

Solve the following pairs of simultaneous equations, one linear and one quadratic.

5. $x^2 + y^2 = 25$
 $x + y = 7$

① Rewrite linear

$$x + y = 7 \Rightarrow x = 7 - y$$

② Sub into quadratic & solve

$$\begin{aligned} (7-y)^2 + y^2 &= 25 \\ 49 - 14y + y^2 + y^2 &= 25 \\ 2y^2 - 14y + 24 &= 0 \\ y^2 - 7y + 12 &= 0 \\ (y-3)(y-4) &= 0 \end{aligned}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

y Solutions

$$y = 3 \quad \text{or} \quad y = 4$$

③ Sub back into linear

$$x = 7 - y$$

$$x = ? \quad y = 3 \Rightarrow$$

$$x = 7 - 3 = 4$$

$$\text{pt. } (4, 3)$$

$$y = 4 \Rightarrow$$

$$x = 7 - 4 = 3$$

$$\text{pt. } (3, 4)$$

Solve the following pairs of simultaneous equations, one linear and one quadratic.

6. $3x^2 - y^2 = 3$
 $2x - y = 1$

① Rewrite linear

$$2x - y = 1 \Rightarrow 2x - 1 = y$$

② Sub into quadratic & solve

$$\begin{aligned} 3x^2 - (2x-1)^2 &= 3 \\ 3x^2 - [4x^2 - 4x + 1] &= 3 \\ 3x^2 - 4x^2 + 4x - 1 &= 3 \\ -x^2 + 4x - 4 &= 0 \\ x^2 - 4x + 4 &= 0 \\ (x-2)(x-2) &= 0 \\ x = 2 \quad \text{and} \quad x = 2 \end{aligned}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

x Solutions

③ Sub back into linear

$$y = 2x - 1$$

$$y = ? \quad x = 2$$

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

$$\text{pt. } (2, 3)$$

Solve the following pairs of simultaneous equations, one linear and one quadratic.

$$7. \quad y = x^2 - 4x + 6$$

$$y = 3x - 4$$

① Rewrite linear

$$y = 3x - 4 \quad (\text{already good to go!})$$

② Sub into quadratic & solve

$$3x - 4 = x^2 - 4x + 6$$

$$x^2 - 7x + 10 = 0$$

$$(x - 2)(x - 5) = 0$$

X Solutions

$$x = 2 \quad \text{or} \quad x = 5$$

③ Sub back into linear

$$y = ? \quad x = 2$$

$$y = 3(2) - 4 = 2 \quad \text{pt. } (2, 2)$$

$$x = 5$$

$$y = 3(5) - 4 = 11 \quad \text{pt. } (5, 11)$$

Solve the following pairs of simultaneous equations, one linear and one quadratic.

$$8. \quad x^2 + y^2 - 4x + 2 = 0$$

$$x + y - 4 = 0$$

① Rewrite linear

$$x = 4 - y$$

② Sub into quadratic & solve

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

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$\cancel{16} - 8y + y^2 + y^2 - \cancel{16} + 4y + 2 = 0$$

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

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

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

Y Solutions

$$y = 1 \quad \text{or} \quad y = 1$$

③ Sub back into linear

$$y = 1 \Rightarrow$$

$$x = 4 - y = 4 - 1 = 3$$

$$x = ?$$

$$\text{pt. } (3, 1)$$