

Factor theorem

Name: _____

Class: _____

Date: _____

Time: **125 min.**

Marks: **105 marks**

Comments:

Q1.

The polynomial $p(x)$ is given by

$$p(x) = x^3 + ax^2 - x - 21$$

where a is a constant.

The remainder when $p(x)$ is divided by $(x + 2)$ is -7

- (a) Use the Remainder Theorem to show that $a = 5$

(2)

- (b) Use the Factor Theorem to show that $(x + 3)$ is a factor of $p(x)$.

(2)

- (c) ° Given that $x > 0$, use your answer to part (b) to find

$$\int \frac{x^3 + 5x^2 - x - 21}{\sqrt{x}(x + 3)} dx$$

(6)

(Total 10 marks)

Q2.

- (a) The expressions $x^2 + bx + c$ and $x^2 - 3mx + 2n$ have a common factor of $(x - p)$, where b, c, m and n are positive.

Show that $p = \frac{2n - c}{b + 3m}$

(3)

- (b) The equation $x^2 + (3k + 1)x + 3(k + 3) = 0$ has no real roots.

Find the range of possible values of k .

Show clearly each step of your working.

(6)

(Total 9 marks)