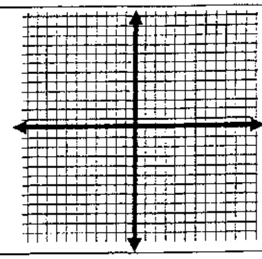
Pre-Calculus Honors Conics Review Sections 8.1-8.3

All work must be shown on a separate sheet of paper. Place answers on this sheet in the appropriate location.

Given: $x^2 - 4x + 6y + 10 = 0$

1. Type of conic. parabola
2. Standard form. $(x-2)^2 = -6(y+1)$
3. Vertex. $(2,-1)$
4. Focus. $(2, -\frac{5}{2})$
5. Directrix. $y = \frac{1}{2}$

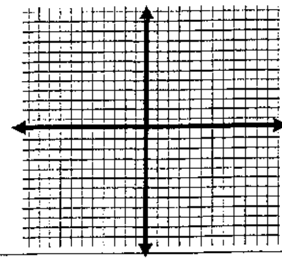
6. Graph. see work



Given: $-4x^2 + 8x + 6y^2 + 48y + 56 = 0$

7. Type of conic. hyperbola
8. Center. $(1,-4)$
9. Vertices. $(1, -4 \pm \sqrt{6})$
10. Foci. $(1, -4 \pm \sqrt{15})$
11. Asymptotes. $y+4 = \pm \frac{\sqrt{6}}{3}(x-1)$

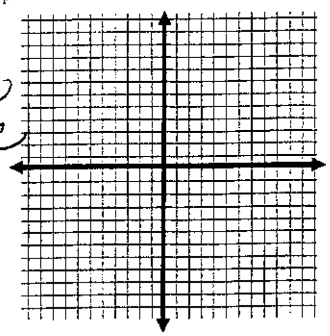
12. Graph. see work



Given: $4x^2 + 16x + y^2 + 6y = -9$

13. Type of conic. ellipse
14. Center. $(-2,-3)$
15. Vertices. $(-2,1)$ $(-2,-7)$
16. Co-Vertices $(0,-3)$ $(-4,-3)$
17. Foci. $(-2, -3 \pm 2\sqrt{3})$
18. Eccentricity.
19. Length of Minor Axis. 4
20. Length of Major Axis. 8

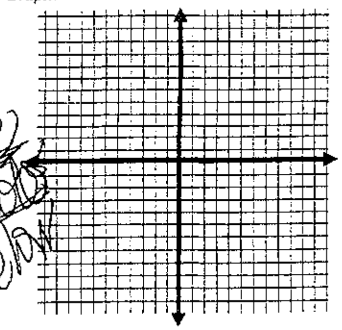
21. Graph. see work



Given: $3x^2 + 3y^2 - 12x = 0$

22. Type of conic. circle
23. Center. $(2,0)$
24. Vertices $(2,2)$ $(0,0)$ $(4,0)$
25. Co-Vertices $(2,-2)$
26. Foci. none
27. Eccentricity. 0
28. Length of Minor Axis. 4
29. Length of Major Axis. 4

30. Graph. see graph below



31. Find the standard form of the equation of the specified ellipse.
Center (2, -8), Vertex (8 , -8) and length of minor axis of length 4
$\frac{(x-2)^2}{36} + \frac{(y+8)^2}{4} = 1$

32. In a factory, parabolic mirror to be use in a search light was placed on the floor. It measure 50 centimeters tall and 60 centimeters wide. Find an equation of the parabola with its vertex at the origin. $x^2 = 18y$

33. A parabola opens up with a vertex at (1, -7) and an x-intercept of (4 , 0). Find the standard form equation of the parabola. $(x-1)^2 = \frac{9}{7}(y+7)$

34. A fireplace arch is to be constructed in the shape of a semiellipse. The opening is to have a height of 35 inches at the center and a width of 74 inches along the base. To sketch the outline of the fireplace, the contractor uses a 74-inch string tied to two thumbtacks. Where should the thumbtacks be placed? $(\pm 12, 0)$

35. Find the standard form of the equation of a hyperbola: Vertices: $(\pm 2, 0)$ Asymptotes: $\pm \frac{5}{2}x$
$\frac{x^2}{4} - \frac{y^2}{25} = 1$

36. Determine the type of conic.
A. $3x + 8y^2 - 10y - 6 = 0$ parabola
B. $33x^2 + 4x + 8y^2 - 12y = -9$ ellipse
C. $12x^2 + 2x + 3y = -5y^2 - 14$ ellipse
D. $6x^2 + 5x - 4 = -6y^2 + 3y$ circle

37. Find the standard form of the equation of an ellipse: co-vertices $(0, \pm 6)$ foci $(\pm 4, 0)$ $\frac{x^2}{52} + \frac{y^2}{36} = 1$

38. Find the standard form of the equation of a parabola: focus (5 , 4) and directrix y = -2 $(x-5)^2 = 12(y-1)$

39. Find the standard form of the equation of a hyperbola: Center (-3 , 3), Focus (-13 , 3), Vertex (-9 , 3)

$\frac{(x+3)^2}{36} - \frac{(y-3)^2}{64} = 1$

Key

see work below!

