Supporting Special Populations Through Instructional Routines

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Grace Kelemanik

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Goal # 1

Understand how developing mathematical practices supports special populations.

You will know your learning is on track if you can:

- Describe how the math practices align with best practices for supporting students with learning disabilities and English learners.

Goal # 2

Learn the Instructional Routine, *Three Reads*.

You will know your learning is on track if you can:

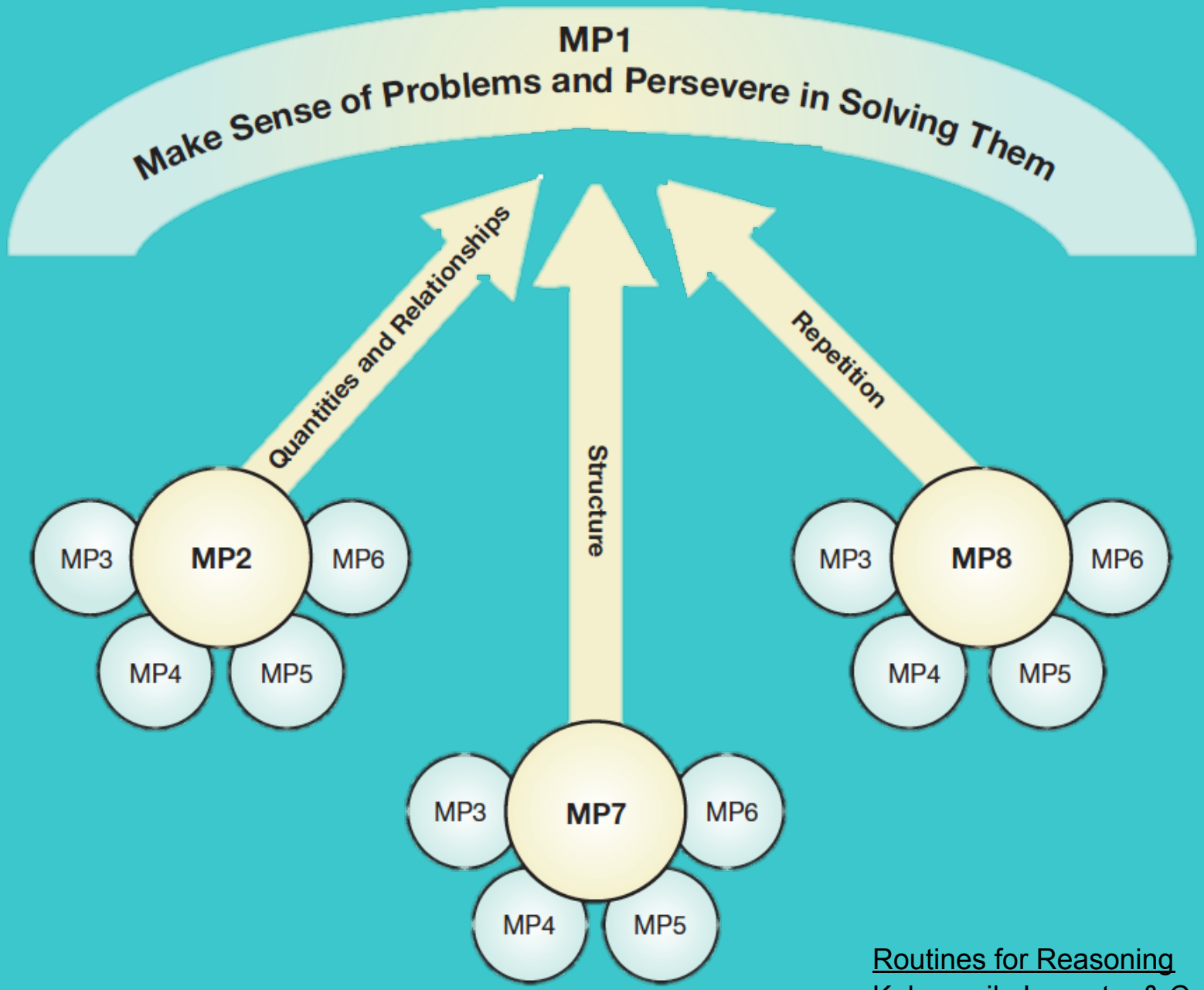
- Articulate the flow of the Instructional Routine
- Describe how the routine provides on-ramps and continued support for all learners to 'think like mathematicians'

Agenda

- Opening Goals and Agenda
- MPs and SpPops: A Symbiotic Relationship
- Explore an Instructional Routine: 3 Reads
- Articulate essential supports for special populations

Standards for Mathematical Practice

- **MP1** Make Sense of Problems and Persevere in Solving Them
- **MP2** Reason Abstractly and Quantitatively
- **MP3** Construct Viable Arguments and Critique the Reasoning of Others
- **MP4** Model with Mathematics
- **MP5** Use Appropriate of Tools Strategically
- **MP6** Precision in Mathematics
- **MP7** Look for and Make Use of Structure
- **MP8** Look for and Express Regularity in Repeated Reasoning



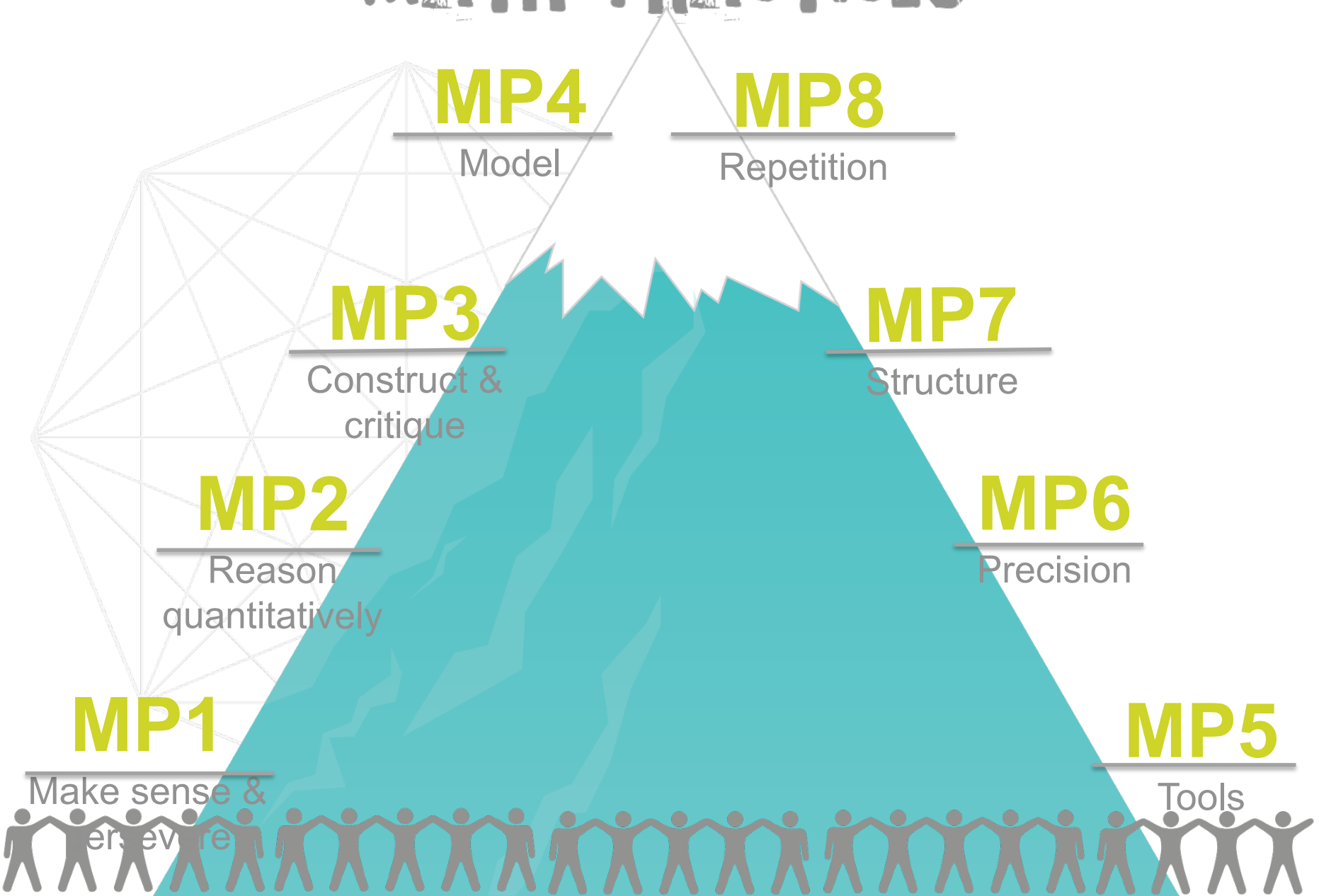
Routines for Reasoning
Kelemanik, Lucenta, & Creighton

MATH PRACTICES

a. An essential goal for all?

b. A critical support for special populations?.

