

BE-Alg. 2 WEDNESDAY 3-23-11

ACT
practice

① $-|x-3| - |2x-6|$, if $x = -2$

② $13 \left(\frac{1}{\frac{1}{5} + \frac{2}{3}} \right)$

③ A rectangular lot that measures 150 ft. by 200 ft. is completely fenced. What is the approximate length, in feet, of the fence?

④ On 4 quizzes a student scored 65, 73, 81 and 82%. What must the Quiz 5 score be to have an average of 80%?

ANS $-|(-2)-3| - |2(-2)-6|$

① $-|-5| - |-4-6|$
 $-(5) - (10) = \boxed{-15}$

② $13 \left(\frac{1}{\frac{3}{15} + \frac{10}{15}} \right) = 13 \left(\frac{1}{\frac{13}{15}} \right) = 13 \cdot \frac{15}{13} = \boxed{15}$

③ $200 + 200 + 150 + 150 = \boxed{700 \text{ ft}}$

④ $\overline{80} \Rightarrow 65, 73, 81, 82,$
 $-15 \quad -7 \quad +1 \quad +2 \Rightarrow -19 \therefore 80 + 19 = \boxed{99}$

Alg. 2 HW Review - Pg 438 # 8, 10

$$\textcircled{8} \quad \frac{(X-1)^2}{20} + \frac{(Y+2)^2}{4} = 1$$

$$\uparrow$$
$$a^2 = 20$$

$$a = 2\sqrt{5}$$

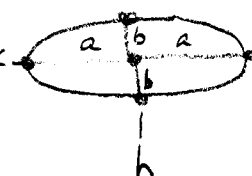
Major Axis
= $4\sqrt{5}$ units
length

$$\uparrow$$
$$b^2 = 4$$

$$b = 2$$

Minor Axis
= 4 units
length

} Since $a^2 \Rightarrow$ is under X



Center

$C(1, -2)$
h, k

$$c^2 = a^2 - b^2 = 20 - 4 = 16$$

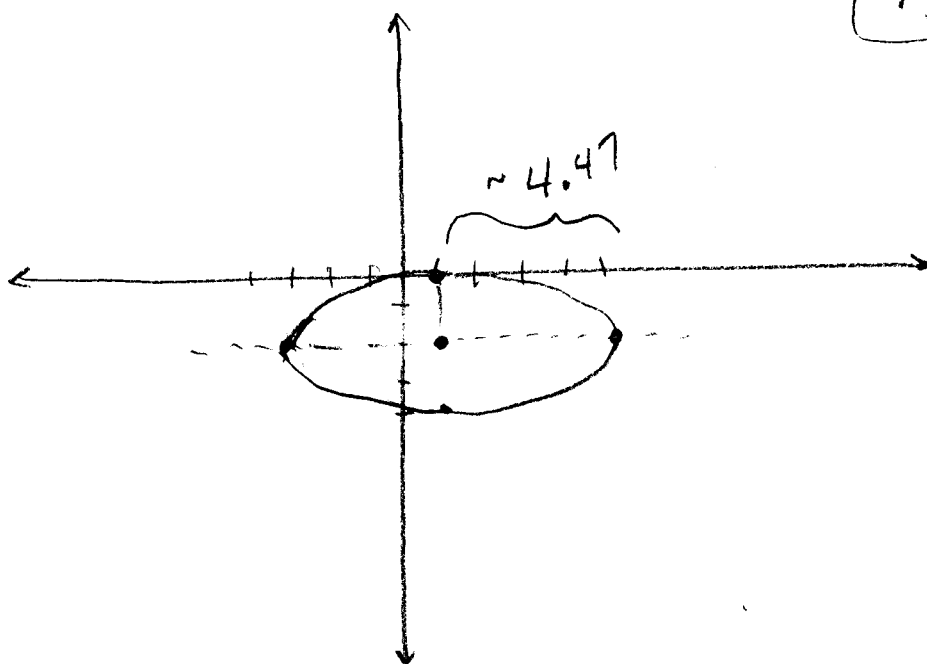
$\therefore c^2 = 16 \quad c = 4$ So Foci are at $(h \pm 4, k)$

$$F(1 \pm 4, -2)$$

$$F_1(5, -2)$$

$$F_2(-3, -2)$$

Note: $2\sqrt{5} \approx 4.47$



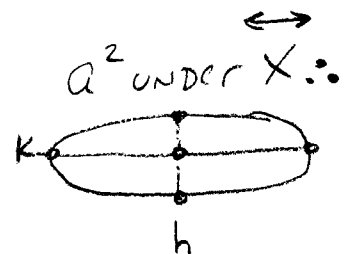
$$(10) \quad x^2 + 25y^2 - 8x + 100y + 91 = 0$$

$$x^2 - 8x + 4^2 + 25y^2 + 100y = -91 + 16$$

$$(x-4)^2 + 25(y^2 + 4y + 2^2) = -75 + 100$$

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

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



$$a^2 = 25$$

$$a = 5$$

$\therefore$ length of major axis = 10

$$b^2 = 1$$

$$b = 1$$

length of minor axis is 2

Center
(4, -2)

