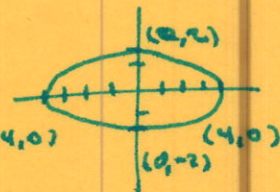


MAT 142 Homework #9 Key

1a. $\frac{x^2}{16} + \frac{y^2}{4} = 1$ $a=4, b=2$
 $c(0,0)$

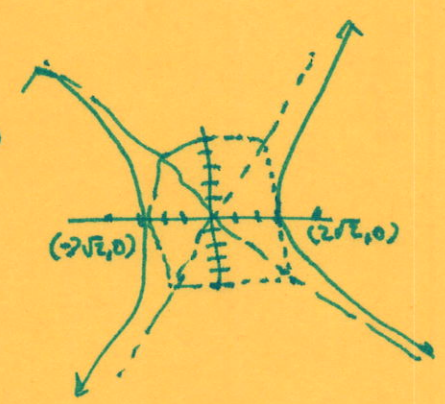
$16-4=12$ foci $(\pm\sqrt{3}, 0)$ $(-4, 0)$



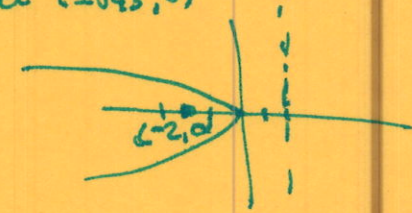
b. $\frac{x^2}{8} - \frac{y^2}{25} = 1$

$a=2\sqrt{2}$ $b=5$ $y = \pm \frac{5}{2\sqrt{2}}x$

$8+25=33$ foci $(\pm\sqrt{33}, 0)$



c. $y^2 = -8x$



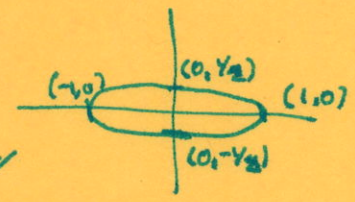
d. $x^2 = 1 - 4y^2$

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

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

$a=1$
 $b=1/2$
 $1 - 1/4 = 3/4$ $c = \sqrt{3}/2$

foci $(\pm\sqrt{3}/2, 0)$ $x=2$



e. $y = \pm\sqrt{x^2 - 3}$

$y^2 = x^2 - 3$

$y^2 - x^2 = -3$

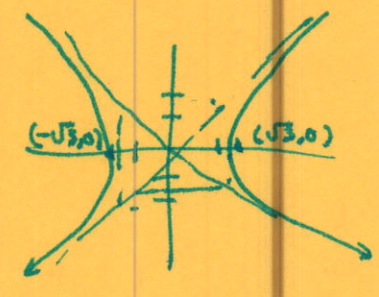
$x^2 - y^2 = 3$

$\frac{x^2}{3} - \frac{y^2}{3} = 1$

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

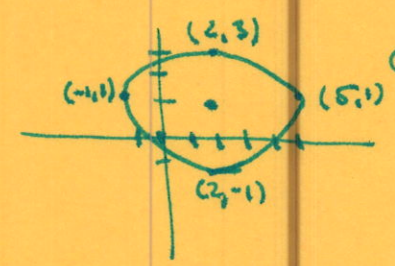
$y = \pm x$

$3+3=6$ foci $(\pm\sqrt{6}, 0)$



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

$a=3, b=2$ $9-4=5$



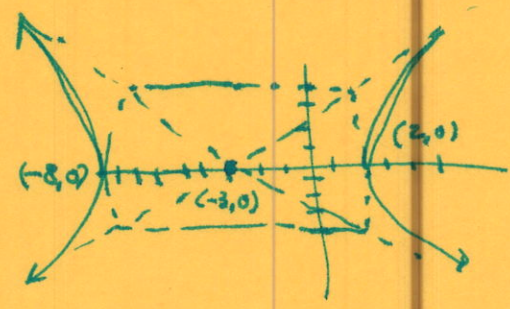
$c = (2, 1)$
 foci $(2 \pm \sqrt{5}, 1)$

