

Ch.11 Review
NO CALCULATOR!!!

NAME: *Key*

PER:

1. Write the equation in standard form, then find the coordinates of the vertex and focus. Identify the equations of the directrix and Sketch a graph using the focal diameter for more accuracy. Show work.

$$x^2 - 2x - 8y + 17 = 0$$

$$x^2 - 2x + 1 = +8y - 17 + 1$$

$$(x-1)^2 = 8y - 16$$

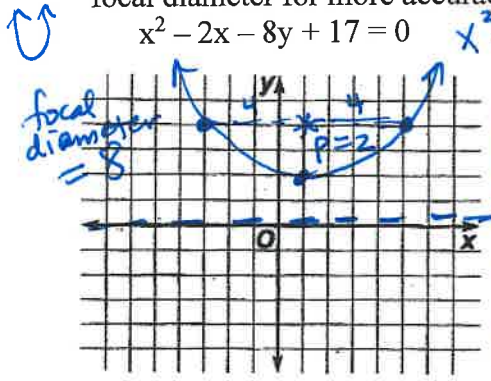
$$(x-1)^2 = 8(y-2)$$

$$\text{Vertex } (1, 2)$$

$$\text{Focus: } 4p = 8 \rightarrow p = 2$$

$$(1, 4)$$

$$y = 0 \text{ directrix}$$



2. Find the standard form of the equation for a parabola that opens to the right, has a vertex at $(3, -2)$ and passes through the point $(5, -6)$. Show work.

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

$$(-6+2)^2 = 4p(5-3)$$

$$(-4)^2 = 4p(2)$$

$$16 = 8p$$

$$2 = p$$

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

Write the equation of the parabola that meets each set of conditions. Graph each parabola using the focal diameter for more accuracy. Show work!

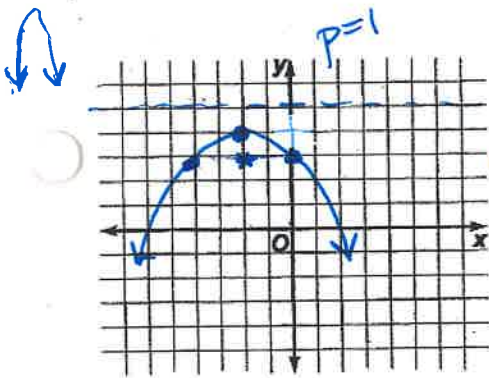
3. The vertex is at $(-2, 4)$ and the focus is at $(-2, 3)$.

$$x^2 = 4py$$

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

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

$$\text{focal diameter } |4-3| = 1$$



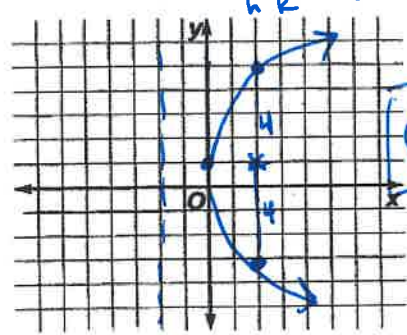
4. The focus is at $(2, 1)$, and the equation of the directrix is $x = -2$.

$$\text{Vertex } (0, 1)$$

$$y^2 = 4px$$

$$(y-1)^2 = 8x$$

$$\text{focal diameter } 1+1 = 2$$



5. Write an equation of the hyperbola where the length of the transverse axis is 8 units, and the foci are at $(6, 0)$ and $(-4, 0)$. Show your work. It may be helpful to make a rough sketch of the graph.

$$c^2 = a^2 + b^2$$

$$5^2 = 4^2 + b^2$$

$$25 = 16 + b^2$$

$$9 = b^2$$

$$b = 3$$

$$\frac{(x-1)^2}{16} - \frac{(y)^2}{9} = 1$$

$$2a = 8$$

$$a = 4$$

$$\text{center} = (1, 0)$$

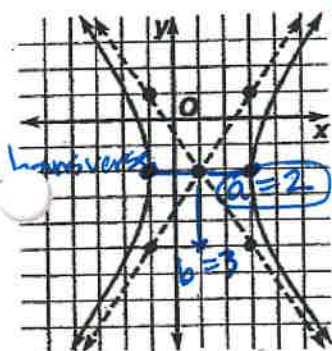
$$\text{horizontal } a \rightarrow x\text{-axis}$$

$$-4 \rightarrow 6 = 10$$

$$\frac{10}{2} \rightarrow c = 5$$



6. Write the equation of the hyperbola in standard form. Center = $(1, -2)$



$$\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = 1$$

7. Identify the coordinates of the foci for the hyperbola given in #6. Show work. No decimals!

$$c^2 = a^2 + b^2$$

$$c^2 = 4 + 9$$

$$c^2 = 13$$

$$c = \sqrt{13}$$

$$\text{foci: } (1 \pm \sqrt{13}, -2)$$

8. Identify the conic, then write $4x^2 - 36x + 4y^2 - 28y - 2 = 0$ in standard form.

No decimals! Use fractions when completing the square. Clearly show all work.