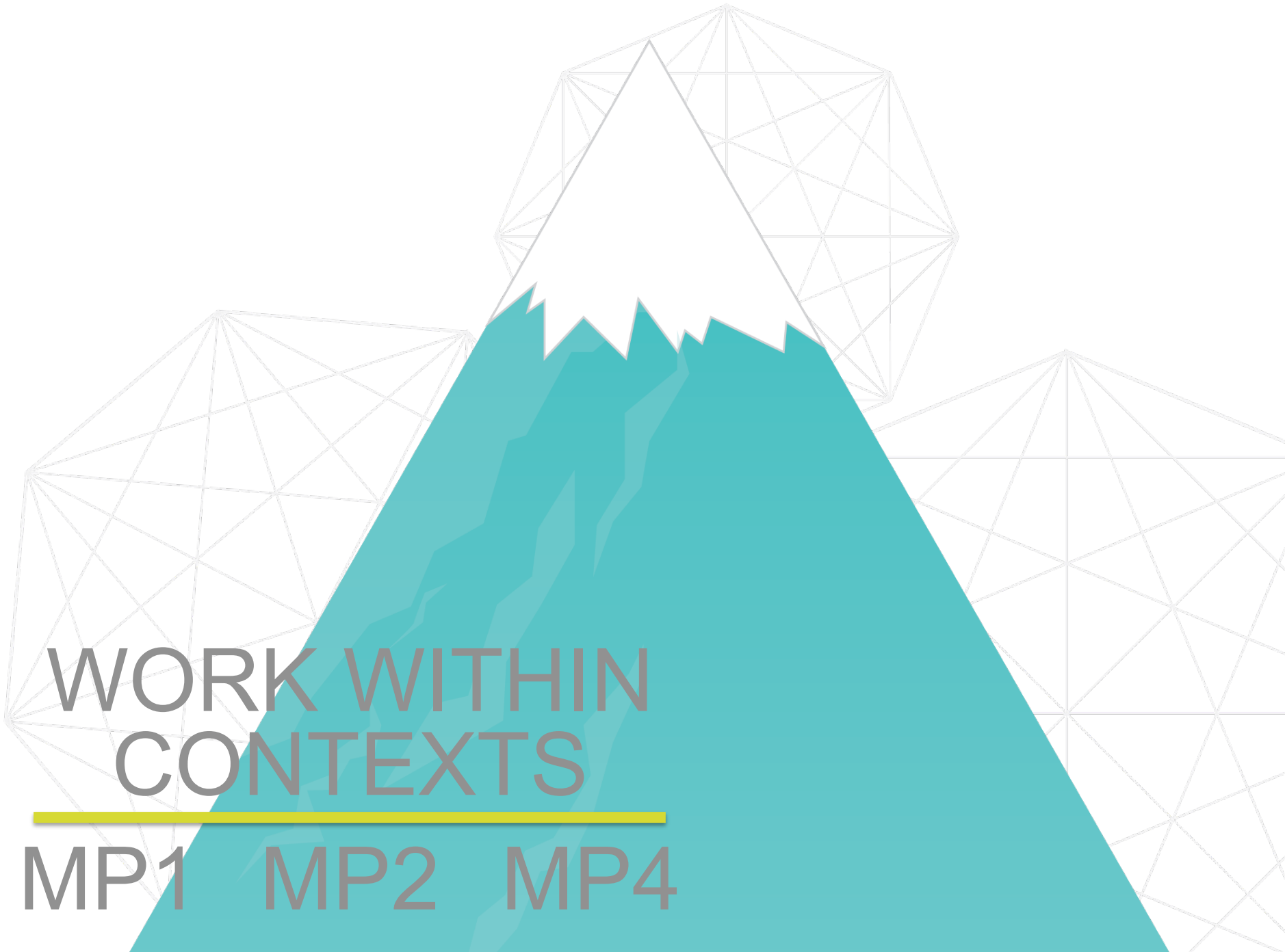
MATH PRACTICES



MATH PRACTICES

MATH PRACTICES

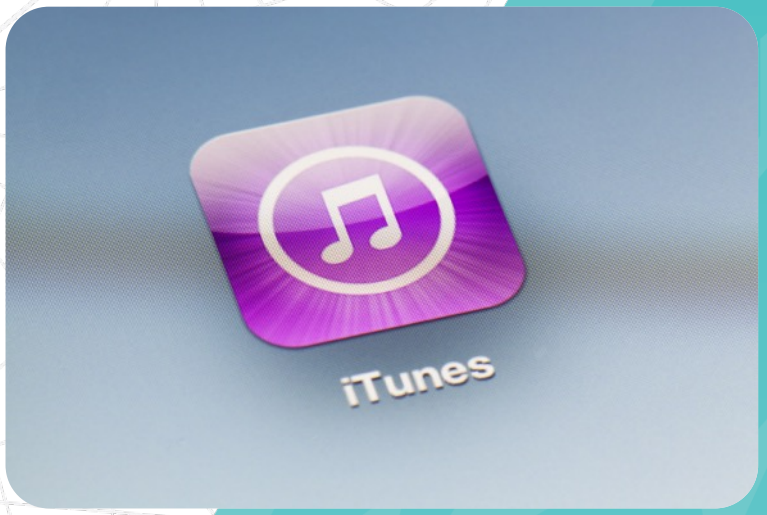

MP 1
MP 2
MP 3
MP 4
MP 5
MP 6
MP 7
MP 8

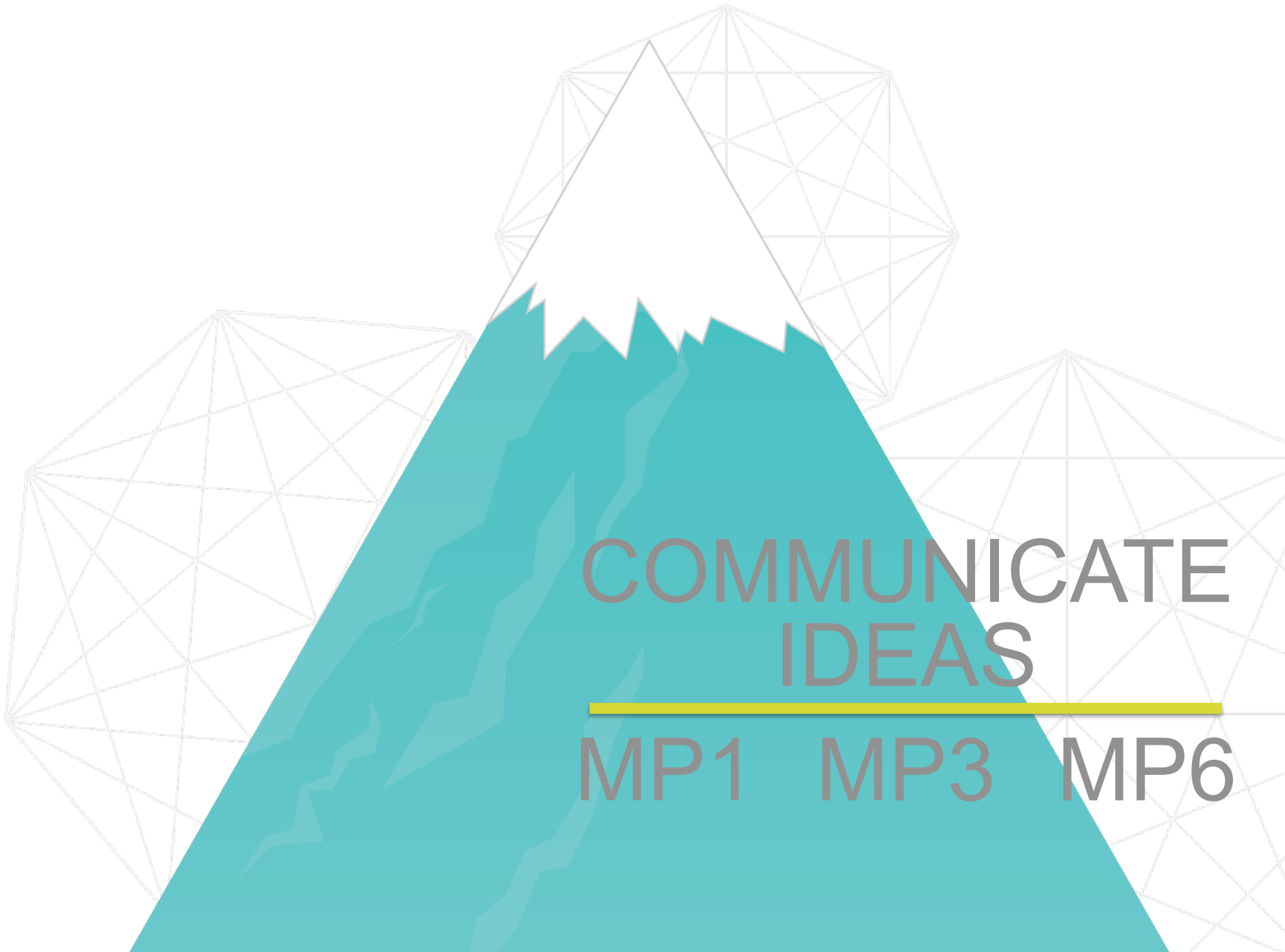

WORK WITHIN
CONTEXTS
MP1 MP2 MP4

WORK WITHIN CONTEXTS

$$\begin{array}{r} 25 \\ \times\ 9 \\ \hline \end{array}$$

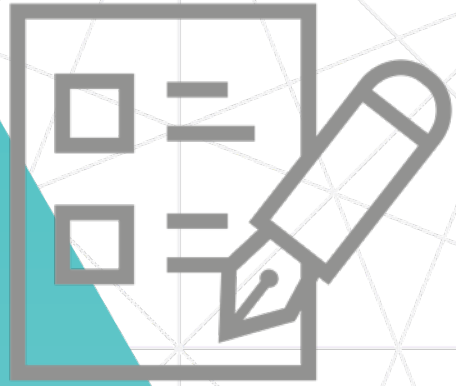
WORK WITHIN CONTEXTS




COMMUNICATE
IDEAS
MP1 MP3 MP6

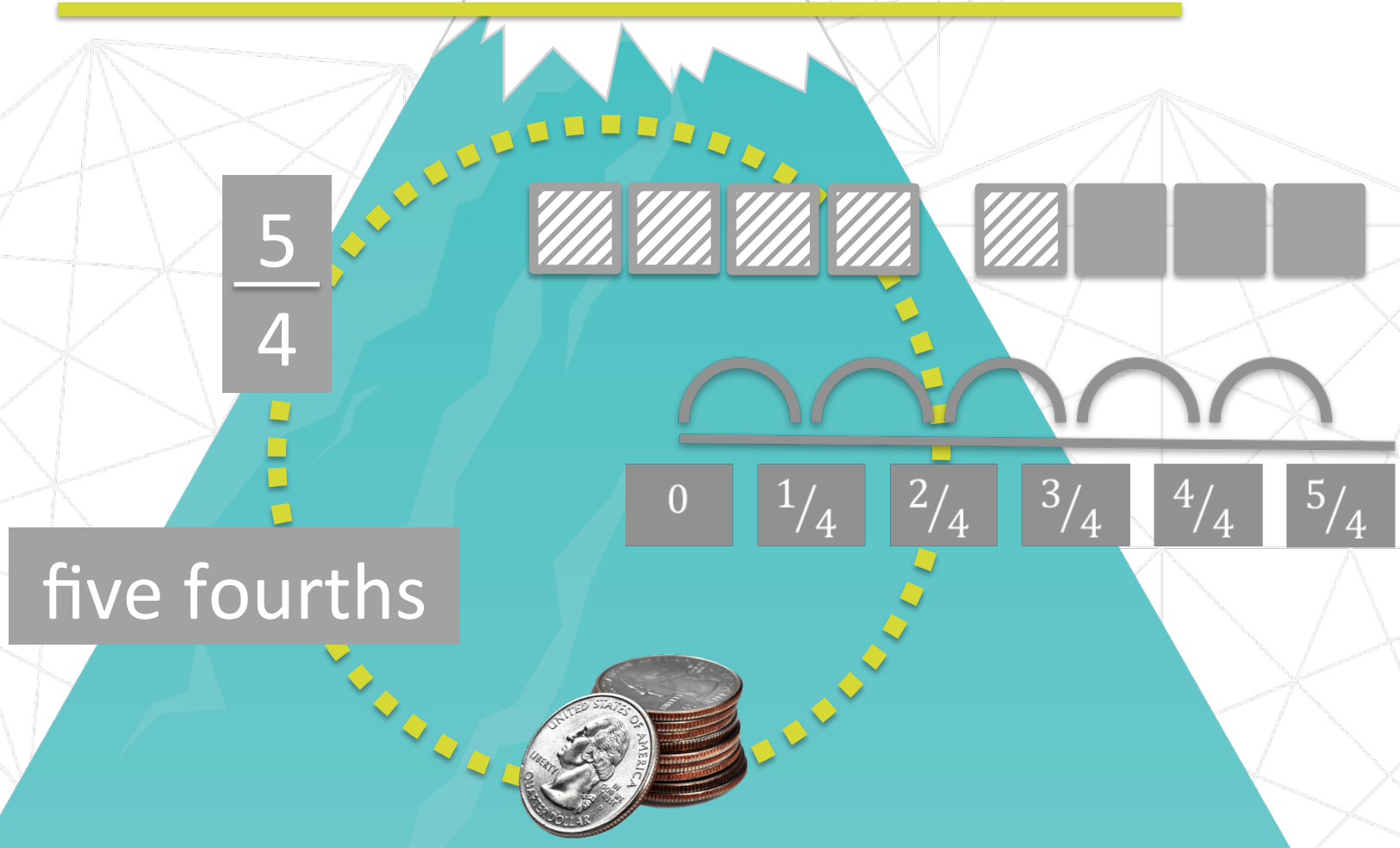
