

Add and Subtract Fractions

Unit 7 Overview: 9 lessons

In some states the unit opens with prime numbers and factor trees. Then factors and multiples go to work on fractions: the greatest common factor writes a fraction in simplest form in one step, and the least common multiple of the denominators is the least common denominator, for renaming and comparing. Students add and subtract fractions with unlike denominators, on strips and then by renaming; add and subtract mixed numbers, renaming fractions that make 1 or more as a whole and trading 1 whole when the top fraction is too small; estimate with 0, one half and 1; and solve story problems in one and two steps. Denominators go to 12. Ask “what size parts can both fractions be written in?” every day.

THE UNIT, DAY BY DAY

Day 1	Pre-Check	What students already know, before the first lesson.
Day 2	7.1 Prime numbers and factor trees ★	I can find prime numbers and make a factor tree.
Day 3	7.2 Simplest form and the GCF	I can use the GCF to write a fraction in simplest form.
Day 4	7.3 Common denominators	I can rename fractions with a common denominator.
Day 5	7.4 Add fractions with unlike denominators	I can add fractions with unlike denominators.
Day 6	7.5 Subtract fractions with unlike denominators	I can subtract fractions with unlike denominators.
Day 7	7.6 Add mixed numbers	I can add mixed numbers with unlike denominators.
Day 8	7.7 Subtract mixed numbers	I can subtract mixed numbers by trading 1 whole.
Day 9	7.8 Estimate with benchmarks	I can estimate to see if an answer makes sense.
Day 10	7.9 Fraction story problems	I can solve fraction story problems.
Day 11	Unit Review	The review, to go over together.
Day 12	Unit Test	Form A; Form B (other numbers) is for a retest.

★ Taught in 5th grade in some states. Skip these lessons if yours teaches them in another grade; animalmath.com/standards shows your state’s list.

GET READY FOR THE UNIT

- Paper strips of one length, marked in halves to twelfths, several of each for every pair
- Hundreds charts, crayons and multiplication charts to 12 × 12
- Fraction number lines from 0 to 1, one under another (the Graph Paper maker prints them)
- Whiteboards, markers and two colored pencils for every student
- Chart paper for anchor charts: simplest form, the least common denominator, trading 1 whole

HOW EACH LESSON GOES

1. **Warm up** (5 min)
 2. **Teach** (10 min)
 3. **Try it together** (10 min)
 4. **Practice** (15 min)
 5. **Exit ticket** (5 min): a quick check on the lesson.
- Each lesson page ends with the Animal Math sheets, makers, tools and quizzes for it. “Sheet 3” is the third worksheet of a pack; a color pack prints each sheet again in black and white.

CHECKING AS YOU GO

PRINTABLE

Pre-Check: Day 1, with a key

PRINTABLE

Unit Review: the day before the test

EXIT TICKET

Exit Tickets: one a lesson, two to a page

PRINTABLE

Unit Test: Forms A and B, with keys



Add and Subtract Fractions

Lesson 7.1: Prime numbers and factor trees

GOAL Students sort whole numbers into prime (exactly two factors, 1 and itself) and composite (more than two), then break a composite number into primes with a factor tree.

About 45 minutes

★ Taught in 5th grade in some states

I can find prime numbers and make a factor tree.

THE LESSON

- 1 Warm up** (5 min) Pairs build every rectangle they can with 12 tiles, then with 7 tiles. How many rectangles does each number make?
- 2 Teach** (10 min) Twelve tiles make three rectangles, so 12 is composite; seven tiles make only one row, so 7 is prime. 1 is neither: it has one factor. On a hundreds chart, cross out 1, circle 2 and cross out its other multiples, then do the same with 3, 5 and 7: the numbers left are prime. Then a factor tree: $36 = 4 \times 9 = 2 \times 2 \times 3 \times 3$. Starting with 6×6 gives the same primes.
Say: "A prime number has exactly two factors, 1 and itself. A factor tree breaks a number into factors until every branch ends in a prime."
- 3 Try it together** (10 min) Pairs test 83, 85 and 89 by dividing by 2, 3, 5 and 7. Then each partner makes a factor tree for 48 from a different first pair, and they compare the primes.
- 4 Practice** (15 min) Students draw rectangles, sort numbers into prime, composite and neither, and show a factor pair for each composite number on sheet 4 of Factors and Multiples, then make the factor trees on sheet 5.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.1** and circle a face beside the "I can" line. Question 1: 23, 41 and 53 circled; a circled 91 means only 2, 3 and 5 were tried (91 is 7×13), and a circled 27 or 45 means odd was taken for prime. Question 2: $90 = 2 \times 3 \times 3 \times 5$, in any order; a tree that stops at 9 or 10 has a branch that is not prime.