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

$a=5, b=4$

$25+16=41$ $y = \pm \frac{4}{5}(x+3)$

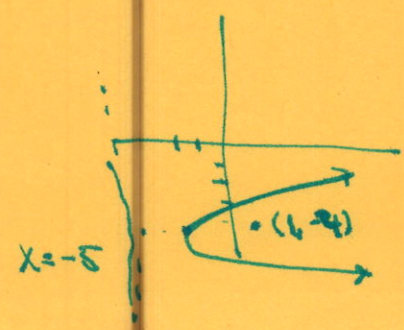
foci $(-3 \pm \sqrt{41}, 0)$



h. $(y+4)^2 = 12(x+2)$

Center $(-2, -4)$

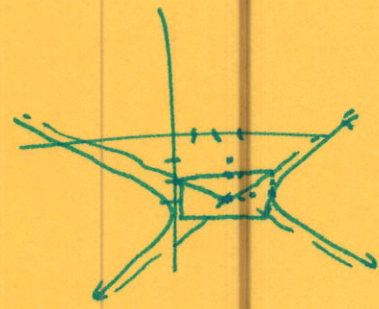
$a=3$



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

$\frac{(X-3)^2}{4} - (Y+3)^2 = 1$

$a=2, b=1$ $c=(3,-3)$
 $4+1=5$ $v(1,-3)(5,-3)$
 $f(3\pm\sqrt{5}, -3)$
 $y+3 = \pm\frac{1}{2}(x-3)$



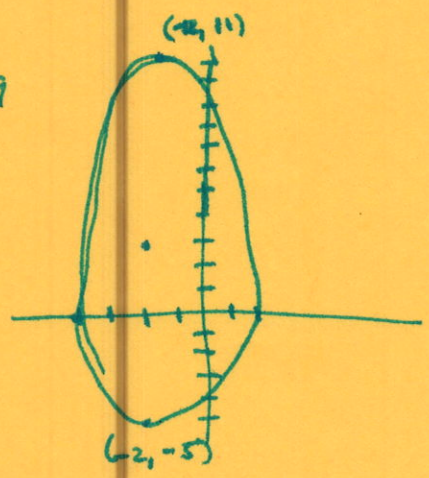
j. $4x^2 + y^2 + 16x - 6y - 39 = 0$

$4x^2 + y^2 + 16x - 6y = 39$
 $4x^2 + 16x + y^2 - 6y = 39$
 $4(x^2 + 4x + 4) + (y^2 - 6y + 9) = 39 + 16 + 9$

$\frac{4(x+2)^2}{64} + \frac{(y-3)^2}{64} = \frac{64}{64}$

$\frac{(x+2)^2}{16} + \frac{(y-3)^2}{64} = 1$

$a=8$ $c=(-2,3)$
 $b=4$ $f(-2, \pm 4\sqrt{3}+3)$
 $64-16=48$



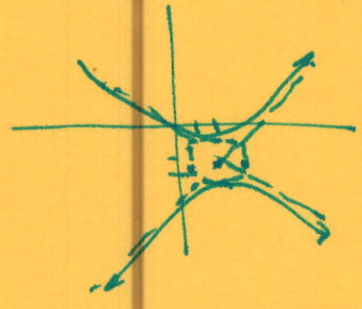
k. $9x^2 - 16y^2 - 36x - 64y + 116 = 0$

$9(x^2 - 4x + 4) - 16(y^2 + 4y + 4) = -116 + 36 + 64$

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

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

$1^2 + \frac{16}{9} = \frac{25}{9} \cdot c = \frac{5}{3}$ $c=(2,-2)$
 $a=1$
 $b=\frac{4}{3}$
 $v(2, -\frac{1}{3})(2, -\frac{5}{3})$
 focus $(2, -\frac{1}{3}), (2, -\frac{5}{3})$
 $y+2 = \pm\frac{3}{4}(x-2)$



