

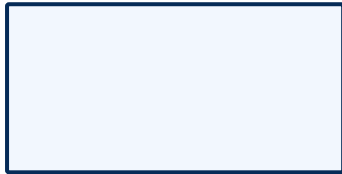
Make It a Fraction First

Multiplying any combination — fractions, whole numbers, mixed numbers. One rule.

WHY IT WORKS — $2\frac{1}{2} \times 1\frac{1}{3}$

1

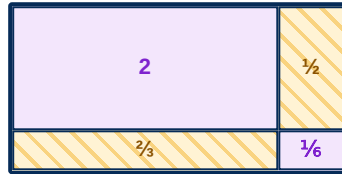
A product is an area. Draw it $2\frac{1}{2}$ wide, $1\frac{1}{3}$ tall.



one rectangle

2

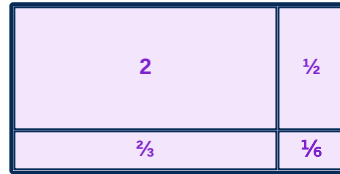
Cut where the whole parts end. Four pieces, not two.



$2 \cdot \frac{1}{2} \cdot \frac{2}{3} \cdot \frac{1}{6}$

3

Add all four. Or convert and multiply — same thing.



$= 20/6 = 3\frac{1}{3}$

the two the wrong method keeps the two it drops

Make everything a fraction. Then there is only one rule.

$$2\frac{1}{2} = \frac{5}{2} \cdot 1\frac{1}{3} = \frac{4}{3} \cdot \frac{5}{2} \times \frac{4}{3} = \frac{20}{6} = 3\frac{1}{3}$$

CONVERSIONS TO KNOW BY SIGHT

MIXED	IMPROPER	MIXED	IMPROPER
$1\frac{1}{2}$	$\frac{3}{2}$	$2\frac{1}{4}$	$\frac{9}{4}$
$2\frac{1}{2}$	$\frac{5}{2}$	$3\frac{3}{4}$	$\frac{15}{4}$
$3\frac{1}{2}$	$\frac{7}{2}$	$1\frac{2}{5}$	$\frac{7}{5}$
$1\frac{1}{3}$	$\frac{4}{3}$	$2\frac{3}{5}$	$\frac{13}{5}$
$2\frac{1}{3}$	$\frac{7}{3}$	$1\frac{7}{8}$	$\frac{15}{8}$
$3\frac{1}{3}$	$\frac{10}{3}$	$4\frac{2}{3}$	$\frac{14}{3}$

Whole $\times$ denominator, plus numerator, over the denominator. Going back: divide, and the remainder is the new numerator.

THREE SHAPES, ONE METHOD

WHOLE NUMBER

$$4 = \frac{4}{1}$$

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

MIXED NUMBER

$$2\frac{3}{5} = \frac{13}{5}$$

$$\times 5 + 3 \text{ over } 5$$

FRACTION — ALREADY DONE

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

nothing to change

EVERY PAIRING, SAME THREE STEPS — SIX IN ALL

SHAPES	AS WRITTEN	AS FRACTIONS	ANSWER
whole $\times$ mixed	$4 \times 1\frac{3}{4}$	$\frac{4}{1} \times \frac{7}{4}$	7
fraction $\times$ mixed	$\frac{4}{5} \times 2\frac{1}{2}$	$\frac{4}{5} \times \frac{5}{2}$	2
mixed $\times$ mixed	$2\frac{1}{4} \times 1\frac{1}{5}$	$\frac{9}{4} \times \frac{6}{5}$	$2\frac{7}{10}$

THE ERROR THIS WEEK EXISTS TO KILL

$$2\frac{1}{2} \times 1\frac{1}{3} = 2\frac{1}{6}$$

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

Multiplying the whole parts and the fraction parts separately keeps only two of the four pieces. The missing $\frac{1}{2}$ and $\frac{1}{3}$ come to $\frac{7}{6}$ — exactly the gap.

A mixed number is **one** number, not two.