Conic Sections In Standard Form

	Circles	Parabolas	Ellipses	Hyperbolas
Horizontal:				
Equation	$(x-h)^2 + (y-k)^2 = r^2$	$x = a(y-k)^2 + h$	$(x-h)^2/a^2 + (y-k)^2/b^2 = 1$	$(x-h)^2/a^2 - (y-k)^2/b^2 = 1$
Center	(h, k)		(h, k)	(h, k)
Axis Of Symmetry	Any Diameter	$y = k$	See “a” and “b”	See “a” and “b”
Focus (Foci)	(h, k) center is focus	$(h+1/(4a), k)$	(h+c, k) & (h-c, k)	(h+c, k) & (h-c, k)
Directrix		$x = h - 1/(4a)$		
Vertex (Vertices)		(h, k)	(h+a, k), (h-a, k), (h, k+b), (h, k-b)	(h+a, k), (h-a, k)
Asymptotes				$y= \pm(b/a)(x-h)+k$
Variables	r = radius		a = semi-major axis	a = semi-transverse axis
			b = semi-minor axis	b = semi-conjugate axis
Note:			$a^2 > b^2$	
"c" is equal to…			sqrt (a^2-b^2)	sqrt (a^2+b^2)
Eccentricity:	$e = 0$	$e = 1$	$e = c/a$; $0<e<1$	$e = c/a$; $e>1$
Vertical:				
Equation	$(x-h)^2 + (y-k)^2 = r^2$	$y = a(x-h)^2+k$	$(x-h)^2/b^2 + (y-k)^2/a^2 = 1$	$(y-k)^2/a^2 - (x-h)^2/b^2 = 1$
Center	(h, k)		(h, k)	(h, k)
Axis Of Symmetry	Any Diameter	$x = h$	See “a” and “b”	See “a” and “b”
Focus (Foci)	(h, k) center is focus	$(h, k+1/(4a))$	(h, k+c) & (h, k-c)	(h, k+c) & (h, k-c)
Directrix		$y = k - 1/(4a)$		
Vertex (Vertices)		(h, k)	(h+b, k), (h-b, k), (h, k+a), (h, k-a)	(h, k + a), (h, k - a)
Asymptotes				$y= \pm(a/b)(x-h)+k$
Variables	r = radius		a = semi-major axis	a = semi- transverse axis
			b = semi-minor axis	b = semi- conjugate axis
Note:			$a^2 > b^2$	
"c" is equal to…			sqrt (a^2-b^2)	sqrt (a^2+b^2)
Eccentricity:	$e = 0$	$e = 1$	$e = c/a$; $0<e<1$	$e = c/a$; $e>1$

For Rectangular Hyperbolas See the Lecture Notes in your packet or on the Web:
http://www.lcusd.net/lchs/dclausen/algebra2/rectangular_hyperbolas.htm

Distance Formula:

$$\text{distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Midpoint Formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Conic Sections in General Form: $Ax^2 + By^2 + Cx + Dy + E = 0$

Circles:

For Circles A = B
A & B need to have the same number and same sign.

Parabolas:

If either A = 0 or B = 0 then the equation defines a parabola (x^2 or y^2 is missing). Isolate the variable that is not squared and use the completing the square method to convert the equation to that of a Parabola in Standard Form.
Hint: Solve for y if there is no y^2 in the equation or solve for x if there is no x^2 in the equation.

Ellipses:

1) A & B have the same sign (both positive or both negative)
2) A & B are different numbers (if they were the same, this would be a circle).

Hyperbolas:

1) A & B must have different signs (one positive and the other negative).
2) A & B must be different numbers or opposites (same number with different signs)