Building Something Great Together with the New Math Curriculum: Highlighting Cross-stranding Components of Effective Mathematics Classrooms

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Land Acknowledgement

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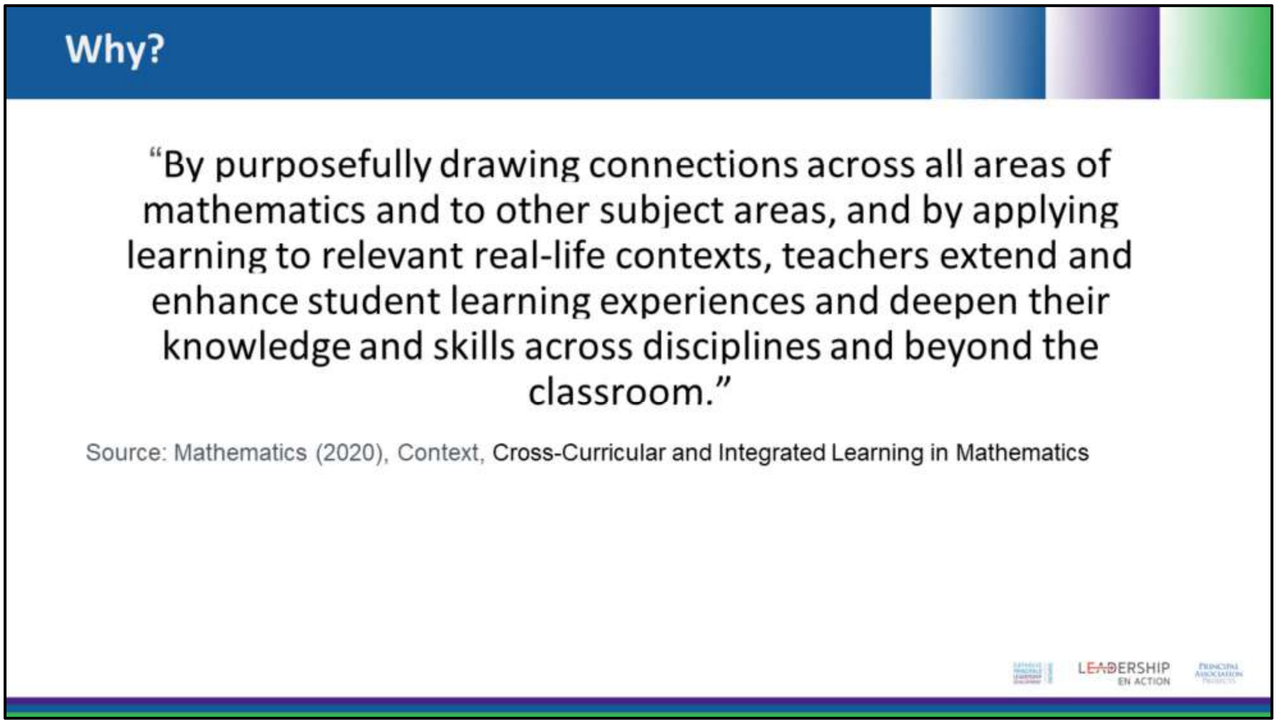
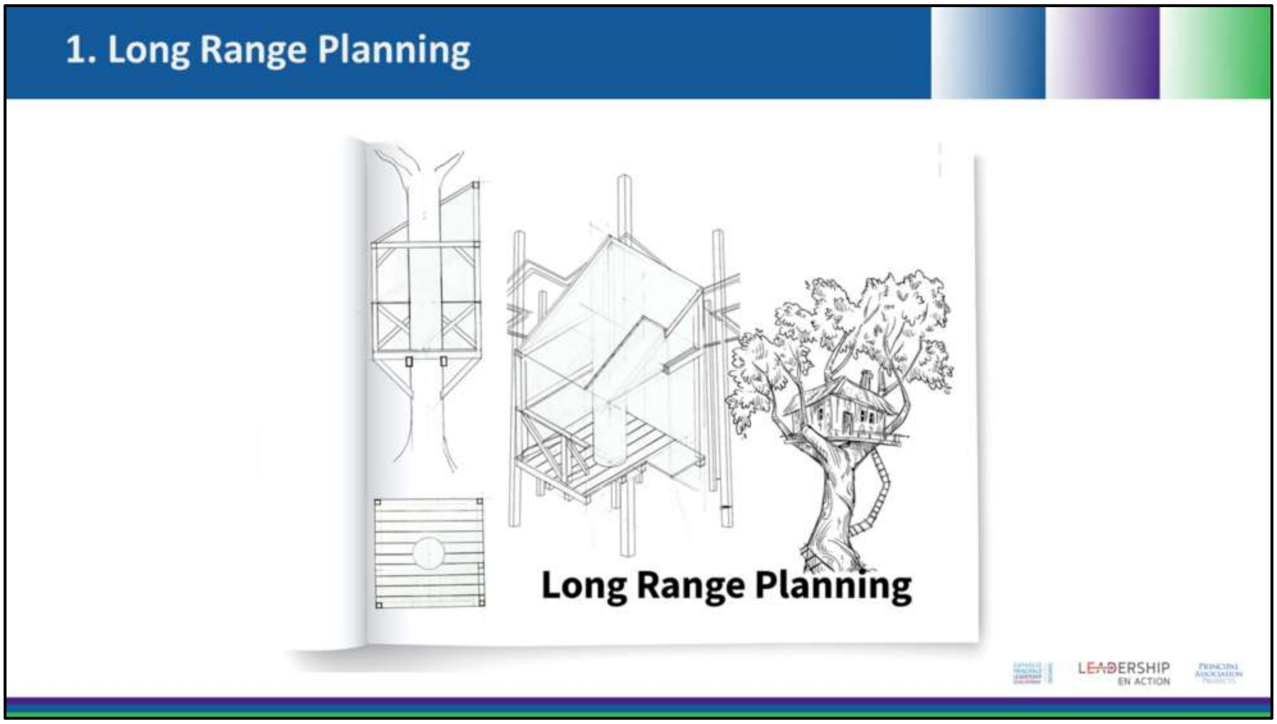
Ana: Trillium Lakelands District School Board acknowledges that these lands and waters are the traditional homeland of the Ojibway (Oh-jib-way) Nation and the Huron (Hur-on) / Wendat (When-dat) Nation, and now includes communities from the Mohawk Nation, the Pottawatomi (Pot-a-watt-a-me) Nation, the Inuit Nation and the Métis (May-tee) Nation of Ontario .
Under the One Dish With One Spoon Treaty, the Haudenosaunee (Hoden-oh-show-nee) Confederacy and the Anishinaabe (An-ish-i-na-bay) Peoples agreed to share and care for this territory for the benefit of future generations. We acknowledge their stewardship throughout the ages. Please take a moment now to acknowledge the traditional territory that you are situated on.

Picture the new math curriculum like a tree house.

1. Long-term planning is like the blueprints for the tree house.
2. The high impact instructional practices are like the trunk of a tree. It provides stability to the curriculum and allows students and teachers alike to reach great heights.
3. Cross Strand teaching is like weaving material together to bring colour to the treehouse.
4. Mathematical modelling is like the actual process of building a tree house.
5. Assessment and evaluation along the way is like a snapshot of where you are currently and can use to compare to where you want to end up.



Simon Sinek tells leaders to start with "why" to inspire action. Let's look at why our new math curriculum extends across various math strands and contexts. (Read quote on slide).



Let’s explore the The Long Range Planning component of the revised math curriculum. Perhaps it would help to visualize it as the blueprints for building a treehouse.

Ministry Long-Range Plans

What they are…

- examples
- dynamic documents
- samples that include all curriculum expectations
- a reflective document
- a prioritization of student learning

What they are not…

- a mandatory document
- a static document
- a recipe book

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(Read the slide)
According to the ministry the ministry long-range plans are samples. We do wish to point out that some boards have deemed them to be mandatory.

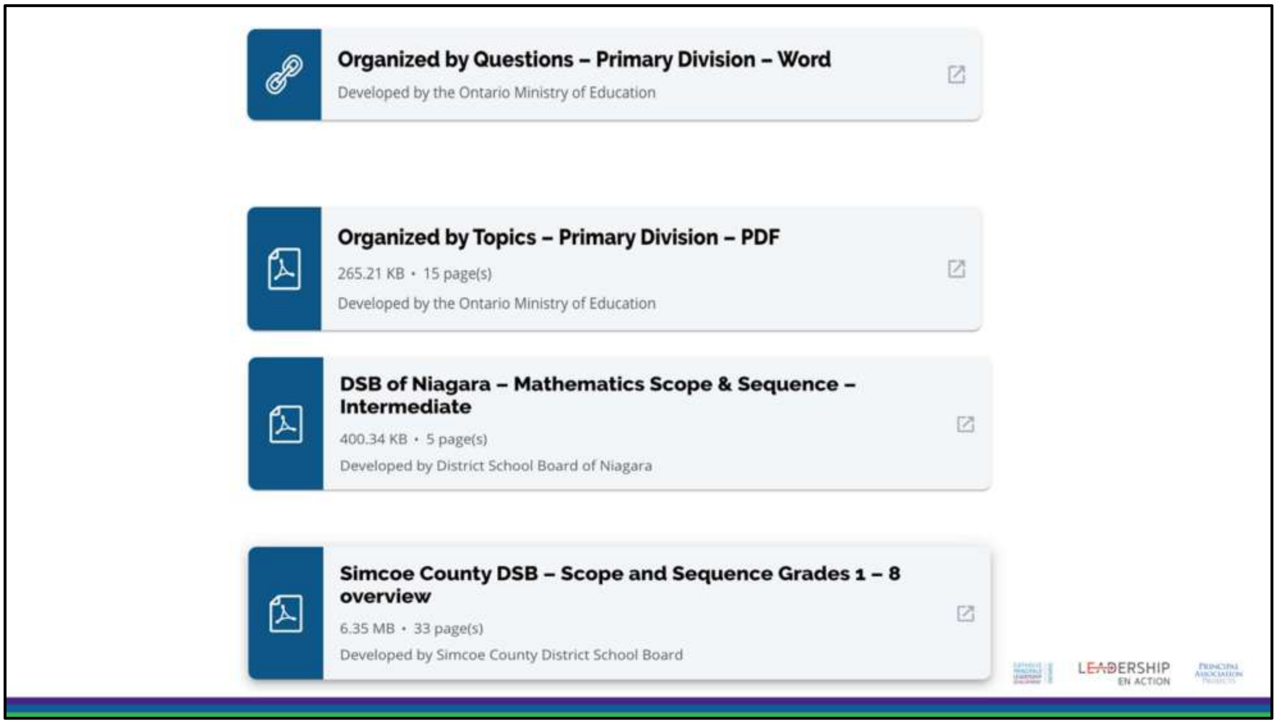
Where to start?

So, let’s start by viewing the examples of long-range plans included in the revised math curriculum.

We’ve included a link to the ministry of education’s sample long-range plans found on the revised math curriculum website. There are various ways to access these plans: either through the blue resource tab at the top or the quick links on the bottom right as your scroll through the home page. You will notice that the sample long range plans are organized by questions, topics, or school boards.

Although the idea of long-range plans developed by questions or topics might feel uncomfortable to some teachers or administrators in mathematics, perhaps as we unpack, explore, play with, and break-down the actual plans, cross-strand plans will look more achievable. Taking a learning and curiosity stance might help those staff members who are overwhelmed with the revised math curriculum and hesitant to start.

Naturally, the long-range plans are only samples, although some boards have directed teachers to use a specific set of plans or developed their own. Regardless, they can be starting points for the professional learning teams conversations. We can start by viewing and learning those long-range plans to give us an idea of what it looks like.



When you dive into the revised Ontario mathematics curriculum and look under the resources tab, you will find sample Long Range Plans

The long range plans organized by questions break down the learning month by month providing an overarching question to guide the learning across various strands.

There are plans organized by topics as well. These plans break down the learning over various time frames from 10 days to 30 days depending on the topic. Once again they integrate the various math strands.

And finally, Niagara and Simcoe County have shared their long-range plans. More great resources to tap into.

By Question: What do you notice in primary grades?

	Grade 1	Grade 2	Grade 3
Jan	**What shapes are in our world?** Number, Algebra, Data, Spatial Sense	**How can we describe 2D shapes?** Number, Algebra, Data, Spatial Sense	**How can we describe 3D objects and space?** Data, Spatial Sense
Feb	**What is a pattern?** Number, Algebra, Spatial Sense	**Are they the same?** Number, Algebra, Spatial Sense	**Are they the same?** Number, Algebra, Spatial Sense
May	**How can we share things equally?** Number, Algebra, Spatial Sense	**How can we share things equally?** Number, Algebra	**How can we share things equally?** Number, Algebra, Data
Jun	**How much is that?** Number, Algebra, Data, Financial Literacy	**Equal groups: How much is that?** Number, Algebra, Financial Literacy	**Equal groups: How much is that?** Number, Algebra

Let's take a look at the sample Long Range Plans Developed by Questions.
On this slide you will find the grades 1-3 questions for January, February, May and June.

