Math in Focus: Singapore Math National Institute
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Welcome!

Houghton Mifflin Harcourt

Andy Clark 7/16/13

Administrators Supporting the Math Practices

How can administrators support classrooms that promote reasoning and thinking?

Mathematics | Standards for Mathematical Practice

- Able :
  - to make sense of problems and persevere
  - to reason abstractly and quantitatively
  - to construct viable arguments
  - to model with mathematics
  - to use tools appropriately
  - to attend to precision
  - to looks for and make use of structure
  - to look for regularity

Mathematics | Standards for Mathematical Practice

Habits of Mind Of a Productive Mathematical Thinker	Reasoning and Explaining	Modeling Using Tools	Seeing Structure and Generalizing
MP.1 Make sense of problems and persevere in solving them.	MP.2 Reason abstractly and quantitatively MP.3 Construct viable arguments and critique the reasoning of others.	MP.4 Model with mathematics MP.5 Use appropriate tools strategically	MP.7 Look for and make sense of structure. MP.8 Look for and express regularity in repeated reasoning.
MP.6 Attend to Precision			

MIF AND CCSS

-MAKE SENSE OF PROBLEMS AND PERSEVERE

-REASON ABSTRACTLY AND QUANTITATIVELY

-CONSTRUCT VIABLE ARGUMENTS

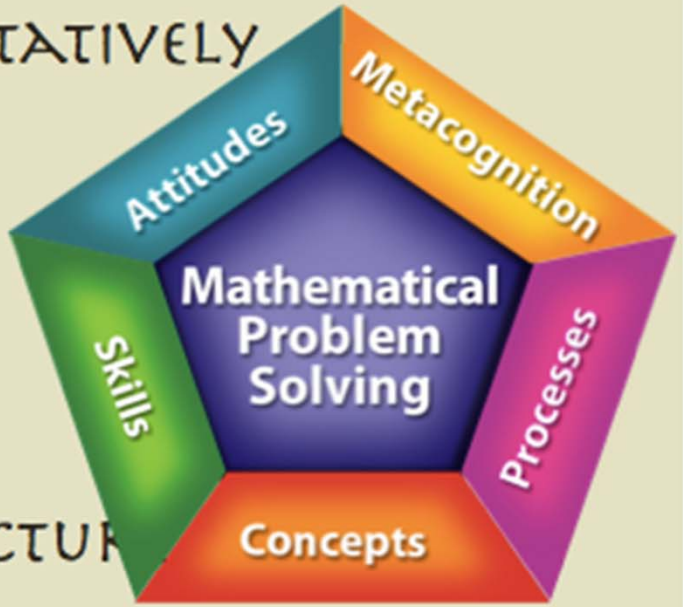
-MODEL WITH MATHEMATICS

-USE TOOLS STRATEGICALLY

-ATTEND TO PRECISION

-LOOK FOR AND MAKE USE OF STRUCTUR

-LOOK FOR AND MAKE USE OF REGULARITY



Teachers who foster the practices_____.

Ensure that every child has a mathematical voice.

Know when to slow down and what to slow down for.

Ask the right questions.

How can administrators support MIF?

What areas of implementation do you have control over?