COMMUNICATE IDEAS

COMMUNICATE IDEAS




CONNECT IDEAS &
REPRESENTATIONS
MP2 MP4 MP5 MP7

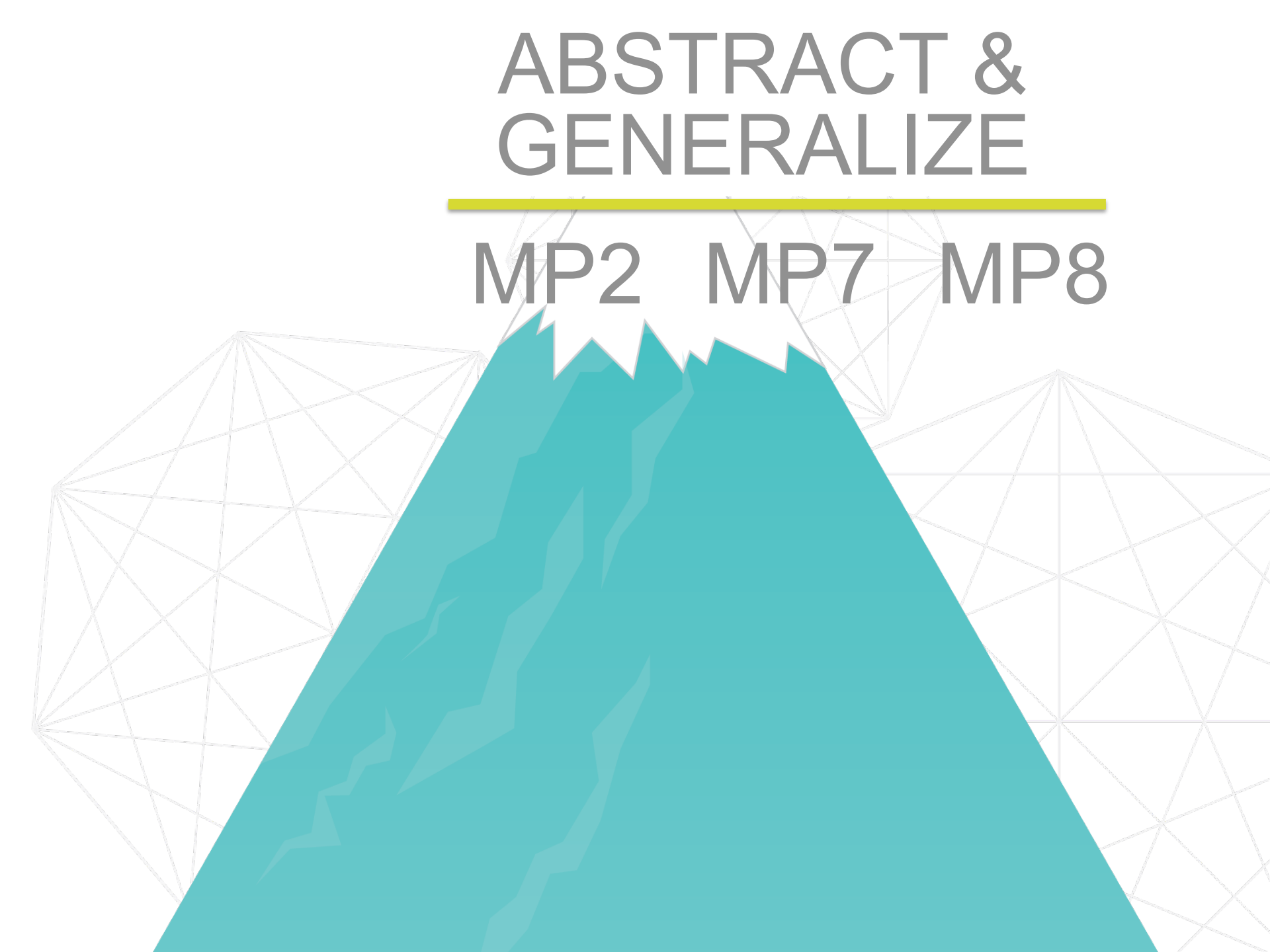
CONNECT IDEAS & REPRESENTATIONS



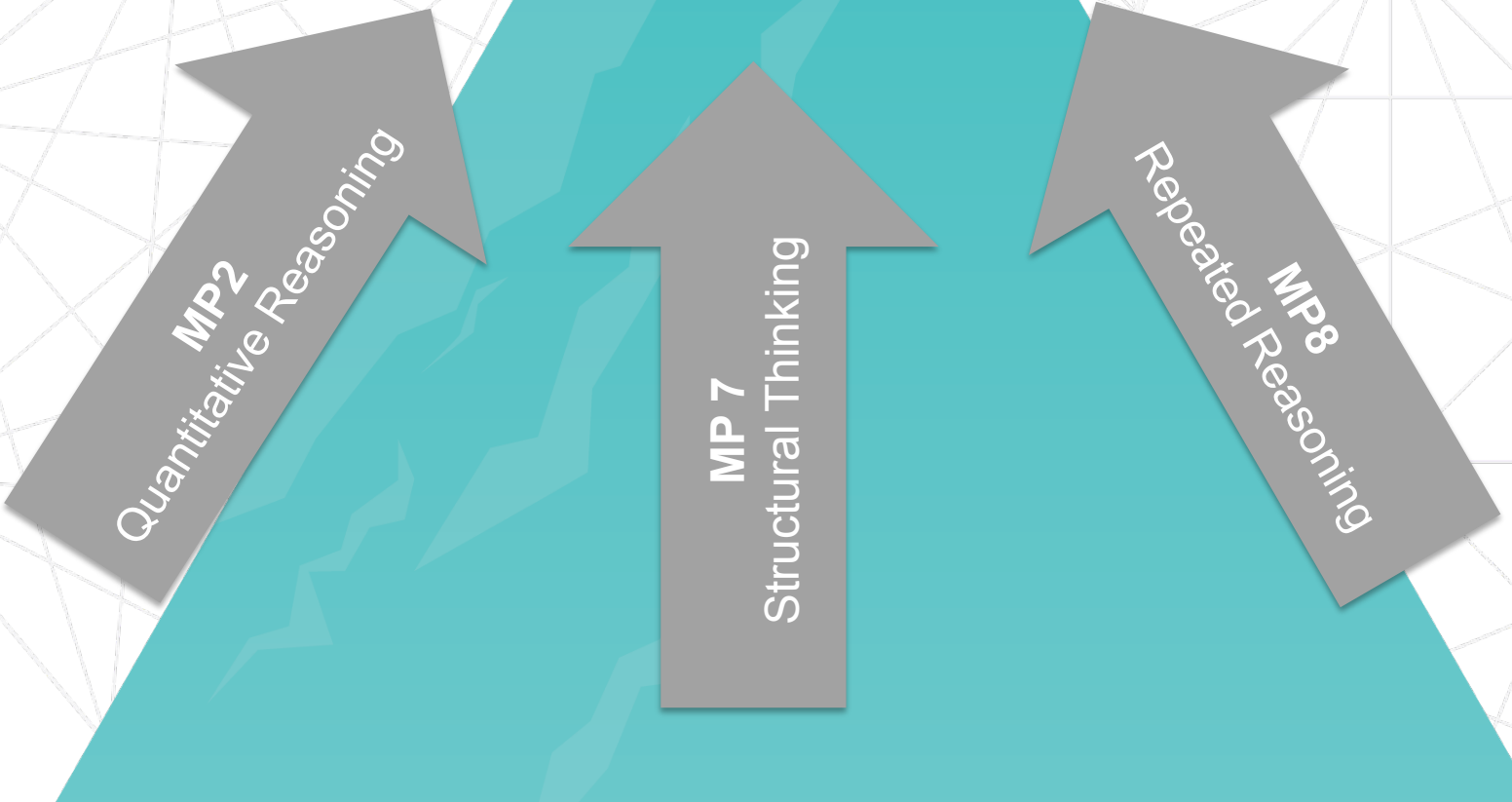
CONNECT IDEAS & REPRESENTATIONS

ABSTRACT & GENERALIZE

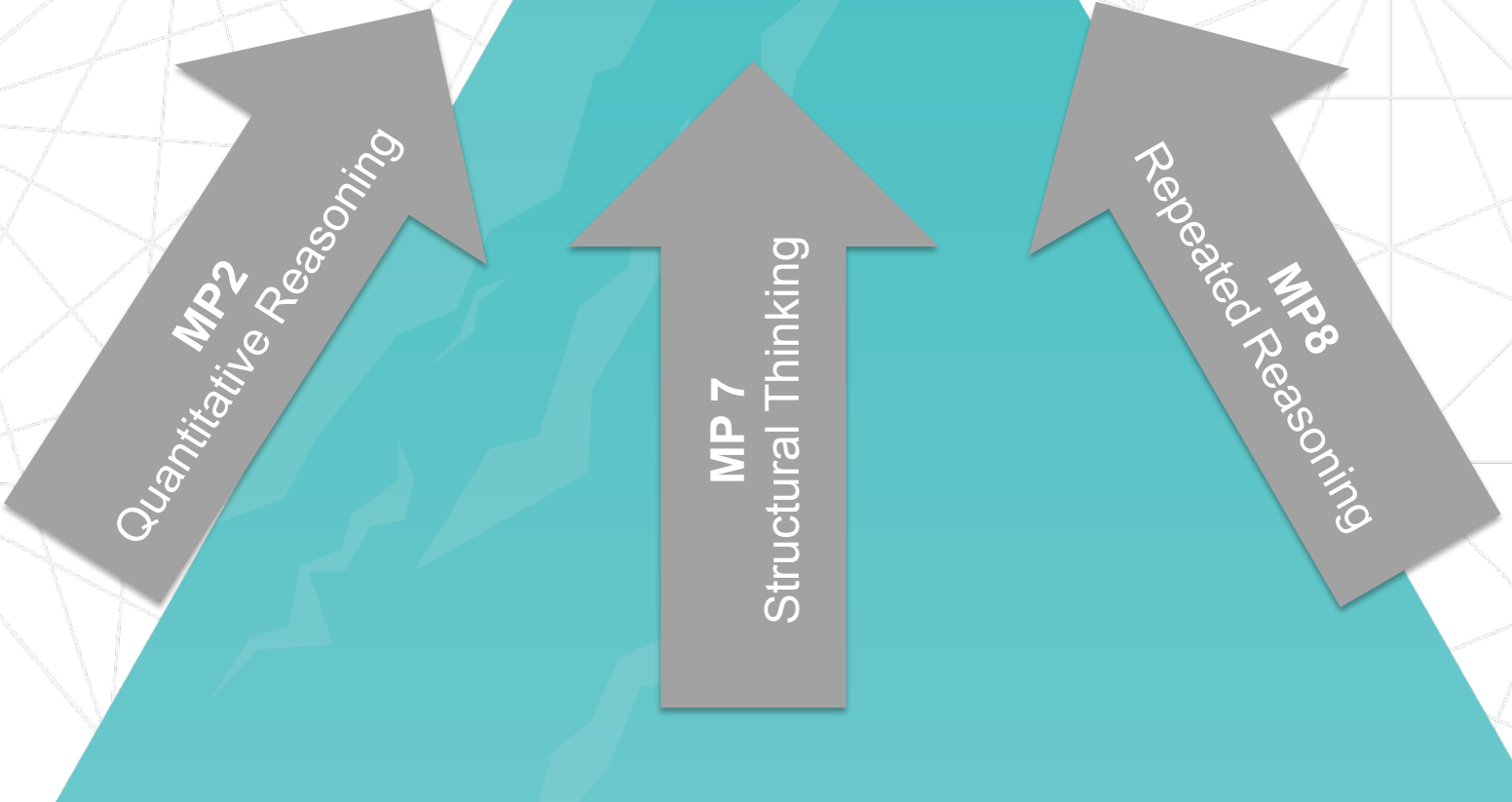
MP2 MP7 MP8



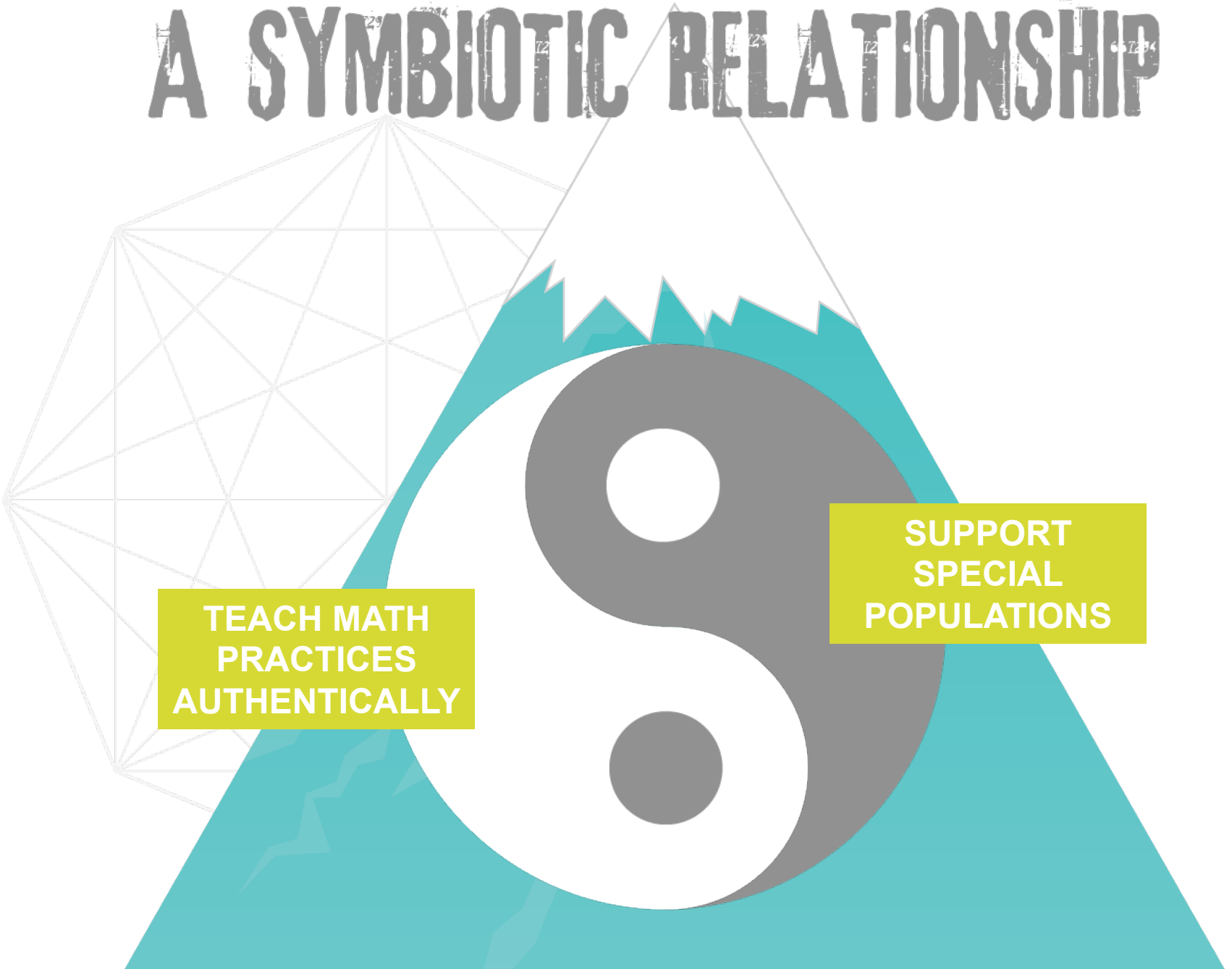
ABSTRACT & GENERALIZE

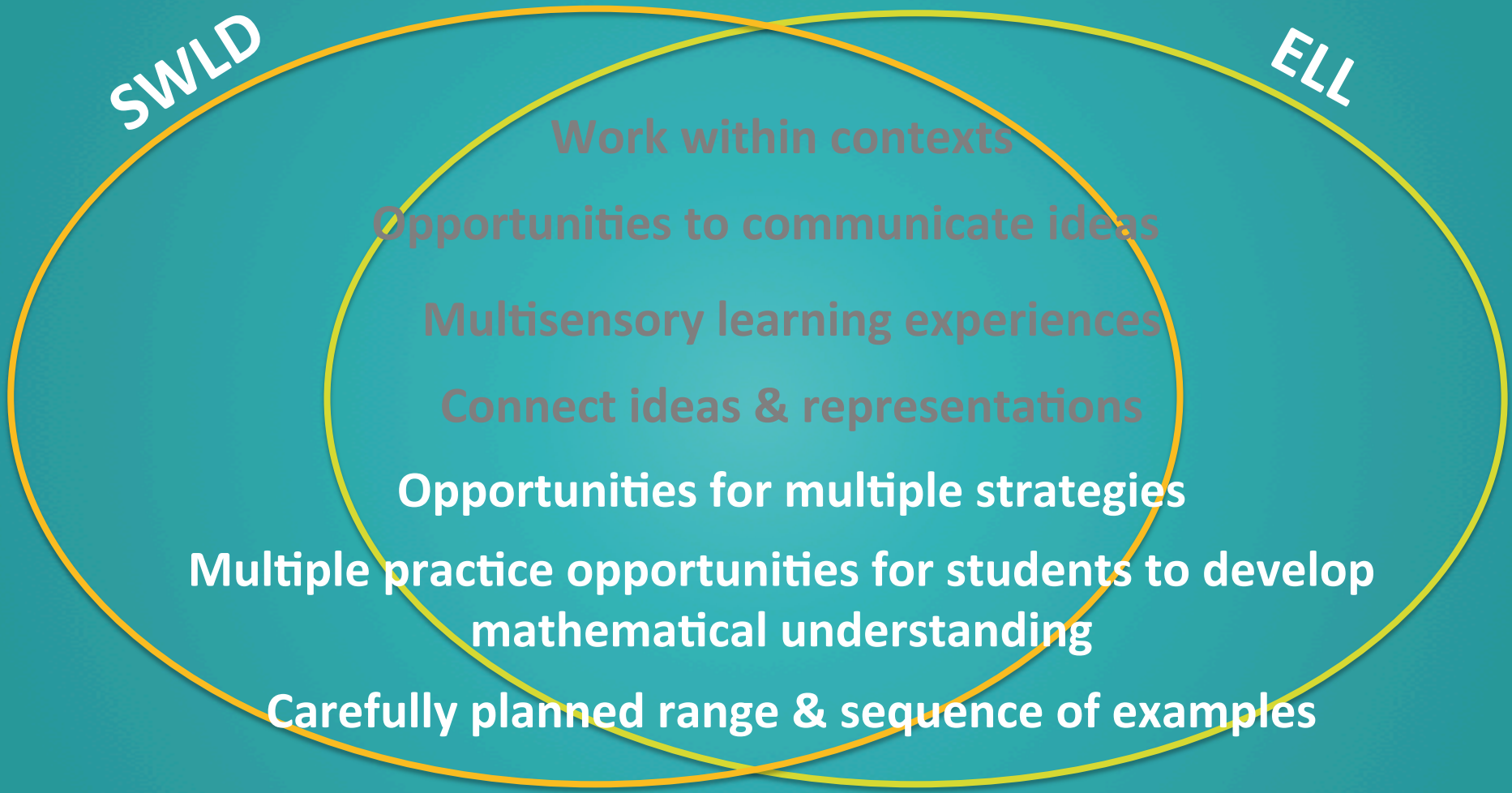


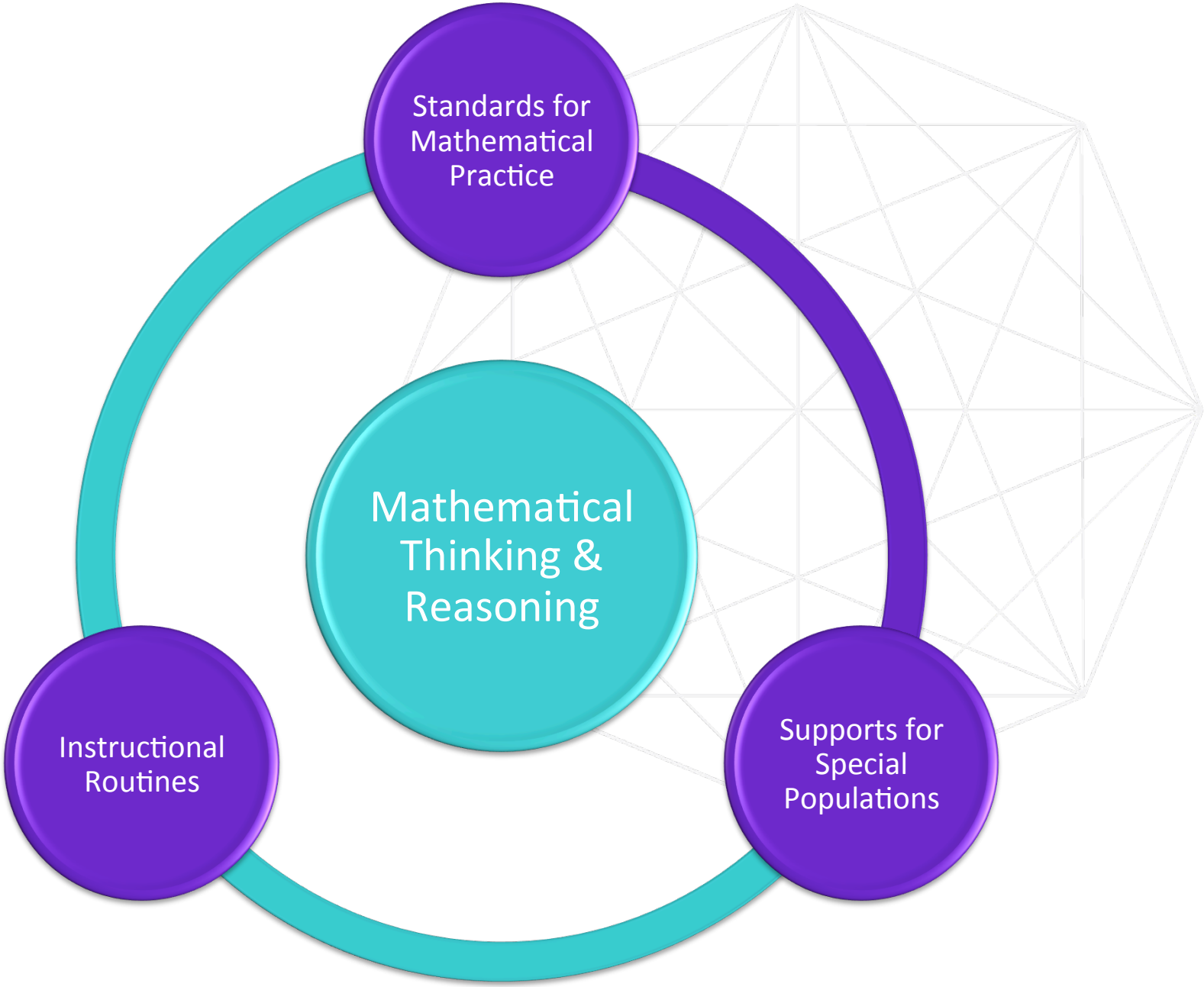
MP1 PERSEVERANCE