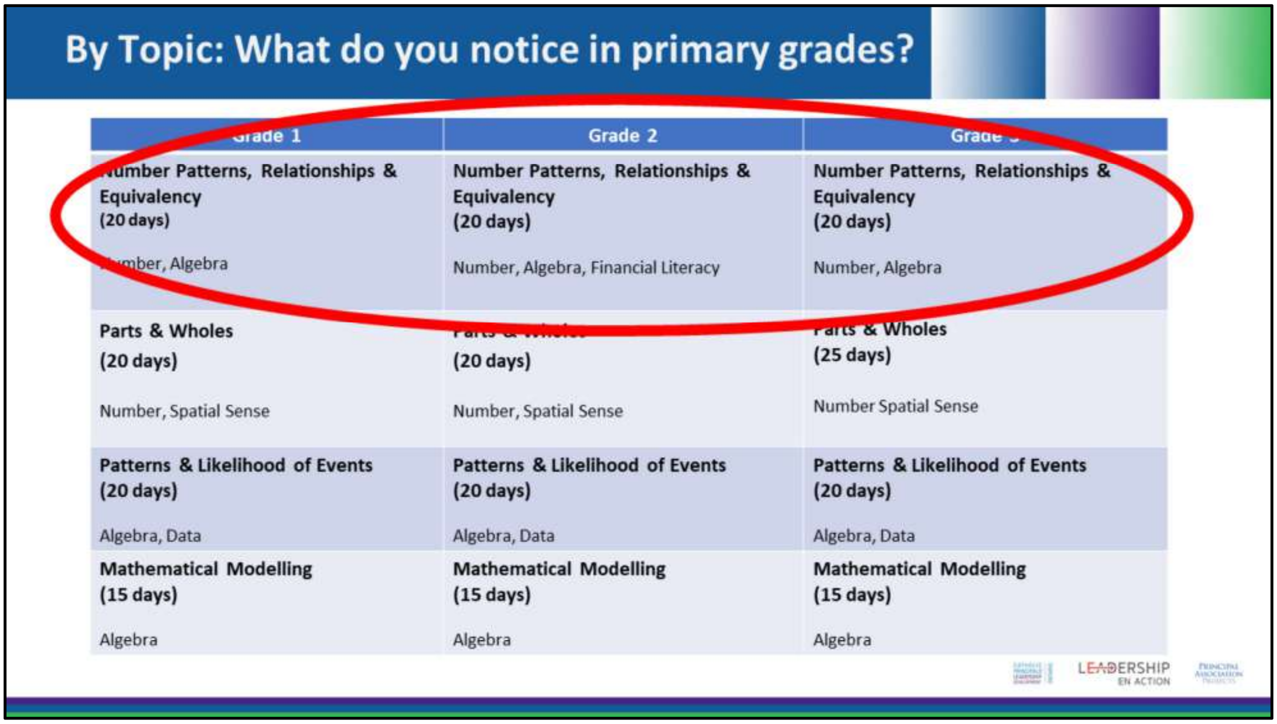
What do you notice? Please type your observations in the chat box.

Presenter is looking for these key ideas:
Expectations are connected
Expectations are expanded on
Expectations are revisited through different questions/contexts
Each question typically involves several strands and draws on big mathematical themes such as quantity, change, equivalence, dimension, pattern, and uncertainty.
Often the same question spans several grades.

How can you leverage these observations as a principal? Please share your ideas in the chat box.

Ideas to highlight include:
Using the same question in math helps combined classes.
The questions can be split into shorter blocks with the embedded strands and topics serving as different contexts that would spiral throughout the year.

Even though they are presented in month-long blocks, there is flexibility for responding to student need and readiness.
Deep learning occurs when ideas are re-visited



By Topic: What do you notice in primary grades?

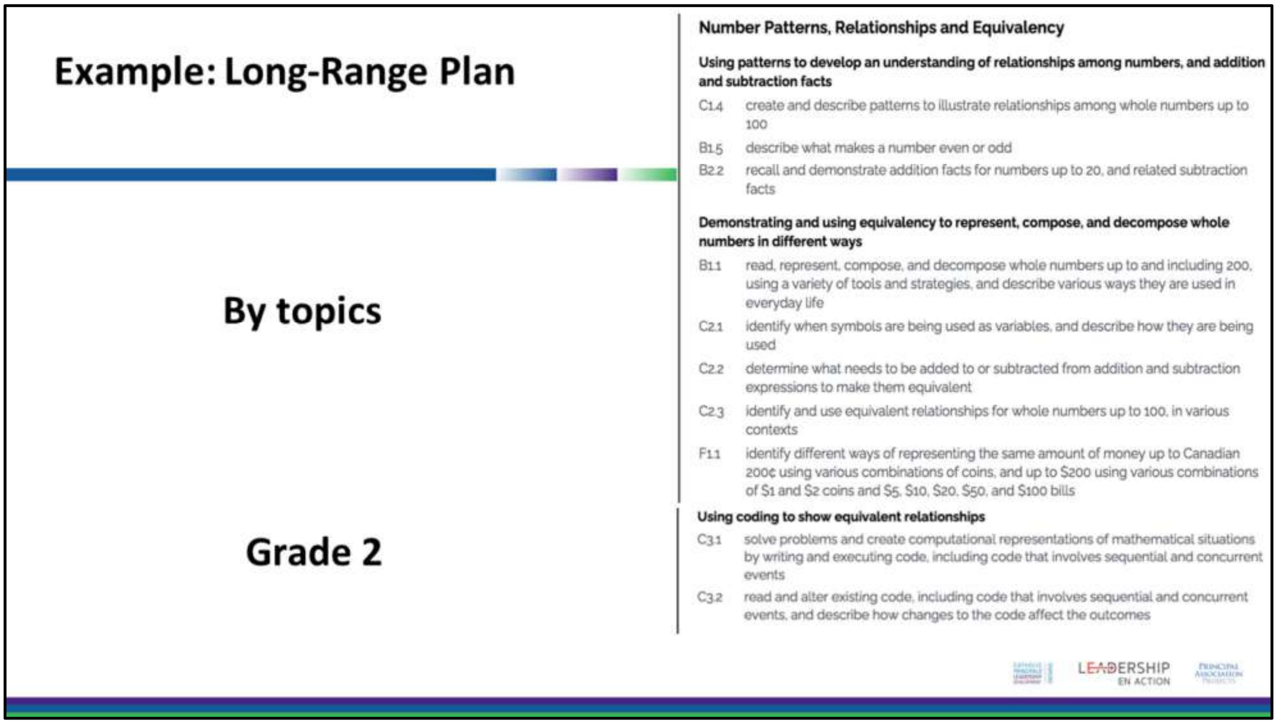
Grade 1	Grade 2	Grade 3
Number Patterns, Relationships & Equivalency (20 days) Number, Algebra	Number Patterns, Relationships & Equivalency (20 days) Number, Algebra, Financial Literacy	Number Patterns, Relationships & Equivalency (20 days) Number, Algebra
Parts & Wholes (20 days) Number, Spatial Sense	Parts & Wholes (20 days) Number, Spatial Sense	Parts & Wholes (25 days) Number Spatial Sense
Patterns & Likelihood of Events (20 days) Algebra, Data	Patterns & Likelihood of Events (20 days) Algebra, Data	Patterns & Likelihood of Events (20 days) Algebra, Data
Mathematical Modelling (15 days) Algebra	Mathematical Modelling (15 days) Algebra	Mathematical Modelling (15 days) Algebra

These primary sample long range plans are organized by topics. What do you notice in the primary grades? Please share your observations in the chat box.

Look for answers that identify specific expectations are revisited
There is a flow of learning
Specific expectations are connected
Specific expectations are expanded on
Specific expectations are revisited
Timing is suggested but has room for student learning needs

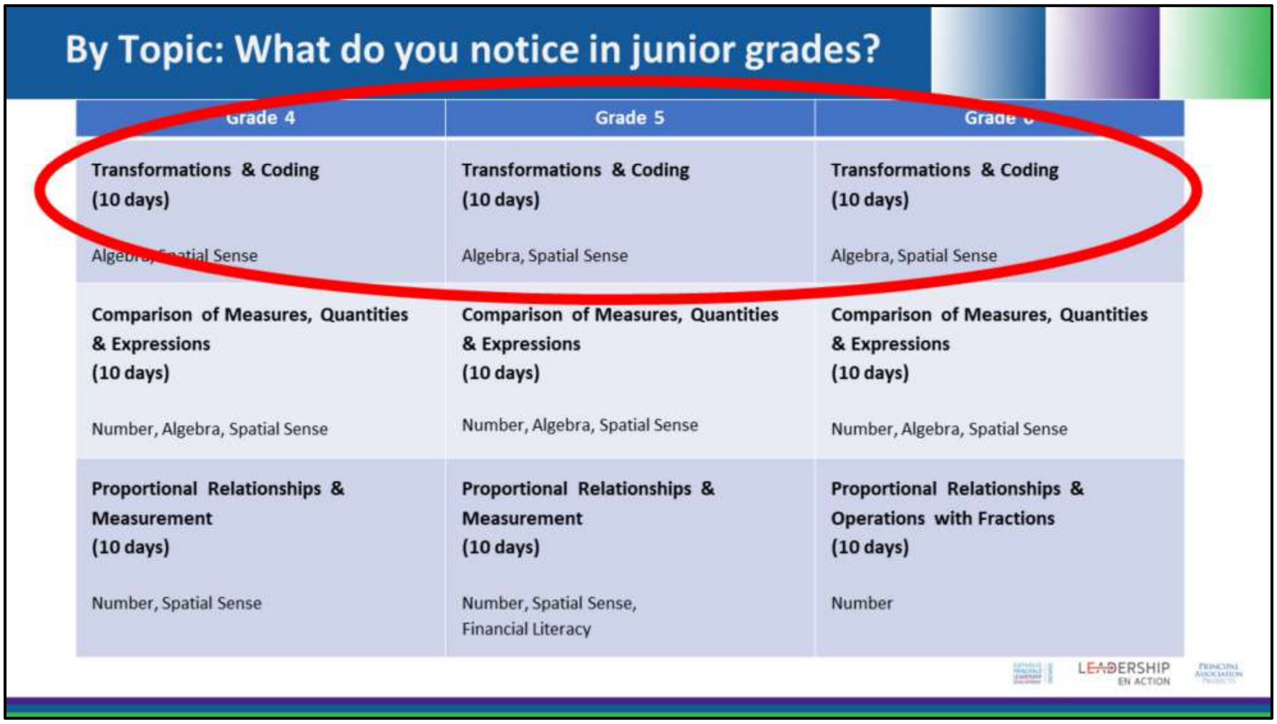
How can you leverage this as a principal with your staff?

Let's look into the deeper description of number patterns, relationships & equivalency (click on animation to circle the row)



When we look further into Number Patterns, Relationships and Equivalency we can see the various strands that fall under each topic. (Read some of the slide)

Now that we've looked at the long-range plans in detail, the question remains, how do we lead staff to use these blueprints for a successful math program?



By Topic: What do you notice in junior grades?

Grade 4	Grade 5	Grade 6
Transformations & Coding (10 days) Algebra, Spatial Sense	**Transformations & Coding (10 days)** Algebra, Spatial Sense	**Transformations & Coding (10 days)** Algebra, Spatial Sense
Comparison of Measures, Quantities & Expressions (10 days) Number, Algebra, Spatial Sense	**Comparison of Measures, Quantities & Expressions (10 days)** Number, Algebra, Spatial Sense	**Comparison of Measures, Quantities & Expressions (10 days)** Number, Algebra, Spatial Sense
Proportional Relationships & Measurement (10 days) Number, Spatial Sense	**Proportional Relationships & Measurement (10 days)** Number, Spatial Sense, Financial Literacy	**Proportional Relationships & Operations with Fractions (10 days)** Number

These sample long range plans are organized by topics. What do you notice in the primary grades? Please share your observations in the chat box.

Look for answers that identify specific expectations are revisited
There is a flow of learning
Specific expectations are connected
Specific expectations are expanded on
Specific expectations are revisited
Timing is suggested but has room for student learning needs

How can you leverage this as a principal with your staff?

By Question: What do you notice in junior grades

	Grade 4	Grade 5	Grade 6
	When is addition and subtraction useful? Number, Algebra, Spatial Sense, Financial Literacy	**When are different operations useful?** Number, Algebra, Spatial Sense, Financial Literacy	**When are different operations useful?** Number, Algebra, Data, Spatial Sense
Mar	**How can we keep things in balance?** Number, Algebra, Data, Financial Literacy	**How can we keep things in balance?** Number, Algebra, Financial Literacy	**How can we keep things in balance?** Number, Algebra, Spatial Sense, Financial Literacy
Apr	**Scaling & splitting: How much now?** Number, Data, Spatial Sense	**Scaling & splitting: How much now?** Number, Data, Spatial Sense, Financial Literacy	**Scaling & splitting: How much now?** Number, Data
May	**How can we make predictions and decide?** Number, Algebra, Data, Financial Literacy	**How can we make predictions and decide?** Number, Algebra, Data, Financial Literacy	**How can we make predictions and decide?** Number, Algebra, Data

Let’s take a look at the sample Long Range Plans Developed by Question.
On this slide you will find the grades 4-6 questions for February, March, April and May.

What do you notice? Please type your observations in the chat box.

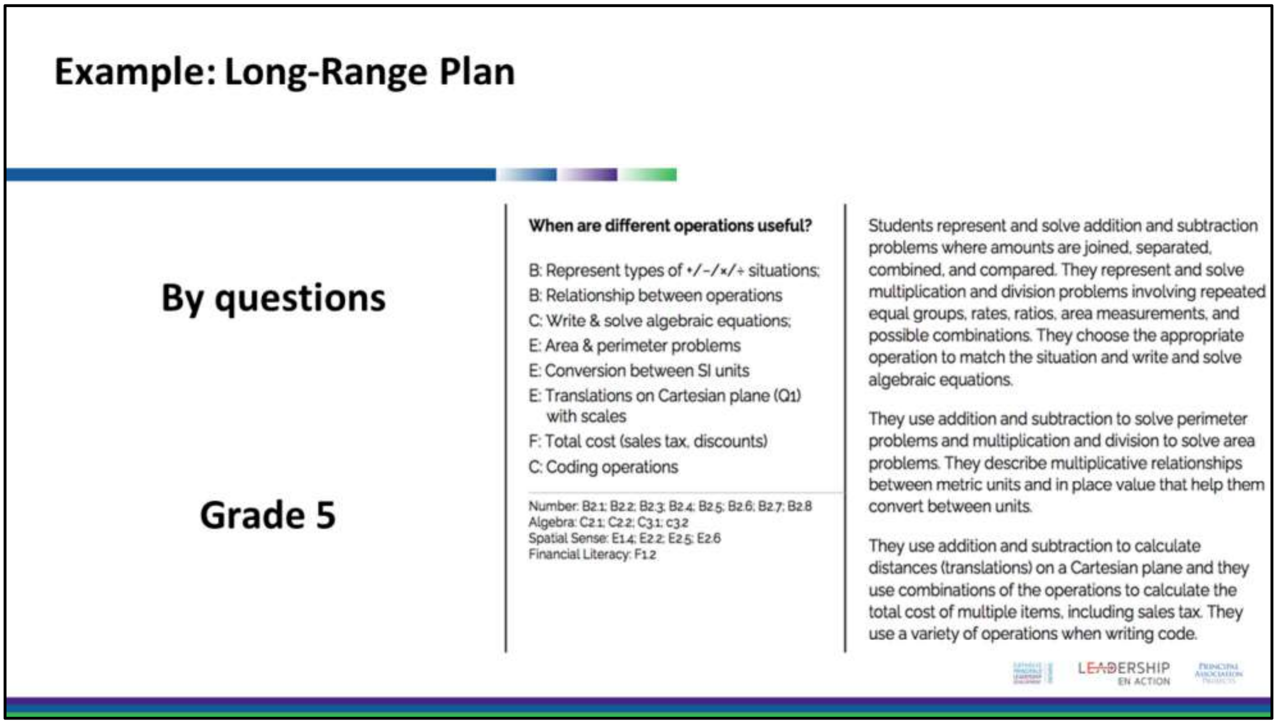
Presenter is looking for these key ideas:
Expectations are connected
Expectations are expanded on
Expectations are revisited through different contexts
Each question typically involves several strands and draws on big mathematical themes such as quantity, change, equivalence, dimension, pattern, and uncertainty.
Often the same question spans several grades.