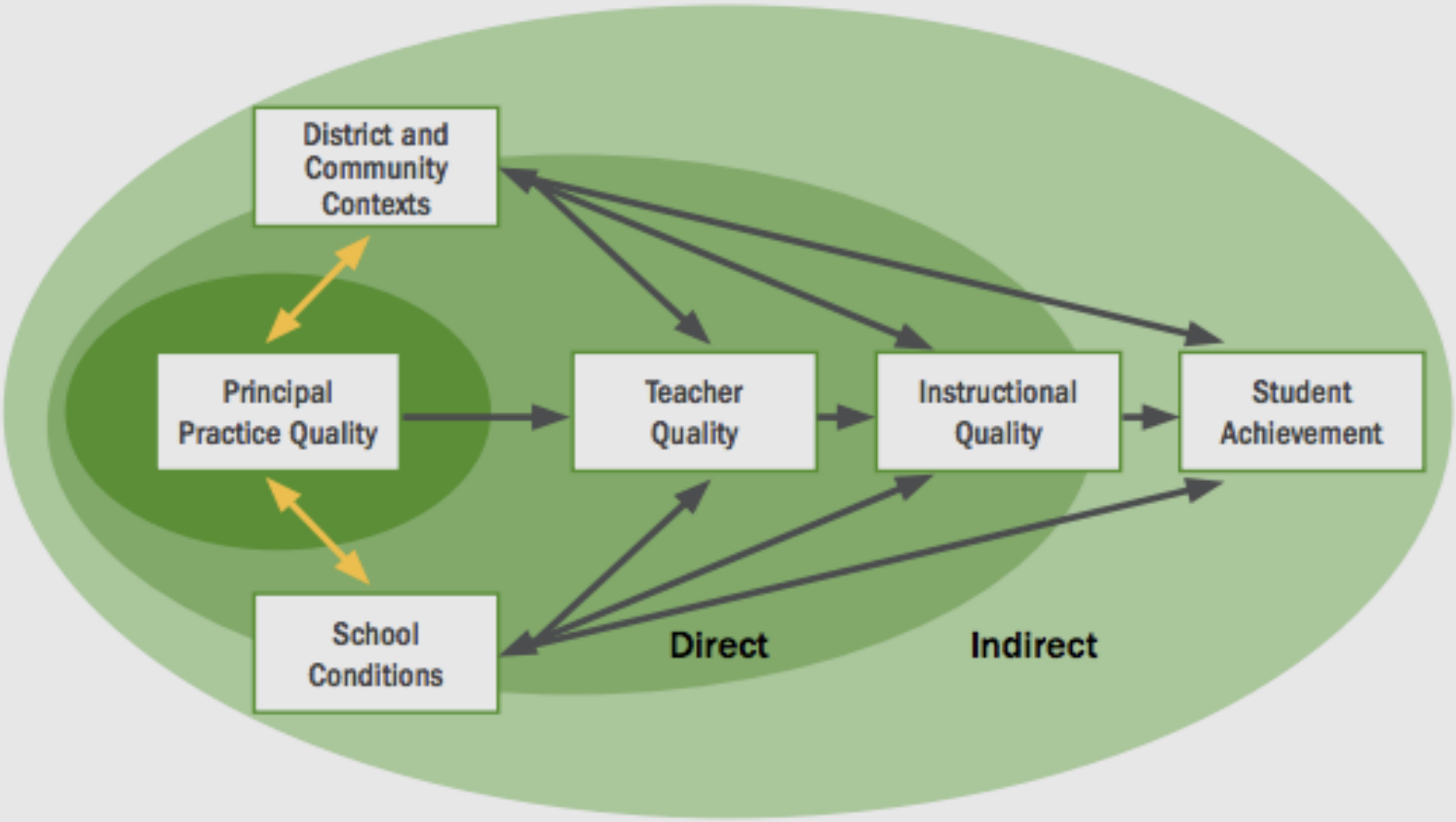
What do you see as the biggest challenges?

What do you need to support your staff?

Where to begin?

How can administrators support MIF?

Figure 2. The Ripple Effect: Framework for Principal Impact



Source. Halliger & Heck, 1998; Leithwood et al., 2004; Stronge, Richard, & Catano, 2008; Waters, Marzano, & McNulty, 2003

How can administrators support MIF?

- Encourage collaboration both within grade levels and across grade levels
- Schedule common planning time
- Help staff agree on some common language and themes for the first year, such as the use of visualization or concrete to abstract pedagogy
- Establish some first year goals and then some longer term goals
- Visit as many classrooms as you have time for, in a non-evaluative capacity

How can administrators support teachers s they work to implement the CCSS Math Practices

- Encourage depth of learning

Depth: slow down

Put on Your Thinking Cap!

Problem Solving

Fill in the blanks.

Jan uses tiles to make shapes that form a pattern.

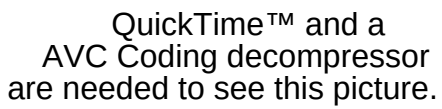
Shape 1 Shape 2 Shape 3 Shape 4

1. Draw Shape 4.

2. Jan needs _____ more tiles to make Shape 4.

How can administrators support teachers s they work to implement the CCSS Math Practices

- Encourage depth of learning
- Allow teachers to practice teaching


QuickTime™ and a
AVC Coding decompressor
are needed to see this picture.