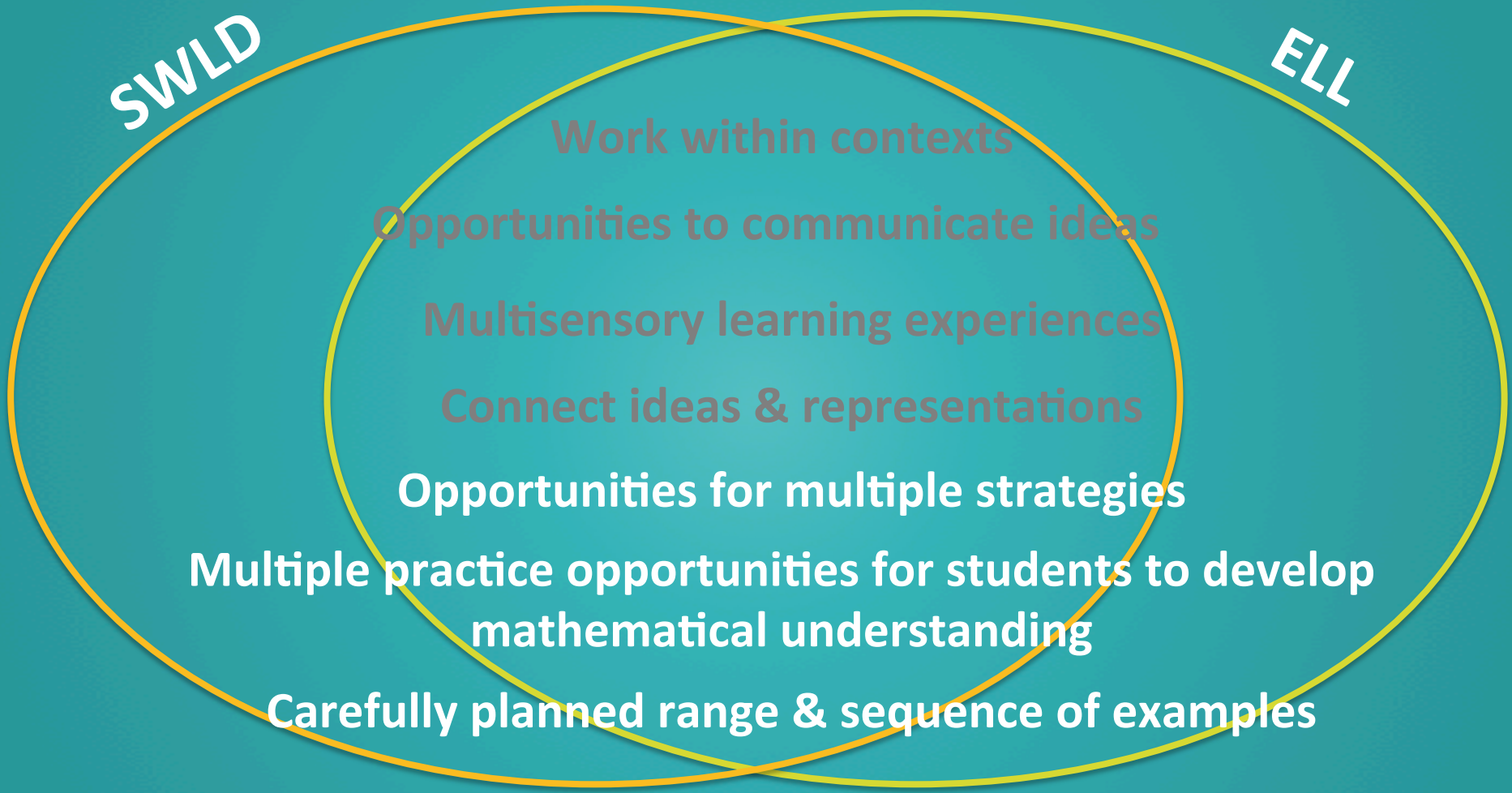


A SYMBIOTIC RELATIONSHIP

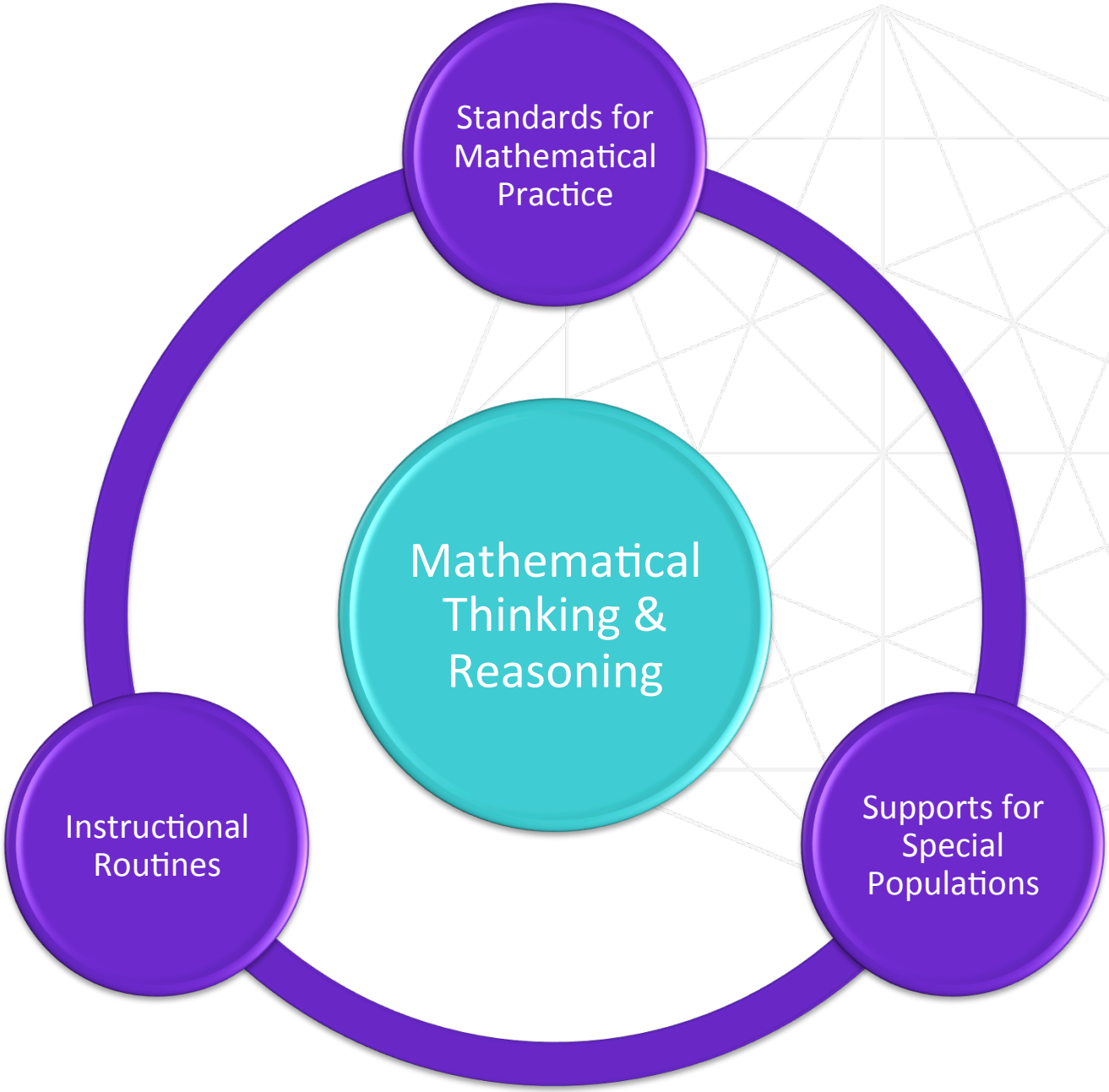



SWLD
ELL
Work within contexts
Opportunities to communicate ideas
Multisensory learning experiences
Connect ideas & representations
Opportunities for multiple strategies
Multiple practice opportunities for students to develop mathematical understanding
Carefully planned range & sequence of examples

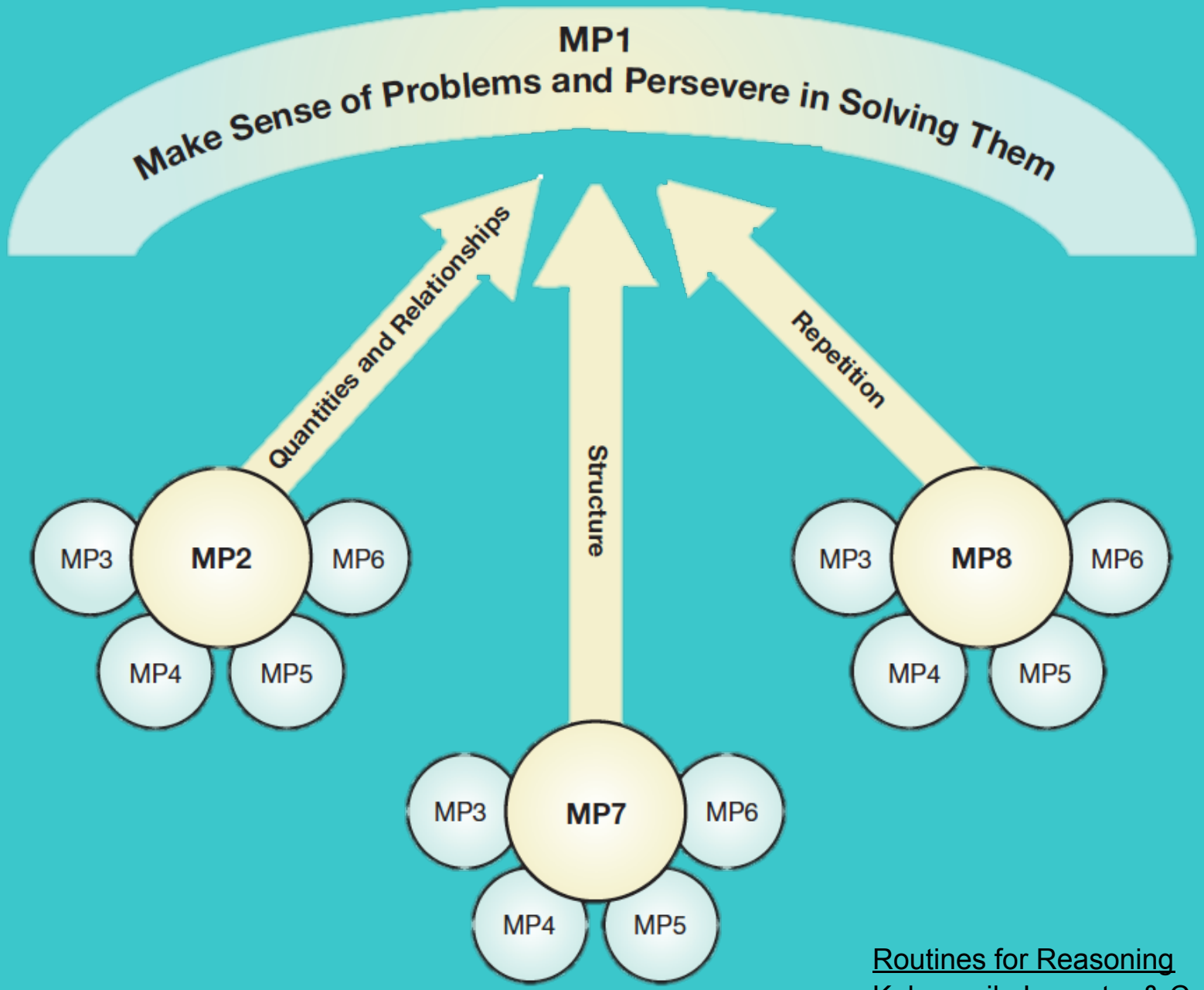

Standards for Mathematical Practice
Mathematical Thinking & Reasoning
Instructional Routines
Supports for Special Populations


SWLD
ELL
Work within contexts
Opportunities to communicate ideas
Multisensory learning experiences
Connect ideas & representations
Opportunities for multiple strategies
Multiple practice opportunities for students to develop mathematical understanding
Carefully planned range & sequence of examples


HOW ARE INSTRUCTIONAL ROUTINES
SUPPORTS for
SPECIAL POPULATIONS?