How can you leverage these observations as a principal? Please share your ideas in the chat box.

Ideas to highlight include:
Using the same question in math helps combined classes.
The questions can be split into shorter blocks with the embedded strands and topics serving as different contexts that would spiral throughout the year.

Even though they are presented in month-long blocks, there is flexibility for responding to student need and readiness.

Deep learning occurs when ideas are re-visited



When we look further into Number Patterns, Relationships and Equivalency we can see the various strands that fall under each topic. (Read some of the slide)

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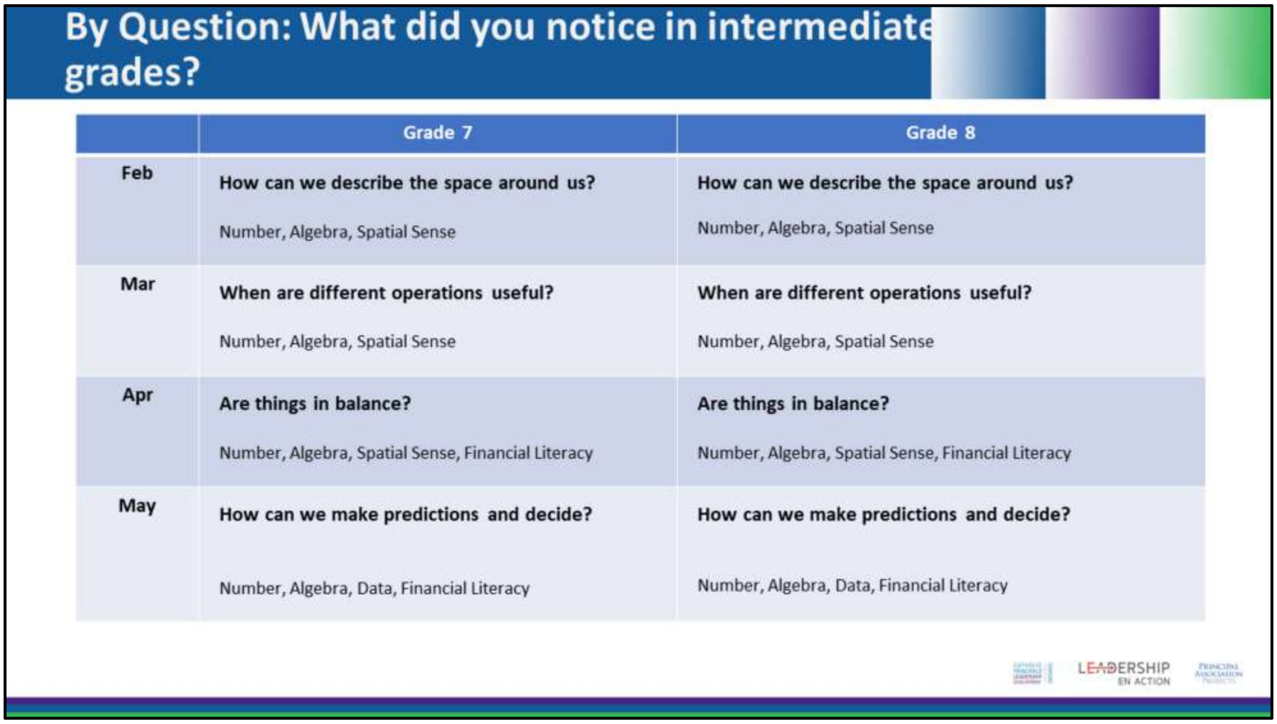

By Question: What did you notice in intermediate grades?

	Grade 7	Grade 8
Feb	**How can we describe the space around us?** Number, Algebra, Spatial Sense	**How can we describe the space around us?** Number, Algebra, Spatial Sense
Mar	**When are different operations useful?** Number, Algebra, Spatial Sense	**When are different operations useful?** Number, Algebra, Spatial Sense
Apr	**Are things in balance?** Number, Algebra, Spatial Sense, Financial Literacy	**Are things in balance?** Number, Algebra, Spatial Sense, Financial Literacy
May	**How can we make predictions and decide?** Number, Algebra, Data, Financial Literacy	**How can we make predictions and decide?** Number, Algebra, Data, Financial Literacy

Let’s take a look at the sample Long Range Plans Developed by Question.
On this slide you will find the grades 7 & 8 questions for February, March, April and May.

What do you notice? Please type your observations in the chat box.

Presenter is looking for these key ideas:
Expectations are connected
Expectations are expanded on
Expectations are revisited through different contexts
Each question typically involves several strands and draws on big mathematical themes such as quantity, change, equivalence, dimension, pattern, and uncertainty.
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Ideas to highlight include:
Using the same question in math helps combined classes.
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Even though they are presented in month-long blocks, there is flexibility for responding to student need and readiness.
Deep learning occurs when ideas are re-visited

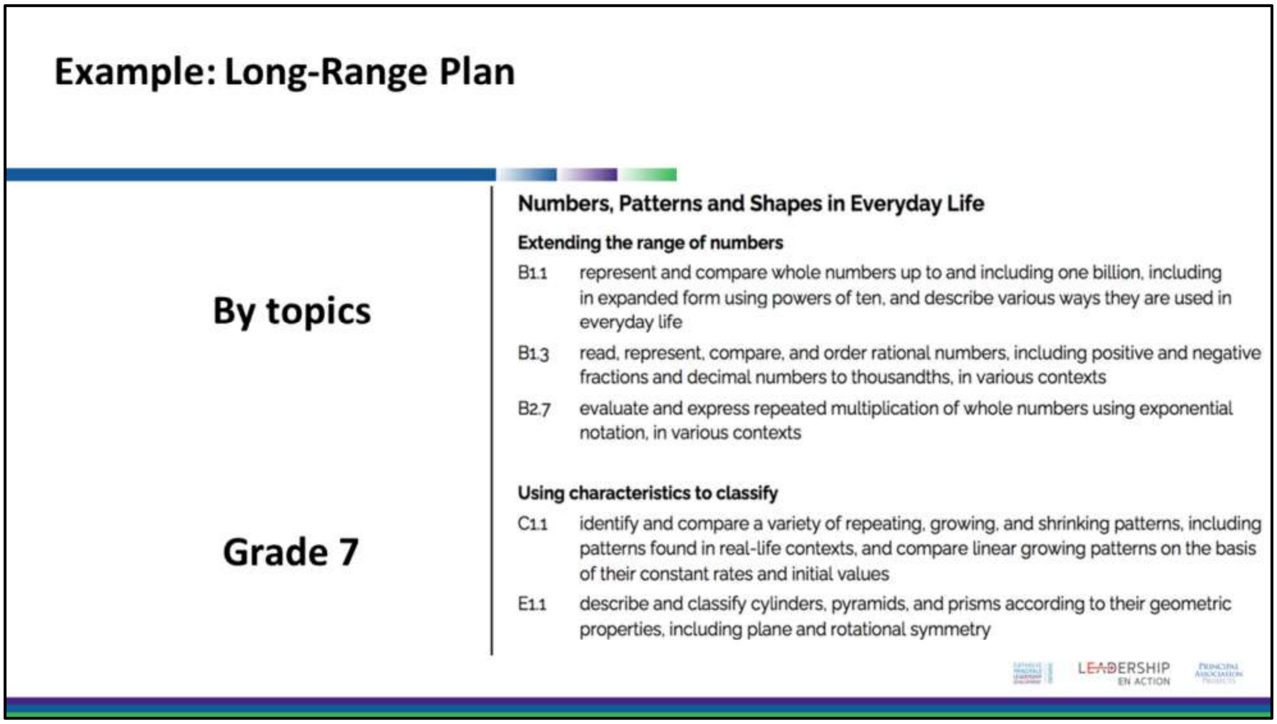
By Topic: What do you notice in intermediate grades?

Grade 7	Grade 8
Proportionality **(25 days)** Number, Algebra, Spatial Sense, Financial Literacy	**Proportionality** **(25 days)** Number, Algebra, Spatial Sense
Operations & Measurements **(20 days)** Number, Algebra, Spatial Sense	**Operations & Measurements** **(20 days)** Number, Algebra, Spatial Sense
Financial Literacy & Operations involving Money **(15 days)** Number, Financial Literacy	**Financial Literacy, Patterns, & Operations involving Money** **(15 days)** Number, Algebra
Integrated Mathematical Modelling Task **(10 days)** Algebra	**Integrated Mathematical Modelling Task** **(10 days)** Algebra

These sample long range plans are organized by topics. What do you notice in the primary grades? Please share your observations in the chat box.

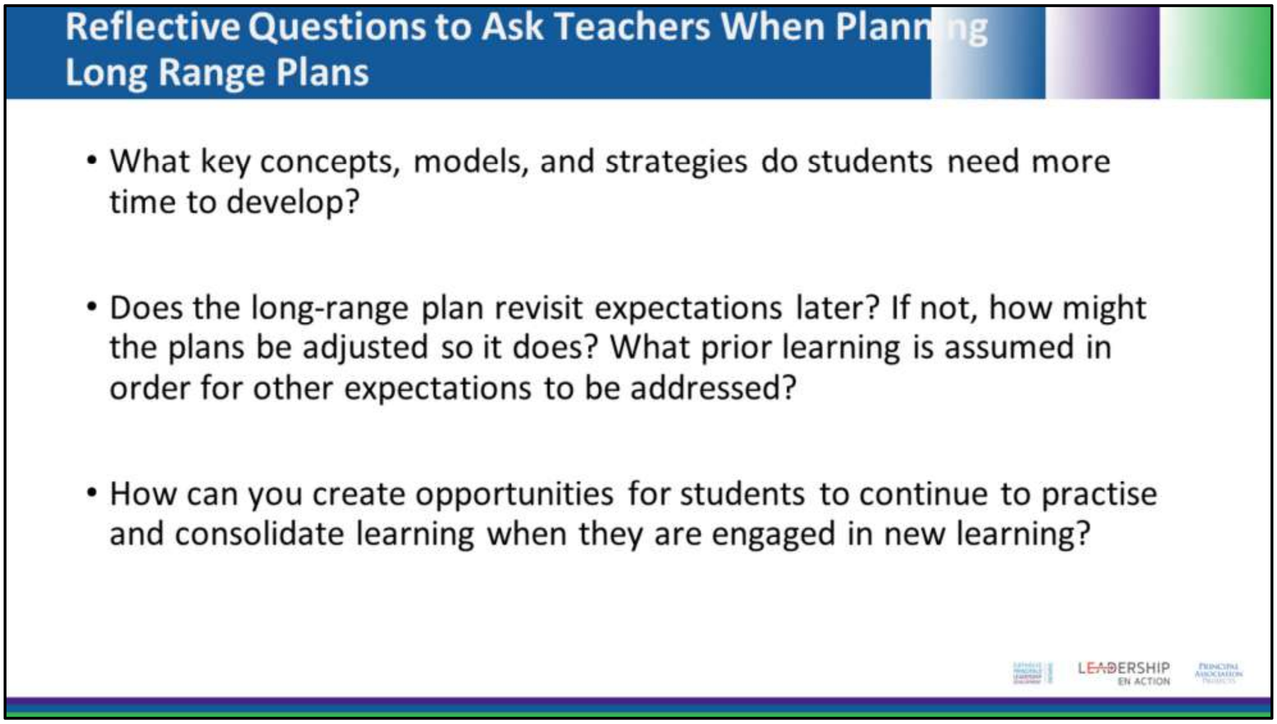
Look for answers that identify specific expectations are revisited
There is a flow of learning
Specific expectations are connected
Specific expectations are expanded on
Specific expectations are revisited
Timing is suggested but has room for student learning needs

How can you leverage this as a principal with your staff?



When we look further into Number Patterns, Relationships and Equivalency we can see the various strands that fall under each topic. (Read some of the slide).

Now that we've looked at the long-range plans in detail, the question remains, how do we lead staff to use these blueprints for a successful math program?



One of the answers lies in the reflective questions to ask teacsecthers ion in the curriculum itself.

Asking questions helps teachers refine their instruction and reflect. This is a critical time to do so given that it is our teachers' first year with the revised curriculum.

On this slide you will find some great questions from the ministry long-range plans to guide your discussions with teachers.

