Secondary Math 2 Honors

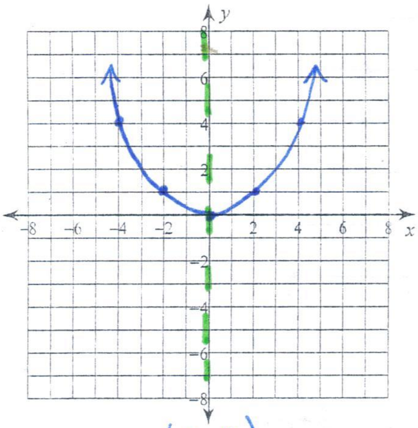
Name KEY!

Conic Sections Review

Date________________ Period____

Graph each equation and identify the following features.

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



Vertex: (0,0)

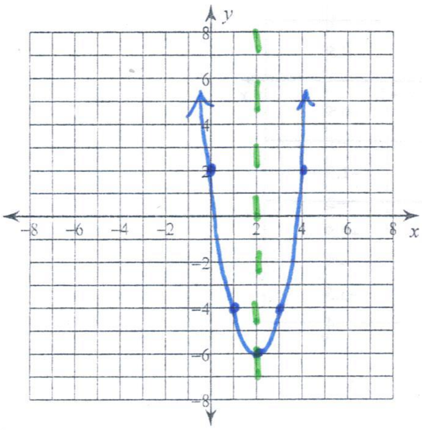
[✓ Min] or Max

Axis of Symmetry: X=0

Domain: (-∞,∞)

Range: [0,∞)

2) $y = 2(x-2)^2 - 6$



Vertex: (2,-6)

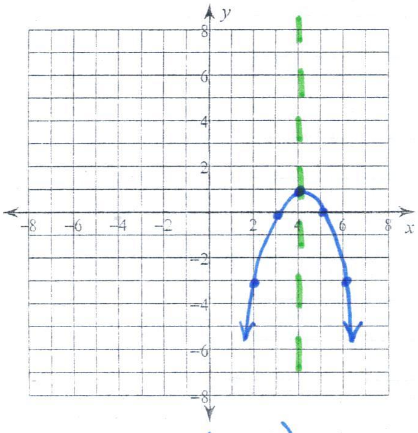
[✓ Min] or Max

Axis of Symmetry: X=2

Domain: (-∞,∞)

Range: [-6,∞)

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



Vertex: (4,1)

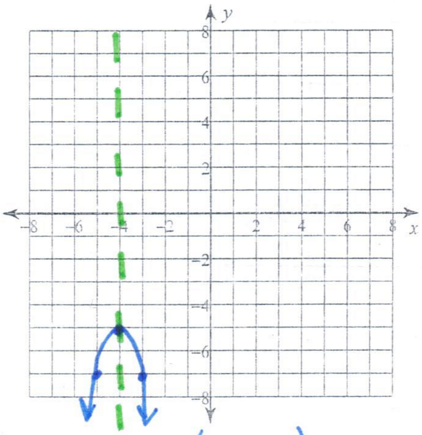
Min or [✓ Max]

Axis of Symmetry: X=4

Domain: (-∞,∞)

Range: (-∞,1]

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



Vertex: (-4,-5)

Min or [✓ Max]

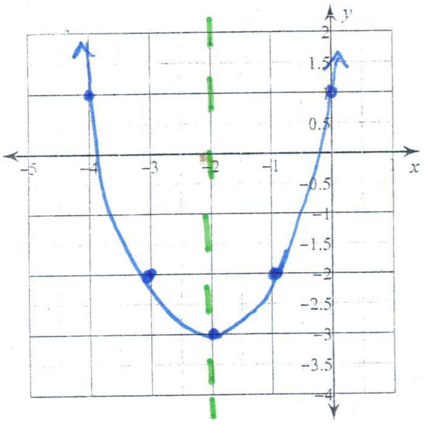
Axis of Symmetry: X=-4

Domain: (-∞,∞)

Range: (-∞,-5]

Sketch the graph of each function. Identify the vertex and the axis of symmetry. Then change the equation to standard form.

