



**THIRD SPACE  
LEARNING**

# Math Intervention Pack

**Subtracting mixed numbers**

**Grade 5**

## How To Use This Resource

### 1. Title Slide

Use this slide to activate prior knowledge needed for lesson. Students should be encouraged to initially attempt the question presented independently.

### 2. Let's Learn

Use this slide to introduce the concept. Tutors should work with the student to explore the concept together, usually using diagrams to support understanding.

### 3. Follow Me + Your Turn

The tutor should work through the follow me slide, modeling the process and explaining their thinking out loud.

Students should use the your turn slide as an opportunity to work through a question similar to the follow me questions. They should apply the method modeled by the tutor in the follow me slide. Students should be encouraged to explain their thinking out loud.

### 4. You Do

Students should work through a range of questions that build in complexity.

Tutors can offer support but students should initially be encouraged to attempt these questions independently.

### 5. Go Further

Use this slide to allow students to apply their understanding to a more challenging question in an unfamiliar context.

### 6. Support for Slides

The support slide is used to support students during the lesson. In the tutor notes, there will be guidance as to when to use the support slide.

### 7. Check Your Understanding

Tutors should use this slide to assess the student's knowledge and whether or not they have mastered the concept within the lesson.

## Standard

**5.NF.1:** 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,  $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$ . (In general,  $\frac{a}{b} + \frac{c}{d} = (\frac{ad + bc}{bd})$ )

## Key Mathematical Ideas

1. Use understanding of multiples and equivalent fractions to find common denominators
2. Subtract mixed numbers with unlike denominators

## Overview

### Terminology

- **Add:** To combine or join together.
- **Subtract:** To find the difference between two numbers
- **Fraction:** A part of a whole number
- **Mixed number:** A number that is made up of a whole number and a fraction (example  $8\frac{2}{3}$ )
- **Equivalent fractions:** Fractions that name the same amount or number but look different (example:  $\frac{2}{3}$  and  $\frac{6}{9}$ )
- **Numerator:** The top number of a fraction which tells the number of equal-sized parts of the whole
- **Denominator:** The bottom number of a fraction which tells the number of equal-sized pieces in the whole
- **Common denominator/Like denominator:** Having the same denominator
- **Like/Unlike:** The same/different

## Overview

### Sentence Stems

- ..... is a multiple of ..... .
- (fraction) is equivalent to (fraction).
- We can use the number ..... for a common denominator.

### Common Misconceptions

Common Misconceptions	Tutoring Strategies	Checks for Understanding
At the end, sometimes students will subtract the remaining whole number and fraction, when they need to be added or combined.	Show students that we are combining the remaining whole number and fraction because we have already subtracted the entirety of the second mixed number in the problem.	Why do we add together the remaining whole number and fraction?
When borrowing a whole in order to subtract the fractions, students sometimes forget to actually take 1 whole away.	Before students add the whole into the fraction, make sure they cross off the whole number and write the new remaining number next to it.	How can we show that we have borrow 1 whole from the remaining whole number?
Students may forget to combine the whole number and the fraction at the end.	Continue to point out that the very last step is add the whole number to the fraction to get our final answer.	What is the final answer? Does this answer make sense?



## Overview

### Common Misconceptions (continued)

Common Misconceptions	Tutoring Strategies	Checks for Understanding
When students find equivalent fractions using multiplication, they must multiply the denominator and the numerator by the same number. Some students only multiply the denominator, which changes the value of the fraction.	<p>Show students an example where only the denominator is multiplied by 2. For example, if we multiply the denominator of <math>\frac{1}{2}</math> by 2, we get <math>\frac{1}{4}</math>. Is <math>\frac{1}{2} = \frac{1}{4}</math>? (No)</p> <p>Then, show students how the value of <math>\frac{1}{2}</math> stays the same if both the numerator and denominator are multiplied by 2. Does <math>\frac{1}{2} = \frac{2}{4}</math>? (yes)</p> <p>It may be even more helpful to show examples using a diagrams to give students a visual.</p>	Ask students after converting to an equivalent fraction - does the fraction still have the same value?
Students may use a high number as the common denominator, which may work, but will cause a lot of unnecessary steps and more work for the student.	If students are finding a higher common multiple, ask them to check to see if one denominator is a multiple of the other.	Is either of the denominators a multiple of the other? How does this help us?