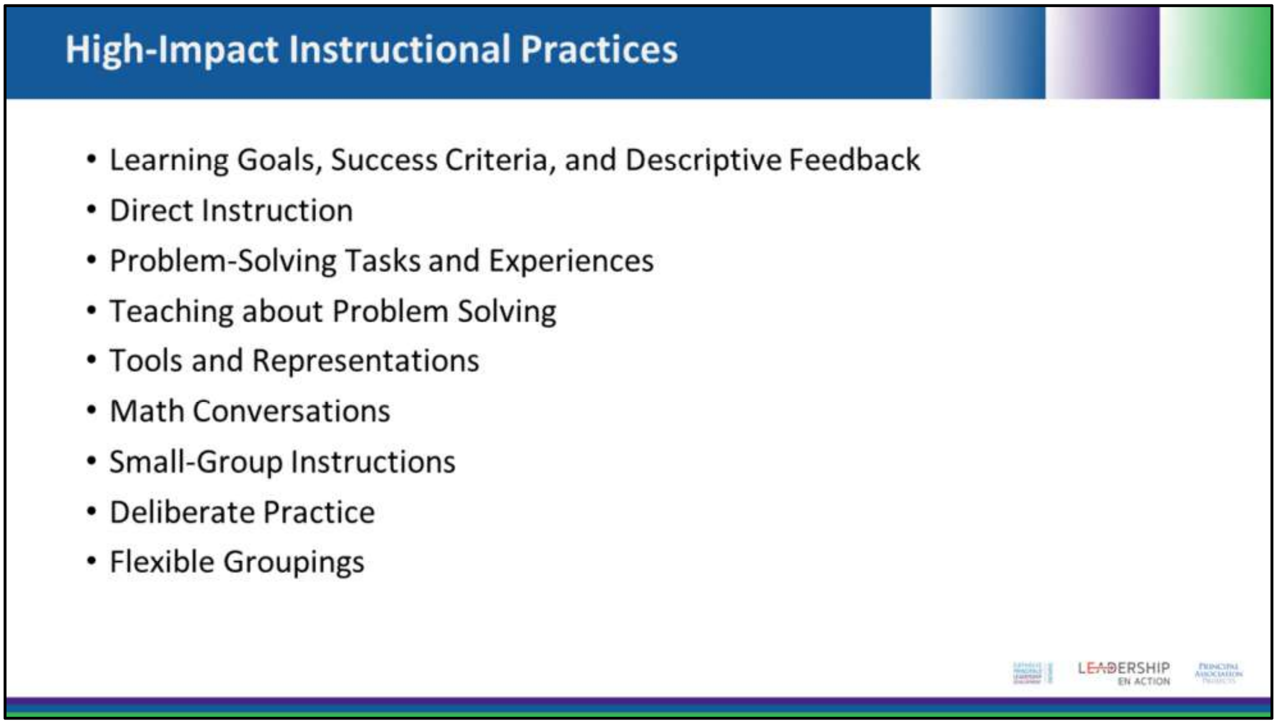
The second point would be an excellent question to guide staff in a division meeting. As a leader, providing time and space for teachers to highlight which expectations are revisited, which ones are built upon and which ones are addressed only once helps build their understanding of the blueprint for math.

How do you provide time and space between meetings to continue the conversations?

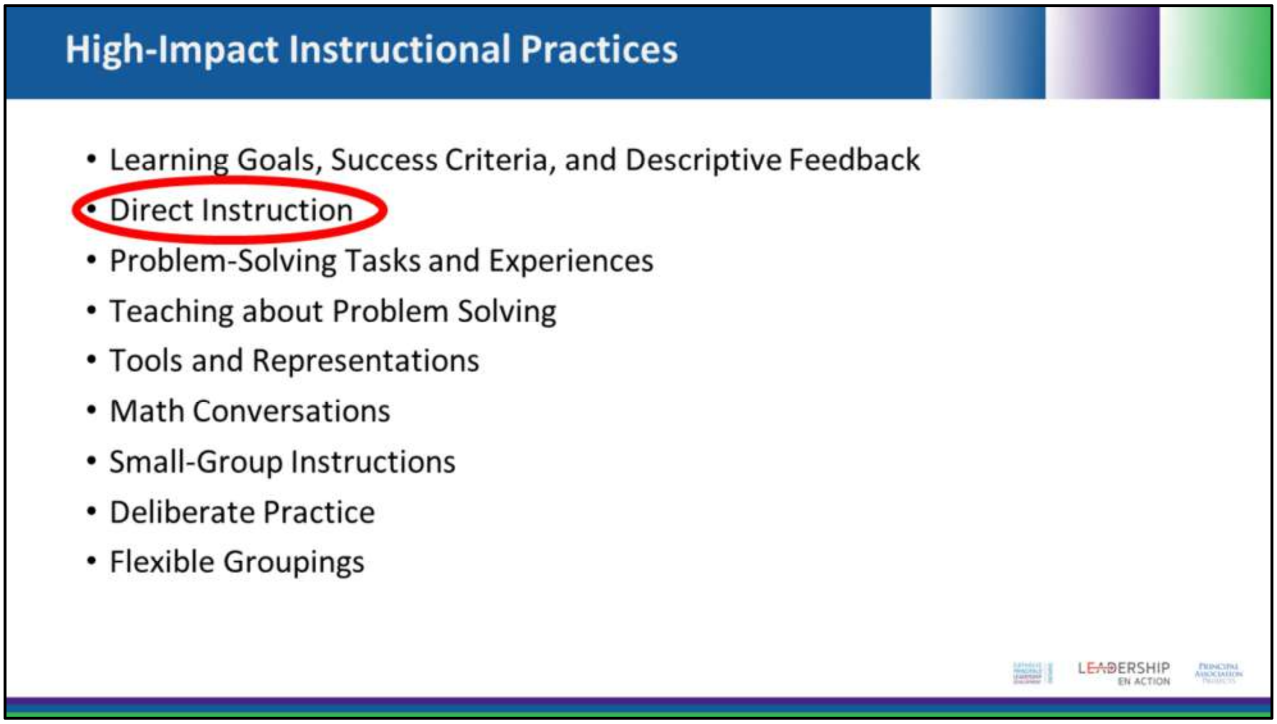
A key leadership move is to provide time and space between meetings to continue the conversations. How do you continue the conversations, ensure sharing of practices, and sharing of students' work, between scheduled meetings? Please share your thoughts in the chat box.

Look for: Make note of the things individual teachers are sharing that they will be trying or have identified they need support in. This supports you in providing follow up that includes follow up questions specific to what was said, offer support based on their own identified needs to keep the cycles iterative. i.e. At our last meeting you were going to try...., tell me about how your students engaged in this learning? At our last meeting you shared you would really like to try or learn more about... let's talk about how I can support you in this.

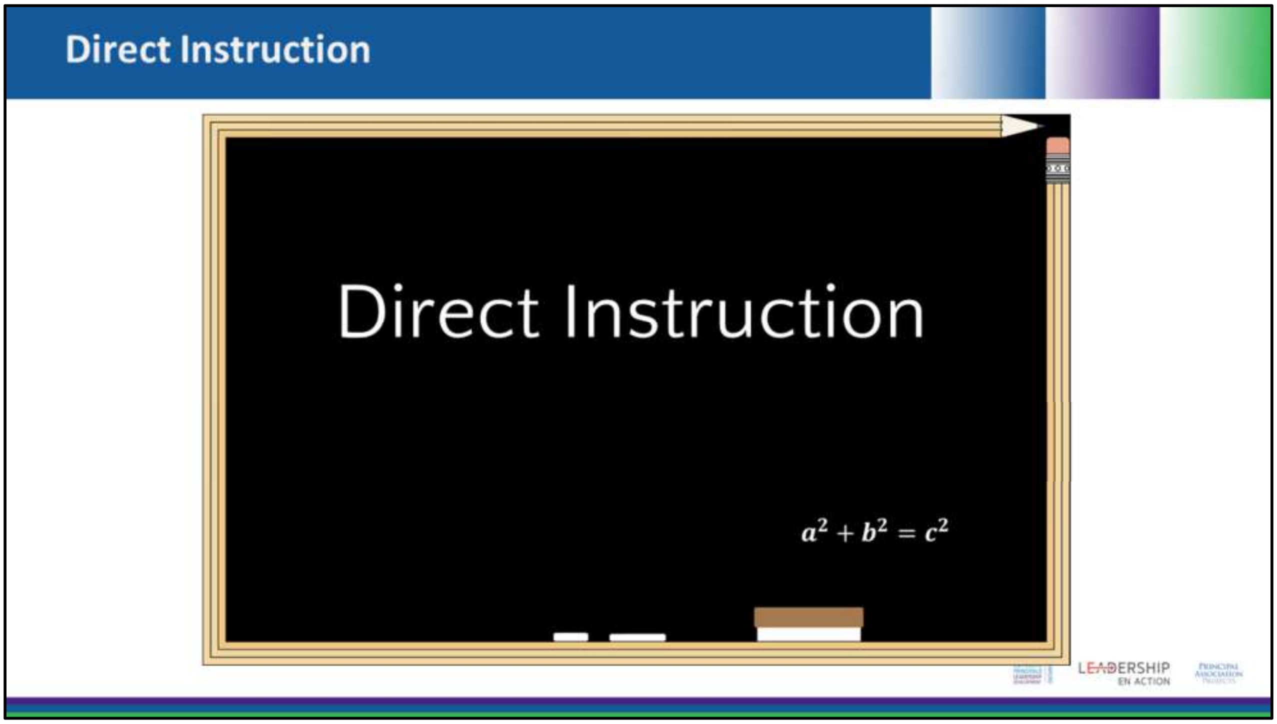
2. High Impact Instructional Practices



High-Impact Instructional Practices are essential to effective math instruction. They have consistently shown to have a high-impact on teaching and learning in mathematics. The 2020 Math Curriculum continues to highlight these 9 through a series of fact sheets. Any of them can be used to facilitate a learning conversation with teachers around what they are, what they look like in the classroom, and how to use them. All of them play a role in a rich math program and not only is it important to understand them, but also think about when to use each one and in what context.



The goal today will be to think about how to facilitate professional dialogue with teachers using the High-Impact Instructional Strategy of Direct Instruction as just one example (in the context of Cross Strand Mathematics.)



What do you think of when you hear "Direct Instruction"? What comes to mind? Use the chat feature to share your ideas.

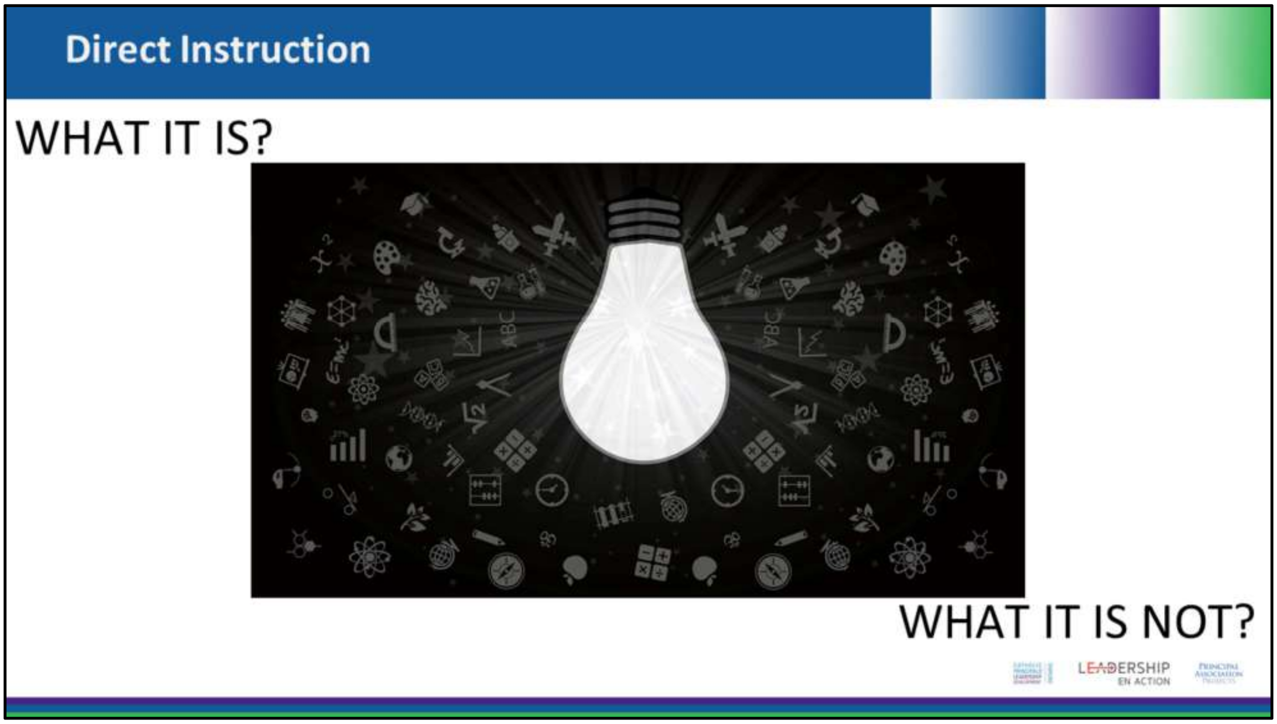
Examples that might be shared: teacher led, passive learning, one size fits all, lecture style, explicit instruction

Highlight Ministry Video available on the learning exchange "Explicit Teaching in Problem-based Mathematics"

https://thelearningexchange.ca/projects/explicit-teaching-problem-based-mathematics/

Rather than a separate pedagogical approach, direct teaching or explicit instruction is an integral part of problem-based learning and instruction.

This ink can be found in the resources section that has been shared with you



Ideas to consider…..

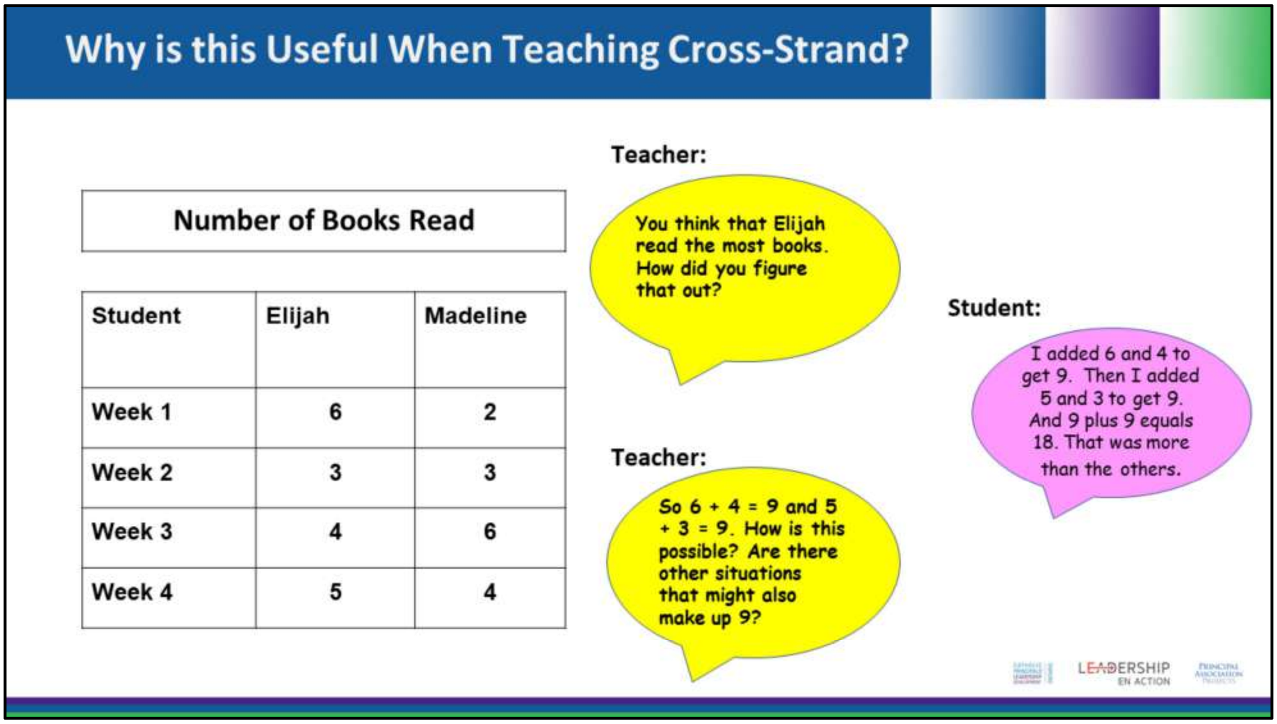
Direct Instruction Is:

- intentional teaching
- concise
- requires careful planning
- focuses on learning goals, success criteria and descriptive feedback
- require pedagogical content knowledge
- teacher making explicit connections to learning goals and success criteria using student work
- explicit instruction
- strategic use of questions
- clarifies, models, names, defines, extends thinking
- checks for understanding
- concludes with a clear summary of the learning

Direct Instruction is not:

- lecture
- all teacher talk up front

- imparting knowledge
- reading from a textbook
- independent worksheets
- teacher talking, kids working



Student	Elijah	Madeline
Week 1	6	2
Week 2	3	3
Week 3	4	6
Week 4	5	4

For Primary presentation only

Why is this useful when teaching Cross-Strand? To answer this question, let's look at a primary example.

