Representing Fractions – Ottawa-Carleton DSB KNAER Lesson — Grade 6

MO 10 min
A 35 min
C/D 15 min
60 min

Learning Goals

Students will:

- understand that a fraction can have multiple meanings (e.g., part to part; part to whole)
- connect and distinguish between measurement models (such as area) and set models for fractions
- explain and justify their reasoning about fraction representations

Materials

4 of each of the following baggies of pattern blocks
- 4 hexagon, 6 trapezoid
- 4 hexagon, 6 rhombus
- 4 hexagon, 6 triangle

Minds On…

Whole Group → Mind Map

Ask students what they know about fractions. Create a mind map using their input and organized to align with your pre-planned mind map for the unit.

Using the unit outline to create the mind map ahead of time will allow for the strategic placement of student ideas. Using a different colour each day will highlight the learning that students are gaining through the unit.

Action!

Small Group → Activity

Provide each group with one baggie. Ask small groups to generate as many fractions as they can with the blocks. Thinking can be provoked and extended with the following types of questions:

- How would you represent a fraction which uses all the blocks?
- How would you use the same blocks to represent a different fraction?
- What fractions can you create if one block is the whole?

Whole Class → Sharing

Ask small groups to each share a fraction and the corresponding representation. Consider having students either use pattern block paper to record their answers, sharing their work using a document camera, or having pattern blocks cloned on an interactive whiteboard for the sharing of their solutions.

Record the following information as it arises from the student talk:

- Meaning of the numerator
- Meaning of the denominator
- Definition of the whole
- Different meanings of fraction – measure (such as distance, area) and set (one attribute of a number of pieces regardless of another of the pieces)

Some questions which may be useful:

- How are the fractions the same? How are they different?
- How can we have 3 different sets of blocks to use but still end up with the same fractions?
- If you used a set, what attributes did you use to identify the fraction?
- Record for all to see, fractions generated, along with explanations of student thinking.

Some examples:

- $\frac{6}{9}$ (6 blue pieces of 9 total)
- $\frac{3}{9}$ (3 blue on top of 3 yellow. whole is 3 yellow)
- $\frac{1}{4}$ (3 blue and 3 yellow ... 3 blue is equivalent to one yellow)

Set model...

- $\frac{4}{10}$ yellow (for all baggies)

Consolidate Debrief

Whole Group → Discussion

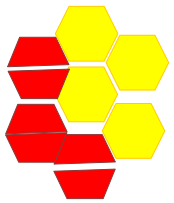
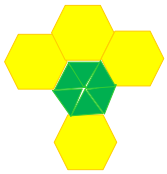
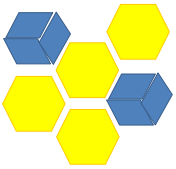
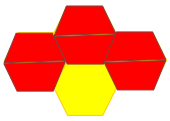
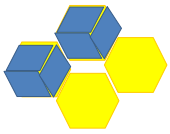
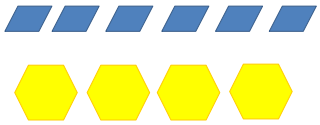
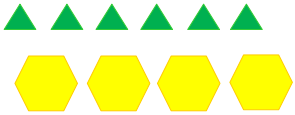
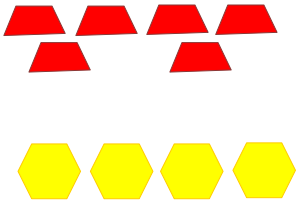
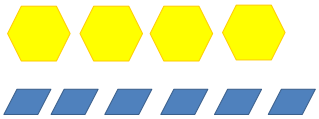
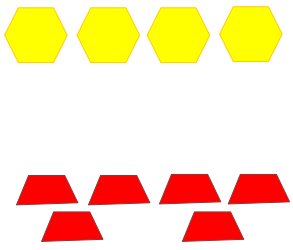
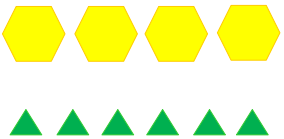
Review the terminology with students, making explicit connections to their responses. Allow them to ask any further questions that they may still have. Highlight that fractions have multiple meanings and show the multiple meanings that are demonstrated in their responses.

