

Dividing Fractions Parents' Guide

Teaching Mathematics That Makes Sense

Dividing Fractions

There are many ways to divide fractions. Too often people only know one way – “flipping” the second fraction and multiplying. Many people were taught this rule and often don’t know why the rule works. In fact, back in the day, some of us were taught, “It is not for you to question why, just invert and multiply.”

Often students are taught to divide fractions by changing the operation to multiplication and multiplying by the reciprocal of the second fraction.

$$\frac{a}{b} \div \frac{c}{d}$$

$$= \frac{a}{b} \cdot \frac{d}{c}$$

(A red circle highlights the division symbol in the first equation, and a red arrow points down to the multiplication symbol in the second equation.)

Unfortunately this is just a rule and although it works it is sometimes the least efficient way to divide fractions. Did you know you can just divide across (dividing numerators and dividing denominators)? You can also get common denominators and then divide across.

Rule:

$$\frac{9}{8} \div \frac{3}{4}$$

$$= \frac{9}{8} \cdot \frac{4}{3}$$

$$= \frac{9 \cdot 4}{8 \cdot 3}$$

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

$$= \frac{\cancel{3} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{2}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{3}}$$

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

Dividing Across:

$$\frac{9}{8} \div \frac{3}{4}$$

$$= \frac{9 \div 3}{8 \div 4}$$

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

Dividing across does work all the time – just not always so neatly.

Common Denominators:

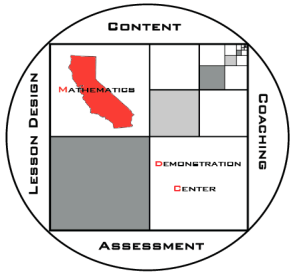
$$\frac{9}{8} \div \frac{3}{4}$$

$$= \frac{9}{8} \div \frac{6}{8}$$

$$= \frac{9 \div 6}{8 \div 8}$$

$$= \frac{9}{6}$$

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



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A Few More Examples

We encourage students to learn each of the methods, since the most efficient method depends on the problem.

Rule:	Dividing Across:	Common Denominators:
$\frac{8}{15} \div \frac{4}{3}$	$\frac{8}{15} \div \frac{4}{3}$	$\frac{8}{15} \div \frac{4}{3}$
$= \frac{8}{15} \cdot \frac{3}{4}$	$= \frac{8 \div 4}{15 \div 3}$	$= \frac{8}{15} \div \frac{20}{15}$
$= \frac{\cancel{2} \cdot \cancel{4} \cdot 3}{3 \cdot \cancel{5} \cdot \cancel{4}}$	$= \frac{2}{5}$	$= \frac{8 \div 20}{1}$
$= \frac{2}{5}$		$= \frac{8}{20}$
		$= \frac{2}{5}$

Sometimes it is easier to just multiply by the reciprocal.

$$\begin{aligned} & \frac{7}{12} \div \frac{15}{16} \\ & \quad \downarrow \\ & = \frac{7}{12} \cdot \frac{16}{15} \\ & = \frac{\cancel{7} \cdot \cancel{4} \cdot 4}{3 \cdot \cancel{4} \cdot 3 \cdot 5} \\ & = \frac{28}{45} \end{aligned}$$