Suppose a teacher was using this visual to represent the numbers of books read by students in the class to raise money for charity. When asking students questions such as, who read the most books and how did you figure that out? You may be looking for a variety of strategies to add which is a Number expectation.
But notice in this dialogue between the teacher and student the teacher can look to highlight the concept of equality which is an Algebra expectation.

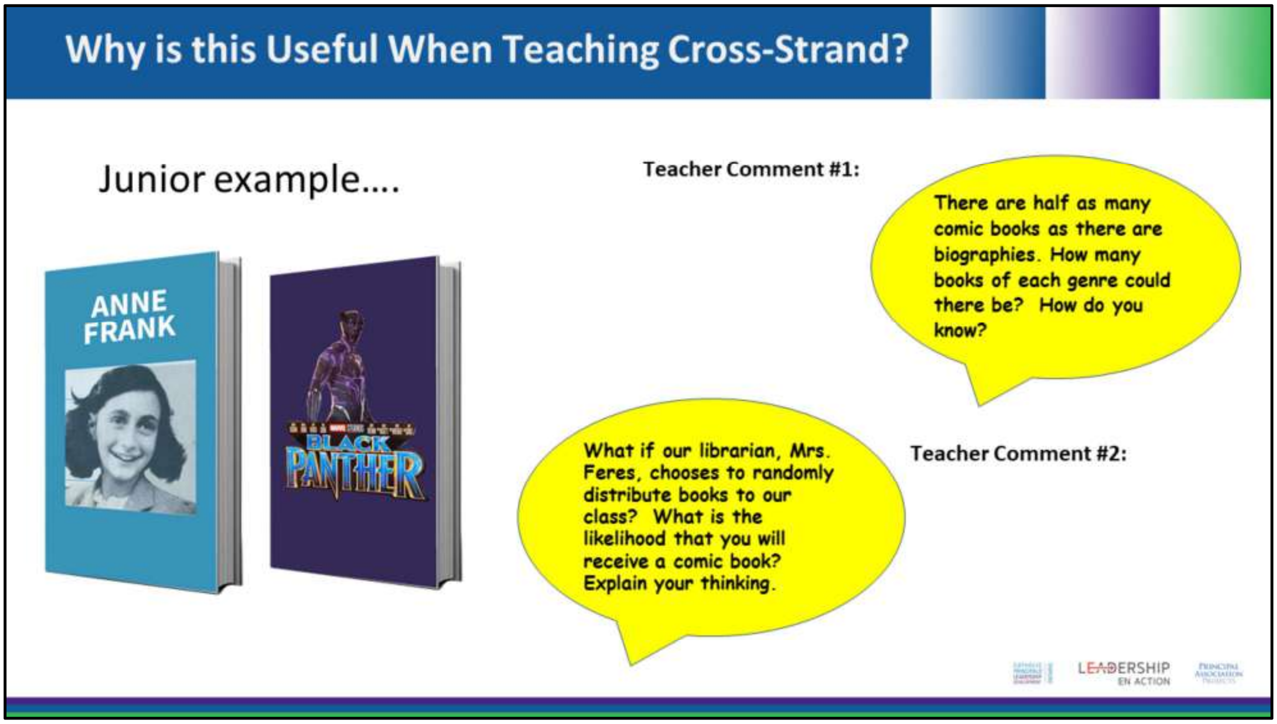
Dialogue:

Teacher: You think that Elijah read the most books. How did you figure that out?
Student: I added 6 and 4 to get 9.
Then I added 5 and 3 to get 9.

And 9 plus 9 equals 18. That was more than the others.
Teacher: So 6 + 4 = 9 and 5 + 3 = 9. How is this possible? Are there other situations that might also make up 9?

With careful planning, pedagogical content knowledge and the strategic use of questioning, a teacher can look to address multiple concepts across strands. You can see that building a teacher's skill set in the components of direct instruction can help build teacher understanding which can support the development of rich questions, deeper understanding of curriculum content and continuums across strands, skills to recognize when and how to lift the math concept out of the student thinking and also be more responsive to students through appropriate feedback.

Gr: 1 Expectations
Number: (Addition and Subtraction) B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of whole numbers that add up to no more than 50
Algebra: (Equalities and Inequalities) C2.2 determine whether given pairs of addition and subtraction expressions are equivalent or not



For Junior presentation only

Why is this useful when teaching Cross-Strand? To answer this question, let's look at a junior example.

Suppose a teacher was exploring a variety of book genres with her class and presented a problem that could allow students the opportunity to explore fractions. For example,

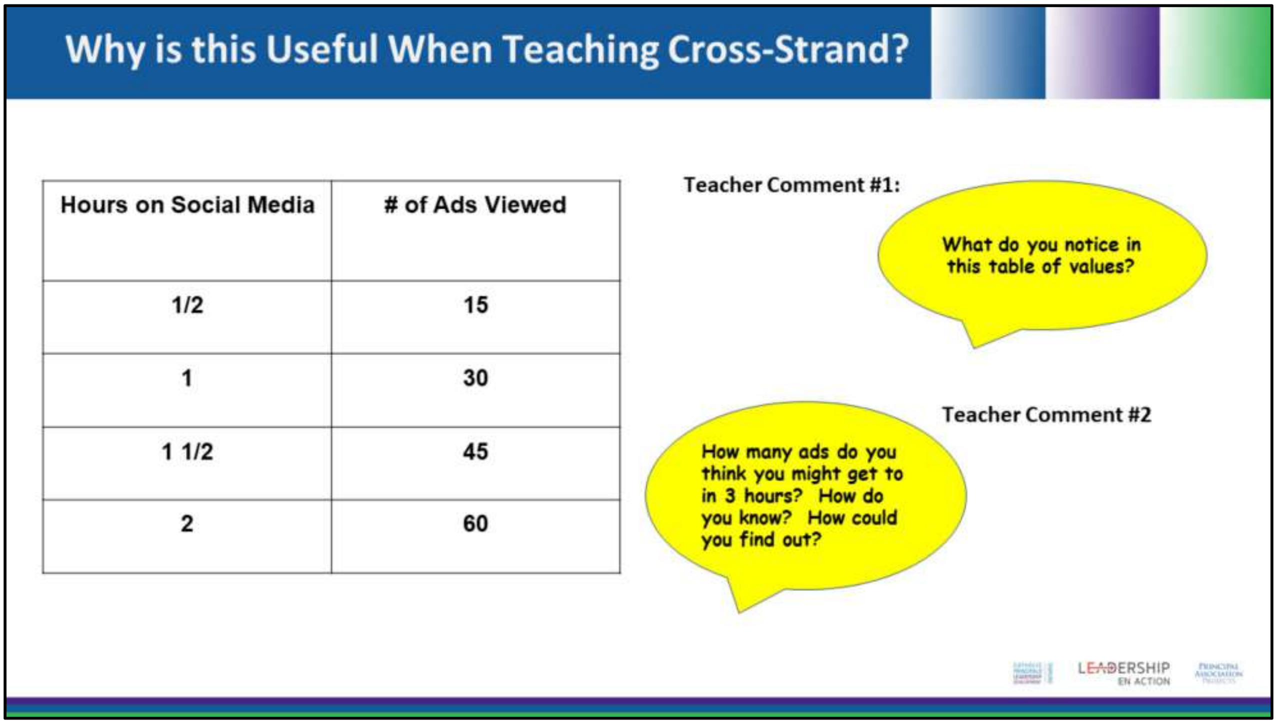
Teacher Comment #1: There are half as many comic books as there are biographies. How many books of each genre could there be? How do you know?

The task is a very open one which allows students several entrance points to connect to this fraction concept, depending on where they are. She may be looking for students to explore a variety of tools, drawings and standard notation to help answer this fraction question, which is a Number expectation. But notice in this dialogue that the teacher can look to highlight the concept of probability, which is a Data expectation.

Teacher Comment #2: What if our librarian, Mrs. Feres, chooses to randomly distribute books to our class? What is the likelihood that you will receive a comic book? Explain your thinking.

With careful planning, pedagogical content knowledge and the strategic use of questioning, a teacher can look to address multiple concepts across strands. You can see that building a teacher's skill set in the components of direct instruction can help build teacher understanding which can support the development of rich questions, deeper understanding of curriculum content and continuums across strands, skills to recognize when and how to lift the math concept out of the student thinking and also be more responsive to students through appropriate feedback.

Gr: 4 Expectations
Number: (Fractions and Decimals) B1.4 represent fractions from halves to tenths using drawings, tools, and standard fractional notation, and explain the meanings of the denominator and the numerator
Data: (Probability) D2.1 use mathematical language, including the terms "impossible", "unlikely", "equally likely", "likely", and "certain", to describe the likelihood of events happening, represent this likelihood on a probability line, and use it to make predictions and informed decisions



For Intermediate presentation only

Why is this useful when teaching Cross-Strand? To answer this question, let's look at an intermediate example.

Suppose a teacher wanted to focus on data expectations were students were exploring data collection of media adds on a variety of social media platforms and organizing them using a table of values. This is a Data expectation. But notice in this dialogue that the teacher can connect to Algebra expectations by asking the right questions.

Teacher Comment #1: What do you notice in this table of values?

Teacher Comment #2: How many ads do you think you might get to in 3 hours? How do you know? How could you find out?

With careful planning, pedagogical content knowledge and the strategic use of questioning, a teacher can look to address multiple concepts across strands. You can see that building a teacher's skill set in the components of direct instruction can help build teacher understanding which can support the development of rich questions, deeper understanding of curriculum content and continuums across strands, skills to recognize when and how to lift the math concept out of the student thinking and also be more responsive to students through appropriate feedback.

Gr: 8 Expectations

Data : (Data Collection and Organization) D1.2 collect continuous data to answer questions of interest involving two variables, and organize the data sets as appropriate in a table of values

Algebra: (Patterns) C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns

Where Can I Start?

So now what? What does this mean for me as a principal or vice-principal? Where do I start?

Start where your teachers are.

Do you know where they when it comes to direct instruction?
If your answer is YES...great….you can get going

-Maybe you will go explore this topic together
-Maybe you will need to clarify misconceptions about direct instruction
-Maybe you will start unpacking the various components of direct instruction

If your answer is NO….then how are you going to find out where they are?

-Maybe you will visit classrooms
-Maybe you will have conversations
-Maybe you will develop some PLCs
-Maybe you will develop a survey

The main thing is that you have a starting point and a beginning next step to further developing this important high impact instructional strategy. And remember that this is just 1 of the 9 high impact instructional strategies that are so important in moving students and teachers understanding in mathematics forward.

3. Cross-Strand Teaching

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Messages in the curriculum…

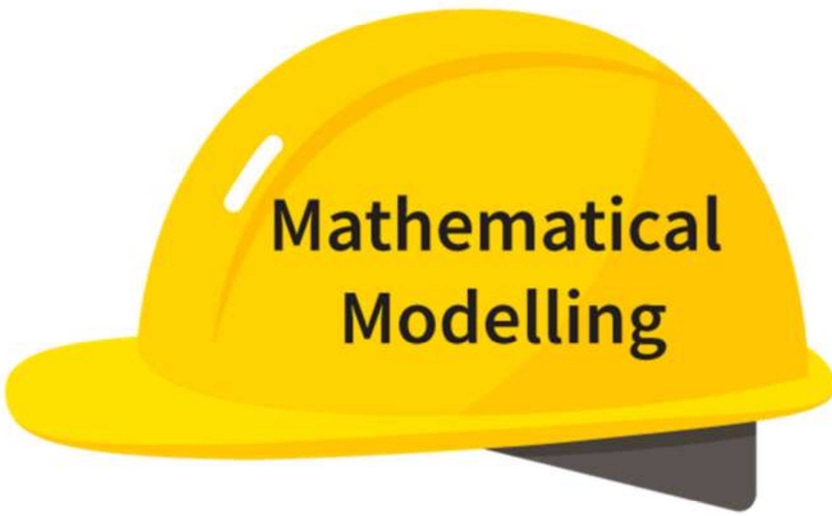
The Ontario Curriculum, Grades 1–8: Mathematics, 2020 focuses on fundamental mathematics concepts and skills, as well as on **making connections** between related math concepts, between mathematics and other disciplines, and between mathematics and everyday life.” (Curriculum Context)

