

This module has been designed to support those providing Mathematics Professional learning for K-12 classroom educators.

## Comparing Fractions Presentation Guide

### Session Description

Through a variety of classroom ready activities participants will gain a deeper understanding of purposeful selection of representations, foundations of equivalency and comparing fractions. Using both participant and student thinking, discussion will highlight mathematical thinking and anticipated responses.

### Importance

In North American instruction we tend to overemphasize procedures in fraction instruction, preventing students from making connections to their prior knowledge. Visual representations enhance student's intuitive understanding of operations and ready them for formal procedures. Linear representations develop student's understanding of fractions as quantity and emphasize the underlying concepts of comparing fractions and identifying the whole.

### Learning Focus

*Participants will:*

- Explore the impact of using intentionally selected representations.
- Use number lines to develop fraction number sense.
- Compare fractions using a variety of strategies and tools.
- Connect research to practice.

### Agenda

#### Minds On:

- Pre-session task
- Overview of research
- Partitioning rectangles

#### Action:

- Using Number Lines (Fractions on the number line, Examining student thinking)
- Understanding equivalency (Pre-session task, Research, Comparing, Benchmarks)
- Understanding density

#### Consolidation:

- Curriculum connections task
- Exploring mathies.ca

### Session Contents

- Presentation Guide: Overview, Learning Activities, Questions to Stimulate Conversations (as needed), Aha Moments (possible participants' insights), Materials, Adaptations (20 minute, 1.5 hour, and 2.5 hour sessions)
- PowerPoint with script and <<presenter notes>>
- BLMs

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p style="text-align: center;"><b>Introduction and Minds On (20 minutes)</b></p> <p><b>Table Task (Slide 1) Pre-Session</b> Participants to complete an equivalency task to be discussed further within the session.</p> <p><b>Introduction (Slides 2 – 14) 15 minutes</b> Provide an overview of the session and the research.</p> <p><b>Partitioning Rectangles Task (Slide 15) 5 minutes</b> Participants will complete a partitioning rectangles activity using graph paper.</p>	<ul style="list-style-type: none"> <li>• What are you picturing in your head as you partition the whole?</li> </ul>	<ul style="list-style-type: none"> <li>• Fractions play a significant role in students' learning from Kindergarten through to grade 12.</li> </ul>	<ul style="list-style-type: none"> <li>• Slide 1 (one copy/ pair)</li> <li>• Coloured markers/ highlighters</li> <li>• Graph paper</li> </ul>
<p style="text-align: center;"><b>Action (215 minutes)</b></p> <p><b>Using Number Lines: A Deeper look at Number Lines (Slides 16 - 39) 90 minutes</b> Outlining recent research about effective representations of fractions using different models with the emphasis on the use of the number line (30 minutes)</p> <p>Reflecting upon the research about representations, participants will complete a task by placing fractions on number lines. (30 minutes)</p> <p>Participants will examine student thinking of the same task (30 minutes)</p>	<ul style="list-style-type: none"> <li>• How do you know that you have accurately placed the fractions?</li> <li>• How does your strategy compare to others?</li> <li>• Did you use different strategies to place the fraction or to double check? Why?</li> <li>• How does the scale of your number line affect the strategy can use?</li> </ul>	<ul style="list-style-type: none"> <li>• I do not need to use a common denominator to find a fraction between two fractions.</li> <li>• Letting students partition their own number line enriches the learning.</li> <li>• If I am scaling a number line I have to first identify the range of values.</li> <li>• Physically splitting regions is the same as multiplying the symbolic fraction.</li> </ul>	<ul style="list-style-type: none"> <li>• BLM 1 Number Lines (one/person)</li> <li>• BLM 2 Density Samples (a selection per table)</li> <li>• Sticky notes</li> <li>• <i>Paying Attention to Fractions</i> (one/ person)</li> <li>• Chart paper (one/ table)</li> <li>• Markers/writing tools</li> <li>• String, tape or adding machine paper to make 1 metre long number lines</li> </ul>

