HOMEWORK: ELLIPSES

NAME: ______________________________ DAY 3 DUE: ____________

Find the vertices and foci of each ellipse. Graph each equation.

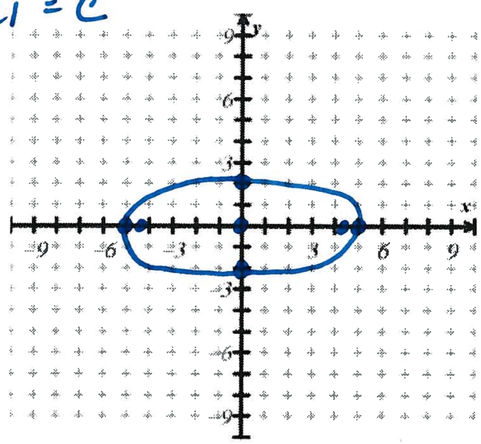
1. $\frac{x^2}{25}+\frac{y^2}{4}=1$

0

a^2 b^2

$b^2=a^2-c^2$
$4=25-c^2$
$+21=+c^2$
$\sqrt{21}=c$

Center: $(0,0)$
vertices: $(-5,0)$ $(5,0)$
Foci: $(\sqrt{21},0)$ $(-\sqrt{21},0)$



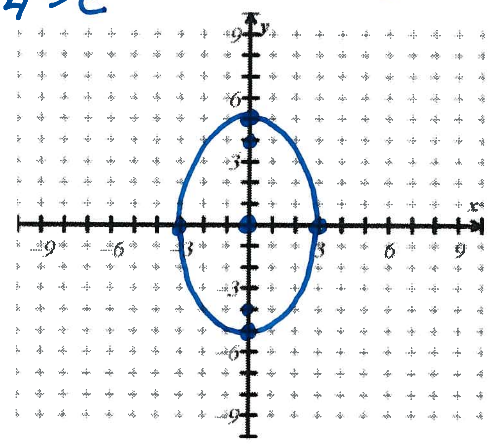
2. $\frac{x^2}{9}+\frac{y^2}{25}=1$

0

b^2 a^2

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

Center: $(0,0)$
Vertices: $(0,5)$ $(0,-5)$
Foci: $(0,4)$ $(0,-4)$



3. $4x^2+y^2=16$

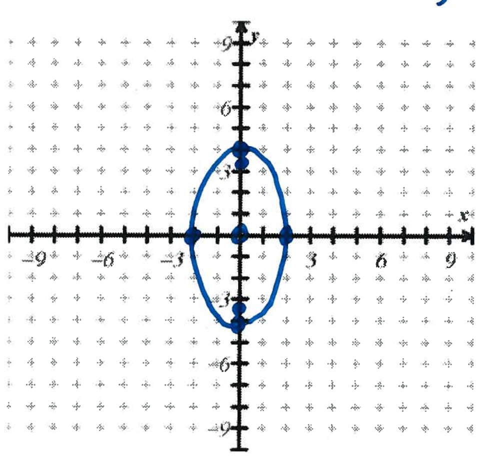
0

$\frac{4x^2}{16}+\frac{y^2}{16}=\frac{16}{16}$

$\frac{x^2}{4}+\frac{y^2}{16}=1$

b^2 a^2

Center: $(0,0)$
Vertices: $(0,4)$ $(0,-4)$
Foci: $(0,2\sqrt{3})$ $(0,-2\sqrt{3})$



$b^2=a^2-c^2$
$4=16-c^2$
$+12=+c^2$
$\sqrt{12}=c$
$2\sqrt{3}=c$

4. $4y^2+x^2=8$

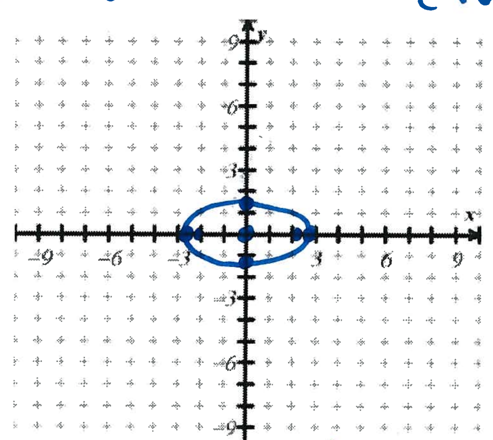
0

$\frac{4y^2}{8}+\frac{x^2}{8}=\frac{8}{8}$

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

b^2 a^2

center: $(0,0)$
vertices: $(2\sqrt{2},0)$ $(-2\sqrt{2},0)$
Foci: $(\sqrt{6},0)$ $(-\sqrt{6},0)$



$a^2=8$
$a=\sqrt{8}$
$a=2\sqrt{2}$

$b^2=2$
$b=\sqrt{2}$

$b^2=a^2-c^2$
$2=8-c^2$
$+6=+c^2$
$\sqrt{6}=c$

Graph. Write the equation.