l. $y^2 - 2y + 12x - 35 = 0$

$(y^2 - 2y + 1) = -12x + 35 + 1$

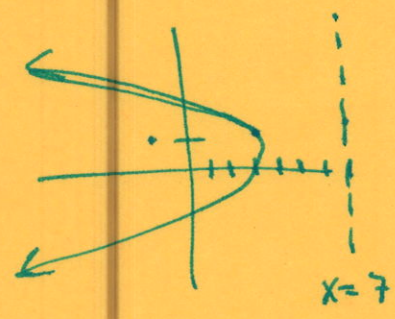
$(y-1)^2 = -12x + 36$

$(y-1)^2 = -12(x-3)$

$c = (3, 1)$

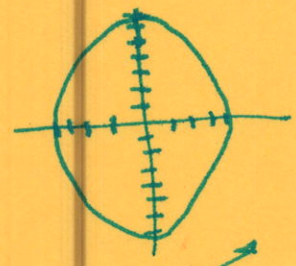
$a = 4$

focus $(-1, 1)$



m. $\frac{x^2}{16} + \frac{y^2}{49} = 1$ $a=7$ $c=(0,0)$
 $b=4$

$49-16=33$ $f(0, \pm\sqrt{33})$



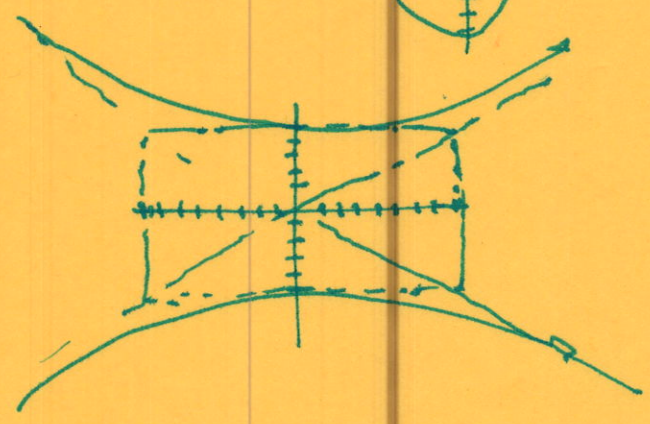
n. $\frac{y^2}{25} - \frac{x^2}{64} = 1$ $c=(0,0)$

