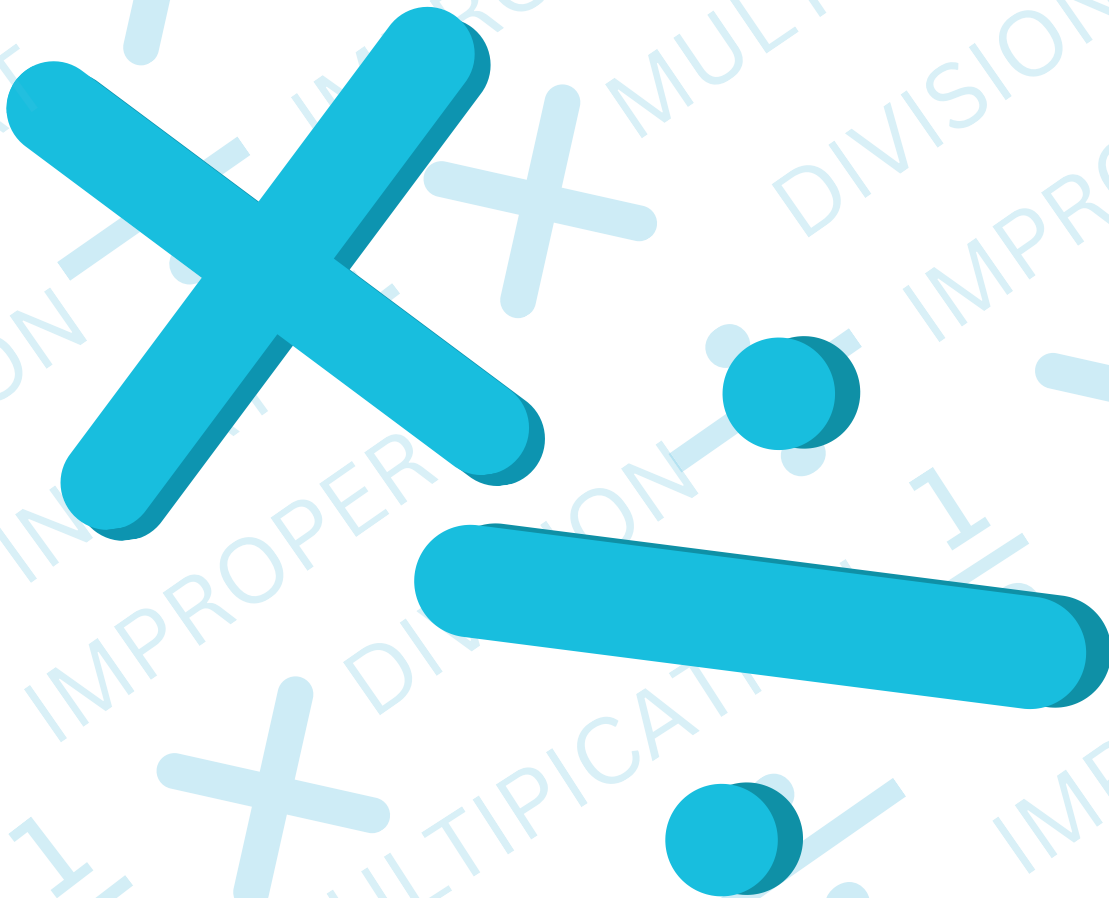


Topic Tutorials

POWERED BY *Alpha II*

Fractions

Multiplication & Division



Student copy: Fractions – Multiplication & Division Topic Tutorials

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Multiplying Fractions

Multiplying fractions is a simple process. If you can multiply whole numbers, then you can multiply fractions.

For example, multiply: $\frac{3}{4} \times \frac{2}{5}$. Follow the steps below.

