The Reciprocal Method

The rule for division by the reciprocal method is: Multiply the dividend by the reciprocal of the divisor. This is sometimes stated in short form as follows: Invert the divisor and multiply.

The following examples of cases that arise in division with fractions will be solved by both the reciprocal method and the common denominator method. The common denominator method more clearly shows the division process and is easier for the beginner to grasp. The reciprocal method is more obscure as to the reason for its use but has the advantage of speed and the possibility of cancellation of like factors, which simplifies the computation. It is the suggested method once the principles become familiar .

EXAMPLE: $\frac{2}{5} \div 4 = ?$

Common Denominator   Method   Reciprocal Method

$$\frac{2}{5} \div 4 = \frac{2}{5} \times \frac{1}{4}$$

$$\frac{2}{5} \div 4 = \frac{2}{5} \div \frac{20}{5}$$

$$= 2 \div 20$$

$$= \frac{2 \times 1}{5 \times \underset{2}{\cancel{4}}}$$

$$= \frac{2}{20} = \frac{1}{10}$$

$$= \frac{1}{10}$$

EXAMPLE: $2\frac{2}{3} \div 3 = ?$

Common Denominator   Method   Reciprocal Method

$$2\frac{2}{3} \div 3 = \frac{8}{3} \div \frac{9}{3}$$

$$= 8 \div 9$$

$$= \frac{8}{9}$$

$$2\frac{2}{3} \div 3 = \frac{8}{3} \times \frac{1}{3}$$

$$= \frac{8 \times 1}{3 \times 3}$$

$$= \frac{8}{9}$$

EXAMPLE: $9 \div \frac{2}{7} = ?$

Common
Denominator   Method   Reciprocal

$$9 \div \frac{2}{7} = \frac{63}{7} \div \frac{2}{7}$$

$$= 63 \div 2$$

$$= \frac{63}{2} = 31\frac{1}{2}$$

Method

$$9 \div \frac{2}{7} = 9 \times \frac{7}{2}$$

$$= \frac{9 \times 7}{1 \times 2}$$

$$= \frac{63}{2} = 31\frac{1}{2}$$

EXAMPLE: $10 \div 5\frac{3}{4} = ?$

Common Denominator   Method   Reciprocal Method

$$10 \div 5\frac{3}{4} = \frac{40}{4} \div \frac{23}{4}$$

$$= 40 \div 23$$

$$= \frac{40}{23} = 1\frac{17}{23}$$

$$10 \div 5\frac{3}{4} = 10 \times \frac{4}{23}$$

$$= \frac{10 \times 4}{1 \times 23}$$

$$= \frac{40}{23} = 1\frac{17}{23}$$

EXAMPLE: $\frac{2}{3} \div \frac{1}{4} = ?$

Common Denominator   Method   Reciprocal Method

$$\frac{2}{3} \div \frac{1}{4} = \frac{8}{12} \div \frac{3}{12}$$

$$= 8 \div 3$$

$$= \frac{8}{3} = 2\frac{2}{3}$$

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

$$= \frac{8}{3} = 2\frac{2}{3}$$

EXAMPLE: $\frac{9}{16} \div \frac{3}{10} = ?$

Common Denominator   Method   Reciprocal

$$\frac{9}{16} \div \frac{3}{10} = \frac{45}{80} \div \frac{24}{80}$$

$$= 45 \div 24$$

$$= \frac{45}{24} = \frac{15}{8}$$

$$= 1\frac{7}{8}$$

Method

$$\frac{9}{16} \div \frac{3}{10} = \frac{9}{16} \times \frac{10}{3}$$

$$= \frac{\cancel{9}^{3}}{\cancel{16}_{8}} \times \frac{\cancel{10}^{5}}{\cancel{3}}$$

$$= \frac{15}{8} = 1\frac{7}{8}$$

Practice problems. Perform the following division by the reciprocal method:

1. $\frac{3}{8} \div \frac{2}{3}$ 2. $2\frac{1}{3} \div 1\frac{1}{2}$ 3. $\frac{5}{8} \div \frac{5}{16}$ 4. $\frac{1}{3} \div \frac{4}{6}$

Answers:

1. $\frac{9}{16}$ 2. $1\frac{5}{9}$ 3. 2   4. $\frac{1}{2}$