

# CHAPTER 4:

## REMAINDER AND FACTOR THEOREM

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1. Given that  $f(x) = x^3 - 3x^2 + 4$ .
  - (a) Find the remainder when  $f(x)$  is divided by  $(x + 1)$ .
  - (b) Solve the equation  $f(x) = 0$

2. (a) Given that  $5x^2 - 4x + 22 \equiv A(x - 1)^2 + B(x + 2) - C$  for all values of  $x$ , find the values of  $A$ ,  $B$  and  $C$ .
- (b) Given that  $f(x) = 3x^3 - 5x^2 - 16x + 12$ .
- (i) Calculate the remainder when  $f(x)$  is divided by  $(x - 3)$ .
- (ii) Solve the equation  $f(x) = 0$ .

3. (a) Find the remainder when  $5x^3 + 7x^2 - 5x - 17$  is divided by  $(2x + 1)$ .
- (b) Given that  $2x^3 + 7x^2 - px + 18$  leaves a remainder of 5 when divided by  $(x - 1)$ , find the values of  $p$ .
- (c) Given that  $2x^3 - 3x^2 + px + 10 = (2x - 1)(x - 2)(x + q) + 4x + r$  for all values of  $x$ , find the values of  $p$ ,  $q$  and  $r$ .
- (d) The expression  $4x^3 + px^2 - qx + 18$  leaves a remainder of 3 and  $-3$  when divided by  $(x-1)$  and  $(x - 3)$  respectively, find the values of  $p$  and  $q$ .

4. (a) Find the remainder when  $4x^3 + 6x^2 - 2x - 14$  is divided by  $(2x - 5)$ .
- (b) Given that  $(x - 2)$  is a factor of  $2x^3 - 3x^2 + kx + 12$ , find the value of  $k$ . [2]
- (c) Solve the equation  $3x^3 - 24x^2 + 37x + 24 = 0$ , giving answers correct to 2 decimal places where necessary.
- (d) One of the factors of  $x^2 - 5x + 6$  is a factor of  $f(x) = x^3 + hx^2 - 4x + 3$  where  $h$  is an integer. Find the common factor and the value of  $h$ , hence find the remainder when  $f(x)$  is divided by  $(3x + 2)$ .

5. (a) Solve the equation  $2x^3 - 7x^2 + 3x + 6 = 0$ , giving your answer correct to 2 decimal places where necessary.
- (b) The expression  $x^3 + 2ax^2 - bx - 5a$  is exactly divisible by  $x^2 + 6x + 5$ . Calculate the values of  $a$  and  $b$ .

6. (a) Find the remainder when  $x^3 - 3x^2 + 5x - 13$  is divided by  $(x + 1)$ .
- (b) Given that  $(2x - 1)$  is a factor of  $4x^3 - 9x^2 + kx - 18$ , find the value of  $k$ .
- (c) Solve the equation,  $x^3 - 4x^2 - 13x = 8$  giving your answer correct to 2 decimal places where necessary.
- (d) When the expression  $x^3 - 2x^2 + ax - 2b$  is divided by  $(x - 3)$ , the remainder is  $-4$ .  
When  $x^3 - 2x^2 - x + 36$  is divided by  $(x + 1)$ , the remainder is  $-8$ , find the possible values of  $a$  and of  $b$