How can administrators support teachers s they work to implement the CCSS Math Practices

- Encourage depth of learning
- Allow teachers to practice teaching
- Encourage teachers to view videos and analyze them

QuickTime™ and a
decompressor
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How can administrators support teachers s they work to implement the CCSS Math Practices

- Encourage depth of learning
- Allow teachers to practice teaching
- Encourage teachers to view videos and analyze them
- Help teachers identify the big ideas in math

What's the big idea?

Fill in the circle next to the correct answer.

1. $456 = \_\_\_\_\_ + 19$

   What is the missing number?

   Ⓐ 256 Ⓑ 437 Ⓒ 466 Ⓓ 475

1. 0.95 is equal to _____

   Ⓐ $9 + \frac{5}{10}$ Ⓑ $\frac{9}{10} + \frac{5}{10}$ Ⓒ $\frac{9}{10} + \frac{5}{100}$ Ⓓ $9 + \frac{5}{100}$

How can administrators support teachers s they work to implement the CCSS Math Practices

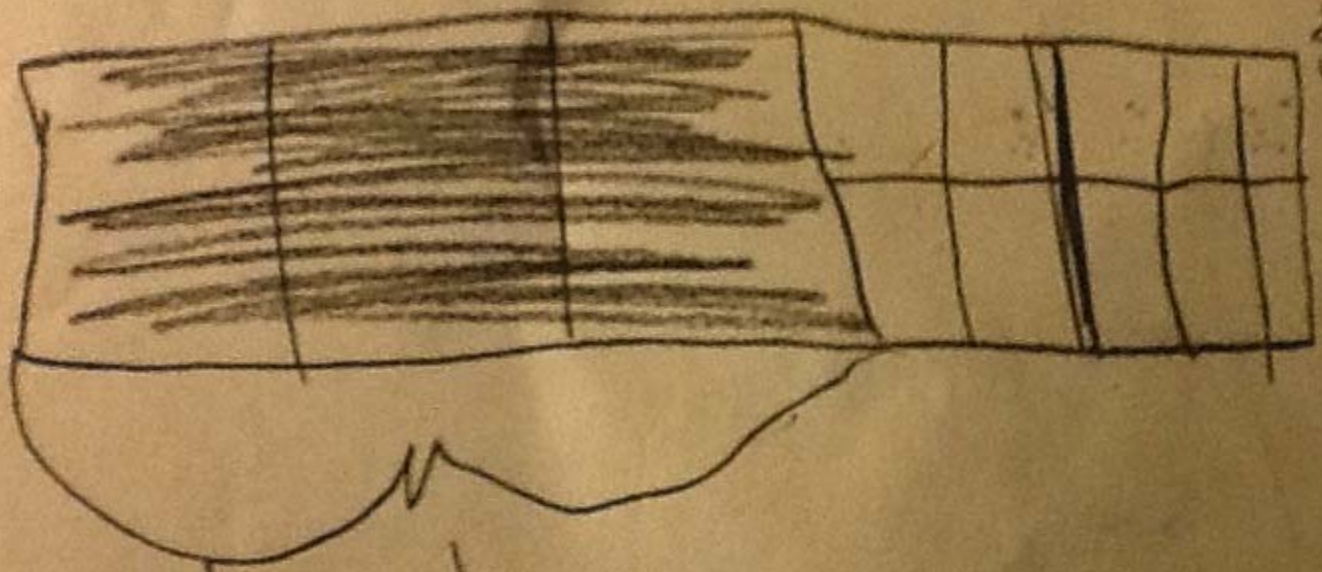
- Encourage depth of learning
- Allow teachers to practice teaching
- Encourage teachers to view videos and analyze them
- Help teachers identify the big ideas in math
- Allow time for teachers to analyze student work

Facilitating Teacher Discussion Regarding Student Work

Susan has $80. She spends 3/5 of the money on Monday. She spends the remaining money equally over the next 5 days. How much money does she spend on each of the 5 days?

10. Susan has $80. She spends $\frac{3}{8}$ of the money on Monday. She spends the remaining money equally over the next 5 days. How much money does she spend on each of the 5 days?

