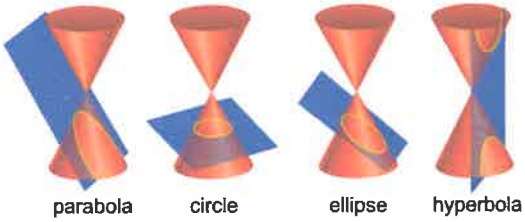


Name: Key

Algebra 2: Conic Sections big REVIEW

Use what you've learned in our Conic Sections Unit - and prior - to solve each exercise.
[Note: This study guide has been arranged by section for organizational purposes. On the Test, the exercises may be in a random, scrambled order. You must understand how to distinguish between the four conic sections]

Part 1- Differentiating between the four Conic Section

Directions: Name the type of conic section given by each equation. Briefly describe how you know!

1) $25x^2 + 9y^2 - 200x - 18y + 184 = 0$

Ellipse

2) $-9x^2 + 16y^2 + 18x - 32y - 137 = 0$

Hyperbola

3) $5x^2 + 5y^2 + 4x + 2y + 1 = 0$

Equal Circle

4) $y^2 + x - 12y + 40 = 0$

No x^2 Parabola

5) $100x^2 - 16y^2 + 500x + 225 = 0$

Hyperbola

6) $x^2 + y^2 + 8x - 8y + 23 = 0$

Circle

Directions: Name the type of conic section given by each equation. Then "complete the square" so the equation is in the more-friendly standard or vertex form:

7) $x^2 + y^2 + 2x - 4y - 11 = 0$ ← Circle

$(x^2+2x+\boxed{1}) + (y^2-4y+\boxed{4}) = 11+\boxed{1}+\boxed{4}$

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

center: (-1 , 2)

radius: 4

8) $-2x^2 + 12x + y - 17 = 0$ ← parabola

$y = 2x^2 - 12x + 17$

$y = 2(x^2-6x+\boxed{9}) + 17 - \boxed{18}$

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

vertex: (3 , 1)

Direction of opening: upward

Part 2 - The Circle

Directions: Extract the center and radius information from each equation of a circle.

9) $(x+12)^2+(y+16)^2=9$

C: $(-12,-16)$ $r=3$

10) $(x-8)^2+(y+1)^2=4$

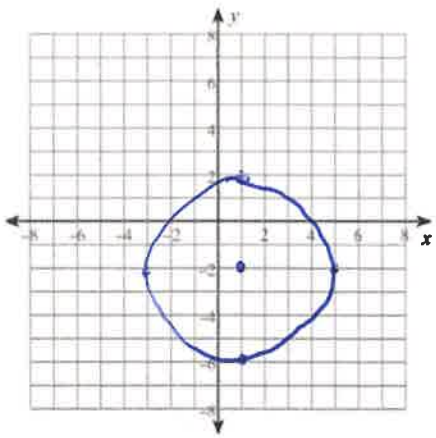
C: $(8,-1)$ $r=2$

11) $x^2+y^2=36$

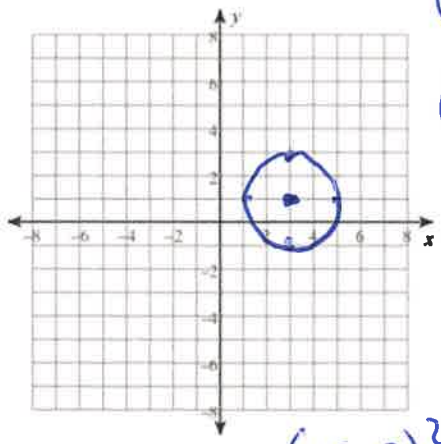
C: $(0;0)$ $r=6$

Directions: Graph each circle. [Hint: for #13 you need to "complete the square" to get to standard form]

