

6.4 Answers

GCSE Mathematics Simultaneous Equations III

6.4.1 Solution to Example #1

$$x^2 - 2x - 3 = 0$$

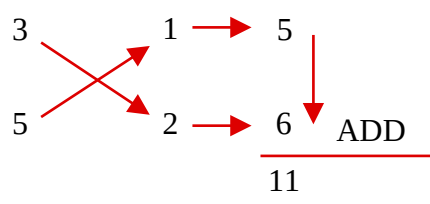
$$(x + 1)(x - 3) = 0$$

$$\text{Either } x + 1 = 0 \text{ or } x - 3 = 0$$

$$x = -1 \text{ or } x = 3$$

6.4.2 Solution to Example #2

$$y = 15x^2 + 11x + 2$$

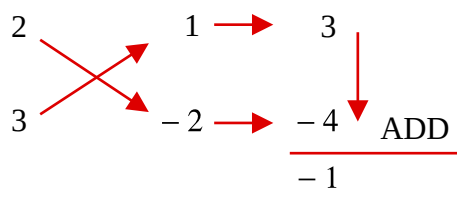

$$\begin{array}{r} 3 \quad 1 \rightarrow 5 \\ 5 \quad 2 \rightarrow 6 \end{array} \quad \begin{array}{r} \text{ADD} \\ \hline 11 \end{array}$$

$$y = (3x + 1)(5x + 2)$$

6.4.3 Solution to Example #3

$$y = 6x^2 - x - 2$$

$$6x^2 - x - 2 = 0$$


$$\begin{array}{r} 2 \quad 1 \rightarrow 3 \\ 3 \quad -2 \rightarrow -4 \end{array} \quad \begin{array}{r} \text{ADD} \\ \hline -1 \end{array}$$

$$(2x + 1)(3x - 2) = 0$$

$$\text{Either } 2x + 1 = 0 \text{ or } 3x - 2 = 0$$

$$x = -\frac{1}{2} \text{ or } x = \frac{2}{3}$$

6.4.4 Solutions to 6.3 Exercise

Answer 1

$$\begin{aligned} \text{(i)} \quad y &= 2x^2 + 13x + 15 \\ y &= (2x + 3)(x + 5) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad y &= 7x^2 + 23x + 6 \\ y &= (7x + 2)(x + 3) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad y &= 9x^2 + 24x + 7 \\ y &= (3x + 1)(3x + 7) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= 6x^2 + 25x + 25 \\ y &= (3x + 5)(2x + 5) \end{aligned}$$

Answer 2

$$\begin{aligned} \text{(i)} \quad y &= 10x^2 - 9x + 2 \\ y &= (2x - 1)(5x - 2) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad y &= 6x^2 - 13x + 5 \\ y &= (3x - 5)(2x - 1) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad y &= 3x^2 - 7x + 4 \\ y &= (3x - 4)(x - 1) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= 3x^2 - 20x + 33 \\ y &= (3x - 11)(x - 3) \end{aligned}$$

Answer 3

$$\begin{aligned} \text{(i)} \quad y &= 5x^2 - 33x - 14 \\ y &= (5x + 2)(x - 7) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad y &= 6x^2 + 7x - 5 \\ y &= (2x - 1)(3x + 5) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad y &= 4x^2 - 4x - 3 \\ y &= (2x + 1)(2x - 3) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= 14x^2 + 15x - 9 \\ y &= (7x - 3)(2x + 3) \end{aligned}$$

Answer 4

$$\begin{aligned} \text{(i)} \quad y &= 18x^2 + 27x + 10 \\ y &= (3x + 2)(6x + 5) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad y &= 24x^2 + 7x - 6 \\ y &= (8x - 3)(3x + 2) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad y &= 12x^2 + 56x + 9 \\ y &= (6x + 1)(2x + 9) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad y &= 13x^2 - 43x - 36 \\ y &= (13x + 9)(x - 4) \end{aligned}$$

Answer 5

$$\begin{aligned} \text{(i)} \quad 2x^2 + 7x + 3 &= 0 \\ (2x + 1)(x + 3) &= 0 \\ \text{Either } x &= -\frac{1}{2} \text{ or } x = -3 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad 4x^2 - 12x - 7 &= 0 \\ (2x + 1)(2x - 7) &= 0 \\ \text{Either } x &= -\frac{1}{2} \text{ or } x = \frac{7}{2} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad 3x^2 + 13x - 10 &= 0 \\ (3x - 2)(x + 5) &= 0 \\ \text{Either } x &= \frac{2}{3} \text{ or } x = -5 \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad 9x^2 - 38x + 8 &= 0 \\ (9x - 2)(x - 4) &= 0 \\ \text{Either } x &= \frac{2}{9} \text{ or } x = 4 \end{aligned}$$

Answer 6

To find the roots, set y equal to zero,

$$12x^2 + 23x + 10 = 0$$

$$(3x + 2)(4x + 5) = 0$$

$$\text{Either } x = -\frac{2}{3} \text{ or } x = -\frac{5}{4}$$

Answer 7

$$3x^2 = 2x + 16$$

$$3x^2 - 2x - 16 = 0$$

$$(x + 2)(3x - 8) = 0$$

$$\text{Either } x = -2 \text{ or } x = \frac{8}{3}$$

Answer 8

$$x^2 + 8x - 7 = \frac{1}{2}x - 3$$

$$2x^2 + 16x - 14 = x - 6$$

$$2x^2 + 15x - 8 = 0$$

$$(2x - 1)(x + 8) = 0$$

$$\text{Either } x = \frac{1}{2} \text{ or } x = -8$$

$$\text{Points are } \left(\frac{1}{2}, -\frac{11}{4} \right), \left(-8, -\frac{49}{16} \right)$$

Answer 9

$$x - y = 3 \Leftrightarrow x = y + 3$$

$$y^2 + (y + 3)y = 5$$

$$y^2 + y^2 + 3y = 5$$

$$2y^2 + 3y - 5 = 0$$

$$(y - 1)(2y + 5) = 0$$

$$\text{Either } y = 1 \text{ or } y = -\frac{5}{2}$$

$$\text{Points are } (4, 1) \text{ or } \left(\frac{1}{2}, -\frac{5}{2} \right)$$

This document is a part of a **Mathematics Community Outreach Project** initiated by Shrewsbury School

It may be freely duplicated and distributed, unaltered, for non-profit educational use

In October 2020, Shrewsbury School was voted “**Independent School of the Year 2020**”

© 2025 Number Wonder

Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com