CHAPTER 6: Simple Fractions
MINI-MODULE F

Addition and Subtraction of Like Fractions

Objectives

This mini-module aims to help teachers:

- Explain and demonstrate how to add and subtract fractions using various fraction representations.
- Teach how to add and subtract like fractions.
- Practice a new teaching activity.

Recommended Materials

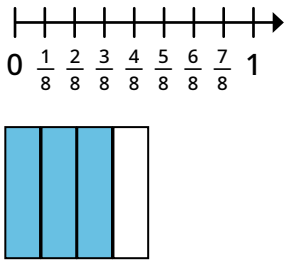
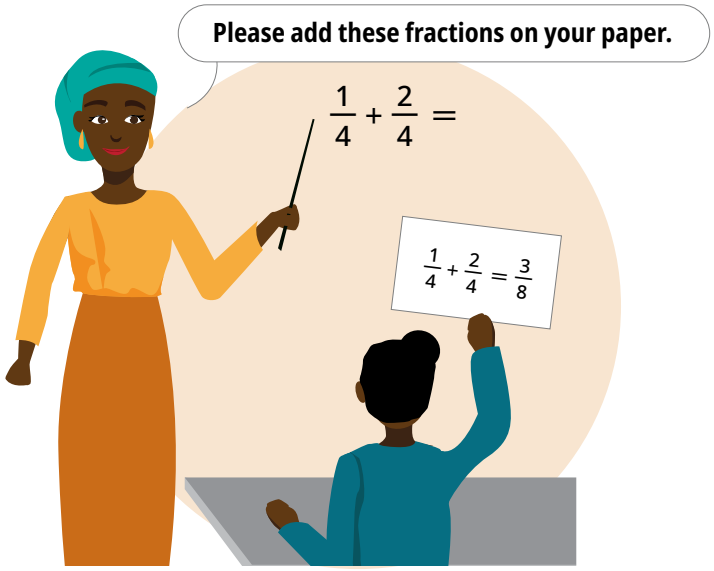


Illustration of Teaching



REFLECT:

- What mistake did the student make?
- What do you think the student misunderstands about fraction addition?
- What materials or activities could you use to address this misunderstanding?

Ideas to Consider

The teacher asked the student to add two fractions written on the board. This is an abstract problem, without any visual representation. The student incorrectly added the numerators and the denominators of the fractions: ✗ $\frac{1}{4}+\frac{2}{4}=\frac{1+2}{4+4}=\frac{3}{8}$. They do not seem to understand that only the parts of the whole (the numerators) are added: ✓ $\frac{1}{4}+\frac{2}{4}=\frac{1+2}{4}=\frac{3}{4}$.

The teacher could show the student how to use fraction representations, such as shapes or a number line, to add fractions. These materials help children understand the concept by demonstrating the parts of the whole that are being added. Teachers should give students plenty of practice with representations before asking them to add abstract fractions. They may also use stories to bring the problems to life.

In this mini-module, you will explore what children learn about fraction addition and subtraction and how to support them with representations.

ACTIVITY: SUBTRACT FRACTIONS

This activity can be completed alone, in pairs, or with a group of teachers. If you have colleagues to work with, you may take turns explaining how to use your fraction representations. Discuss your responses to the questions.

Purpose: Identify fraction representations that can be used to subtract fractions.

Materials needed: Writing materials for participants.

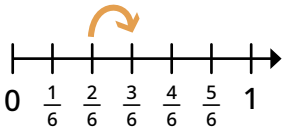
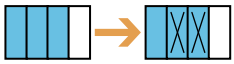
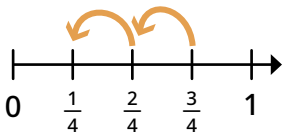
Instructions

- Read a story: ***Fatima had $\frac{3}{4}$ of a yam this morning, and she ate $\frac{1}{4}$ of a yam for breakfast. How much yam does Fatima have now?***
- Draw a fraction representation that could be used to solve this problem (e.g., a shape or a number line).
- ***How can this representation be used to solve the problem? What are the steps?***
- Share your representation with your colleagues and explain the steps to solve the problem.
- ***Which fraction representation do you think is most useful for adding or subtracting fractions? Why?***

What Do Children Learn about Adding and Subtracting Fractions?

