Representing Improper Fractions Using Sets - Simcoe County DSB KNAER Lesson — Grade 6

MO 10 min
A 45 min
C/D 20 min
75 min

Math Learning Goals

Students will:

- reason about the meaning of a fraction and how to represent fractions using a variety of tools
- identify and represent various improper fractions by considering them within the context of a set
- connect improper fractions to mixed numbers

Materials

- two colour counters
- linking cubes
- plastic/paper bags
- BLM 1.1 – 1 copy/student

Minds On…

Whole Group → Discussion

Show students 2 red and 1 blue counters equal in size. Ask why this could represent $\frac{2}{3}$ (There are 3 things altogether and 2 are red, which is 'part-whole' relationship.)

Show 1 red and 1 blue counter and 1 red linking cube, all separated. Ask if this still shows $\frac{2}{3}$. Ask why? (There are still 3 things and 2 are red. In this set, we are looking at the colours.)

Ask what the numerator 2 tells. (how many parts we're using/referring to when we say "red". Note that the numerator would have been 1 had we said "blue" instead of "red") Ask what the denominator 3 tells? (how many things there are altogether in the set.). Ask what $\frac{3}{3}$ would mean? (all 3 parts of a set of 3, or the whole set of 3). Ask what $\frac{4}{3}$ would mean? (1 more part than the whole set of 3). Show 4 counters in a bag and one counter outside the bag. Ask students what fractions they see in this model. (e.g., $\frac{5}{4}$ because there are 5 counters but it only takes 4 to fill one whole bag; $\frac{4}{5}$ because 4 of the set are in the bag but there are 5 counters total.) Bring "whole" into the discussion and tell students that they must identify the whole when writing a fraction. Engage them in reasoning that when we are working with bags of cookies we would call the whole the entire set of cookies in one bag.

This lesson is modified from the Gap Closing Junior Package (available on—line at edugains.ca under Math).

Action!

Small Group → Open Question

Students complete BLM 1.1 using counters and bags to model the scenario of cookies in a bag. Circulate to monitor student understanding. Use the following guiding questions to prompt students as necessary:

- Explain why you chose this representation.
- Have you thought about…?
- What do you notice about…?
- Does this answer make sense to you?
- How can you verify this answer?
- What evidence of your thinking can you share?
- Is this a reasonable answer, given that…?
- How do these different representations connect to one another?

Revisions to Open Question:

- change $\frac{1}{2}$ to $\frac{3}{6}$
- fraction of a fraction

These questions are selected from the Math Processes Connections and Continuum Package available at edugains.ca.

Consolidate Debrief

Whole Group → Discussion

Ask specific students with correct representations to show one of the fractions in a way that allows all students to see all of the fractions represented during the following discussion. Gather and discuss with the class, ways in which the given fractions are alike (all the fractions are improper; the numerator is greater than the denominator; each fraction is more than 3 and less than 4, there are always 4 items left when items are rearranged into the bags), and ways that they are different (the sizes of the numbers; whether the denominators and numerators are even or odd; the number of parts in a whole, etc).

If necessary, ask questions such as:

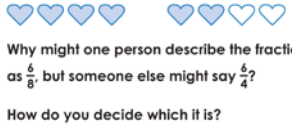
- How did you know you needed to draw more than 3 whole bags?
- What is another fraction that would be like all of these?
- What is a fraction that would be different from all of these?
- Why does it make sense to call these fractions even though they are more than a whole? (e.g., because they are written like fractions and they are just counting parts of wholes.)

If some students need a challenge, add an example with equivalent mixed numbers e.g., $\frac{7}{2}$ and $\frac{21}{6}$; As students share their responses, highlight the terminology of improper fraction and mixed number. Also, reinforce that the numerator can be larger than the denominator.

Home Activity or Further Classroom Consolidation

You have $\frac{5}{2}$ bags of cookies. If 8 cookies go into each bag, how many cookies would you have?

OR



Use either, depending on the readiness of the students.
#4 is from pg. 23 of the student workbook of Gap Closing Junior.

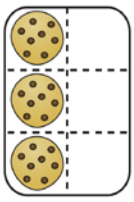
BLM 1.1

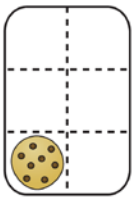
Improper Fractions as Parts of Sets

Open Question

1 whole is a box full of cookies.

If a box contains 6 cookies, then

3 cookies fill $\frac{3}{6}$ of a box. 

1 cookie fills $\frac{1}{6}$ of a box. 

Draw pictures of boxes of cookies to show these fractions.
Show full bags and extra cookies, if needed.

$\frac{22}{6}$ $\frac{19}{5}$ $\frac{28}{8}$ $\frac{34}{10}$

Show how many whole boxes and what part of a box each fraction would be. Write it under your pictures.

- How are these fractions alike?

- How are they different?

(Junior/Intermediate Gap Closing: Number Sense: Module 1: Representing Fractions - adapted)