Name_____

Systems of Conics – Circle and a Line

Solve each system

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

2 solutions

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

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

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

$5x^2 = 5$

$x^2 = 1$

$x = \pm 1$

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

2 solutions

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

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

$x^2 + x^2 - 14x + 49 = 49$

$2x^2 - 14x = 0$

$2x(x-7) = 0$

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

$x = 0, \; x = 7$

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

$\boxed{(1,3)}$

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

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

$x^2 - 2x + 1 = 0$

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

$x = 1$

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

NO SOLUTION
DOES NOT FACTOR; discriminant is negative

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

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

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

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

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

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

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

$\boxed{(3,3) \quad (-3,-3)}$

$x^2 + x^2 = 18$

$2x^2 = 18$

$x^2 = 9$

$x = \pm 3$

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

90
17

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

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

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

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

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

$2(x+4)(x-3) = 0 \rightarrow x = -4, \; x = 3$

$\boxed{(-4,-3) \quad (3,4)}$

$$X - 3y = 3 \longrightarrow X = 3 + 3y$$

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

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

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

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

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

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

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

$$x = \frac{-34 \pm \sqrt{34^2 - 4(10)(36)}}{2(10)}$$

$$x = \frac{-34 \pm \sqrt{-284}}{20}$$ ← NO REAL SOLUTION