

Grade 4 - Multiplying a Fraction by a Whole Number - Lesson

Common Core 4.NF.B.4a, 4.NF.B.4b, 4.NF.B.4c · maths-pdf.fr/en/

To multiply a whole number by a fraction, multiply the whole number by the numerator and keep the denominator: $3 \times \frac{2}{5} = \frac{6}{5}$. A fraction such as $\frac{5}{6}$ is a multiple of the unit fraction $\frac{1}{6}$, because it is $5 \times \frac{1}{6}$. Change an improper fraction to a mixed number to read the answer more easily.

Grade 4 · Common Core State Standards: **4.NF.B.4a, 4.NF.B.4b, 4.NF.B.4c**

Key facts

- A fraction a/b is a multiple of the unit fraction $1/b$, so $a/b = a \times 1/b$.
- $n \times (a/b) = (n \times a)/b$. Multiply the whole number by the numerator and keep the denominator.
- Repeated jumps on a number line show the same product.
- Write improper fraction products as mixed numbers when it helps.
- Equal groups in word problems signal fraction times whole number.

What does a fraction mean as a multiple of a unit fraction?

A **unit fraction** has a numerator of 1, like $\frac{1}{6}$. Every fraction is built from unit fractions. The fraction $\frac{5}{6}$ is 5 pieces that are each $\frac{1}{6}$, so $\frac{5}{6} = 5 \times \frac{1}{6}$.



$$\frac{5}{6} = 5 \times \frac{1}{6}$$

Five sixths is five copies of one sixth.

Multiplying a whole number by a fraction

$n \times \frac{a}{b} = \frac{n \times a}{b}$. Multiply the whole number by the numerator. Keep the denominator, because the size of the pieces does not change.

How do you multiply a whole number by a fraction?

Example: Find $3 \times \frac{2}{5}$.

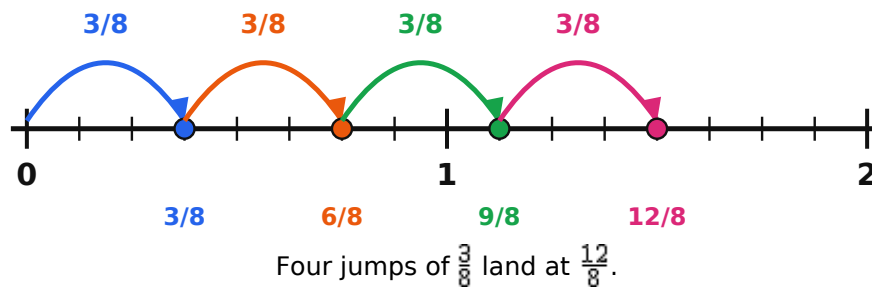
1. Think of 3 groups of $\frac{2}{5}$.
2. Multiply the whole number by the numerator: $3 \times 2 = 6$.
3. Keep the denominator: $\frac{6}{5}$.
4. Change to a mixed number if you like: $\frac{6}{5} = 1\frac{1}{5}$.



Three groups of $\frac{2}{5}$ make 6 fifths, which is more than 1 whole.

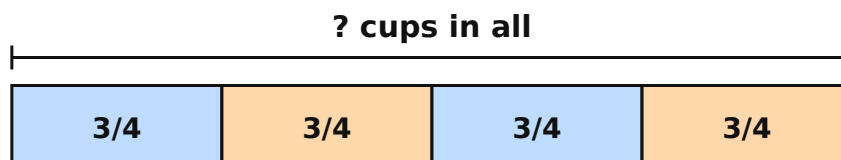
How can you show it on a number line?

Make equal jumps. For $4 \times \frac{3}{8}$, start at 0 and make 4 jumps of $\frac{3}{8}$. The last jump lands at $\frac{12}{8}$, which is $1\frac{4}{8}$.



How do you solve a word problem?

Look for equal groups. If each of 4 batches uses $\frac{3}{4}$ cup of milk, the total is $4 \times \frac{3}{4} = \frac{12}{4} = 3$ cups.



A tape diagram with 4 equal parts of $\frac{3}{4}$ cup.

When the answer is an improper fraction, write it as a mixed number or a whole number so it

is easier to understand. Divide the numerator by the denominator: the quotient is the whole number and the remainder is the new numerator.

What mistakes should you avoid?

- **Multiplying the denominator.** In $3 \times \frac{2}{5}$, the answer is $\frac{6}{5}$, not $\frac{6}{15}$. The pieces are still fifths.
- **Stopping at an improper fraction** when the problem asks how many cups or miles. Write a mixed number so the amount is easy to picture.
- **Forgetting the groups.** In a word problem, find how many equal groups there are and what fraction is in each group.

A quick check: $\frac{6}{5}$ is a little more than 1 whole, and 3 groups of two fifths should be a little more than 1 too. If your answer looks far too big or too small, try the number line again.

Questions about multiplying a fraction by a whole number

How do you multiply a fraction by a whole number?

Multiply the whole number by the numerator and keep the same denominator. For 3 times $\frac{2}{5}$, multiply 3 times 2 to get 6, so the answer is $\frac{6}{5}$.

Why is $\frac{3}{4}$ the same as 3 times $\frac{1}{4}$?

Three fourths means three pieces that are each one fourth. Putting 3 equal pieces together is the same as multiplying 3 by $\frac{1}{4}$.

Does the denominator change when you multiply by a whole number?

No. The denominator tells the size of each piece, and multiplying by a whole number only changes how many pieces there are.

How do you change an improper fraction answer to a mixed number?

Divide the numerator by the denominator. The quotient is the whole number part and the remainder is the numerator of the fraction part. For $\frac{12}{8}$, 12 divided by 8 is 1 remainder 4, so it is $1 \frac{4}{8}$.

How can you tell a word problem needs fraction times whole number?

Look for equal groups where each group is a fraction, such as 5 days of $\frac{2}{3}$ mile each. The total is the number of groups times the fraction.