$a=5, b=8$ $y = \pm \frac{5}{8}x$

$v(0, \pm 5)$

$64+25=89$

$f(0, \pm\sqrt{89})$

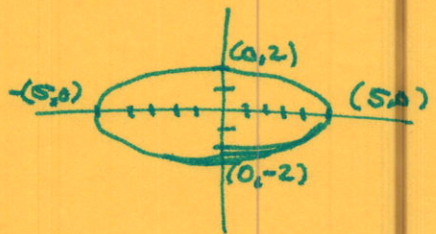


o. $\frac{4x^2}{100} + \frac{25y^2}{100} = \frac{100}{100}$

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

$a=5, b=2$ $f(\pm\sqrt{21}, 0)$

$c = \sqrt{21}$

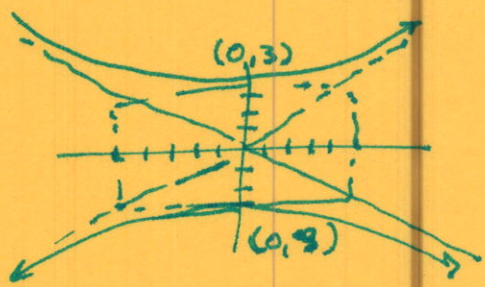


p. $\frac{9y^2}{225} - \frac{25x^2}{225} = \frac{225}{225}$

$\frac{y^2}{25} - \frac{x^2}{9} = 1$ $a=5$
 $b=3$

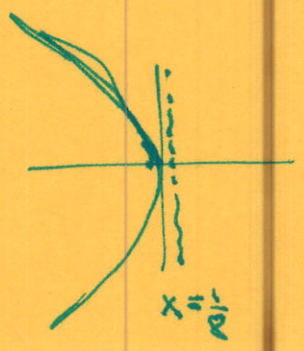
$y = \pm \frac{3}{5}x$

$25+9=34$ $f(0, \pm\sqrt{34})$

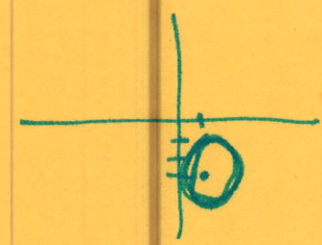


q. $\frac{8y^2}{8} = \frac{-4x}{8}$ $y^2 = -\frac{1}{2}x$
 $a = -\frac{1}{8}$

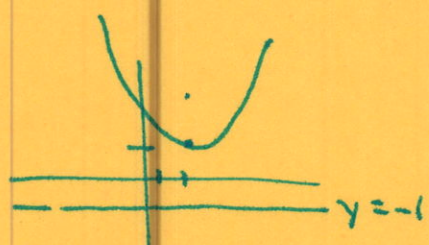
$f(\frac{1}{8}, 0)$



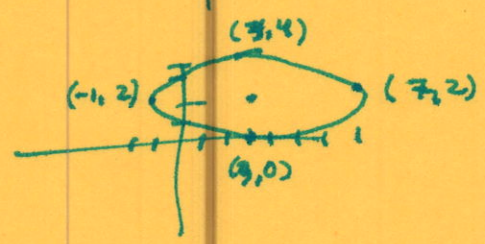
r. $\frac{(x-1)^2}{2} + \frac{(y+3)^2}{5} = 1$ $a = \sqrt{5}$
 $b = \sqrt{2}$
 $c(1, -3)$ $5+2=7$
 $c = \sqrt{7}$
 $v(1, -3 \pm \sqrt{5})$
 $mv(1 \pm \sqrt{2}, -3)$
 $f(1, -3 \pm \sqrt{3})$



s. $(x-2)^2 = 8(y-1)$
 $c(2, 1)$ $a=2$
 $f(4, 1)$



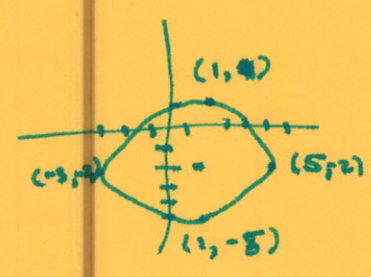
t. $\frac{(x-3)^2}{16} + \frac{4(y-2)^2}{16} = \frac{16}{16}$
 $\frac{(x-3)^2}{16} + \frac{(y-2)^2}{4} = 1$ $a=4$
 $b=2$ $c=2\sqrt{3}$
 $c(3, 2)$ $f(3 \pm 2\sqrt{3}, 2)$



u. $9x^2 + 16y^2 - 18x + 64y = 71$
 $9(x^2 - 2x + 1) + 16(y^2 + 4y - 4) = 71 + 9 - 64$

