Name: ____ Date: __________

PC Ms. Loughran

Do Now:

1. Find the center and the radius of the circle whose equation is $x^2 + y^2 - 6x + 4y = 108$.

$$x^2 - 6x + 9 + y^2 + 4y + 4 = 108 + 9 + 4$$

$$(x-3)^2 + (y+2)^2 = 121$$

Center: $(3, -2)$

$r = 11$

2. Write an equation of the circle, in standard form, whose diameter has endpoints (0,0) and (-9, 12).

midpt (center): $\left(\frac{0+(-9)}{2}, \frac{0+12}{2}\right) = \left(-\frac{9}{2}, 6\right)$

or

$(-4.5, 6)$

$$r = \sqrt{\left(-\frac{9}{2} - 0\right)^2 + (6-0)^2}$$

$$r = \sqrt{\left(\frac{-9}{2}\right)^2 + 6^2} = \sqrt{\frac{81}{4} + 36} = \sqrt{\frac{225}{4}} = \frac{15}{2}$$

$$\left(x + \frac{9}{2}\right)^2 + (y-6)^2 = \left(\frac{15}{2}\right)^2$$

$$\left(x + \frac{9}{2}\right)^2 + (y-6)^2 = \frac{225}{4}$$

or

$$(x + 4.5)^2 + (y-6)^2 = 56.25$$

Name:______________________________________ Date:____________

PC: Ellipses Ms. Loughran

An **ellipse** is the locus of all points in a plane such that the sum of the distances from two given points in the plane, called foci, is constant.

The standard form of the equation of an ellipse with center at (h,k), major axis of length $2a$ units and minor axis of length $2b$ units, where $c^2 = a^2 - b^2$, is as follows:

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1, \text{ when the major axis is parallel to the } x\text{-axis,}$$

horizontal major axis (HMA)

or

$$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1, \text{ when the major axis is parallel to the } y\text{-axis.}$$

vertical major axis (VMA)

The foci are located on the major axis with formulas:

$(h+c,k)$ and $(h-c,k)$ if the major axis is parallel to the $x-$axis (HMA)

$(h,k+c)$ and $(h,k-c)$ if the major axis is parallel to the y$-$axis (VMA)

In all ellipses, $a^2 > b^2$. You can use this information to determine the orientation of the major axis from the values given in the equation. If a^2 is the denominator of the x term, the major axis is parallel to the x-axis. If a^2 is the denominator of the y term, the major axis is parallel to the y-axis. The **vertices** of the ellipse are the endpoints of the major axis. The **covertices** are the endpoints of the minor axis.

1. Graph $\frac{x^2}{9}+\frac{y^2}{4}=1$

center: (0,0) HMA

$a^2=9$, $a=3$ ⇄

$b^2=4$, $b=2$ ↑↓

$(0\pm3,0)$

vertices: (3,0), (−3,0)

covertices: (0,2), (0,−2)

