

## Solving a System of Quadratic – Linear Equations

- There are 3 possible scenarios when solving a quadratic-linear system.
- Unlike a Linear-Linear and Quadratic-Quadratic systems that can have infinitely many solutions, Quadratic-Linear system cannot have infinitely many solutions.

### 1. There are no real solutions to the system

- When graphed, the parabola and the line never intersect
- When solving algebraically resulting equation does not have real solutions.

**Examples:**

**Solve:**

$$\begin{aligned}3x^2 + 10 &= y \\ y &= -0.5x + 5\end{aligned}$$

**2. There is one solution to the system**

- When graphed, the parabola and the line either touch (the line is a tangent line to the parabola) or the graphs intersect once.

**Examples:**

**Solve:**

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

$$2x - 4 = y$$

### 3. There are two solutions to the system

- When graphed, the parabola and the line intersect twice.
- The line is a secant line to the parabola.
- When solving algebraically, the resulting equation has two solutions (the discriminant is positive).

**Examples:**

**Solve:**

$$y = -3x^2 + 6x + 2$$

$$y - 3 = 0.75(x - 1)$$