## Title Slide

### If stuck

- What mixed number do the shaded parts of the diagram represent? (before any were crossed out)
- How much of the diagram was crossed out? (1 whole and  $\frac{1}{8}$ )
- How much of the shaded part of the diagram is still showing? (2 wholes and  $\frac{2}{8}$ )

### Answers

- $3\frac{3}{8} - 1\frac{1}{8} = 2\frac{2}{8}$
- The model starts with  $3\frac{3}{8}$  shaded, then  $1\frac{1}{8}$  is crossed out, leaving  $2\frac{2}{8}$  remaining shaded pieces.

## Let's Learn

### If stuck

- Start the diagram over and cross out as you complete each step.

### Questions

- Why do we add the remaining whole number and fraction at the end?

### Watch out for

- At the end of a problem, sometimes students will subtract the remaining whole number and fraction, when they need to be added or combined.

### Answers

a. 1

b.  $\frac{3}{6} - \frac{2}{6} = \frac{1}{6}$

c.  $1 + \frac{1}{6}$

d.  $1\frac{1}{6}$

## Follow Me

### Modeling prompts

- Let's see what happens when the first fraction is smaller than the second fraction.
- We start the same way - separating the wholes and the fractions. Let's cross off 2 wholes. How many are remaining? (2)
- Now we need to find a common denominator so we can subtract the fractions. We will use 8.  $\frac{3}{4} =$  how many eighths? (6)
- We can't subtract  $\frac{6}{8}$  from  $\frac{1}{8}$ . So now, we need to borrow from the 2 wholes we have remaining. We can convert 1 whole to a fraction and then add it to  $\frac{1}{8}$ .
- I will cross off 1 more whole and change the number to 1, since now there is only 1 whole remaining.
- 1 whole = how many eighths? (8)
- Let's add  $\frac{1}{8}$  to  $\frac{8}{8}$ . Now how many eighths are there? (9)
- Now we can subtract.  $\frac{6}{8} - \frac{6}{8} = \frac{3}{8}$
- Last, we combine the remaining whole number, which is 1, with our fraction, which is  $\frac{3}{8}$ .
- Our final answer is  $1\frac{3}{8}$

### Answers

- ~~1~~
- 6
- 8
- 8 and 9
- $1\frac{3}{8}$

## Your Turn

### If stuck

- Use the Let's explore this more slide to show students how to solve this problem using a model.

### Questions

- How did you know if you had to borrow a whole?
- What fraction did you convert the borrowed whole into? Why?
- What is your final answer? Does it seem reasonable? Why or why not?

### Watch out for

- Students thinking they need to subtract at the very end instead of adding the remaining whole and the fraction together.
- Students forgetting to remove 1 whole when they borrow.

### Answers

a.  $\cancel{1}$

b.  $\frac{9}{12} - \frac{8}{12}$

c.  $\frac{12}{12}$

d.  $\frac{12}{12} + \frac{3}{12} = \frac{15}{12}$

e.  $\frac{15}{12} - \frac{8}{12} = \frac{7}{12}$

f.  $1 + \frac{7}{12} = 1\frac{7}{12}$

## You Do

### If stuck

- Allow students to draw a model for each question as needed.

### Questions

- Did you have to borrow from the whole to subtract your fractions in any of the problems? Did that make it more challenging?

### Watch out for

- Students thinking they need to subtract at the very end instead of adding the remaining whole and the fraction together.
- Students forgetting to remove 1 whole when they borrow.

### Answers

$$\text{a. } (9 - 5) + \left(\frac{4}{5} - \frac{1}{2}\right) = (4) + \left(\frac{8}{10} - \frac{5}{10}\right) = 4 \frac{3}{10}$$

$$\text{b. } (6 - 3) + \left(\frac{2}{3} - \frac{1}{4}\right) = (3) + \left(\frac{8}{12} - \frac{3}{12}\right) = 3 \frac{5}{12}$$

$$\text{c. } (10 - 4) + \left(\frac{1}{3} - \frac{5}{6}\right) = (6 - 1) + \left(\frac{2}{6} - \frac{5}{6}\right) = (5) + \left(\frac{8}{6} - \frac{5}{6}\right) = 5 \frac{3}{6} \text{ or } 5 \frac{1}{2}$$

$$\text{d. } (3 - 2) + \left(\frac{3}{4} - \frac{1}{2}\right) = (1) + \left(\frac{3}{4} - \frac{2}{4}\right) = 1 \frac{1}{4}$$

## Go Further

### If stuck

- Ask students what the opposite of subtraction is and how we can use that to help us solve this problem.

