Polynomials
Factor & Remainder Theorem
Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Algebra
Sub Topic	Polynomials – Factor & Remainder Theorem
Booklet	Question Paper 4

Time Allowed: **75 minutes**

Score: **/62**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 The polynomial $2x^3 + 7x^2 + ax + b$, where a and b are constants, is denoted by $p(x)$. It is given that $(x + 1)$ is a factor of $p(x)$, and that when $p(x)$ is divided by $(x + 2)$ the remainder is 5. Find the values of a and b. [5]

2 The polynomial $3x^3 + 8x^2 + ax - 2$, where a is a constant, is denoted by $p(x)$. It is given that $(x + 2)$ is a factor of $p(x)$.

(i) Find the value of a. [2]

(ii) When a has this value, solve the equation $p(x) = 0$. [4]

3 The polynomial $2x^3 - 3x^2 + ax + b$, where a and b are constants, is denoted by $p(x)$. It is given that $(x - 2)$ is a factor of $p(x)$, and that when $p(x)$ is divided by $(x + 2)$ the remainder is -20.

(i) Find the values of a and b. [5]

(ii) When a and b have these values, find the remainder when $p(x)$ is divided by $(x^2 - 4)$. [3]

4 The polynomial $4x^3 - 7x + a$, where a is a constant, is denoted by $p(x)$. It is given that $(2x - 3)$ is a factor of $p(x)$.

(i) Show that $a = -3$. [2]

(ii) Hence, or otherwise, solve the equation $p(x) = 0$. [4]

5 The cubic polynomial $ax^3 + bx^2 - 3x - 2$, where a and b are constants, is denoted by $p(x)$. It is given that $(x - 1)$ and $(x + 2)$ are factors of $p(x)$.

(i) Find the values of a and b. [5]

(ii) When a and b have these values, find the other linear factor of $p(x)$. [2]

6 The polynomial $x^3 - x^2 + ax + b$ is denoted by $\mathrm{p}(x)$. It is given that $(x + 1)$ is a factor of $\mathrm{p}(x)$ and that when $\mathrm{p}(x)$ is divided by $(x - 2)$ the remainder is 12.

(i) Find the values of a and b. [5]

(ii) When a and b have these values, factorise $\mathrm{p}(x)$. [2]

7 The cubic polynomial $2x^3 - 5x^2 + ax + b$ is denoted by $\mathrm{f}(x)$. It is given that $(x - 2)$ is a factor of $\mathrm{f}(x)$, and that when $\mathrm{f}(x)$ is divided by $(x + 1)$ the remainder is -6. Find the values of a and b. [5]

8 The cubic polynomial $2x^3 + ax^2 - 13x - 6$ is denoted by $\mathrm{f}(x)$. It is given that $(x - 3)$ is a factor of $\mathrm{f}(x)$.

(i) Find the value of a. [2]

(ii) When a has this value, solve the equation $\mathrm{f}(x) = 0$. [4]

9 The polynomial $x^4 - 6x^2 + x + a$ is denoted by $\mathrm{f}(x)$.

(i) It is given that $(x + 1)$ is a factor of $\mathrm{f}(x)$. Find the value of a. [2]

(ii) When a has this value, verify that $(x - 2)$ is also a factor of $\mathrm{f}(x)$ and hence factorise $\mathrm{f}(x)$ completely. [4]

10 The polynomial $x^4 - 9x^2 - 6x - 1$ is denoted by $\mathrm{f}(x)$.

(i) Find the value of the constant a for which

$$\mathrm{f}(x) \equiv (x^2 + ax + 1)(x^2 - ax - 1).$$ [3]

(ii) Hence solve the equation $\mathrm{f}(x) = 0$, giving your answers in an exact form. [3]