CONIC: Circle

$$x^2 - 9x + y^2 - 7y - \frac{1}{2} = 0$$

$$x^2 - 9x + \frac{81}{4} + y^2 - 7y + \frac{49}{4} = \frac{1}{2} + \frac{81}{4} + \frac{49}{4}$$

$$\boxed{(x - \frac{9}{2})^2 + (y - \frac{7}{2})^2 = 33}$$

$$r = \sqrt{33} \quad \text{Center } (\frac{9}{2}, \frac{7}{2})$$

$$4(x^2 - 9x + \frac{81}{4}) + 4(y^2 - 7y + \frac{49}{4}) = 2 + 81 + 49$$

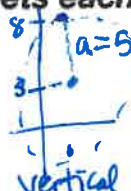
$$4(x - \frac{9}{2})^2 + 4(y - \frac{7}{2})^2 = 132$$

$$\boxed{(x - \frac{9}{2})^2 + (y - \frac{7}{2})^2 = 33}$$

Write the equation of the ellipse that meets each set of conditions. Show work. A rough sketch may be helpful.

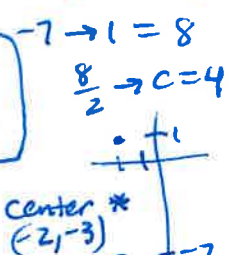
9. The center is at (1, 3), the major axis is parallel to the y-axis, and one vertex is at (1, 8), and $b = 3$.

$$\boxed{\frac{(x-1)^2}{9} + \frac{(y-3)^2}{25} = 1}$$



10. The foci are at (-2, 1) and (-2, -7), and $a = 5$.

$$\boxed{\frac{(x+2)^2}{9} + \frac{(y+3)^2}{25} = 1}$$



11. Construction A semi elliptical arch is used to design a headboard for a bed frame. The headboard will have a height of 2 feet at the center and a width of 5 feet at the base. Where should the craftsman place the foci in order to sketch the arch?

Sketch a diagram and show work.

Don't use a calculator. Use fractions when solving for c.

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

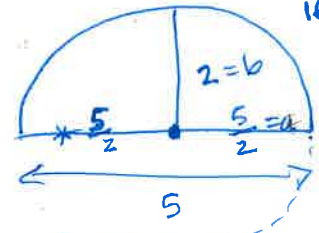
$$c^2 = (\frac{5}{2})^2 - (2)^2$$

$$c^2 = \frac{25}{4} - \frac{4}{1}$$

$$c^2 = \frac{25}{4} - \frac{16}{4}$$

$$c^2 = \frac{9}{4}$$

$$\boxed{c = \frac{3}{2}} \text{ or } 1.5 \text{ feet from center}$$



12. Write $3x^2 + 2y^2 + 24x - 4y + 32 = 0$ in standard form. Identify the center, vertices, foci, and carefully graph the equation. Show all steps. Use exact values, no decimals.

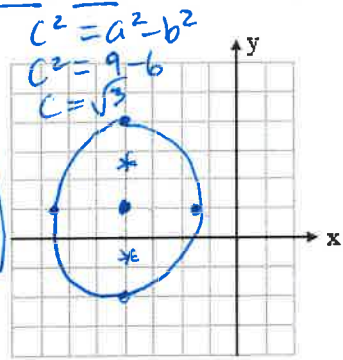
$$3(x^2 + 8x + 16) + 2(y^2 - 2y + 1) = -32 + 48 + 2$$

$$3(x+4)^2 + 2(y-1)^2 = 18$$

$$\boxed{\frac{(x+4)^2}{6} + \frac{(y-1)^2}{9} = 1}$$

$b^2 = 6$
 $b = \sqrt{6}$
 $a^2 = 9$
 $a = 3$ (vertical ellipse)

Center = (-4, 1)
Vertices = (-4, 4), (-4, -2)
Foci = (-4, 1 ± √3)



CHECK ANSWERS #1-12:

~~$$\frac{(x+2)^2}{9} + \frac{(y+3)^2}{25} = 1$$~~

~~$$\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = 1$$~~

~~$$\frac{(x-1)^2}{16} - \frac{y^2}{9} = 1$$~~

~~$$\frac{(x-1)^2}{9} + \frac{(y-3)^2}{25} = 1$$~~

~~$$(x - \frac{9}{2})^2 + (y - \frac{7}{2})^2 = 33$$~~

~~$$(x-1)^2 = 8(y-2)$$~~

~~$$\frac{(x+4)^2}{6} + \frac{(y-1)^2}{9} = 1$$~~

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

~~$$(y-1)^2 = 8x$$~~

~~$$(1 \pm \sqrt{13}, -2)$$~~

~~$$(1, 2)$$~~

~~$$(-4, 1)$$~~

~~$$(-4, 4)$$~~

~~$$(-4, -2)$$~~

~~$$(1, 4)$$~~

~~$$y = 0$$~~

~~$$(-4, 1 \pm \sqrt{3})$$~~

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