Unit Fraction: Day 1: Representing Fractions Using Manipulatives

Jr/Int

MO 5 min
A 45 min
C/D 25 min
75 min

Math Learning Goals

- Students will:
  - represent fractions as parts of a whole using a variety of models
  - reason about meaning of a fraction and the relationship between numerator and denominator
  - communicate strengths of different representations for different students and in certain contexts e.g., use of benchmarks to support and refine the meaning of fractions

Materials

- a variety of manipulatives
- sticky notes

Minds On…

Independent → Math Log

Students respond to the prompt: What is a fraction?

Action!

Pairs → Parallel Task (15 min)

Ask students to select one of the following fractions: $\frac{4}{10}$ or $\frac{2}{5}$, and represent it in as many ways as they canr. Pairs display all of their representations in their workspace.

Teachers can provide scaffolding by suggesting different manipulatives for different pairs.

Whole Group → Gallery Walk (10 min)

Students circulate around the room and review the different representations. Students consider which representation they think most clearly shows the fraction, and indicate their preference by placing a sticky note with their name by their first choice. Ask students to be prepared to discuss any similarities or differences they notice between the representations of $\frac{4}{10}$ and $\frac{2}{5}$.

Students may notice that the two fractions are equivalent. Allow them to reason and explore to reach this conclusion.

Consolidate Debrief

Whole Group → Discussion

Organize and name the different types of representations students preferred. Ask students who put their name on a sticky note by each particular representation to explain why they think that one is the most effective. Use prompts such as:

- What did you see?
- What did you like?
- I am noticing a lot of students selected (this) model. Why do you think so many of us chose that representation?
- Why didn't you pick (the most popular)?
- I am interested in this representation…. (least picked)
- One of my favourite representations of $\frac{2}{5}$ is <show a representation that students did not show e.g., position on a number line>. Why do you think I like this type of representation?

Push their thinking for each representation by using some of the following questions:

Key Questions:

- So what does the 4 (2) represent?
- What does the 10 (5) represent?
- How are the 4 and the 10 (2 and 5) related?
- Why is it important for this to be partitioned into equal parts?
- What do equal parts mean in this model?

Include the following types of representations in the discussion:

- **Part-whole: measure**
  - length (1-D)
  - area (2-D)

  Include discussion of strengths of rectangular representations over circular representations
  - volume (3-D)
- **Part-whole: sets** with either identical or non-identical items
- **Part-Part: a ratio representation which shows numerator : denominator**
- Position (point) on a number line
- Segment of a number line

Independent → Math Log

Use another colour of ink to build on your note in your Math Log. Be sure to include at least one example of each type of representation that shows your understanding of a fraction.

Home Activity or Further Classroom Consolidation

Find at least two different representations of fractions. You may consider looking in the kitchen, garage, or newspapers and magazines.

Unit Equivalency in Fractions: Day 2: Thinking Proportionally

Junior/Int

	Math Learning Goals	**Materials**
MO 15 min A 25 min C/D 35 min 75 min	• Students will: ○ represent fractions as parts of a whole using a variety of models ○ reason about meaning of a fraction and the relationship between numerator and denominator ○ communicate strengths of different representations for different students and in certain contexts e.g., use of benchmarks to support and refine the meaning of fractions	
Minds On… •	**Pairs → Exploration** Ask students to use their multiplication chart (BLM 2.1) to identify equivalent fractions for $\frac{2}{5}$, $\frac{6}{7}$, and $\frac{3}{10}$. Students list their observations. Possible observations include: • you are counting by 2's at the top and by 2's at the bottom • the equivalent fractions are found by looking across the chart • you could extend the pattern beyond the chart • the numerator and denominator grow at the same rate (proportionally)	
Action! •	**Pairs → Activity** Ask students to show how they know that $\frac{2}{3}$ and $\frac{8}{12}$ are equivalent on chart paper. They should provide enough detail to support their classmates in understanding their work during the Gallery Walk.	This could be differentiated by using the fractions $\frac{1}{2}$ and $\frac{2}{4}$ for some students.
Consolidate Debrief •	**Whole Group → Gallery Walk** Students go on a Gallery Walk affix their sticky note on the representation they think best helps them to understand equivalent fractions. Facilitate an Elmo presentation and post examples Bansho style. Point out the different representations (pictures, fraction circles, fraction towers, number lines, numerical operations). Discuss the different ways to represent. Post the charts that contain important learning – with labels – so that the students can refer back. For example, two area models that are accurate / same size or two line models that are overlaid, or a numerical explanation 2x4=8 … 3x4=12	
Practise	**Home Activity or Further Classroom Consolidation** Choose A or B. A: Name a fraction that is equivalent to $\frac{1}{3}$ and show how you know. B: $\frac{1}{3}$ and $\frac{2}{6}$ are equivalent. How do you know?	

