CONIC SECTIONS ELLIPSES!

Name Key

Period ____ Date ____________

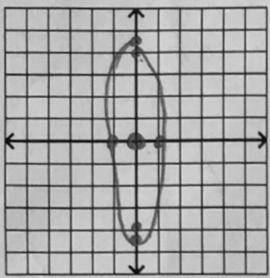
Use simplest radical form where appropriate (no decimals!)

1. Find the requested information, then graph the ellipse.

a. $\frac{x^2}{4}+\frac{y^2}{81}=1$

$a=9$
$b=2$

$c^2 = 81-4$
$= 77$
$c=\sqrt{77}$



length of major axis: 18

length of minor axis: 4

center: $(0,0)$

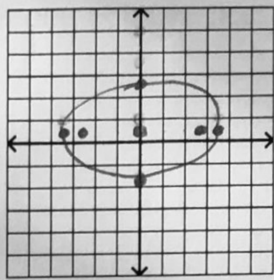
vertices: $(0,9)$ $(0,-9)$

co-vertices: $(2,0)$ $(-2,0)$

foci: $(0,\sqrt{77})$ $(0,-\sqrt{77})$

b. $\frac{x^2}{49}+\frac{(y-1)^2}{20}=1$

$a=7$
$b=\sqrt{20}=2\sqrt{5}$



length of major axis: 14

length of minor axis: $4\sqrt{5}$

center: $(0,1)$

vertices: $(7,1)$ $(-7,1)$

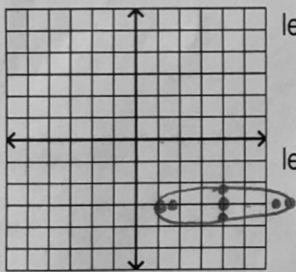
co-vertices: $(0,\ 1+2\sqrt{5})$ $(0,\ 1-2\sqrt{5})$

foci: $c^2 = 49-20$
$= 29$
$c=\sqrt{29}$
$(\sqrt{29},1)$ $(-\sqrt{29},1)$

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

$a=3$
$b=\frac{1}{2}$

$c^2 = 9-1/4$
$= \frac{35}{4}$
$c=\frac{\sqrt{35}}{\sqrt{4}}=\frac{\sqrt{35}}{2}$
$= 2.9$



length of major axis: 6

length of minor axis: 1

center: $(4,-3)$

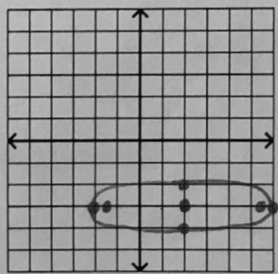
vertices: $(7,-3)$ $(1,-3)$

co-vertices: $(4,-2\frac{1}{2})$ $(4,-3\frac{1}{2})$

foci: $(1.1\ ,-3)$ $(5.9\ ,-3)$

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

$a=4$
$b=1$



length of major axis: 8

length of minor axis: 2

center: $(2,-3)$

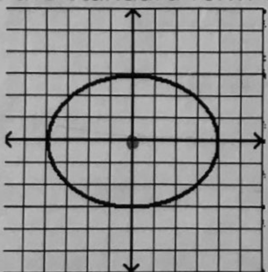
vertices: $(6,-3)$ $(-2,-3)$

co-vertices: $(2,-2)$ $(2,-4)$

foci: $c^2 = 16-1=15$
$c=\sqrt{15}=3.9$
$(-1.9,-3)$ $(5.9,-3)$

2. Write the standard form equation of the ellipse shown or described

a.

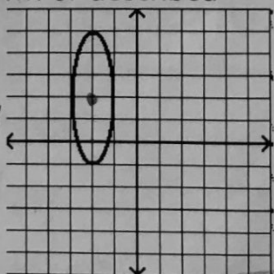


$a=4$
$b=3$
$c^2=16-9=7$
$c=\sqrt{7}$

Identify the foci:
$(\sqrt{7},0)$
$(-\sqrt{7},0)$

$\boxed{\frac{x^2}{16}+\frac{y^2}{9}=1}$

b.