Need help? Build each number with tiles: if the only rectangle is one row, it is prime.

Ready for more? Explain why 2 is the only even prime number. Then write 96 as a product of primes.

GET READY

- A hundreds chart and crayons for each student
- Square tiles, about 20 for each pair
- Whiteboards and markers

WORDS TO USE

prime number: a number with exactly two factors, 1 and itself

composite number: a number with more than two factors

prime factorization: a number written as a product of primes only

ASK

- How many factors does it have?
- Which primes did you try? When can you stop trying?
- Is every number at the end of your tree prime?

WATCH FOR

Calls every odd number prime. Try 3 and 7 as well: 49 is 7×7 .

Calls 1 prime. A prime has exactly two factors; 1 has only one.

Stops a tree at a composite number. Circle each prime as it is reached, and keep breaking the rest.

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PRINTABLE

Factors and Multiples: sheets 4-5

TOOL

Hundreds Chart

QUIZ

Factors and Multiples Quiz: the Prime or Composite level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.1

Add and Subtract Fractions

Lesson 7.2: Simplest form and the GCF

GOAL Students find the greatest common factor of two numbers by listing their factors, then divide the numerator and the denominator of a fraction by it to write the fraction in simplest form in one step, and check that nothing but 1 divides both.

About 45 minutes

I can use the GCF to write a fraction in simplest form.

THE LESSON

- 1 Warm up** (5 min) List the factors of 16 and of 24. Which factors are on both lists? Which is the greatest? (1, 2, 4 and 8; the greatest is 8.)
- 2 Teach** (10 min) Write $16/24$. The GCF of 16 and 24 is 8, so divide both by 8: $16/24 = 2/3$ in one step. Dividing by 2 three times gets there too, in three steps. Then $14/35$: the GCF of 14 and 35 is 7, so $14/35 = 2/5$. Last, is $21/32$ in simplest form? $21 = 3 \times 7$ and $32 = 2 \times 2 \times 2 \times 2 \times 2$ share no prime, so yes.
Say: "The GCF is the biggest number that divides the top and the bottom. Dividing both by it writes the fraction in simplest form in one step."
- 3 Try it together** (10 min) Pairs find the GCF and simplify $12/30$ and $36/48$, then check each answer: do the new numerator and denominator share a factor? Then they explain why $15/32$ is already in simplest form.
- 4 Practice** (15 min) Students list factors and find the GCF on the top half of sheet 5 of Factors and Multiples, then divide to simplest form on sheet 5 of Equivalent Fractions for 4th Grade, a review that now uses the GCF.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.2** and circle a face beside the "I can" line. Question 1: the GCF 6, then $3/5$; $9/15$ or $6/10$ means a smaller common factor (2 or 3) was used, so ask if the new numbers still share one. Question 2: $3/4$ and $7/10$; $9/12$ or $14/20$ is equal but not in simplest form.

Need help? List the factors of both numbers in two rows and circle the ones on both lists.

Ready for more? Find a fraction with a denominator of 48 whose simplest form is $5/6$, and one whose simplest form is $7/8$.

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PRINTABLE

Factors and Multiples: sheet 5, the GCF problems

PRINTABLE

Equivalent Fractions for 4th Grade: sheet 5 for review

QUIZ

Fraction Operations Quiz: the Equivalent Fractions level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.2

GET READY

- Multiplication charts, for finding factors
- Paper strips to fold and compare
- Whiteboards and markers

WORDS TO USE

common factor: a number that divides both numbers

greatest common factor (GCF): the biggest number that divides both

simplest form: a fraction whose numerator and denominator share no factor but 1

ASK

- What are the common factors? Which is the greatest?
- How do you know the fraction is in simplest form?
- Could you get there in one step?