$(0,0\pm2)$

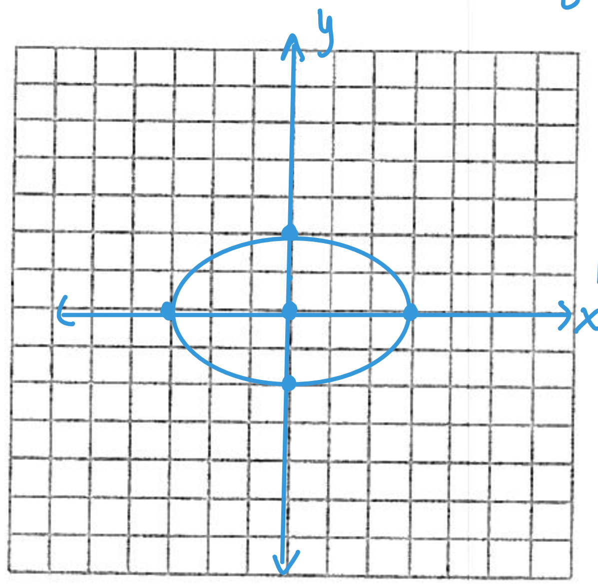
$c^2=a^2-b^2$

$c^2=9-4$

$c^2=5$

$c=\sqrt{5}$ ⇄

foci: $(0\pm\sqrt{5},\ 0)$

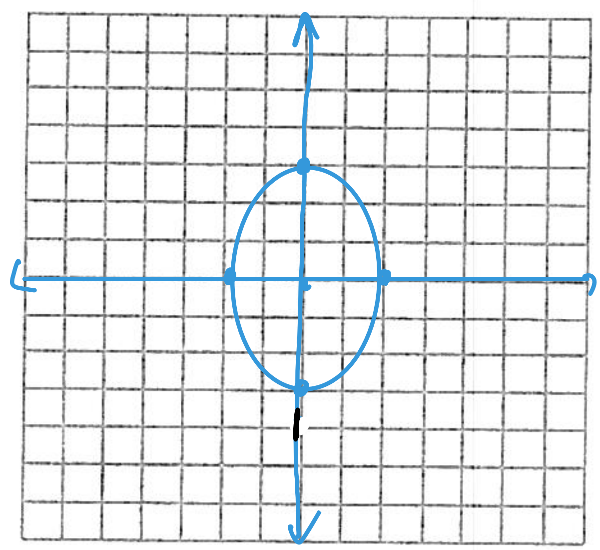


2. Graph $\frac{y^2}{9}+\frac{x^2}{4}=1$

center: (0,0) VMA

$a^2=9$, $a=3$ ↑↓

$b^2=4$, $b=2$ ⇄



vertices: $(0,0\pm3)$

(0,3), (0,−3)