BLM 2.1: Multiplication Chart (1 through 12)

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

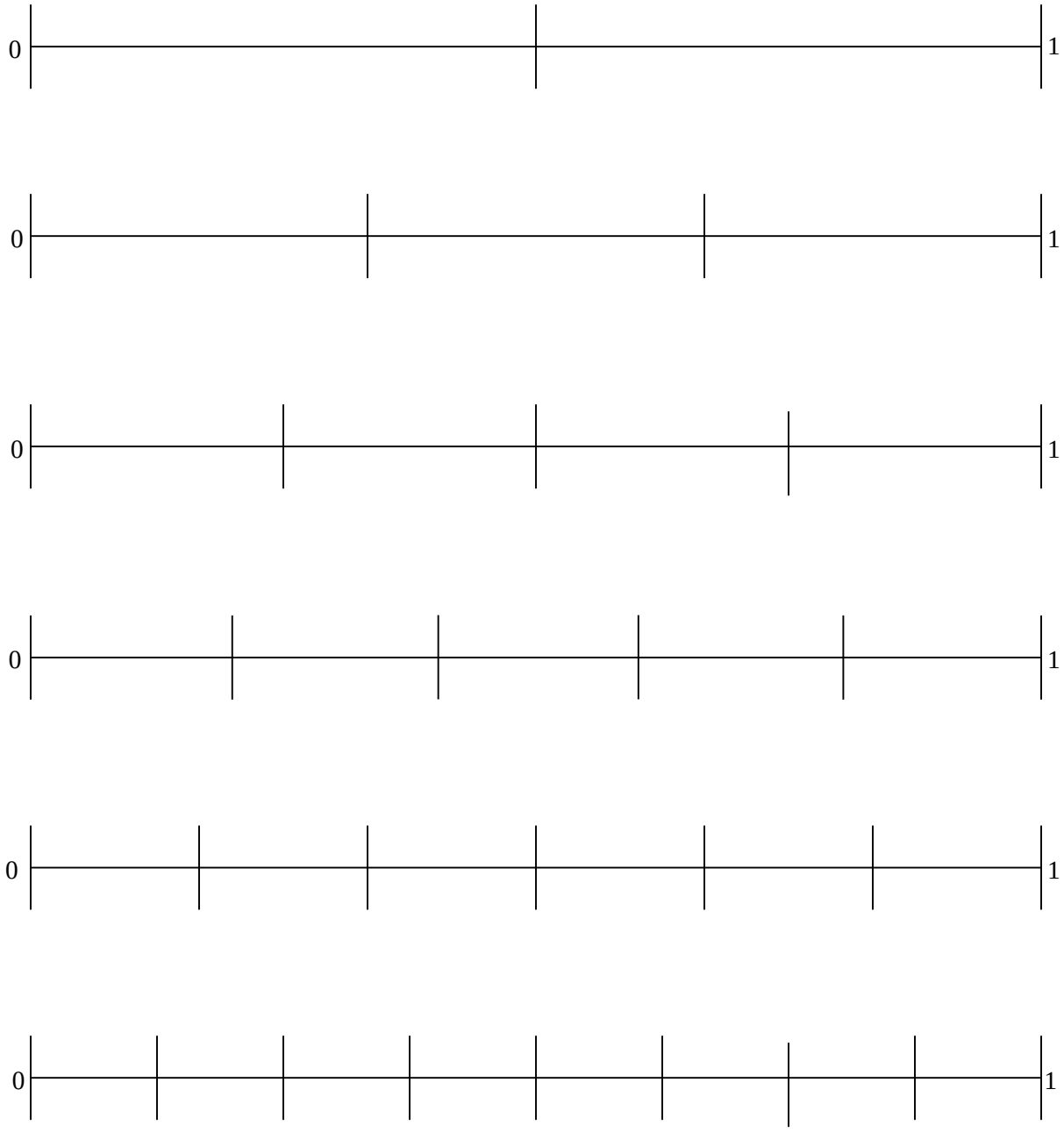
Unit Equivalency in Fractions: Day 3: Representing Fractions on Number LIne

