

Simultaneous Equations – One Linear, One Quadratic

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| 1) $y = 2x - 5$ $x^2 + y^2 = 10$ | 2) $x + 2y = 10$ $x^2 + y^2 = 65$ | 3) $2x + y = 5$ $x^2 + y^2 = 25$ |
| 4) $y = 2x + 5$ $x^2 + y^2 = 50$ | 5) $x + 3y = 5$ $x^2 + y^2 = 125$ | 6) $y = 2x + 1$ $x^2 + y^2 = 29$ |
| 7) $x + y = 7$ $x^2 + y + y^2 = 43$ | 8) $y = 3x - 1$ $x^2 + y^2 = 73$ | 9) $x + y = 5$ $x^2 + x + y^2 = 51$ |

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Answers

(For working see next page.)

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| 1) $x = 3, y = 1$ or $x = 1, y = -3$ |
| 2) $x = 8, y = 1$ or $x = -4, y = 7$ |
| 3) $x = 0, y = 5$ or $x = 4, y = -3$ |
| 4) $x = -5, y = -5$ or $x = 1, y = 7$ |
| 5) $x = -10, y = 5$ or $x = 11, y = -2$ |
| 6) $x = 2, y = 5$ or $x = -\frac{14}{5}, y = -\frac{23}{5}$ |
| 7) $x = 1, y = 6$ or $x = \frac{13}{2}, y = \frac{1}{2}$ |
| 8) $x = 3, y = 8$ or $x = -\frac{12}{5}, y = -\frac{41}{5}$ |
| 9) $x = -2, y = 7$ or $x = \frac{13}{2}, y = -\frac{3}{2}$ |

$$\begin{aligned} \textcircled{1} \quad x^2 + (2x-5)^2 &= 10 \\ x^2 + 4x^2 - 20x + 25 &= 10 \\ 5x^2 - 20x + 15 &= 0 \\ x^2 - 4x + 3 &= 0 \\ (x-3)(x-1) &= 0 \\ x=3 \quad \text{or} \quad x=1 \\ y=+1 \quad \quad y=3 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x &= 10 - 2y \\ (10-2y)^2 + y^2 &= 65 \\ 100 - 40y + 4y^2 + y^2 &= 65 \\ 5y^2 - 40y + 35 &= 0 \\ y^2 - 8y + 7 &= 0 \\ (y-7)(y-1) &= 0 \\ y=7 \quad \text{or} \quad y=1 \\ x=-4 \quad \quad x=8 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad y &= 5 - 2x \\ x^2 + (5-2x)^2 &= 25 \\ x^2 + 25 - 20x + 4x^2 &= 25 \\ 5x^2 - 20x &= 0 \\ 5x(x-4) &= 0 \\ x=0 \quad \text{or} \quad x=4 \\ y=5 \quad \quad y=-3 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad x^2 + (2x+5)^2 &= 50 \\ x^2 + 4x^2 + 20x + 25 &= 50 \\ 5x^2 + 20x - 25 &= 0 \\ x^2 + 4x - 5 &= 0 \\ (x+5)(x-1) &= 0 \\ x=-5 \quad \text{or} \quad x=1 \\ y=-5 \quad \quad y=7 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad x &= 5 - 3y \\ (5-3y)^2 + y^2 &= 125 \\ 25 - 30y + 9y^2 + y^2 &= 125 \\ 10y^2 - 30y - 100 &= 0 \\ y^2 - 3y - 10 &= 0 \\ (y-5)(y+2) &= 0 \\ y=5 \quad \text{or} \quad y=-2 \\ x=-10 \quad \quad x=11 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad x^2 + (2x+1)^2 &= 29 \\ x^2 + 4x^2 + 4x + 1 &= 29 \\ 5x^2 + 4x - 28 &= 0 \\ (5x+14)(x-2) &= 0 \\ x=-2.8 \quad \text{or} \quad x=2 \\ y=-4.6 \quad \quad y=5 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad x &= 7 - y \\ (7-y)^2 + y + y^2 &= 43 \\ 49 - 14y + y^2 + y + y^2 &= 43 \\ 2y^2 - 13y + 6 &= 0 \\ (2y-1)(y-6) &= 0 \\ y=1/2 \quad \text{or} \quad y=6 \\ x=6 1/2 \quad \quad x=1 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad x^2 + (3x-1)^2 &= 73 \\ x^2 + 9x^2 - 6x + 1 &= 73 \\ 10x^2 - 6x - 72 &= 0 \\ 5x^2 - 3x - 36 &= 0 \\ (5x+12)(x-3) &= 0 \\ x=-2.4 \quad \text{or} \quad x=3 \\ y=-8.2 \quad \quad y=8 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad y &= 5 - x \\ x^2 + x + (5-x)^2 &= 51 \\ x^2 + x + 25 - 10x + x^2 &= 51 \\ 2x^2 - 9x - 26 &= 0 \\ (2x-13)(x+2) &= 0 \\ x=6 1/2 \quad \text{or} \quad x=-2 \\ y=-1 1/2 \quad \quad y=7 \end{aligned}$$