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

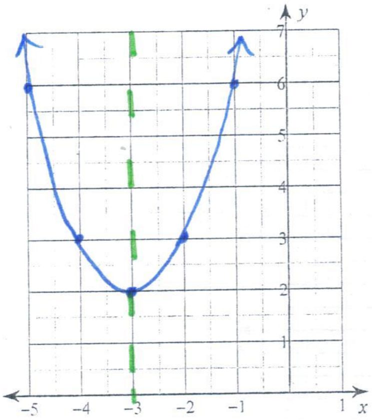


Vertex: $(-2,-3)$

Axis of Symmetry: $x=-2$

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

6) $y=(x+3)^2+2$ $x^2+6x+9+2$



Vertex: $(-3,2)$

Axis of Symmetry: $x=-3$

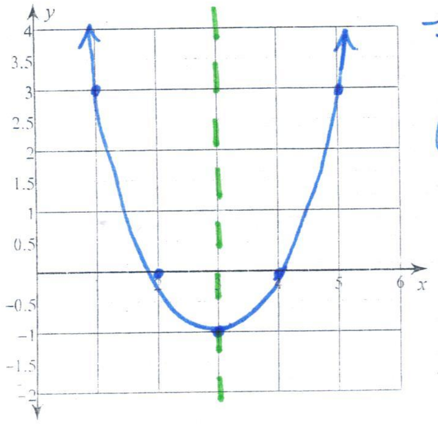
Standard: $y=x^2+6x+11$

Change the equation to vertex form. Sketch the graph. Identify the vertex and the axis of symmetry.

7) $y=x^2-6x+8$ $x^2-6x+\underline{9}+8-\underline{9}$

$-\frac{6}{2}=(-3)^2$

$(x-3)^2-1$



Vertex Form: $y=(x-3)^2-1$

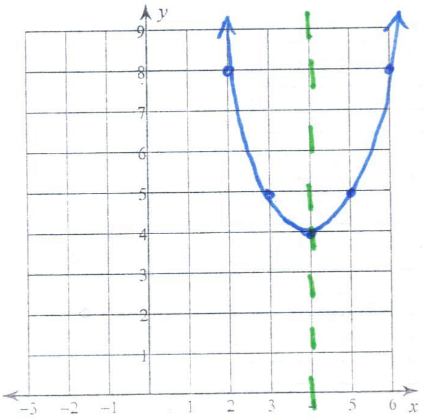
Vertex: $(3,-1)$

Axis of Symmetry: $x=3$

8) $y=x^2-8x+20$ $x^2-8x+\underline{16}+20-\underline{16}$

$-\frac{8}{2}=(-4)^2$

$(x-4)^2+4$



Vertex Form: $y=(x-4)^2+4$

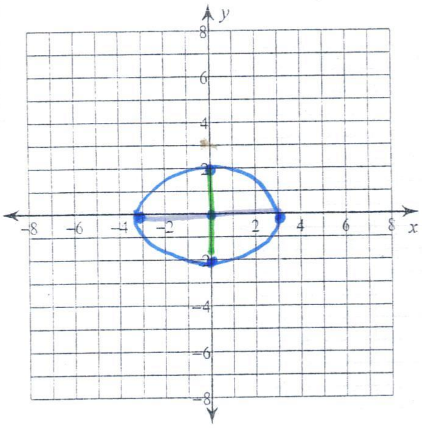
Vertex: $(4,4)$

Axis of Symmetry: $x=4$

(c) (v) (F)

Identify the center, vertices, foci, length of the major axis, and length of the minor axis of each. Then sketch the graph.