Children first learn how to add and subtract fractions using visual or concrete representations, such as shapes or a number line. This helps them learn and understand the concepts of fraction addition and subtraction. Once they understand the concepts with representations, they can solve written problems along with the representations. Eventually they will be prepared to add and subtract fractions without representations, but these representations can always be used again later to explain and reinforce the concepts. It is helpful to use the same representations for teaching addition and subtraction. This helps students develop a strong understanding of each topic and reinforces the relationship between the two (that addition and subtraction are opposite operations).

In the early grades, children learn how to solve only basic addition and subtraction problems. They should not be required to convert fractions or work with negative numbers. This means that the fractions should have the same denominator, and the answers should not be more than 1 or less than 0. Teachers should take care when choosing fractions to ensure that this is always the case.

Children should be able to . . .	What does this mean?	Example
Add fractions with the same denominator	Add fractions with the same denominator using representations.	Q: ***Can you add $\frac{2}{6}+\frac{1}{6}$ using a shape?*** A: To add $\frac{2}{6}+\frac{1}{6}$ using a fraction shape, shade two parts ($\frac{2}{6}$) and then shade one more ($\frac{1}{6}$):  Q: ***Can you add $\frac{2}{6}+\frac{1}{6}$ using a number line?*** A: To add $\frac{2}{6}+\frac{1}{6}$ using a number line, find $\frac{2}{6}$ and add $\frac{1}{6}$ by moving one space to the right: 
Subtract fractions with the same denominator	Subtract fractions with the same denominator using representations.	Q: ***Can you subtract $\frac{3}{4}-\frac{2}{4}$ using a shape?*** A: To subtract $\frac{3}{4}-\frac{2}{4}$ using a fraction shape, shade three parts ($\frac{3}{4}$) and then take away two parts ($\frac{2}{4}$) by crossing them out:  Q: ***Can you subtract $\frac{3}{4}-\frac{2}{4}$ using a number line?*** A: To subtract $\frac{3}{4}-\frac{2}{4}$ using a number line, find $\frac{3}{4}$ and subtract $\frac{2}{4}$ by moving two spaces to the left: 

Reflection

Write your responses down or discuss your ideas with your colleagues:

- Why is it helpful to use visual representations to teach fraction addition and subtraction?
- In your opinion, what is the most useful representation for adding fractions? For subtracting fractions?
- Which representation do you think your students will find challenging? How can you support them?

Teaching Practice

This practice activity may be completed by teachers with their own class or with a smaller group of students.

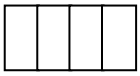
ACTIVITY: ADD FRACTIONS

Purpose: Add fractions using shapes.

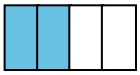
Materials needed: Writing materials for all students.

Instructions

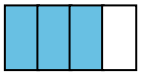
- Read a story: ***Amma is planting a garden. Her garden is in the shape of a rectangle. She divided it into four equal parts.***
- Ask: ***What shape is Amma's garden? How many parts are there in her garden?***
- Draw a rectangle on the board, and divide the rectangle on the board into four equal parts. Ask students to copy the shape on their paper.



- Continue the story: ***Amma planted $\frac{2}{4}$ of her garden with yams. She planted $\frac{1}{4}$ of her garden with corn. Amma wants to find out what fraction of her garden has been planted in total.***
- Ask: ***How much of her garden did Amma plant with yams?***
- Ask students to shade their rectangle to show the part of the garden planted with yams.
- Shade two parts of the shape on the board and ask students to check their work. Note that they could have shaded any two parts.



- Ask: ***How much did Amma plant with corn?***
- Ask students to shade more of their rectangle to show the part of the garden planted with corn.
- Shade one more part of the rectangle on the board.



- Discuss: ***What fraction of her garden has Amma planted in total? How do you know?***
- Say: ***Amma planted $\frac{2}{4}$ of her garden with yams, then she planted $\frac{1}{4}$ with corn. Altogether, she has planted $\frac{3}{4}$ of her garden.***
- Write on the board: $\frac{2}{4} + \frac{1}{4} =$
- Point and read the addition sentence together with students.
- Discuss: ***Amma wrote this to add the parts of her garden that she planted with yams and corn. What do you think the answer is? How do you know?***
- Write the answer on the board: $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$
- Say: ***You drew a picture of Amma's garden to find out how much she has planted in total. You found that $\frac{2}{4}$ plus $\frac{1}{4}$ make $\frac{3}{4}$ in total.***
- Ask students to copy the addition sentence under the rectangle they drew.

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AUTHORS: Brittany Meredith, Yasmin Sitabkhan, Wendi Ralaingita, Linda Akach