covertices: $(0\pm2,0)$

$c^2=9-4$

$c=\sqrt{5}$ ↑↓

foci: $(0,\ 0\pm\sqrt{5})$

$(0,\ \pm\sqrt{5})$

3. Graph $\frac{(x-4)^2}{121}+\frac{(y+5)^2}{64}=1$

HMA

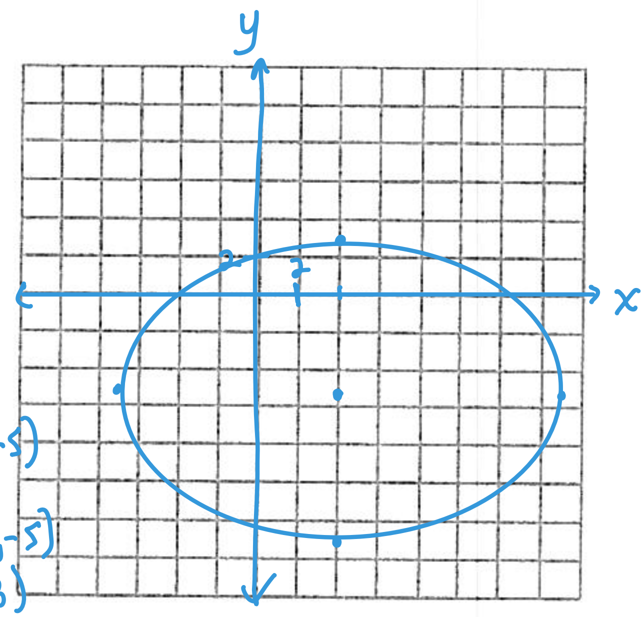
center: $(4,-5)$

$a^2=121,\ a=11 \rightleftarrows$

$b^2=64,\ b=8\ \uparrow\downarrow$

$c^2=121-64=57$

$c=\sqrt{57} \rightleftarrows$



vertices: $(4\pm 11,-5)$ < $(15,-5)$ $(-7,-5)$

covertices: $(4,-5\pm 8)$ < $(4,3)$ $(4,-13)$

foci: $(4\pm\sqrt{57},-5)$

4. Graph $\frac{(y+2)^2}{25}+\frac{(x-3)^2}{16}=1$

vmA

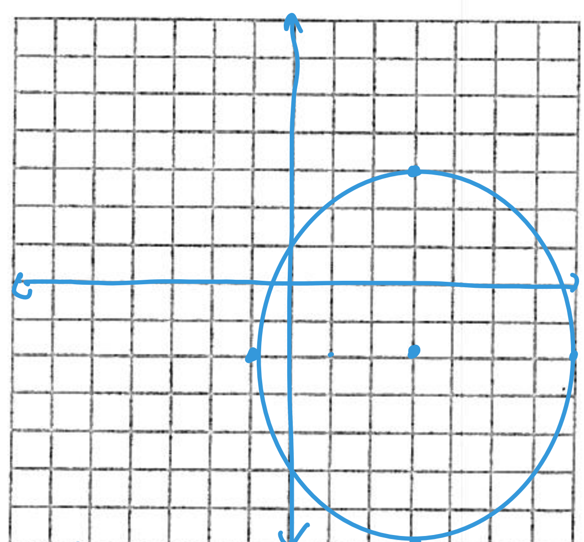
Center: $(3,-2)$

$a^2=25,\ a=5\ \uparrow\downarrow$

$b^2=16,\ b=4 \rightleftarrows$

$c^2=25-16=9$

$c=3\ \uparrow\downarrow$



vertices: $(3,-2\pm 5)$ < $(3,-7)$ $(3,3)$

covertices: $(3\pm 4,-2)$ < $(-1,-2)$ $(7,-2)$

foci: $(3,-2\pm 3)$ < $(3,-5)$ $(3,1)$

Homework 04-16

Name: Key Date: ____________

PC: Circle Practice Ms. Loughran

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

1) $8x + x^2 - 2y = 64 - y^2$

$(x+4)^2 + (y-1)^2 = 81$

2) $137 + 6y = -y^2 - x^2 - 24x$

$(x+12)^2 + (y+3)^2 = 16$

3) $x^2 + y^2 + 14x - 12y + 4 = 0$

$(x+7)^2 + (y-6)^2 = 81$

4) $y^2 + 2x + x^2 = 24y - 120$

$(x+1)^2 + (y-12)^2 = 25$

5) $x^2 + 2x + y^2 = 55 + 10y$

$(x+1)^2 + (y-5)^2 = 81$

6) $8x + 32y + y^2 = -263 - x^2$

$(x+4)^2 + (y+16)^2 = 9$

7) Center: $(-11, -8)$
Radius: 4

$(x+11)^2 + (y+8)^2 = 16$

8) Center: $(-6, -15)$
Radius: $\sqrt{5}$

$(x+6)^2 + (y+15)^2 = 5$

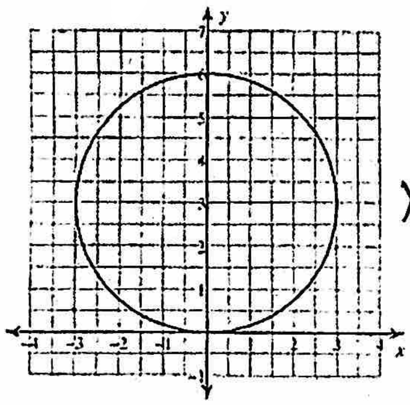
9) Center: $(2, -5)$
Point on Circle: $(-7, -1)$

$(x-2)^2 + (y+5)^2 = 97$

10) Center: $(14, 17)$
Point on Circle: $(15, 17)$

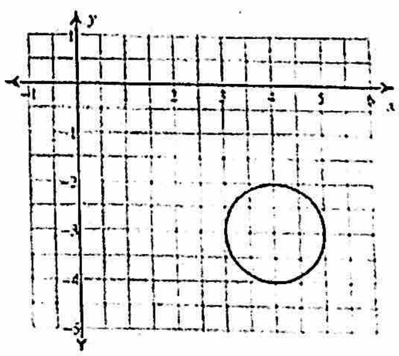
$(x-14)^2 + (y-17)^2 = 1$

11)



$x^2 + (y-3)^2 = 9$

12)



* careful here
notice scale
2 boxes = 1 unit

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

13) Ends of a diameter: $(-17, -9)$ and $(-19, -9)$

$(x+18)^2 + (y+9)^2 = 1$

14) Ends of a diameter: $(-3, 11)$ and $(3, -13)$

$x^2 + (y+1)^2 = 153$

15) Center: $(-15, 3\sqrt{7})$
Area: 2π

$(x+15)^2 + (y-3\sqrt{7})^2 = 2$

16) Center: $(-11, -14)$
Area: 16π

$(x+11)^2 + (y+14)^2 = 16$

17) Center: $(-5, 12)$
Circumference: 8π

$(x+5)^2 + (y-12)^2 = 16$

18) Center: $(15, 14)$
Circumference: $2\pi\sqrt{15}$

$(x-15)^2 + (y-14)^2 = 15$