$a=3$
$b=1$

Identify the foci:
$c^2=9-1=8$
$c=\sqrt{8}=2\sqrt{2}=2.8$
$(-2,\ 4.8)$
$(-2,\ -0.8)$

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

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c. Vertices: (-25, 0) and (25, 0)
Co-vertices: (0, -15) and (0, 15)

$a=25$
$b=15$

$$\boxed{\frac{x^2}{625} + \frac{y^2}{225} = 1}$$

d. Foci: (-10, 1) and (10, 1)
Co-vertices: (0, -2) and (0, 4)

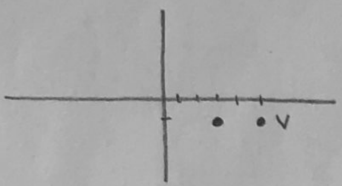
center (0,1)

$b=3$
$c=10$

$10^2 = a^2 - 3^2$
$100 = a^2 - 9$
$109 = a^2$

$$\boxed{\frac{x^2}{109} + \frac{(y-1)^2}{9} = 1}$$

e. An ellipse's center is at (3, -1), the point (5, -1) is one of its vertices, and it is tangent to the *x*-axis.



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

4. Convert each equation into standard form, then identify the center, vertices, co-vertices, and foci of the ellipse.

a. $\frac{x^2}{16} + \frac{16y^2}{16} = \frac{16}{16}$

$a=4$
$b=1$

$c^2 = 16-1 = 15$
$c = \sqrt{15}$

standard form: $\boxed{\frac{x^2}{16} + \frac{y^2}{1} = 1}$

center: $(0,0)$ vertices: $(4,0)$ $(-4,0)$

co-vertices: $(0,1)$ $(0,-1)$ foci: $(\sqrt{15},0)$ $(-\sqrt{15},0)$

b. $x^2 + 4y^2 - 2x - 16y + 13 = 0$

$c^2 = 4-1 = 3$
$c = \sqrt{3} = 1.7$

$(x^2 - 2x + \_\_) + (4y^2 - 16y + \_\_) = -13$
$(x^2 - 2x + \underline{1}) + 4(y^2 - 4y + \underline{4}) = -13 + \underline{1} + \underline{16}$
$(x-1)^2 + 4(y-2)^2 = 4$

$a=2$
$b=1$

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

standard form:

center: $(1,2)$ vertices: $(3,2)$ $(-1,2)$

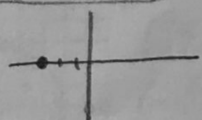
co-vertices: $(1,3)$ $(1,1)$ foci ~~co-vertices~~: $(2.7, 2)$ $(-.7, 2)$ OR $(1+\sqrt{3}, 2)$ $(1-\sqrt{3}, 2)$

c. $x^2 + 4y^2 + 6x - 27 = 0$

$(x^2 + 6x + \underline{9}) + 4y^2 = 27 + \underline{9}$
$(x+3)^2 + 4y^2 = 36$

Horiz. $a=6$
$b=3$

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



$c^2 = 36-9$
$c = \sqrt{27} = 3\sqrt{3}$

standard form:

center: $(-3,0)$ vertices: $(3,0)$ $(-9,0)$

co-vertices: $(-3,3)$ $(-3,-3)$ foci: $(-3+3\sqrt{3}, 0)$ $(-3-3\sqrt{3}, 0)$

d. $4x^2 + y^2 + 8x - 8y + 16 = 0$

$(4x^2 + 8x + \_\_) + (y^2 - 8y + \_\_) = -16 + \_\_ + \_\_$
$4(x^2 + 2x + \underline{1}) + (y^2 - 8y + \underline{16}) = -16 + \underline{4} + \underline{16}$
$4(x+1)^2 + (y-4)^2 = 4$

$a=2$
$b=1$

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

standard form:

center: $(-1,4)$ vertices: $(-1,2)$ $(-1,6)$

co-vertices: $(0,4)$ $(-2,4)$

foci: $c^2 = 4-1 = 3$
$c = \sqrt{3} = 1.7$
$(-1, 2.3)$ $(-1, 5.7)$ OR $(-1, 4-\sqrt{3})$ $(-1, 4+\sqrt{3})$