WATCH FOR

Divides by a common factor that is not the greatest ($16/24 = 8/12$). Check again: 8 and 12 still share 4. The GCF finishes in one step.

Divides the top and the bottom by different numbers. The same number, top and bottom, or the amount changes.

Gives the GCF as the answer. The GCF is what you divide by; the answer is a fraction.

Add and Subtract Fractions

Lesson 7.3: Common denominators

GOAL Students find the least common multiple of two denominators, rename both fractions with it, and compare fractions with unlike denominators.

About 45 minutes

I can rename fractions with a common denominator.

THE LESSON

- 1 Warm up** (5 min) Skip count by 6s and by 9s on two rows of the multiplication chart. Which numbers are in both rows? Which is the smallest?
- 2 Teach** (10 min) Compare $\frac{5}{6}$ and $\frac{7}{9}$. Multiples of 6: 6, 12, 18; multiples of 9: 9, 18. The LCM is 18, so $\frac{5}{6} = \frac{15}{18}$ and $\frac{7}{9} = \frac{14}{18}$. The parts are now the same size, and $\frac{15}{18} > \frac{14}{18}$, so $\frac{5}{6} > \frac{7}{9}$.
Say: "Fractions are easy to compare when the parts are the same size. The LCM of the denominators is the smallest size both can be written in."
- 3 Try it together** (10 min) Pairs find the least common denominator of $\frac{4}{9}$ and $\frac{1}{6}$ from lists of multiples, rename both and compare. Then they do the same with $\frac{3}{5}$ and $\frac{2}{3}$.
- 4 Practice** (15 min) Students rename on sheet 1 of Adding and Subtracting Fractions with Unlike Denominators, find least common multiples on sheet 3 of Factors and Multiples, and compare on sheets 2 and 5 of Comparing and Ordering Fractions.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.3** and circle a face beside the "I can" line. Question 1: $\frac{25}{30}$ and $\frac{9}{30}$; $\frac{50}{60}$ and $\frac{18}{60}$ are equal but not the least, and $\frac{5}{30}$ means only the denominator changed. Question 2: $<$ and $>$ ($\frac{20}{30} < \frac{21}{30}$, $\frac{25}{40} > \frac{24}{40}$); judging by the bigger denominator, or by how many parts are missing, gets both wrong.

Need help? Lay strips of both fractions under a strip cut into the common parts.

Ready for more? Find two fractions with different denominators whose least common denominator is 24, and compare them.

GET READY

- Paper strips of one length
- Multiplication charts to 12×12
- Cards with $>$, $<$ and $=$

WORDS TO USE

multiple: a number in a skip count: 12 is a multiple of 6

least common multiple (LCM): the smallest number on both lists

least common denominator: the LCM of the denominators

ASK

- What are the first few multiples of each denominator?
- Is that the least common denominator?
- Now that the parts match, which is greater?

WATCH FOR

Multiplies only the denominator ($\frac{5}{6} = \frac{5}{18}$). Multiply the top too.

Compares the denominators ($\frac{7}{9} > \frac{5}{6}$ because $9 > 6$). Bigger denominators mean smaller parts. Rename first.

Always multiplies the denominators. It works, but a smaller one may do.

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PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 1

PRINTABLE

Factors and Multiples: sheet 3

PRINTABLE

Comparing and Ordering Fractions: sheets 2 and 5

QUIZ

Comparing Fractions Quiz: the Unlike Denominators level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.3

Add and Subtract Fractions

Lesson 7.4: Add fractions with unlike denominators

GOAL Students add fractions with unlike denominators: they see on strips that both must be cut into parts of the same size, then rename both with a common denominator, add, and simplify, writing a sum over 1 as a mixed number.

About 45 minutes

I can add fractions with unlike denominators.

