

L2 Simultaneous Equations Practice #2

Solve the following pairs of Simultaneous Equations

Warm Up

1. $y = \frac{1}{2}x + 4$ and $y = 5x - 2$

2. $2x + y = 4$ and $5x - y = 3$

Achieved

3. $y = x + 4$ and $x^2 + y^2 = 58$

4. $y = x^2 + 5x - 1$ and $4x - y + 1 = 0$

Merit

5. $(x + 2)^2 + y^2 = 400$ and $4x - 3y + 8 = 0$

6. $(a - 3)(b + 1) = 1$ and $a - b = 4$

Excellence

7. $(x + 1)^2 + (y + 2)^2 = 100$ and $y = \frac{x + 37}{7}$

8. Find k so that $y = 5 - x$ is a tangent to $y = x^2 + kx + 14$

Answers: L2 Simultaneous Equations Practice #2

1. $y = \frac{1}{2}x + 4$ and $y = 5x - 2$

make $y = y : \frac{1}{2}x + 4 = 5x - 2$ answer = $(\frac{4}{3}, \frac{14}{3})$

2. $2x + y = 4$ and $5x - y = 3$ rearranges to $2x + y = 4$ and $y = 5x - 3$

substitute out $y : 2x + (5x - 3) = 4$ answer = (1, 2)

3. $y = x + 4$ and $x^2 + y^2 = 58$

substitute out $y : x^2 + (x + 4)^2 = 58$ answer = (-7, -3) and (3, 7)

4. $y = x^2 + 5x - 1$ and $4x - y + 1 = 0$ rearranges to $y = x^2 + 5x - 1$ and $y = 4x + 1$

make $y = y : x^2 + 5x - 1 = 4x + 1$ answer = (-2, -7) and (1, 5)

5. $(x + 2)^2 + y^2 = 400$ and $4x - 3y + 8 = 0$

rearranges to $(x + 2)^2 + y^2 = 400$ and $x = \frac{3}{4}y - 2$ (easier to $\div 4$ than $\div 3$)

substitute out $x : (\frac{3}{4}y - 2 + 2)^2 + y^2 = 400$ which is $(0.75y)^2 + y^2 = 400$

$1.5625y^2 - 400 = 0$ answer = (-14, -16) and (10, 16)

6. $(a - 3)(b + 1) = 1$ and $a - b = 4$ rearranges to $(a - 3)(b + 1) = 1$ and $a = 4 + b$

substitute out the $a : (4 + b - 3)(b + 1) = 1$ which is $(b + 1)(b + 1) = 1$

$b^2 + 2b = 0$ or $b(b + 2) = 0$ answer $a = 2, b = -2$ and $a = 4, b = 0$

7. $(x + 1)^2 + (y + 2)^2 = 100$ and $y = \frac{x + 37}{7}$ rearranges to circle and $x = 7y - 37$

substitute out $x : (7y - 37 + 1)^2 + (y + 2)^2 = 100$ which is

$(7y - 36)^2 + (y + 2)^2 = 100$ which gives $49y^2 - 504y + 1296 + y^2 + 4y + 4 = 100$

$50y^2 - 500y + 1200 = 0$ answer = (-9, 4) and (5, 6)

8. Find k so that $y = 5 - x$ is a tangent to $y = x^2 + kx + 14$

$y = y : 5 - x = x^2 + kx + 14$ which gives : $x^2 + (k + 1)x + 9 = 0$

tangent when $b^2 - 4ac = 0$ which gives: $(k + 1)^2 - 4 \times 1 \times 9 = 0$

$k^2 + 2k - 35 = 0$ answer $k = -7$ or 5