



Questions

Expand the following:

1. $(x + 3)(x - 3)$
2. $(y - 2)(y + 1)$
3. $\left(\frac{5v}{3} + 1\right)(v - 1)$
4. $(y - 2)(y - 2)$
5. $(2x - 3)(x - 1)$

Factorise the following, and find the solutions, using a method of your choice:

1. $x^2 - 2x - 3 = 0$
2. $x^2 + 6x + 8 = 0$
3. $2x^2 + 5x + 3 = 0$
4. $4x^2 + 2x - 2 = 0$
5. $3y^2 + \frac{7y}{2} + \frac{1}{2} = 0$
6. $a^2 - 3a - 4 = 0$
7. $x^2 - 4x - 3 = 0$
8. $\frac{x^2}{6} + \frac{11x}{12} + 1 = 0$

Answers

Expand:

1. $x^2 - 9$

2. $y^2 - y - 2$

3. $\frac{5v^2}{3} - \frac{2v}{3} - 1$

4. $y^2 - 4y + 4$

5. $2x^2 - 5x + 3$

Factorise and find solutions:

1. $x = \frac{2 \pm \sqrt{4+12}}{2} = \frac{2 \pm \sqrt{16}}{2} = \frac{2 \pm 4}{2} = 1 \pm 2$

Solutions: $x = -1, x = 3$

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

2. $x = \frac{-6 \pm \sqrt{4}}{2} = \frac{-6 \pm 2}{2} = -3 \pm 1$

Solutions: $x = -2, x = -4$

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

3. $x = \frac{-5 \pm \sqrt{1}}{4} = \frac{-5 \pm 1}{4}$

Solutions: $x = -\frac{3}{2}, x = -1$

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

4. $x = \frac{-2 \pm \sqrt{36}}{8} = \frac{-2 \pm 6}{8} = \frac{-1 \pm 3}{4}$

Solutions: $x = \frac{1}{2}, x = -1$

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

5. $y = \frac{-\frac{7}{2} \pm \sqrt{\frac{25}{4}}}{6} = \frac{-\frac{7}{2} \pm \frac{5}{2}}{6} = \frac{-7 \pm 5}{12}$

Solutions: $y = -\frac{1}{6}, y = -1$

$\left(3y + \frac{1}{2}\right)(y + 1) = 0$

6. $a = \frac{3 \pm \sqrt{25}}{2} = \frac{3 \pm 5}{2}$

Solutions: $a = 4, a = -1$

$(a - 4)(a + 1) = 0$

7. $x = \frac{4 \pm \sqrt{16+12}}{2} = \frac{4 \pm \sqrt{28}}{2} = \frac{4 \pm 2\sqrt{7}}{2} = 2 \pm \sqrt{7}$

Solutions: $x = 2 + \sqrt{7}, x = 2 - \sqrt{7}$

$(x - 2 - \sqrt{7})(x - 2 + \sqrt{7}) = 0$

$\frac{x^2}{6} + \frac{11x}{12} + 1 = 0$

$$8. x = \frac{\frac{-11 \pm \sqrt{25}}{12} \pm \sqrt{144}}{\frac{2}{6}} = \frac{\frac{-11 \pm 5}{12} \pm \frac{1}{3}}{\frac{1}{3}} = \frac{-11 \pm 5}{4}$$

$$\text{Solutions: } x = -4, x = -\frac{3}{2}$$

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

You may have spotted that does not expand to give $\frac{x^2}{6} + \frac{11x}{12} + 1 = 0$, but rather $2x^2 + 11x + 12 = 0$. These are equivalent since they are equal to 0, so we have simply multiplied the first by 12 on both sides.

To factorise the original, we need to divide by 12:

$$\frac{1}{12}(2x + 3)(x + 4) = 0$$

$$\frac{1}{6}(2x + 3) \frac{1}{2}(x + 4) = 0$$

$$\left(\frac{1x}{3} + \frac{1}{2}\right)\left(\frac{x}{2} + 2\right) = 0$$

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