$\frac{9(x-1)^2}{144} + \frac{16(y+2)^2}{144} = 1$

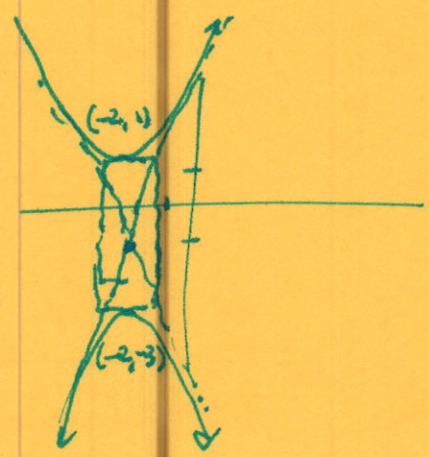
$\frac{(x-1)^2}{16} + \frac{(y+2)^2}{9} = 1$ $c(1, -2)$
 $a=4, b=3$
 $c = \sqrt{7}$ $f(1 \pm \sqrt{7}, -2)$



v. $16x^2 - y^2 + 64x - 2y = -67$
 $16(x^2 + 4x + 4) - (y^2 + 2y + 1) = -67 - 16 + 1$

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

$\frac{(y+1)^2}{4} - \frac{(x+2)^2}{1/4} = 1$
 $a=2, b=1/2$ $c = (-2, -1)$ $f(-2, -1 \pm \frac{\sqrt{5}}{2})$
 $c = \frac{\sqrt{5}}{2} = \frac{\sqrt{5}}{2}$ $y+1 = \pm 2(x+2)$



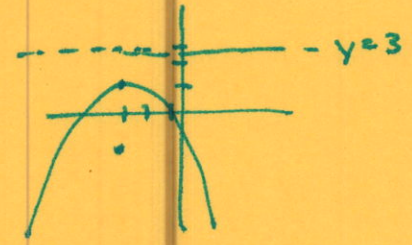
w. $x^2 + 6x + 8y + 1 = 0$

$(x^2 + 6x + 9) = -8y - 1 + 9$

$(x+3)^2 = -8(y-1)$ $c = (-3, 1)$

$a = 2$

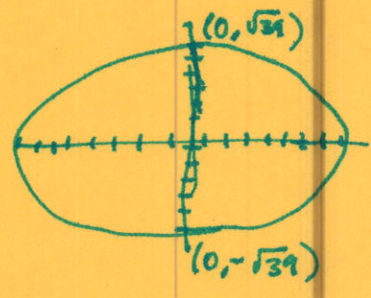
$f(-3, 1)$



2a. $c(0, 0)$

$c = 5$

$a = 8$ $64 - 25 = 39$



b. $\frac{x^2}{4} + \frac{y^2}{8} = 1$

$a = 2\sqrt{2}$

$c = 2$

$b = 2$



c. $a = 5$

$b = 2$

$25 - 4 = 21$

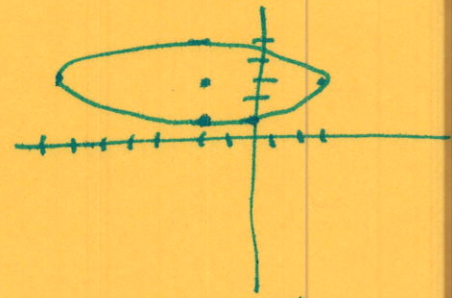
$c = \sqrt{21}$

$c(-2, 3)$

$v(-7, 3)$ $(3, 3)$

$ma(-2, 1)$ $(-2, 5)$

$f(-2 \pm \sqrt{21}, 3)$



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

d. $v(7, 9)$ $(7, 3)$

$a = 3$

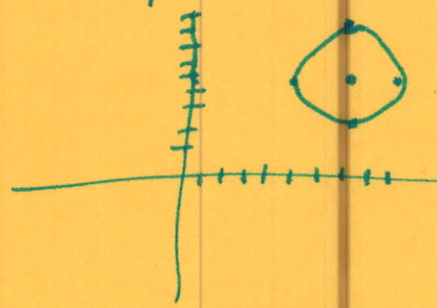
$c(7, 6)$

$ma(5, 6)$ $(9, 6)$

$b = 2$

$f(7 \pm \sqrt{5}, 6)$

$c = \sqrt{5}$



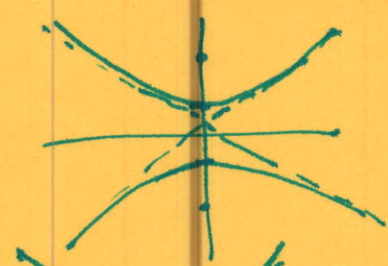
$\frac{(x-7)^2}{4} + \frac{(y-6)^2}{9} = 1$

