L2 Simultaneous Equations Practice #6

Solve the following pairs of Simultaneous Equations

Warm Up

1. $a = 5b + 4$ and $a + 2b + 10 = 0$

2. $a = \frac{b-3}{4}$ and $2a - b + 9 = 0$

Achieved

3. $y = 8 - x^2$ and $y = x + 2$

4. $a = \frac{5}{b-4}$ and $2a = 5b - 15$

Merit

5. $y^2 + 2x = 11$ and $y - x = 2$

6. $x^2 + xy = 40$ and $x - 3y + 4 = 0$

Excellence

7. Find k so that $x = ky^2 - 2$ does not meet $y = \frac{x+1}{3}$

8. Find k so that $y = kx + 3$ is a tangent to $x = \frac{y+5}{y+2}$

Answers: L2 Simultaneous Equations Practice #6

1. $a = 5b + 4$ and $a + 2b + 10 = 0$

   make $a = a$: $(5b + 4) + 2b + 10 = 0$ answer $a = ^-6$, $b = ^-2$

2. $a = \frac{b-3}{4}$ and $2a - b + 9 = 0$ rearranges to $4a = b - 3$ and $b = 2a + 9$

   substitute out b : $4a = (2a + 9) - 3$ answer $a = 3$, $b = 15$

3. $y = 8 - x^2$ and $y = x + 2$

   make $y = y$: $8 - x^2 = x + 2$ answer = (2, 4) or ($^-3$, $^-1$)

4. $a = \frac{5}{b-4}$ and $2a = 5b - 15$ rearrange to $a(b - 4) = 5$ and $b = 0.4a + 3$

   substitute out b : $a(0.4a + 3 - 4) = 5$ answer $a = 5$, $b = 5$ or $a = ^-2.5$, $b = 2$

5. $y^2 + 2x = 11$ and $y - x = 2$ rearranges to $y^2 + 2x = 11$ and $y = x + 2$

   substitute in y : $(x + 2)^2 + 2x = 11$ gives $x^2 + 4x + 4 + 2x = 11$

   $x^2 + 6x - 7 = 0$ answer = (1, 3) and ($^-7$, $^-5$)

6. $x^2 + xy = 40$ and $x - 3y + 4 = 0$ rearranges to $x^2 + xy = 40$ and $x = 3y - 4$

   substitute out x : $(3y - 4)^2 + (3y - 4)y = 40$ gives $9y^2 - 24y + 16 + 3y^2 - 4y = 40$

   $12y^2 - 28y - 24 = 0$ answer = (5, 3) and ($^-6$, $^-\frac{2}{3}$)

7. $x = ky^2 - 2$ does not meet $y = \frac{x+1}{3}$ rearranges to $x = ky^2 - 2$ and $x = 3y - 1$

   substitute out x : $ky^2 - 2 = 3y - 1$ which gives : $k\,y^2 - 3y - 1 = 0$

   no intersection when $b^2 - 4ac < 0$ which gives: $(^-3)^2 - 4 \times k \times ^-1 < 0$

   $9 + 4k < 0$ answer $k < ^-2.25$

8. $y = kx + 3$ is a tangent to $x = \frac{y+5}{y+2}$ rearranges to $y = kx + 3$ and $x(y + 2) = y + 5$

   substitute out y : $x(kx + 3 + 2) = (kx + 3) + 5$ which gives $kx^2 + (5 - k)x - 8 = 0$

   tangent when $b^2 - 4ac = 0$ which gives: $(5 - k)^2 - 4 \times k \times ^-8 = 0$

   $k^2 + 22k + 25 = 0$ answer $k = ^-1.202$ or $^-20.79$