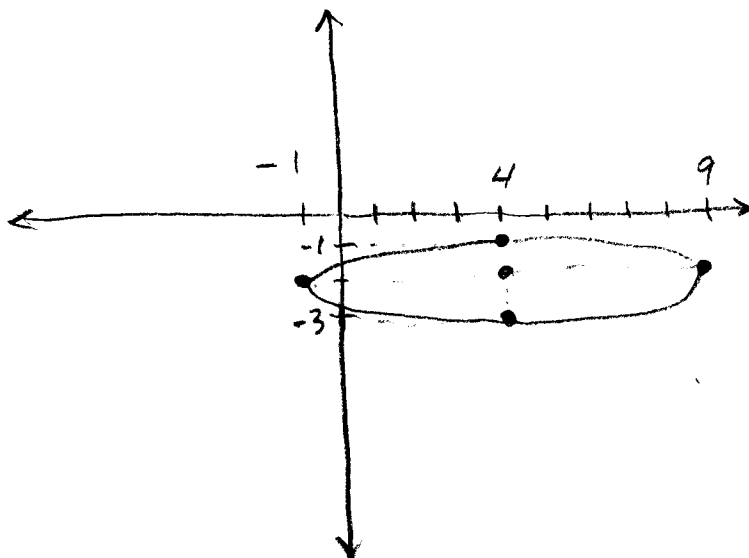
h, k

$$\text{Foci } c^2 = a^2 - b^2 \therefore c^2 = 24$$

$$c = 2\sqrt{6} \therefore \text{Foci} \Rightarrow$$

$$(h \pm c, k)$$

$$F(4 \pm 2\sqrt{6}, -2)$$

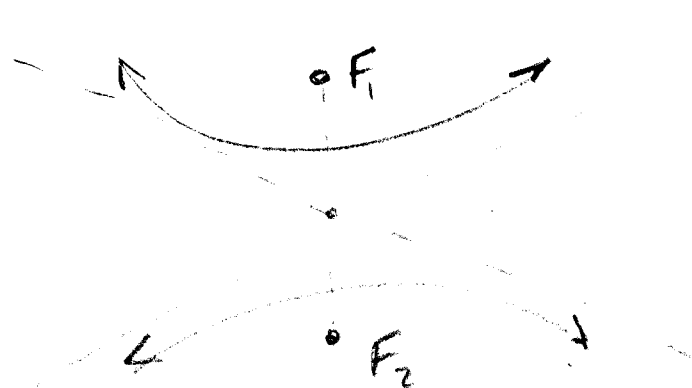
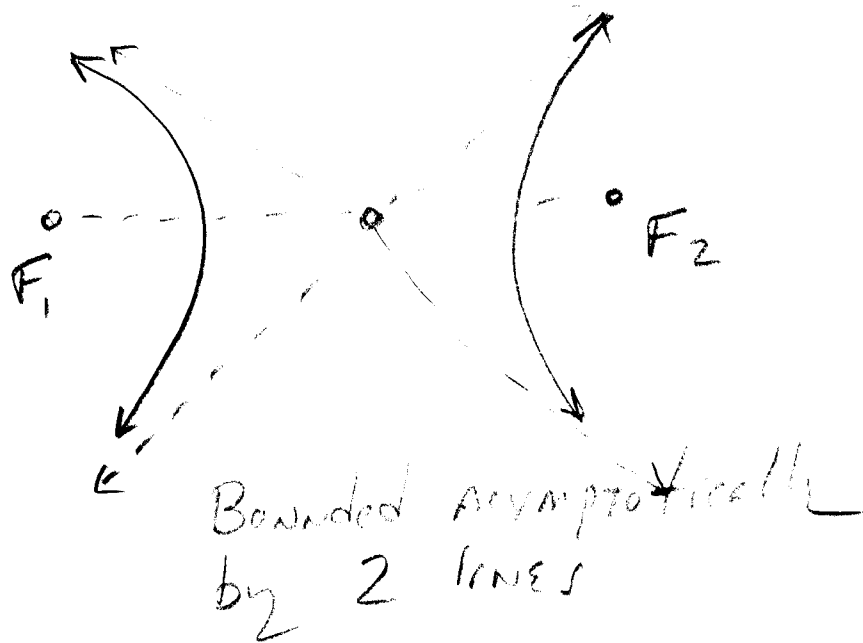