Home Activity or Further Classroom Consolidation

Select one fraction and represent it using each of the different meanings discussed today.

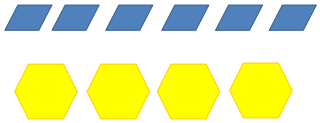
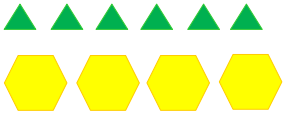
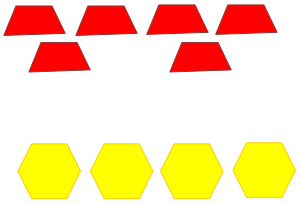
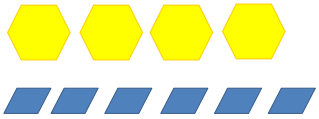
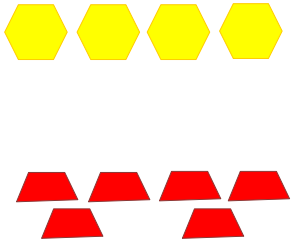
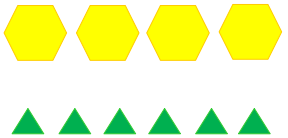
BLM 1.1 Teacher Notes

What we anticipated students to say:

Drawing	Fractional Representation	Drawing	Fractional Representation
	3 *red hexagons* / 7 *hexagons total* (part-whole; area or set**)		1 *green hexagon* / 5 *hexagons total* (part-whole; area or set**)
	2 *blue hexagons* / 6 *hexagons total* (part-whole; area or set**)		3 *red hexagons* / 4 *hexagons total* (part-whole; area or set**)
	2 *blue hexagons* / 4 *hexagons total* (part-whole; area or set**)		1 *green hexagons* / 4 *hexagons total* (part-whole; area or set**)
	6 *rhombus pieces* / 10 *pieces total* (part-whole; set)		6 *triangle pieces* / 10 *pieces total* (part-whole; set)
	6 *trapezoid pieces* / 10 *pieces total* (part-whole; set)		4 *hexagon pieces* / 10 *pieces total* (part-whole; set)
	4 *hexagon pieces* / 10 *pieces total* (part-whole; set)		4 *hexagon pieces* / 10 *pieces total* (part-whole; set)

** Students may be seeing these are sets of hexagons or areas of figures. It is important to uncover their thinking by asking probing questions.

What the students said:

Drawing	Fractional Representation	Drawing	Fractional Representation
	$\frac{1}{2}$ One trapezoid is $\frac{1}{2}$ of the hexagon. (part-whole; area)		$\frac{1}{6}$ One triangle is $\frac{1}{6}$ of the hexagon. (part-whole; area)
	$\frac{1}{3}$ One trapezoid is $\frac{1}{3}$ of the hexagon. (part-whole; area)		$\frac{1}{3}$ One triangle is $\frac{1}{3}$ of the trapezoid. (part-whole; area)
	$\frac{2}{3}$ One rhombus is $\frac{2}{3}$ of the trapezoid. (part-whole; area)		$\frac{1}{2}$ One triangle is $\frac{1}{2}$ of the rhombus. (part-whole; area)
	$\frac{6}{4}$ There are 6 rhombus pieces for 4 hexagons. (part-part; set)		$\frac{6}{4}$ There are 6 triangle pieces for 4 hexagons. (part-part; set)
	$\frac{6}{4}$ There are 6 trapezoid pieces for 4 hexagons. (part-part; set)		$\frac{4}{6}$ There are 4 hexagon pieces for 6 rhombuses. (part-part; set)
	$\frac{4}{6}$ There are 4 hexagon pieces for 6 trapezoids. (part-part; set)		$\frac{4}{6}$ There are 4 hexagon pieces for 6 triangles. (part-part; set)

Drawing	Fractional Representation	Drawing	Fractional Representation
	$\frac{2}{2}$ 2 trapezoids cover the whole hexagon. (part-whole; area)		$\frac{6}{6}$ 6 triangles cover the whole hexagon. (part-whole; area)
	$\frac{3}{3}$ 3 rhombuses cover the whole hexagon. (part-whole; area)		$\frac{1}{6}$ 1 of the 6 vertices of the hexagon are circled. (part-whole; set)