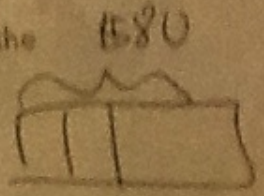
Draw a bar model. You may also show calculations if you'd like.



She spends $2 on each of the 5 days

15min 15min

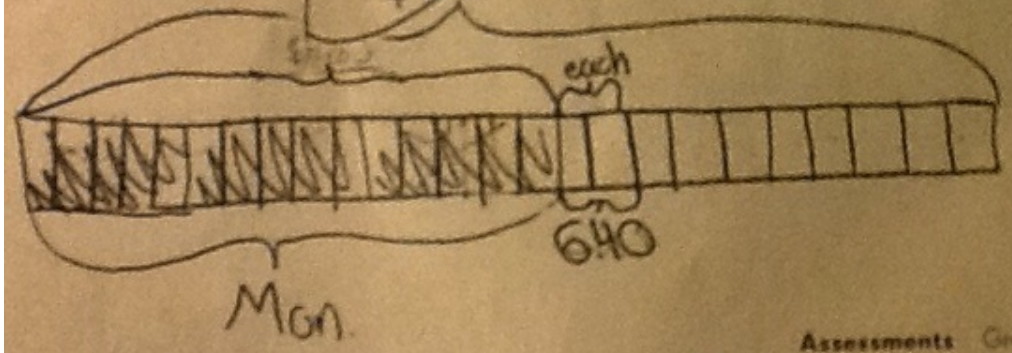
Susan has $80. She spends $\frac{3}{5}$ of the money on Monday. She spends the remaining money equally over the next 5 days. How much money does she spend on each of the 5 days?



Draw a bar model. You may also show calculations if you'd like.

She spends $6.40 on each of the 5 days.

$$
\begin{array}{r}
3.20 \\
25\overline{)80.00} \\
\underline{75} \\
50 \\
\underline{50} \\
0
\end{array}
$$



How can administrators support teachers s they work to implement the CCSS Math Practices

- Encourage depth of learning
- Allow teachers to practice teaching
- Encourage teachers to view videos and analyze them
- Help teachers identify the big ideas in math
- Allow time for teachers to analyze student work
- Encourage teachers to observe/help each other

SMARTER BALANCED – *Mathematics* Item Specifications
A "Snapshot" of the Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup, 2009)

Depth of Thinking Webb + Type of Thinking (Revised Bloom's)	DOK Level 1 Recall & Reproduction	DOK Level 2 Basic Skills & Concepts	DOK Level 3 Strategic Thinking & Reasoning	DOK Level 4 Extended Thinking
Remember	• Recall conversions, terms, facts			
Understand	• Evaluate an expression • Locate points on a grid or number on number line • Solve a one-step problem • Represent math relationships in words, pictures, or symbols	• Specify, explain relationships • Make basic inferences or logical predictions from data/observations • Use models/diagrams to explain concepts • Make and explain estimates	• Use concepts to solve non-routine problems • Use supporting evidence to justify conjectures, generalize, or connect ideas • Explain reasoning when more than one response is possible • Explain phenomena in terms of concepts	• Relate mathematical concepts to other content areas, other domains • Develop generalization of the results obtained and strategies used, apply them to new problem situations
Apply	• Follow simple procedures • Calculate, measure, apply a rule (e.g., rounding) • Apply algorithm or formula • Solve linear equations • Make conversions	• Select a procedure and perform it • Solve routine problem applying multiple concepts • Retrieve information to solve a problem • Translate between representations	• Design investigation for a specific purpose or research question • Use reasoning, planning, and supporting evidence • Translate between problem and symbolic notation when not a direct translation	• Initiate, design, and conduct a project that specifies a problem, identifies solution paths, solve the problem and reports results.
Analyze	• Retrieve information from a table or graph to answer a question • Identify a pattern/trend	• Categorize data, figures • Organize, order data • Select appropriate graph and organize & display data • Interpret data from a simple graph • Extend a pattern	• Compare information within or across data sets or texts • Analyze and draw conclusions from data, citing evidence • Generalize a pattern • Interpret data from complex graph	• Analyze multiple sources of evidence or data sets
Evaluate			• Cite evidence and develop a logical argument • Compare/contrast solutions methods • Verify reasonableness	• Apply understanding in a novel way, provide argument or justification for the new application
Create	• Brainstorm ideas, concepts, problems, or perspective related to a topic or concept	• Generate conjectures or hypotheses based on observations or prior knowledge and experience	• Develop an alternative solution • Synthesize information within one data set	• Synthesize information across multiple sources or data sets • Design a model to inform and solve a practical or abstract situation

