Year 1 Pure Chapter 7 – Algebraic Methods

Algebraic Fractions

Golden rule:

factorise as soon as you can.

Long Division

$3x^2 - 2x + 4 \div x - 1$

$$
\begin{array}{r|l}
 & 3x^2 \;+\; 3x \;+1 \\
\hline
x - 1 & 3x^3 + 0x^2 - 2x + 4 \\
 & \underline{3x^3 - 3x^2} \\
 & \qquad 3x^2 - 2x \\
 & \qquad \underline{3x^2 - 3x} \\
 & \qquad\qquad x + 4 \\
 & \qquad\qquad \underline{x - 1} \\
 & \qquad\qquad\quad 5
\end{array}
$$

The remainder is 5.

Factor Theorem

Is $x - 2$ a factor of

$x^3 + x^2 - 4x - 4$?

$(2)^3 + (2)^2 - 4(2) - 4$

$= 0$

Remainder is 0

$\therefore\ x - 2$ is a factor.

Is $x + 3$ a factor

$x^3 + x^2 - 4x - 4$?

$(-3)^3 + (-3)^2 - 4(-3) - 4$

$= -10$

Remainder is -10

$\therefore\ x + 3$ is a not a factor

Proofs by Deduction

Tips

- Show LHS ≡ RHS

- Complete the square to show a max or min value

- Use properties of shapes

Proofs by Exhaustion

Tips

Break the statement down into smaller case and prove each smaller case.

Maybe break it down into odd (2n+1) and even (2n).

Proofs by Counter-Example

Tips

You only need one counter-example to show that a statement is false.