1. $x^2 - 4x = -6y - 10$

$x^2 - 4x + 4 = -6y - 10 + 4$

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

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

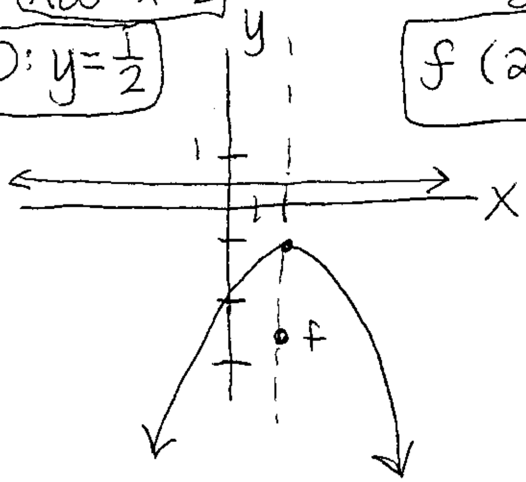
$\boxed{\text{parabola}}$ $\boxed{\text{down}}$

$\boxed{V(2,-1)}$ $4p = -6$

$p = -\frac{3}{2}$

$\boxed{\text{AOS: } x = 2}$ $\boxed{f\left(2, -\frac{5}{2}\right)}$

$\boxed{D: y = \frac{1}{2}}$



+. $-4x^2 + 8x + 6y^2 + 48y = -56$

$-4(x^2 - 2x + 1) + 6(y^2 + 8y + 16) = -56 - 4 + 96$

$-4(x-1)^2 + 6(y+4)^2 = 36$

$\frac{(x-1)^2}{-9} + \frac{(y+4)^2}{6} = 1$

$\boxed{\frac{(y+4)^2}{6} - \frac{(x-1)^2}{9} = 1}$

hyperbola

vertical

c: $(1,-4)$

$a^2 = 6$ $b^2 = 9$

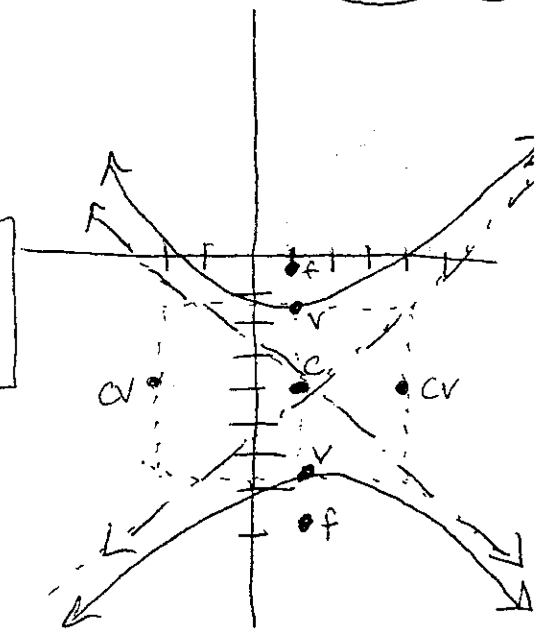
$a = \pm\sqrt{6}$ $b = \pm 3$

$\boxed{V(1, -4 \pm \sqrt{6})}$ $\boxed{CV(4,-4) \quad (-2,-4)}$ don't really exist!