Step 1: Multiply the numerators.

$$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$$

Step 2: Multiply the denominators.

$$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$$

Step 3: Simplify to lowest terms.

$$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20} = \frac{6 \div 2}{20 \div 2} = \frac{3}{10}$$

Answer: $\frac{3}{10}$

Procedure:

$$1) \frac{3}{8} \times \frac{3}{4}$$

$$\frac{3}{8} \times \frac{3}{4} = \frac{3 \times 3}{8 \times 4} = \frac{9}{32}$$

$$\text{Answer: } \frac{9}{32}$$

$$2) \frac{5}{6} \times \frac{1}{2}$$

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

$$\text{Answer: } \frac{5}{12}$$

$$3) \frac{2}{3} \times \frac{4}{9}$$

$$\frac{2}{3} \times \frac{4}{9} = \frac{2 \times 4}{3 \times 9} = \frac{8}{27}$$

$$\text{Answer: } \frac{8}{27}$$

Try These:

Multiply.

1) $\frac{1}{5} \times \frac{4}{7}$

2) $\frac{5}{8} \times \frac{11}{12}$

3) $\frac{7}{9} \times \frac{13}{15}$

4) $\frac{4}{7} \times \frac{3}{4}$

5) $\frac{3}{5} \times \frac{5}{8}$

6) $\frac{1}{3} \times \frac{5}{16}$

7) $\frac{2}{3} \times \frac{7}{9}$

$$8) \frac{1}{12} \times \frac{2}{3}$$

$$9) \frac{3}{4} \times \frac{9}{10}$$

$$10) \frac{2}{15} \times \frac{1}{2}$$

Dividing a Fraction by a Fraction

Dividing a fraction by another fraction is not difficult. But before you can proceed, you need to make certain changes in the problem. You will have to **invert** the second fraction. This means that you must flip the second fraction.

For example, $\frac{3}{4} \div \frac{4}{6}$.

Follow the steps below.

Step 1: *Invert* the second fraction. Make the numerator the denominator. Make the denominator the numerator.

$$\frac{3}{4} \div \frac{6}{4} =$$

Step 2: Change the division sign to a multiplication sign.

$$\frac{3}{4} \times \frac{6}{4} =$$

Step 3: Simplify by cancelling, if possible.

$$\frac{3}{\cancel{4}_2} \times \frac{\cancel{6}^3}{4} =$$

Step 4: Multiply the numerators.

$$\frac{3}{\cancel{4}_2} \times \frac{\cancel{6}^3}{4} = \frac{9}{2}$$

Step 5: Multiply the denominators.

$$\frac{3}{\cancel{4}_2} \times \frac{\cancel{6}^3}{4} = \frac{9}{8}$$

Step 6: If the product is an improper fraction, change it to a mixed number.

$$\frac{9}{8} = 1\frac{1}{8}$$

Answer: $1\frac{1}{8}$

Procedure:

$$1) \frac{2}{3} \div \frac{2}{8}$$

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

Answer: $2\frac{2}{3}$

$$2) \frac{3}{5} \div \frac{5}{9}$$

$$\frac{3}{5} \div \frac{5}{9} = \frac{3}{5} \times \frac{9}{5} = \frac{27}{25} = 1\frac{2}{25}$$

Answer: $1\frac{2}{25}$

$$3) \frac{1}{2} \div \frac{1}{4}$$

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

Answer: 2

Try These: Divide.

$$1) \frac{3}{4} \div \frac{1}{8}$$

$$2) \frac{5}{9} \div \frac{1}{2}$$

$$3) \frac{7}{9} \div \frac{1}{3}$$

$$4) \frac{4}{5} \div \frac{1}{15}$$

$$5) \frac{7}{8} \div \frac{1}{3}$$

$$6) \frac{5}{6} \div \frac{1}{5}$$

$$7) \frac{3}{5} \div \frac{7}{8}$$

$$8) \frac{6}{11} \div \frac{1}{2}$$

$$9) \frac{11}{16} \div \frac{1}{4}$$

$$10) \frac{2}{3} \div \frac{4}{6}$$

Solving Problems with Fractions

Solving word problems with fractions is easy. Just follow the steps below and look for clues. Read this problem. Follow the steps to solve it.

Rita had $\frac{3}{4}$ of a yard of cloth. She used $\frac{1}{2}$ of it. How much cloth did she have left?

Step 1: Read the problem.

Step 2: Learn what you must find out.

How much cloth did Rita have left?

Clue word: **of**

Step 3: Notice the clue words. Clue words help you solve the problem. In this problem, there is only one clue word, 'of'. **Of** suggests that you may have to multiply.