Standards for Mathematical Practice
Mathematical Thinking & Reasoning
Instructional Routines
Supports for Special Populations

So…an instructional routine that focuses on one or more avenues of thinking, and has ‘baked-in’, research-based supports for special populations…



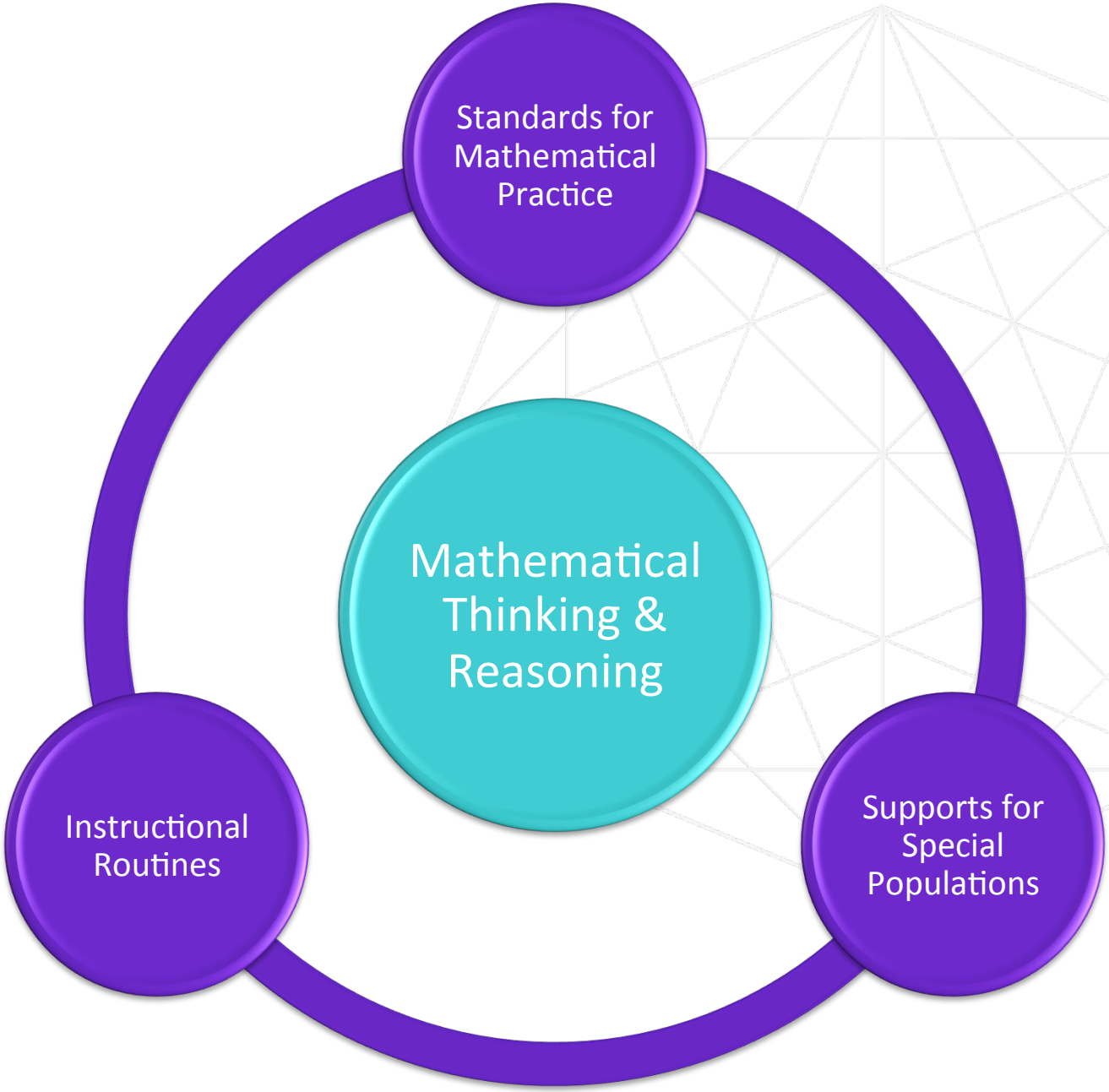
Routines for Reasoning
Kelemanik, Lucenta, & Creighton

Developing mathematical practices requires high leverage teaching practices

Instructional Routines embody

NCTM effective teaching practices

and equitable practices for students, teachers, and districts.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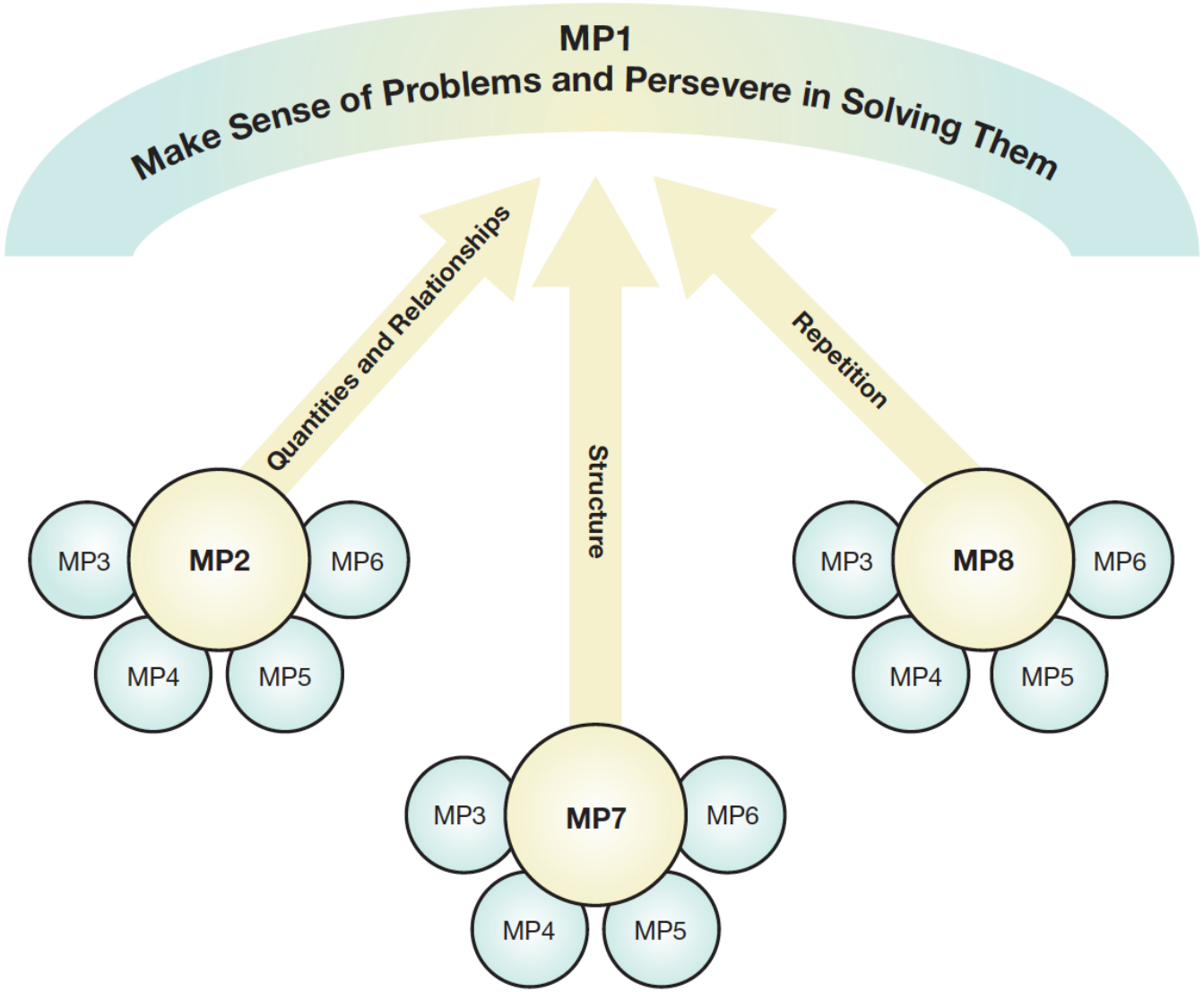
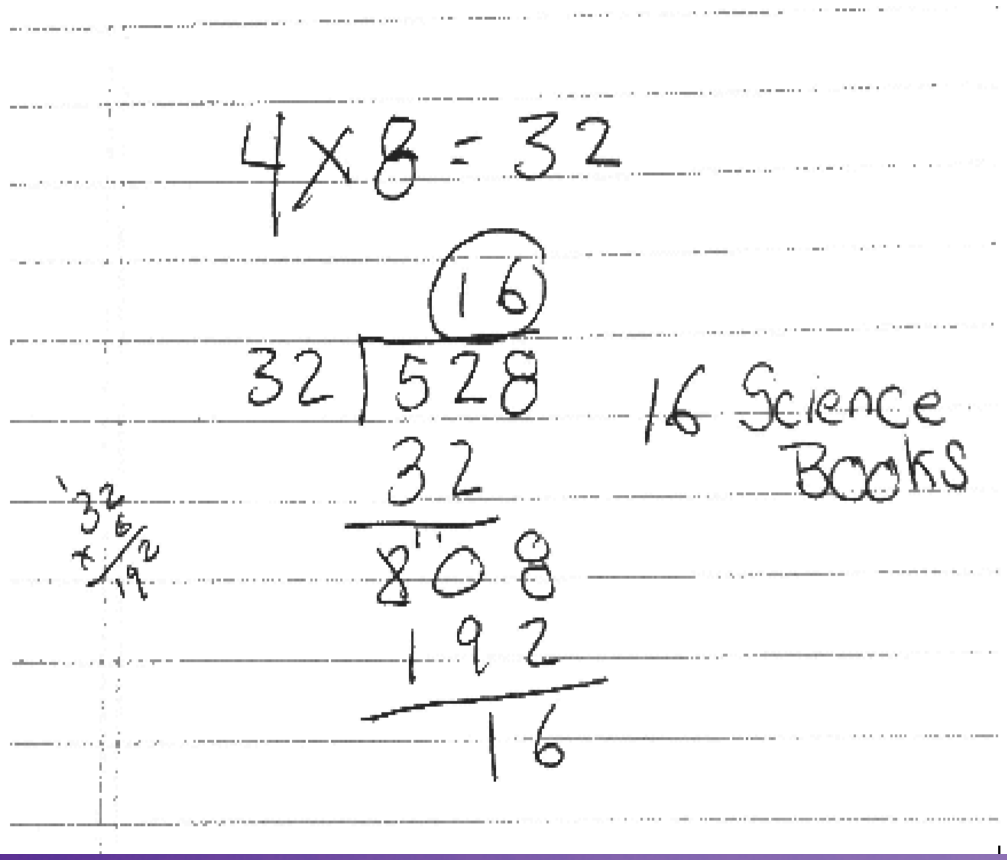


Figure 1.1 Diagram that shows the relationship of the practices to each other

Three Reads Deep Dive

1. A few words on reading in Math
2. Experience the *Three-Reads* Instructional Routine x2
3. Unpack the *Three-Reads* Instructional Routine
4. Consider who this routine supports and how it supports them

