Name	Date started	Target end date

GCE A LEVEL — PURE MATHEMATICS B QUESTION PACK

0975-01 (Legacy C3) · New spec Unit 3 Topic 4 · A2 unit, 35% of A-level, 120 marks, 2h 30min paper

REVISE
.wales

MATHEMATICS — PURE B · MODULUS & INEQUALITIES

Modulus & Inequalities

Every modulus / inequality question from the legacy WJEC C3 papers (June 2011 – June 2017) for new-spec A2 Unit 3 algebra & functions

LEGACY 2008 SPECIFICATION

Estimated time for entire question pack: ~0 hours 55 minutes

*Derived from the legacy C3/C4 paper's pace of **~1.25 min/mark** (44 marks over 8 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 4 (2.3.2).

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.

For Examiner's use only

Q	Source	Max	Mark
1	Jan 12 Q7	5	
2	Jun 12 Q7	6	
3	Jan 13 Q7	6	
4	Jun 13 Q7	6	

Q	Source	Max	Mark
5	Jan 14 Q8	3	
6	Jun 14 Q8	5	
7	Jun 15 Q8	5	
8	Jun 16 Q8	8	
Total		**44**	

Modulus & Inequalities — what the new spec asks

WJEC GCE A Level Mathematics (from 2017) · Unit 3: Pure Mathematics B · Topic 2.3.2.

Modulus equations 2.3.2

- Solve $|f(x)| = g(x)$ by squaring or splitting into cases.
- Always check solutions against the original equation.
- Sketch $y = |f(x)|$ to identify points of intersection.

Modulus inequalities 2.3.2

- $|x| < a \iff -a < x < a$ — both bounds.
- $|x| > a \iff x < -a$ or $x > a$ — two separate intervals.
- For complicated cases, square both sides.

Crib sheet »

Modulus & Inequalities in one page

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

Modulus definition

$|x| = x$ if $x \geq 0$, $-x$ if $x < 0$.

$|x|^2 = x^2$ — useful for squaring both sides.

$|f(x)| = g(x)$

Either $f(x) = g(x)$ or $f(x) = -g(x)$.

Solve each case; reject any solution making $g(x) < 0$.

$|f(x)| = |h(x)|$

Square: $f(x)^2 = h(x)^2$.

Move to one side and factorise as a difference of squares.

Modulus inequalities

$|x| < a \iff -a < x < a$.

$|x| > a \iff x < -a$ or $x > a$.

Sketching $y = |f(x)|$

Sketch $y = f(x)$ then reflect negative parts in x-axis.

$y = f(|x|)$ — reflect right half in y-axis.

Pitfalls

Always check solutions in the original equation.

Squaring can introduce extraneous solutions.

SECTION T4

Modulus & Inequalities

Questions 1–8 · 44 marks

7. Solve the following.

(a) $|4x - 5| \geqslant 3,$ [3]

(b) $(3|x| + 1)^{\frac{1}{3}} = 4.$ [2]

7. Solve the following.

(a) $4|x-3|+2=8-5|x-3|$ [3]

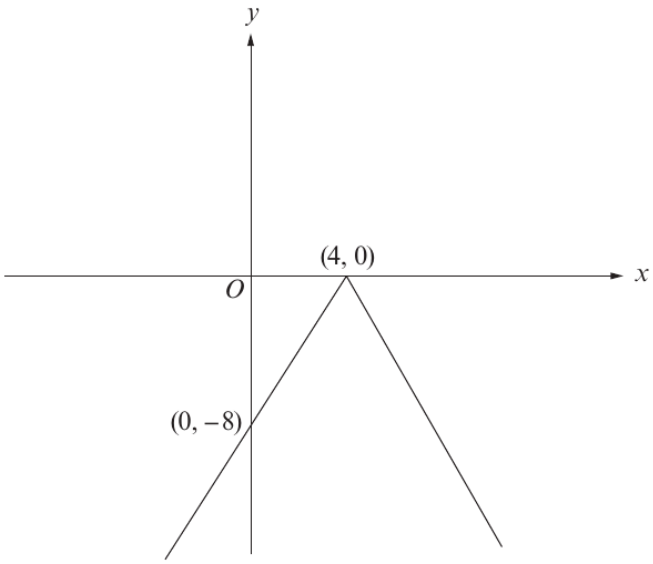
(b) $|5x-2| \leqslant 3$ [3]

TURN OVER

7. *(a)* Solve the inequality $|3x - 4| > 5$. [3]

(b) (i) Sketch the graph of $y = |x|$.

(ii) The diagram below shows a sketch of the graph of $y = a|x + b|$, where a and b are constants. The graph meets the x-axis at the point $(4, 0)$ and the y-axis at the point $(0, -8)$.



Find the value of a and the value of b. [3]

TURN OVER

7. *(a)* Show, by counter-example, that the statement

$$\text{'If } |a + 1| = |b + 1| \text{, then } a = b\text{'}$$

is false. [2]

(b) Solve the inequality

$$|x^2 - 10| \leqslant 6.$$ [4]

8. Solve the equation

$$|3x + 4| = 2|x - 3|.$$ [3]

8. *(a)* Show, by counter-example, that the statement

$$|2a + 3b| \equiv 2|a| + 3|b|$$

is false. [2]

(b) Solve the equation

$$|3x - 2| = 7|x|.$$ [3]

8. *(a)* Find all values of x satisfying the inequality $|3x - 5| \leqslant 1$. [3]

(b) **Use your answer to part *(a)*** to find all values of y satisfying the inequality

$$\left|\frac{3}{y} - 5\right| \leqslant 1.$$ [2]

TURN OVER

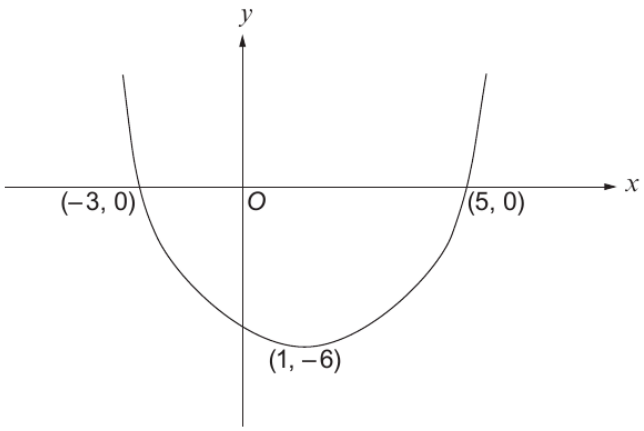
8. *(a)* Show, by counter-example, that the following statement is false.

'If the integers a, b, c, d are such that a is a factor of c and b is a factor of d, then $(a + b)$ is a factor of $(c + d)$.' [2]

(b) Solve the equation

$$|5x + 4| = -7x.$$ [4]

(c) The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-3, 0)$ and $(5, 0)$ and has a minimum point at $(1, -6)$.



(i) The graph of $y = 4f(x + a)$ passes through the origin. Write down the possible values of a.

(ii) The y-coordinate of the stationary point on the graph of $y = bf(x + 2)$ is 4. Write down the value of b. [2]

END OF MODULUS & INEQUALITIES PACK

Source: WJEC C3 + C4 (2008 modular spec) · 2011–2017
Curated for WJEC Maths 2017 spec A2 Unit 3 — Topic 4 (2.3.2)