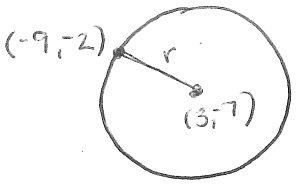
Precalculus
Conic Sections Review

Name Key

Write the equation of the conic section that meets each set of criteria:

1. A circle whose center is at the point (3, -7) and contains the point (-9, -2).



$r = \sqrt{(-9-3)^2 + (-2+7)^2}$

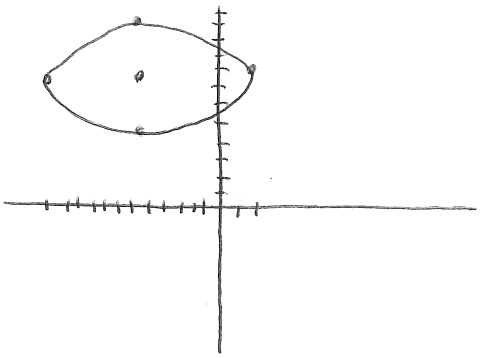
$r = \sqrt{144 + 25}$

$r = \sqrt{169}$

$r = 13$

$(x-3)^2 + (y+7)^2 = 169$

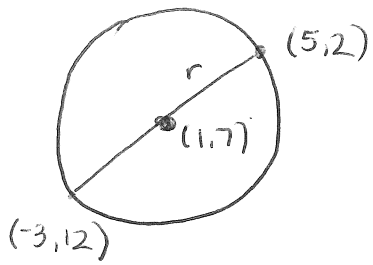
2. An ellipse whose center is at the point (-5, 8), the length of its minor axis is 8 and the length of its horizontal axis is 14.



$a = 7$
$b = 4$

$\frac{(x+5)^2}{49} + \frac{(y-8)^2}{16} = 1$

3. Circle with a diameter whose endpoints are (-3, 12) and (5, 2).



center: $\left(\frac{5+-3}{2}, \frac{12+2}{2}\right)$

$(1, 7)$

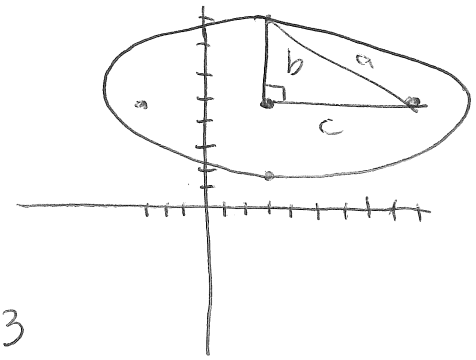
$r = \sqrt{(5-1)^2 + (2-7)^2}$

$r = \sqrt{16 + 25}$

$r = \sqrt{41}$

$(x-1)^2 + (y-7)^2 = 41$

4. An ellipse whose center is at (3, 5), the length of the vertical minor axis is 6 and the foci are at the points (9, 5) and (-3, 5).



$$\frac{(x-3)^2}{45} + \frac{(y-5)^2}{9} = 1$$

$b = 3$

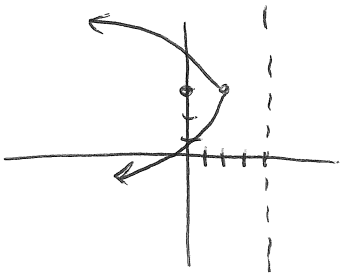
$c = 6$

$3^2 + 6^2 = a^2$

$9 + 36 = a^2$

$45 = a^2$

5. A parabola whose vertex is (2, 3) and whose directrix is the line x = 4.

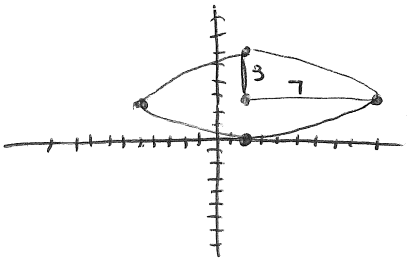


$$(y-3)^2 = 4p(x-2)$$

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

$$(y-3)^2 = -8(x-2)$$

6. An ellipse whose vertices are at (9, 3), (-5, 3), (2, 6), (2, 0).



$$\frac{(x-2)^2}{49} + \frac{(y-3)^2}{9} = 1$$

center:
(2, 3)

