



MATHEMATICS 509

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I. Part One

Objectives

To divide whole numbers by fractions
 To review decimal numbers
 To divide with a two-digit divisor



▲ Shortcuts are a quick way to solve problems in mathematics.

1.1 Multiply. Add zeros. Remember commas.

a. $10 \times 374 = \underline{\hspace{2cm}}$ $1,000 \times 708 = \underline{\hspace{2cm}}$ $100 \times 5,312 = \underline{\hspace{2cm}}$

b. $1,000 \times 450 = \underline{\hspace{2cm}}$ $100 \times 63 = \underline{\hspace{2cm}}$ $10 \times 8 = \underline{\hspace{2cm}}$

1.2 Multiply. Move the decimal point. Add zeros, if necessary.

a. $100 \times .023 = \underline{\hspace{2cm}}$ $1,000 \times 3.506 = \underline{\hspace{2cm}}$ $10 \times 4.9 = \underline{\hspace{2cm}}$

b. $10 \times 4.6 = \underline{\hspace{2cm}}$ $100 \times .7 = \underline{\hspace{2cm}}$ $1,000 \times 2.8 = \underline{\hspace{2cm}}$

1.3 Think the problem. Write the answer.

a. $3 + 8 + 2 + 6 = \underline{\hspace{2cm}}$ $(4 \times 8) + 18 - 25 = \underline{\hspace{2cm}}$

b. $10(8 + 5) - 100 = \underline{\hspace{2cm}}$ $9 \times 3 \times 0 \times 8 = \underline{\hspace{2cm}}$

c. $187 \times 1 \times 1 \times 1 = \underline{\hspace{2cm}}$ $(8 \times 3) \cdot (5 \times 2) = \underline{\hspace{2cm}}$

1.4 Solve the problems in short division. *Mentally* divide, multiply, subtract, compare. Tuck the number in. Repeat.

$$5 \overline{)236} \begin{array}{l} 47 \text{ R } 1 \\ \underline{20} \\ 36 \\ \underline{35} \\ 1 \end{array}$$

a. $2 \overline{)85}$ $9 \overline{)274}$ $4 \overline{)320}$ $6 \overline{)63}$

b. $7 \overline{)586}$ $7 \overline{)84}$ $3 \overline{)52}$ $8 \overline{)375}$

1.5 Write words in symbol language.

a. Five plus three is greater than thirty-six divided by nine. _____

b. Forty-seven minus nineteen is less than four times eight. _____

Multiplication of fractions has a shortcut.
Simplify in the problem and then multiply.

$$\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{4}{\cancel{8}}} = \frac{1}{4}$$

1.6 Multiply fractions times whole numbers.
Remember the understood denominator of 1 for whole numbers.

a. $\frac{4}{7} \times 14 =$ $\frac{5}{8} \times 6 =$ $\frac{3}{4} \times 9 =$ $\frac{2}{5} \times 15 =$

b. $\frac{4}{9} \times 3 =$ $\frac{7}{12} \times 4 =$ $\frac{1}{2} \times 11 =$ $\frac{2}{3} \times 8 =$

1.7 Multiply whole numbers times fractions.

a. $5 \times \frac{3}{10} =$ $9 \times \frac{2}{3} =$ $15 \times \frac{1}{8} =$ $6 \times \frac{4}{5} =$

b. $3 \times \frac{1}{2} =$ $7 \times \frac{13}{14} =$ $9 \times \frac{11}{12} =$ $7 \times \frac{3}{8} =$

1.8 Multiply fractions times fractions.

a. $\frac{3}{5} \times \frac{5}{9} =$ $\frac{1}{8} \times \frac{3}{8} =$ $\frac{1}{2} \times \frac{4}{5} =$ $\frac{8}{9} \times \frac{3}{4} =$

b. $\frac{5}{12} \times \frac{16}{25} =$ $\frac{10}{21} \times \frac{3}{5} =$ $\frac{3}{16} \times \frac{6}{7} =$ $\frac{7}{9} \times \frac{4}{5} =$

1.9 Change mixed numbers to improper fractions.

$3\frac{2}{5} =$ $6\frac{3}{4} =$ $9\frac{1}{2} =$ $2\frac{14}{15} =$

1.10 Multiply mixed numbers and fractions.

a. $\frac{2}{3} \times 3\frac{1}{4} =$ $\frac{5}{7} \times 4\frac{1}{5} =$ $2\frac{6}{7} \times \frac{3}{4} =$

b. $8\frac{1}{3} \times 3\frac{3}{10} =$ $6\frac{1}{8} \times 4\frac{4}{7} =$ $9\frac{3}{5} \times 4\frac{1}{6} =$

▲ Division of fractions follows the same steps as multiplication of fractions; but, there is one additional step that must be taken or the answer will be wrong. To divide fractions, *invert the divisor* and multiply.