$c^2 = 6 + 9$

$c = \pm\sqrt{15}$

$\boxed{f(1, -4 \pm \sqrt{15})}$



Asymptotes

$y - k = \pm \frac{a}{b}(x - h)$

$\boxed{y + 4 = \pm \frac{\sqrt{6}}{3}(x-1)}$

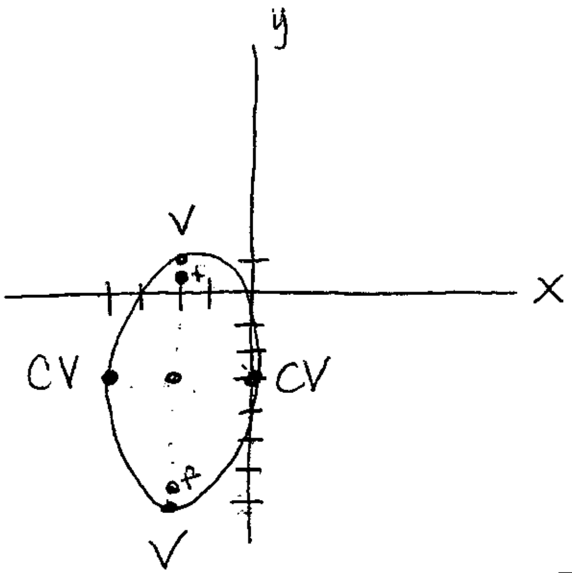
3) $4x^2+16x+y^2+6y=-9$

$4(x^2+4x+4)+y^2+6y+9=-9+16+9$

$4(x+2)^2+(y+3)^2=16$

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

ellipse vertical



$C(-2,-3)$

$a^2=16$; $b^2=4$

$a=\pm 4$; $b=\pm 2$

$\boxed{V(-2,1)\ (-2,-7)}$ $\boxed{CV(0,-3)\ (-4,-3)}$

$c^2=16-4$

$c^2=12$

$c=\pm 2\sqrt{3}$

$\boxed{f(-2,-3\pm 2\sqrt{3})}$

2a $\boxed{l_{major}=8}$

2b $\boxed{l_{minor}=4}$

22) $3x^2-12x+3y^2=0$

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

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

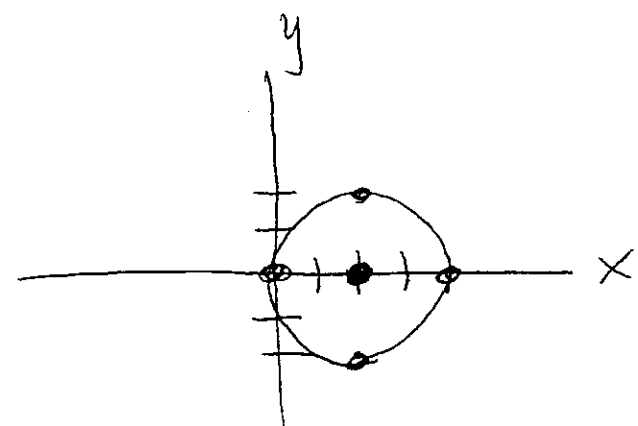
$$\boxed{\frac{(x-2)^2}{4}+\frac{(y-0)^2}{4}=1}$$

circle $\boxed{C(2,0)}$

V/CV: $(2,2)\ (2,-2)$
$(0,0)\ (4,0)$

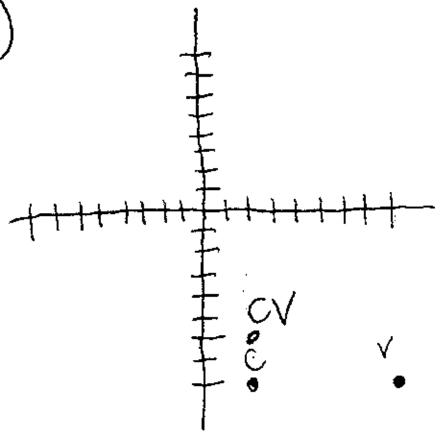
since radius $=2$

$l_{maj}=l_{minor}=4$



page 2

(31.)

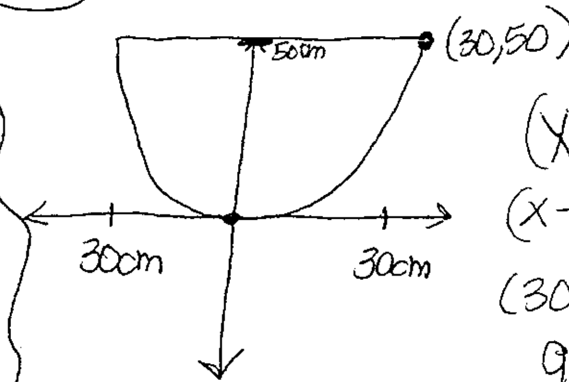


$a = 6$, $a^2 = 36$; $b = 2$, $b^2 = 4$

$$\frac{(x-2)^2}{36} + \frac{(y+8)^2}{4} = 1$$

1/2 of minor axis length = 2 ∴ b = 2

(32)



$(x-h)^2 = 4p(y-k)$

$(x-0)^2 = 4p(y-0)$

$(30-0)^2 = 4p(50)$

$900 = 4p(50)$

$900 = 200p$

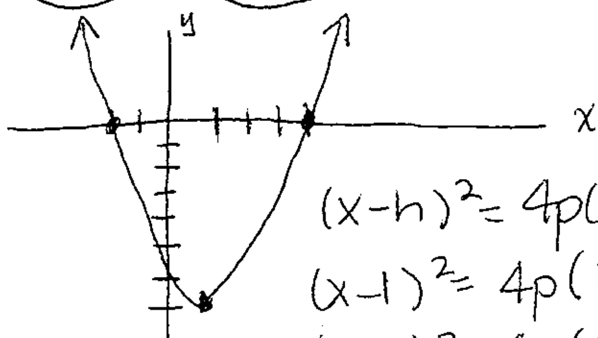
$p = \frac{9}{2}$

$(x-0)^2 = 4(\frac{9}{2})(y-0)$

$x^2 = 18(y-0)$

$x^2 = 18y$

(33)



