Precalculus

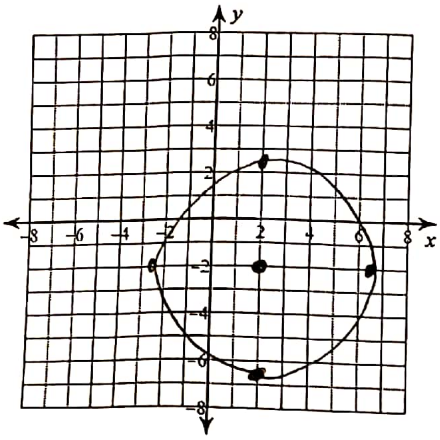
Conics Review

Name__________________________ ID: 1

Date________________ Period____

Identify the center and radius of each. Then sketch the graph.

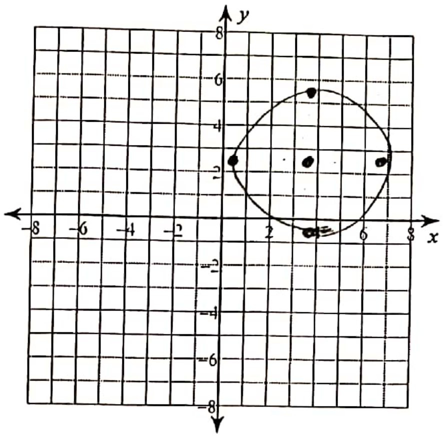
1) $(x-2)^2+(y+2)^2=21$



C: (2, -2)

$r=\sqrt{21}$

2) $(x-\sqrt{13})^2+\left(y-\frac{5}{2}\right)^2=9$

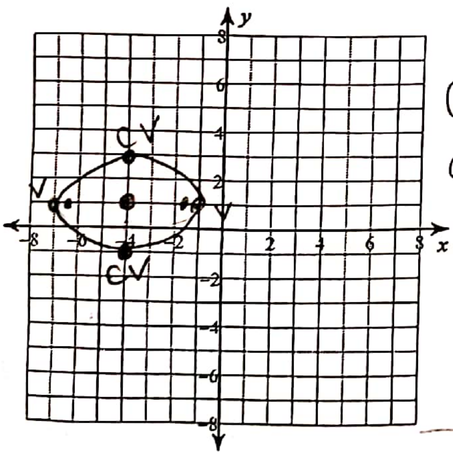


C: $(\sqrt{13}, 5/2)$

$r=3$

Identify the center, vertices, co-vertices, foci, length of the major axis, and length of the minor axis of each. Then sketch the graph.

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



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

$9-4=c^2$

$5=c^2$

$\sqrt{5}=c$

C: (-4, 1)

V: (-1, 1) (-7, 1)

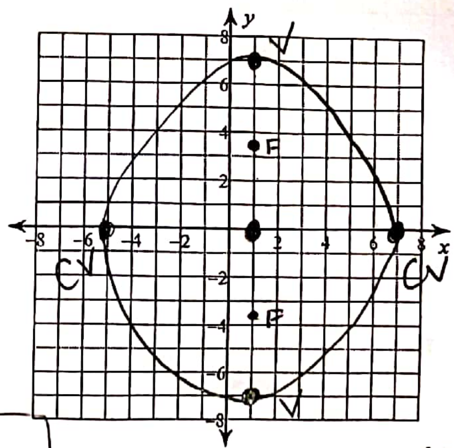
CV: (-4, 3) (-4, -1)

F: $(-4+\sqrt{5}, 1)$ $(-4-\sqrt{5}, 1)$

major axis = 6 units

minor axis = 4 units

4) $\frac{(x-1)^2}{36}+\frac{y^2}{49}=1$



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

$49-36=c^2$

$13=c^2$

$c=\sqrt{13}$

C: (1, 0)

V: (1, 7) (1, -7)

CV: (7, 0) (-5, 0)

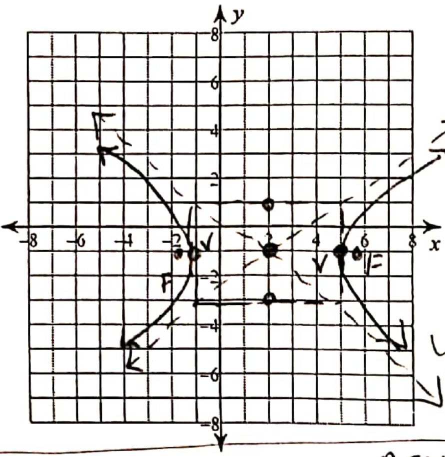
F: $(1, \sqrt{13})$ $(1, -\sqrt{13})$

Major axis = 14 units

minor axis = 12 units

Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

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



$y = \pm \frac{2}{3}(x-2) - 1$

$y = \frac{2}{3}x - \frac{4}{3} - 1$

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

C: $(2,-1)$

V: $(5,-1)$ $(-1,-1)$

F: $(2+\sqrt{13},-1)$ $(2-\sqrt{13},-1)$

Asymp:

$y = \frac{2}{3}x - \frac{7}{3}$

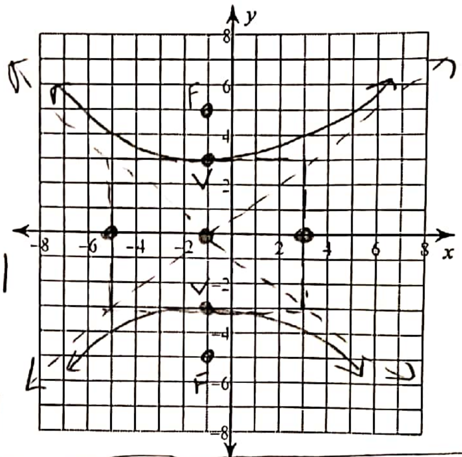
$y = -\frac{2}{3}x + \frac{1}{3}$

$c^2 = 9+4$

$c^2 = 13$

$c = \sqrt{13}$

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



$y = \pm \frac{3}{4}(x+1)$

C: $(-1,0)$

V: $(-1,3)$ $(-1,-3)$

F: $(-1,5)$ $(-1,-5)$

Asymp:

$y = \frac{3}{4}x + \frac{3}{4}$

$y = -\frac{3}{4}x - \frac{3}{4}$

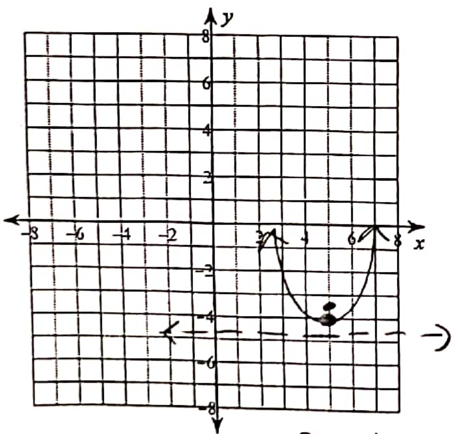
$c^2 = 9+16$

$c^2 = 25$

$c = 5$

Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

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



V: $(5,-4)$

F: $(5,-3\frac{3}{8})$

D: $y = -4\frac{5}{8}$

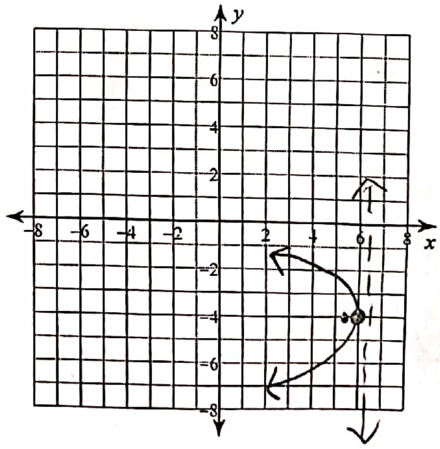
AOS: $x = 5$

$\frac{2}{5} = \frac{1}{4p}$

$8p = 5$

$p = \frac{5}{8}$

8) $x = -3(y+4)^2 + 6$ $\quad x-6 = -3(y+4)^2$



$-3 = \frac{1}{4p}$

$-12p = 1$

$p = -\frac{1}{12}$

V: $(6,-4)$

F: $(5\frac{11}{12},-4)$

D: $x = 6\frac{1}{12}$

AOS: $y = -4$

Identify the conic and write the standard form equation of each.

9) $x^2 + y^2 - 24x - 18y + 218 = 0$ Circle

$x^2 - 24x + \underline{144} + y^2 - 18y + \underline{81} = -218 + 144 + 81$

$\boxed{(x-12)^2 + (y-9)^2 = 7}$

10) $x^2 + 4y^2 - 12x - 40y + 36 = 0$ ellipse

$x^2 - 12x + \underline{36} + 4(y^2 - 10y + \underline{25}) = -36 + 36 + 100$

$(x-6)^2 + 4(y-5)^2 = 100$

$\boxed{\frac{(x-6)^2}{100} + \frac{(y-5)^2}{25} = 1}$

11) $-16x^2 + 9y^2 + 32x - 108y - 268 = 0$ hyperbola

$9(y^2 - 12y + \underline{36}) - 16(x^2 - 2x + \underline{1}) = 268 + 324 + -16$

$9(y-6)^2 - 16(x-1)^2 = 576$

$\boxed{\frac{(y-6)^2}{64} - \frac{(x-1)^2}{36} = 1}$

12) $-2x^2 + 4x + y - 1 = 0$ parabola

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

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

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

Use the information provided to write the standard form equation of each circle.