12) $(x-1)^2+(y+2)^2=16$



13) $x^2+y^2-6x-2y+6=0$



$(x^2-6x+\boxed{9})$

$(y^2-2y+\triangle)$

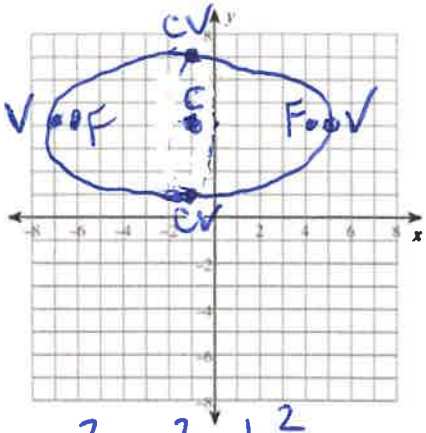
$=-6+\boxed{9}+\triangle$

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

Part 3 - The Ellipse

Directions: Graph and identify the required features of each ellipse.

14) $\dfrac{(x+1)^2}{36}+\dfrac{(y-4)^2}{9}=1$



center: $(-1, 4)$

vertices: $(5, 4)$

$(-7, 4)$

co-vertices: $(-1, 1)$

$(-1, 7)$

foci: $(-1+\sqrt{27}, 4)$

$(-1-\sqrt{27}, 4)$

length major axis: 12

length minor axis: 6

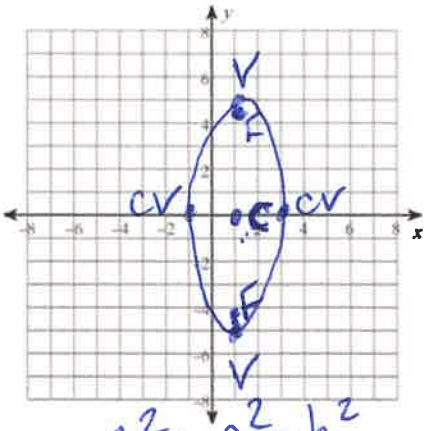
$c^2=a^2-b^2$

$c^2=36-9$

$c^2=27$

$c=\sqrt{27}\approx 5.2$

15) $\dfrac{(x-1)^2}{4}+\dfrac{y^2}{25}=1$



center: $(1, 0)$

vertices: $(1, 5)$

$(1, -5)$

co-vertices: $(3, 0)$

$(-1, 0)$

foci: $(1, \sqrt{21})$

$(1, -\sqrt{21})$

length major axis: 10

length minor axis: 4

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

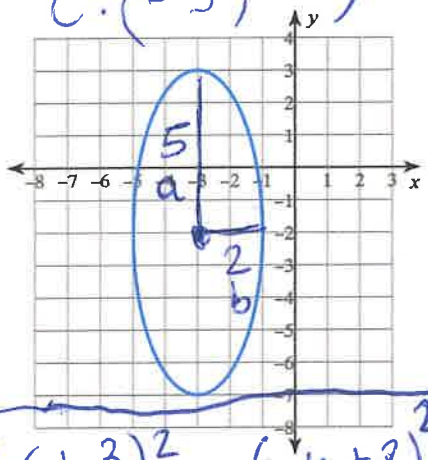
$c^2=25-4$

$c^2=21$

$c=\sqrt{21}\approx 4.6$

Directions: Use the information provided to write the standard form equation of each ellipse.

16) C: (−3, −2)



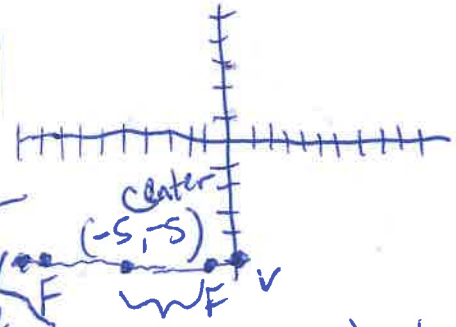
$$\boxed{\frac{(x+3)^2}{4} + \frac{(y+2)^2}{25} = 1}$$

17) Major axis is vertical
Center: (3, 9)
Major axis is 20 units long
Minor axis is 12 units long

