

# Pearson Edexcel AS Mathematics 8MA0

## Unit Test 3 Further Algebra

Time allowed: 50 minutes

School:

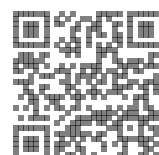
Name:

Teacher:

How I can achieve better:

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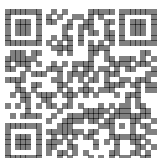
Question	Points	Score
1	6	
2	7	
3	8	
4	7	
5	12	
6	4	
7	6	
Total:	50	



1. Use the factor theorem and division to factorise  $f(x)$  completely.

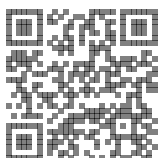
[6]

$$f(x) = 2x^3 - x^2 - 13x - 6.$$



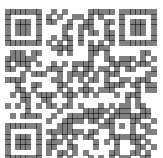
2. (a) Expand  $(1 + 3x)^8$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , simplifying each coefficient in the expansion. [4]
- (b) Showing your working clearly, use your expansion to find, to 5 significant figures, an approximation for  $1.03^8$ . [3]

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



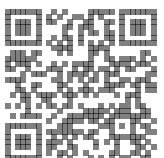
4. (a) Fully expand  $(p + q)^5$ . [2]

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 [5]  
probability that the number 4 is rolled at least 3 times.

Total: 7



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

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

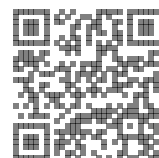
(a) find the values of  $p$  and  $q$ .

[7]

(b) factorise  $f(x)$  completely.

[5]

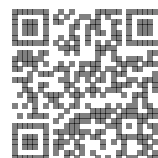
Total: 12



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