13) Center: $(15, 11)$
Radius: $6\sqrt{2}$

$\boxed{(x-15)^2 + (y-11)^2 = 72}$

14) Center: $(13, -4)$
Radius: 5

$\boxed{(x-13)^2 + (y+4)^2 = 25}$

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

15) Vertices: $(8, 13)$, $(8, -1)$
Co-vertices: $(12, 6)$, $(4, 6)$

C: $(8, 6)$
$a = 7$
$b = 4$

$\boxed{\frac{(x-8)^2}{16} + \frac{(y-6)^2}{49} = 1}$

16) Vertices: $(-1 + 3\sqrt{15}, 9)$, $(-1 - 3\sqrt{15}, 9)$
Foci: $(-1 + 5\sqrt{2}, 9)$, $(-1 - 5\sqrt{2}, 9)$

C: $(-1, 9)$
$a = 3\sqrt{15}$
$b =$
$c = 5\sqrt{2}$
$50 = 135 - b^2$
$-85 = -b^2$

$\boxed{\frac{(x+1)^2}{135} + \frac{(y-9)^2}{85} = 1}$

17) Foci: $(-4 + \sqrt{17}, 10)$, $(-4 - \sqrt{17}, 10)$
Co-vertices: $(-4, 18)$, $(-4, 2)$

C: $(-4, 10)$
$a =$
$b = 8$
$c = \sqrt{17}$
$17 = a^2 - 64$
$a^2 = 81$

$\boxed{\frac{(x+4)^2}{81} + \frac{(y-10)^2}{64} = 1}$

18) Foci: $(-7, 1 + \sqrt{13})$, $(-7, 1 - \sqrt{13})$
Endpoints of major axis: $(-7, 8)$, $(-7, -6)$ ← vertices

C: $(-7, 1)$
$a = 7$
$b =$
$c = \sqrt{13}$
$13 = 49 - b^2$
$-36 = -b^2$

$\boxed{\frac{(x+7)^2}{36} + \frac{(y-1)^2}{49} = 1}$

19) Center: $(-2, -8)$
Vertex: $(-2, 2)$
Co-vertex: $(4, -8)$

$a = 10$
$b = 6$

$$\boxed{\frac{(x+2)^2}{36} + \frac{(y+8)^2}{100} = 1}$$

20) Center: $(-2, 3)$
Vertex: $(-2, -7)$
Focus: $(-2, 9)$

$a = 10$
$b =$
$c = 6$

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

$36 = 100 - b^2$
$-64 = -b^2$

Use the information provided to write the standard form equation of each hyperbola. $a = 12$

21) Vertices: $(-4, -2 + 6\sqrt{5}), (-4, -2 - 6\sqrt{5})$
Foci: $(-4, -2 + \sqrt{185}), (-4, -2 - \sqrt{185})$

$C: (-4, -2)$

$$\boxed{\frac{(y+2)^2}{180} - \frac{(x+4)^2}{5} = 1}$$

$a = 6\sqrt{5}$
$b =$
$c = \sqrt{185}$
$185 = 180 + b^2$
$5 = b^2$

22) Vertices: $(2, 10), (2, -14)$ $C: (2, -2)$
Perimeter of Central Rectangle = 104

$$\boxed{\frac{(y+2)^2}{144} - \frac{(x-2)^2}{196} = 1}$$

$104 - 4(12)$
$= \frac{56}{4}$
$= 14$

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

23) Vertex: $(-2, -7)$, Focus: $\left(-\frac{57}{28}, -7\right)$

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

$p = F - V$
$= -\frac{57}{28} - -2$
$= -1/28$
$\frac{1}{4(-1/28)} = -7$

24) Vertex: $(-2, 6)$, Directrix: $x = -1$

$p = V - D$
$= -2 - -1$
$= -1$

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

25) Focus: $\left(2, -\frac{33}{7}\right)$, Directrix: $y = -\frac{37}{7}$

$V: \left(2, \frac{-\frac{33}{7} + -\frac{37}{7}}{2}\right)$
$= (2, -5)$

$$\boxed{y + 5 = 7/8(x-2)^2}$$

$p = V - D$
$= -5 - -\frac{37}{7}$
$= 2/7$
$\frac{1}{4(2/7)} = \frac{1}{8/7}$