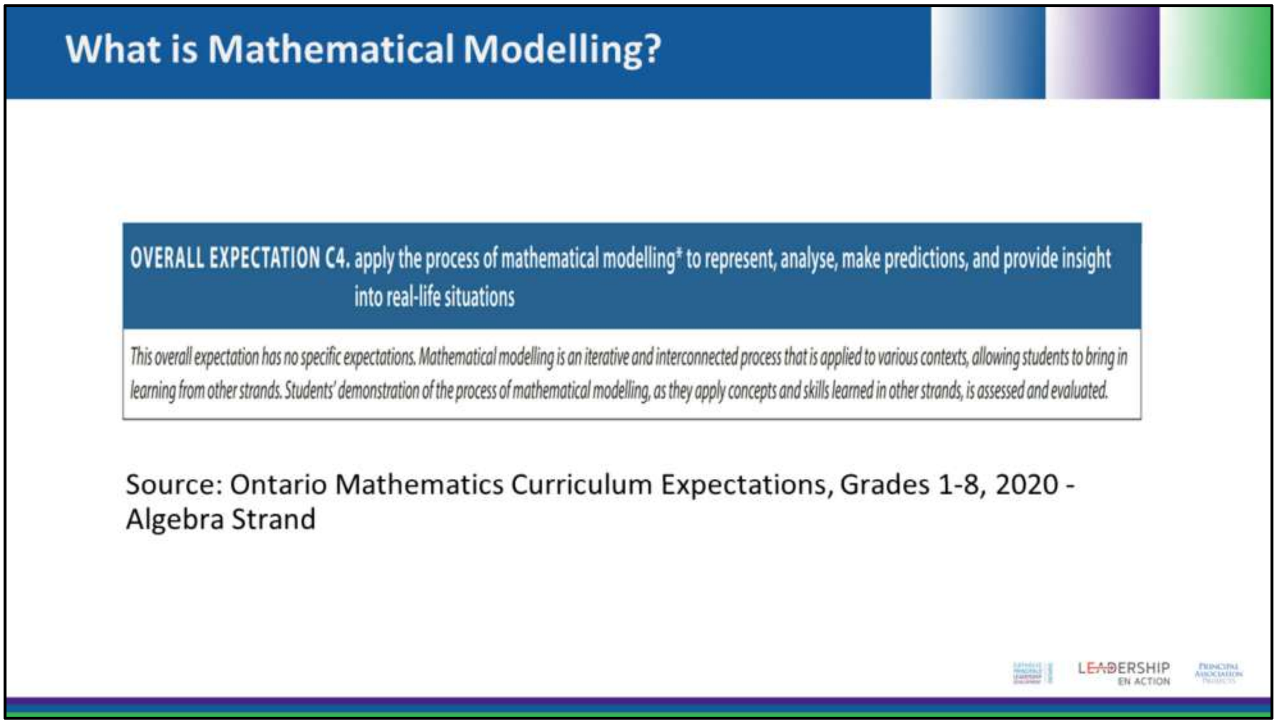
"A robust mathematics curriculum is essential for ensuring that all students reach their full potential. The Ontario mathematics curriculum challenges all students by including learning expectations that capitalize on students' prior knowledge; involve higher-order thinking skills; and require students to make connections between their lived experiences, mathematical concepts, other subject areas, and situations outside of school. This learning enables all students to gain a powerful knowledge of the usefulness of the discipline and an appreciation of the importance of mathematics." (Curriculum Context)

Mathematics Processes - Connecting

"Experiences that allow all students to make connections – to see, for example, how knowledge, concepts, and skills from one strand of mathematics are related to those from another – will help them to grasp general mathematical principles. Through making connections, students learn that mathematics is more than a series of isolated skills and concepts and that they can use their learning in one area of mathematics to understand another. Seeing the relationships among procedures and concepts also helps develop mathematical understanding. The more connections students make, the deeper their understanding, and understanding, in turn, helps them to develop their sense of identity. In addition, making connections between the mathematics they learn at school and its applications in their everyday lives not only helps students understand mathematics but also allows them to understand how useful and relevant it is in the world beyond the classroom. These kinds of connections will also contribute to building students' mathematical identities." (Curriculum context)

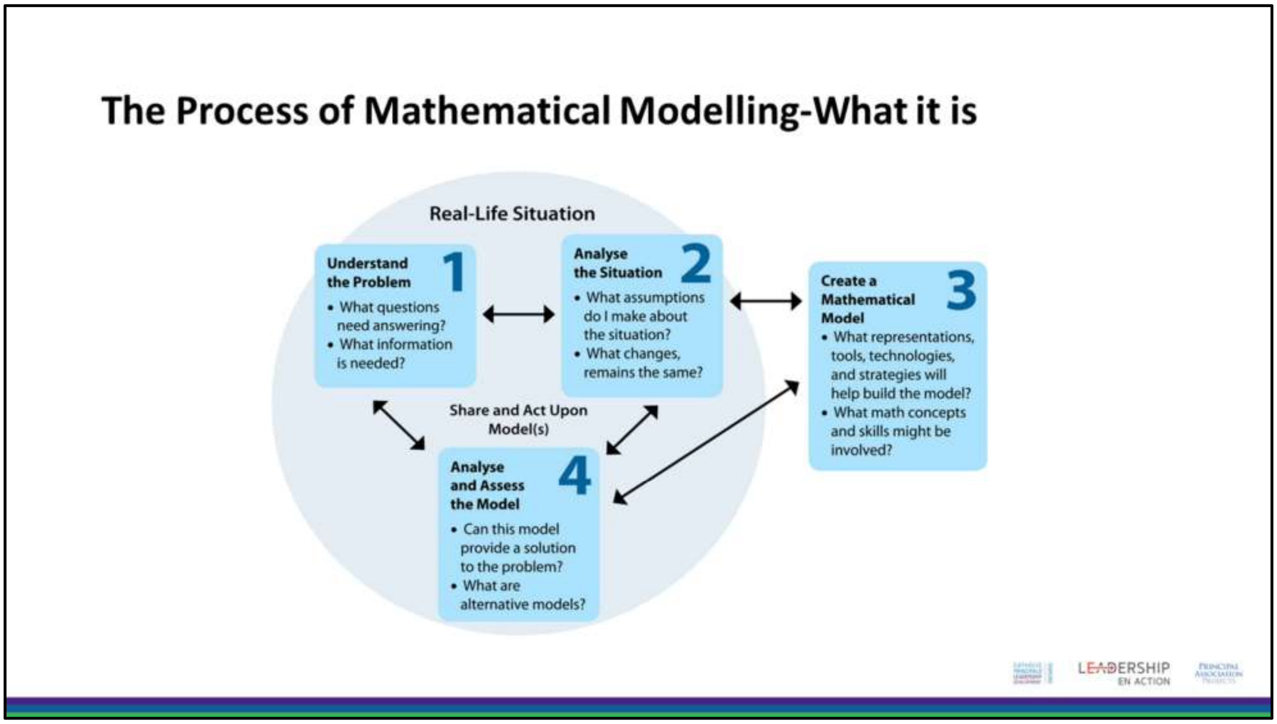
4. Mathematical Modelling





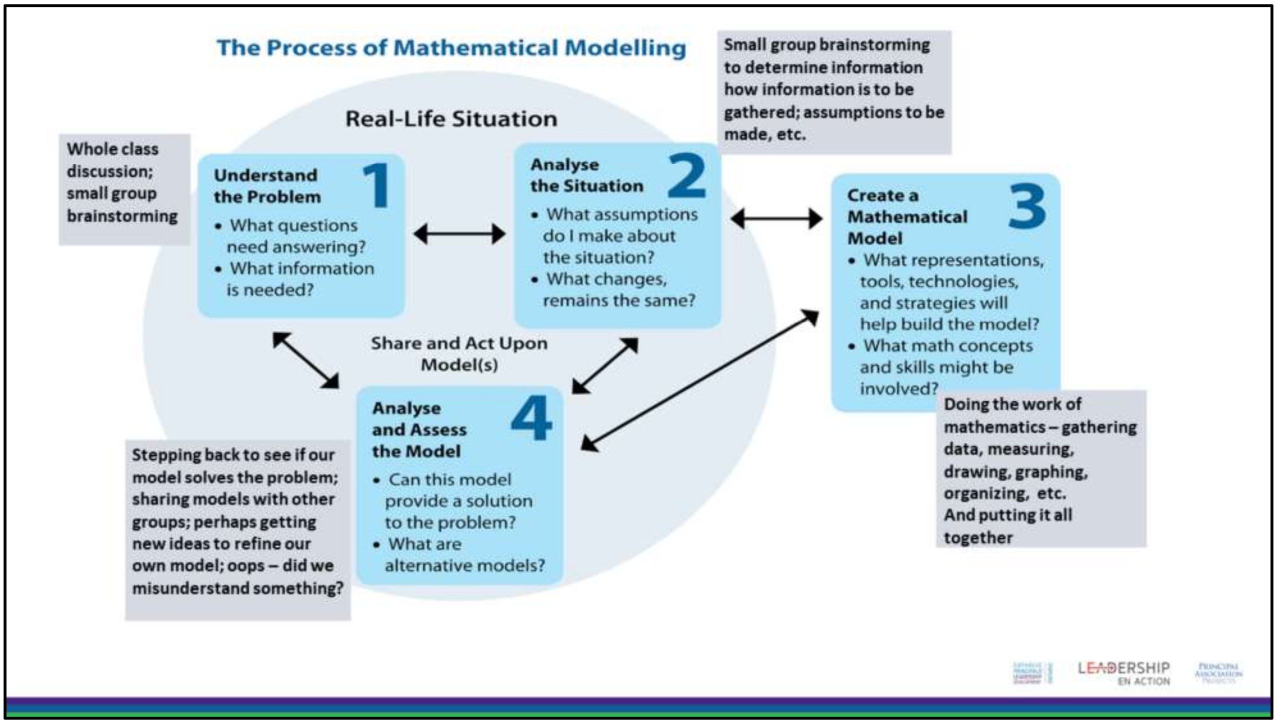
You've come to this webinar with some thoughts on what mathematical modelling is in the new math curriculum.

When you look at the overall expectation for Mathematical Modelling in the algebra strand, you will notice that the grade 1 & grade 8 description are identical as are all the overall expectations. In this case there are no specific expectations. Teachers assess and evaluate the <u>process</u> of mathematical modelling. This is tricky to get our head wrapped around as we are often looking at the results-not the process.

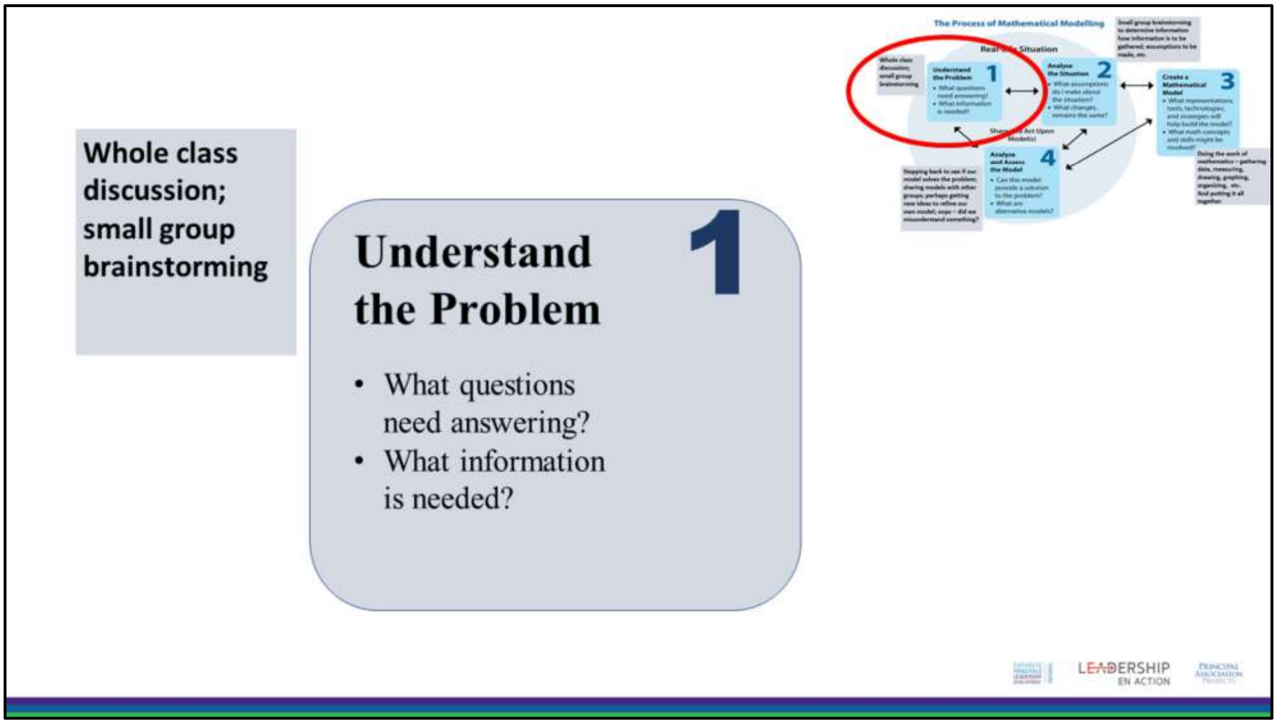


The Mathematical Modelling Process

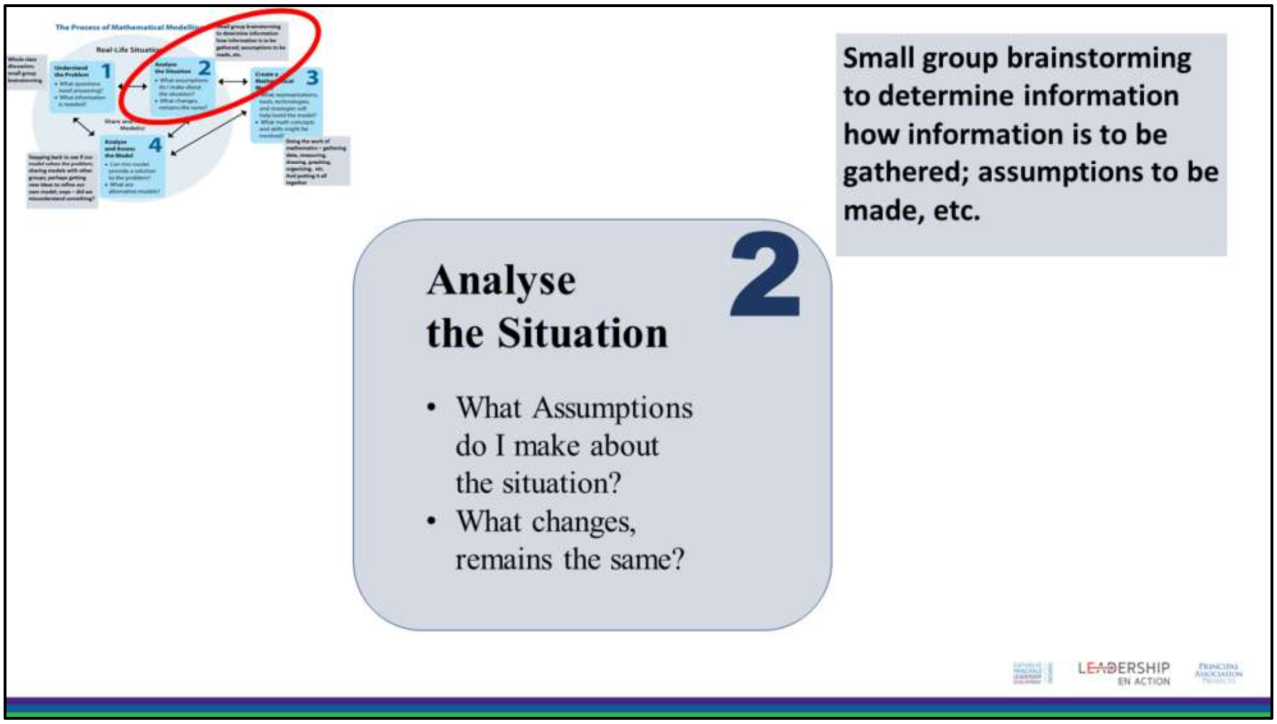
Mathematical modelling provides authentic connections to real-life situations. The process starts with ill-defined, often messy real-life problems that may have several different solutions that are all correct. Mathematical modelling requires the modeller to be critical and creative and make choices, assumptions, and decisions. Teachers should be culturally aware of the choices of mathematical modelling questions they pose. Students will create a variety of different models based on their experiences. From the curriculum context document: Culturally reflective and responsive teachers know that there is more than one way to develop a solution. Students are exposed to multiple ways of knowing and are encouraged to explore multiple ways of finding answers. For example, an Indigenous pedagogical approach emphasizes holistic, experiential learning; teacher modelling; and the use of collaborative and engaging activities" (p. 48).