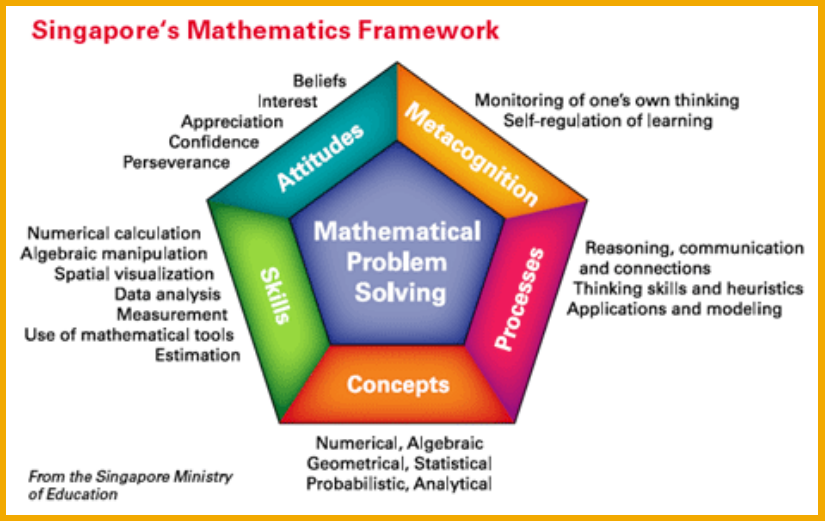
Teachers who foster the practices_____.

Ensure that every child has a mathematical voice.

Know when to slow down and what to slow down for.

Ask the right questions.

What can you encourage regarding:



Concepts Skills Processes

MetaCognition Attitudes

Math In Focus

Look-fors

Instructional Implementation Sequence:
Attaining the CCSS Mathematical Practices

Engagement Strategies			
Strategy	**Description**	**CCSS Math Practices**	**Student Actions**
Partner Conversations	Turn and Talk, Team Mates Consult, Pair-Share, or Think-Pair-Share, are engagement strategies easy to implement in any classroom at any grade level or subject. Partner conversations do not require any change in pedagogy or materials. For pair – share, teachers merely ask a question or assign a problem and allow students to think and work with a partner for one to three minutes before requesting an answer to the question or problem. In think – pair – share students are given a brief period of time to think independently before working with a partner. These strategies are a significant first step in engaging all students in classroom instructional activities.	• Make sense of problems. • Critique the reasoning of others.	• Explain their thought processes in solving a problem one way. • Understand and discuss other ideas and approaches.
Showing thinking in classrooms	Teachers need to work toward higher degrees of student involvement in classroom activities. Once pair – share is incorporated into classroom routines, teachers need to incorporate additional strategies that promote "every pupil response" (EPR). EPR strategies include such responses as "thumbs up/thumbs down," or use of individual white boards for noting answers. Students are also pressed to be more aware of their thinking and express their thinking in more detail. Students are routinely asked to share their thinking in mathematics classrooms. However, what is routinely accepted as thinking is actually process description. Students merely provide the steps they used to solve the problem, not their reasoning and thinking about how they knew which processes to use. In order to reveal student thinking, more challenging, open-ended problems are needed.	• Construct viable arguments. • Attend to precision.	• Explain their thinking for the solution they found. • Communicate their reasoning and solution to others.