THE LESSON

- 1 Warm up** (5 min) Add $3/10 + 4/10$ in your head. Then show $1/2$ and $1/5$ on strips. Why is $1/2 + 1/5$ harder?
- 2 Teach** (10 min) Lay strips showing $1/4$ and $1/6$ over a strip cut into twelfths: $1/4$ covers 3 twelfths and $1/6$ covers 2, so $1/4 + 1/6 = 3/12 + 2/12 = 5/12$. Then without strips: $5/8 + 5/6$. The least common denominator is 24, so $15/24 + 20/24 = 35/24$, which is $1\frac{11}{24}$. Last, $1/2 + 5/6 = 3/6 + 5/6 = 8/6$, more than 1 and not in simplest form: $8/6 = 1\frac{2}{6} = 1\frac{1}{3}$.
Say: "I can only add parts of the same size. I rename both fractions with a common denominator, add the numerators, and write the sum in simplest form."
- 3 Try it together** (10 min) Pairs add $1/3 + 1/4$ with strips, then $5/6 + 2/9$ by renaming, writing the sum as a mixed number. Then they answer Kai, who says $1/2 + 1/4 = 2/6$. Is $2/6$ more or less than $1/2$ alone?
- 4 Practice** (15 min) Students rewrite, add and simplify on sheet 2 of Adding and Subtracting Fractions with Unlike Denominators, writing sums more than 1 as mixed numbers.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.4** and circle a face beside the "I can" line. Question 1: $5/15 + 6/15 = 11/15$; $3/8$ means the numerators and the denominators were added. Question 2: $14/15$ and $3/4$; $28/30$ and $9/12$ are right but not in simplest form, and $6/16$ or $3/15$ means the denominators were added.

Need help? Lay both fractions on a strip cut into the common parts and count the parts.

Ready for more? Find two fractions with different denominators whose sum is 1, and two whose sum is $1\frac{1}{12}$.

GET READY

- Paper strips of one length, marked in halves to twelfths
- Colored pencils
- Whiteboards and markers

WORDS TO USE

unlike denominators: different bottom numbers, so the parts are different sizes

rename: write a fraction with a new denominator without changing its amount

sum: the answer when we add

ASK

- What size parts can both fractions be written in?
- Did you rename both fractions?
- Is the sum more than 1? Is it in simplest form?

WATCH FOR

Adds the numerators and the denominators ($1/2 + 1/4 = 2/6$). The sum is less than $1/2$ alone. Rename first: the parts must be the same size.

Renames the denominator but keeps the numerator ($1/2 = 1/4$). Ask: how many fourths make one half? Multiply the top too.

Leaves $8/6$ as the answer. Write it as a mixed number in simplest form: $1\frac{1}{3}$.

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PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 2

QUIZ

Fraction Operations Quiz: the Unlike Denominators level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.4

Add and Subtract Fractions

Lesson 7.5: Subtract fractions with unlike denominators

GOAL Students subtract fractions with unlike denominators: they rename both with a common denominator, subtract the numerators, write the difference in simplest form and check it by adding back.

About 45 minutes

I can subtract fractions with unlike denominators.

THE LESSON

- 1 Warm up** (5 min) Take $\frac{2}{5}$ of a strip away from 1 whole strip. What is left? Then $\frac{5}{7} - \frac{2}{7}$. What stays the same when the denominators match?
- 2 Teach** (10 min) Subtract $\frac{5}{8} - \frac{1}{3}$. The least common denominator is 24: $\frac{5}{8} = \frac{15}{24}$ and $\frac{1}{3} = \frac{8}{24}$, so $\frac{15}{24} - \frac{8}{24} = \frac{7}{24}$. Check by adding: $\frac{7}{24} + \frac{8}{24} = \frac{15}{24}$. Then $\frac{5}{6} - \frac{1}{2} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6}$, and $\frac{2}{6}$ in simplest form is $\frac{1}{3}$. Only one fraction needed renaming there, because 6 is a multiple of 2.
Say: "I subtract parts of the same size. I rename with a common denominator, subtract the numerators and simplify. Adding back checks my answer."
- 3 Try it together** (10 min) Pairs subtract $\frac{3}{4} - \frac{2}{5}$ and $\frac{5}{12} - \frac{1}{4}$, writing each answer in simplest form and checking it by adding. Then they find $\frac{4}{5} - \frac{1}{2}$ two ways: in tenths, and with strips.
- 4 Practice** (15 min) Students rewrite, subtract and simplify on sheet 3 of Adding and Subtracting Fractions with Unlike Denominators.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.5** and circle a face beside the "I can" line. Question 1: $\frac{21}{24} - \frac{14}{24} = \frac{7}{24}$; 0 means the numerators were subtracted with no renaming. Question 2: $\frac{2}{3}$ and $\frac{13}{20}$; $\frac{8}{12}$ is right but not in simplest form, and $\frac{8}{6}$ for the second means the numerators and the denominators were subtracted.