Step 4: Find the numbers.

$$\frac{3}{4} \quad \frac{1}{2}$$

Step 5: Write the problem. Solve it.

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

Step 6: Check the answer. Ask yourself if it makes sense.

$\frac{3}{8}$ makes sense. It is less than the original amount of fabric.

CLUE WORDS

These words indicate multiplication.

of *part*

These words indicate division.

How many *in*

Reminder: Not all problems have clue words.

Procedure:

- 1) The speed of a certain submarine when submerged is $\frac{3}{5}$ of its surface speed. If its maximum surface speed is $17\frac{1}{2}$ knots, what is its maximum speed when submerged?

Given Facts: Maximum surface speed is $17\frac{1}{2}$ knots

Speed, when submerged, is $\frac{3}{5}$ of surface speed

Question Asked: What is the maximum speed when submerged?

Operation Needed: Finding a fractional part of a number indicates multiplication.

Write out your Plan: $\frac{3}{5}$ of the maximum speed is equal to maximum speed when submerged.

Equation: $\frac{3}{5} \times 17\frac{1}{2} = N$

Estimate your answer:

$$\frac{3}{5} \longrightarrow \frac{1}{2}$$

$$17\frac{1}{2} \longrightarrow 18$$

$$\frac{1}{2} \times 18 = 9 \text{ knots, estimate}$$

Solve:

$$\frac{3}{5} \times 17\frac{1}{2} = \frac{3}{\cancel{5}_1} \times \frac{\overset{7}{\cancel{35}}}{2} = \frac{21}{2} = 10\frac{1}{2} \text{ knots}$$

Answer: $10\frac{1}{2}$ knots

Check your accuracy:

$$17\frac{1}{2} \times \frac{3}{5} = \frac{\overset{7}{\cancel{35}}}{2} \times \frac{\cancel{3}}{\cancel{5}_1} = \frac{21}{2} = 10\frac{1}{2}$$

Compare answer to estimate:

The answer $10\frac{1}{2}$ knots compares reasonably with the estimate 9 knots because they are very close.

2) A bus is scheduled to go a distance of 121 miles in $2\frac{3}{4}$ hours. What average rate of speed must be maintained to arrive on schedule?

Given Facts: A distance of 121 miles is to be traveled in $2\frac{3}{4}$ hours.

Question Asked: What is the average rate of speed?

Operation Needed: The words '*what is the average*' indicate division.

Write out your Plan: The distance (121 miles) divided by the time of travel ($2\frac{3}{4}$ hours) is equal to the average rate of speed.

Equation: $121 \div 2\frac{3}{4} = N$

Estimate your answer:

$$121 \longrightarrow 120$$

$$2\frac{3}{4} \longrightarrow 3$$

$$120 \div 3 = 40 \text{ miles per hour, estimate}$$

Solve:

$$121 \div 2\frac{3}{4} = \frac{121}{1} \div \frac{11}{4} = \frac{\overset{11}{\cancel{121}}}{1} \times \frac{4}{\underset{1}{\cancel{11}}} = \frac{44}{1} = 44 \text{ miles per hour}$$

Answer: 44 miles per hour

Check your accuracy:

$$2\frac{3}{4} \times 44 = \frac{11}{\cancel{4}_1} \times \frac{\overset{11}{\cancel{44}}}{1} = \frac{121}{1} = 121 \text{ miles}$$

Compare answer to estimate:

The answer 44 miles per hour compares reasonably with the estimate 40 miles per hour because they are very close.

Try These:

- 1) How much wood is needed to make 15 shelves each $6\frac{2}{3}$ feet long?

- 2) If an airplane flies 1440 kilometers in $2\frac{1}{4}$ hours, what is its average ground speed in kilometers per hour?

- 3) Find the cost of $2\frac{1}{4}$ pounds of bananas at 32 cents per pound.

4) What is the cost of 1 pound of apples if $2\frac{5}{8}$ pounds costs 84 cents?

5) Mr. Rogers earns \$9 per hour. If his overtime rate is $1\frac{1}{2}$ times his regular rate, what is his hourly rate for overtime work?

6) If a board $10\frac{1}{2}$ feet long was cut into 6 pieces of equal length, what would the length of each piece be? Disregard waste.