Lesson 2

2.1 Algebraic Long Division Of Polynomials

Example

$$f(x) = x^3 + 12x^2 + 47x + 60$$

(**i**)   Show by algebraic long division that $f(x)$ is divisible by ($x + 5$)

(**ii**)   Hence factorise $f(x)$ completely

(**iii**)   Hence sketch the graph of $f(x)$

Teaching Video : http://www.NumberWonder.co.uk/v9029/2a.mp4 (Part 1)

http://www.NumberWonder.co.uk/v9029/2b.mp4 (Part 2)

<= Part 1   Part 2 =>

[4, 2, 2 marks]

2.2 Exercise

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

Marks Available : 46

Question 1

$$f(x) = x^3 + 7x^2 + 14x + 8$$

(i)   Show by algebraic long division that $f(x)$ is divisible by $(x+4)$

(ii) Hence factorise $f(x)$ completely

(iii) Hence sketch the graph of $f(x)$

[4, 2, 2 marks]

Question 2

$$f(x) = x^3 + 7x^2 - 9x - 63$$

(i) Show by algebraic long division that $f(x)$ is divisible by $(x + 3)$

(ii) Hence factorise $f(x)$ completely

(iii) Hence sketch the graph of $f(x)$

Be careful with minus signs

e.g. $(-9x) - (12x) = -21x$

[4, 2, 2 marks]

Question 3

$$f(x) = x^3 + 3x^2 - 4x - 12$$

(**i**)   Show by algebraic long division that $f(x)$ is divisible by $(x - 2)$

(**ii**)   Hence factorise $f(x)$ completely.

(**iii**)   Hence sketch the graph of $f(x)$.

Be **VERY** careful with minus signs !

e.g. $(-4x) - (-10x) = 6x$

[4, 2, 2 marks]

Question 4

$$f(x) = x^3 + 6x^2 + 3x - 10$$

Notice that the function "ends" in -10

As a result the likely factors are $(x \pm 1)$, $(x \pm 2)$, $(x \pm 5)$ or $(x \pm 10)$

(**i**) Show by algebraic long division that $f(x)$ is NOT divisible by $(x + 1)$

(**ii**) Try other possibilities from the list, until you find a factor that divides $f(x)$

(**iii**) Hence factorise $f(x)$ completely

(**iv**) Hence sketch the graph of $f(x)$

[4, 4, 2, 2 marks]

Question 5

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

(**i**)　　Use the -6 to list the likely factors of $f(x)$

(**ii**)　　By algebraic long division, find a factor of $f(x)$ of the form $(x + a)$ where a is an integer.

(**iii**)　　Hence factorise $f(x)$ completely

(**iv**)　　Hence sketch the graph of $f(x)$

[2, 4, 2, 2 marks]