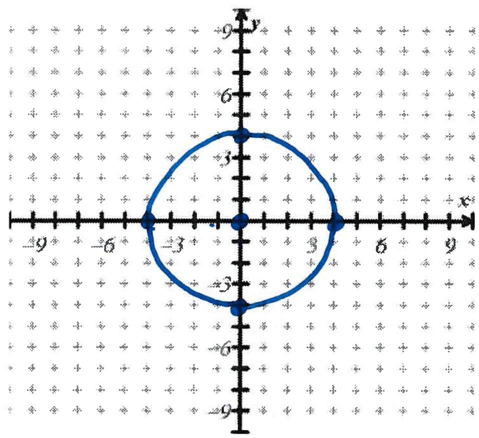
5. $\frac{x^2}{16} + \frac{y^2}{16} = \frac{16}{16}$

center: $(0,0)$
$r = 4$

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

$a = b \rightarrow$ circle!

$\boxed{x^2 + h^2 = r^2}$

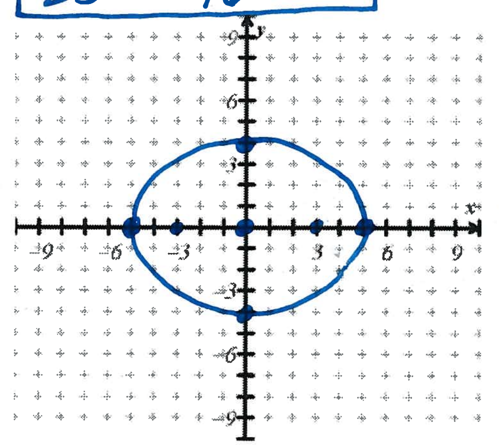


6. Center (0, 0), Focus (3, 0), Vertex (5, 0)

$a = 5$
$c = 3$
$b = 4$

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

$\boxed{\frac{x^2}{25} + \frac{y^2}{16} = 1}$

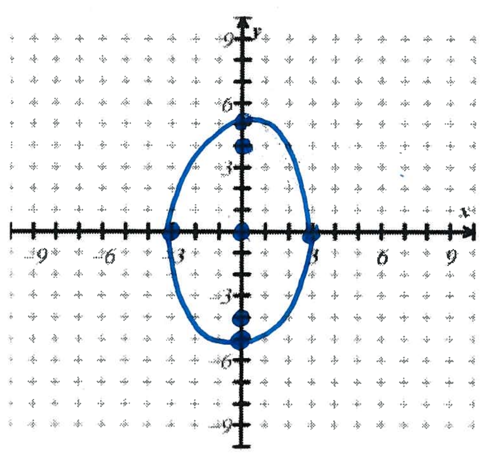


7. Center (0, 0), Focus (0, –4), Vertex (0, 5)

$a = 5$
$c = 4$
$b = 3$

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

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

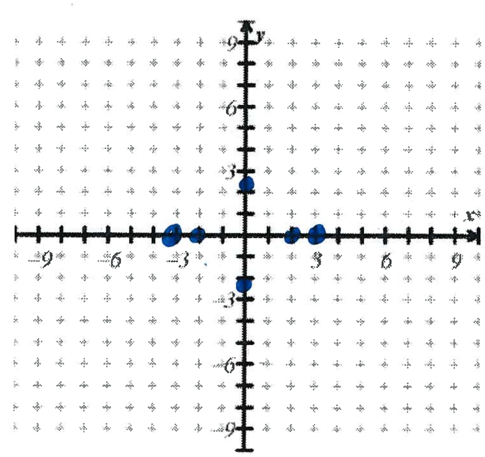


8. Foci at (±2, 0), length of major axis = 6

$a = 3$
$c = 2$
$b = \sqrt{5}$

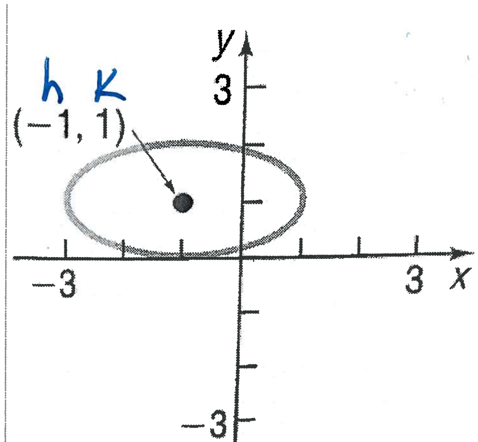
$b^2 = a^2 - c^2$
$b^2 = 9 - 4$
$b^2 = 5$
$b = \sqrt{5}$

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



Write an equation for each ellipse.