subst. (4,0) for x & y

$(x-h)^2 = 4p(y-k)$

$(x-1)^2 = 4p(y+7)$

$(4-1)^2 = 4p(0+7)$

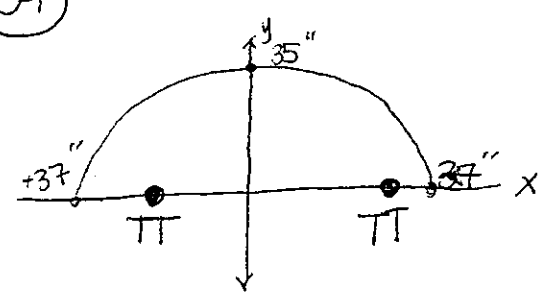
$9 = 4p(7)$

$p = \frac{9}{28}$

$(x-1)^2 = (\frac{9}{28})4(y+7)$

$$\boxed{(x-1)^2 = \frac{9}{7}(y+7)}$$

(34)



TT = thumb tack
they are placed at the foci.

$b = 35$, $b^2 = 1225$; $a = 37$, $a^2 = 1369$

$c^2 = 1369 - 1225$

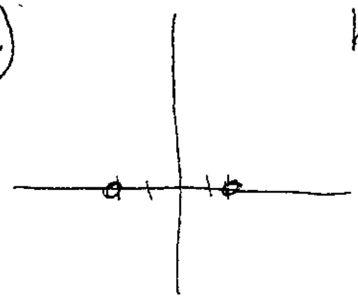
$c^2 = 144$

$c = \pm 12$

If. fireplace is placed w/ center @ origin, TT should be placed @ $\boxed{(\pm 12, 0)}$

page 3

35.



horizontal $\therefore$

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

"a" is a "run" $\therefore$ $m = \frac{b}{a} = \frac{5}{2}$

& $a = 2$ so $\frac{b}{2} = \frac{5}{2}$

$2b = 10$

$b = 5$

$\therefore$ $b^2 = 25$ & $a^2 = 4$ so

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

36. A. parabola (1 squared term)

B. ellipse (2 □, same sign, diff. coeff.)

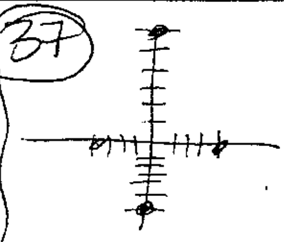
C. ellipse (same as above)

$12x^2 + 5y^2 + 2x + 3y + 14 = 0$

D. circle (2 □, same sign, same coeff.)

a hyperbola: 2 □, opp. signs.

37.



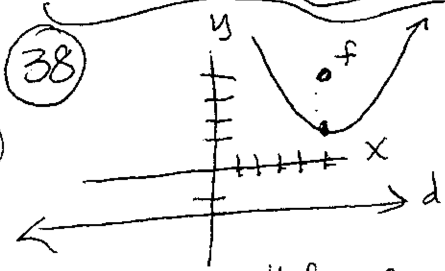
$b = 6$, $b^2 = 36$; $c = 4$, $c^2 = 16$; $a^2 = c^2 + b^2$, $a^2 = 36 + 16$, $a^2 = 52$

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

$16 = a^2 - 36$

$$\boxed{\frac{(x-0)^2}{52} + \frac{(y-0)^2}{36} = 1}$$

38.



vertex is "3" from f or d

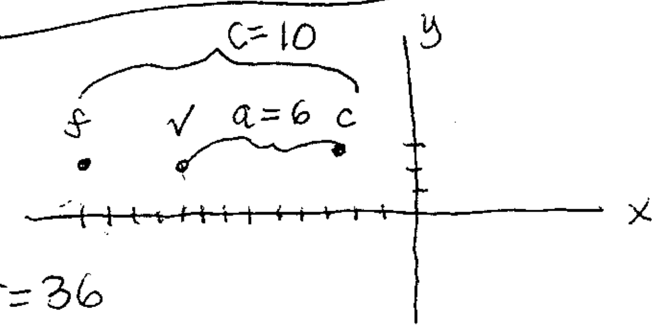
$p = \frac{6}{2} = 3$ opens up!

$(x-h)^2 = 4p(y-k$

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

$$\boxed{(x-5)^2 = 12(y-1)}$$

39.



$a^2 = 36$

$c^2 = 100$

$c^2 = a^2 + b^2$

$100 = 36 + b^2$

$b^2 = 64$

$$\boxed{\frac{(x+3)^2}{36} - \frac{(y-3)^2}{64} = 1}$$