Same-Size Pieces for Unlike Fractions

Teacher		**Class**	Grade 5
Subject	Math	**Topic**	Adding fractions with unlike denominators
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn to rename unlike fractions to equivalent like fractions. They build, add and subtract fractions and mixed numbers with models.

Curriculum links

- Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. [1]
- Find the least common multiple of two numbers to use as the least common denominator for fractions. [2]
- Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. [1]

Learning objectives

- Students will rename unlike fractions as equivalent fractions with a common denominator.
- Students will add and subtract fractions and mixed numbers with unlike denominators.
- Students will simplify answers and use estimation to check reasonableness.

Success criteria

- I can make equivalent fractions with like denominators to add and subtract.
- I can solve mixed numbers with unlike denominators and simplify my answer.
- I can estimate with benchmarks to check if my answer makes sense.

What students already know

Show 3/8 + 2/8 on strips. Ask: What do you add and what stays the same? Listen for add tops only, keep bottom.

Key words

unlike denominators	different bottom numbers, so pieces are different sizes [5]
common denominator	same shared bottom number that both parts can use [2]
equivalent fractions	same amount written with different top and bottom numbers [1]
mixed number	a whole together with a leftover part, like 2 and 1/4 [5]
simplify	write the answer with the smallest possible pieces [10]

Materials

- Whole circles and fraction pieces for thirds, fourths, sixths
- Recording sheets for before-and-after models and equations
- Slides 1-5, 7-12
- Video clip 2 (0:00–4:40) ready to play
- Copies of Worksheet Task B
- Mini whiteboards, markers, erasers

Before the lesson

- Print recording sheets and one copy of Worksheet Task B per pair
- Sort whole circles and thirds, fourths, sixths pieces into trays
- Test Slides 1-5, 7-12 and Video clip 2 (0:00–4:40) with sound
- Draw example area model split into fourths for support group

Lesson outline

0–5 min **Starter** 5 min · Whole class

Activate like-denominator addition and spark curiosity about different-sized pieces.

YOU DO

1. Show Slide 1 title and state the day's goal in student words.
2. Hold up models for 2 and 3/4 and 1 and 1/3 and say the hook question.
3. Show Slide 3 key words and quick-check 3/8 + 2/8 with strips.
4. Take 2 partner answers about why same-size pieces are easy to add.

STUDENTS DO

1. Look at the two builds and discuss with a partner why the pieces do not match.
2. Answer 3/8 + 2/8 on mini whiteboards and explain why the bottom stayed 8.
3. Share ideas about what we must do before we can add thirds and fourths.

Say: A student built 2 and 3/4 with pieces, and another built 1 and 1/3. How much do they have together if the pieces are different sizes? First remind me what we already can do when pieces match.

Ask: Why can we add 3/8 + 2/8 directly? (Pieces are the same size, eighths, so add tops only to get 5/8 [3].) · Why can we not add thirds and fourths the same way? (Bottoms differ, so pieces differ and must be renamed first [5].)

Check understanding: Whiteboards up for 3/8 + 2/8. If many miss, re-lay strips before moving on.

Support: Show labeled strips 1/4 = 2/8 so students only add tops with the same bottom [5]. **Stretch:** Ask: would 12 work for 2/3 + 3/4 and would any smaller number work? Explain.

Use: Slides 1-3

5–15 min **Teaching** 10 min · Whole class

Show the rename-first routine for adding and subtracting unlike fractions.

YOU DO

1. Walk through Slide 4 chain: bottoms differ, find common bottom, make equal pieces, add or subtract tops, simplify and check.
2. Model 3/8 + 1/4 by trading 1/4 for 2/8, then adding tops and keeping 8 [3].
3. Model 3/4 - 1/3 by listing multiples to get 12, then 9/12 - 4/12 [2].
4. Stress multiplying top and bottom by the same number keeps value the same because the multiplier equals 1, like 2/2 or 3/3 [4].

STUDENTS DO

1. Copy the two models and chant the steps with the teacher.
2. Use multiplication chart to list multiples of 4 and 3 and confirm 12.
3. Turn and talk: why did the denominator stay 12 after subtracting?

Say: You can only add same-size pieces, so rename first, then add or subtract. We find a common denominator, make equivalent fractions by multiplying top and bottom by the same number, then add or subtract tops and keep the bottom.

