Algebra and functions

P1 | Study notes, worked example and practice

What to understand

Use index laws before simplifying expressions. Rationalise a denominator by multiplying by a suitable surd or conjugate.

A quadratic can be solved by factorising, completing the square or using the quadratic formula. The discriminant tells you how many real roots exist.

Key formulae

$$a^m a^n = a^{m+n}, \qquad a^{-n} = \frac{1}{a^n}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \qquad \Delta = b^2 - 4ac$$

$$x^2 + 2px + q = (x + p)^2 + q - p^2$$

Worked example

$$x^2 + 6x + 2 = (x + 3)^2 - 7$$

Complete the square by halving the coefficient of x, then adjust the constant.

Practice questions

Show your working. Try these without looking at the answers.

1. Simplify $\sqrt{50} - \sqrt{8}$.

2. Solve $x^2 - 5x + 6 = 0$.

3. Write $x^2 + 6x + 2$ in completed-square form.

4. Solve $x^2 - 5x + 6 < 0$.

Answers

Use these to check the method as well as the final answer.

1. $3\sqrt{2}$.

2. $x = 2$ or 3.

3. $(x + 3)^2 - 7$.

4. $2 < x < 3$.