

Grade 5 · Multiplying Fractions · Lesson

Common Core 5.NF.B.3, 5.NF.B.4, 5.NF.B.5, 5.NF.B.6 · mathovore.fr

Multiplying fractions means finding a part of a part. Multiply the numerators, multiply the denominators, and simplify: $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$. A fraction $\frac{a}{b}$ also equals $a \div b$. A factor less than 1 shrinks a number, and a factor greater than 1 enlarges it.

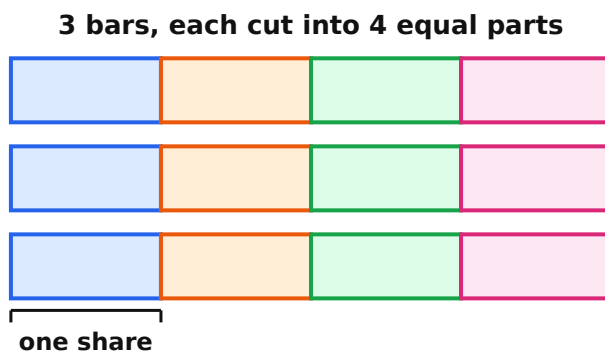
Grade 5 Common Core: 5.NF.B.3 · 5.NF.B.4 · 5.NF.B.5 · 5.NF.B.6

Key facts:

- A fraction is a division: $a \div b = \frac{a}{b}$.
- To multiply fractions, multiply numerators and multiply denominators, then simplify.
- Write mixed numbers as improper fractions before multiplying.
- The area of a rectangle with fractional sides is length times width.
- Multiplying by a factor less than 1 gives a smaller product; greater than 1 gives a larger product.

What does a fraction mean as division?

The fraction $\frac{3}{4}$ also means $3 \div 4$. Share 3 pizzas equally among 4 friends. Cut every pizza into 4 equal slices. Each friend takes one slice from each pizza, so each friend gets 3 slices of size $\frac{1}{4}$, which is $\frac{3}{4}$ of a pizza.



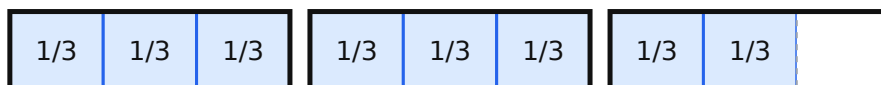
Three pizzas shared by 4 friends: each friend gets 3 slices, so $\frac{3}{4}$ of a pizza.

Fraction as division

For whole numbers a and b with $b \neq 0$: $a \div b = \frac{a}{b}$. When the number being shared is larger than the number of shares, the answer is greater than 1: $7 \div 4 = \frac{7}{4} = 1\frac{3}{4}$.

How do you multiply a fraction by a whole number?

The product $4 \times \frac{2}{3}$ means 4 groups of $\frac{2}{3}$. That is 8 pieces of size $\frac{1}{3}$, so the product is $\frac{8}{3} = 2\frac{2}{3}$. To find a fraction of a number, multiply: $\frac{3}{4} \times 8 = \frac{24}{4} = 6$.

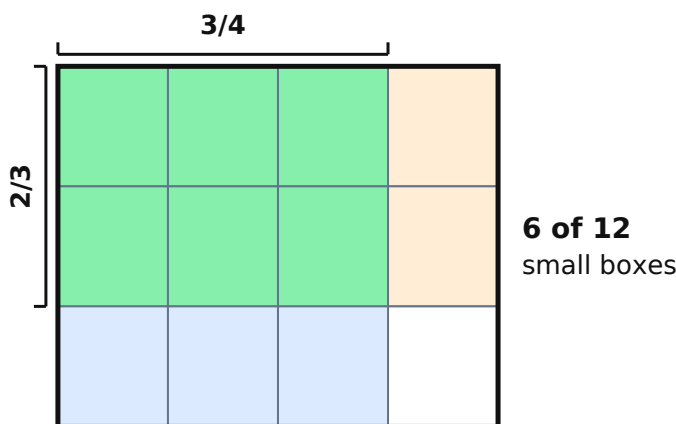


8 thirds = 2 $\frac{2}{3}$

Eight pieces of $\frac{1}{3}$ fill 2 wholes and leave $\frac{2}{3}$.