Worked example: 3/4 - 1/3 = 9/12 - 4/12 = 5/12. Step 1: least common denominator of 4 and 3 is 12. Step 2: 3/4 x 3/3 = 9/12 and 1/3 x 4/4 = 4/12. Step 3: 9 - 4 = 5, keep 12.

Ask: How did 1/4 become 2/8 without changing its value? (Multiply top and bottom by 2, which is multiplying by 2/2 = 1 [4].) · After renaming, what do we add or subtract? (Add or subtract the numerators only and keep the common denominator [3].)

Check understanding: Thumbs up for each step on 3/4 - 1/3. Reteach listing multiples if unsure.

Support: Give multiplication chart to spot common multiples faster while finding the least common denominator [2]. **Stretch:** Compare using product 12 versus a larger common denominator like 24 for 3/4 and 1/3.

Use: Slides 4-5

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15–25 min **Toolkit and video** 10 min · Whole class

Connect the routine to mixed numbers, simplifying, and estimating to check.

YOU DO

1. Show Slide 7 toolkit and have students repeat: find least common denominator, multiply top and bottom same, add or subtract tops, simplify.
2. Play Video clip 2 (0:00–4:40) and tell students to watch splitting wholes and fractions apart.
3. Pause twice to name the equivalent fractions and the adding of wholes separately.
4. Model the grade-level example 2/3 + 5/4 = 8/12 + 15/12 = 23/12 = 1 11/12 [1].

STUDENTS DO

1. Watch, then state the two equivalent fractions they heard in the video.
2. Copy the 2/3 + 5/4 model and estimate: answer is more than 1, so 1 11/12 fits.
3. Vote on Slide 5 prompt: which way to find a common bottom helps most?

Say: For mixed numbers we split wholes and fractions apart, rename the fraction parts to the same bottom, then add. At the end we simplify if needed and estimate with 0, 1/2, and 1 to see if the answer is reasonable.

Worked example: 2/3 + 5/4 = 8/12 + 15/12 = 23/12 = 1 11/12. Least common denominator 12, add tops 8 + 15 = 23, keep 12, change to mixed number [1].

Ask: Why do we add wholes and renamed fractions separately? (Wholes are already same-size ones; only fraction pieces need matching bottoms.) · How do you know 1 11/12 is reasonable for 2/3 + 5/4? (2/3 is past 1/2 and 5/4 is past 1, so sum past 1 1/2 is expected; use benchmarks to check [1].)

Check understanding: Hinge question on boards: 1/3 + 1/2 = ? If many write 2/5, re-teach piece size.

Support: Show pre-split area model into twelfths so students see 2/3 = 8/12 and 5/4 = 15/12 [5]. **Stretch:** Ask students to rename 2/3 + 5/4 using denominator 24 and explain why 12 is more efficient.

Use: Slides 7-8, Video clip 2 (0:00–4:40)

25–45 min **Main activity** 20 min · Pairs

Build and trade mixed numbers to add and subtract with like denominators.

YOU DO

1. Hand out pieces and recording sheets and demo 2 1/4 + 1 1/2 with a trade to fourths.
2. Assign Slide 9 tasks: 1/2 + 1/3, 3/4 - 1/3, 2 1/4 + 1 1/2, 3 1/2 - 1 1/4. Show renaming.
3. Circulate, ask pairs to draw strips or list multiples and write equivalent fractions first.
4. Stop class at 15 minutes to have two pairs show before-and-after models and equations.

STUDENTS DO

1. Build each mixed number, trade pieces for a common denominator, and record before-and-after drawings.
2. Write equations with equivalent fractions, then solve Worksheet Task B showing equivalent fractions first.
3. Compare answers with another pair and check with a benchmark estimate.

Say: Build each number with pieces. If bottoms do not match, trade for equivalent pieces with a common denominator. Add the wholes and the new fraction parts separately, write the equation, and simplify. You must show the renaming step.

Worked example: 2 1/4 + 1 1/2 = 2 1/4 + 1 2/4 = 3 3/4. Step 1: 1/2 x 2/2 = 2/4. Step 2: wholes 2 + 1 = 3. Step 3: fractions 1/4 + 2/4 = 3/4 [1].

