Name:

Level 2 Further Maths

Solving Quadratics by Factorising

Ensure you have: Pencil or pen

Answers

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

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1. Solve \(2x^2 + 5x + 2 = 0\)

\[
(2x + 1)(x + 2) = 0
\]

\[
x = \frac{-1}{2} \quad \text{or} \quad x = -2
\]

2. Solve \(3x^2 - x - 2 = 0\)

\[
(3x + 2)(x - 1) = 0
\]

\[
x = -\frac{2}{3} \quad \text{or} \quad x = 1
\]

3. Solve \(2x^2 - x - 6 = 0\)

\[
(2x + 3)(x - 2) = 0
\]

\[
x = -\frac{3}{2} \quad \text{or} \quad x = 2
\]
4. Solve \(7x^2 - 22x + 16 = 0\)

\[ (7x - 8)(x - 2) = 0 \]
\[ x = \frac{8}{7} \quad \text{or} \quad x = 2 \]

(2)

5. Solve \(2x^2 + 15x - 38 = 0\)

\[ (x - 2)(2x + 19) = 0 \]
\[ x = 2 \quad \text{or} \quad x = -\frac{19}{2} \]

(2)

6. Solve \(4x^2 + 12x - 7 = 0\)

\[ (2x - 1)(2x + 7) = 0 \]
\[ x = \frac{1}{2} \quad \text{or} \quad x = -\frac{7}{2} \]

(3)
7. Solve \( 6x^2 + 31x + 5 = 0 \)

\[
(6x + 1)(x + 5) = 0
\]

\[
x = -\frac{1}{6} \text{ or } x = -5
\]

8. Solve \( 4x^2 - 4x - 35 = 0 \)

\[
(2x + 5)(2x - 7) = 0
\]

\[
x = -\frac{5}{2} \text{ or } x = \frac{7}{2}
\]

9. Solve \( 12x^2 + 25x + 12 = 0 \)

\[
(4x + 3)(3x + 4) = 0
\]

\[
x = -\frac{4}{3} \text{ or } x = -\frac{3}{4}
\]

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10. Solve $16x^2 - 30x + 9 = 0$
   
   $(8x - 3)(2x - 3) = 0$
   
   $x = \frac{3}{8}$ or $x = \frac{3}{2}$

11. Solve $100x^2 - 169 = 0$
   
   $(10x - 13)(10x + 13) = 0$
   
   $x = \frac{13}{10}$ or $x = -\frac{13}{10}$

12. Solve $6y^2 + 4 = 13 - 3y + 4y^2$
   
   $2y^2 + 3y - 9 = 0$
   
   $(y + 3)(2y - 3) = 0$
   
   $y = -3$ or $y = \frac{3}{2}$
13. Solve $3(x + 1) = 3x^2 + x + 2$

$0 = 3x^2 - 2x - 1$

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

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

14. Solve $\frac{(4x + 3)(x + 2)}{x + 1} = 3$

$(4x + 3)(x + 2) = 3(x + 1)$

$4x^2 + 11x + 6 = 3x + 3$

$4x^2 + 8x + 3 = 0$

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

$x = -\frac{1}{2} \text{ or } x = -\frac{3}{2}$
15. Solve \( \frac{2}{x^2} + \frac{13}{x} + 6 = 0 \)

\[
2 + 13x + 6x^2 = 0 \\
6x^2 + 13x + 2 = 0 \\
(x + 2)(6x + 1) = 0 \\
x = -2 \text{ or } x = -\frac{1}{6}
\]

16. Solve \( \frac{2x - 1}{4} = \frac{1}{2x - 1} \)

\[
(2x - 1)(2x - 1) = 4 \\
4x^2 - 4x + 1 = 4 \\
4x^2 - 4x - 3 = 0 \\
(2x - 3)(2x + 1) = 0 \\
x = \frac{3}{2} \text{ or } x = -\frac{1}{2}
\]
17. Solve \( \frac{3}{x^2} - \frac{5}{x} - 12 = 0 \)

\[
3 - 5x - 12x^2 = 0 \\
12x^2 + 5x - 3 = 0 \\
(3x - 1)(4x + 3) = 0 \\
x = \frac{1}{3} \text{ or } x = -\frac{3}{4}
\]

18. A rectangular field has a width of \( x \) metres.
The length of the field is 25 metres greater than twice the width of the field.
The area of the field is 450m²

Work out the length of the field.

\[
x(2x + 25) = 450 \\
2x^2 + 25x - 450 = 0 \\
(x - 10)(2x + 45) = 0 \\
x = 10 \text{ or } x = -\frac{45}{2}
\]
19. Shown is a right angled triangle.

(a) Show that \(11x^2 - 42x - 8 = 0\)

\[
(x + 1)^2 + (2x + 4)^2 = (4x - 3)^2
\]

\[
x^2 + 2x + 1 + 4x^2 + 16x + 16 = 16x^2 - 24x + 9
\]

\[
5x^2 + 18x + 17 = 16x^2 - 24x + 9
\]

\[
0 = 11x^2 - 42x - 8
\]

(b) Find the value of \(x\)

\[
11x^2 - 42x - 8 = 0
\]

\[
(x - 4)(11x + 2) = 0
\]

\[
x = 4 \quad \text{or} \quad x = -\frac{2}{11}
\]

\[
\boxed{4}
\]
20. Solve the equation \( 7x - 22x^{\frac{1}{2}} + 16 = 0 \)

Let \( x = y^2 \)

\( 7y^2 - 22y + 16 = 0 \)

\( (7y - 8)(y - 2) = 0 \)

\( y = \frac{8}{7} \) or \( y = 2 \)

\( x = \frac{64}{49} \) or \( x = 4 \)

21. Solve the equation \( 4x^4 - 11x^2 + 6 = 0 \)

Let \( y = x^2 \)

\( 4y^2 - 11y + 6 = 0 \)

\( (y - 2)(4y - 3) = 0 \)

\( y = 2 \) or \( y = \frac{3}{4} \)

\( x = \sqrt{2} \) or \( x = -\frac{\sqrt{3}}{2} \)
22. Solve \(8x^2+4x+3 = 16x^2+5x+6\)

\[
\begin{align*}
(2^3) x^2 + 4x + 3 &= (2^4) x^2 + 5x + 6 \\
2^3 x^2 + 12x + 9 &= 2^4 x^2 + 20x + 24 \\
3x^2 + 12x + 9 &= 4x^2 + 20x + 24 \\
0 &= x^2 + 8x + 15 \\
0 &= (x+3)(x+5) \\
x &= -3 \text{ or } x = -5
\end{align*}
\]