Division of a Fraction by a Whole Number

i. Definition and Explanation

Dividing a fraction by a whole number means taking a fractional part of something and splitting it into several equal, smaller parts.

Think of it this way: Imagine you have $\frac{1}{2}$ of a pizza left. You and two friends (a total of 3 people) want to share it equally. You are essentially calculating $\frac{1}{2} \div 3$. Each person will get a smaller slice of the original whole pizza.

When you divide a fraction by a whole number, the result is always a smaller fraction.

ii. Key Points and Important Terms

Fraction: A number that represents a part of a whole (e.g., $\frac{1}{2}, \frac{3}{4}$).

- **Numerator:** The top number in a fraction (the part).
- **Denominator:** The bottom number in a fraction (the whole).

Whole Number: A number without fractions or decimals (e.g., 3, 7, 12).

Reciprocal (or Multiplicative Inverse): The "flipped" version of a number. To find the reciprocal of a number, you write it as a fraction and then swap the numerator and the denominator.

- The reciprocal of 3 (which is $\frac{3}{1}$) is $\frac{1}{3}$.
- The reciprocal of 5 (which is $\frac{5}{1}$) is $\frac{1}{5}$.
- The product of a number and its reciprocal is always 1 (e.g., $3 \times \frac{1}{3} = 1$).

The Core Rule: To divide a fraction by a whole number, you multiply the fraction by the reciprocal of the whole number.

iii. Detailed Examples with Solutions

Example 1: A Unit Fraction Solve: $\frac{1}{2} \div 5$

KEEP $\frac{1}{2}$.

CHANGE ÷ to ×.

FLIP 5 (or $\frac{5}{1}$) to $\frac{1}{5}$.

Multiply: $\frac{1}{2} \times \frac{1}{5} = \frac{(1 \times 1)}{(2 \times 5)} = \frac{1}{10}$

Example 2: A Non-Unit Fraction Solve: $\frac{3}{4} \div 6$

KEEP $\frac{3}{4}$.

CHANGE ÷ to ×.

FLIP 6 (or $\frac{6}{1}$) to $\frac{1}{6}$.

Multiply: $\frac{3}{4} \times \frac{1}{6} = \frac{(3 \times 1)}{(4 \times 6)} = \frac{3}{24}$

Simplify: Both 3 and 24 are divisible by 3. 3 ÷ 3 = 1 24 ÷ 3 = 8

The final answer is $\frac{1}{8}$.

Example 3: Simplification Before Multiplying (Advanced Tip) Solve: $\frac{4}{5} \div 8$

Set up the problem: $\frac{4}{5} \times \frac{1}{8}$

Before you multiply, look for common factors between a numerator and a denominator. Here, 4 and 8 share a common factor of 4.

Divide both 4 (in the numerator) and 8 (in the denominator) by 4.

- 4 ÷ 4 = 1
- 8 ÷ 4 = 2

Your new, simpler problem is: $\frac{1}{5} \times \frac{1}{2}$

Multiply: $\frac{(1 \times 1)}{(5 \times 2)} = \frac{1}{10}$ (This gives the same result as $\frac{4 \times 1}{5 \times 8} = \frac{4}{40}$, but is often easier to calculate).

iv. Summary of Main Concepts

- **Meaning:** Dividing a fraction by a whole number is splitting a part into smaller, equal parts. The answer will be a smaller fraction.
- **Procedure:** Use the Keep, Change, Flip method.
  1. KEEP the first fraction.
  2. CHANGE division to multiplication.
  3. FLIP the whole number into its reciprocal (1 over the number).
- **Calculation:** Multiply the numerators together and the denominators together.