

## 7D Algebraic Proof

1. Prove that:

$$(3x + 2)(x - 5)(x + 7) \equiv 3x^3 + 8x^2 - 101x - 70$$

2. Prove that if  $(x - p)$  is a factor of  $f(x)$  then  $f(p) = 0$

3. Prove that  $A(1,1)$ ,  $B(3,3)$  and  $C(4,2)$  are the vertices of a right-angled triangle.

4. 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”

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

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