Intro. to Hyperbolas (see Ch. 8-5)

Similar concept to locus definition of ellipse $\Rightarrow$ sum of $d_1 + d_2$ to Foci = constant

hyperbola $\Rightarrow$ difference of $d_1 - d_2$ to Foci = constant
(subtract)

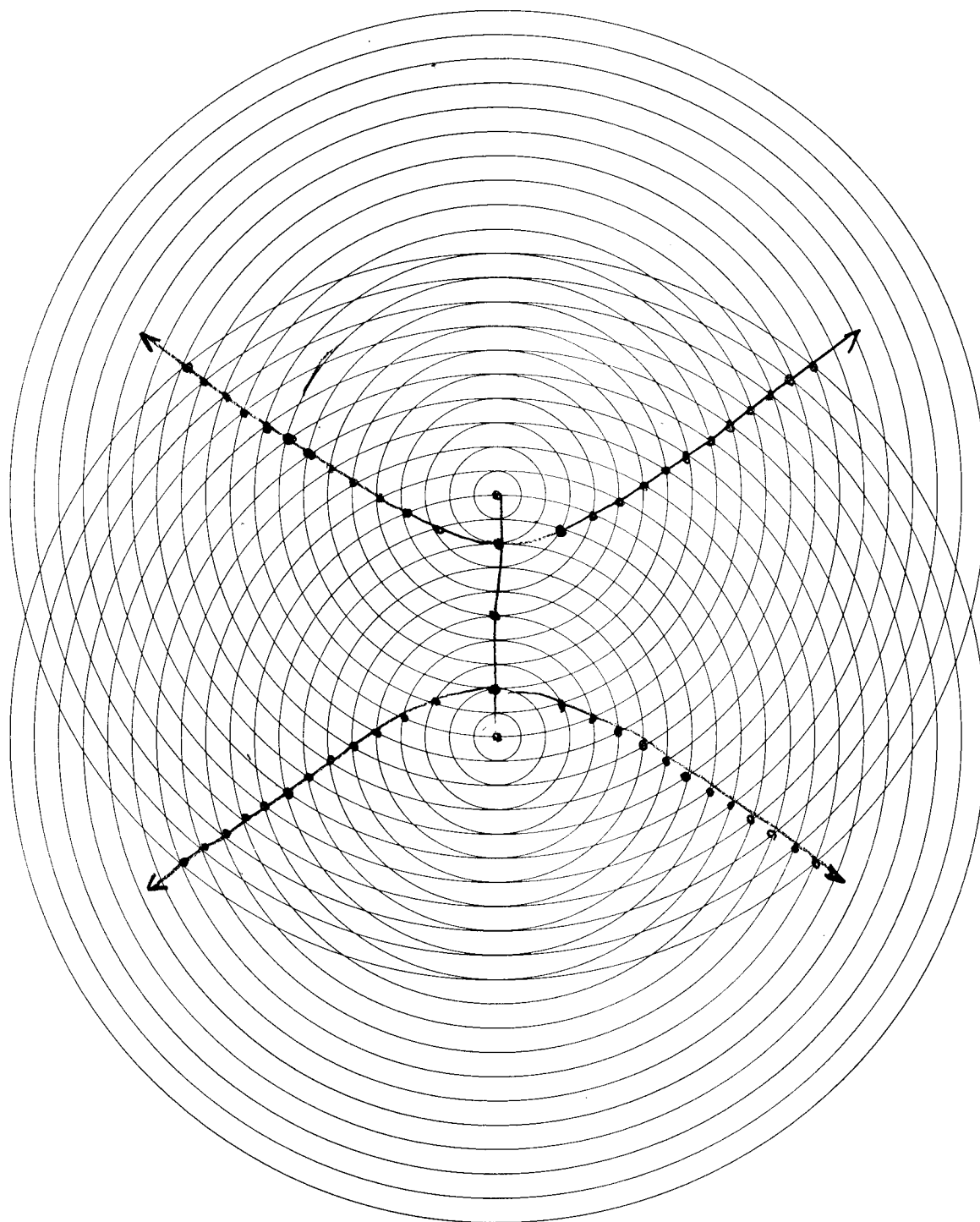
Result is two, bounded curves



$$\frac{(x-h)^2}{a^2} - \frac{(x-k)^2}{b^2} = 1 \quad (3x)$$

Conic Graph Paper

(overlapping circles)



HYPERBOLA - DIFFERENCE OF DISTANCES
TO FOCAL POINTS = 6 (X) 15-9

Some "real world" places to find

hyperbolas $\Rightarrow$ • cooling towers

• Cassegrain telescopes

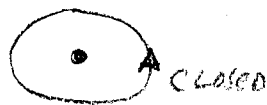
(see blind spot line on bulldozer)

• Ripples from 2 rocks in a pond.