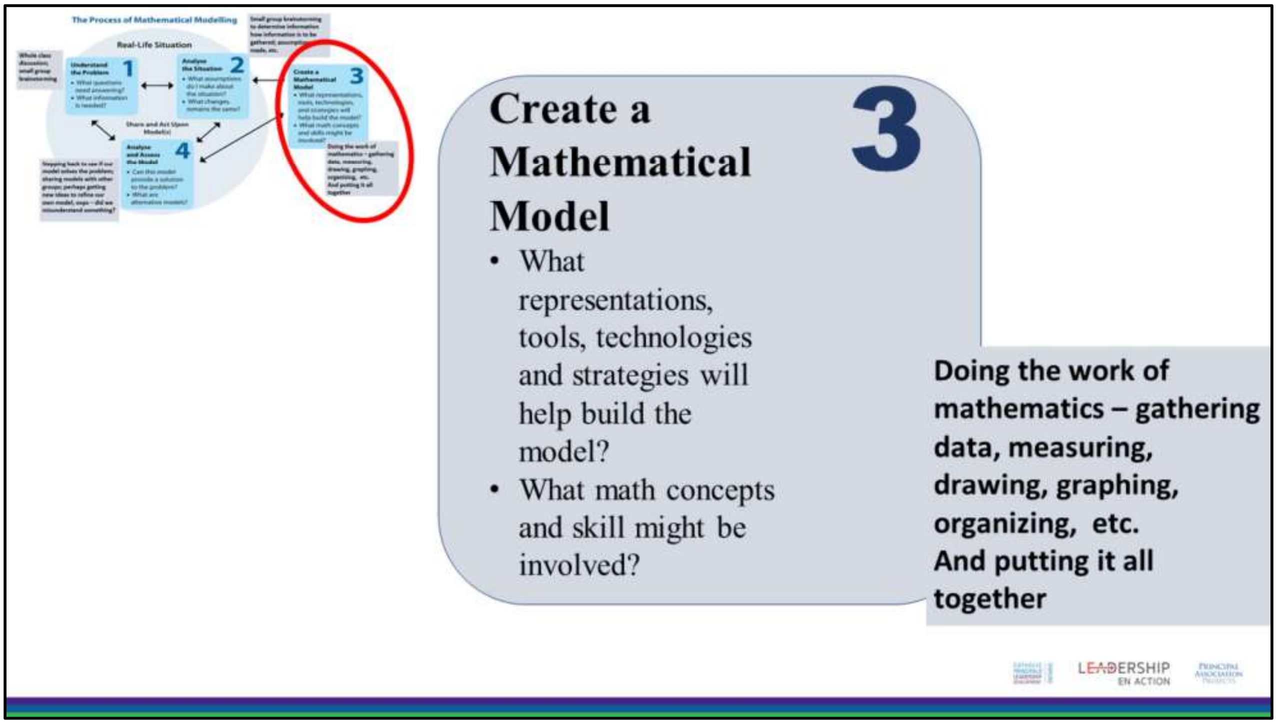
What do these stages look like? How might this process unfold?



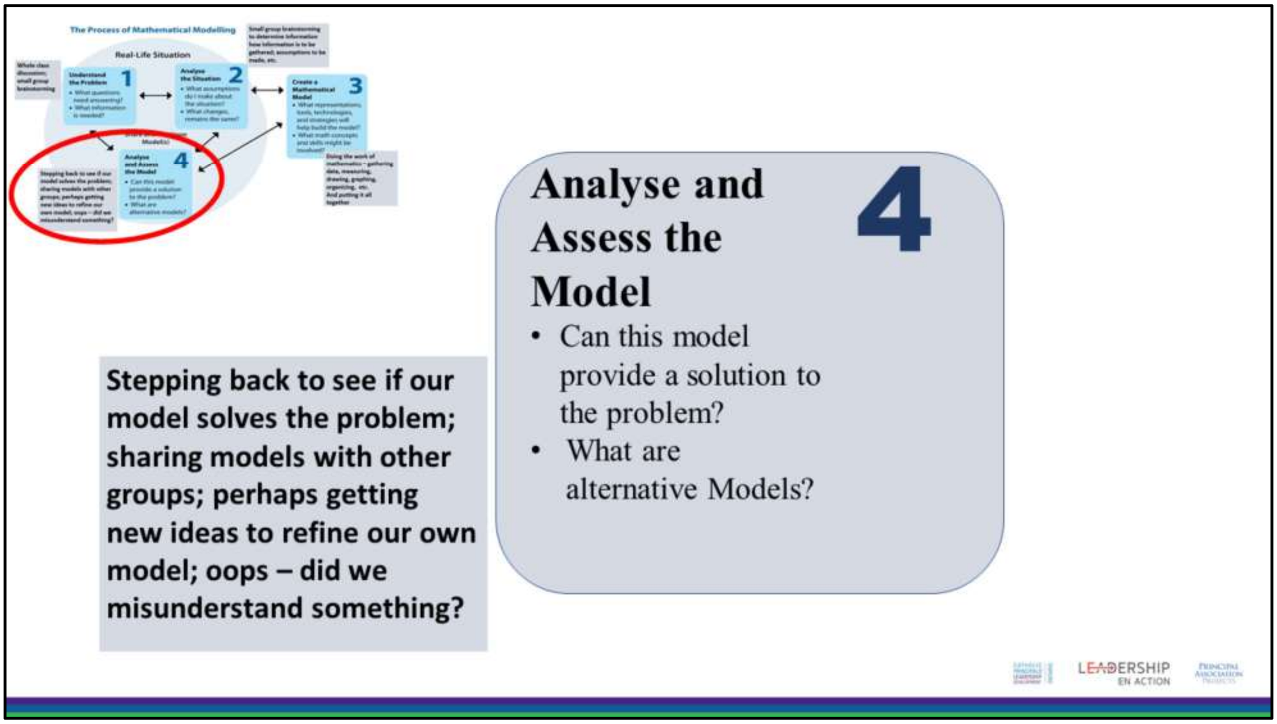
Understanding the problem could be a whole class discussion or small group brainstorming activity.



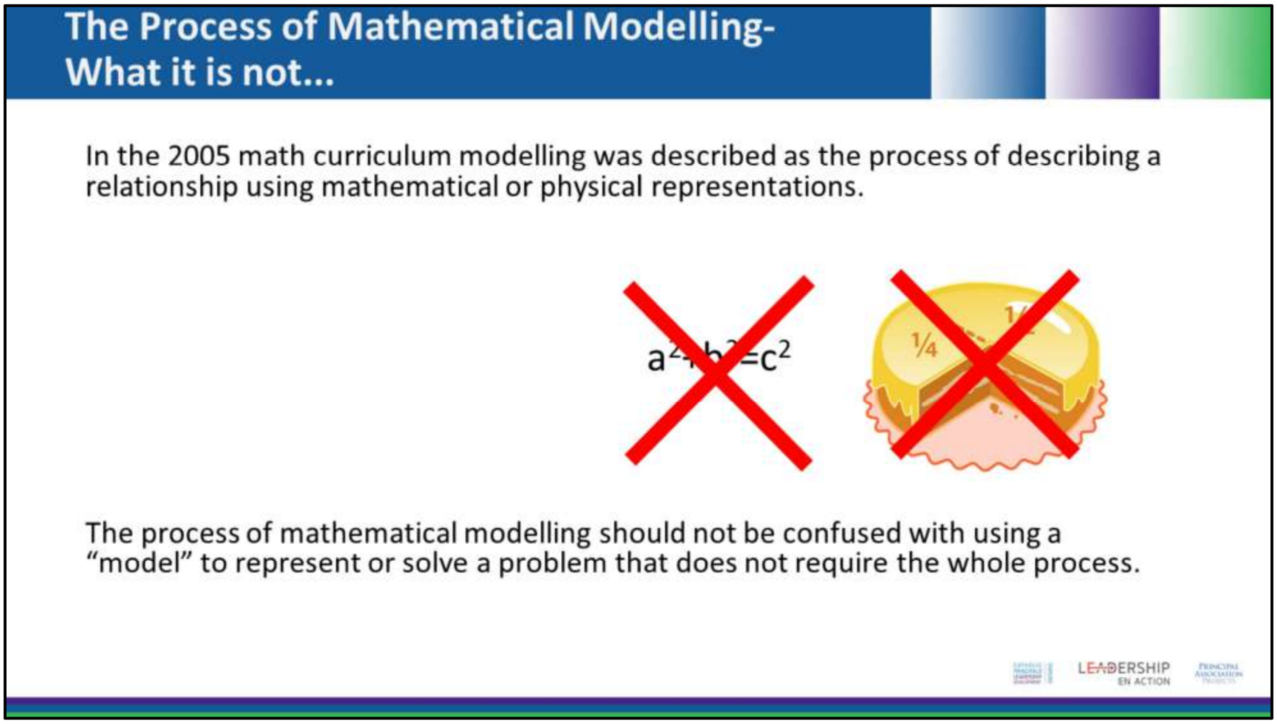
Moving to the analysis of the situation, small groups can brainstorm to determine information, how information is to be gathered, assumptions to be made and so on.



When students are creating a mathematical model, they are truly doing the work of mathematicians-gathering data, measuring, drawing, graphing, organizing, and putting it all together.

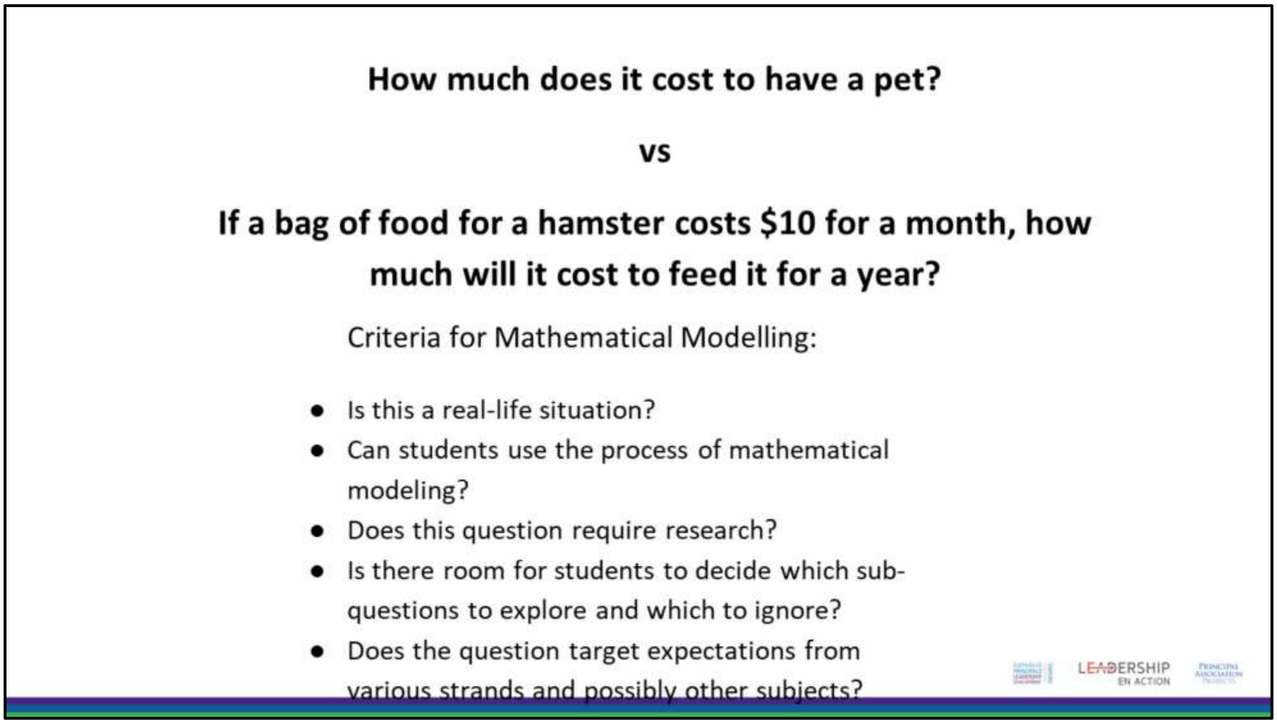


When the students are analysing and assessing the model they need to step back and see if the model does indeed solve the problem. They need to share their solutions and perhaps gain new insights and opportunities to refine their model from the feedback and clarify their understanding. Once again-a messy process! And definitely non-linear.