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p style="text-align: center;"><b>Action (continued)</b></p> <p><b>Understanding Equivalency (Slides 40 – 51) 105 minutes</b>            Outlining the concepts of equivalency (5 minutes)</p> <p>The pre-session task and the partitioning rectangles activities are revisited after sharing more information about equivalence (15 minutes).</p> <p>Through a think-pair-share activity, the equivalence section of <i>Paying Attention to Fractions</i> will be unpacked by participants (45 minutes).</p> <p>Through a variety of tasks, participants will engage in metacognition to better understand the connections between the research and the actions of doing mathematics (20 minutes).</p> <p>Participants will work in groups of 2 – 4 to place fractions on number lines which have been displayed around the room. The number lines will be closed number lines, extending from 0 to 4 (20 minutes).</p> <p><b>Understanding Density (Slides 52 - 56) 20 minutes</b>            Participants will appreciate the importance of this concept by considering the various applications of density in daily activities and specific occupations and engaging in two density questions.</p>	<ul style="list-style-type: none"> <li>• How do the physical actions and representations for equivalence connect to symbolic procedures?</li> <li>• Can you think of a moment today where you used or heard someone else use (concept)?</li> <li>• How does your confidence/competence with unit fractions and fractional units (i.e. denominator) influence how you compare fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Physically merging regions is the same as dividing the symbolic fraction.</li> <li>• A fraction without context is a number and the whole is 1.</li> </ul>	

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p><b>Consolidation/Debrief (95 minutes)</b>  <b>Curriculum Connections Task (Slides 57 - 60)</b>  <b>30 minutes</b>            Participants will explore the curriculum connections, both cross-strand connections of fractions and comparing fractions across the grades.</p> <p><b>mathies.ca tools Exploration (Slides 60 – 66)</b>  <b>60 minutes</b>            Participants will explore the mathies.ca tools.</p> <p><b>Fraction Resources (Slide 67) 5 minutes</b>            Highlight the location of additional resources.</p>	<ul style="list-style-type: none"> <li>• How might this tool support students with learning disabilities?</li> <li>• What understanding are you gaining by using a concrete representation for fractions learning?</li> </ul>	<ul style="list-style-type: none"> <li>• There are so many virtual tools for representing fractions, this will engage my students.</li> <li>• Students can choose different representations to help understand fractions.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Comparing Fractions Across K to 12 Curriculum</i></li> <li>• One device per pair</li> </ul>

**Suggestions if you are offering the session as part of a series:**

Have participants complete the Number Line Task with their class and return with student responses and trends noticed.

**Considerations if you are offering the session on-line:**

Insert slides and see ONLINE screenshots for Adobe Connect room layout.

Adaptations	Materials
<p><b>If you have 20 minutes:</b>  <i>Learning Focus:</i></p> <ul style="list-style-type: none"> <li>Use number lines to develop fraction number sense.</li> </ul> <p><i>Activities:</i></p> <ul style="list-style-type: none"> <li>Complete the pre-session table task (Slide 1) and debrief (Slide 45) OR have participants complete the density task (Slide 54). Show the Fractions Learning Pathways on-line. Demonstrate the interactivity by clicking on a comparing cell and then selecting a task.</li> <li>Suggest participants read Building Understanding of Equivalence and Equi-partitioning as a follow-up activity.</li> </ul>	<p>Slides 1 and 45 OR slide 54  Internet access to show Fractions Learning Pathways  <i>Math Teaching for Learning: Building Understanding of Equivalence and Equi-partitioning (one/person)</i></p>
<p><b>If you have 1.5 hours:</b>  <i>Learning Focus:</i></p> <ul style="list-style-type: none"> <li>Explore the impact of using intentionally selected representations.</li> <li>Use number lines to develop fraction number sense.</li> </ul> <p><i>Activities:</i></p> <ul style="list-style-type: none"> <li>Omit slides 27 – 39, slides 46 – 51 and slides 57-66.</li> </ul>	<p>See 5.5 hours outline</p>
<p><b>If you have 2.5 hours:</b>  <i>Learning Focus:</i></p> <ul style="list-style-type: none"> <li>Explore the impact of using intentionally selected representations.</li> <li>Use number lines to develop fraction number sense.</li> </ul> <p><i>Activities:</i></p> <ul style="list-style-type: none"> <li>Omit slides 27 – 28, 30 - 39, slides 50 – 51 and slides 57-66.</li> </ul>	<p>See 5.5 hours outline</p>