Need help? Shade the first fraction on a strip cut into the common parts, then cross out the parts taken away.

Ready for more? Write three subtractions with unlike denominators whose difference is $\frac{1}{4}$.

GET READY

- Paper strips of one length
- Fraction number lines from 0 to 1, one under another
- Whiteboards and markers

WORDS TO USE

difference: the answer when we subtract

common denominator: a denominator both fractions can be renamed with

check by adding: the difference plus the part taken away gives the start

ASK

- Which denominator can both be renamed with?
- Can the difference be simplified?
- How can adding check your answer?

WATCH FOR

Subtracts the numerators and the denominators ($\frac{5}{8} - \frac{1}{3} = \frac{4}{5}$). Ask: can the answer be more than the start? Rename first.

Renames one fraction but not the other. Check each fraction: is it written in the common parts?

Leaves $\frac{2}{6}$. Ask if 2 and 6 share a factor, and divide by the GCF.

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PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 3

QUIZ

Fraction Operations Quiz: the Unlike Denominators level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.5

Add and Subtract Fractions

Lesson 7.6: Add mixed numbers

GOAL Students add mixed numbers with unlike denominators by parts: they add the wholes, rename the fractions with a common denominator and add them, rename a sum of fractions that is 1 or more as a whole, and simplify.

About 45 minutes

I can add mixed numbers with unlike denominators.

THE LESSON

- 1 Warm up** (5 min) Add $3 + 4$. Then $\frac{1}{2} + \frac{1}{3}$. Put the two answers together: what mixed number is it? ($7\frac{5}{6}$.)
- 2 Teach** (10 min) Add $2\frac{1}{4} + 1\frac{2}{3}$ by parts: the wholes make 3, and in twelfths $\frac{3}{12} + \frac{8}{12} = \frac{11}{12}$, so $3\frac{11}{12}$. Then $3\frac{5}{6} + 2\frac{3}{8}$: the wholes make 5, and $\frac{20}{24} + \frac{9}{24} = \frac{29}{24}$, more than 1. Rename it as $1\frac{5}{24}$: the sum is $6\frac{5}{24}$. Last, $1\frac{1}{6} + 2\frac{1}{2}$: the wholes make 3, and $\frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}$, so $3\frac{2}{3}$.
Say: "I add the wholes, then the fractions in parts of the same size. If the fractions make 1 or more, I rename them as a whole and add it on."
- 3 Try it together** (10 min) Pairs add $1\frac{1}{3} + 2\frac{1}{4}$ with strips, then on paper $1\frac{4}{5} + 2\frac{1}{2}$ (a rename) and $3\frac{1}{4} + 1\frac{5}{12}$ (a sum to simplify). They check one by writing both numbers as fractions greater than 1 and adding.
- 4 Practice** (15 min) Students add by parts on sheet 1 of Mixed Numbers with Unlike Denominators and in columns on sheet 2. Early finishers do the two sums on sheet 4 of Adding and Subtracting Fractions with Unlike Denominators.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.6** and circle a face beside the "I can" line. Question 1: $3\frac{11}{15}$ and $5\frac{13}{24}$; $4\frac{37}{24}$ means the fractions were not renamed as a whole, and $4\frac{13}{24}$ means the new whole was not added. Question 2: $3\frac{1}{2}$; $3\frac{5}{10}$ is right but not in simplest form.

