac{4}{3}}$

Convert from polar to rectangular

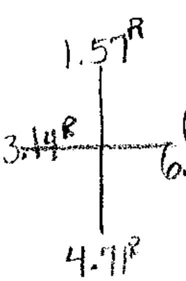
$x = r\cos\theta \qquad y = r\sin\theta$

9. $(6, 170°)$ Q2

$x = 6\cos(170°)$ $\qquad$ $y = 6\sin(170°)$
$x = -5.91$ $\qquad$ $y = 1.04$
$\boxed{(-5.91, 1.04)}$ Q2 ✓

10. $(2, 73°)$ Q1

$x = 2\cos 73$ $\qquad$ $y = 2\sin(73)$
$x = .58$ $\qquad$ $y = 1.91$
$\boxed{(.58, 1.91)}$ Q1 ✓



11. $(1.5, 3.85^R)$ Q3

$x = 1.5\cos(3.85^R)$ $\qquad$ $y = 1.5\sin(3.85^R)$
$x = -1.14$ $\qquad$ $y = -.98$
$(-1.14, -.98)$ Q3 ✓

12. $(3.5, 5.20^R)$ Q4

$x = 3.5\cos(5.20^R)$ $\qquad$ $y = 3.5\sin(5.20^R)$
$x = 1.64$ $\qquad$ $y = -3.09$
$(1.64, 3.09)$ Q4 ✓

1.57^R

3.14^R 6.28^R

4.71^R

POLAR REVIEW
Part 2

Convert from rectangular to polar $x^2+y^2=r^2$ $\tan\theta=\frac{y}{x}$

Radians

13. $(-3,5)$

Q2

$(-3)^2+(5)^2=r^2$
$9+25=r^2$
$34=r^2$
$\sqrt{34}=r$

$\tan\theta=\frac{5}{-3}$
$\theta=\tan^{-1}(\frac{5}{-3})$
$\theta=-1.03^R$ ref angle

$6.28^R-1.03^R=5.25^R$

$3.14^R - 1.03^R = 2.11^R$ in Q2

$\boxed{(\sqrt{34}, 2.11^R)}$

14. $(-2,-6)$

Q3

$(-2)^2+(-6)^2=r^2$
$4+36=r^2$
$40=r^2$
$2\sqrt{10}=r$

$\tan\theta=\frac{-6}{-2}$
$\theta=\tan^{-1}(3)$
$\theta=1.25^R$ ref angle

$3.14^R + 1.25^R = 4.39^R$

$\boxed{2\sqrt{10}, 4.39^R}$

Find the intersection point(s) of the two polar curves. Express the solution in the form of (r,θ). Be sure to graph the system to check your work and make sure there isn't an "extra" intersection point. pole

GIVE ALL ANSWERS IN RADIANS!

15. $\boldsymbol{r=6sin\theta}$ ***and*** $\boldsymbol{r=3}$

$r=3$

$6\sin\theta=3$
$\sin\theta=\frac{1}{2}$ UNIT CIRCLE!
$\theta=\sin^{-1}(\frac{1}{2})$

Q1 $\frac{\pi}{6}$ and Q2 $\frac{5\pi}{6}=\theta$

$(3,\frac{\pi}{6})$ and $(3,\frac{5\pi}{6})$

16. $\boldsymbol{r=1-2sin\theta}$ ***and*** $\boldsymbol{r=sin\theta}$

$\sin\theta=1-2\sin\theta$
$3\sin\theta=1$
$\sin\theta=\frac{1}{3}$ NOT unit circle
$\theta=\sin^{-1}(\frac{1}{3})$
$\theta=.34^R$

$r=\sin\theta$
$\sin\theta=\frac{1}{3}$
$r=\frac{1}{3}$

need Q1 & Q2

$3.14^R - .34^R = 2.8^R$

$(\frac{1}{3}, .34^R)$ and $(\frac{1}{3}, 2.8^R)$ and

pole $(0,0)$