Junior/Int

MO 15 min
A 40 min
C/D 20 min
75 min
	Math Learning Goals
	• Students will:
	  ○ represent fractions on a number line
	  ○ reason about meaning of a fraction and the relationship between numerator and denominator
	  ○ communicate strengths of different representations for different students and in certain contexts e.g., use of benchmarks to support and refine the meaning of fractions
		Materials
		• large number line
		• copies of BLM 3.1

Minds On… •	**Whole Class → Brainstorm** Here is a number line. (get a large "wall" number line from a primary classroom) What do you notice? How is this like a ruler? How can these help us learn math? Create a list. [measuring, counting, adding on, subtracting, skip counting] How could a number line help us with fractions? Write on a chart.	
Action! •	**Pair-Share → Investigation** In groups label each partition on BLM 3.1. Compare the number lines. - What do you notice? - What equivalent fractions do you see? - How do you know they are equivalent? Write questions based on your number lines. Pairs rotate and answer another group's questions.	
Consolidate Debrief •	**Whole Class → Guided Discussion** Look back at the chart we created about number lines and fractions. What else have you learned about the ways that number lines can help us learn fractions?	
	Home Activity or Further Classroom Consolidation	

BLM 3.1 Equivalence on the Number Line



Our group's questions:

Unit Equivalency in Fractions: Day 4: Determining Equivalency

Junior/Int

MO 15 min
A 40 min
C/D 20 min
75 min

Math Learning Goals

- Students will:
  - represent fractions on a number line
  - reason about meaning of a fraction and the relationship between numerator and denominator
  - communicate strengths of different representations for different students and in certain contexts e.g., use of benchmarks to support and refine the meaning of fractions

Materials

- envelopes with fraction pieces, one per pair
- chart paper

Minds On…

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Think-Pair → Reflection

Individually, students write a journal entry about the number line. What is it? What are the rules? Make a number line that you would use to show $\frac{2}{8}$. Could you use this number line to show $\frac{2}{5}$?

Pairs share their journal entries.

Action!

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Small Groups → Exploration

Distribute envelopes containing Set A or Set B below of eight fractions in numerical form to pairs. Students decide how they will place their set of fractions on a number line. Remind students that they may need to make more than one number line to help show fractions that are equivalent.

[Set A: $\frac{2}{4}, \frac{1}{2,}, \frac{1}{3}, \frac{2}{6}, \frac{3}{4}, \frac{6}{8}, \frac{5}{10}, \frac{3}{9}$]

[Set B: $\frac{8}{6}, 1\frac{2}{6,}, 1\frac{1}{3}, \frac{4}{3}, \frac{5}{8}, \frac{2}{8}, \frac{1}{4}, \frac{1}{3}$]

Consolidate Debrief

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Whole Class → Discussion

- How did you decide whether to do one / two / three number lines?
- How are your number lines like the fraction towers?
- Which numbers were easy to place?
- What did you find challenging?
- What questions do you still have about equivalent fractions?

Home Activity or Further Classroom Consolidation

Additional Equivalent Fractions Activities:

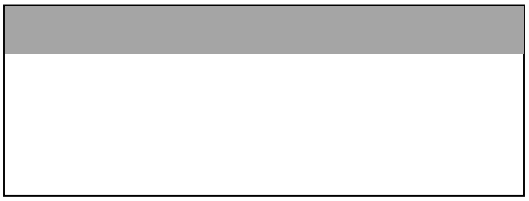
[Choose from these for students who need more practice, or an extension.]

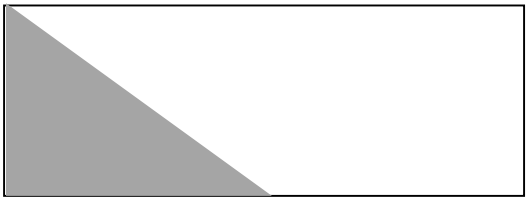
Choose a fraction. Show as many equivalent fractions as you can, using the manipulatives provided.

What do you notice about the numerator and denominator in the fractions $\frac{3}{5}$ and $\frac{12}{20}$?

You have a bag of marbles. There are 5 black and 5 white marbles in the bag. What is the probability of getting a black? Now, if you remove one black and one white (4 of each), what is the probability of pulling out a black? What about 3 of each? What do you notice?

Look at the two granola bars. Sue says that the two bars both show $\frac{1}{4}$ of the granola bar is shaded. Mitchell says that the fractions are different. Who is right?





Jian threw his paper airplane 0.66 m and Sylvain threw his $\frac{2}{3}$ of a meter. Whose airplane went the farthest?

(Other examples: 0.75 and $\frac{3}{4}$; 0.2 and $\frac{2}{10}$; 1.25m and $\frac{5}{4}$)