Pre-Calculus
REVIEW: Conics

Name: Key

1. Identify the vertex, focus, axis of symmetry, and directrix. Then graph the parabola.

$(y-2)^2 = 8(x-5)$

$p = 2$

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

$y =$

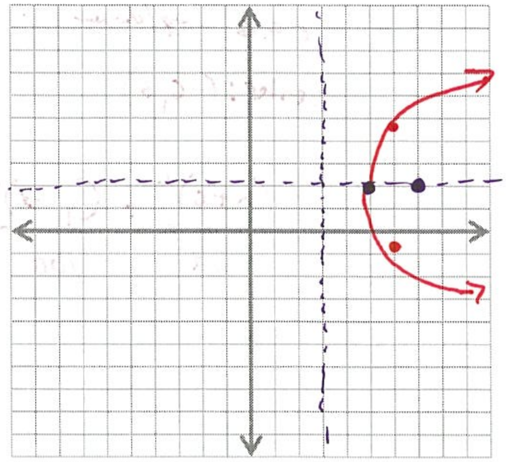
| x | y |
|---|---|
| 6 | -.8 |
| | 4.8 |

Vertex: $(5, 2)$

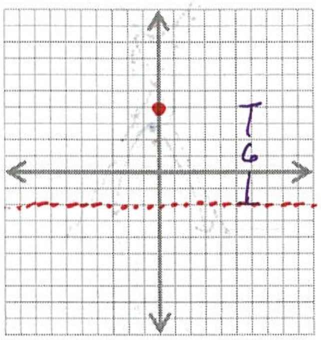
Focus: $(7, 2)$

Axis of Symmetry: $y = 2$

Directrix: $x = 3$



2. Write an equation for a parabola with focus: focus (0, 4), directrix $y = -2$

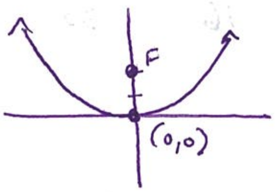


$p = 3$ opens up!

center: $(0, 1)$

$12(y-1) = x^2$

3. A cross section of a satellite dish is in the shape of a parabola.
The antenna is located at the focus which is 2 inches from the vertex.
The satellite dish's vertex is at the origin and the satellite points upwards.
Write an equation for the cross section of the satellite.




$8y = x^2$

4. Write in standard form: $y^2 + 21 = -20x - 6y - 68$

$y^2 + 6y + \underline{9} = -20x - 89 + \underline{9}$

$(y+3)^2 = -20x - 80$

$(y+3)^2 = -20(x+4)$

5. Write the equation for the ellipse in standard form. Identify the center, vertices, and co-vertices. Then sketch a graph.

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

$\frac{4x^2 + 8y^2 - 8x + 48y + 44 = 0}{4}$

$x^2 - 2x + \underline{1} + 2(y^2 + 6y + \underline{9}) =$

$-11 + \underline{1} + \underline{18}$

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

Center: $(1, -3)$

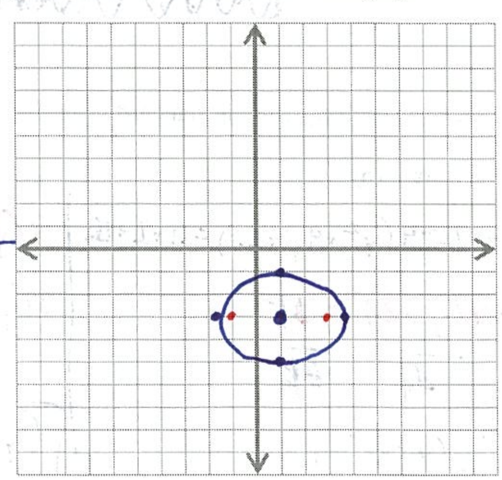
Vertices: $(1 \pm 2\sqrt{2}, -3) \approx (3.8, -3)$ $(-1.8, -3)$

