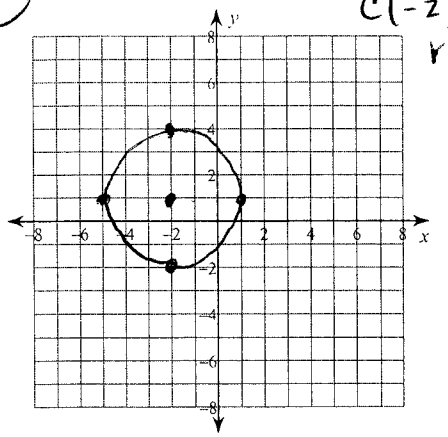
Circles

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

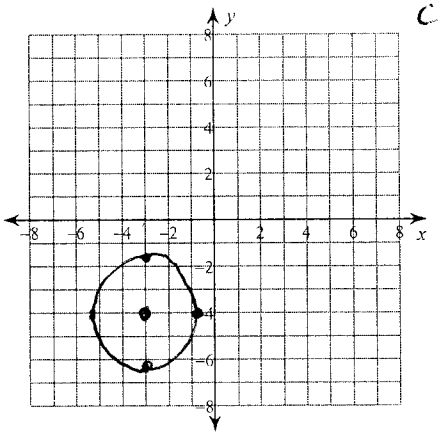
1) $(x+2)^2 + (y-1)^2 = 9$

$C(-2,1)$
$r = 3$



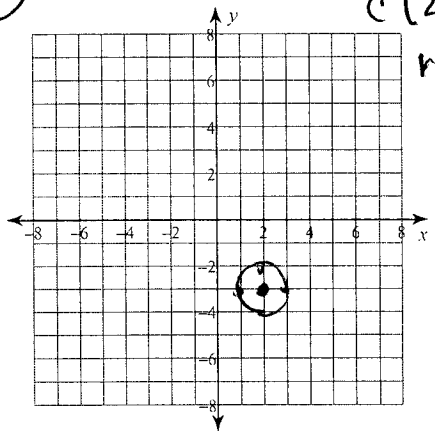
2) $(x+3)^2 + (y+4)^2 = 5$

$C(-3,-4)$
$r = \sqrt{5}$



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

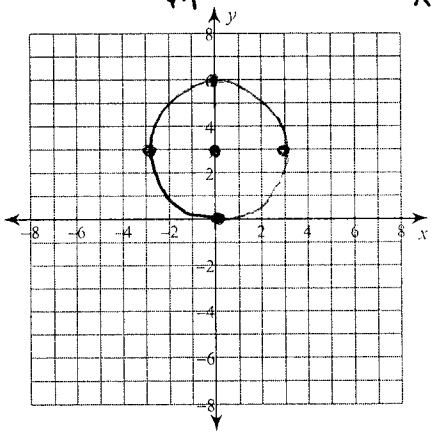
$C(2,-3)$
$r = 1$



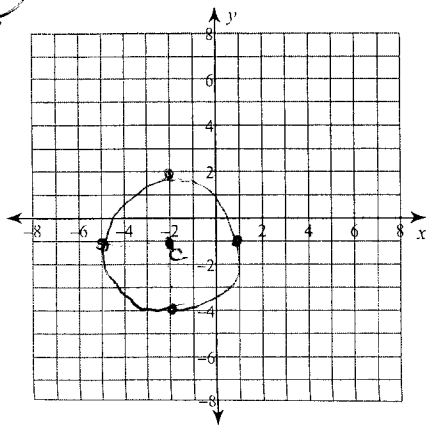
4) $x^2 + y^2 - 6y = 0$
$\quad\quad\quad +9 \quad +9$

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

$C(0,3)$
$r = 3$



5) $x^2 + y^2 + 4x + 2y - 4 = 0$



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

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

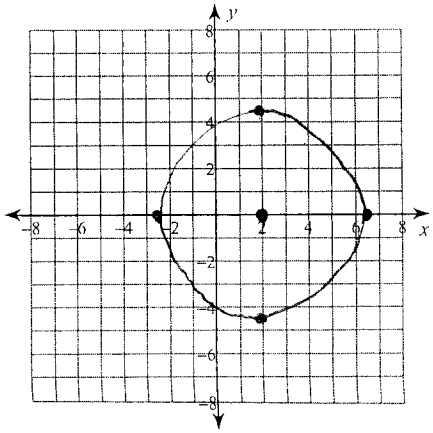
$C(-2,-1) \quad r = 3$

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

$x^2 - 4x + 4 + y^2 = 14 + 4$

$(x-2)^2 + y^2 = 18$

$C(2,0)$
$r = \sqrt{18} = 3\sqrt{2}$



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

7) Center: $(-13, -14)$
Radius: 1

$(x+13)^2 + (y+14)^2 = 1$

8) Center: $(15, -8)$
Area: 16π

$\pi r^2 = 16\pi$
$r^2 = 16$
$r = 4$

$(x-15)^2 + (y+8)^2 = 16$

9) Center: $(-2, 9)$
Point on Circle: $(-5, 18)$

$(x+2)^2 + (y-9)^2 = r^2$
$(-5+2)^2 + (18-9)^2 = r^2$
$9 + 81 = r^2$
$90 = r^2$
$(x+2)^2 + (y-9)^2 = 90$