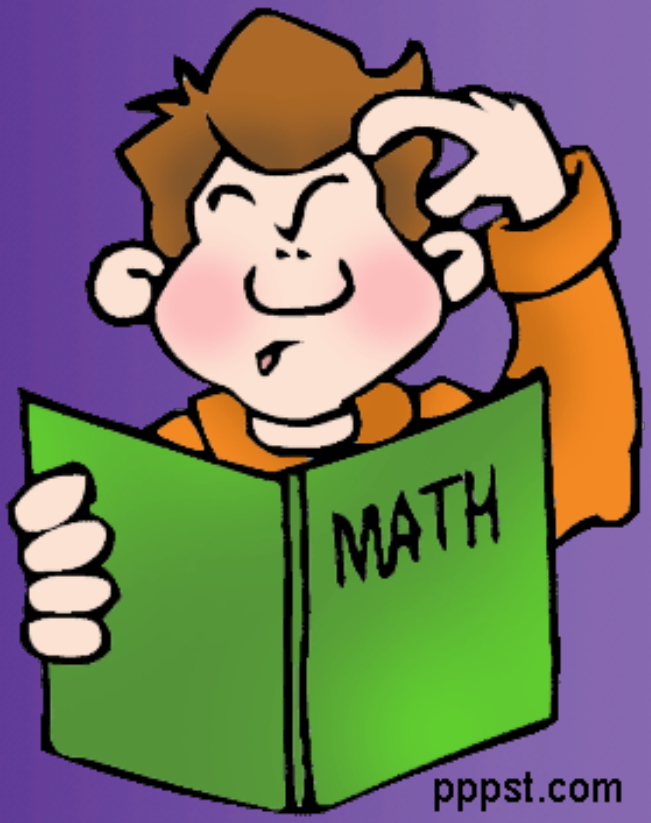
A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?



Instructions:

1. Solve the textbook task.
2. Analyze the student work.
3. Talk with a partner about how the student was thinking.

Why is reading a math problem challenging for students?



I don't get it!

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Mathematicians read the problem more than once!

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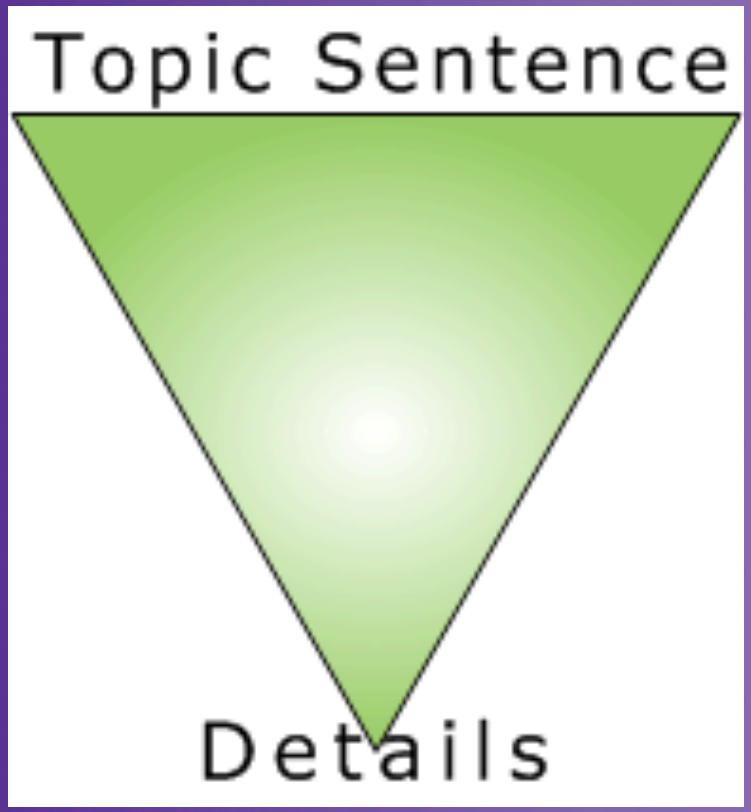
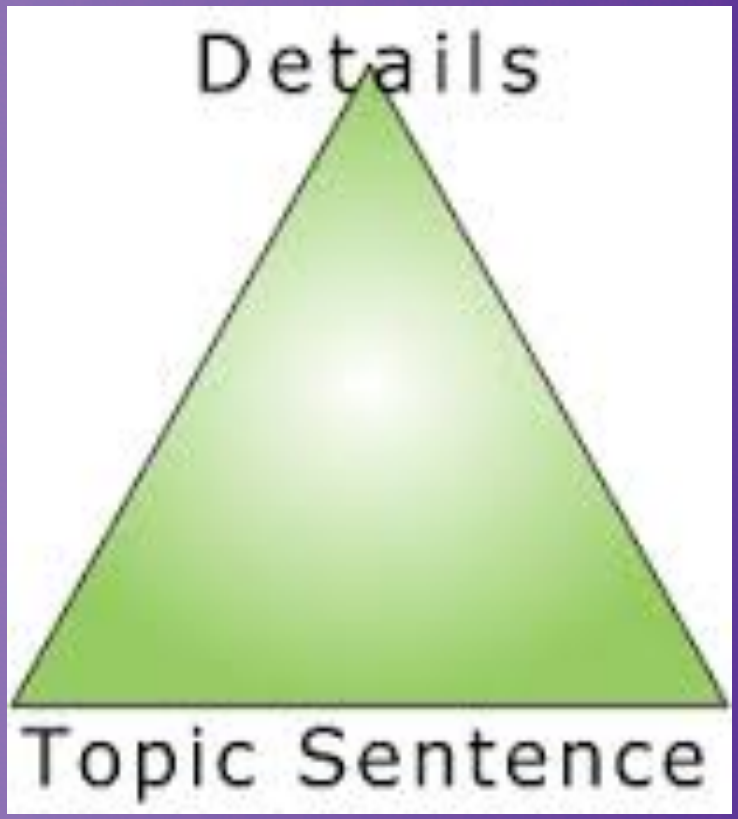
Math problems are written differently

PARAGRAPH STRUCTURE



MATH WORD PROBLEMS



DETAILS

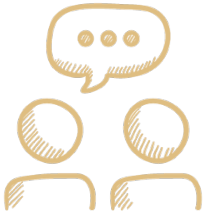
A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?

Purpose

Read the Problem 3 Times

1st Read What is the problem about?

2nd Read What is the question?



3rd Read What information is important?

What information do mathematicians think important?

Quantities & Relationships

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What's a Quantity?

- A Quantity is something you can count or measure
  - The number of…
  - The amount of...

- It answers the questions:
  - How many?
  - How much?

What are the quantities in this problem?

A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?

What's a Relationship?

- A Relationship describes a comparison between two quantities.
  - The number of… is _(relationship)_ the number of ....

Quantity  Quantity

FOSTERING MATH PRACTICES

What are the relationships between quantities in this problem?

A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?

Three Reads

An Instructional Routine to Develop
Reading Like a Mathematician

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Lesson Goal

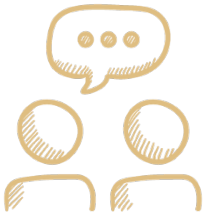
Learn to “read like a mathematician”.

Pay attention to quantities in the problem statement.

Read the Problem 3 Times

1st Read What is the problem about?

2nd Read What is the question?



3rd Read What information is important?

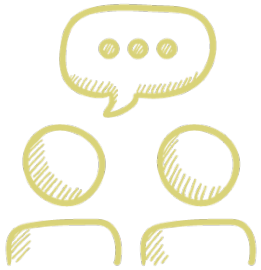
1st Read

What is the problem about?

2nd Read

What's the question?

What's the Question?

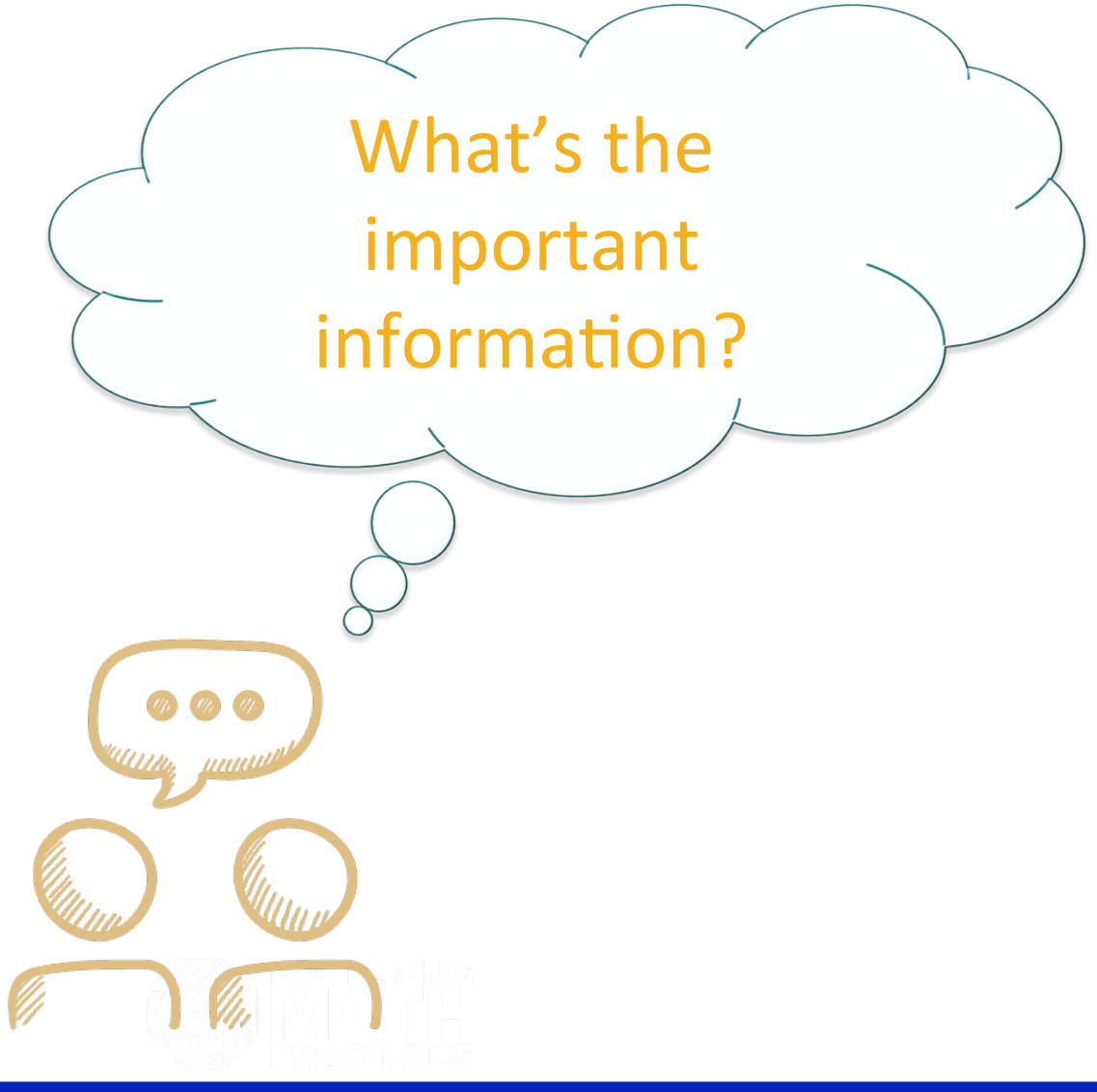


Rick keeps his trading cards in a box. Rick's uncle gave him 6 packs of 8 trading cards to add to his box. Rick found that 29 of the trading cards from his uncle were different than any of the cards he already had in the box. The rest of the trading cards from his uncle were the same as those he already had. How many of the trading cards from his uncle were the same as those Rick already had in his box?

