

Recipe Scaler

Mission: The bakery's granola bar recipe makes 12 bars, but orders come in for half batches, double batches, and $1\frac{1}{2}$ batches. Measure scoops to see what multiplying a fraction really means.

Big question: What does it mean to multiply a fraction by a whole number or a fraction?

★ Warm-up: Estimation station

Without solving exactly, is each answer MORE or LESS than 1? Why?

$2 \times \frac{3}{4}$ ✓ **More: $\frac{3}{4} + \frac{3}{4}$ is more than 1.**

$\frac{1}{2} \times \frac{3}{4}$ ✓ **Less: half of $\frac{3}{4}$ is $\frac{3}{8}$.**

Key vocabulary

Factor	A number being multiplied.
Product	The answer to a multiplication problem.
Scale	Make bigger or smaller by multiplying.
Repeated addition	Adding the same amount again and again.

1 Box 1

Repeated addition

Which expression means the same as $3 \times \frac{3}{4}$?

☐ $\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$ ☐ $3 + \frac{3}{4}$ ☐ $\frac{3}{12}$ ☐ $3 \times 3 \div 3$

✓ **$\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$**

2 Box 2

Predict half a batch

PREDICTION For HALF a batch, will you need more or less than $\frac{3}{4}$ cup of honey?

☐ Less ☐ More ☐ The same

Half batch

In the simulator: Measure honey for $\frac{1}{2}$ **batch** (use Add half a scoop).

What is $\frac{1}{2} \times \frac{3}{4}$?

Answer: _____ cup ✓ **0.375**

3 Box 3

Scale the whole recipe

Fill in the recipe for 2 batches (type fractions or mixed numbers).

Ingredient	1 batch	2 batches
Oats		5
Peanut butter		1.3333333333333333
Raisins		1

4 Box 4

1½ batches

In the simulator: Measure oats for 1½ batches.

What is $1\frac{1}{2} \times 2\frac{1}{2}$ cups of oats?

Answer: _____ cups ✓ **3.75**

Show your thinking:

5 Box 5

Bigger or smaller?

Without calculating, will the product be bigger or smaller than $2\frac{1}{2}$?

Sort: $3 \times 2\frac{1}{2}$ · $\frac{1}{2} \times 2\frac{1}{2}$ · $\frac{3}{4} \times 2\frac{1}{2}$ · $1\frac{1}{2} \times 2\frac{1}{2}$ · $\frac{5}{4} \times 2\frac{1}{2}$

Bigger than $2\frac{1}{2}$	Smaller than $2\frac{1}{2}$
$3 \times 2\frac{1}{2}$ $1\frac{1}{2} \times 2\frac{1}{2}$ $\frac{5}{4} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$ $\frac{3}{4} \times 2\frac{1}{2}$

6 Box 6

Legend: bars for the class Legend only

The class needs 30 bars. One batch makes 12. How many cups of honey ($\frac{3}{4}$ cup per batch) do you need?

Answer: _____ cups ✓ **1.875**

Show your thinking:

7 Box 7

Explain it

Explain why $\frac{1}{2} \times \frac{3}{4}$ is SMALLER than $\frac{3}{4}$, but $3 \times \frac{3}{4}$ is BIGGER.

Look for: Multiplying by less than 1 takes part of it; Multiplying by more than 1 makes groups

Exit ticket: answer the big question in your own words

What does it mean to multiply a fraction by a whole number or a fraction?

Look for: Multiplying $3 \times \frac{3}{4}$ means 3 groups of $\frac{3}{4}$ (repeated addition): $\frac{9}{4} = 2\frac{1}{4}$. Multiplying by $\frac{1}{2}$ means taking half of the amount, so the answer is smaller. When you multiply by a number less than 1, the product gets smaller; by a number greater than 1, it gets bigger.

Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

Level	Code starts with
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 Explorer	1M2-E
 Investigator	QRU-I
 Legend	E57-L

 Watch for these misconceptions

- "Add the tops and add the bottoms." $1/2 + 1/3$ is not $2/5$.
- "Multiplying always makes a number bigger." Multiplying by a fraction less than 1 makes it smaller.
- "You need a common denominator to multiply." Only for adding and subtracting.