

Grade 5 - Dividing Unit Fractions and Whole Numbers - Lesson

Common Core 5.NF.B.7a, 5.NF.B.7b, 5.NF.B.7c · maths-pdf.fr/en/

Dividing with unit fractions follows two patterns. A unit fraction divided by a whole number gets smaller: $\frac{1}{3} \div 4 = \frac{1}{12}$, because each piece is cut again. A whole number divided by a unit fraction gets bigger: $4 \div \frac{1}{3} = 12$, because each whole holds 3 pieces. Check every answer with multiplication.

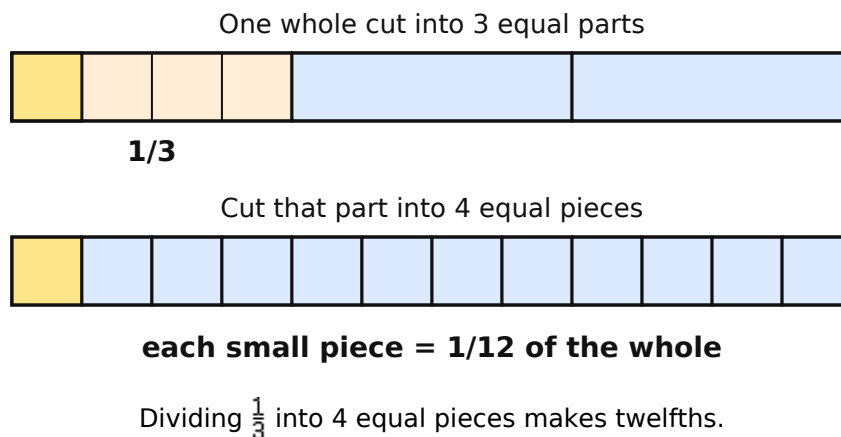
Grade 5 · Common Core State Standards: 5.NF.B.7a, 5.NF.B.7b, 5.NF.B.7c

Key facts

- A unit fraction has a numerator of 1, like $\frac{1}{4}$ or $\frac{1}{8}$.
- A unit fraction divided by a whole number n is 1 over (denominator times n).
- A whole number divided by a unit fraction $\frac{1}{b}$ equals the whole number times b .
- Check any quotient by multiplying it by the divisor to get the dividend.
- Bar models and number lines show how many pieces there are.

What does it mean to divide a unit fraction by a whole number?

A unit fraction has a 1 on top, like $\frac{1}{2}$, $\frac{1}{3}$ or $\frac{1}{5}$. When you divide it by a whole number, you cut it into equal smaller pieces. Picture $\frac{1}{3}$ of a pizza shared by 4 friends. Each friend gets $\frac{1}{12}$ of the whole pizza.



Vocabulary

Unit fraction: a fraction with a numerator of 1. **Quotient:** the answer to a division

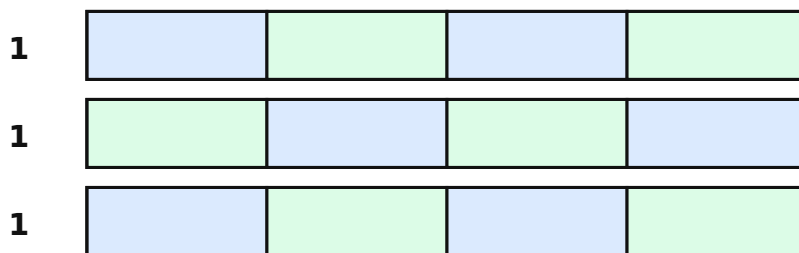
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problem. **Dividend:** the number being divided.

What does it mean to divide a whole number by a unit fraction?

Now the question is, "How many pieces fit?" The problem $3 \div \frac{1}{4}$ asks how many fourths are in 3 wholes. Each whole holds 4 fourths, so 3 wholes hold $3 \times 4 = 12$ fourths.



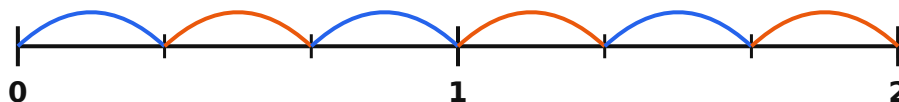
3 wholes x 4 pieces = 12 pieces of size $\frac{1}{4}$

Three wholes contain 12 pieces that are each $\frac{1}{4}$ of a whole.

How can a number line show the division?

Start at 0 and make jumps that are the size of the unit fraction. Count the jumps until you reach the whole number. For $2 \div \frac{1}{3}$ you make 6 jumps of $\frac{1}{3}$ to land on 2.

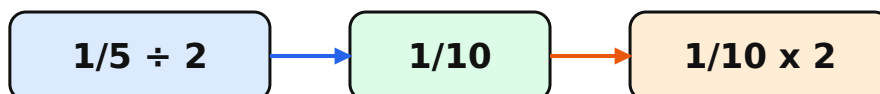
6 jumps of $\frac{1}{3}$ make 2



Six jumps of $\frac{1}{3}$ reach 2, so $2 \div \frac{1}{3} = 6$.

How do you check a division answer?

Division and multiplication are partners. Multiply the quotient by the divisor and you should get the dividend back.



$\frac{1}{10} \times 2 = \frac{2}{10} = \frac{1}{5}$, so the answer checks out

Multiplying the answer by the divisor returns the starting number.

Two patterns to remember

- $\frac{1}{b} \div n = \frac{1}{b \times n}$: the pieces get smaller, so the quotient is less than the unit fraction.
- $n \div \frac{1}{b} = n \times b$: there are more pieces than wholes, so the quotient is greater than n .

What are the steps to solve a problem?

1. Read the problem. Decide: is a unit fraction being cut up, or are you counting pieces in a whole number?
2. Draw a bar model or number line to see the pieces.
3. Multiply the correct numbers to find the number of pieces or the new size of a piece.
4. Check by multiplying the quotient by the divisor.

Example: Maya has $\frac{1}{4}$ pound of raisins. She puts them equally into 2 bags. Each bag gets $\frac{1}{4} \div 2 = \frac{1}{8}$ pound. Check: $\frac{1}{8} \times 2 = \frac{2}{8} = \frac{1}{4}$.

Questions about dividing unit fractions and whole numbers

Why is $\frac{1}{2} \div 3$ equal to $\frac{1}{6}$ and not $\frac{3}{2}$?

Dividing $\frac{1}{2}$ by 3 cuts one half into 3 equal pieces, so each piece is smaller than $\frac{1}{2}$. Six of those pieces make one whole, so each piece is $\frac{1}{6}$. The answer $\frac{3}{2}$ comes from multiplying by 3 by mistake.

Why does dividing 5 by $\frac{1}{4}$ give 20?

Each whole contains 4 fourths. Five wholes contain $5 \times 4 = 20$ fourths. The question asks how many pieces of size $\frac{1}{4}$ fit in 5, so the answer is larger than 5.

What is a unit fraction?

A unit fraction is a fraction with 1 as the numerator, such as $\frac{1}{3}$, $\frac{1}{5}$, or $\frac{1}{10}$. It shows one equal part of a whole.

How can I check my division answer?

Multiply the quotient by the divisor. If you get the dividend, the answer is right. For example, $\frac{1}{8} \times 2 = \frac{1}{4}$ confirms that $\frac{1}{4} \div 2 = \frac{1}{8}$.

When should I use a number line or a bar model?

Use a bar model when you cut a fraction into smaller pieces. Use a number line when you count how many equal jumps reach a whole number. Both pictures lead to the same answer.