

# MULTIPLYING FRACTIONS

Remember! 1. Multiply 2. Multiply 3. Simplify	Fraction multiplied by a fraction <i>Top x top Bottom x bottom</i>	Whole number multiplied by a fraction	Fraction multiplied by a mixed number
<b>Step 1:</b> Write whole number as fraction; write mixed number as improper fraction.	$\frac{2}{3} \times \frac{3}{4}$	$9 \times \frac{2}{5}$ ↓ $\frac{9}{1} \times \frac{2}{5}$	$\frac{2}{3} \times 2\frac{1}{3}$ ↓ $\frac{2}{3} \times \frac{7}{3}$
<b>Step 2:</b> Multiply the numerators	$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$	$\frac{9}{1} \times \frac{2}{5} = \frac{18}{5}$	$\frac{2}{3} \times \frac{7}{3} = \frac{14}{9}$
<b>Step 3:</b> Multiply the denominators	$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$	$\frac{9}{1} \times \frac{2}{5} = \frac{18}{5}$	$\frac{2}{3} \times \frac{7}{3} = \frac{14}{9}$
<b>Step 4:</b> Write answer in simplest terms	$\frac{6}{12} \xrightarrow{\div 6} \frac{1}{2}$	$\frac{18}{5} = 3\frac{3}{5}$	$\frac{14}{9} = 1\frac{5}{9}$

## Multiplying Fractions

When you are multiplying fractions, you simply multiply the numerators and multiply the denominators. **(Always Reduce)**  
 Either before or after

Ex.  $\frac{2}{9} \times \frac{7}{11} =$

$= \frac{14}{99}$

b) reduce as you go or at end

$\frac{8}{15} \times \frac{3}{4} =$

$\frac{8 \div 4}{15 \div 3} \times \frac{3 \div 3}{4 \div 4}$  OR

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

$= \boxed{\frac{2}{5}}$

$\frac{8}{15} \times \frac{3}{4}$

$\frac{24}{60}$

$= \frac{12}{30}$

$= \frac{6}{15}$

$= \boxed{\frac{2}{5}}$

c)  $\frac{5}{12} \times \frac{6}{7}$

$= \frac{5}{2} \times \frac{1}{7}$

$= \boxed{\frac{5}{14}}$

OR

$\frac{5}{12} \times \frac{6}{7}$

$\frac{30}{84}$

$= \frac{15}{42}$

$= \frac{5}{14}$

d)  $\frac{2}{3} \times \frac{15}{21}$

$= \frac{2}{1} \times \frac{5}{21}$  OR

$= \frac{10}{21}$

$\frac{2}{3} \times \frac{15}{21}$

$= \frac{30}{63}$

$= \frac{10}{21}$

## Multiplying Mixed Fractions

-ALWAYS Change to IMPROPER first

**When you multiply mixed numbers, change them to improper fractions first, then multiply the numerators and multiply the denominators.**

a)  $1 \frac{4}{7} \times 2 \frac{1}{6}$

*Handwritten notes: "add" in red above the first fraction, "add" in blue above the second fraction. Red and blue arrows point from the whole numbers to the numerators.*

$$\frac{11}{7} \times \frac{13}{6}$$

$$\frac{143}{42}$$

$$3 \frac{17}{42}$$

b)  $3 \frac{3}{5} \times 4 \frac{5}{8}$

## Rule for Dividing Fractions "Flip and Multiply"

- 1) Keep first fraction the same
- 2) Flip the second fraction & Change the division sign to multiply
- 3) Now use the rules for multiplying fraction (Reduce)

Examples:

(a)  $\frac{3}{5} \div \frac{4}{7}$  *Flip and Multiply*

$= \frac{3}{5} \times \frac{7}{4}$

$= \frac{21}{20}$  *Improper (top bigger than bottom)*

$= 1\frac{1}{20}$  *Mixed*

(b)  $\frac{9}{10} \div \frac{8}{15}$  *Always Reduce after you flip and multiply*

$= \frac{9}{10 \div 5} \times \frac{15 \div 5}{8}$

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

$= \frac{27}{16}$

$= 1\frac{11}{16}$

Rule for Dividing Fractions is:

Flip second fraction and Multiply

a)