■ Problems in division of fractions have the same names as problems in whole numbers. Read the problem aloud.

dividend divisor quotient

$$\frac{2}{15} \text{ divided by } \frac{1}{3} \text{ equals } \frac{2}{5}$$

■ To invert a fraction, reverse the numerator and denominator. The special name given to an inverted fraction is **reciprocal**.

$$\frac{1}{3} \text{ inverts to } \frac{3}{1}$$

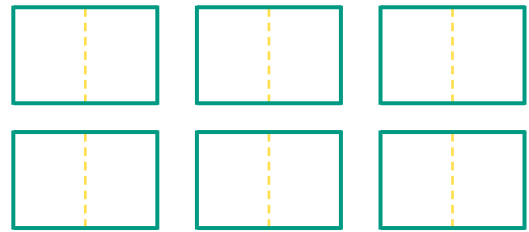
1.11 Invert the fractions. (Find the reciprocal of the fractions.)

a. $\frac{7}{9}$ _____ $\frac{3}{5}$ _____ $\frac{11}{20}$ _____ $\frac{5}{8}$ _____ $\frac{3}{11}$ _____

b. $\frac{1}{4}$ _____ $\frac{2}{7}$ _____ $\frac{2}{3}$ _____ $\frac{1}{6}$ _____ $\frac{9}{16}$ _____

■ We can divide a whole number by a fraction.

■ The illustration shows 6 rectangles. Each rectangle has been divided in half. There are twelve halves altogether. 6 divided by halves is equal to 12 halves.



Write the problem.

Add the understood denominator of 1 to the 6.

Find the reciprocal of the divisor.

Change the division sign to a multiplication sign.

Complete as a multiplication problem.

$$6 \div \frac{1}{2} = ?$$

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

1.12 Divide whole numbers by fractions. Follow the steps!

a. $8 \div \frac{1}{4} =$

$9 \div \frac{1}{3} =$

$3 \div \frac{1}{5} =$

b. $12 \div \frac{1}{5} =$

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

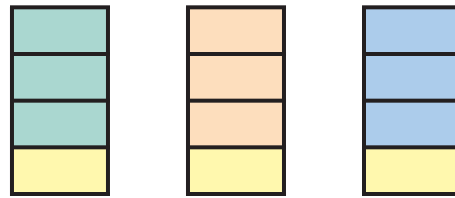
$15 \div \frac{1}{3} =$

c. $14 \div \frac{1}{7} =$

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

$6 \div \frac{1}{7} =$

■ The illustration shows three rectangles.
 Each rectangle is divided into $\frac{1}{4}$ sections.
 The sections are grouped by $\frac{3}{4}$.
 There are four $\frac{3}{4}$ sections.
 3 divided by $\frac{3}{4}$ is equal to 4.

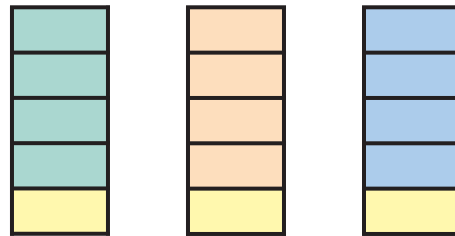


Write the problem.
 Add the understood denominator of 1 to the 3.
 Find the reciprocal of the divisor.
 Change the division sign to a multiplication sign.
 Complete as a multiplication problem.

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

$$\frac{1}{\cancel{3}} \times \frac{\cancel{4}}{\cancel{3}} = \frac{4}{1} = 4$$

The division may not work out evenly.
 There may be a remainder.



$$3 \div \frac{4}{5} = \frac{3}{1} \times \frac{5}{4} = \frac{15}{4} = 3\frac{3}{4}$$

Note: The $\frac{3}{4}$ remainder represents $\frac{3}{4}$ of a $\frac{4}{5}$ section. $\frac{3}{4}$ of $\frac{4}{5} = \frac{3}{5}$

1.13 Follow each step carefully. Then, solve as a multiplication problem.
 Simplify in the problem, if possible. Reduce answers to lowest terms.

a. $6 \div \frac{2}{3} =$ $4 \div \frac{2}{5} =$ $2 \div \frac{6}{7} =$

b. $9 \div \frac{3}{8} =$ $4 \div \frac{3}{5} =$ $5 \div \frac{5}{8} =$

c. $8 \div \frac{4}{5} =$ $12 \div \frac{3}{4} =$ $5 \div \frac{7}{8} =$

1.14 Write the place of the underlined digit.
 (a) ones (b) tens (c) hundreds (d) tenths (e) hundredths (f) thousandths

a. .05 _____ .046 _____ 5.63 _____ 6.409 _____ 267.41 _____

b. 5.142 _____ 317.8 _____ 79.42 _____ 94.518 _____ .007 _____

1.15 Write the underlined digits in words.

a. 4.063 _____ .018 _____

b. 32.617 _____ 57.79 _____