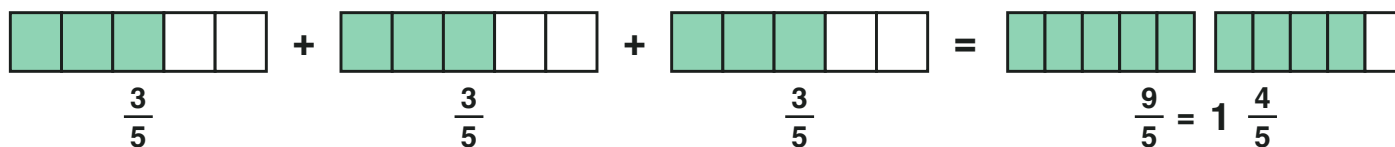


Multiplying Fractions: How It Works

Multiplying by a fraction means taking groups of it, or taking a part of something.

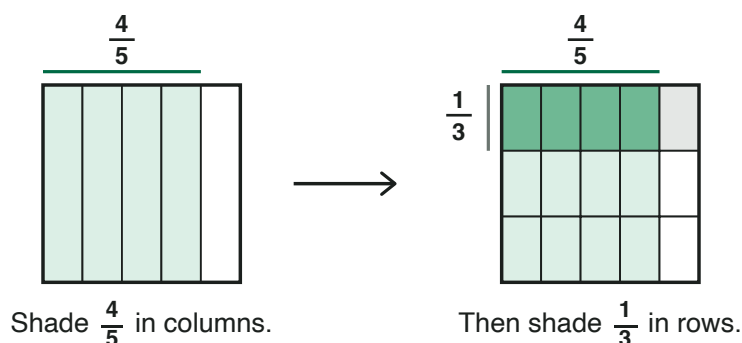
1. A whole number times a fraction



$3 \times \frac{3}{5}$ means **3 groups of 3 fifths**. Put them together and you have 9 fifths. Multiply the **top number** by the whole number: $3 \times 3 = 9$. The **bottom number** stays 5, because the pieces are still fifths. 9 fifths is 1 whole and 4 fifths.

2. A fraction times a fraction

$\frac{1}{3} \times \frac{4}{5}$ means $\frac{1}{3}$ of $\frac{4}{5}$. You are taking a part of a part.



The part shaded **twice** is $\frac{1}{3}$ of $\frac{4}{5}$. It is 4 of the 15 equal pieces in the square.

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

3. The rule

Multiply the **top numbers**. Multiply the **bottom numbers**. Simplify if you can.

A mixed number? Change it to an improper fraction first: $2\frac{1}{2} \times \frac{1}{3} = \frac{5}{2} \times \frac{1}{3} = \frac{5}{6}$

Example: two fractions

$$\frac{3}{4} \times \frac{2}{5}$$

Step 1. Multiply the tops. $3 \times 2 = 6$

Step 2. Multiply the bottoms. $4 \times 5 = 20$

Step 3. Simplify. Divide both by 2. $\frac{6}{20} = \frac{3}{10}$

So $\frac{3}{4} \times \frac{2}{5} = \frac{3}{10}$

Example: a whole number

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

Step 1. Multiply the top by 4. $4 \times 3 = 12$

Step 2. The bottom stays 5.

Step 3. $\frac{12}{5}$ is more than 1. $12 \div 5 = 2 \text{ R } 2$

So $4 \times \frac{3}{5} = \frac{12}{5} = 2 \frac{2}{5}$

Will the answer be bigger or smaller?

A fraction less than 1 takes only **part** of the number, so the answer is smaller.

$$8 \times 2 = 16$$

bigger

$$8 \times 1 = 8$$

the same

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

smaller

Watch out

Do **not** find a common denominator. That is for adding and subtracting.

A whole number multiplies **only the top**.

$3 \times \frac{3}{5}$ is $\frac{9}{5}$, not $\frac{9}{15}$.