Partial Fractions
Difficulty: Medium

Question Paper 1

Level	A Level only
Subject	Maths - Pure
Exam Board	Edexcel
Topic	Binomial Expansion
Sub-Topic	Partial Fractions
Difficulty	Medium
Booklet	Question Paper 1

Time allowed: **79 minutes**

Score: **/66**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

Question 1

$$f(x) = \frac{3x^2 + 16}{(1-3x)(2+x)^2} = \frac{A}{(1-3x)} + \frac{B}{(2+x)} + \frac{C}{(2+x)^2}, \ |x| < \frac{1}{3}.$$

(*a*) Find the values of A and C and show that $B = 0$. **(4)**

(*b*) Hence, or otherwise, find the series expansion of f(x), in ascending powers of x, up to and including the term in x^3. Simplify each term.

(7)

(Total 11 marks)

Question 2

$$f(x) = \frac{3x-1}{(1-2x)^2}, \qquad |x| < \tfrac{1}{2}$$

Given that, for $x \neq \frac{1}{2}$, $\dfrac{3x-1}{(1-2x)^2} = \dfrac{A}{(1-2x)} + \dfrac{B}{(1-2x)^2}$, where A and B are constants,

(a) find the values of A and B. **(3)**

(b) Hence, or otherwise, find the series expansion of f(x), in ascending powers of x, up to and including the term in x^3, simplifying each term.

(6)

(Total 9 marks)

$$\frac{2x^2+5x-10}{(x-1)(x+2)} \equiv A + \frac{B}{x-1} + \frac{C}{x+2}$$

(a) Find the values of the constants A, B and C.

(4)

(b) Hence, or otherwise, expand $\frac{2x^2+5x-10}{(x-1)(x+2)}$ in ascending powers of x, as far as the term in x^2. Give each coefficient as a simplified fraction.

(7)

(Total 11 marks)

$$\frac{4x^2-4x-9}{(2x+1)(x-1)} \equiv A+\frac{B}{2x+1}+\frac{C}{x-1}.$$

(a) Find the values of the constants A, B and C.

(6 marks)

(b) Hence, or otherwise, expand $\frac{4x^2-4x-9}{(2x+1)(x-1)}$ in ascending powers of x, as far as the x^2 term.

(6 marks)

(c) Explain why the expansion is not valid for $x=\frac{3}{4}$.

(1 mark)

(Total 13 marks)

$$f(x) = \frac{1+14x}{(1-x)(1+2x)}, \qquad |x| < \frac{1}{2}.$$

(a) Express f(x) in partial fractions. (3)

(c) Use the binomial theorem to expand f(x) in ascending powers of x, up to and including the term in x^3, simplifying each term.

(5)

(Total 8 marks)

$$f(x) = \frac{27x^2 + 32x + 16}{(3x+2)^2(1-x)}, \quad |x| < \frac{2}{3}$$

Given that f (x) can be expressed in the form

$$f(x) = \frac{A}{(3x+2)} + \frac{B}{(3x+2)^2} + \frac{C}{(1-x)},$$

(a) find the values of B and C and show that $A = 0$. **(4)**

(b) Hence, or otherwise, find the series expansion of f (x), in ascending powers of x, up to and including the term in x^2. Simplify each term.

(6)

(c) Find the percentage error made in using the series expansion in part (b) to estimate the value of f (0.2). Give your answer to 2 significant figures.

(4)

(Total 14 marks)