FRACTIONS

A DEFINITIONS



B ON THE NUMBER LINE



C EQUIVALENT FRACTIONS

Definition Equivalent Fractions _

• When you multiply the numerator and the denominator by the same number, the fractions are equals.



• When you divide the numerator and the denominator by the same number, the fractions are equals.



D SIMPLIFICATION

Method **Simplifying a fraction**

To simplify a fraction, we find an equivalent fraction with the smallest possible numerator and denominator.

Ex: Simplify
$$\frac{4}{6}$$

Answer:
E CROSS MULTIPLICATION
Proposition Cross Multiplication Property
 $\frac{a}{b} \sim \frac{c}{d}$ if and only if $a \times d = b \times c$
Ex: Solve x for $\frac{10}{5} = \frac{x}{8}$.
Answer:
 $\frac{10 - x}{8}$
 $5 \times x = 10 \times 8$ (cross mutiplication)
 $x = 10 \times 8 \div 5$ (dividing both sides by 5)
 $x = 16$
F ORDERING FRACTIONS
Definition Ordering Fractions with the Same Denominator
For two fractions with the same denominator, the fraction with the larger numerator is larger.
Ex: Compare $\frac{3}{4}$ and $\frac{2}{4}$.

Answer:

(°±°)



Method Comparing Fractions with Different Denominators

To compare two fractions with different denominators:

- Find a common denominator.
- Convert each fraction to an equivalent fraction with that denominator.
- Compare the numerators.

Ex: Compare $\frac{1}{2}$ and $\frac{3}{4}$. *Answer:*

• Since $\frac{1}{2}$ and $\frac{3}{4}$ have different denominators, we change $\frac{1}{2}$ into an equivalent fraction with denominator 4:



 $\frac{2}{4} < \frac{3}{4}$

- Compare the numerators:
- Therefore,
- In pictures:



G ADDITION AND SUBTRACTION WITH COMMON DENOMINATORS

Definition Addition of Fractions with Common Denominators When we add fractions with common denominators, we keep the denominator the same and add the numerators:



Definition Subtraction of Fractions with Common Denominators

When we **subtract** fractions with common denominators, we keep the denominator the same and subtract the numerators:



H ADDITION AND SUBTRACTION WITH DIFFERENT DENOMINATORS



Method Addition or Subtraction of Fractions with Different Denominators To add or subtract fractions with different denominators:

- Find a common denominator: Choose a common multiple of the denominators.
- Convert each fraction: Rewrite each fraction so it has the common denominator.
- Add or subtract the numerators: Add or subtract the numerators and keep the denominator the same.

Ex: Calculate $\frac{3}{4} + \frac{5}{6}$.

Answer:

- Find a common denominator: To add fractions, they must have the same denominator.
 - Multiples of 4: 4, 8, **12**, 16, 20, ...
 - Multiples of 6: 6, **12**, 18, 24, ...
 - The smallest common denominator is **12**.

•
$$\frac{3}{4} + \frac{5}{6} = \frac{3 \times 3}{4 \times 3} + \frac{5 \times 2}{6 \times 2}$$

 $= \frac{9}{12} + \frac{10}{12}$ (common denominator = 12)
 $= \frac{9 + 10}{12}$ (adding numerators)
 $= \frac{19}{12}$

• Visual representation:



I FRACTION AS QUOTIENT

Proposition Fraction as Quotient

A fraction is a quotient that represents the result of **division**. It tells us how much of something we have when we divide it into equal parts.

- The top number (numerator) is the whole.
- The bottom number (denominator) is the number of equal parts the whole is divided into.

The fraction $\frac{2}{3}$ is the same as saying "2 divided by 3".



The fraction $\frac{2}{3}$ is the number which, when multiplied by 3, gives 2:

 $\frac{2}{3} \times 3 = 2$

J FRACTION AS RATIO

Definition **Fractions as Ratios**

A fraction can represent the ratio of part to the whole:

 Part Whole



K FRACTION AS DECIMAL NUMBER

Method Converting a Fraction to a Decimal

- Division Method: Perform the division of the numerator by the denominator.
- Power of 10 Denominator Method: Find an equivalent fraction where the denominator is a power of 10.

Ex: Convert $\frac{3}{4}$ to a decimal number.

Answer:

• Division Method:

$$\frac{3}{4} = 3 \div 4$$
$$= 0.75$$

• Power of 10 Denominator Method:

$$\frac{3}{4} = \frac{3 \times 25}{4 \times 25}$$
$$= \frac{75}{100}$$
$$= 75 \div 100$$
$$= 0.75$$

Method Converting Decimal to Fraction _

- Multiply the decimal by a power of 10 (10, 100, 1000, ...) to eliminate the decimal point.
- Write the result over the same power of 10 to form a fraction.

Ex: Convert 1.3 to a fraction.

Answer:

$$1.3 = \frac{1.3 \times 10}{10} \\ = \frac{13}{10}$$

L PROPER AND IMPROPER FRACTIONS

Definition **Proper and improper fractions** _

- A fraction which has numerator less than its denominator is called a **proper fraction**.
- A fraction which has numerator greater than its denominator is called an improper fraction.







- Definition Mixed Number A mixed number is a representation of a number that combines a whole number and a proper fraction. By standard convention, the addition symbol is implied and thus not explicitly written: $1\frac{2}{3}$ is understood as $1 + \frac{2}{3} = 1$

