Pearson Edexcel AS Mathematics 8MA0

Unit Test 3 Further Algebra

Time allowed: 50 **minutes**

School:

Name:

Teacher:

Question	Points	Score
1	6	
2	7	
3	8	
4	7	
5	12	
6	4	
7	6	
Total:	50	

How I can achieve better:

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1. Use the factor theorem and division to factorise f(x) completely. [6]

$$\text{f}(x) = 2x^3 - x^2 - 13x - 6.$$

2. (a) Expand $(1+3x)^8$ in ascending powers of x, up to and including the term in x^3, simplifying each coefficient in the expansion. [4]

   (b) Showing your working clearly, use your expansion to find, to 5 significant figures, an approximation for 1.03^8. [3]

Total: 7

3. (a) Find the first four terms, in ascending powers of x, of the binomial expansion of $(2 + px)^9$. [4]

   (b) Given that the coefficient of the x^3 term in the expansion is -84.

      i. Find the value of p. [2]

      ii. Find the numerical values for the coefficients of the x and x^2 terms. [2]

Total: 8

4. (a) Fully expand $(p+q)^5$. [2]

A fair four-sided die, numbered $1, 2, 3$ and 4, is rolled 5 times.

Let p represent the probability that the number 4 is rolled on a given roll and let q represent the probability that the number 4 is not rolled on a given roll.

(b) Using the first three terms of the binomial expansion from part a, or otherwise, find the probability that the number 4 is rolled at least 3 times. [5]

Total: 7

5. $f(x) = x^3 + x^2 + px + q$ where p and q are constants.

   Given that $f(5) = 0$ and $f(-3) = 8$.

   (a) find the values of p and q. [7]

   (b) factorise $f(x)$ completely. [5]

Total: 12

6. Prove that, for all values of x, [4]

$$x^2 + 6x + 18 > 2 - \frac{1}{2}x.$$

7. (a) Prove that if $1 + 3x^2 + x^3 < (1 + x)^3$ then $x > 0$. [4]

   (b) Show, by means of a counter example, that the inequality $1 + 3x^2 + x^3 < (1 + x)^3$ is not true for all values of x. [2]

Total: 6