

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

## **Fractions in the Context of Probability Presentation Guide**

### **Session Description**

Junior and Intermediate teachers will gain a deeper understanding of the key concepts which support student understanding of fractions through engaging in activities in context and discussion of connections to probability.

### **Importance**

Research clearly indicates that students who have a solid understanding of fractions have increased success in algebra and subsequent mathematics. Rather than requiring additional time, filling gaps in student knowledge can be accomplished through precise instructional decisions and inclusion of a few powerful activities. In this way, students can solidify their understanding of fractions whilst learning the grade-level content of probability.

### **Learning Focus**

*Participants will:*

- Engage in tasks to build deeper understanding of fractions in the context of probability;
- Build awareness of how understanding the unit fraction underpins fractions learning;
- Explore a powerful representation for fractions and probability – the number line;
- Connect research to practice

### **Agenda**

Minds On:

- Ordering Fractions on a Number Line task
- Connecting to probability on the number line

Action:

- Purposeful representations
- Research overview
- Fractions Learning Pathway overview (video)
- Mathematical language: equi-partitioning, iterating, disembedding and connections to probability
- Unit Fractions Counting Game and connections

Consolidation:

- Grab Bag activity using a combination of hands on manipulatives and Mathies tools

### **Module Contents**

- Presentation Guide: overview, Learning Activities, Questions to Stimulate Conversations (as needed), Aha Moments (possible participants' insights) and Materials, Adaptations (20 minute, 1.5 hour and 5.5 hour sessions)
- PowerPoint with script and <<presenter notes>>
- BLMs

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p align="center"><b>Minds On (40 minutes)</b></p> <p><b>Introduction (Slides 1 - 5) 5 minutes</b> Participants can work on the EQAO Probability questions while they are waiting for the session to begin. Provide an overview of the session.</p> <p><b>Ordering Fractions on a Number Line (Slides 6- 7) 25 minutes</b> Pairs will engage in placing given fractions on a number line and participate in a discussion about strategies used and fraction concepts that are needed to successfully complete this task</p> <p><b>Connecting the Number line to Probability (Slides 8 - 12) 10 minutes</b> Participants place events on a (0 to 1) number line based on the likelihood that the event will occur. They will discuss connections of probability concepts to fractions thinking. Connections to curriculum for Grades 4 to 6 will also be made..</p>	<ul style="list-style-type: none"> <li>• If you place <math>\frac{1}{2}</math> at 2 where will you place <math>1\frac{1}{2}</math>?</li> <li>• What is the challenge of this task if you choose to use common denominators to complete this task?</li> <li>• How does changing the fractions to decimals support student understanding of fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• I didn't realize that there were so many different strategies that I could use to graph these fractions</li> <li>• This is a good activity for students to learn that a fraction is a number</li> </ul>	<ul style="list-style-type: none"> <li>• 11 x 17 paper, rulers, markers</li> <li>• <i>Comparing Fractions Across K to 12 Curriculum</i></li> <li>• <i>Paying Attention to Fractions</i> (several copies / table)</li> <li>• <i>Fractions Learning Pathways</i> (one/person)</li> <li>• BLM 1 Probability Questions EQAO (one /person)</li> </ul>
<p align="center"><b>Action (80 minutes)</b></p> <p><b>Unpacking Representations (Slides 13 to 14) 10 minutes</b> Through guided Instruction participants will learn about powerful representations.</p> <p><b>Changing the Scale Task (slide 15) 10 minutes</b> Participants will place <math>1\frac{7}{8}</math> on four different closed number lines. Advantages of this kind of task and using open number lines for tasks are discussed.</p> <p><b>Fractions Research Overview (Slides 16 – 20) 10 minutes</b></p>	<ul style="list-style-type: none"> <li>• When doing the Changing the scale task <ul style="list-style-type: none"> <li>○ Which number line was the easiest or most challenging to use? Why?</li> <li>○ What surprised you? Why?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• I'm going to stop using circles so much when I teach fractions.</li> <li>• I never thought about the power of the number line.</li> <li>• I can see how using non-labelled and open number lines would help students scale an axis better.</li> <li>• There are a lot of</li> </ul>	<ul style="list-style-type: none"> <li>• BLM 2 Changing the Scale (one /person) Note: Handout not to be distributed until slide 16.</li> <li>• blank paper</li> <li>• pens/coloured pencils</li> <li>• <i>Math Teaching for Learning: Building</i></li> </ul>