10) Center: $(13, 7)$
Tangent to $y = 11 \Rightarrow r = 4$

$(x-13)^2 + (y-7)^2 = 16$

11) Center lies in the second quadrant
Tangent to $x = -14$, $y = -4$, and $x = 8$

$c(-3, -4)$ $r = 11$

$(x+3)^2 + (y+4)^2 = 121$

12) Ends of a diameter: $(11, -6)$ and $(1, 14)$

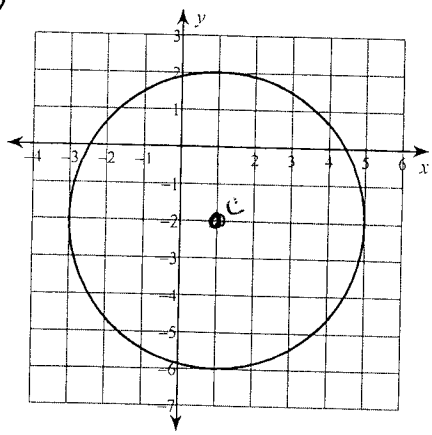
midpt: $\left(\frac{11+1}{2}, \frac{-6+14}{2}\right) = (6, 4)$ center

distance: $\sqrt{(11-1)^2 + (-6-14)^2} = \sqrt{500} = 10\sqrt{5}$
diam $= 10\sqrt{5} \Rightarrow$ rad $= 5\sqrt{5}$

$(x-6)^2 + (y-4)^2 = 125$

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

13)



$c(1, -2)$
$r = 4$

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

$x^2 - 2x + 1 + y^2 + 4y + 4 = 16$

$x^2 + y^2 - 2x + 4y - 11 = 0$ general conic form

14) Three points on the circle:
$(7, -4)$, $(-3, -4)$, and $(6, -7)$

$c(2, -4)$ $r = 5$

$(x-2)^2 + (y+4)^2 = 25$

$x^2 - 4x + 4 + y^2 + 8y + 16 = 25$

$x^2 + y^2 - 4x + 8y - 5 = 0$

evens

Pre-Calculus Worksheet

Conic Sections – Ellipses

I. Find the requested information for each ellipse. Graph *COMPLETELY*.

1. $\frac{x^2}{36}+\frac{y^2}{16}=1$

$c^2 = 36-16$
$c^2 = 20$
$c = \sqrt{20} = 2\sqrt{5}$

$e = \frac{c}{a} = \frac{2\sqrt{5}}{6} = \frac{\sqrt{5}}{3}$

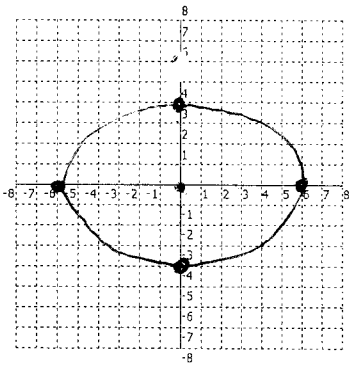
Center: (0 , 0)

Major Axis Endpoints: (-6 , 0) and (6 , 0)

Minor Axis Endpoints: (0 , 4) and (0 , -4)

Foci: ($2\sqrt{5}$, 0) and ($-2\sqrt{5}$, 0)

Eccentricity ≈ .745



2. $x = 7\cos T$
$y = 8\sin T$

Center: (_____ , _____)

Major Axis Endpoints: (_____ , _____) and (_____ , _____)

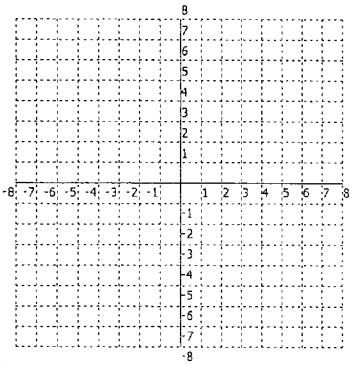
Minor Axis Endpoints: (_____ , _____) and (_____ , _____)

Foci: (_____ , _____) and (_____ , _____)

Eccentricity ≈ _____

Standard Form of the Ellipse:

_____



3. $16x^2+9y^2=144$

Center: (_____ , _____)

Major Axis Endpoints: (_____ , _____) and (_____ , _____)

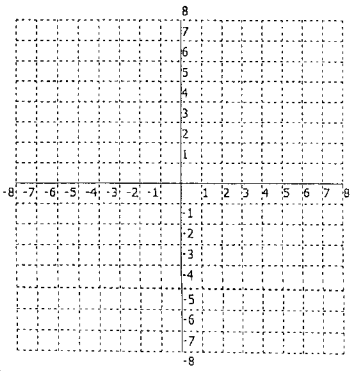
Minor Axis Endpoints: (_____ , _____) and (_____ , _____)

Foci: (_____ , _____) and (_____ , _____)

Eccentricity ≈ _____

Parametric Form of the Ellipse:

$x =$ _____ and $y =$ _____



4. $\frac{(x-2)^2}{16}+\frac{(y-3)^2}{9}=1$

$c^2 = 16-9$

$c^2 = 7$

$c = \sqrt{7}$

$e = \frac{c}{a} = \frac{\sqrt{7}}{4}$

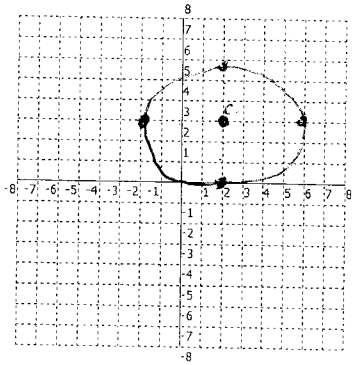
Center: (2 , 3)

Major Axis Endpoints: (−2 , 3) and (6 , 3)

Minor Axis Endpoints: (2 , 0) and (2 , 6)

Foci: ($2-\sqrt{7}$, 3) and ($2+\sqrt{7}$, 3)

Eccentricity ≈ .661



5. $x = 2\cos T - 3$
$y = 4\sin T + 5$

Center: (_____ , _____)

Major Axis Endpoints: (_____ , _____) and (_____ , _____)

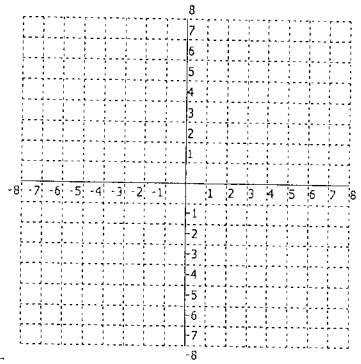
Minor Axis Endpoints: (_____ , _____) and (_____ , _____)

Foci: (_____ , _____) and (_____ , _____)

Eccentricity ≈ _____

Standard Form of the Ellipse:

_____



6. $x^2+9y^2+4x+18y+4=0$

$x^2+4x \quad +9y^2+18y \quad = -4$

$x^2+4x+4 \quad +9(y^2+2y+1) = -4+4+9$

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

$\frac{9}{9}$

Standard Form of the Ellipse:

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

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

$c^2 = 9-1$

$c^2 = 8$

$c = \sqrt{8} = 2\sqrt{2}$

$e = \frac{c}{a} = \frac{2\sqrt{2}}{3}$

Center: (−2 , −1)

Major Axis Endpoints: (−5 , −1) and (1 , −1)

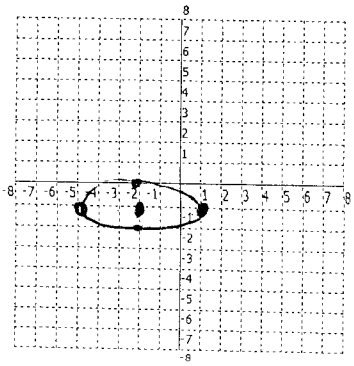
Minor Axis Endpoints: (−2 , 0) and (−2 , −2)

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

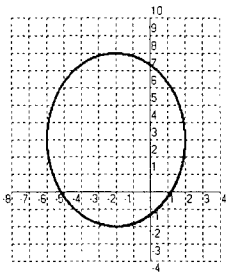
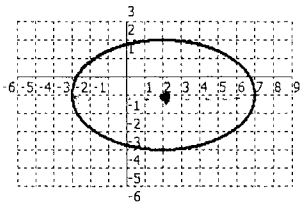
Eccentricity ≈ .943

Parametric Form of the Ellipse:

$x =$ _____ and $y =$ _____



II. Write the equation of each ellipse in the requested form.

7. Foci $(\pm 4,0)$; length of the major axis is 12; parametric form	8. Foci $(1,7)$ and $(1,-3)$; length of the minor axis is 8; standard form $C(1,2)$ $2b=8$ $b=4$ $b^2=16$ $c^2=a^2-b^2$ $5^2=a^2-16$ $41=a^2$ $\frac{(x-1)^2}{16}+\frac{(y-2)^2}{41}=1$
9. Foci $(2,5)$ and $(2,1)$; Sum of the focal radii is $2\sqrt{13}$; standard form	10. Major Axis Endpoints $(-16,4)$ and $(4,4)$; Minor Axis Endpoints $(-6,-4)$ and $(-6,12)$; ~~parametric~~ standard form $C(-6,4)$ $2a=20$ $a=10$ $a^2=100$ $2b=16$ $b=8$ $b^2=64$ $\frac{(x+6)^2}{100}+\frac{(y-4)^2}{64}=1$
11. Sum of the focal radii is 18; Minor Axis Endpoints $(0,\pm 6\sqrt{2})$; standard form	12. One Major Axis Endpoint $(-7,-9)$; center $(-7,6)$; one foci $(-7,15)$; ~~parametric~~ standard form $c^2=a^2-b^2$ $81=225-b^2$ $b^2=144$ $\frac{(x+7)^2}{144}+\frac{(y-6)^2}{225}=1$
13. in standard form 	14. in ~~parametric~~ standard form  $C(2,-1)$ $\frac{(x-2)^2}{25}+\frac{(y+1)^2}{9}=1$

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