### Questions

- What operation did you need to use to find the missing number?

### Watch out for

- Students may overthink the problem and not realize it is as simple as adding the two mixed numbers shown.

### Answers

- Work backwards:

$$3\frac{2}{5} + 5\frac{1}{3} = (3 + 5) + \left(\frac{2}{5} + \frac{1}{3}\right) = (8) + \left(\frac{6}{15} + \frac{5}{15}\right) = 8\frac{11}{15}$$

## Support for Slide(s)

This slide supports the Your Turn slide.

### If stuck

- Students can use diagrams to help them subtract mixed numbers, especially when they need to borrow from the whole to subtract the fractions.

### Questions

- How does the diagram help you visualize borrowing one whole in order to subtract the fractions?

### Answers

a.  $2\frac{1}{12}$

b.  $\frac{3}{12} - \frac{8}{12}$

15, 8 and 7

c.  $1\frac{7}{12}$

## Check Your Understanding

### Correct answers

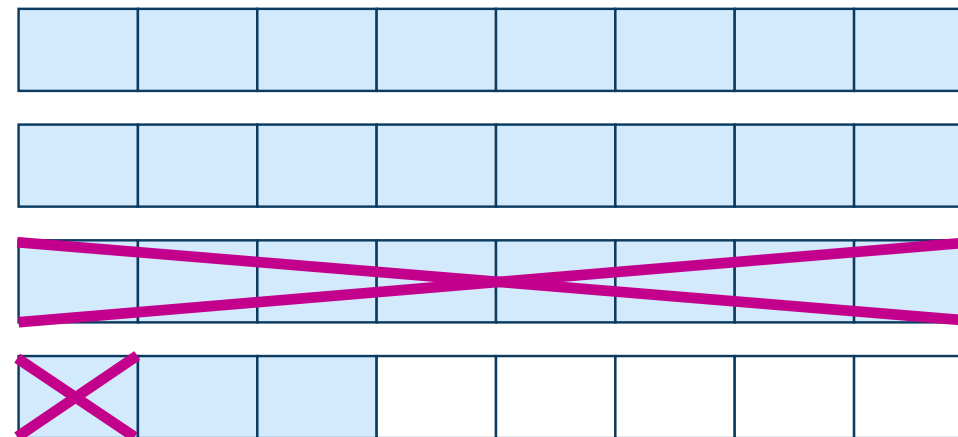
- d.  $2\frac{7}{9}$
- a. Students may choose this answer if they subtract the numerators and the denominators.
- b. Students may choose this answer if they borrow one whole from the remaining whole number to add to the fractions, but forget to take that whole away.
- c. Students may choose this answer if they forget to combine the whole number and fraction at the end.
- d. This is the correct answer. Students need to subtract the whole numbers ( $8 - 5 = 3$ ) and then the fractions. First, they need to change  $\frac{2}{3}$  to the equivalent fraction of  $\frac{6}{9}$

Today you will learn about

# Subtracting mixed numbers

Warm-up question

What equation is shown using the bar models?



How do you know?



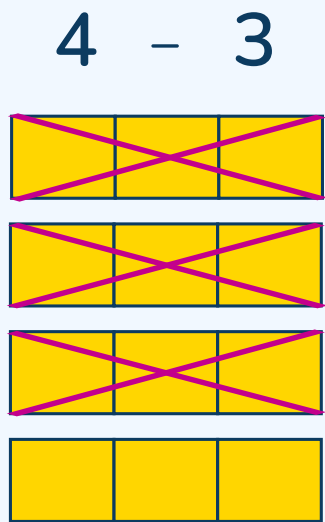
# Let's learn

When subtracting **mixed numbers**, we can separate the equation into **whole numbers** and **fractions**.

$$4\frac{1}{2} - 3\frac{1}{3}$$

We can subtract the **whole numbers** and **fractions** separately

Subtract the **whole numbers**



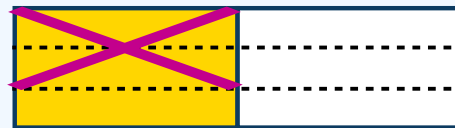
a 4 wholes - 3 wholes = .....

