

L2 Simultaneous Equations Practice #5

Solve the following pairs of Simultaneous Equations

Warm Up

1. $y = \frac{1}{2}x + 3$ and $y = 2x - 3$

2. $4x + 2y = 5$ and $8x - 5y = -0.5$

Achieved

3. $b = 4a - 3$ and $b = a^2$

4. $y = \frac{1}{x-2}$ and $y = \frac{1}{2}(x-3)$

Merit

5. $x^2 + y^2 + 2x - 7 = 0$ and $y = x - 3$

6. $x^2 + \left(\frac{y}{4}\right)^2 = 10$ and $y = 4x - 8$

Excellence

7. Find k so that $y = k - 2x$ is a tangent to $y = \frac{1}{x}$

8. Find k so that $y = 3x + k$ intersects $x^2 + y^2 = 12$

Answers: L2 Simultaneous Equations Practice #5

1. $y = \frac{1}{2}x + 3$ and $y = 2x - 3$

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

2. $4x + 2y = 5$ and $8x - 5y = -0.5$ rearranges to $y = 2.5 - 2x$ and $8x - 5y = -0.5$

substitute out $y : 8x - 5(2.5 - 2x) = -0.5$ answer = $(\frac{2}{3}, \frac{7}{6})$

3. $b = 4a - 3$ and $b = a^2$

make $b = b : 4a - 3 = a^2$ which rearranges to give $a^2 - 4a + 3 = 0$

Quadratic, just a not the usual x answer $a = 3, b = 9$ and $a = 1, b = 1$

4. $y = \frac{1}{x-2}$ and $y = \frac{1}{2}(x-3)$ rearranges to give $y(x-2) = 1$ and $x = 2y + 3$

make $x = x : y(2y + 3 - 2) = 1$ answer = (1, -1) and (4, 0.5)

5. $x^2 + y^2 + 2x - 7 = 0$ and $y = x - 3$

substitute out $y : x^2 + (x-3)^2 + 2x - 7 = 0$ which gives $2x^2 - 4x + 2 = 0$

One solution, at $x = 1$, as it is a tangent answer = (1, -2)

6. $x^2 + (\frac{y}{4})^2 = 10$ becomes $x^2 + \frac{y^2}{16} = 10$ multiply by 16 gives $16x^2 + y^2 = 160$

substitute out $y : 16x^2 + (4x-8)^2 = 160$ answer = (3, 4) or (-1, -12)

7. $y = k - 2x$ is a tangent to $y = \frac{1}{x}$ rearranges to $y = k - 2x$ and $xy = 1$

substitute out $y : x(k - 2x) = 1$ rearranges to give $2x^2 - kx + 1 = 0$

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

$k^2 = 8$ answer $k = \pm\sqrt{8}$

8. Find k so that $y = 3x + k$ intersects $x^2 + y^2 = 12$

$y = y : x^2 + (3x + k)^2 = 12$ which gives : $10x^2 + (6k)x + (k^2 - 12) = 0$

intersection when $b^2 - 4ac \geq 0$ which gives: $(6k)^2 - 4 \times 10 \times (k^2 - 12) \geq 0$

$4k^2 \leq 480$ answer $-\sqrt{120} \leq k \leq \sqrt{120}$ (note, **not** <)