**7A Cancelling Algebraic Fractions**

1. Simplify the following fractions
2. $\frac{7x^{4}-2x^{3}+6x}{x}$
3. $\frac{(x+7)(2x-1)}{(2x-1)}$
4. $\frac{x+3}{x^{2}+7x+12}$
5. $\frac{x^{2}+6x+5}{x^{2}+3x-10}$
6. $\frac{2x^{2}+11x+12}{(x+3)(x+4)}$

**7B Polynomial Division**

1. Divide x3 + 2x2 – 17x + 6 by (x – 3)
2. Given that $f\left(x\right)=4x^{4}-17x^{2}+4$, write $f\left(x\right)$ in the form:

 $f\left(x\right)=(2x+1)(ax^{3}+bx^{2}+cx+d)$

1. Find the remainder when $2x^{3}-5x^{2}-16x+10$ is divided by $(x-4)$

**7C The Factor Theorem**

1. Show that $(x-2)$ is a factor of $x^{3}+x^{2}-4x-4$ by:
2. Algebraic division
3. The factor theorem
4. Fully factorise $2x^{3}+x^{2}-18x-9$
5. Hence, sketch the graph of $y=2x^{3}+x^{2}-18x-9$

x

y

1. Given that (x + 1) is a factor of 4x4 – 3x2 + a, find the value of a.

**7D Algebraic Proof**

1. Prove that:

$$\left(3x+2\right)\left(x-5\right)\left(x+7\right)≡3x^{3}+8x^{2}-101x-70$$

1. Prove that if $(x-p)$ is a factor of $f(x)$ then $f\left(p\right)=0$
2. Prove that $A(1,1)$, $B\left(3,3\right)$ and $C(4,2)$ are the vertices of a right-angled triangle.
3. The equation $kx^{2}+3kx+2=0$, where k is a constant, has no real roots. Prove that k satisfies the inequality $0\leq k<\frac{8}{9}$.

**7E Proof by Exhaustion, Counter-Example & Jottings**

1. Prove that all square numbers are either a multiple of 4, or 1 more than a multiple of 4
2. Prove that the following statement is not true:

“The sum of two consecutive prime numbers is always even”

1. Prove that for all positive values of x and y:

$$\frac{x}{y}+\frac{y}{x}\geq 2$$