# Year 9 Fractions and Decimals – Revision Notes

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Year 9 · Maths · Fraction and Decimal Calculations · Key ideas and worked examples

**For grown-ups and learners:** read each part and try the worked example. Then work through the sheets: Foundation, Developing, Challenge, then Mixed Practice to revise everything. Show your working: it earns marks in tests and helps you spot mistakes.

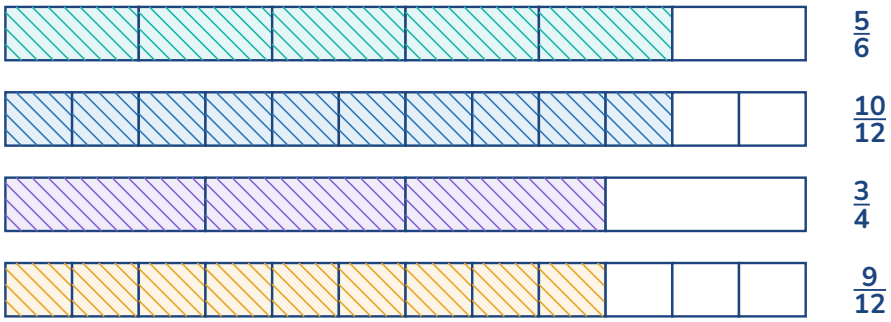
## 1. Terminating or recurring?

Write the fraction in its **simplest form**, then find the prime factors of the denominator. If the only prime factors are **2 and 5**, the decimal **terminates**: 7/40 = 0.175, because $40 = 2^3 \times 5$. Any other prime factor makes it **recur**: 5/12 = 0.41666..., because $12 = 2^2 \times 3$. Simplify first: 21/30 = 7/10 terminates even though 30 has a factor 3.

**Example:** Without dividing, decide whether 2/25 is equal to a terminating or a recurring decimal. Explain.
→ 2/25 is in its simplest form
→ $25 = 5^2$
→ Only 2s and 5s: terminating
**Answer:** terminating: $25 = 5^2$, which has no prime factors other than 2 and 5

## 2. Adding and subtracting mixed numbers

Estimate first: 3 5/6 − 1 3/4 is about 4 − 2 = 2. Then change to improper fractions with a common denominator: 23/6 − 7/4 = 46/12 − 21/12 = 25/12 = **2 1/12**. Use the order of operations when there are several steps: brackets, then indices, then × and ÷, then + and −.




Equal bars show $\frac{5}{6} = \frac{10}{12}$ and $\frac{3}{4} = \frac{9}{12}$. In twelfths, the fraction parts subtract directly: $\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$.

**Example:** Work out 1 8/9 + 1 2/5.
→ Improper fractions with denominator 45: 85/45 + 63/45
→ = 148/45 = 3 13/45
**Answer: 3 13/45**

## 3. Multiplying and dividing fractions

Change mixed numbers to improper fractions and **cancel common factors before you multiply**: 2 1/4 × 1 1/3 = 9/4 × 4/3 = 3/1 = **3**. Dividing by a fraction is the same as multiplying by its **reciprocal** (its multiplicative inverse): 3 1/3 ÷ 5/6 = 10/3 × 6/5 = **4**. The reciprocal of 2 3/4 = 11/4 is 4/11.

**Example:** Work out 1 4/5 ÷ 1 1/3.
→ Improper fractions: 9/5 ÷ 4/3
→ Multiply by the reciprocal: 9/5 × 3/4
→ = 1 7/20
**Answer: 1 7/20**

## 4. Decimals and the laws of arithmetic

Estimate by rounding to 1 significant figure: 4.87 × 0.32 ≈ 5 × 0.3 = 1.5. To multiply decimals, multiply the digits and count the decimal places: 0.26 × 0.05 = 0.0130. To divide by a decimal, multiply both numbers by a power of 10 first: 3.92 ÷ 0.07 = 392 ÷ 7 = 56. The laws of arithmetic make some calculations easier: 3.7 × 2/5 + 6.3 × 2/5 = (3.7 + 6.3) × 2/5 = 4, and 0.25 × 7.3 × 4 = 1 × 7.3.

**Example:** Dividing by 0.5 is the same as multiplying by which number? Use this to work out 34 ÷ 0.5.
→ 0.5 = 1/2, and dividing by 1/2 is the same as multiplying by 2
→ 34 × 2 = 68
**Answer: 2; 68**

**Think like a mathematician:** test a few cases (**specialising**), look for the rule that always works (**generalising**), and explain why you are sure (**convincing**). When you check someone's working, say what is wrong and how to **improve** it.

**Common mistakes:** adding the denominators. Multiplying the whole numbers and the fractions separately. Turning over the first fraction instead of the second. Putting the decimal point in the wrong place. Deciding terminating or recurring before simplifying.