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



$c^2 = 9 - 4$

$c = \pm\sqrt{5}$

C: $(0,0)$

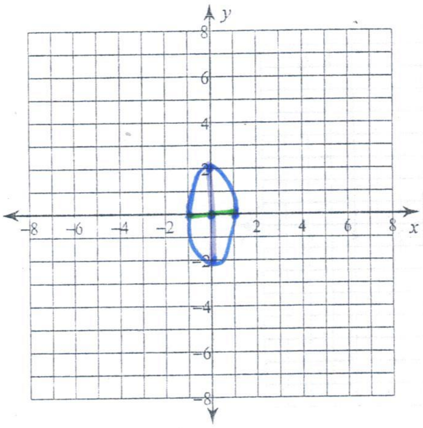
V: $(-3,0)$ & $(3,0)$

F: $(-\sqrt{5},0)$ & $(\sqrt{5},0)$

Major: 6 units

Minor: 4 units

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



$c^2 = 4 - 1$

$c = \pm\sqrt{3}$

C: $(0,0)$

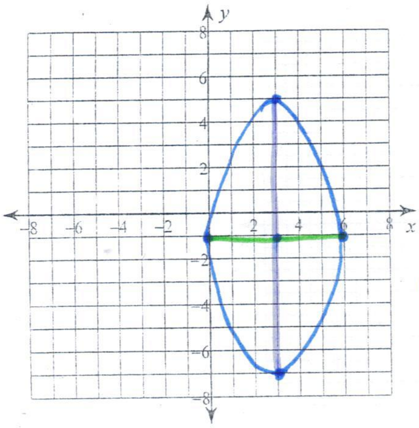
V: $(0,2)$ & $(0,-2)$

F: $(0,\sqrt{3})$ & $(0,-\sqrt{3})$

Major: 4 units

Minor: 2 units

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



$c^2 = 36 - 9$

$c = \pm\sqrt{27}$

C: $(3,-1)$

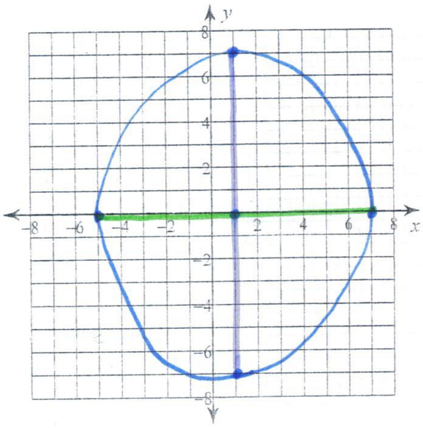
V: $(3,5)$ & $(3,-7)$

F: $(3,-1+\sqrt{27})$ & $(3,-1-\sqrt{27})$

Major: 12 units

Minor: 6 units

12) $\frac{(x-1)^2}{36} + \frac{y^2}{49} = 1$



$c^2 = 49 - 36$

$c = \pm\sqrt{13}$

C: $(1,0)$

V: $(1,7)$ & $(1,-7)$

F: $(1,\sqrt{13})$ & $(1,-\sqrt{13})$

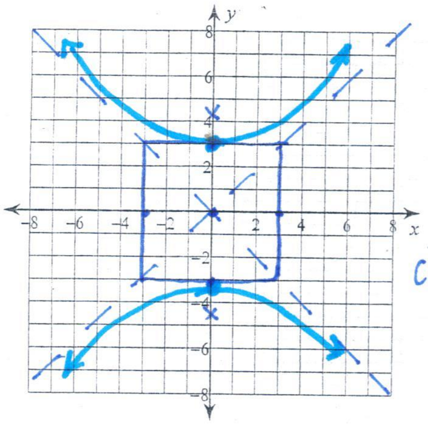
Major: 14 units

Minor: 12 units

(V) (F) (TA) (CA)

Identify the vertices, foci, length of the transverse axis, and length of the conjugate axis of each. Then sketch the graph.

