*AAT

Name: Key

Chapter 11: Quiz Review 11.1-11.5, omit 11.4 (IC/HW)

Date: _____ Period: _____

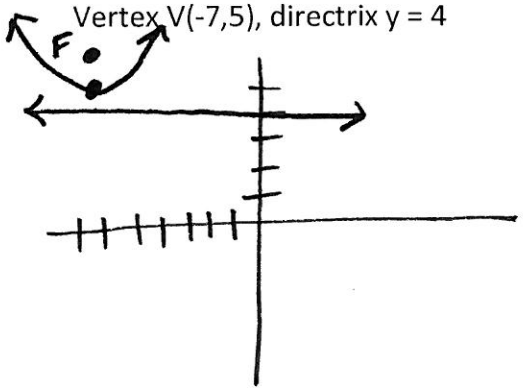
1. Find the vertex of the parabola.

$(x + 8)^2 = -4(y - 9)$ $a(x-h)^2 = (y-k)$

$V(-8, 9)$

2. Find an equation of the parabola that satisfies the condition.

Vertex V(-7,5), directrix y = 4



$p = \frac{1}{4a}$

$1 = \frac{1}{4a}$

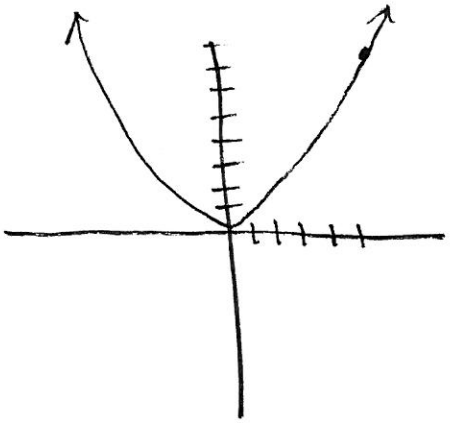
$a = \frac{1}{4}$

$\frac{1}{4}(x+7)^2 = y - 5$

$\frac{1}{4}(x+7)^2 + 5 = y$

3. Find an equation of the parabola that satisfies the given conditions.

Vertex at the origin, symmetric to the y-axis, and passing through the point (5,8)



$y = ax^2$

$8 = a(5)^2$

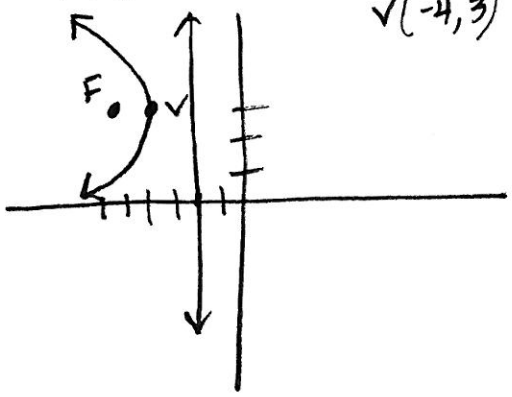
$8 = 25a$

$\frac{8}{25} = a$

$y = \frac{8}{25}x^2$

4. Find an equation of the parabola that satisfies the given conditions.

Focus: F(-6,3), directrix: x = -2



$V(-4,3)$

$x = a(y-3)^2 - 4$

$p = \frac{1}{4a}$

$2 = \frac{1}{4a}$

$8a = 1$

$a = \frac{1}{8}$

$x = -\frac{1}{8}(y-3)^2 - 4$

5. Find an equation for the parabola in the form $y = ax^2 + bx + c$ that has a vertical axis and passes through the given points.