Need help? Line up whole strips and parts on the desk, and swap a full set of parts for a whole strip.

Ready for more? Find two mixed numbers with different denominators whose sum is exactly 5.

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PRINTABLE

Mixed Numbers with Unlike Denominators: sheets 1-2

PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 4, problems 1 and 3

QUIZ

Fraction Operations Quiz: the Mixed Numbers, Unlike level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.6

GET READY

- Paper strips, whole and cut into parts
- Number lines from 0 to 10
- Whiteboards and markers

WORDS TO USE

mixed number: a whole number and a fraction, like $2\frac{3}{4}$

add by parts: add the wholes, then the fractions

rename as a whole: turn fractions that make 1 or more into a whole: $\frac{13}{12} = 1\frac{1}{12}$

ASK

- What do the wholes make? What do the fractions make?
- Do the fractions make more than 1 whole?
- About how big should the sum be?

WATCH FOR

Leaves too many parts (5 $\frac{29}{24}$). Rename $\frac{29}{24}$ as $1\frac{5}{24}$ and add the whole.

Renames the fractions but forgets the wholes. Write the wholes first, in a box, so they are not lost.

Adds the denominators of the fraction parts. Rename with a common denominator, as with fractions alone.

Add and Subtract Fractions

Lesson 7.7: Subtract mixed numbers

GOAL Students subtract mixed numbers with unlike denominators: they rename the fractions with a common denominator, and when the top fraction is too small they trade 1 whole for parts first. A whole number is traded the same way.

About 45 minutes

I can subtract mixed numbers by trading 1 whole.

THE LESSON

- 1 Warm up** (5 min) Write 5 as 4 and some sixths. Write $3\frac{1}{4}$ as 2 and some fourths. ($4\frac{6}{6}$ and $2\frac{5}{4}$.)
- 2 Teach** (10 min) Subtract $5\frac{5}{6} - 2\frac{1}{4}$: in twelfths, $10/12 - 3/12 = 7/12$, and the wholes give 3, so $3\frac{7}{12}$. Then $4\frac{1}{6} - 1\frac{3}{8}$: in twenty-fourths that is $4\frac{4}{24} - 1\frac{9}{24}$, and $4/24$ is too small to take $9/24$ from. Trade 1 whole: $4\frac{4}{24} = 3\frac{28}{24}$. Now $3\frac{28}{24} - 1\frac{9}{24} = 2\frac{19}{24}$. A whole number works the same way: $5 - 2\frac{3}{10} = 4\frac{10}{10} - 2\frac{3}{10} = 2\frac{7}{10}$.
Say: "If the top fraction is too small, I trade 1 whole for parts of the same size. Then I subtract the fractions and the wholes."
- 3 Try it together** (10 min) Pairs solve with strips, cutting a whole strip to trade: $3\frac{1}{3} - 1\frac{1}{2}$, then $7 - 4\frac{5}{6}$. They check each answer by adding.
- 4 Practice** (15 min) Students subtract by parts on sheet 3 of Mixed Numbers with Unlike Denominators and trade 1 whole on sheet 4. Early finishers do the two subtractions on sheet 4 of Adding and Subtracting Fractions with Unlike Denominators.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.7** and circle a face beside the "I can" line. Question 1: $3\frac{9}{20}$ and $2\frac{3}{8}$; $4\frac{11}{20}$ means the smaller fraction was taken from the bigger, and $3\frac{5}{8}$ means 6 was not traded for $5\frac{8}{8}$. Question 2: $3\frac{2}{3}$; $3\frac{8}{12}$ is not in simplest form, and $4\frac{1}{3}$ means the parts were flipped.

Need help? Model every problem with strips, cutting a whole strip into parts to trade.

Ready for more? Write a subtraction of mixed numbers with unlike denominators that needs a trade and has $1\frac{3}{4}$ as its answer.