e. $c = 3$ $a = 1$

$9 - 1 = 8$ $b = 2\sqrt{2}$

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

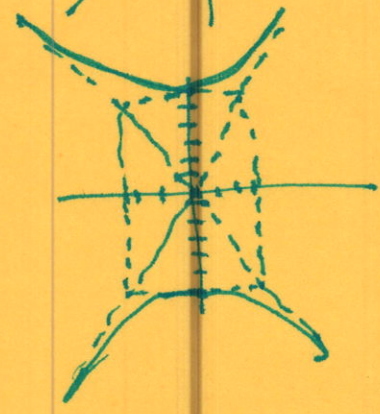
$y = \pm \frac{1}{2\sqrt{2}}(x)$



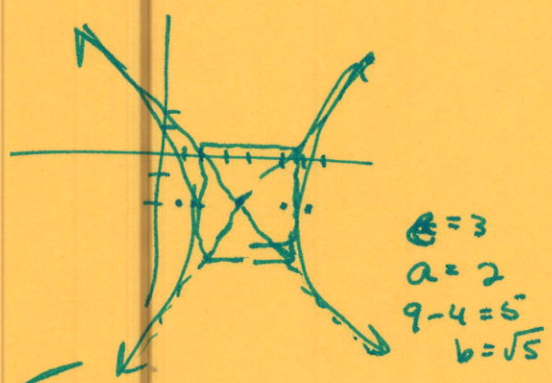
f. $a = 6$ $b = 3$

$36 + 9 = 45$ $c = 3\sqrt{5}$

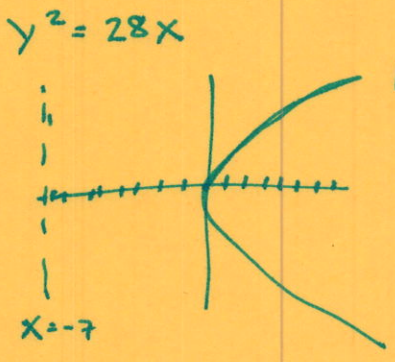
$\frac{y^2}{36} - \frac{x^2}{9} = 1$



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

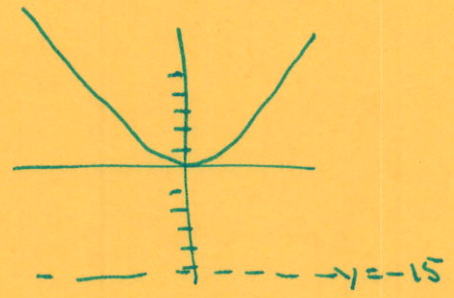


h. f=(7,0) c=(0,0) a=7

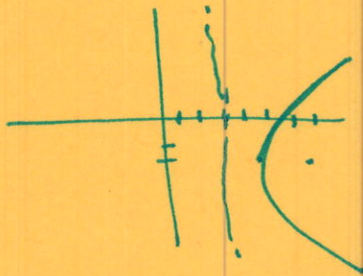


i. f(0,5), d: y=-15

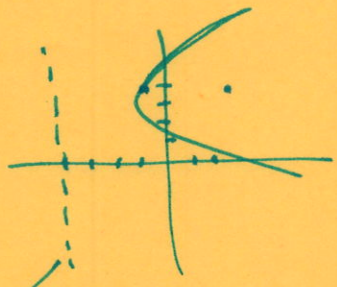
$x^2 = 60y$



j. v(5,-2), f(7,-2)
a=2 x=3 directrix

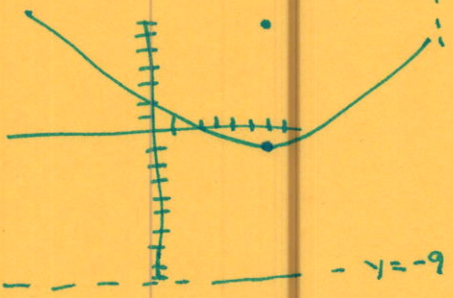


$(y+2)^2 = 8(x-5)$



k. f(2,4) directrix x=-4
c(-1,4) a=3

$(y-4)^2 = 12(x+1)$



l. f(7,7) y=-9
v(7,-1) a=8

$(x-7)^2 = 32(y+1)$

3.a. v(-1,2) f(-1,3) a=1

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

b. v(0,0) f(-2,0) a=2

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

3c. $a=t, b=5$

$$\frac{x^2}{16} - \frac{y^2}{25} = 1$$

