IDENTIFYING CONICS

1) Solve quadratic
Systems of eq.

2) Identify conics
from equation

P 1) $x = 5 - 3(y+2)^2$

H 2) $\dfrac{x^2}{9} - \dfrac{(y+3)^2}{4} = 1$

E 3) $\dfrac{x^2}{9} + \dfrac{(y-2)^2}{4} = 1$

$9x^2$

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

E 5) $3x^2 + 7x - 4y + 2y^2 = 11$

P 6) $2x^2 - 5y = 3x + 14 - 3x^2$

H 7) $9x^2 - 2x + 1 = 3y^2 + 2y$

$9x^2 - 3y^2$

C 8) $2 - 4y + 7y^2 = 5x + 3 - 7x^2$

$7y^2 + 7x^2$

Parabola = one squared
Variable

Hyperbolas = two squared
Variables with
opposite signs

Circles — two square vars.
Same signs, same coeff

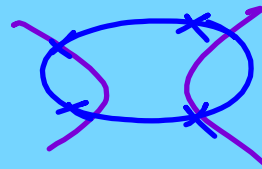Ellipses — two squared vars,
same signs, different
coefficients

<u>Solving Systems of Quadratic Equations</u>

H $5x^2 - 3y^2 = -28$

E_3 $\boxed{2x^2 + 1y^2 = 24}$

<div style="border: 2px solid green; padding: 8px;">
Elimination--Variables must have the same exponents.
</div>

$5x^2 - 3y^2 = -28$

$+\ 6x^2 + 3y^2 = 72$

$\dfrac{11x^2}{11} = \dfrac{44}{11}$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

$2x^2 + y^2 = 24$

$x = 2$ $\quad 2(2)^2 + y^2 = 24$

$8 + y^2 = 24$

$\sqrt{y^2} = \sqrt{16}$

$y = \pm 4$

$x = -2 \quad 2(-2)^2 + y^2 = 24$

$\boxed{\begin{array}{l}(2, 4)\\(2, -4)\\(-2, 4)\\(-2, -4)\end{array}}$

Ell $x^2 + 4y^2 = 25$

Line $2y = 1 - x$

$$x = 1 - 2y$$

Substitution--Variables do NOT have the same exponents.

KEY: Isolate a variable which has no exponent!

FOIL!
$$(1-2y)^2 + 4y^2 = 25$$
$$(1-2y)(1-2y)$$
$$1 - 2y - 2y + 4y^2 + 4y^2 = 25$$
$$8y^2 - 4y + 1 = 25$$
$${-25 \quad -25}$$
$$8y^2 - 4y - 24 = 0$$
$$4(2y^2 - y - 6) = 0 \qquad \begin{matrix}1 & 6\\ 2 & 3\end{matrix}$$
$$4(2y + 3)(y - 2) = 0$$
$$+3y$$
$$-4y$$

$$2y + 3 = 0 \qquad y - 2 = 0$$
$$2y = -3 \qquad y = 2$$
$$y = -3/2$$

$\varnothing$

$x = 1 - 2y$

$y = -\frac{3}{2} \quad x = 1 - 2\left(\frac{-3}{2}\right)$
$\qquad\qquad x = 4$

$\left(4, \frac{-3}{2}\right)$

$y = 2 \quad x = 1 - 2(2)$
$\qquad\quad x = -3$

$(-3, 2)$

<u>No solution</u>

Variables will cancel

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

$$\sqrt{x^2} = \sqrt{-7}$$

imaginary = no sol.

<u>Infinitely Many</u>

Variables cancel

$$7 = 7$$
$$0 = 0$$

Calculator:

Change to Conic entry mode:

Menu - 3 - 3 - 6

Intersection = Draw box around intersection pt.

$$(x^2)^2 + 3x^2 = 10$$
$$x^4 + 3x^2 = 10$$
$$x^4 + 3x^2 - 10 = 0$$
$$(x^2 - 2)(x^2 + 5) = 0$$

$$\begin{array}{cc} 1 & 10 \\ 2 & 5 \end{array}$$

$$-2x^2$$
$$+5x^2$$