Division of Rational Numbers

To divide one rational number by another, we multiply the first number (dividend) by the reciprocal (multiplicative inverse) of the second number (divisor).

Rule:

If $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

(Where c ≠ 0 and d ≠ 0)

Steps to Divide Rational Numbers:

1. Write the reciprocal of the second rational number (flip numerator and denominator).
2. Multiply the first number with this reciprocal.
3. Simplify the result if possible.

Example 1:

Divide: $\frac{2}{3} \div \frac{4}{5}$

Solution:

$= \frac{2}{3} \times \frac{5}{4}$

$= \frac{(2 \times 5)}{(3 \times 4)}$

$= \frac{10}{12} = \frac{5}{6}$

Example 2:

Divide: $-\frac{6}{7} \div \frac{3}{2}$

Solution:

$= -\frac{6}{7} \times \frac{2}{3}$

$= \frac{(-6 \times 2)}{(7 \times 3)}$

$= -\frac{12}{21} = -\frac{4}{7}$

Dividing by a Whole Number:

To divide a rational number by a whole number, convert the whole number into a rational number by writing it as a fraction with denominator 1.

Example 3:

Divide: $\frac{5}{6} \div 2$

Solution:

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

$= \frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$

Example 4:

Divide: $-\frac{8}{9} \div 4$

Solution:

$4 = \frac{4}{1}$

$= -\frac{8}{9} \times \frac{1}{4} = -\frac{8}{36} = -\frac{2}{9}$

Summary:

Rule / Property	Result / Rule
a ÷ b = a × (reciprocal of b)	Multiply with reciprocal
a ÷ 1 = a	Division by 1 does not change value
a ÷ a = 1 (if a ≠ 0)	Number divided by itself is 1
0 ÷ a = 0 (if a ≠ 0)	Zero divided by a number is 0
a ÷ 0 = Not defined	Division by 0 is **undefined**