Co-vertices: $(1, -1)$ + $(1, -5)$

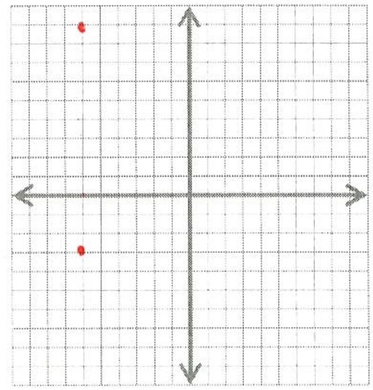
Foci: $(1 \pm 2, -3)$

$(3, -3) + (-1, -3)$

$c^2 = a^2 - b^2$
$c^2 = 8 - 4$
$c = 2$



6. Write an equation in standard form for the ellipse with the given set of characteristics.
foci: (-6, 9), (-6, -3); length of major axis equals 20



$c = 6$ up/down $\qquad a = 10$

center: $(-6, 3)$

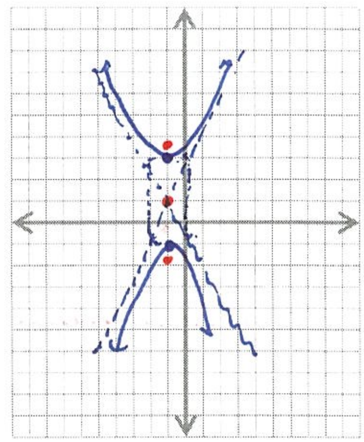
$36 = 100 - b^2$

$b = 8$

$$\frac{(x+6)^2}{64} + \frac{(y-3)^2}{100} = 1$$

7. Identify the center, vertices of the hyperbola, equations of the asymptotes, foci, and sketch a graph.

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



$a = 2 \qquad b = 1$

opens up/down

$c^2 = 4 + 1$

$c = \sqrt{5}$

Center: $(-1, 1)$

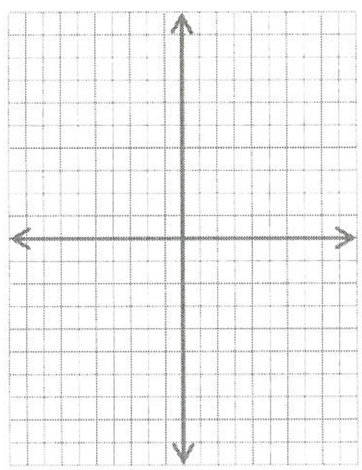
Vertices: $(-1, 3)$ and $(-1, -1)$

Foci: $(-1, 1 \pm \sqrt{5})$

Equation of Asymptotes:

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

8. Write an equation for the hyperbola with the given characteristics.
vertices: (-3, -12), (-3,-4); foci: (-3,-15), (-3,-1)



8 $\qquad c = 7$

$a = 4$

up + down

$49 = 16 + b^2$

center at: $(-3, -8)$

$b = \sqrt{33}$

~~$(x+3)^2 - (y+8)^2$~~

$$\frac{(y+8)^2}{16} - \frac{(x+3)^2}{33} = 1$$

could also use discrim.

For 9 – 11, write each equation in standard form. Then determine the type of conic represented by the equation.

9. $x^2 - 4y^2 - 6x - 16y - 11 = 0$

$x^2 - 6x + 9 - 4(y^2 + 4y + 4) = 11 + 9 - 16$

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

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

Hyperbola!

10. $4y^2 - x - 40y + 107 = 0$

$4y^2 - 40y = x - 107$

$4(y^2 - 10y + 25) = x - 107 + 100$

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

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

Parabola!

11. $9x^2 + 4y^2 + 162x + 8y + 732 = 0$

$9(x^2 + 18x + 81) + 4(y^2 + 2y + 1)$

$= -732 + 729 + 4$

$9(x+9)^2 + 4(y+1)^2 = 1$

Ellipse!