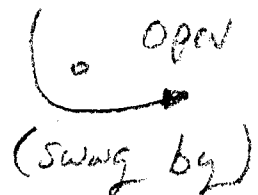
• Rocket Nozzles.

• Sonic boom (where the sound waves strikes the earth)

• Shape of an "open" orbit vs. closed (ellipse)



closed

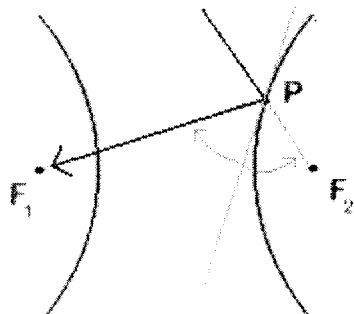


open

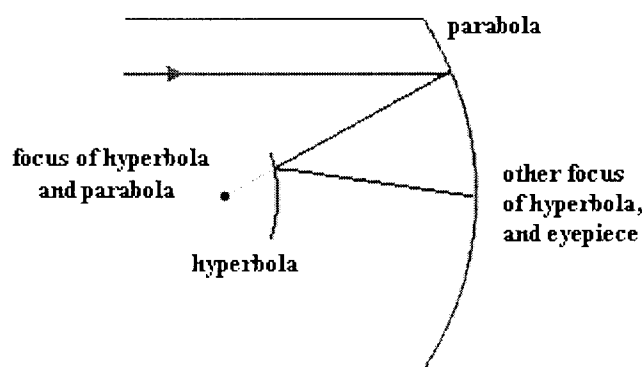
(swing by)

The reflection property of the hyperbola is of great importance in optics. Let P be any point on one branch of the hyperbola. Then the line segments joining P to each of the foci form an angle which is bisected by the tangent line at P .

<http://www.mathacademy.com/pr/prime/articles/conics/index.asp>



Consequently, any ray approaching one of the foci from a convex side of the hyperbola is reflected to the opposite focus. An example of an application of this principle is the Cassegrain reflecting telescope:



A concave parabolic mirror forms the back of the telescope, and this shares a focus with a convex hyperbolic mirror, the other focus of which is at the eyepiece.

Ch. 8-6 Conic Sections (Classify)

PARABOLA $y = a(x-h)^2 + k$

CIRCLE $(x-h)^2 + (y-k)^2 = r^2$

Ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

Hyperbola $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

See pg. 449

Looking at ALL the combinations of x^2, y^2, x, y and numbers:

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$$

Usually $B=0$, the xy term "rotates" the conic section, $xy=c$ is a special case of a hyperbola

PARABOLA $A=0$ or $C=0$

CIRCLE $A=C$

Ellipse $A \neq C$ But both are + or both -

Hyperbola A and C have opposite signs.

Complete squares on x 's or y 's to put in standard form = (h, k) form

Ex 2 Pg. 450 Parabola, circle, ellipse, or Hyperbola?

① $y^2 - 2x^2 - 4x - 4y - 4 = 0$

$A = -2$ $C = 1$ opposite signs, hyperbola

② $4x^2 + 4y^2 + 20x - 12y + 30 = 0$

$A = 4$ $C = 4$ $A = C \Rightarrow$ circle.

③ $y^2 - 3x + 6y + 12 = 0$

$A = 0$ (no x^2 term), $C = 1$ parabola

More:

④ $x^2 - 14x + 4 = 9y^2 - 36y$

PUT IN GENERAL FORM

$x^2 - 9y^2 - 14x - 36y + 4 = 0$

$A = 1$ $C = -9$ opp. signs = hyperbola

⑤ $5x^2 + 6x - 4y = x^2 - y^2 - 2x$
 $-x^2 + 2x \quad -x^2 + 2x$

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

$A = 4$ $C = 1$ $A \neq C$ ellipse
 (BOTH $\oplus$)

HW: Practice for HW 2 Worksheet