10 ↑ a
6 b

$$\boxed{\frac{(x-3)^2}{36} + \frac{(y-9)^2}{100} = 1}$$

18) Vertices: (0, −5), (−10, −5)
Foci: (−1, −5), (−9, −5)



$$\boxed{\frac{(x+5)^2}{25} + \frac{(y+5)^2}{9} = 1}$$

So: c (focal dist) = 4

$c^2 = a^2 - b^2$
$4^2 = 5^2 - b^2$
$16 = 25 - b^2$
$9 = b^2$
$3 = b$

Part 4 - The Hyperbola

Directions: Graph and identify the required features of each hyperbola.

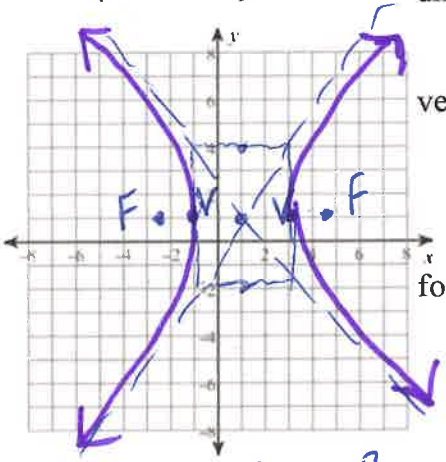
19) $\frac{(x-1)^2}{4} - \frac{(y-1)^2}{9} = 1$

Center: (1, 1)

direction of opening: horizontal

vertices: (3, 1)
(−1, 1)

foci: $(1+\sqrt{13}, 1)$
$(1-\sqrt{13}, 1)$



$c^2 = a^2 + b^2$
$c^2 = 4 + 9$
$c^2 = 13$
$c = \sqrt{13} \approx 3.6$

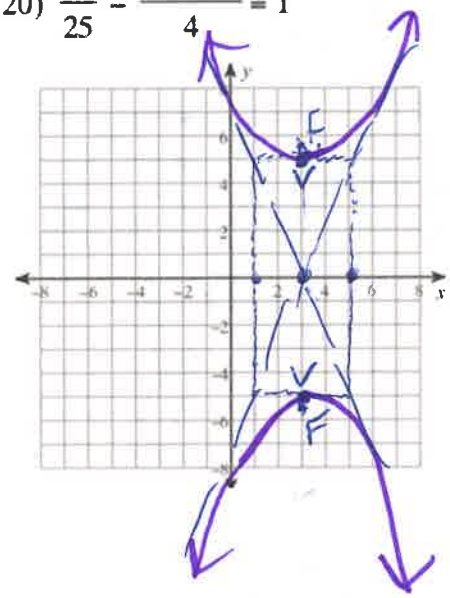
20) $\frac{y^2}{25} - \frac{(x-3)^2}{4} = 1$

Center: (3, 0)

direction of opening: Vertical

vertices: (3, 5)
(3, −5)

foci: $(3, \sqrt{29})$
$(3, -\sqrt{29})$



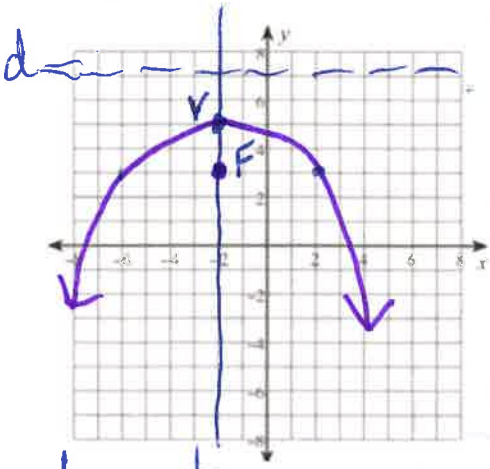
$c^2 = a^2 + b^2$
$c^2 = 25 + 4$
$c^2 = 29$
$c = \sqrt{29} \approx 5.4$

Part 5 - The Parabola

Directions: Graph and identify the required features of each hyperbola.