13) $\frac{y^2}{9} - \frac{x^2}{9} = 1$ c = (0,0)



opens upward & downward

$c^2 = 9+9$

$c = \pm\sqrt{18}$

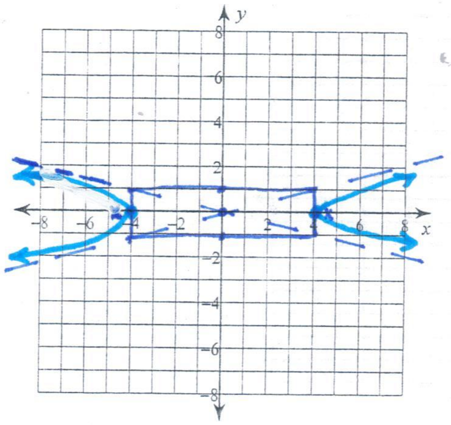
V: (0,3) & (0,-3)

F: $(0,\sqrt{18})$ & $(0,-\sqrt{18})$

TA: 6 units

CA: 6 units

14) $\frac{x^2}{16} - y^2 = 1$ c = (0,0)



opens L/R

TA = 2a = 2(4)

CA = 2b = 2(1)

$c^2 = 16+1$

$c = \pm\sqrt{17}$

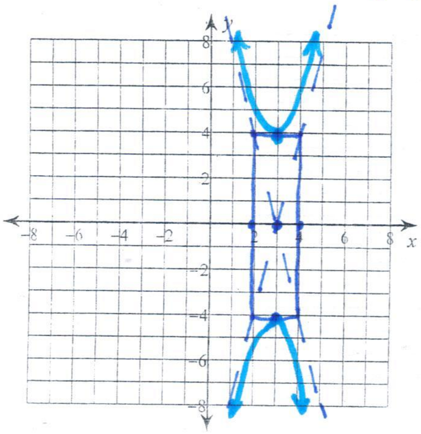
V: (-4,0) & (4,0)

F: $(\sqrt{17},0)$ & $(-\sqrt{17},0)$

TA: 8 units

CA: 2 units

15) $\frac{y^2}{16} - (x-3)^2 = 1$ c = (3,0)



opens up/down

$c^2 = 16+1$

$c = \pm\sqrt{17}$

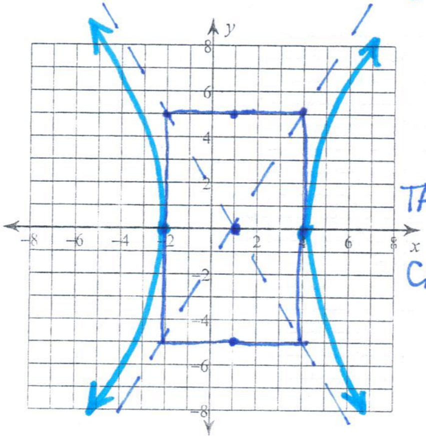
V: (3,4) & (3,-4)

F: $(3,\sqrt{17})$ & $(3,-\sqrt{17})$

TA: 8 units

CA: 2 units

16) $\frac{(x-1)^2}{9} - \frac{y^2}{25} = 1$ c = (1,0)



opens L/R

TA = 2a = 2(3)

CA = 2b = 2(5)

$c^2 = 9+25$

$c = \pm\sqrt{34}$

V: (4,0) & (-2,0)

F: $(1+\sqrt{34},0)$ & $(1-\sqrt{34},0)$

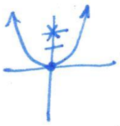
TA: 6 units

CA: 10 units

Write the equation of the parabola with vertex at the origin and the given focus.

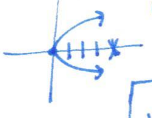
17) Focus at (0,2)

$C=2$ $a=\left|\frac{1}{4c}\right|=\frac{1}{4(2)}=\frac{1}{8}$



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

18) Focus at (4,0)



$C=4$ $a=\frac{1}{4(4)}=\frac{1}{16}$

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

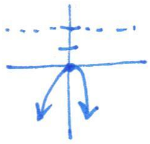
19) Focus at (-8,0)

$C=-8$ $a=\frac{1}{4(-8)}=\frac{-1}{32}$

$\boxed{x=\frac{-1}{32}y^2}$

Write the equation of the parabola with vertex at the origin and the given directrix.

