

6.1 Revision

The Factor Theorem

If, for a given polynomial function $p(x)$, $p(a) = 0$ (for some constant, a)
then $(x - a)$ is a factor of $p(x)$

The Remainder Theorem

When a polynomial $p(x)$ is divided by $(x - a)$, where a is a constant,
the remainder is $p(a)$

6.2 The Revision

*Any solution based entirely on graphical
or numerical methods is not acceptable*

Marks Available : 50

Question 1

$$p(x) = 2x^3 + 4x^2 - 6x + 14$$

What is the degree of polynomial $p(x)$?

[1 mark]

Question 2

A polynomial of degree five is called a Quintic.

(i) What is a polynomial of degree 2 called ?

[1 mark]

(ii) What is a polynomial of degree 4 called ?

[1 mark]

Question 3

A-Level Examination Question from May 2011, Paper C2, Q1 (Edexcel)

$$f(x) = 2x^3 - 7x^2 - 5x + 4$$

- (a) Find the remainder when $f(x)$ is divided by $(x - 1)$

[2 marks]

- (b) Use the factor theorem to show that $(x + 1)$ is a factor of $f(x)$

[2 marks]

- (c) Factorise $f(x)$ completely

[4 marks]

Question 4

A-Level Examination Question from January 2011, Paper C2, Q1 (Edexcel)

$$f(x) = x^4 + x^3 + 2x^2 + ax + b \quad \text{where } a \text{ and } b \text{ are constants}$$

When $f(x)$ is divided by $(x - 1)$ the remainder is 7

(a) Show that $a + b = 3$

[2 marks]

When $f(x)$ is divided by $(x + 2)$ the remainder is -8

(b) Find the value of a and the value of b

[5 marks]

Question 5

A-Level Examination Question from January 2008, Paper C2, Q1 (Edexcel)

(a) Find the remainder when

$$x^3 - 2x^2 - 4x + 8$$

is divided by

(i) $x - 3$

(ii) $x + 2$

[3 marks]

(b) Hence, or otherwise, find all solutions to the equation

$$x^3 - 2x^2 - 4x + 8 = 0$$

[4 marks]

Question 6

Additional Mathematics Examination Question from June 2012, Q3 (OCR)

The function $f(x) = x^3 + ax + 6$ is such that when $f(x)$ is divided by $(x - 3)$ the remainder is 12

- (i) Show that the value of a is -7

[2 marks]

- (ii) Factorise $f(x)$

[3 marks]

Question 7

A-Level Examination Question from January 2012, Paper C2, Q5 (Edexcel)

$$f(x) = x^3 + ax^2 + bx + 3 \text{ where } a \text{ and } b \text{ are constants}$$

Given that when $f(x)$ is divided by $(x + 2)$ the remainder is 7,

(a) Show that $2a - b = 6$

[2 marks]

Given also that when $f(x)$ is divided by $(x - 1)$ the remainder is 4

(b) Find the value of a and the value of b

[4 marks]

Question 8

C2 Examination question from June 2008, Q1.

$$f(x) = 2x^3 - 3x^2 - 39x + 20$$

- (a) Use the factor theorem to show that $(x + 4)$ is a factor of $f(x)$

[2 marks]

- (b) Factorise $f(x)$ completely

[4 marks]

Question 9

A-Level Examination Question from January 2005, Paper C2, Q5 (Edexcel)

$$f(x) = x^3 - 2x^2 + ax + b \text{ where } a \text{ and } b \text{ are constants}$$

- When $f(x)$ is divided by $(x - 2)$ the remainder is 1
- When $f(x)$ is divided the $(x + 1)$ the remainder is 28

(a) Find the value of a and the value of b

[6 marks]

(b) Show that $(x - 3)$ is a factor of $f(x)$

[2 marks]