Math In Focus

Look-fors

Observation Checklist

What to Look for in a ***Math in Focus*** Classroom

Teacher_____ **Observer** _____

Class/Grade _____ **Date**_____ **Time** _____

Math Goal(s) addressed in lesson _____

	Observed ... Not Observed
Visible in the classroom…	
Vocabulary support (math "word wall"/vocabulary list)	
Summary statements, evidence of conclusions and solutions	
Easy access to student learning tools (manipulatives, rulers, etc.)	
Lesson Structure Includes…	
Whole group, direct instruction, and questioning	
Guided groups with differentiation	
Independent practice	
Games, centers, or "Let's Explore " that allow for differentiation	
Helping students make connections to prior knowledge	
Closure/summary of key mathematical ideas	
Teacher is….	
Connecting concrete manipulatives to visual models to abstract notation	
Using pretest and other assessments to provide appropriate instruction	
Helping students use visual models to explain their thinking	
Asking questions that prompt higher-level thinking	
Asking students to justify their answers	
Students are…	
Able to identify what they are learning and how they are doing	
Using manipulatives and other tools appropriately to solve problems	
Interacting on task with others, as well as working independently	
Communicating mathematical ideas to others through examples, models, demonstrations, and logical reasoning	
Working with a partner or with group to justify solutions to problems with each person highly involved	
Sharing strategies including mental math and problem solving methods	
Comments:	

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Administrators Supporting the Math Practices

How can administrators support classrooms that promote reasoning and thinking?

Presenter name or date

Presentation title

Subtitle goes here

Headline

Placeholder

Headline

- Body body body body body body body.

text	text	text	text

Headline

Placeholder

Placeholder

Placeholder

Divider

Subtitle

Divider

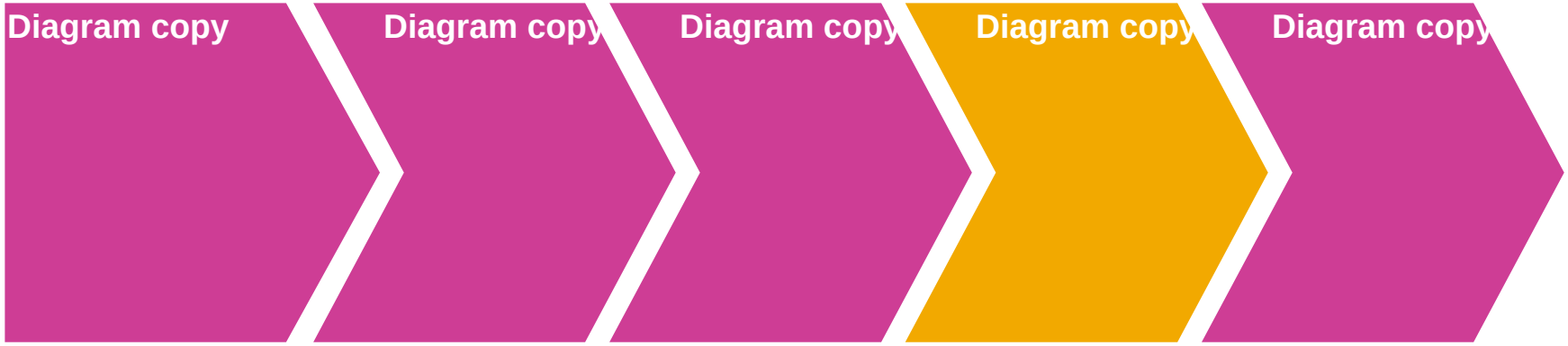
Subtitle

Divider

Subtitle

Diagram

- The peanut is neither a pea nor a nut. Discuss.



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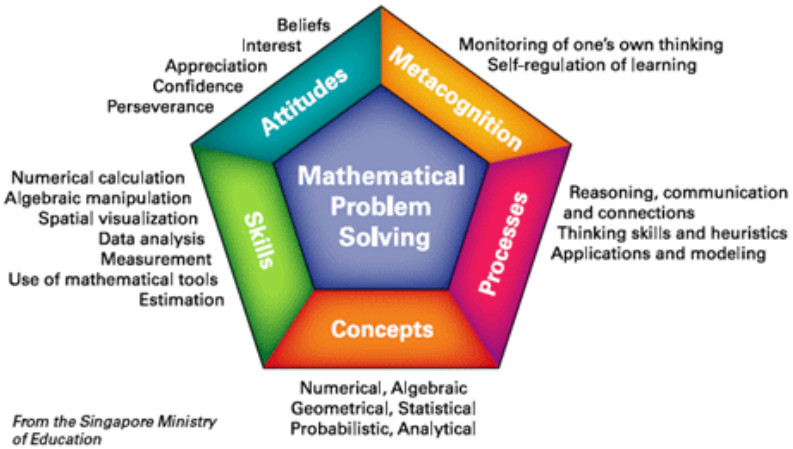
Singapore's Mathematics Framework



