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Fraction Equivalence and Operations

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Fraction Equivalence and Operations — Student Worksheet*. Question numbers match exactly (U1–U6, EQ1–EQ7, C1–C6, AS1–AS7, MU1–MU6, D1–D6, O1–O6, FD1–FD6, A1–A7, the Mixed Review MR1–MR10, and the examination questions Q1–Q8).
Each solution follows the notes' reasoning pattern — identify what is given, state what is required, choose the method *and say why it fits*, work through it, then check. Depth is scaled to difficulty. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution follows the same reasoning pattern used in the notes: identify what is given, decide what is required, choose the method *and say why it fits*, work through it, then check. Depth is scaled to difficulty — brief for basic questions, fuller for harder ones.

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4.1 Solutions — Understanding Fractions

Solution U1

(a) Numerator: 7 (the number of parts we have).

(b) Denominator: 12 (the number of equal parts in the whole).

(c) Since $7 < 12$, this is a **proper fraction** — its value is less than 1.

Solution U2

(a) $\frac{5}{9}$: numerator smaller than denominator $\Rightarrow$ **proper**.

(b) $\frac{11}{4}$: numerator larger than denominator $\Rightarrow$ **improper**.

(c) $2\frac{3}{7}$: a whole number with a proper fraction $\Rightarrow$ **mixed number**.

(d) $\frac{8}{8}$: numerator *equal* to denominator $\Rightarrow$ **improper** (its value is exactly 1).

Solution U3

Divide the numerator by the denominator; the quotient is the whole number and the remainder becomes the new numerator.

(a) $29 \div 6 = 4$ remainder 5, so $\dfrac{29}{6} = 4\frac{5}{6}$.

(b) $47 \div 8 = 5$ remainder 7, so $\dfrac{47}{8} = 5\frac{7}{8}$.

Check: $4 \times 6 + 5 = 29$ ✓and $5 \times 8 + 7 = 47$ ✓.

Solution U4

Multiply the whole number by the denominator, then add the numerator.

(a) $3\frac{4}{9} = \dfrac{3 \times 9 + 4}{9} = \dfrac{27 + 4}{9} = \dfrac{31}{9}$.

(b) $6\frac{2}{7} = \dfrac{6 \times 7 + 2}{7} = \dfrac{42 + 2}{7} = \dfrac{44}{7}$.

Solution U5

The error: the student *added* the whole number to the numerator. The correct rule is to *multiply* the whole number by the denominator first, because each whole unit contains 8 eighths.

Correct working:

$$5\tfrac{3}{8} = \frac{5 \times 8 + 3}{8} = \frac{40 + 3}{8} = \frac{43}{8}.$$

Sense check: $5\frac{3}{8}$ is a little more than 5, and $\frac{43}{8} = 5.375$ ✓— whereas the student's answer of 1 is nowhere near.

Common Mistake

Converting a mixed number is "multiply, then add," never "add, then add." A quick sense check catches this instantly: the improper fraction must be roughly the size of the original whole number.

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