

$$1. x^2 + y^2 = 5$$

$$y = -2x$$

$$x^2 + (-2x)^2 = 5$$

$$x^2 + 4x^2 = 5$$

$$5x^2 = 5$$

$$x^2 = 1$$

$$x = \pm 1$$

$$\boxed{(1, -2) \quad (-1, 2)}$$

If $x = 1$, then $y = -2(1) = -2$

If $x = -1$, then $y = -2(-1) = 2$

$$2. x^2 + y^2 = 49$$

$$y = x - 7$$

$$x^2 + (x - 7)^2 = 49$$

$$x^2 + (x - 7)(x - 7) = 49$$

$$x^2 + x^2 - 7x - 7x + 49 = 49$$

$$2x^2 - 14x = 0$$

$$2x(x - 7) = 0$$

$$\swarrow \quad \downarrow$$

$$2x = 0 \quad x - 7 = 0$$

$$x = 0 \quad x = 7$$

$$\boxed{(0, -7) \quad (7, 0)}$$

If $x = 0$, $y = 0 - 7 = -7$

If $x = 7$, $y = 7 - 7 = 0$

$$3. (x - 1)^2 + y^2 = 9$$

$$y = 3$$

$$(x - 1)^2 + 3^2 = 9$$

$$(x - 1)^2 + 9 = 9$$

$$(x - 1)^2 = 0$$

$$(x - 1)(x - 1) = 0$$

$$x = 1$$

$$\boxed{(1, 3)}$$

$$4. \quad (x+3)^2 + (y-1)^2 = 1$$

$$x - 3y = 3 \rightarrow x = 3y + 3$$

$$(3y + 3 + 3)^2 + (y-1)^2 = 1$$

$$(3y + 6)^2 + (y-1)^2 = 1$$

$$(3y + 6)(3y + 6) + (y-1)(y-1) = 1$$

$$9y^2 + 18y + 18y + 36 + y^2 - y - y + 1 = 1$$

$$10y^2 + 34y + 37 = 1$$

$$10y^2 + 34y + 36 = 0$$

$$2(5y^2 + 17y + 18) = 0$$

~~90~~
~~17~~

does not factor

$$x = \frac{-17 \pm \sqrt{17^2 - 4(5)(18)}}{2(5)}$$

$$x = \frac{-17 \pm \sqrt{289 - 360}}{10} \leftarrow \text{imaginary} = \text{no solutions}$$

(negative discriminant)