How do you multiply two fractions?

Taking a fraction of a fraction cuts a piece into smaller pieces. In the model, $\frac{3}{4}$ of the columns and $\frac{2}{3}$ of the rows are shaded. The green overlap is $\frac{3}{4}$ of $\frac{2}{3}$.



The overlap has 6 of 12 boxes: $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2}$.

Multiplying fractions

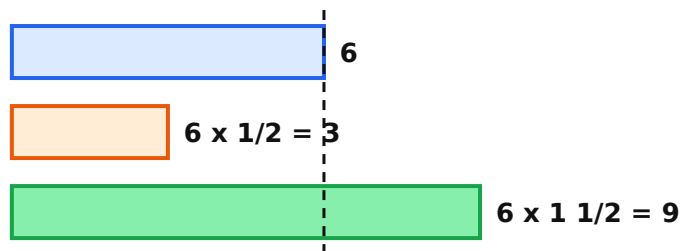
Multiply the numerators, multiply the denominators, then simplify: $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$.

How does multiplying change the size of a number?

Multiplying by a factor greater than 1 scales a number up. Multiplying by a factor less than 1 scales it down. Multiplying by 1 changes nothing.

Factor	Product compared with 6	Example
Less than 1	Smaller than 6	$6 \times \frac{1}{2} = 3$

Factor	Product compared with 6	Example
Equal to 1	Equal to 6	$6 \times \frac{4}{4} = 6$
Greater than 1	Larger than 6	$6 \times \frac{3}{2} = 9$

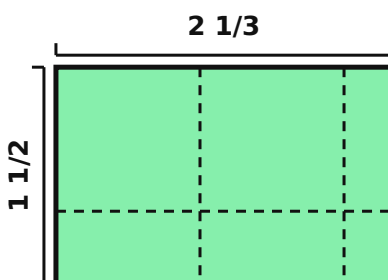


Each bar is the first bar scaled by the factor shown.

How do you multiply mixed numbers?

1. Write each mixed number as an improper fraction.
2. Cancel common factors, then multiply numerators and denominators.
3. Write the result as a mixed number.

Example. A rectangle is $2\frac{1}{3}$ ft wide and $1\frac{1}{2}$ ft tall. Then $2\frac{1}{3} = \frac{7}{3}$ and $1\frac{1}{2} = \frac{3}{2}$. So $\frac{7}{3} \times \frac{3}{2} = \frac{21}{6} = \frac{7}{2} = 3\frac{1}{2}$ square feet.



The rectangle covers $3\frac{1}{2}$ square feet. Dashed lines mark 1-foot squares.

Common mistake: multiplying only the whole parts and the fraction parts separately. $1\frac{1}{2} \times 2\frac{1}{3}$ is not $1 \times 2 = 2$ plus $\frac{1}{2} \times \frac{1}{3}$.

Multiplying Fractions: frequently asked questions

How do you multiply fractions?

Multiply the top numbers to get the new numerator and multiply the bottom numbers to get the new denominator. Then simplify. For example, $\frac{3}{5} \times \frac{2}{9} = \frac{6}{45} = \frac{2}{15}$.

Why is a fraction the same as division?

The fraction $\frac{3}{4}$ is what one person gets when 3 wholes are shared equally among 4 people.

Each person gets $3 \div 4$, so $3 \div 4 = \frac{3}{4}$.

Why does multiplying by a fraction sometimes make a number smaller?

Multiplying by a fraction less than 1 takes only part of the number. For example, $\frac{1}{2} \times 10 = 5$ is half of 10, so the product is smaller than 10.

How do you multiply a mixed number by a fraction?

Change the mixed number to an improper fraction, multiply the fractions, and simplify. For example, $1\frac{1}{2} \times \frac{2}{3} = \frac{3}{2} \times \frac{2}{3} = 1$.

How do you find the area of a rectangle with fractional sides?

Multiply the length by the width. A rectangle $\frac{3}{4}$ ft by $\frac{2}{3}$ ft has area $\frac{6}{12} = \frac{1}{2}$ square foot.