L2 Simultaneous Equations Practice #3

Solve the following pairs of Simultaneous Equations

Warm Up

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

2. $3x + y + 5 = 0$ and $2x + 3y = 6$

Achieved

3. $y = \dfrac{6}{x - 2}$ and $x - 6y - 2 = 0$

4. $(x + 3)^2 + y^2 = 10$ and $y = {}^-2x + 1$

Merit

5. $x = (y - 3)^2 + 5$ and $y = \frac{1}{2}(x + 1)$

6. $y = \dfrac{-4}{x - 3}$ and $y = {}^-\frac{1}{4}x + \frac{3}{4}$

Excellence

7. $y = \dfrac{(x + 4)^2 - 12}{12}$ and $y = \dfrac{4}{x}$

8. Find k so that $y = kx + 2$ is a tangent to $y = x^2 + 2x + 6$

Answers: L2 Simultaneous Equations Practice #3

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

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

2. $3x + y + 5 = 0$ and $2x + 3y = 6$ rearranges to $y = {}^-3x - 5$ and $2x + 3y = 6$

   substitute out y : $2x + 3({}^-3x - 5) = 6$ answer $= ({}^-3, 4)$

3. $y = \frac{6}{x-2}$ and $x - 6y - 2 = 0$ rearranges to $y(x - 2) = 6$ and $x = 6y + 2$

   substitute out x : $y(6y + 2 - 2) = 6$

   $y^2 = 1$, so $y = \pm 1$ (not just $y = 1$)   answer $= ({}^-4, {}^-1)$ and $(8, 1)$

4. $(x + 3)^2 + y^2 = 10$ and $y = {}^-2x + 1$

   substitute out y : $(x + 3)^2 + ({}^-2x + 1)^2 = 10$ so $x^2 + 6x + 9 + 4x^2 - 4x + 1 = 10$

   $5x^2 + 2x = 0$ or $x(5x + 2) = 0$ answer $= ({}^-0.4, 1.8)$ and $(0, 1)$

5. $x = (y - 3)^2 + 5$ and $y = \frac{1}{2}(x + 1)$ rearranges to $x = (y - 3)^2 + 5$ and $x = 2y - 1$

   make $x = x$: $(y - 3)^2 + 5 = 2y - 1$

   $y^2 - 8y + 15 = 0$ answer $= (5, 3)$ and $(9, 5)$

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

   substitute out y : $\frac{1}{4}(-x + 3)(x - 3) = {}^-4$ multiply by 4: $(-x + 3)(x - 3) = {}^-16$

   $x^2 - 6x - 7 = 0$ answer $= (7, {}^-1)$ and $({}^-1, 1)$

7. $y = \frac{(x+4)^2 - 12}{12}$ and $y = \frac{4}{x}$ make $y = y$: $\frac{(x+4)^2 - 12}{12} = \frac{4}{x}$ then multiply out denominators

   $x(x^2 + 8x + 16 - 12) = 48$ which gives $x^3 + 8x^2 + 4x - 48 = 0$

   use graphics to solve   answer $= (2, 2)$, $({}^-4, {}^-1)$ and $({}^-6, {}^-\frac{2}{3})$

8. Find k so that $y = kx + 2$ is a tangent to $y = x^2 + 2x + 6$

   make $y = y$: $kx + 2 = x^2 + 2x + 6$ which gives $x^2 + (2 - k)x + 4 = 0$

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

   $k^2 - 4k - 12 = 0$ answer $k = {}^-2$ or 6