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

$$\frac{7}{8} \times \frac{3}{1}$$

$$= \frac{21}{8} \quad \text{Improper}$$

$$= 2 \frac{5}{8} \quad \text{Mixed}$$

b)

$$\frac{5}{5} \div \frac{1}{8}$$
$$\frac{5}{5} \times \frac{8}{1}$$
$$= \frac{32}{5}$$

c)

$$\frac{1}{8} \div \frac{6}{5}$$
$$\frac{1}{8} \times \frac{5}{6}$$
$$\frac{5}{48}$$

## Order of Operations

ORDER MATTERS --> **BEDMAS**

B - Brackets

E - Exponents

DM - Multiplication and Division in the order they occur in question

AS - Addition and Subtraction in the order they occur in question

$$\begin{aligned} & 3 + 4 \times 6 - 2 \\ = & 3 + 24 - 2 \\ = & 27 - 2 \\ = & 25 \end{aligned}$$

Order of Operations with Fractions

- B - Brackets
- E - Exponents
- DM - Multiplication and Division in the order they occur
- AS - Addition and Subtraction in the order they occur

Examples:

$$\begin{aligned}
 & \text{(a) } \frac{5}{16} - \frac{3}{8} \times \frac{2}{3} \\
 & = \frac{5}{16} - \frac{1}{4} \times \frac{1}{1} \\
 & = \frac{5}{16} - \frac{1}{4} \\
 & = \frac{5}{16} - \frac{4}{16} \\
 & = \boxed{\frac{1}{16}}
 \end{aligned}$$

Need common denominators

$$\begin{aligned}
 & \text{(b) } \frac{4}{5} \times \left( \frac{1}{8} + \frac{1}{4} \right) \\
 & \frac{4}{5} \times \left( \frac{1}{8} + \frac{2}{8} \right) \\
 & \frac{4}{5} \times \frac{3}{8} \\
 & \frac{1}{5} \times \frac{3}{2} \\
 & \frac{3}{10}
 \end{aligned}$$

Need common denominator

or  $\frac{4}{8} \times \frac{3}{4}$

Multiply  $\Rightarrow \frac{12}{40}$

$= \frac{6}{20}$

$= \frac{3}{10}$

## Class/Homework

WS Next Slide #6, #7, #8, #9, #11, #12

(Don't estimate or model just multiply and reduce)

WS gr 139 #8, #9, #10, #11, #12, #14, #15(a,b), #16

(2 slides over)

Ws 155 gr Fraction Order of Operations

(3 slides over)

6. In a First Nations school, five-eighths of the Grade 8 students play the drums. Of these students, three-tenths also play the native flute. What fraction of the Grade 8 students play both the drums and the native flute? Estimate to check the

**Apply**

7. Multiply. Simplify before multiplying. Use benchmarks to estimate to check the product is reasonable.

a)  $\frac{3}{4} \times \frac{8}{5}$    b)  $\frac{1}{3} \times \frac{9}{10}$    c)  $\frac{7}{5} \times \frac{15}{21}$   
 d)  $\frac{5}{9} \times \frac{3}{5}$    e)  $\frac{2}{9} \times \frac{15}{4}$    f)  $\frac{7}{3} \times \frac{9}{14}$

8. Multiply. Use benchmarks to estimate to check the product is reasonable.

a)  $\frac{3}{5} \times \frac{2}{3}$    b)  $\frac{1}{2} \times \frac{5}{10}$    c)  $\frac{1}{6} \times \frac{1}{4}$   
 d)  $\frac{13}{8} \times \frac{3}{2}$    e)  $\frac{5}{4} \times \frac{11}{10}$    f)  $\frac{7}{3} \times \frac{7}{8}$

9. Solve each problem. Estimate to check the solution is reasonable.

a) Josten took  $\frac{3}{8}$  of his savings on a shopping trip. He used  $\frac{1}{4}$  of the money to buy a new coat. What fraction of his savings did Josten spend on the coat?

b) Gervais ate  $\frac{1}{3}$  of a baguette with his dinner. Chantel ate  $\frac{1}{4}$  of the leftover baguette as an evening snack. What fraction of the baguette did Chantel eat as a snack?

11. Eeva spent  $\frac{5}{6}$  of  $\frac{3}{4}$  of her total allowance on a hair crimper. What fraction of her total allowance did Eeva have left?

