

Fraction operations

Pearson Edexcel GCSE Mathematics 1MA1 • L007
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Calculate exactly with fractions using all four operations and explain why each method works.

Work without a calculator except where a check is invited. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

Connect & Check

Common denominator: shared unit for addition or subtraction. Reciprocal: number that multiplies with a non-zero number to make 1. Exact answer: no rounding. Cancellation: dividing factors by a common factor.

R1

Write $\frac{1}{2}$ and $\frac{1}{3}$ in sixths.

R2

Convert $1\frac{1}{2}$ to an improper fraction.

R3

Simplify $\frac{6}{15}$.

Share | In pairs, predict the first step for this problem: Addition and subtraction count equal units: $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$. Multiplication can mean a fraction of a fraction: half of three quarters is three eighths. Division asks how many groups fit: $\frac{3}{4} \div \frac{1}{4} = 3$. Compare your reasons before using the worked model.

Present through worked examples

Addition and subtraction count equal units: $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$. Multiplication can mean a fraction of a fraction: half of three quarters is three eighths. Division asks how many groups fit: $\frac{3}{4} \div \frac{1}{4} = 3$.

D1

Model: $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$. Complete $\frac{1}{4} + \frac{1}{3} = \frac{\quad}{12} + \frac{\quad}{12} = \frac{\quad}{\quad}$.

D2

Model: $\frac{3}{4} - \frac{1}{6} = \frac{9}{12} - \frac{2}{12} = \frac{7}{12}$. Calculate $\frac{5}{6} - \frac{1}{4}$.

D3

Model: $(\frac{1}{2}) \times (\frac{3}{4}) = \frac{3}{8}$. Complete $(\frac{2}{3}) \times (\frac{3}{5}) = \frac{6}{15} = \frac{\quad}{\quad}$.

D4

Model: $(\frac{3}{4}) \div (\frac{2}{5}) = (\frac{3}{4}) \times (\frac{5}{2}) = \frac{15}{8}$. Scaling both sides of the division by $\frac{5}{2}$ makes the divisor 1. Find $(\frac{2}{3}) \div (\frac{4}{5})$.

Apply with less support

For + or −, rename with a common denominator. For ×, multiply numerators and denominators; cancel common factors if useful. For ÷ by a non-zero fraction, multiply by its reciprocal because that makes the divisor 1. Convert mixed numbers first; simplify and check size.

A1

Use the same fractions $\frac{1}{2}$ and $\frac{1}{3}$ with +, −, × and ÷. Compare the four answers.

A2

Calculate (a) $\frac{2}{5} + \frac{3}{10}$ (b) $\frac{7}{8} - \frac{1}{3}$ (c) $(\frac{3}{4}) \times (\frac{2}{9})$ (d) $(\frac{5}{6}) \div (\frac{5}{12})$.

A3

A ribbon is $2\frac{1}{2}$ m long. Pieces are $\frac{3}{4}$ m long. How many complete pieces can be cut and how much remains?

Optional support: Name the operation before choosing a method.

Optional check after A2: use brackets around each fraction, for example $(5 \div 6) \div (5 \div 12) = 2$. Check the result by multiplying by $\frac{5}{12}$. Retain exact fractions when requested.

Apply and extend reasoning

C1

Does multiplying two positive numbers always make a larger result? Give a fraction counterexample.

C2

Why does dividing by $\frac{1}{2}$ double a quantity? Explain with $\frac{3}{4}$, then check by multiplication.

Intentional practice feedback — read after attempting

A1: $\frac{5}{6}$; $\frac{1}{6}$; $\frac{1}{6}$; $\frac{3}{2}$.

A2: $\frac{7}{10}$; $\frac{13}{24}$; $\frac{1}{6}$; 2.

A3: 3 complete pieces; $\frac{1}{4}$ m remains.

C1: No: $(\frac{1}{2}) \times (\frac{1}{3}) = \frac{1}{6}$, smaller than both.

C2: $\frac{3}{4}$ contains 1 $\frac{1}{2}$ halves; $(\frac{3}{4}) \div (\frac{1}{2}) = \frac{3}{2}$; $(\frac{3}{2}) \times (\frac{1}{2}) = \frac{3}{4}$.

Correct one response and explain your change. Stretch is available to either tier; temporary support needs do not determine entry tier.

Recall & Review through retrieval

Work without notes. Six retrieval points; this attempt does not establish mastery. Equivalent exact numeric forms are accepted. Where accuracy is requested, also state the requested form in your written work.

Q1 $\frac{1}{3} + \frac{1}{6}$

Q2 $\frac{3}{4} - \frac{1}{8}$

Q3 $\frac{2}{3} \times \frac{3}{4}$

Q4 $\frac{3}{5} \div \frac{3}{10}$

Q5 $1\frac{2}{3}$ as an improper fraction

Q6 LCM of 4 and 6

Intentional retrieval feedback

Q1 $1\frac{1}{2}$; Q2 $\frac{5}{8}$; Q3 $1\frac{1}{2}$; Q4 2; Q5 $\frac{5}{3}$; Q6 12. Correct and retry tomorrow, then in one week.

Prove independently and improve

P1–P2: five minutes without notes; 4 marks. Your teacher reviews explanations and method marks.
P3 has no mark.

P1

Calculate $2\frac{2}{3} + 1\frac{1}{4}$, showing the common denominator. [2]

P2

Calculate $(\frac{3}{5}) \div (\frac{9}{10})$, showing the reciprocal step. [2]

P3

Name one decision you can now explain. Set a fresh question and a date for checking it without support.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L008: Fraction reasoning and retrieval

F1

Tomorrow calculate $3/4 - 1/8$ and $(2/5) \div (4/5)$.

F2

Before L008, write one false fraction rule and a counterexample.

Read and prepare

An independent check uses the meaning of the original problem. Estimate the size, reverse an operation, or represent equal parts. Repeating the same mistaken procedure is not a check.

Digital workbook: save locally where available; export a JSON backup before closing or moving the file. Restore only this lesson/version. Printing records answers, not mastery. Live browser checks remain pending; use Word/PDF if required.

Optional extension activities

Stretch

Calculate $\frac{5}{6} - \frac{3}{8}$ and $\frac{2}{3} \times \frac{9}{10}$, simplifying each.

Deep challenge

A learner says $\frac{3}{4} \div \frac{2}{5} = \frac{6}{20}$. Explain and correct.

Recall & Review: feedback and extension integration

Source-integrated WWW/EBI and extension page

Lesson L007: Fraction operations

Objective: Calculate exactly with fractions using all four operations and explain why each method works.

Timing for a 60-minute lesson

0-7 Connect & Check; 7-14 Share; 14-25 Present/model; 25-44 Apply route choice/practice; 44-52 independent exam-style check; 52-60 Recall & Review, WWW/EBI and next step.

Recall & Review evidence

At the end of the lesson, solve a fresh question without prompts, explain a check, correct one error and record the next practice step.

What Went Well (WWW)

I selected a suitable representation or multiplier and kept the reference amount clear.

Even Better If (EBI)

I will state the whole/part, show each operation and check that the size of my answer is reasonable.

Integrated stretch and deep challenge

Stretch: Calculate $5/6 - 3/8$ and $2/3 \times 9/10$, simplifying each.

Deep challenge: A learner says $3/4 \div 2/5 = 6/20$. Explain and correct.

My next-step response