$a = 7$

$b = 3$

9. $x^2+y^2+6x-10y=-30$

circle

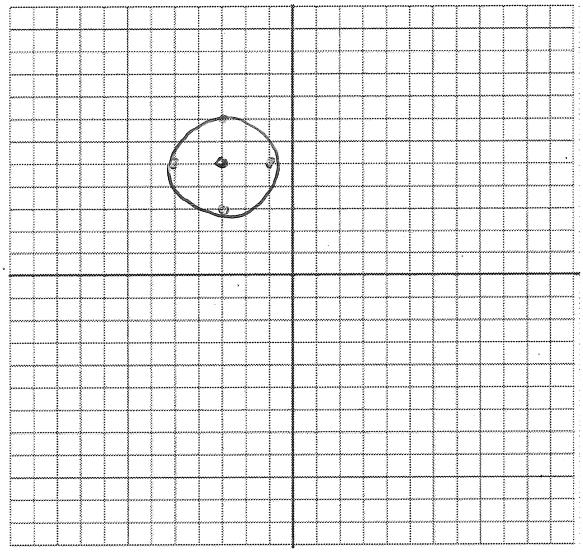
$x^2+6x+y^2-10y=-30$

$x^2+6x+\underline{9}+y^2-10y+\underline{25}=-30+\underline{9}+\underline{25}$

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

center:
$(-3,5)$

radius = 2



10. $\frac{(x-2)^2}{36}+\frac{(y-5)^2}{9}=1$

ellipse

center:
$(2,5)$

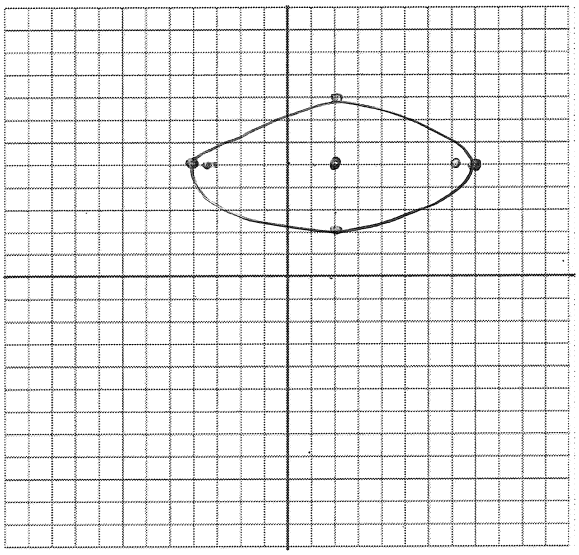
$a=6$

$b=3$

$3^2+c^2=6^2$

$c=\sqrt{27}$

foci:
$(2+\sqrt{27},5)$
$(2-\sqrt{27},5)$



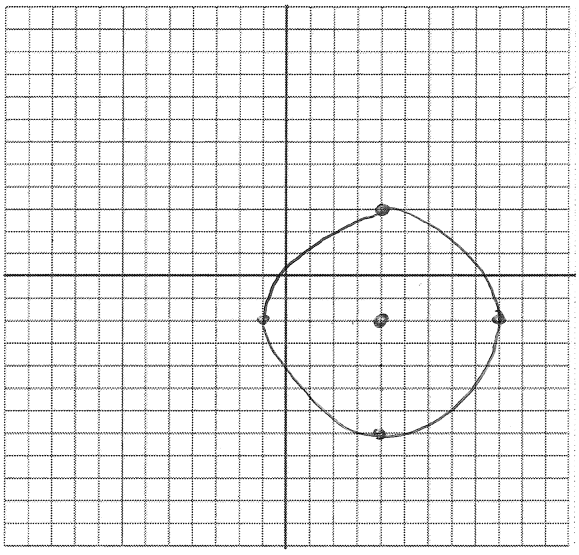
Graph the following equations. State all key information related to the conic section.

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

circle

center:
(4, -2)

radius = 5



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

hyperbola

center:
(-1, 3)