Subtract the **fractions**

$$\frac{1}{2} - \frac{1}{3}$$

First, we need a **common denominator**.

$$\frac{1}{2} = \frac{\boxed{\phantom{00}}}{6} \quad \frac{1}{3} = \frac{\boxed{\phantom{00}}}{6}$$



b  $\frac{\boxed{\phantom{00}}}{6} - \frac{\boxed{\phantom{00}}}{6} = \frac{\boxed{\phantom{00}}}{6}$

Now we put the **whole numbers** and **fractions** back together

c **Add** the difference of the whole numbers and the difference of the fractions.

$$\dots\dots\dots + \dots\dots\dots$$

d  $4\frac{1}{2} - 3\frac{1}{3} = \dots\dots\dots$

# Follow me

Now let's see what happens if the first fraction is less than the second fraction.

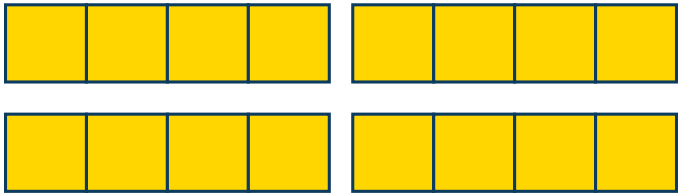
$$4\frac{1}{8} - 2\frac{3}{4}$$

We can **partition** the equation into whole numbers and fractions.

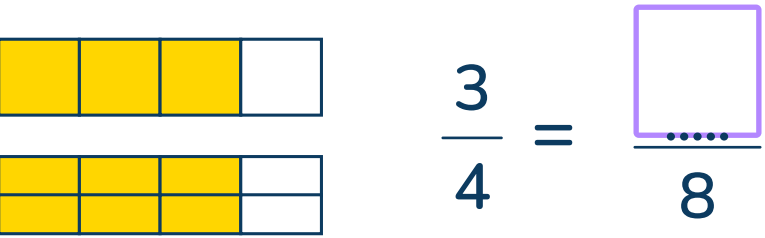
$$(4 - 2) + \left(\frac{1}{8} - \frac{3}{4}\right)$$

Now, we need to subtract the fractions. Since the first fraction is less than the second fraction, we need to **borrow** from our remaining whole numbers first.

a 4 wholes – 2 wholes = .....



b Find a **common denominator** to subtract the fractions.



c Take one whole from the remaining wholes and convert it to a fraction with the common denominator.

$$1 = \frac{\boxed{\phantom{000}}}{8}$$

c Add the one whole to the first fraction.

$$\frac{1}{8} + \frac{\boxed{\phantom{000}}}{8} = \frac{\boxed{\phantom{000}}}{8}$$

d Now we can subtract the fractions.

$$\frac{\boxed{\phantom{000}}}{8} - \frac{\boxed{\phantom{000}}}{8} = \frac{\boxed{\phantom{000}}}{8}$$

e Put the remaining whole number and the fraction back together.



Your turn

$3\frac{1}{4} - 1\frac{2}{3}$

Partition the equation into whole numbers and fractions.

$(3 - 1) + (\frac{1}{4} - \frac{2}{3})$

You need to borrow from the remaining whole numbers to subtract the fractions.

a 3 wholes – 1 wholes = .....

b Find a common denominator to subtract the fractions.

$\frac{1}{4} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$        $\frac{2}{3} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$

c Take one whole from the remaining wholes and convert it to a fraction with the common denominator.

$1 = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$

d Add the one whole to the first fraction.

$\frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} + \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$

e Now subtract  $\frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} - \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \dots\dots\dots$

f Put the remaining whole number and fraction back together.

$\dots\dots\dots + \dots\dots\dots = \dots\dots\dots$   
whole number      fraction      mixed number



You do



a  $9\frac{4}{5} - 5\frac{1}{2} = \dots\dots\dots$

b  $6\frac{2}{3} - 3\frac{1}{4} = \dots\dots\dots$


c  $10\frac{1}{3} - 4\frac{5}{6} = \dots\dots\dots$

d  $3\frac{3}{4} - 2\frac{1}{2} = \dots\dots\dots$

## Go further

What fraction could be underneath the tear?

.....
.....

