9.4 Classifying Conics

Classifying a Conic from Its General Equation

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

$Circle: A = C$

$Parabola: AC = 0$ → your equation has an x^2 or y^2, NOT BOTH

$Ellipse: AC > 0$ → coefficients of x^2, y^2 are different but they have the same sign

$Hyperbola: AC < 0$ coefficients of x^2, y^2 have different signs

NDARD FORM OF EQUATIONS OF TRANSLATED CONICS

following equations the point (h, k) is the *vertex* of the parabola and *enter* of the other conics.

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

	Horizontal axis	Vertical axis
BOLA	$(y - k)^2 = 4p(x - h)$	$(x - h)^2 = 4p(y - k)$
SE	$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$	$\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$
RBOLA	$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$	$\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$

Classify the Conic: Write the equation in standard form.

1.) $4x^2 - 9y^2 + 32x - 144y - 548 = 0$

H

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

E

3.) $4x^2 - 9x + y - 5 = 0$

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

$4x^2 - 9x = -y + 5$

$4\left(x^2 - \frac{9}{4}x + \frac{81}{64}\right) = -y + 5 + \frac{81}{16}$

$4\left(x - \frac{9}{8}\right)^2 = -y + \frac{161}{16}$

$\frac{4\left(x - \frac{9}{8}\right)^2}{4} = \frac{-1\left(y - \frac{161}{16}\right)}{4}$

$\left(x - \frac{9}{8}\right)^2 = -\frac{1}{4}\left(y - \frac{161}{16}\right)$

4.) $2x^2 + 2y^2 - 8x + 12y + 2 = 0$

C

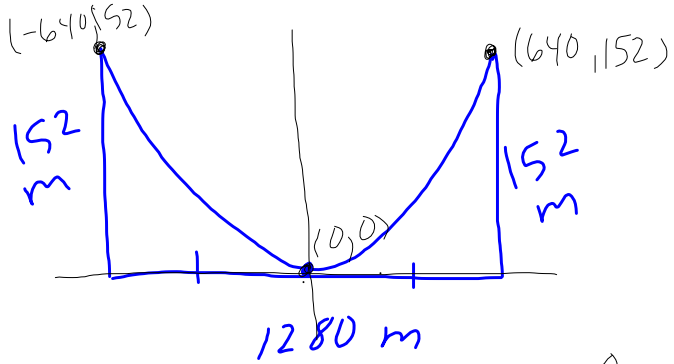
(2) Each cable of the Golden Gate Bridge is suspended (in the shape of a parabola) between two towers that are 1280 meters apart. The top of each tower is 152 meters above the roadway. The cables touch the roadway midway between the towers.

(a) Draw a sketch of the bridge. Locate the origin of a rectangular coordinate system at the center of the roadway. Label the coordinates of the known points.

(b) Write an equation that models the cables. $x^2 = 2694.74y$

(c) Complete the table by finding the height y of the suspension cables over the roadway at a distance of x meters from the center of the bridge.

Distance, x	Height, y
0	0
100	
250	
400	
500	



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

$640^2 = 4p(152)$

$4p = \frac{51200}{19} \approx 2694.74$