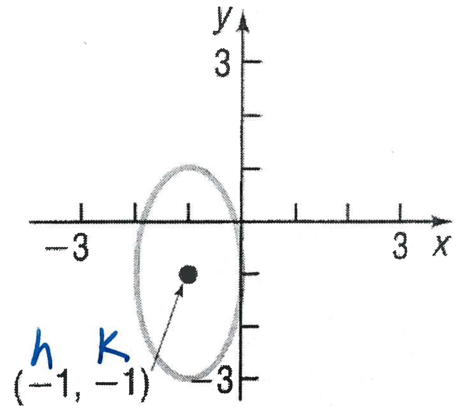
9.



$a = 2$
$b = 1$

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

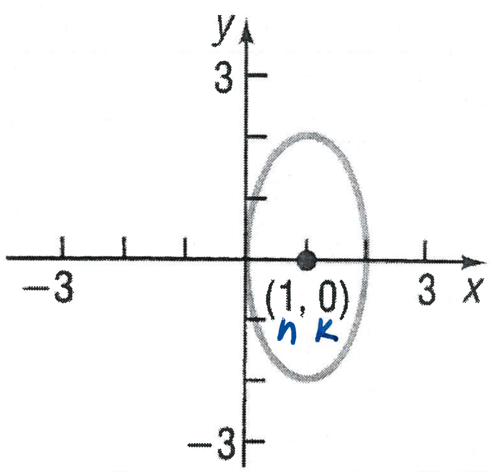
10.



$a = 2$
$b = 1$

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

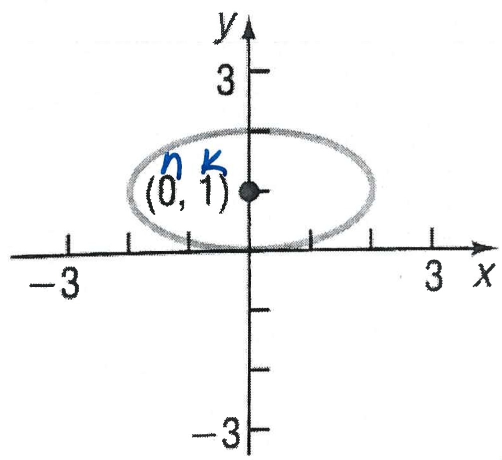
11.



$a = 2$
$b = 1$

$$\boxed{\frac{(x-1)^2}{1} + \frac{(y-0)^2}{4} = 1}$$

12.



$a = 2$
$b = 1$

$$\boxed{\frac{(x-0)^2}{4} + \frac{(y-1)^2}{1} = 1}$$

Discuss the equation (find the center, foci, and vertices).

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

$b^2 \quad a^2$

$a=3$ $\quad b^2=a^2-c^2$

$b=2$ $\quad 4=9-c^2$

$c=\sqrt{5}$ $\quad +5=+c^2$

Center: $(3,-1)$

Vertices: $(3,2)$

$(3,-4)$

Foci: $(3,-1+\sqrt{5})$

$(3,-1-\sqrt{5})$

14. $\frac{(x+5)^2}{16} + \frac{4(y-4)^2}{16} = \frac{16}{16}$

$\frac{(x+5)^2}{16}+\frac{(y-4)^2}{4}=1$

$a^2 \quad b^2$

$a=4$ $\quad b^2=a^2-c^2$

$b=2$ $\quad 4=16-c^2$

$c=2\sqrt{3}$ $\quad +12=+c^2$

$\sqrt{12}=c$

Center: $(-5,4)$

Vertices: $(-1,4)$, $(-9,4)$

Foci: $(-5-2\sqrt{3},4)$, $(-5+2\sqrt{3},4)$

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

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

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

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

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

$a^2 \quad b^2$

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

$b=1$ $\quad 1=4-c^2$

$c=\sqrt{3}$ $\quad +3=+c^2$

Center: $(-2,1)$

Vertices: $(-4,1)$, $(0,1)$

Foci: $(-2-\sqrt{3},1)$, $(-2+\sqrt{3},1)$

16. $2x^2 + 3y^2 - 8x + 6y + 5 = 0$

$2x^2-8x+3y^2+6y=-5$

$2(x^2-4x+\square)+3(y^2+2y+\square)=-5$

$2(x^2-4x+4)+3(y^2+2y+1)=-5+8+3$

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

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

$a=\sqrt{3}$ $\quad b^2=a^2-c^2$

$b=\sqrt{2}$ $\quad 2=3-c^2$

$c=1$ $\quad +1=+c^2$

Center: $(2,-1)$

Vertices: $(2+\sqrt{3},-1)$, $(2-\sqrt{3},-1)$

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