P(4, -38), Q(-3, -52), R(3, -16)

$-38 = 16a + 4b + c$

$-52 = 9a - 3b + c$

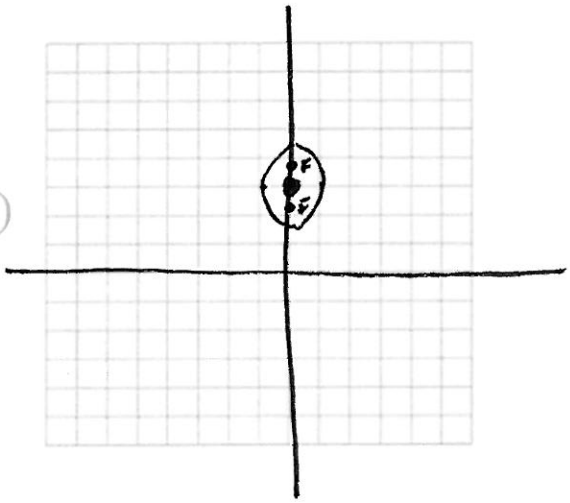
$-16 = 9a + 3b + c$

Use Matrices

$-4x^2 + 6x + 2 = y$

6. Sketch the graph of the ellipse, showing the foci.

$4x^2 + y^2 = 6y - 8$



$4x^2 + y^2 - 6y = -8$

$4x^2 + y^2 - 6y + 9 = -8 + 9$

$4x^2 + (y-3)^2 = 1$

$\frac{x^2}{\frac{1}{4}} + \frac{(y-3)^2}{1} = 1$

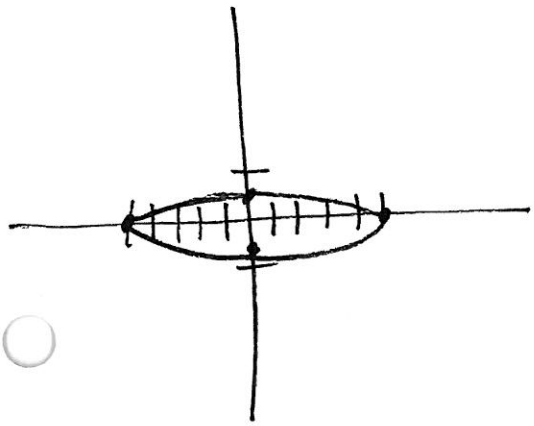
$F(0, 3 \pm \frac{\sqrt{3}}{2})$

$c^2 = a^2 - b^2$ $\quad c^2 = \frac{3}{4}$

$= 1 - \frac{1}{4}$ $\quad c = \pm \frac{\sqrt{3}}{2}$

7. Find an equation for the ellipse that has its center at the origin and satisfies the conditions:

x-intercepts: ± 5, y-intercepts: $\pm \frac{1}{2}$



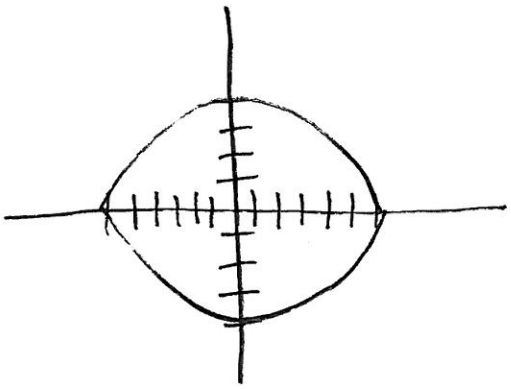
$\frac{x^2}{25} + \frac{y^2}{\frac{1}{4}} = 1$

