

Ribbon Shop

Mission: The craft shop sells ribbon by the yard. Customers keep asking for strange lengths like $2\frac{3}{4}$ yards. Measure on the ruler and count up to find out how much ribbon is left on each spool, without the standard algorithm.

Big question: How can we subtract mixed numbers by counting up on a number line?

★ Warm-up: Number talk

Solve in your head. Write HOW you did it.

How far is it from $2\frac{3}{4}$ to 3? ✓ **$\frac{1}{4}$.**

How far from 3 to $4\frac{1}{3}$? ✓ **$1\frac{1}{3}$.**

Key vocabulary

Mixed number	A whole number and a fraction, like $2\frac{3}{4}$.
Counting up	Finding a difference by hopping from the smaller number to the larger.
Common denominator	Ruler marks that show both fractions exactly.
Difference	The answer to a subtraction problem.

1 Box 1

Mark the cut

In the simulator: Click the ruler at exactly $2\frac{3}{4}$ yards.

What did you notice?

Count up

In the simulator: Hop from the cut to the end of the ribbon (land exactly on $4\frac{1}{3}$).

How much ribbon is left? (Type a mixed number like $1\frac{7}{12}$.)

Answer: _____ ✓ **1.5833333333333333**

2 Box 2

Check with an estimate

Is $1\frac{7}{12}$ a reasonable answer? $4\frac{1}{3}$ is about 4, and $2\frac{3}{4}$ is about 3.

☐ Yes: about $4 - 3 = 1$, and $1\frac{7}{12}$ is a little more than $1\frac{1}{2}$ ☐ No, it should be about 7

☐ No, it should be less than 1

✓ **Yes: about $4 - 3 = 1$, and $1\frac{7}{12}$ is a little more than $1\frac{1}{2}$**

3 Box 3

Customer 2

In the simulator: Spool: $3\frac{1}{2}$ yd. Customer wants $1\frac{2}{3}$ yd. Count up to the end.

How much is left?

Answer: _____ ✓ **1.8333333333333333**

Show your thinking:

4 Box 4

Customer 3

In the simulator: Spool: $4\frac{1}{2}$ yd. Customer wants $2\frac{1}{8}$ yd. Count up.

How much is left?

Answer: _____ ✓ **2.375**

Show your thinking:

5 Box 5

Compare strategies

What could Ava do instead?

☐ Count up from $2\frac{3}{4}$ to $4\frac{1}{3}$, or regroup 1 whole as $\frac{12}{12}$ to get $3\frac{16}{12}$ ☐ Just subtract $9 - 4 = 5$

☐ Give up; it can't be done

✓ **Count up from $2\frac{3}{4}$ to $4\frac{1}{3}$, or regroup 1 whole as $\frac{12}{12}$ to get $3\frac{16}{12}$**

6 Box 6

Legend: the whole order Legend only

A spool had 6 yards. Three customers bought $1\frac{3}{4}$, $2\frac{1}{2}$, and $1\frac{1}{8}$ yards. How much is left?

Answer: _____ yd ✓ **0.625**

Show your thinking:

7 Box 7

Explain your hops

Explain how you found $4\frac{1}{3} - 2\frac{3}{4}$ by counting up.

Look for: Describes counting up; Uses a friendly whole number; a number from the simulator

Exit ticket: answer the big question in your own words

How can we subtract mixed numbers by counting up on a number line?

Look for: To subtract mixed numbers, you can count up: start at the smaller number and hop to the larger one, using friendly hops (to the next whole number, then whole yards, then the leftover). Choosing ruler marks that show both fractions (a common denominator) makes the hops exact.

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
 Explorer	1SI-E

 Investigator

ODH-I

 Legend

76X-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.