Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Adding, subtracting, multiplying, dividing and simplifying algebraic fractions, including those with variable denominators. Sourced from legacy WJEC G

REVISE
.wales

2.09 — Algebraic fractions

Spec 2.1.9, 2.1.10 — Unit 2 (no calculator)

Adding, subtracting, multiplying, dividing and simplifying algebraic fractions, including those with variable denominators. Sourced from legacy WJEC GCSE Mathematics Higher (with Intermediate top-up) non-calculator papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~33 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (22 marks across 8 questions).*

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

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

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

*A calculator is **not** permitted on any question in this pack (Unit 2 is the non-calculator paper).*

Algebraic fractions — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 2: non-calculator.

Add & subtract algebraic fractions 2.1.9

- Find a common denominator (often the product).
- Combine numerators, keep one denominator.
- Expand and simplify the numerator carefully.

Multiply & divide algebraic fractions 2.1.9

- Multiply: numerator × numerator, denominator × denominator.
- Divide: multiply by the reciprocal.
- Cancel any common factors before or after multiplying.

Simplify algebraic fractions 2.1.10

- Factorise numerator and denominator first.
- Cancel only matching brackets (factors), never individual terms.
- State restrictions on the variable where appropriate.

Combine into a single fraction 2.1.9

- Write each piece over the common denominator first.
- Combine into one fraction, simplify the numerator.
- Check the final answer factors no further.

Crib sheet »

Algebraic fractions in one page

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

Add & subtract — common denominator

$$\frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm bc}{bd}$$

$\frac{2}{x} + \frac{3}{x+1} = \frac{2(x+1)+3x}{x(x+1)} = \frac{5x+2}{x(x+1)}$.

The product bd always works; the LCM may be smaller.

Multiply

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

Multiply numerator by numerator, denominator by denominator.

$\frac{x}{2} \times \frac{3}{x+1} = \frac{3x}{2(x+1)}$.

Cancel common factors *before* multiplying to keep things tidy.

Divide — flip and multiply

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

$\frac{x+1}{4} \div \frac{x+1}{8} = \frac{x+1}{4} \times \frac{8}{x+1} = 2$.

Cancel only common *factors*

Cancel things that **multiply**, never things that **add**.

$\frac{2(x+3)}{x+3} = 2$ (legal).

$\frac{x+3}{x+5} \neq \frac{3}{5}$ — x is not a common factor.

Factorise to spot factors

$\frac{x^2-9}{x+3} = \frac{(x-3)(x+3)}{x+3} = x-3$.

$\frac{x^2+5x+6}{x+3} = \frac{(x+2)(x+3)}{x+3} = x+2$.

Always factorise top and bottom first; cancel matching brackets.

Combine then simplify

$\frac{1}{x} - \frac{1}{x+1} = \frac{(x+1)-x}{x(x+1)} = \frac{1}{x(x+1)}$.

Expand the numerator carefully, then check for any cancellation.

Restrictions

An algebraic fraction is undefined whenever its denominator is 0.

$\frac{1}{x-2}$ excludes $x=2$; $\frac{x+1}{(x-3)(x+5)}$ excludes $x=3$ and $x=-5$.

Common traps

- Cancelling individual terms: $\frac{x+3}{3} \neq x$.
- Forgetting brackets in the numerator after combining.
- Leaving a factorisable result un-simplified.

Examiner only

12. Express $\frac{3x}{3x+2} - \frac{2x}{2x+7}$ as a single fraction in its simplest form. [3]

Examiner only

15. Express the following as a single fraction in its simplest form. [4]

$$\frac{2}{3x-5}-\frac{7}{11x-13}$$

Examiner only

19. *(a)* Write the following expression as a single fraction.
Give your answer in its simplest form. [2]

$$\frac{1}{x-a}-\frac{1}{x}$$

(b) Solve the following equation. [5]

$$\frac{x-1}{x(4x+3)}+2=0$$

Examiner only

11. *(a)* Circle the expression which is equivalent to $m^{\frac{2}{3}}$. [1]

$\frac{1}{3}m^2$ $2m^{\frac{1}{3}}$ $\frac{2}{3}m$ $\left(\sqrt[3]{m}\right)^2$ $\left(\sqrt{m}\right)^3$

(b) Circle the expression which is equivalent to $p^{\frac{3}{4}} \times p^{-\frac{1}{4}} \div p^{\frac{1}{4}}$. [1]

$p^{-\frac{1}{4}}$ $p^{-\frac{3}{64}}$ $p^{\frac{5}{4}}$ $p^{\frac{3}{4}}$ $p^{\frac{1}{4}}$

12. Express the following as a single fraction in its simplest form. [3]

$$\frac{6}{3x-5} - \frac{4}{2x+1}$$

Examiner only

10. Express $\frac{5x}{2x-1} - \frac{4x}{4x+3}$ as a single fraction in its simplest form. [4]

Examiner only

12. Express the following as a single fraction in its simplest form. [3]

$$\frac{4}{3x-7} + \frac{5}{2x+9}$$

Examiner only

10. (a) Expand and simplify $(2h+3t)(5h-7t)$. [3]

(b) Simplify $\dfrac{7(d+5)^8}{(d+5)^{-2}}$. [1]

Examiner only

9. (a) Express 48 as a percentage of 400. [2]

(b) Share £45 in the ratio 8 : 1. [2]

£ ..... and £ .....

(c) Express $1-\frac{1}{2^3}$ as a single fraction in the form $\frac{a}{b}$, where a and b are integers. [2]

Answer = ...