12. Multiply. Estimate to check the product is reasonable.

a)  $1\frac{3}{4} \times 2\frac{1}{2}$    b)  $3\frac{2}{3} \times 2\frac{1}{5}$   
 c)  $4\frac{3}{8} \times 1\frac{1}{4}$    d)  $3\frac{3}{4} \times 3\frac{3}{4}$   
 e)  $4\frac{3}{10} \times \frac{4}{5}$    f)  $\frac{7}{8} \times 2\frac{3}{5}$

## WS 139 #8, #9, #10, #11, #12, #14, #15(a,b), #16

**8.** Find each quotient.

a)  $\frac{7}{10} \div \frac{3}{10}$

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

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

d)  $\frac{4}{5} \div \frac{2}{5}$

**9.** Use multiplication to find each quotient.

a)  $\frac{8}{5} \div \frac{3}{4}$

b)  $\frac{9}{10} \div \frac{5}{3}$

c)  $\frac{7}{2} \div \frac{4}{3}$

d)  $\frac{1}{2} \div \frac{7}{6}$

**10.** ~~Use common denominators~~ to find each quotient.

a)  $\frac{7}{12} \div \frac{1}{4}$

b)  $\frac{3}{5} \div \frac{11}{10}$

c)  $\frac{5}{2} \div \frac{1}{3}$

d)  $\frac{5}{6} \div \frac{9}{8}$

**11.** Divide. ~~Estimate to check each quotient is reasonable.~~

a)  $\frac{5}{3} \div \frac{3}{5}$

b)  $\frac{4}{9} \div \frac{4}{9}$

c)  $\frac{1}{6} \div \frac{5}{2}$

**12.** Suppose you have  $\frac{11}{12}$  of a cake.

How many servings can you make of each size?

a)  $\frac{1}{4}$  of the cake

$\frac{11}{12} \div \#$

b)  $\frac{1}{3}$  of the cake

c)  $\frac{1}{6}$  of the cake

d)  $\frac{1}{2}$  of the cake

**14.** As a busboy in a restaurant, Amiel takes  $\frac{1}{12}$  h to clear and reset a table.

How many tables can Amiel clear

in  $\frac{2}{3}$  h? Estimate to check the solution is reasonable.

**15.** Divide. Estimate to check each quotient is reasonable.

a)  $\frac{27}{28} \div \frac{9}{14}$

b)  $\frac{15}{22} \div \frac{3}{11}$

c)  $\frac{32}{51} \div \frac{8}{17}$

d)  $\frac{57}{69} \div \frac{19}{115}$

**16.** To conduct a science experiment, each pair of students requires  $\frac{1}{16}$  cup of vinegar. The science teacher has  $\frac{3}{4}$  cup of vinegar. How many pairs of students can conduct the experiment?

Ws 155 gr Fraction Order of Operations

Do on your own paper

$$\text{a) } \frac{1}{3} \times \left(\frac{7}{8} - \frac{3}{4}\right) \quad \text{b) } \frac{7}{8} \div \left(\frac{1}{3} \times \frac{1}{8}\right) \quad \text{c) } \frac{9}{5} \times \left(\frac{3}{5} \div \frac{1}{10}\right) \quad \text{d) } \left(\frac{5}{3} + \frac{7}{12}\right) \times \frac{4}{9}$$

**7.** Evaluate. Show all steps.

$$\text{a) } \frac{1}{8} \times \frac{3}{4} \times \frac{7}{5} \div \frac{7}{10}$$

$$\text{b) } \frac{14}{15} \div \frac{2}{3} \times \frac{5}{8} + \frac{3}{4}$$

$$\text{c) } \frac{2}{3} - \frac{1}{4} + \frac{1}{2} \div \frac{2}{5}$$

$$\text{d) } \frac{5}{6} - \frac{1}{5} \times \frac{5}{8} + \frac{2}{3}$$

**9.** Evaluate.

$$\text{a) } \frac{7}{10} - \left(\frac{1}{5} + \frac{1}{4}\right) \times \frac{2}{3}$$

$$\text{b) } \left(\frac{1}{4} + \frac{5}{6} - \frac{1}{3}\right) \times \frac{8}{5}$$

$$\text{c) } \left(\frac{6}{5} + \frac{4}{10}\right) \times \left(\frac{3}{8} - \frac{1}{16}\right)$$

**10.** Evaluate.

$$\text{a) } \frac{5}{2} + \frac{1}{4} \times \frac{4}{5} \div \frac{1}{10} - \frac{1}{2}$$

$$\text{b) } \frac{4}{9} \times \left(\frac{2}{3} - \frac{1}{6}\right) - \frac{1}{8} \times \frac{4}{3}$$