March 2, 2012 & March 5, 2012

Topic: Conic Sections

Question: What is a conic section?
Name them all.

Compare and Contrast

Goal: Given an algebraic equality,
tell me what type of conic section...

Warm-Up. 1.

Write in standard form

$$x^2+y^2+8x-24y+16=0$$

$$(x^2+8x)+(y^2-24y)=-16$$

$$(x^2+8x+16)+(y^2-24y+144)=-16+16+144$$

$$(x+4)^2+(y-12)^2=144$$

circle

Warm-Up 2

Write in standard form

$$x^2+3y^2-16x+24y+31=0$$

$$x^2-16x+3y^2+24y=-31$$

$$(x^2-16x)+3(y^2+8y)=-31$$

$$(x^2-16x+64)+3(y^2+8y+16)=-31+64+3(16)$$

$$\frac{(x-8)^2+3(y+4)^2}{81}=\frac{81}{81}$$

$$\boxed{\frac{(x-8)^2}{81}+\frac{(y+4)^2}{27}=1}$$

Ellipse

Warm-Up 3

Write in standard form

$$9x^2-4y^2+18x+32y-91=0$$

$$(9x^2+18x)-(4y^2+32y)=91$$

$$9(x^2+2x)-4(y^2-8y)=91$$

$$9(x^2+2x+1)-4(y^2-8y+16)=91+9(1)+-4(16)$$

$$\frac{9(x+1)^2-4(y-4)^2}{36}=\frac{36}{36}$$

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

hyperbola

Warm-Up 4

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

Write in standard form

$$4y - x^2 = 14x - 27$$

$$4y = (x^2 + 14x) - 27$$

$$4y = (x^2 + 14x + 49) - 27 - 49$$

$$\frac{4y}{4} = \frac{(x+7)^2 - 76}{4}$$

$$y = \frac{1}{4}(x+7)^2 - 19$$

NOTES: Section 8.6

Identify Conic Sections If you are given an equation of the form

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0, \text{ with } B = 0,$$

you can determine the type of conic section just by considering the values of A and C. Refer to the following chart.

Relationship of A and C	Type of Conic Section
$A = 0$ or $C = 0$, but not both.	parabola
$A = C$	circle
A and C have the same sign, but $A \neq C$.	ellipse
A and C have opposite signs.	hyperbola

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

Example **Without writing the equation in standard form, state whether the graph of each equation is a *parabola*, *circle*, *ellipse*, or *hyperbola*.**

a. $3x^2 - 3y^2 + 5x + 12 = 0$

A = 3
B = 0
C = −3
D = 5
E = 0
F = 12

3 & −3 have opposite signs

∴ hyperbola

b. $y^2 = 7y - 2x + 13$

$-7y + 2x - 13$

$y^2 - 7y + 2x - 13 = 0$

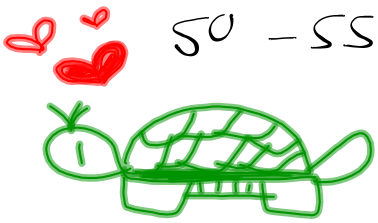
A = 0
B = 0
C = 1
D = 2
E = −7
F = −13

A = 0 C = 1

Parabola

Lorena will write the homework now...

homework: page 451-452
13-29 odd, 47, 48,
50-55 all and # 33-38



13.) $\frac{4x^2+2y^2}{8} = \frac{8}{8}$

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

$A=4 \quad C=2 \Rightarrow$ Ellipse

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

$h=0$

$K=0$

center $(0,0)$

$a^2=4$

$a=2$

$2a=4$

$b^2=2$

$b=\sqrt{2}=1.4$

$2b=2.8$

minor axis

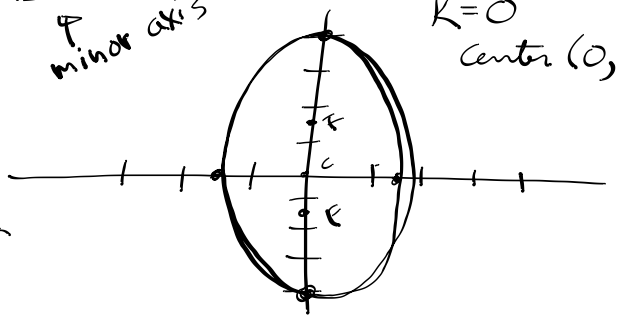
$c^2=a^2-b^2$

$c^2=4-2$

$c^2=2$

$c=\sqrt{2}$

major axis

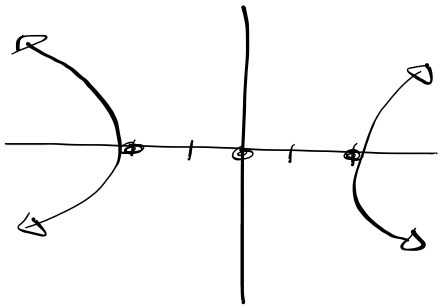


15.) $4y^2-x^2+4=0$

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

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

$\frac{x^2}{4}-\frac{y^2}{1}=1$ $\quad h=0$, $K=0$



hyperbola

$a^2=4$ $\quad b^2=1$

$a=2$ $\quad b=1$

$2a=4$ $\quad 2b=2$

vertices $(h+a,0)$

$(0+2,0)$

$(0-2,0)$

$\frac{(x-h)^2}{a^2} - \frac{(y-K)^2}{b^2}$