Ask: What common denominator did you use for 1/2 + 1/3 and why? (6, because 6 is the least common multiple of 2 and 3; 3/6 + 2/6 = 5/6 [2].) · How did you handle the wholes in 3 1/2 - 1 1/4? (Rename 1/2 to 2/4, then wholes 3 - 1 = 2 and fractions 2/4 - 1/4 = 1/4 to get 2 1/4.)

Check understanding: Collect recording sheets; look for renaming step and correct keep-the-bottom. Pull small group if missing.

Support: Start with 1 1/2 + 1/4 with area model already split into fourths so students only find equivalent numerators and add [5]. **Stretch:** Give 2 1/4 - 1 2/3 and ask students to show trading 1 whole for more small pieces to regroup.

Use: Slide 9, Worksheet Task B

45–60 min **Plenary** 15 min · Whole class

Use benchmarks to reject errors and check fluency with a short quiz.

YOU DO

1. Show Slide 10 big idea and have class read it together.
2. Pose Slide 11: A student says 2/5 + 1/2 = 3/7. How do you know that cannot be right?
3. Guide proof with number line 0, 1/2, 1 and with renaming to 4/10 + 5/10 = 9/10.
4. Run Slide 12 quick quiz on boards and confirm estimates match exact answers.

STUDENTS DO

1. Think, pair, share why 3/7 is too small, placing 2/5, 1/2, and 3/7 on a benchmark line.
2. Solve the three quiz problems on boards showing renaming and simplified answers.
3. Self-rate the three success criteria with fingers 1-3.

Say: Estimate first. If you add, the sum must be bigger than each part. We use 1/2 as a benchmark to catch adding across tops and bottoms. Show the correct renaming to prove it.

Worked example: 2/5 + 1/2 cannot be 3/7 because 3/7 is less than 1/2, but a sum must be larger than 1/2 [1]. Correct: 4/10 + 5/10 = 9/10, which is close to 1 as estimated.

Ask: How does 1/2 prove 2/5 + 1/2 = 3/7 is wrong? (Observe that 3/7 < 1/2, so the claimed sum is smaller than one addend [1].) · What is 3/4 - 1/3 with renaming shown? (9/12 - 4/12 = 5/12.)

Check understanding: Exit boards for 1/3 + 1/2, 3/4 - 1/3, 2 1/4 + 1 1/2. Reteach renaming if below 80% correct.

Support: Show number line with 0, 1/2, 1 marked and place each fraction to see size order [5]. **Stretch:** Invent another wrong add-across example and explain with benchmarks why it is too small or too big.

Use: Slides 10-12

Common mistakes

Mistake	How to spot it	How to fix it
Adding across tops and bottoms, like 2/5 + 1/2 = 3/7	Answer is smaller than one addend; benchmark shows 3/7 < 1/2 [1]	Rename first to 4/10 + 5/10 = 9/10 and add only numerators, keep denominator [3]
Multiplying bottom only when renaming, like 3/4 becomes 3/12	Equivalent piece looks much smaller than original model	Multiply top and bottom by same number because multiplier equals 1, like 3/3 [4]
Adding denominators after renaming or forgetting to simplify	Bottom changes in final step or answer left as 10/8	Keep common bottom and reduce or make mixed number, like 10/8 = 5/4 = 1 1/4 [10]

Support

- Start with 1 1/2 + 1/4 on an area model already split into fourths to show equivalence and focus only on adding numerators [5].
- Provide multiplication chart and labeled strips 1/4 = 2/8, 1/2 = 3/6 to find least common denominators faster [2].

Stretch

- Solve 2 1/4 - 1 2/3 by trading 1 whole for more small pieces and explaining the regrouping.
- Compare using the product of denominators versus the least common denominator for 4 and 6 or 6 and 8.

For the LSE or teaching assistant

Stay with build table during main activity. Prompt trading to same-size pieces, check renaming step, and read Task B aloud as needed.

Check for understanding

Question	Answer
1/3 + 1/2 = ? Show renaming.	5/6, because 2/6 + 3/6 = 5/6
3/4 - 1/3 = ? Show renaming.	5/12, because 9/12 - 4/12 = 5/12
2 1/4 + 1 1/2 = ? Show renaming.	3 3/4, because 2 1/4 + 1 2/4 = 3 3/4

Homework

Rename and solve one addition and one subtraction with unlike denominators, then write one benchmark estimate check.

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