d. $r=\sqrt{17} \quad (x-2)^2 + (y-3)^2 = 17$

e. $a=5, b=4$

$$\frac{x^2}{25} + \frac{y^2}{16} = 1$$

f. $c(-3,5) \quad a=5 \quad b=3$

$$\frac{(x+3)^2}{25} + \frac{(y-5)^2}{9} = 1$$

g. $a=3 \quad b=2$

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

4. $a=48$

$b=11.5 \quad a. \quad \frac{x^2}{48^2} + \frac{y^2}{(11.5)^2} = 1$

b. $48^2 - 11.5^2 = 2171.75$

$c = 46.6$

about 47 feet from center of room

5. $5000^2 - 4000^2 = 1016$ miles

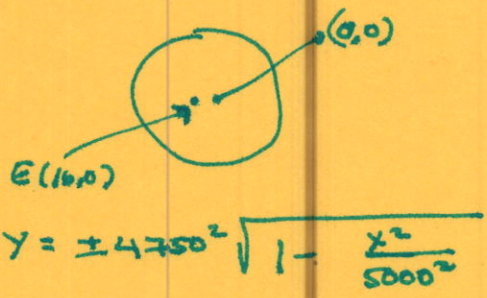
$5000 - 4000 + 16 = 1016$ miles

$$\frac{x^2}{5000^2} + \frac{y^2}{4750^2} = 1$$

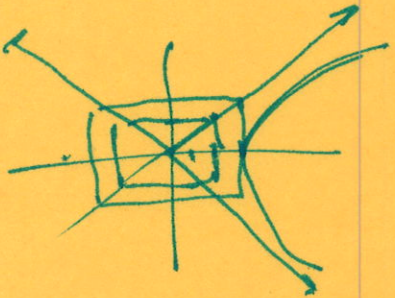
$$(x-16)^2 + (y)^2 = 4000^2$$

$$y = \pm \sqrt{4000^2 - (x-16)^2}$$

$d = 4748.9$ feet apiece at $x=16$



6.

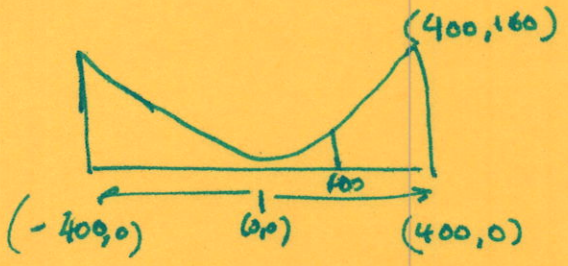


$$\frac{b}{a} = \frac{1}{2} = \frac{b}{3}$$

$$b = \frac{3}{2}$$

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

7.



$$4ay = x^2$$

$$4a(160) = 400^2$$

$$a = 250$$

$$1000y = x^2$$

$$y = \frac{x^2}{1000}$$

$$x = 100$$

$$y = \frac{10,000}{1000}$$

$$y = 10$$