Lower 6 Chapter 7

Algebraic Methods

Chapter Overview

1. Algebraic Fractions
2. Algebraic Long Division
3. Factor Theorem
4. Proof

2 **Algebra and functions** *continued*	2.6	**Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem.**	**Only division by $(ax + b)$ or $(ax - b)$ will be required. Students should know that if $f(x) = 0$ when $x = a$, then $(x - a)$ is a factor of $f(x)$.** **Students may be required to factorise cubic expressions such as $x^3 + 3x^2 - 4$ and $6x^3 + 11x^2 - x - 6$.**
		Simplify rational expressions, including by factorising and cancelling, and algebraic division (by linear expressions only).	Denominators of rational expressions will be linear or quadratic, e.g. $\frac{1}{ax+b}$, $\frac{ax+b}{px^2+qx+r}$, $\frac{x^3+a^3}{x^2-a^2}$
1 **Proof**	1.1	**Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion; use methods of proof, including:**	**Examples of proofs:**
		Proof by deduction	**Proof by deduction** **e.g. using completion of the square, prove that $n^2 - 6n + 10$ is positive for all values of n or, for example, differentiation from first principles for small positive integer powers of x** or proving results for arithmetic and geometric series. **This is the most commonly used method of proof throughout this specification**
		Proof by exhaustion	**Proof by exhaustion** **This involves trying all the options. Suppose x and y are odd integers less than 7. Prove that their sum is divisible by 2.**
		Disproof by counter example	**Disproof by counter example** **e.g. show that the statement "$n^2 - n + 1$ is a prime number for all values of n" is untrue**

Simplifying Algebraic Fractions

Examples

1. $\frac{x^2-1}{x^2+x}$

2. $\frac{x^2+3x+2}{x+1}$

3. $\frac{2x^2+11x+12}{x^2+9x+20}$

4. $\frac{4-x^2}{x^2+2x-8}$

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