Quadratic formula and exact surd answers

6 questions | 17 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $x^2 - 6x + 1 = 0$ exactly. [3 marks]

The discriminant is 32.

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

Answer: $x = 3 \pm 2\sqrt{2}$

2. Solve $2x^2 + 4x - 3 = 0$ exactly. [3 marks]

The discriminant is 40.

$x = \frac{-4 \pm 2\sqrt{10}}{4}$.

Answer: $x = \frac{-2 \pm \sqrt{10}}{2}$

3. Solve $3x^2 - 5x + 1 = 0$ exactly. [3 marks]

Use $a = 3, b = -5, c = 1$.

The discriminant is 13.

Answer: $x = \frac{5 \pm \sqrt{13}}{6}$

4. Solve $x^2 = 3x + 2$ exactly. [3 marks]

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

Use the quadratic formula.

Answer: $x = \frac{3 \pm \sqrt{17}}{2}$

5. A positive length x satisfies $x^2 + 2x = 8$. Find x. [2 marks]

The equation is $x^2 + 2x - 8 = 0$.

Roots are 2 and -4; only 2 is positive.

Answer: $x = 2$

6. Give both roots of $x^2 - 2x - 4 = 0$ to 3 decimal places. [3 marks]

Exact roots are $1 \pm \sqrt{5}$.

Evaluate both branches and round the final values.

Answer: $x \approx -1.236, 3.236$