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p><b>Fractions Learning Pathways Overview (Slides 21-22) 5 minutes</b> Participants will be introduced to the Fractions Learning Pathways (FLP) and the related resources via a video</p> <p><b>Mathematical Language (Slides 23 – 28) 5 minutes</b> Through guided instruction participants will learn about key fraction actions. (equi-partitioning, iterating, and disembedding)</p> <p><b>Connections to Probability (Slides 29-30) 15 minutes</b> Participants solve two probability problems: one involving sets, and a second involving unconventional spinners. They will discuss their strategies using the language learned in slides 24 to 29.</p> <p><b>Building Understanding of Unit Fractions (Slides 31 – 38) 25 minutes</b> Participants will learn about the connections of unit fractions across mathematical learning. Pairs will revisit their number line from the Minds On activity and discuss it using unit fractions.</p>	<ul style="list-style-type: none"> <li>• What actions do you see your students using when solving fractions problems?</li> <li>• What connections can you make between unit fractions and probability content?</li> </ul>	<p>great tasks with lots of support in the FLP that I can use with my students</p> <ul style="list-style-type: none"> <li>• This provides language for my thinking about how students show fractions.</li> <li>• I never considered the power of the unit fraction – it really is foundational.</li> <li>• I wish I had used unit fractions to help students understand the scale on the number line</li> <li>• Revisiting the number line activity made me realize the importance of using mixed numbers with my students (rather than always converting to improper fractions).</li> </ul>	<p><i>Understanding of Unit Fractions (one/person)</i></p>

Learning Activities	Questions to Stimulate Conversation	Aha Moments	Materials
<p align="center"><b>Consolidation/Debrief (30 minutes)</b></p> <p><b>Explore Relational Rods using Mathies Tools (Slides 39-42) 10 minutes</b>  Pairs explore Relational Rods at Mathies.ca. by playing “What Am I?”.</p> <p><b>Grab Bag Activity (Slides 43-44) 15 minutes</b>  Participants will explore the Grab Bag task using relational rods. Discussion will focus on the role of the unit fraction and connections to unit fractions.</p> <p><b>Consolidation Ideas and Fraction Resources (Slide 45-47) 5 minutes</b>  Summarize the key concepts shared in this session. Ask participants to make a commitment to change something about their practice based on this session.</p>		<ul style="list-style-type: none"> <li>• Mathies tools can make a difference with my students.</li> <li>• I like the idea of having my students use the mathies tools and concrete manipulatives at the same time.</li> </ul>	<ul style="list-style-type: none"> <li>• one device per pair</li> <li>• Set of relational rods</li> <li>• Paper bag to hold the set of rods (provide more rods if mathies.ca is not available)</li> </ul>

Adaptations	Materials
<p><b>If you have 20 minutes:</b>  Learning Focus:</p> <ul style="list-style-type: none"> <li>Explore a powerful representation for fractions and probability – the number line</li> </ul> <p>Activities:</p> <ul style="list-style-type: none"> <li>Focus on slides 6 to 12</li> </ul>	<p>11x 17 paper, rulers, markers</p>
<p><b>If you have 1.5 hours:</b>  Learning Focus:</p> <ul style="list-style-type: none"> <li>Engage in tasks to build deeper understanding of fractions in the context of probability;</li> <li>Build awareness of how understanding the unit fraction underpins fractions learning;</li> <li>Explore a powerful representation for fractions and probability – the number line</li> </ul> <p>Activities:</p> <ul style="list-style-type: none"> <li>Omit slides 1, 16-22, 39-46</li> </ul>	<p>See 2.5 hours outline</p>
<p><b>If you have 5.5 hours:</b>  Learning Focus:  Activities:  Combine this session with one other session: e.g. Comparing Fractions, Fractions in Secondary School</p>	<ul style="list-style-type: none"> <li>The two Presentations will have some similar slides/content so you can streamline the ppts to reduce two 2.5 sessions to one 5.5 session.</li> </ul>
<p><b>Suggestions if you are offering the session as part of a series:</b></p>	
<p><b>Considerations if you are offering the session on-line:</b></p>	