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Fraction Equivalence and Operations

IGCSE Mathematics

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Contents

1 Introduction to Fractions **2**

2 Understanding Fractions **2**

3 Equivalent Fractions **4**

4 Comparing and Ordering Fractions **7**

5 Adding and Subtracting Fractions **8**

5.1 Adding and Subtracting Mixed Numbers 10

6 Multiplying Fractions **11**

7 Dividing Fractions **13**

8 Order of Operations with Fractions **16**

9 Fractions and Decimals **17**

10 Real-World Applications **19**

10.1 Worked Problems 19

11 Summary **21**

12 Additional Resources **23**

12.1 Tips for Success in IGCSE Exams 23

12.2 Common Exam Questions 23

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1 Introduction to Fractions

Note

Fractions are one of the most important topics in IGCSE Mathematics. A solid understanding of fraction equivalence and operations is essential for algebra, ratio, proportion, and many other areas of mathematics.

In this chapter, we will explore:

- What fractions represent and their key terminology
- Equivalent fractions and simplifying
- Converting between improper fractions and mixed numbers
- Adding and subtracting fractions
- Multiplying and dividing fractions
- Order of operations with fractions
- Applications to real-world problems

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2 Understanding Fractions

Definition

A **fraction** represents a part of a whole. It is written in the form:

$$\frac{a}{b}$$

where:

- a is the **numerator** (the number of parts we have)
- b is the **denominator** (the total number of equal parts the whole is divided into)
- $b \neq 0$ (we cannot divide by zero)

Example: In the fraction $\frac{3}{8}$, the numerator is 3 and the denominator is 8. This means 3 out of 8 equal parts.

Definition

Fractions can be classified into three types:

- **Proper fraction:** The numerator is less than the denominator.
  Examples: $\frac{2}{5}, \frac{7}{12}, \frac{1}{3}$. These are always less than 1.
- **Improper fraction:** The numerator is greater than or equal to the denominator.
  Examples: $\frac{9}{4}, \frac{15}{7}, \frac{6}{6}$. These are greater than or equal to 1.
- **Mixed number:** A whole number combined with a proper fraction.
  Examples: $2\frac{1}{4}, 3\frac{5}{8}, 1\frac{2}{3}$.

Method

Converting Between Improper Fractions and Mixed Numbers
Improper fraction $\longrightarrow$ Mixed number:

Step 1: Divide the numerator by the denominator

Step 2: The quotient becomes the whole number part

Step 3: The remainder becomes the new numerator

Step 4: The denominator stays the same

Mixed number $\longrightarrow$ Improper fraction:

Step 1: Multiply the whole number by the denominator

Step 2: Add the numerator to the result

Step 3: Write this total over the original denominator

Formula: $a\frac{b}{c} = \frac{a \times c + b}{c}$

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Example

(a) Convert $\frac{23}{5}$ to a mixed number.

(b) Convert $4\frac{3}{7}$ to an improper fraction.

Preview ends here

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