or

$\frac{x^2}{25} + 4y^2 = 1$

8. Find an equation for the ellipse that has its center at the origin and satisfies the conditions:

horizontal major axis of length 12, minor axis of length 8

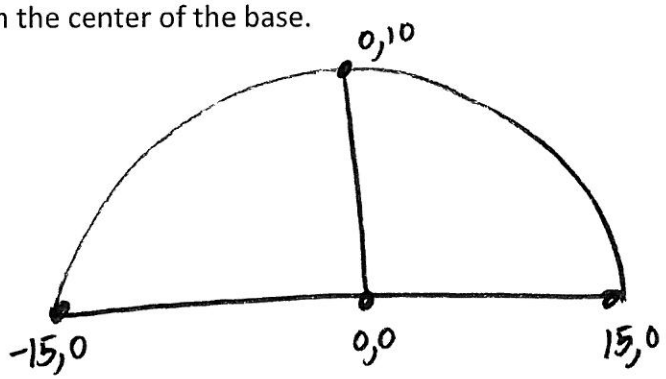


$2a = 12$ $\quad 2b = 8$

$a = 6$ $\quad b = 4$

$$\frac{x^2}{36} + \frac{y^2}{16} = 1$$

9. An arch of a bridge is semi-elliptical, with a major horizontal axis. The base of the arch is 30 feet across, and the highest part of the arch is 10 feet above the horizontal roadway. Find the height of the arch 7 feet from the center of the base.



$$\frac{x^2}{15^2} + \frac{y^2}{10^2} = 1$$

$$\frac{7^2}{225} + \frac{y^2}{100} = 1$$

$$\frac{y^2}{100} = \frac{176}{225}; \quad y^2 = \frac{17600}{225}$$

$y \approx 8.8$ ft

10. Find the vertices of the hyperbola.

$$\frac{y^2}{49} - \frac{x^2}{36} = 1$$

$V(0, \pm 7)$

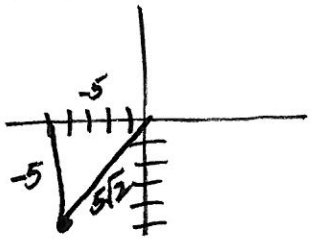
11. Change the rectangular coordinates (-5, -5) to polar coordinates with $r > 0$ and ~~$0 \le \theta \le 2\pi$~~.

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

$r^2 = (-5)^2 + (-5)^2$

$r^2 = 25 + 25$

$r^2 = 50; \quad r = 5\sqrt{2}$



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

$\theta = 225 \cdot \frac{\pi}{180} = \frac{5\pi}{4}$

12. Change the rectangular coordinates $(3, 3\sqrt{3})$ to polar coordinates with $r > 0$ and $0 \le \theta \le 2\pi$.

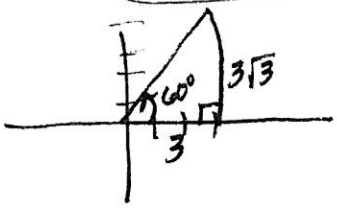
$r^2 = x^2 + y^2$

$= 9 + 27$

$= 36$

$r = 6$

$\left(6, \frac{\pi}{3}\right)$



13. Find a polar equation in r and θ that has the same graph as the equation $(x - 8)^2 + y^2 = 64$.

$x^2 - 16x + 64 + y^2 = 64$

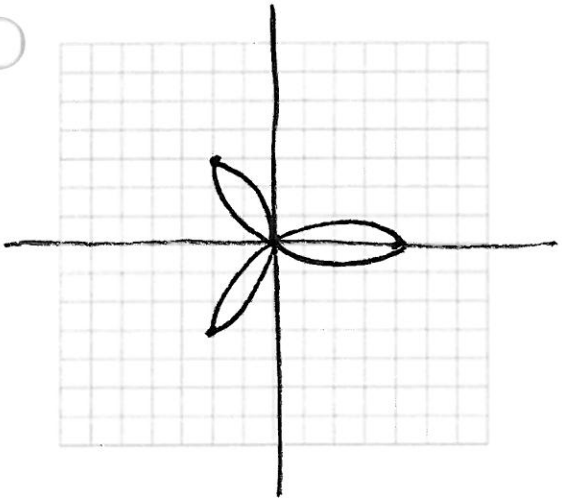
$x^2 + y^2 = 16x$

$r^2 = 16(r\cos\theta)$

$r = 16\cos\theta$

14. Sketch the graph of the polar equation.

$r = 4 \cos 3\theta$



radian mode

polar mode