20) Directrix $y=2$

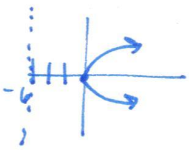


$C=-2$

$a=\frac{-1}{8}$

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

21) Directrix $x=-6$

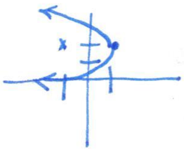


$C=6$ $a=\frac{1}{4(6)}=\frac{1}{24}$

$\boxed{x=\frac{1}{24}y^2}$

Write the equation of the parabola with the given vertex and focus.

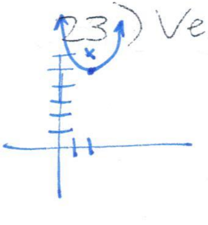
22) Vertex (1,2); Focus (-1,2)



$C=-2$ $a=\frac{-1}{8}$

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

23) Vertex (2,5); Focus (2,6)

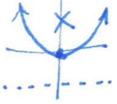


$C=1$ $a=\frac{1}{4}$

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

Find the vertex, focus, and directrix of each parabola.

24) $y=\frac{1}{20}x^2$



$a=\frac{1}{20}$ $C=\left|\frac{1}{4a}\right|=\left|\frac{1}{4(1/20)}\right|$

$C=5$

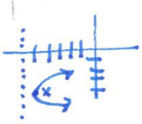
$\boxed{\begin{array}{l}\text{vertex: }(0,0)\\ \text{focus: }(0,5)\end{array}}$

$\boxed{\text{directrix: } y=-5}$

25) $x=y^2-8y+11$

$x=y^2-8y+\underline{16}+11-\underline{16}$

$\frac{-8}{2}=(-4)^2$ $x=(y-4)^2-5$



$a=1$ $C=\left|\frac{1}{4(1)}\right|=\frac{1}{4}=.25$

$\boxed{\begin{array}{l}\text{vertex: }(-5,-4)\\ \text{focus: }(-4.75,-4)\end{array}}$

$\boxed{\text{directrix: } x=-5.25}$

Find the center and radius of each circle.

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

center: $(3,4)$

radius: 2

27) $x^2+(y+8)^2=49$

center: $(0,-8)$

radius: 7

28) $(x+4)^2+y^2=8$

center: $(-4,0)$

radius: $\sqrt{8}$ or $2\sqrt{2}$

Use the given information to write the equation of the circle.

29) Radius: 4
Center: (1,3)

$(x-1)^2+(y-3)^2=16$

30) Radius: 1
Center: (-1,5)

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

31) Center: (1,-2)
Area: 4π

$\downarrow$

πr^2

$\pi r^2=4\pi$

$r=2$

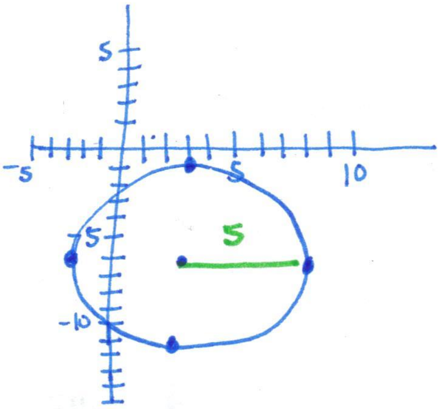
$(x-1)^2+(y+2)^2=4$

Sketch the graph of the circle.