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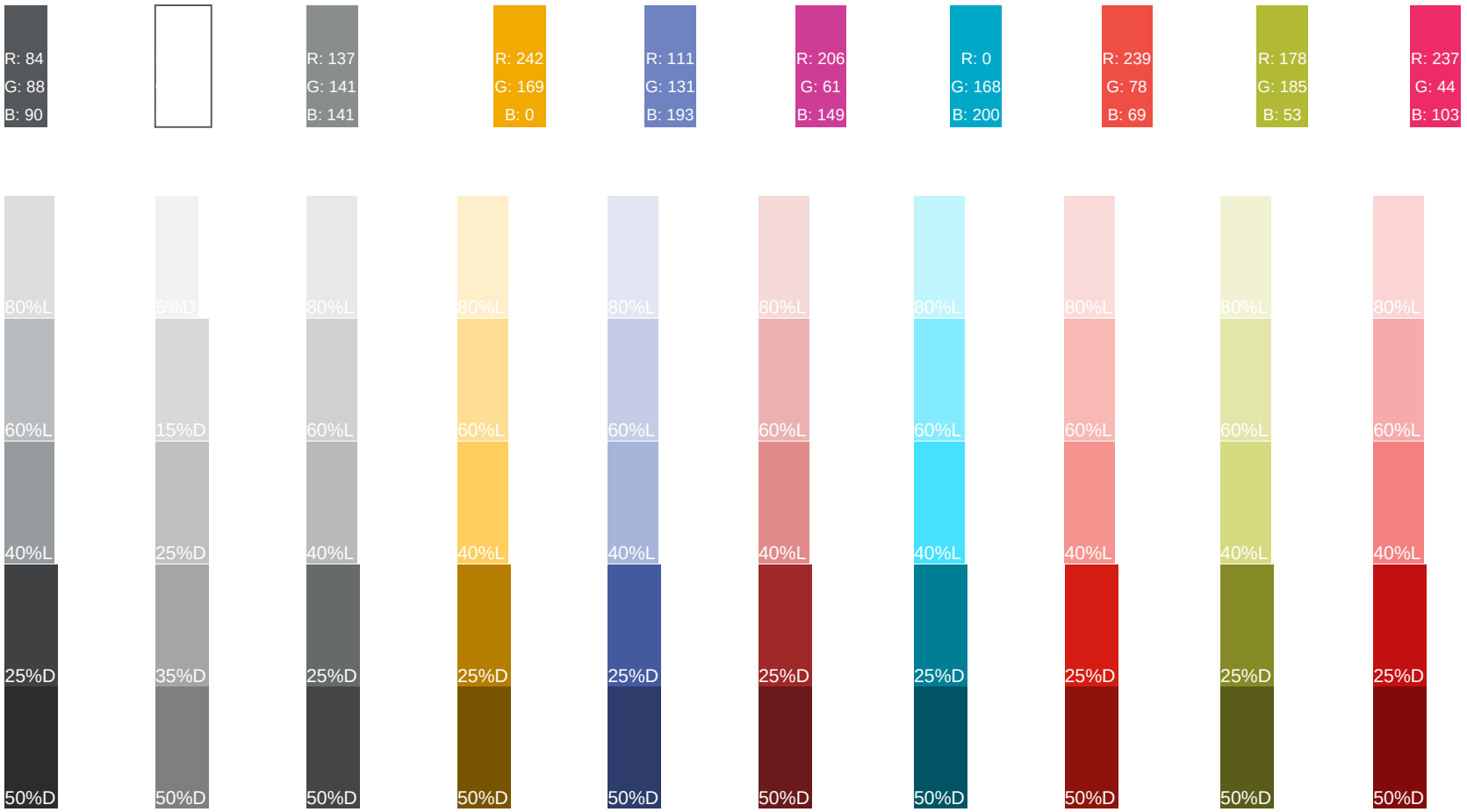
Theme palette / colors



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