# **Properties of Division of Rational Numbers**

To divide one rational number by another, we multiply the first number by the reciprocal of the second number.

 $\frac{A}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} \text{ (where } c \neq 0, d \neq 0 \text{)}$ 

# **Property 1: Division by 1**

#### Statement:

When we divide any rational number by 1, the result is the number itself.

A ÷ 1 = a

#### Example 1:

$$\frac{3}{4} \div \mathbf{1} = \frac{3}{4}$$

# Example 2:

 $-\frac{5}{6} \div 1 = -\frac{5}{6}$ 

# Property 2: Division of a Number by Itself

#### Statement:

Any rational number (except 0) divided by itself gives 1.

 $a \div a = 1(if a \neq 0)$ 

#### Example 1:

 $\frac{2}{5} \div \frac{2}{5} = 1$ 

Example 2:

$$-\frac{3}{7} \div \left(-\frac{3}{7}\right) =$$

# **Property 3: Zero Divided by a Rational Number**

#### Statement:

Zero divided by any non-zero rational number is always zero.

 $0 \div a = 0$  (if  $a \neq 0$ )

#### Example 1:

$$0 \div \frac{4}{5} = 0$$

#### Example 2:

$$0\div(-\frac{7}{3})=0$$

### Property 4: Division by Zero is Not Defined

#### Statement:

We can never divide any number by zero. It is undefined.

 $A \div 0 = Not Defined$ 

#### Example 1:

 $-\frac{3}{4} \div 0 \rightarrow Not defined$ 

#### Example 2:

 $-\frac{2}{5} \div 0 \rightarrow Not$  defined

# Property 5: Division by a Rational Number is Same as Multiplying by its Reciprocal

#### Statement:

Dividing by a rational number is the same as multiplying by its reciprocal.

$$A \div b = a \times \frac{1}{b}$$

#### Example 1:

 $\frac{1}{2} \div \frac{3}{4} = \frac{1}{2} \times \frac{4}{3} = \frac{4}{6} = \frac{2}{3}$ 

#### Example 2:

 $-\frac{5}{6} \div \frac{2}{3} = -\frac{5}{6} \times \frac{3}{2} = -\frac{15}{12} = -\frac{5}{4}$ 

#### **Summary Table:**

Property	Rule/Result
Division by 1	a ÷ 1 = a
Number ÷ itself (a ≠ 0)	a ÷ a = 1
0 ÷ a (a ≠ 0)	0 ÷ a = 0
Division by 0	Not defined
Division = Multiplication by reciprocal	$a \div b = a \times (\frac{1}{b})$