

Name	Date started	Target end date
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GCE A LEVEL – PURE MATHEMATICS B QUESTION PACK

0976-01 (Legacy C4) · New spec Unit 3 Topic 5 · A2 unit, 35% of A-level, 120 marks, 2h 30min paper

REVISE
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MATHEMATICS – PURE B · PARTIAL FRACTIONS

Partial Fractions

Every partial fractions question from the legacy WJEC C4 papers (June 2011 – June 2017) for new-spec A2 Unit 3

LEGACY 2008 SPECIFICATION

Estimated time for entire question pack: ~0 hours 59 minutes

Derived from the legacy C3/C4 paper's pace of ~1.25 min/mark (47 marks over 7 questions).

You are advised to *not* attempt to complete all of this in one sitting.

ABOUT THIS QUESTION PACK

This is a **comprehensive practice question pack**, not a single mock paper. It contains questions from the legacy WJEC C3 and C4 papers (2008 modular spec) that maps onto new-spec A2 Unit 3 Topic 5 (2.3.3).

Questions are ordered chronologically.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working – method marks are awarded for clear setup.

A calculator is allowed (except where specified by individual questions). The WJEC Formula Booklet may be referred to.

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Q	Source	Max	Mark	Q	Source	Max	Mark
1	Jun 11 Q1	7		5	Jun 15 Q1	7	
2	Jun 12 Q1	7		6	Jun 16 Q1	6	
3	Jun 13 Q1	7		7	Jun 17 Q1	7	
4	Jun 14 Q2	6		Total			
						47	

Partial Fractions – what the new spec asks

WJEC GCE A Level Mathematics (from 2017) · Unit 3: Pure Mathematics B · Topic 2.3.3.

Partial fractions form 2.3.3

- Linear factor $(ax + b) \rightarrow \frac{A}{ax+b}$.
- Repeated linear $(ax + b)^2 \rightarrow \frac{A}{ax+b} + \frac{B}{(ax+b)^2}$.
- Irreducible quadratic $(ax^2 + bx + c) \rightarrow \frac{Ax+B}{ax^2+bx+c}$.

Applications 2.3.3

- Differentiation: split first, then differentiate term-by-term.
- Integration: split first, then integrate each piece using logs.
- Always check by recombining over a common denominator.

Partial Fractions in one page

Quick-reference notes – revisit before each section. Don't use during questions.

Linear factor

$$\frac{1}{(ax+b)(cx+d)} = \frac{A}{ax+b} + \frac{C}{cx+d}.$$

Find A, C by cover-up: set the matching denominator to zero.

Repeated linear

$$\frac{1}{(ax+b)^2(cx+d)} = \frac{A}{ax+b} + \frac{B}{(ax+b)^2} + \frac{C}{cx+d}.$$

Find B and C by cover-up; find A by substituting another value of x .

Improper fractions

If degree of numerator \geq degree of denominator: divide first.

Express as polynomial + proper fraction, then split.

Cover-up rule

To find A in $\frac{A}{x-2}$: substitute $x = 2$ into the rest of the expression (covering up the $(x - 2)$).

Applications

Integration: $\int \frac{A}{x+a} dx = A \ln|x+a| + c.$

Differentiation: differentiate each partial term separately.

Check

Always recombine over common denominator to verify the decomposition.

SECTION T5

Partial Fractions

Questions 1-7 · 47 marks

1. Given that $f(x) = \frac{x^2 + x + 13}{(x+2)^2(x-3)}$,

(a) express $f(x)$ in terms of partial fractions, [4]

(b) evaluate

$$\int_6^7 f(x) dx,$$

giving your answer correct to three decimal places. [3]

1. The function f is defined by

$$f(x) = \frac{11 + x - x^2}{(x + 1)(x - 2)^2}.$$

- (a) Express $f(x)$ in terms of partial fractions. [4]
- (b) Use your result to part (a) to find the value of $f'(0)$. [3]

1. The function f is defined by

$$f(x) = \frac{6 + x - 9x^2}{x^2(x + 2)}.$$

- (a) Express $f(x)$ in terms of partial fractions. [4]
- (b) Using your result to part (a),
- find an expression for $f'(x)$,
 - verify that $f(x)$ has a stationary value when $x = 2$. [3]

2. (a) Express $\frac{5x^2 + 7x + 17}{(x+1)^2(x-4)}$ in terms of partial fractions. [4]
- (b) Use your answer to part (a) to express $\frac{5x^2 + 9x + 9}{(x+1)^2(x-4)}$ in terms of partial fractions. [2]

1. Given that $f(x) = \frac{2x^2 + 5x + 25}{(x+3)^2(x-1)}$,

(a) express $f(x)$ in terms of partial fractions, [4]

(b) evaluate

$$\int_3^{10} f(x) dx,$$

giving your answer correct to two decimal places. [3]

1. The function f is defined by

$$f(x) = \frac{17 + 4x - x^2}{(2x - 1)(x - 3)^2}.$$

- (a) Express $f(x)$ in terms of partial fractions. [4]
- (b) Use your result to part (a) to find an expression for $f'(x)$. [2]

1. (a) Express $\frac{8x^2 + 7x - 25}{(x-1)^2(x+4)}$ in terms of partial fractions. [4]
- (b) Use your result to part (a) to express $\frac{9x^2 + 5x - 24}{(x-1)^2(x+4)}$ in terms of partial fractions. [3]

END OF PARTIAL FRACTIONS PACK

Source: WJEC C3 + C4 (2008 modular spec) · 2011–2017
Curated for WJEC Maths 2017 spec A2 Unit 3 – Topic 5 (2.3.3)

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