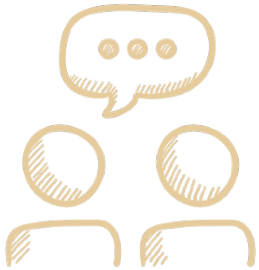
State the question **in your own words.**

What quantity am I trying to find?

3rd Read



What's the Important Information?



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What are the important quantities?

The number of…

REFLECT ON
‘READING LIKE A MATHEMATICIAN’

- When interpreting a word problem, I learned to ask myself _____.

- The next time I read a word problem, I will pay attention to _____ because _____.

3 Reads Instructional Routine

Take Two

Three Reads

An Instructional Routine to Develop
Reading Like a Mathematician

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Lesson Goal

Learn to “read like a mathematician”.

Pay attention to quantities in the problem statement.

Read the Problem 3 Times

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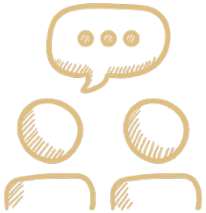


3rd Read What information is important?

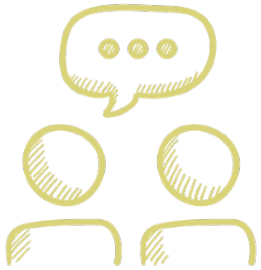
1st Read

What is the problem about?

2nd Read

What's the question?

What's the Question?

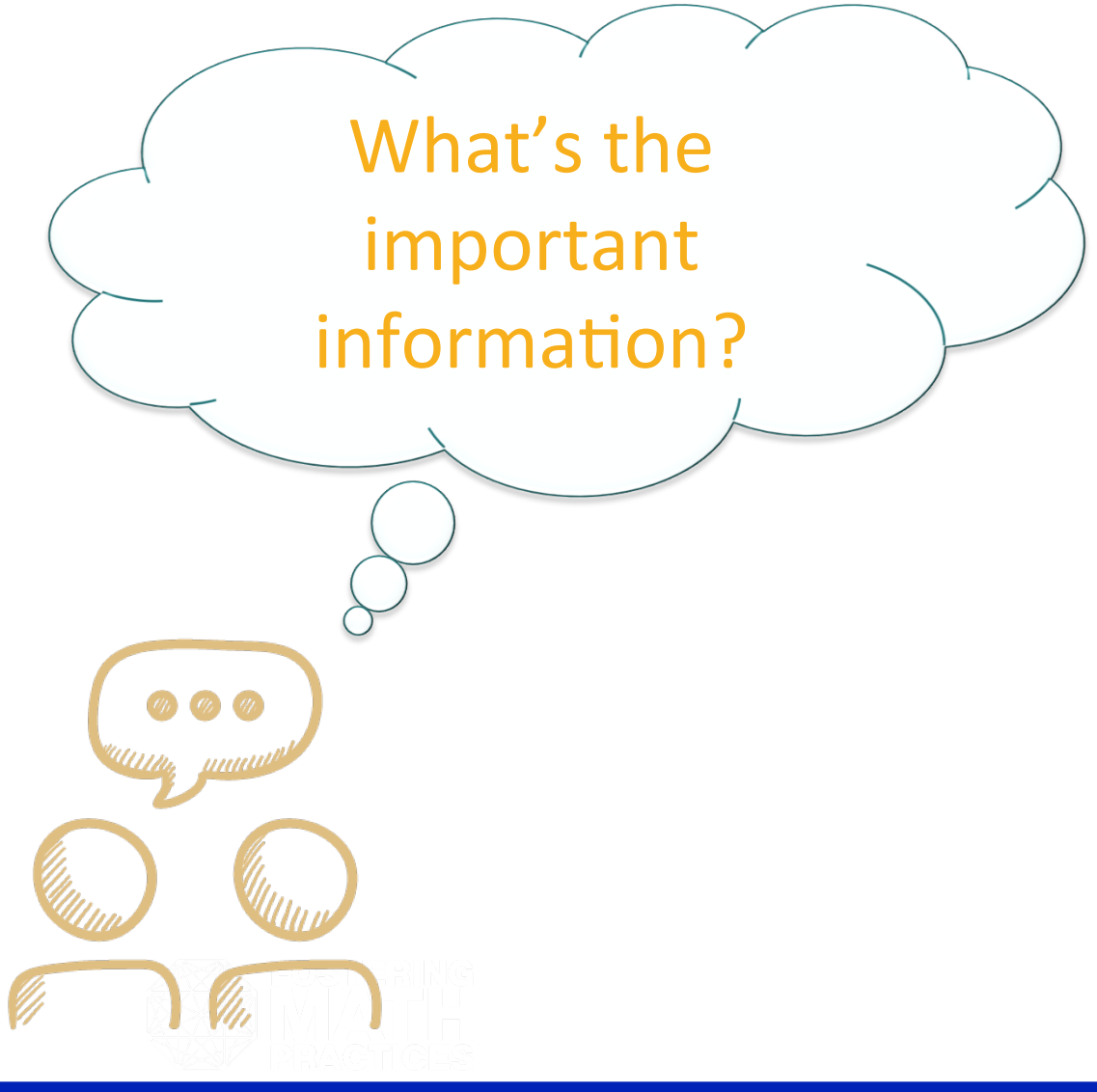


Alicia, Emma, and Nick dive into an extremely deep pool. Alicia dives to a depth of – 9/4 meters from the surface of the pool. Emma's depth is twice as far from the surface as Alicia's dive. Nick's depth is 2/3 the depth of Alicia's dive.

State the question **in your own words.**

What quantity am I trying to find?

3rd Read



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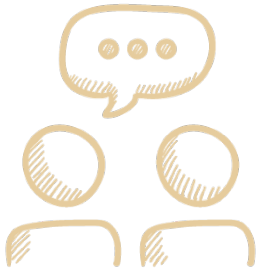

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What are the important quantities?

The number of…

REFLECT ON
‘READING LIKE A MATHEMATICIAN’

- When interpreting a word problem, I learned to ask myself _____.

- The next time I read a word problem, I will pay attention to _____ because _____.

Three Reads

What was the same each time?

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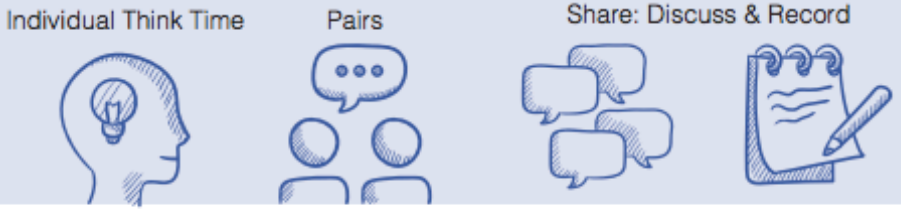
Structure of the 3 Reads Routine

READING GOAL: Read Like a Mathematician

1 **Launch the 3 Reads Routine**
Introduce reading goal, review routine's steps

2 **First Read: Understand the Context**

3 **Second Read: Interpret the Question**



4 **Third Read: Identify Important Information**

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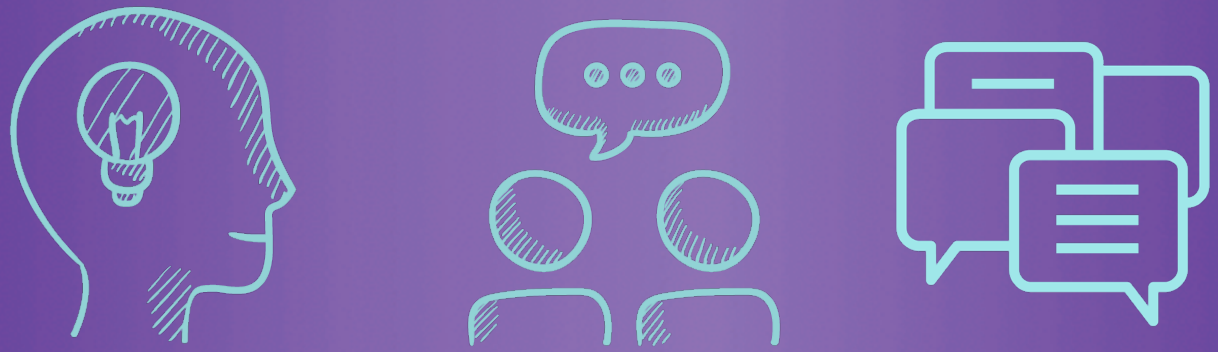
Kelemanik, Lucenta, Janssen-Creighton

Next Steps

- REPRESENT the SITUATION
  - Model with manipulatives
  - Represent the problem visually
  - Write a number sentence
  - Write an algebraic expression or equation
- SOLVE the PROBLEM
- REFLECT on reading like a mathematician

What kind of learner does this way of making sense of a problem situation (MP1) support?



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Consider Ryan

Ryan has difficulty with reading comprehension and struggles to distinguish minor details from important information. He benefits from reading a passage multiple times. Ryan is most successful when content is directly connected to his own experiences. He learns best when provided with multiple examples and models.

INSPIRED BY A PUBLIC SCHOOL STUDENT WITH DISABILITIES

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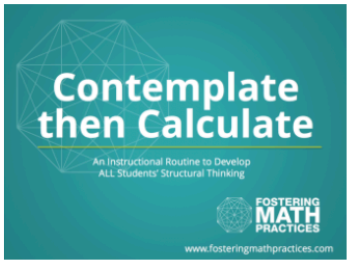
Classroom Planner

Classroom PPTX Template



Tasks & Discussion

For More on Fostering Math Practices through Instructional Routines

Reach Out

GraceKelemanik@gmail.com
AmyLucenta@gmail.com

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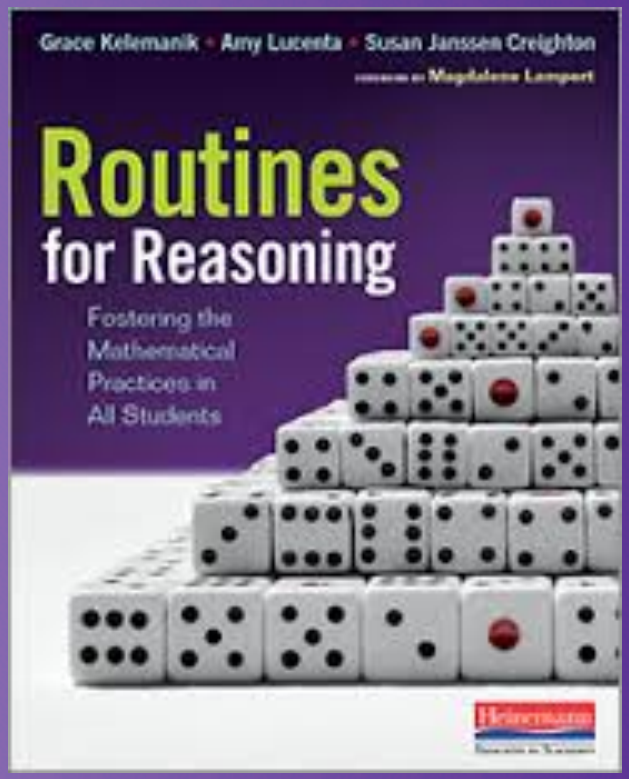

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Please provide feedback

OnebyOne 2017 Session Feedback

* Required

Session Date *

- ○ Tuesday, August 15
- ○ Wednesday, August 16
- ○ Thursday, August 17

NEXT