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PRINTABLE

Mixed Numbers with Unlike Denominators: sheets 3–4

PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 4, problems 2 and 4

PRINTABLE

Adding and Subtracting Mixed Numbers: sheet 3 for review

QUIZ

Fraction Operations Quiz: the Mixed Numbers, Unlike level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.7

GET READY

- Paper strips, whole and cut into parts, and scissors
- Number lines from 0 to 10
- Whiteboards and markers

WORDS TO USE

trade 1 whole: swap 1 whole for parts of the same size: $1 = 12/12$

subtract by parts: take away the fractions, then the wholes

ASK

- Is the top fraction big enough after renaming?
- What does 1 whole look like in twenty-fourths?
- How can adding check your answer?

WATCH FOR

Flips the fractions ($4\frac{1}{6} - 1\frac{3}{8} = 3\frac{5}{24}$). Ask: can 9 twenty-fourths come out of 4? Trade a whole first.

Trades but keeps the whole number the same. Cross it out and write one less.

Treats a whole number as having no parts ($5 - 2\frac{3}{10} = 3\frac{3}{10}$). Write 5 as $4\frac{10}{10}$ first.

Add and Subtract Fractions

Lesson 7.8: Estimate with benchmarks

GOAL Students round fractions to 0, one half or 1, and mixed numbers to whole numbers, to estimate a sum or difference and decide whether an answer makes sense.

About 45 minutes

I can estimate to see if an answer makes sense.

THE LESSON

- 1 Warm up** (5 min) Is each fraction closest to 0, one half or 1? $1/12$, $5/9$ and $6/7$. Students show each on the number line.
- 2 Teach** (10 min) Ana says $4/9 + 7/8 = 11/17$. Estimate: $4/9$ is close to one half and $7/8$ close to 1, so the sum is about $1\frac{1}{2}$, and $11/17$ is less than 1: Ana added the tops and the bottoms. Lee says $9\frac{7}{8} - 3\frac{1}{6} = 6\frac{17}{24}$. Round to whole numbers: $10 - 3 = 7$, and $6\frac{17}{24}$ is close to 7, so it makes sense.
Say: "Before I trust an answer, I round each fraction to 0, one half or 1. If the answer is far from my estimate, I check my work."
- 3 Try it together** (10 min) Pairs estimate and hold up Yes or No: $1/8 + 5/6 = 23/24$, $5/6 + 5/9 = 10/15$ and $6\frac{1}{6} - 2\frac{3}{4} = 4\frac{7}{12}$. Then they fix the wrong ones.
- 4 Practice** (15 min) Students judge the answers on sheet 5 of Adding and Subtracting Fractions with Unlike Denominators and estimate its stories, then estimate and solve on sheet 5 of Mixed Numbers with Unlike Denominators. Sheets 3-4 of Benchmark Fractions are a step back.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.8** and circle a face beside the "I can" line. Question 1: $1\frac{1}{2}$, as $11/12$ is about 1 and $5/8$ about one half; 2 means both were rounded up. Question 2: No, then Yes; $12/18$ is less than 1, but the first sum is about $1\frac{1}{2}$.

Need help? Place each fraction on a number line with 0, one half and 1 marked before estimating.

Ready for more? Write a wrong answer to $2/3 + 7/8$ that an estimate would catch, and one it would not.

GET READY

- Fraction number lines from 0 to 1 with 0, one half and 1 marked
- Cards with answers to judge, some right and some wrong
- Whiteboards and markers

WORDS TO USE

benchmark: a number we know well: 0, one half, 1

estimate: a close answer from easier numbers

reasonable: close to the estimate, so it makes sense

ASK

- Is each fraction closer to 0, one half or 1?
- Should the answer be more or less than 1?
- Is the answer close to your estimate?

WATCH FOR

Says Yes to an answer with the tops and bottoms added. Estimate first: $4/9 + 7/8$ is about $1\frac{1}{2}$, and $11/17$ is less than 1.

Rounds every fraction to 1. Compare the top with half the bottom: $4/9$ is close to one half.

Thinks an answer near the estimate must be right. An estimate catches big mistakes only.