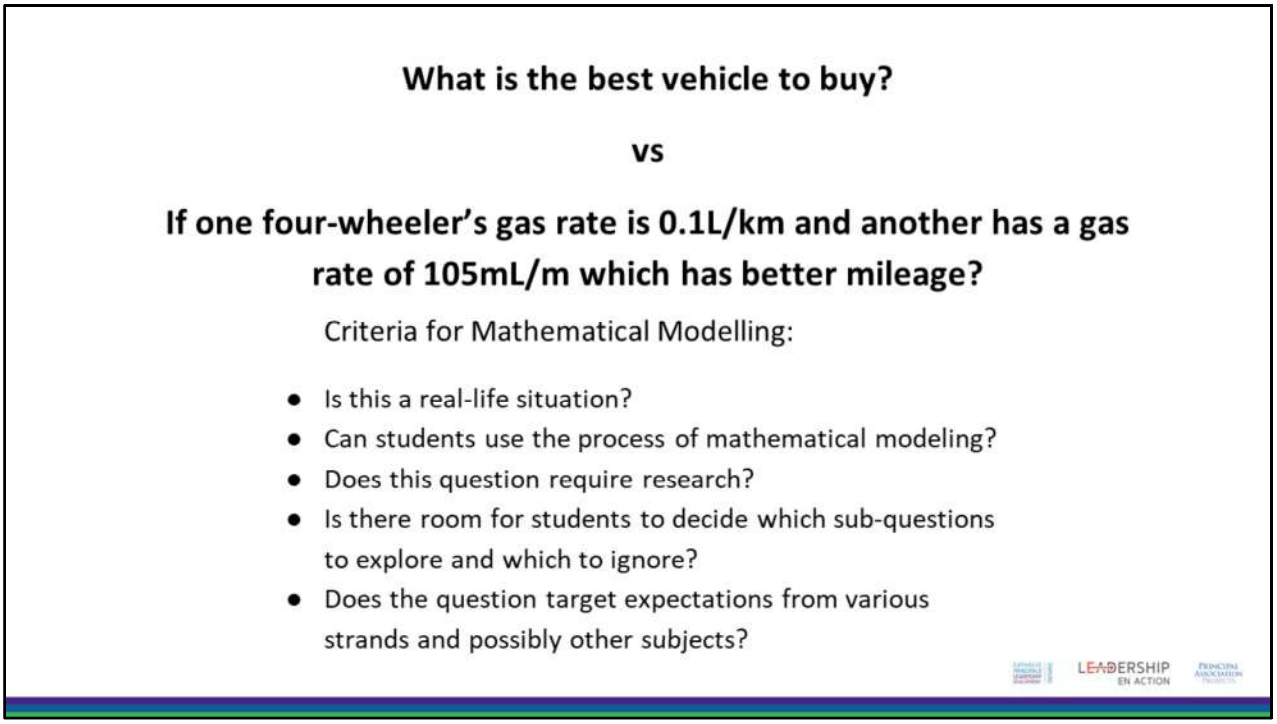


Now that we know what it is...let's look at what it is not. (Read the slide)

In the previous curriculum, equations and manipulatives were used interchangeably as modelling. No longer.



(Primary and Junior Example)
Now that we know what mathematical modelling is and is not...Let’s look at two examples and apply the criteria to determine which one is a Mathematical Modelling question.



Now that we know what mathematical modelling is and is not...Let's look at two examples and apply the criteria to determine which one is a Mathematical Modelling question. (Intermediate example)

Another example might include how much water does a household need? This can lend itself to so many cross curricular connections.... including linking to Water conditions in Canadian First Nations Communities. Then you could possibly pose the questions what cross curricular connections can you make with this question.

How do I guide my teachers in creating quality mathematical modelling tasks?

Considerations:

Start slow and build. Take a word problem and ask yourself what is the underlying problem?

Recognize that the 4 components of mathematical modelling need to be taught explicitly.

Explore the expectations from other subjects such as Science and Technology, Social Studies, Geography to create cross curriculum opportunities.

Consider using mathematical modelling as a culminating activity.

Consider equity, engagement, and inclusion in the creation of your questions.

Watch the webinar provided by the OAME found on this link https://ontariomath.support/index.php?pg=view&lang=EN&id=29

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Start slow and build. Recall the previous example of the hamster food or gas mileage. These were word problems that had underlying problems that could be built into mathematical modelling questions. (Read the remaining considerations)

5. Assessment & Evaluation

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Sound classroom assessment . . .

- Is used to improve teaching and learning
- Is ongoing and imbedded in instruction
- Uses a variety of assessment strategies
- Is aligned with curriculum and instruction
- Focuses on what is important about the subject
- Includes students in the assessment process

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But what about evaluation - moving to one report card mark?

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Information from the addendum to Growing Success

Completing the Provincial Report Cards: Mathematics, Grades 1 to 8

- To foster a cohesive approach to both instruction and assessment across the elementary mathematics curriculum, achievement in mathematics will be reported as one overall grade/mark, with supporting comments.
- Fill in the letter grade/percentage mark that best reflects the overall learning of the student in mathematics in the column headed Report 1 or Report 2, as appropriate. When assigning a grade or mark, consideration should be given to the student's integrated learning across the strands taught in each reporting period. Comments will describe significant strengths demonstrated by the student and identify next steps for improvement; they may also describe growth in learning. When appropriate, teachers may make reference to particular strands in their comments.

From Growing Success

"For Grades 1 to 12, all curriculum expectations must be accounted for in instruction and assessment, but evaluation focuses on students' achievement of the overall expectations. A student's achievement of the overall expectations is evaluated on the basis of his or her achievement of related specific expectations. The overall expectations are broad in nature, and the specific expectations define the particular content or scope of the knowledge and skills referred to in the overall expectations." (Growing Success, p. 38).

Ultimately, we are assessing achievement of the curriculum expectations addressed during that reporting period.

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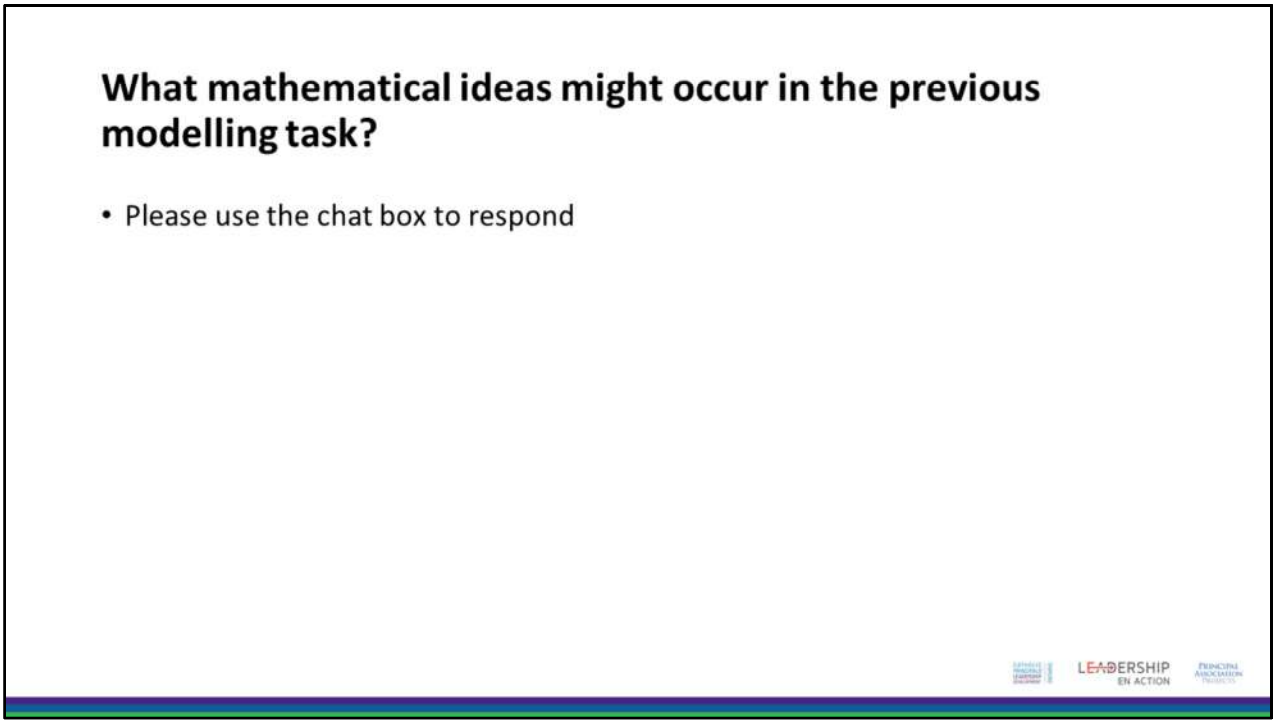
Number	Algebra	Data	Spatial Sense	Financial Literacy
B1 (number)	C1 (patterns)	D1 (data)	E1 (location, space, geometry)	F1
B2 (operations)	C2 (equations)	D2 (probability)	E2 (measurement)	
	C3 (coding)			
	C4 (modelling)			

Number	Algebra	Data	Spatial Sense	Financial Literacy
B1 (number) ❶ ❸	C1 (patterns) ❷ ❹	D1 (data)	E1 ❶	F1
B2 (operations) ❷ ❸ ❹	C2 (equations)	D2 (probability)	E2	
	C3 (coding)			
	C4 (modelling)			



ask participants to place in the chat box, mathematical ideas that might come up in the previous modelling task

Possible Assessment data from a modelling task

Number	Algebra	Data	Spatial Sense	Financial Literacy
Estimating Calculating Proportional reasoning	Proportional reasoning Recognizing patterns Expressing relationships Calculating rates **Mathematical modelling**	Collecting primary data Finding data from secondary sources Organizing data into tables, graphs, etc.	Measuring	Finding costs Building a budget

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Connect back to mathematical modelling and think of tasks that can be cross stranded

Assessing the mathematical modelling process – some ideas

- Checkpoints at each step – through observation, dialogue, written submissions
- Self- and peer-assessments commenting on differences between models of different groups
- Conferencing with students with all of their materials, data, thinking

Number	Algebra	Data	Spatial Sense	Financial Literacy
B1 (number) 1 3	C1 (patterns) 2 4	D1 (data)	E1 1	F1
B2 (operations) 2 3 4	C2 (equations)	D2 (probability)	E2	
	C3 (coding)			
	C4 (modelling)			

Developing professional judgement

"Teachers will use their professional judgement . . ." (Growing Success, p. 38).

Consider the learning opportunities that we can provide for teachers to enhance their understanding of sound instruction and assessment and ultimately enhance their professional judgement.

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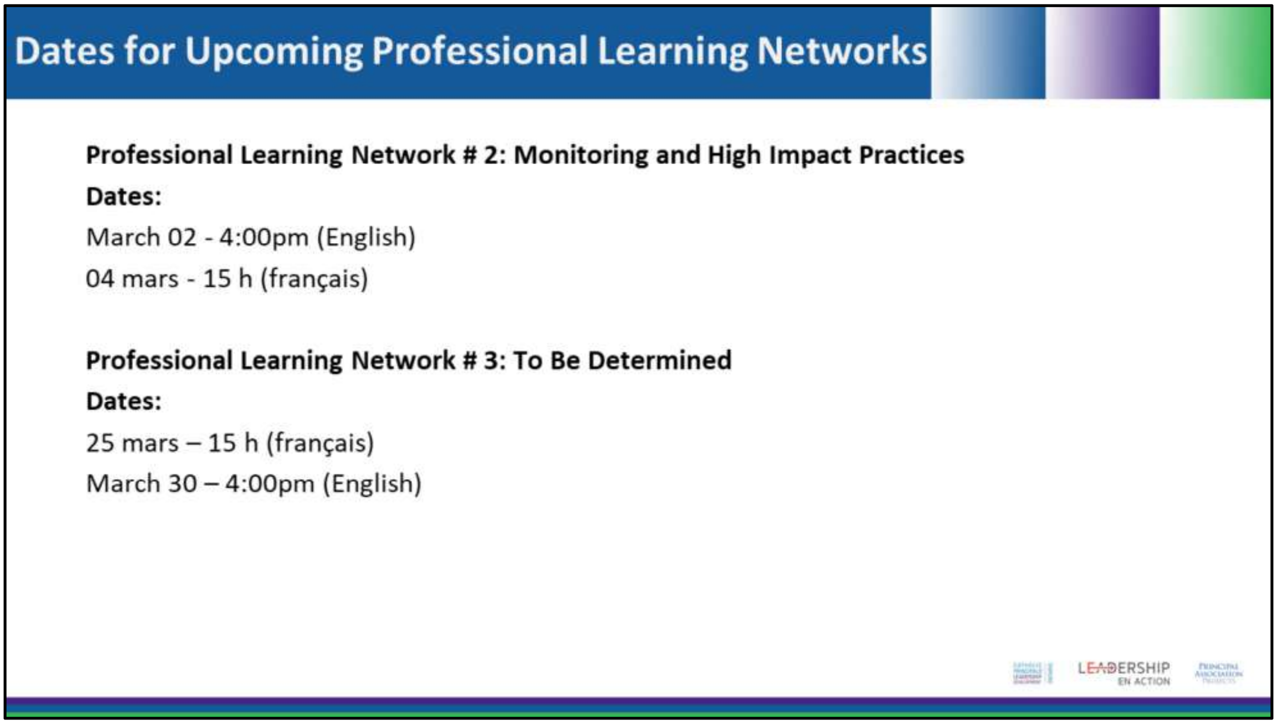
Chris Insert slide about teachers' professional judgement and ways to enhance teachers' professional learning.



Acknowledgement that we are providing a lot of information.
List dates and topics for participants to unpack the learning from this webinar (Professional Learning Networks).

Resources

- "Explicit Teaching in Problem-Based Mathematics" (Learning Exchange video to support direct instruction) https://www.google.com/url?q=https://thelearningexchange.ca/projects/explicit-teaching-problem-based-mathematics/&sa=D&ust=1610732598004000&usg=AFQjCNFsEibKy9QcdhyzunxqlZUMXGvXOA
- OAME Mathematical Modelling Webinar: https://ontariomath.support/index.php?pg=view&lang=EN&id=29
- Mathematics Resources organized by themes
  https://docs.google.com/document/d/1KAJ8ztV5W-X5N5WRAGSf4bD6j-LQmCLYNYG_znCqILo/edit?usp=sharing

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CATHOLIC PRINCIPALS' LEADERSHIP DEVELOPMENT ONTARIO

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