$$5. \quad x^2 + y^2 = 18$$

$$x - y = 0 \rightarrow x = y$$

$$x^2 + x^2 = 18$$

$$2x^2 = 18$$

$$x^2 = 9$$

$$x = \pm 3$$

$$(3, 3) \quad (-3, -3)$$

IF $x = 3$, then $3 - y = 0$
 $y = 3$

IF $x = -3$, then

$$-3 - y = 0$$

$$-3 = y$$

$$6. \quad x^2 + y^2 = 25$$

$$y = x + 1$$

$$\text{If } x = -4, y = -4 + 1 = -3$$

$$x^2 + (x+1)^2 = 25$$

$$x^2 + (x+1)(x+1) = 25$$

$$x^2 + x^2 + x + x + 1 = 25$$

$$2x^2 + 2x - 24 = 0$$

$$2(x^2 + x - 12) = 0$$

$$2(x+4)(x-3) = 0$$

$$x+4=0 \quad x-3=0$$

$$x = -4 \quad x = 3$$

$$\boxed{\begin{matrix} (-4, -3) \\ (3, 4) \end{matrix}}$$

$$\text{If } x = 3, \text{ then}$$

$$y = 3 + 1 = 4$$

$$\begin{array}{r} -12 \\ 4 \times -3 \\ \hline 1 \end{array}$$

$$7. \quad x^2 - 2x + y^2 - 2y = 2$$

$$x + y = 4 \rightarrow x = 4 - y$$

$$\text{If } y = 3,$$

$$x + 3 = 4$$

$$x = 1$$

$$\boxed{(1, 3)}$$

$$(4-y)^2 - 2(4-y) + y^2 - 2y = 2$$

$$(4-y)(4-y) - 8 + 2y + y^2 - 2y = 2$$

$$16 - 4y - 4y + y^2 - 8 + 2y + y^2 - 2y = 2$$

$$2y^2 - 8y + 8 = 2$$

$$2y^2 - 8y + 6 = 0$$

$$2(y^2 - 4y + 3) = 0$$

$$2(y-3)(y-1) = 0$$

$$y-3=0 \quad y-1=0$$

$$y = 3 \quad y = 1$$

$$\begin{array}{r} 3 \\ -3 \times -1 \\ \hline -4 \end{array}$$

$$\text{If } y = 1,$$

$$x + 1 = 4$$

$$x = 3$$

$$\boxed{(3, 1)}$$

$$8. x^2 + y^2 - 4x - 6y = -9$$

$$x + y = 1 \rightarrow x = 1 - y$$

$$(1-y)^2 + y^2 - 4(1-y) - 6y = -9$$

$$(1-y)(1-y) + y^2 - 4 + 4y - 6y = -9$$

$$1 - y - y + y^2 + y^2 - 4 + 4y - 6y = -9$$

$$2y^2 - 4y - 3 = -9$$

$$2y^2 - 4y + 6 = 0$$

$$2(y^2 - 2y + 3) = 0$$

cannot factor

~~3
-2~~

TRY
QUAD
EQUATION

imaginary
no solution

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(2)(3)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 - 24}}{2}$$

negative discriminant

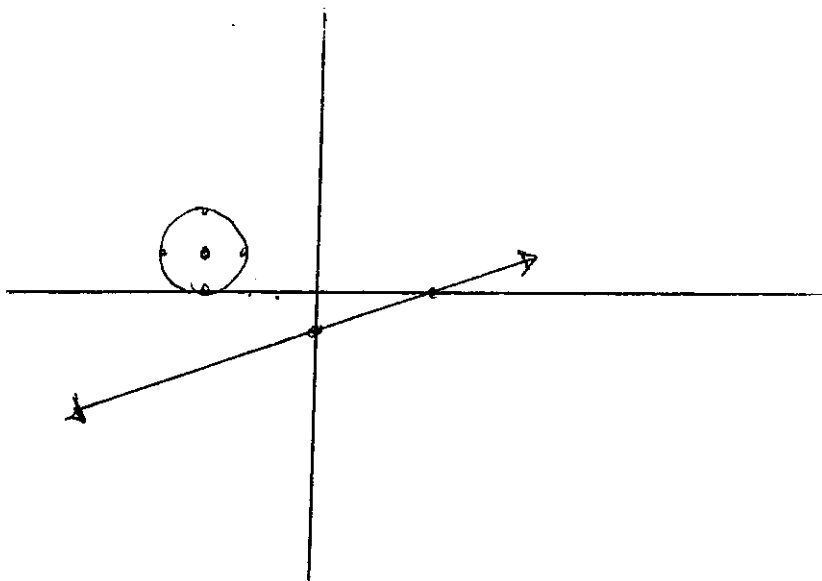
$$x^2 - 4x + y^2 - 6y = -9$$

$$x^2 - 4x + 4 + y^2 - 6y + 9 = -9 + 4 + 9$$

$$(x-2)^2 + (y-3)^2 = 4$$

#4

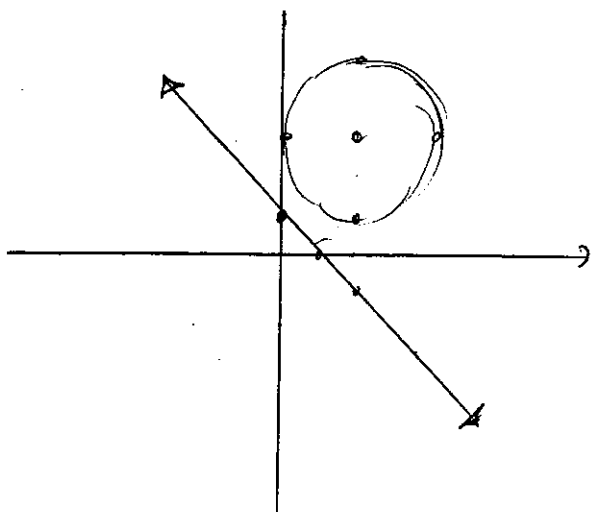
$$(x+3)^2 + (y-1)^2 = 1$$
$$x - 3y = 3$$



#8

$$x^2 + y^2 - 4x - 6y = -9$$

$$x + y = 1$$



Name _____

Systems of Conics – Circle and a Line

Solve each system.

1. $x^2 + y^2 = 5$
 $y = -2x$

2. $x^2 + y^2 = 49$
 $y = x - 7$

3. $(x-1)^2 + y^2 = 9$
 $y = 3$

4. $(x+3)^2 + (y-1)^2 = 1$
 $x - 3y = 3$

5. $x^2 + y^2 = 18$
 $x - y = 0$

6. $x^2 + y^2 = 25$
 $y = x + 1$

7. $x^2 - 2x + y^2 - 2y = 2$
 $x + y = 4$

8. $x^2 + y^2 - 4x - 6y = -9$
 $x + y = 1$