ON ANIMAL MATH

PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 5

PRINTABLE

Mixed Numbers with Unlike Denominators: sheet 5

PRINTABLE

Benchmark Fractions: sheets 3-4, a step back

MAKER

Graph Paper: Paper Type Number Lines, Number Lines "Fractions, 0 to 1"

QUIZ

Fraction Operations Quiz: the Unlike Denominators level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.8

Add and Subtract Fractions

Lesson 7.9: Fraction story problems

GOAL Students solve story problems that add and subtract fractions and mixed numbers with unlike denominators, in one step and in two: they estimate, draw a tape diagram, write an equation with the unknown, solve, and answer in simplest form with the unit.

About 45 minutes

I can solve fraction story problems.

THE LESSON

- 1 Warm up** (5 min) Act it out: pour $\frac{1}{2}$ cup of water, then $\frac{1}{3}$ cup more. Is there more or less than 1 cup? How do you know?
- 2 Teach** (10 min) Read: A ribbon is $3\frac{2}{3}$ yards long. Sam cuts off $1\frac{3}{4}$ yards. How much is left? Estimate $4 - 2 = 2$, draw a tape (the whole, the part cut off, the unknown) and write $3\frac{2}{3} - 1\frac{3}{4} = r$. Rename in twelfths and trade 1 whole: $2\frac{20}{12} - 1\frac{9}{12} = 1\frac{11}{12}$ yards. Two steps: Kim had $2\frac{1}{3}$ cups of flour and used $\frac{3}{4}$ cup, then $1\frac{1}{6}$ cups. Take each away, or add them first: $2\frac{1}{3} - \frac{3}{4} - 1\frac{1}{6} = \frac{5}{12}$ cup.
Say: "I estimate and draw what I know, write an equation with the unknown, solve it, and check it against my estimate."
- 3 Try it together** (10 min) Pairs draw and solve: A jug holds $\frac{3}{4}$ liter of juice. Mo pours in $\frac{2}{3}$ liter more. How much juice is in the jug? Then: A board is $5\frac{3}{4}$ feet long. Ava cuts off $1\frac{2}{3}$ feet, then $2\frac{1}{6}$ feet. How much is left?
- 4 Practice** (15 min) Students estimate, draw tapes and solve on sheets 1-2 of Fraction Word Problems for 5th Grade, then problem 6 of sheet 5 (its other stories multiply and divide). Early finishers solve the stories they estimated in lesson 7.8, on sheet 5 of Adding and Subtracting Fractions with Unlike Denominators.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 7.9** and circle a face beside the "I can" line. Question 1: $1\frac{13}{20}$ miles (or $\frac{33}{20}$); $\frac{12}{14}$ means the tops and the bottoms were added. Question 2: $2\frac{1}{3}$ yards (or $\frac{7}{3}$); $5\frac{1}{12}$ means only the first piece was taken away.

Need help? Act the story out or draw it on a tape before writing the equation.

Ready for more? Write a two step story with $4\frac{1}{4}$, $1\frac{2}{3}$ and $\frac{5}{6}$, then solve it.

GET READY

- Story cards with lengths, weights and amounts in fractions
- Whiteboards and markers
- A ruler or measuring cups to act out a story

WORDS TO USE

tape diagram: a bar that shows the parts and the whole

equation: a number sentence with an equals sign

unknown: the number we need to find

ASK

- What do you know? What do you need to find?
- Does the story join, take away or compare?
- Is your answer close to your estimate, and does it have the unit?

WATCH FOR

Adds when the story compares (how much longer). Draw both amounts as bars and find the gap.

Takes away only one of two amounts in a two step story. Circle every amount used, or add them first and take away once.

Leaves off the unit or the simplest form. Read the question again: how far? Answer in miles.

ON ANIMAL MATH

PRINTABLE

Fraction Word Problems for 5th Grade: sheets 1-2; sheet 5, problem 6

PRINTABLE

Adding and Subtracting Fractions with Unlike Denominators: sheet 5 for early finishers

QUIZ

Fraction Operations Quiz: the Unlike Denominators level

EXIT TICKET

5th Grade Adding and Subtracting Fractions Exit Tickets: Exit Ticket 7.9