+ point (3, 2)

21.) $y = -\frac{1}{8}(x+2)^2 + 5$



direction opening: downward

vertex: (-2, 5)

focus: (-2, 3)

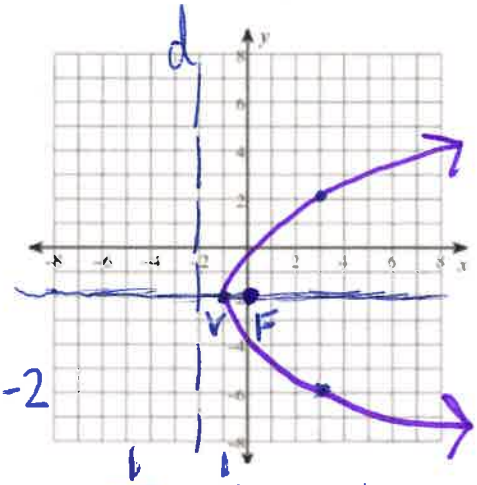
directrix: y = 7

axis of symmetry: x = -2

$\frac{1}{4p} = -\frac{1}{8}$ $p = -2 \downarrow$

+ point (2, 3)

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



direction opening: Right

vertex: (-1, -2)

focus: (0, -2)

directrix: x = -2

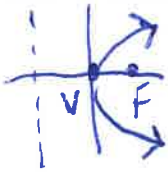
axis of symmetry: y = -2

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

Directions: Use the information provided to write the vertex form equation of each parabola.

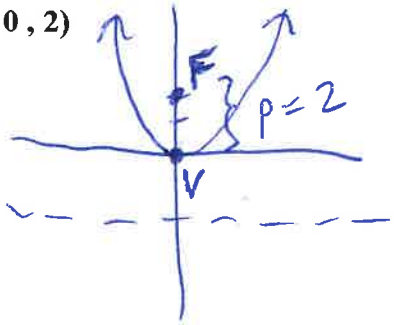
23.) **focus (5, 0) & directrix x = -5**

$x = \frac{1}{20}y^2$



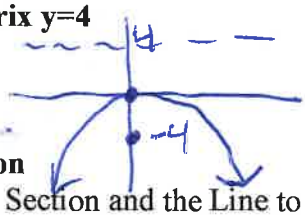
24.) **vertex @ origin & focus (0 , 2)**

$y = \frac{1}{8}x^2$



25.) **vertex @origin, directrix y=4**

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



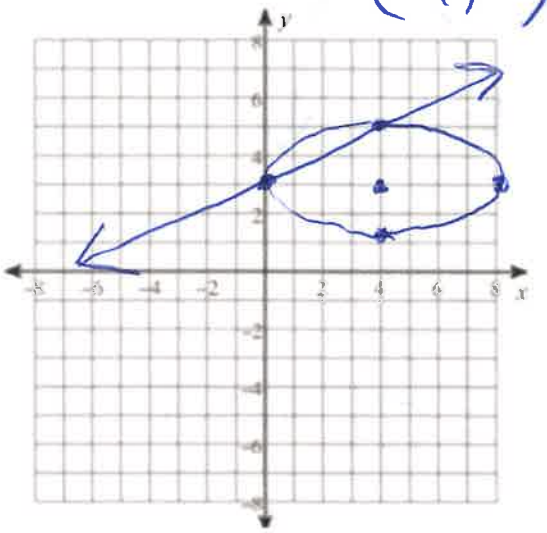
Part 6 - Systems of Equation

Directions: Graph the Conic Section and the Line to find the intersection point(s)

26. $\frac{(x-4)^2}{16} + \frac{(y-3)^2}{4} = 1$

$y = \frac{1}{2}x + 3$

Solutions (0, 3) (4, 5)



27. $(x+5)^2 + (y-2)^2 = 9$

$y = -x$

Solutions (-5, 5) (-2, 2)