$a=5$

$b=2$

$5^2+2^2=c^2$

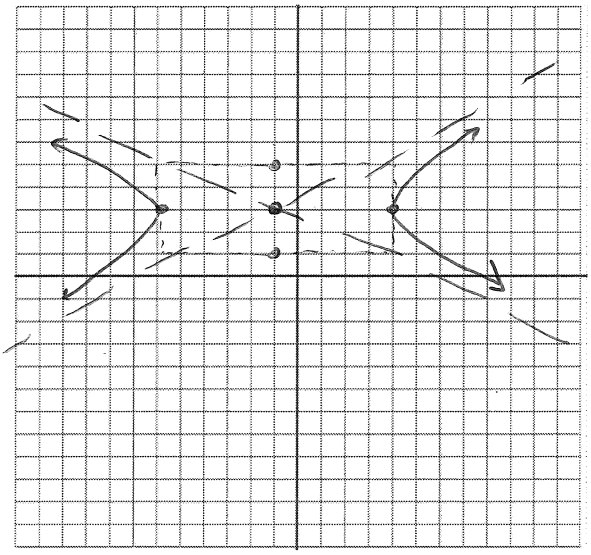
$29=c^2$

$c=\sqrt{29}$

foci:
$(-1+\sqrt{29}, 3)$
$(-1-\sqrt{29}, 3)$

asymptotes

$y=3\pm\frac{2}{5}(x+1)$



11. $\frac{(x+4)^2}{49}+\frac{(y-3)^2}{25}=1$

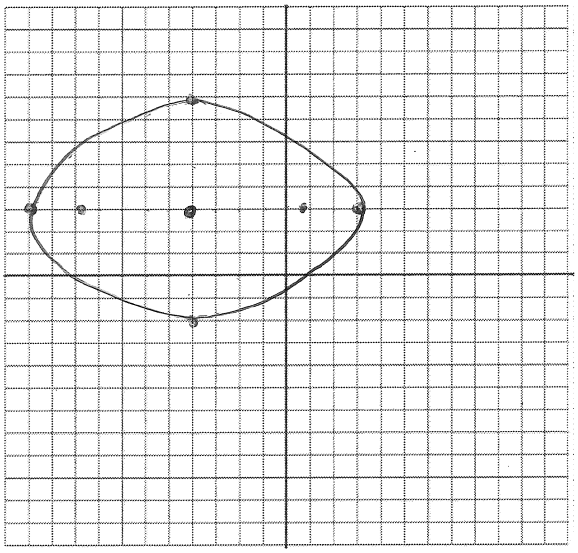
ellipse

$a=7$
$b=5$

center:
$(-4,3)$

$5^2+c^2=7^2$
$c^2=24$
$c=\sqrt{24}$

foci:
$(-4+\sqrt{24},3)$
$(-4-\sqrt{24},3)$



12. $\frac{(y-2)^2}{25}-\frac{(x-5)^2}{4}=1$

hyperbola

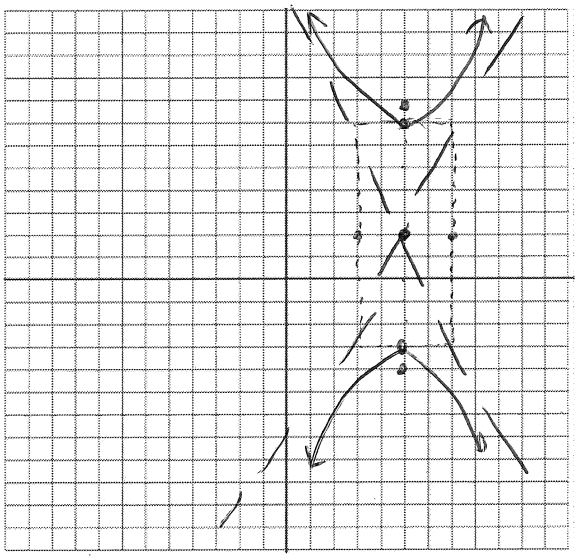
center:
$(5,2)$

$a=5$
$b=2$

$5^2+2^2=c^2$
$29=c^2$
$c=\sqrt{29}$

foci:
$(5,2+\sqrt{29})$
$(5,2-\sqrt{29})$

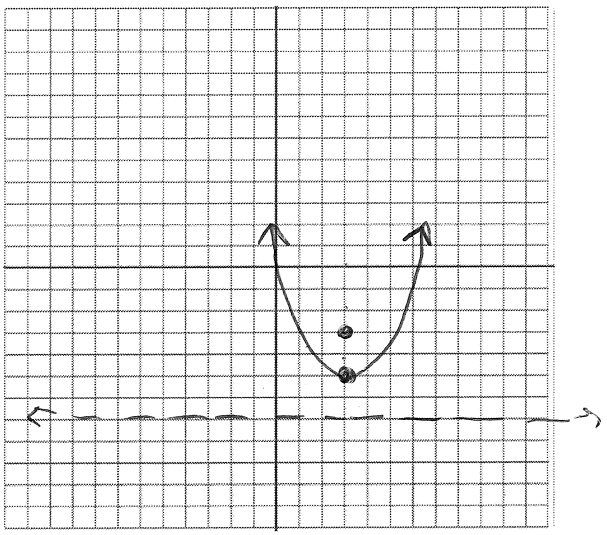
asymptotes:
$y=2\pm\frac{5}{2}(x-5)$



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

parabola

vertex:
$(3,-5)$
$p=2$

directrix:
$y=-7$

focus
$(3,-3)$