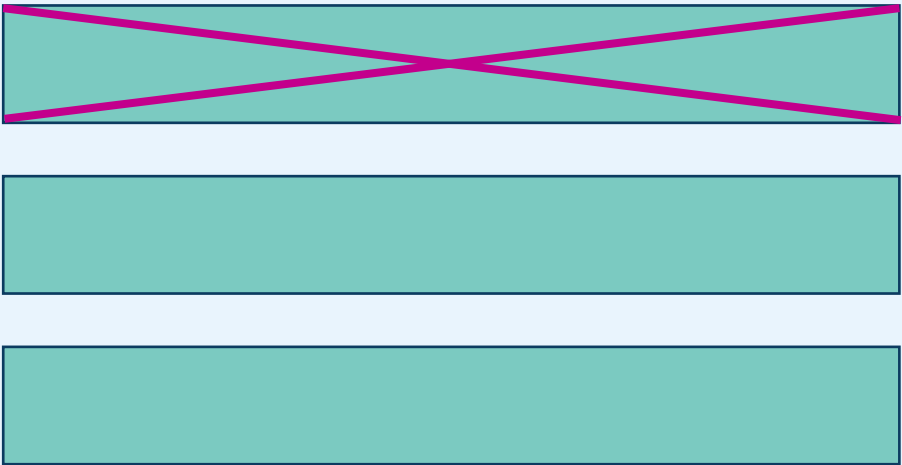

$$- 3\frac{2}{5} = 5\frac{1}{3}$$

Support

$$3\frac{1}{4} - 1\frac{2}{3}$$

Since this is a subtraction equation, we build the first number and cross off or take away the second number.

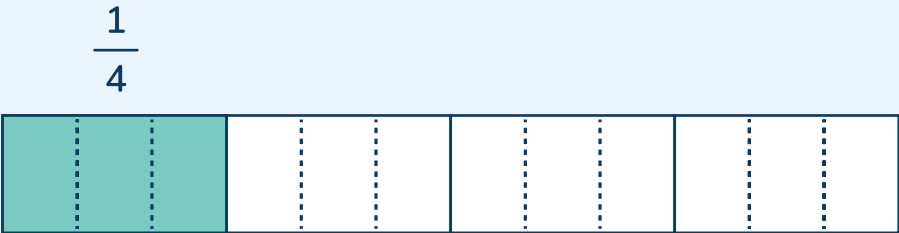
a Subtract the whole numbers



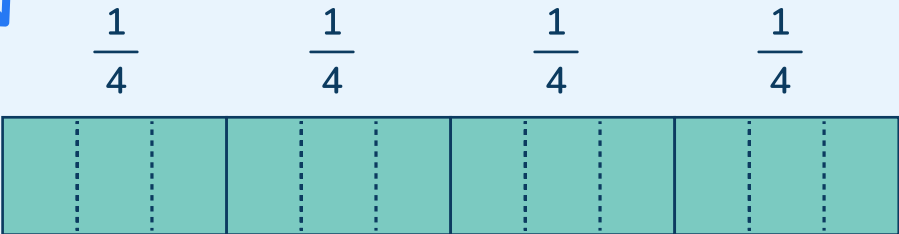
$$3 - 1 = \dots\dots\dots$$

Since we can't subtract  $\frac{2}{3}$  from  $\frac{1}{4}$ , we need to borrow from the remaining whole numbers to subtract the fractions.

We can use 12 as our common denominator.



$$\frac{1}{4} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \quad \frac{2}{3} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$$



b Subtract the fractions

Now there are ..... twelfths  
and we can subtract.

$$\frac{\boxed{\phantom{00}}}{12} - \frac{\boxed{\phantom{00}}}{12} = \frac{\boxed{\phantom{00}}}{12}$$

c Combine the remaining whole number and the fraction.

$$3\frac{1}{4} - 1\frac{2}{3} = \dots\dots\dots$$

## Check your understanding

$$8\frac{4}{9} - 5\frac{2}{3} =$$

a

$$2\frac{2}{6}$$

b

$$3\frac{7}{9}$$

c

$$\frac{7}{9}$$

d

$$2\frac{7}{9}$$

Why do I need to try this question on my own first?

-To show your tutor what you understand

-To give you more practice

-To show your teacher how you are doing



## Do you have a group of students who need a boost in math?

Each student could receive personalized lessons every week from our specialist one-on-one math tutors.




- ✓ Differentiated instruction for each student
- ✓ Aligned to your state's standards
- ✓ Scaffolded learning to close gaps

“We just had our first session and it went great! The kids really liked it and felt like they were learning! One even said he finally felt like math was making sense.”



Michelle Craig, Instructional Coach,  
Sherwood Forest Elementary, Washington

## Speak to us

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