32) $(x-3)^2+(y+6)^2=25$

center: $(3,-6)$

radius: 5



33) $x^2+y^2-6x+14y=6$

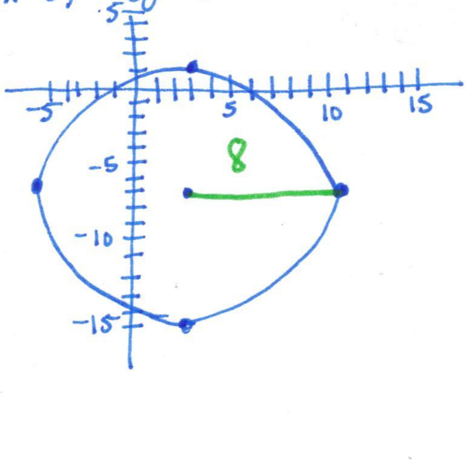
$x^2-6x+\underline{9}+y^2+14y+\underline{49}=6+\underline{9}+\underline{49}$

$\frac{-6}{2}=(-3)^2$ $\frac{+14}{2}=(+7)^2$

$(x-3)^2+(y+7)^2=64$

center: $(3,-7)$

radius: 8



Secondary Math 2 Honors

Name______________________________

Review of Previous Material

Date__________________ Period____

Solve each equation by taking square roots.

1) $3a^2 + 4 = -8$

$-4 \quad -4$

$\frac{3a^2}{3} = \frac{-12}{3}$

$\sqrt{a^2} = \sqrt{-4}$

$\boxed{a = \pm 2i}$

2) $6x^2 - 5 = -37$

$+5 \quad +5$

$\frac{6x^2}{6} = \frac{-32}{6}$

$\sqrt{x^2} = \sqrt{\frac{-16}{3}}$

$\boxed{x = \frac{\pm 4i}{\sqrt{3}}}$

Solve each equation by factoring.

3) $v^2 - 8v + 12 = 0$

$(v-6)(v-2) = 0$

$\boxed{v = 6, 2}$

4) $n^2 - 2n - 15 = 0$

$(n-5)(n+3) = 0$

$\boxed{n = 5, -3}$

Solve each equation by completing the square.

5) $a^2 + 2a - 41 = 7$

$a^2 + 2a + \underline{1} = 48 + \underline{1}$

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

$\sqrt{(a+1)^2} = \sqrt{49}$

$a + 1 = \pm 7$

$-1 \quad -1$

$a = 7 - 1 = \boxed{6}$

$a = -7 - 1 = \boxed{-8}$

6) $p^2 - 14p + 20 = -9$

$p^2 - 14p + \underline{49} = -29 + \underline{49}$

$\frac{-14}{2} = (-7)^2$

$\sqrt{(p-7)^2} = \sqrt{20}$

$p - 7 = \pm\sqrt{20}$

$\boxed{p = 7 \pm \sqrt{20}}$

Find the discriminant of each quadratic equation then state the number and type of solutions.

7) $-7a^2 - a - 4 = 0$ → $b^2 - 4ac$

$a = -7$

$b = -1$

$c = -4$

$(-1)^2 - 4(-7)(-4)$

$1 - 112 = \boxed{-111}$

$\boxed{\therefore \text{2 imaginary roots}}$

8) $3n^2 - 6n + 3 = 0$

$a = 3$

$b = -6$

$c = 3$

$(-6)^2 - 4(3)(3)$

$36 - 36 = \boxed{0}$

$\boxed{\therefore \text{1 Real Root}}$

Solve each equation with the quadratic formula.

9) $4b^2 + 2b - 42 = 0$

$a = 4$

$b = 2$

$c = -42$

$x = \frac{-2 \pm \sqrt{\overset{4+672}{(2)^2 - 4(4)(-42)}}}{2(4)}$

$x = \frac{-2 \pm \sqrt{676}}{8} = \frac{-2 \pm 26}{8}$

$\frac{-2+26}{8} = \boxed{3}$

$\frac{-2-26}{8} = \boxed{\frac{-7}{2}}$

10) $5a^2 + 2a - 51 = 0$

$a = 5$

$b = 2$

$c = -51$

$x = \frac{-2 \pm \sqrt{\overset{4+1020}{(2)^2 - 4(5)(-51)}}}{2(5)}$

$x = \frac{-2 \pm \sqrt{1024}}{10} = \frac{-2 \pm 32}{10}$

$\frac{-2+32}{10} = \boxed{3}$

$\frac{-2-32}{10} = \boxed{\frac{-17}{5}}$