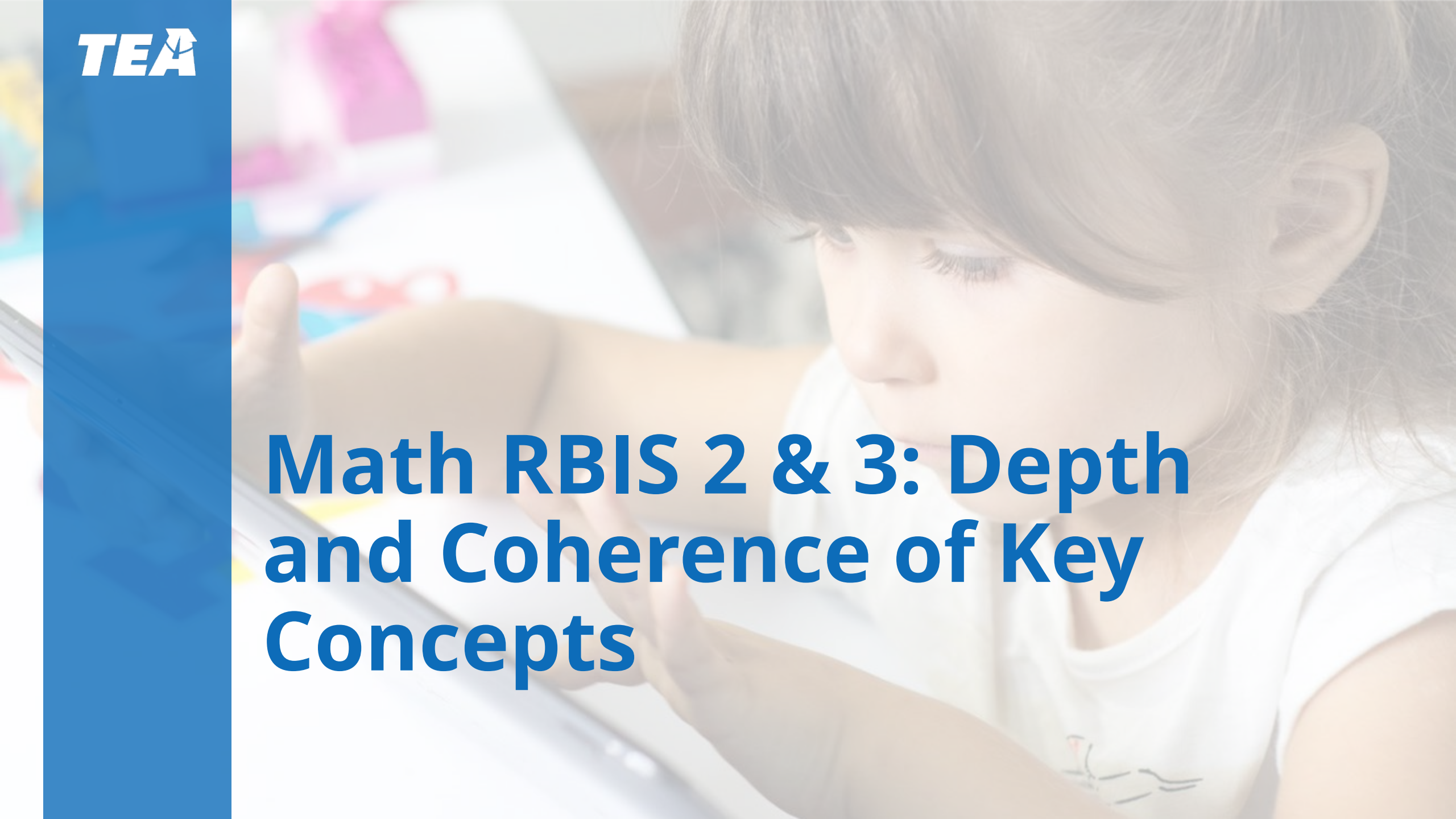
Welcome Back!

Up next…

1:00 – 2:45	Math RBIS 2 & 3 Depth and Coherence of Key Concepts
2:45 – 3:00	Closing and Survey

Please sign-in using this link:
bit.ly/RBIS_SI



Math RBIS 2 & 3: Depth and Coherence of Key Concepts

Objectives

- Define and explain the importance of supporting depth of student understanding across key math concepts

- Define and explain the importance of building coherence across key mathematical concepts, both within and across grade levels.

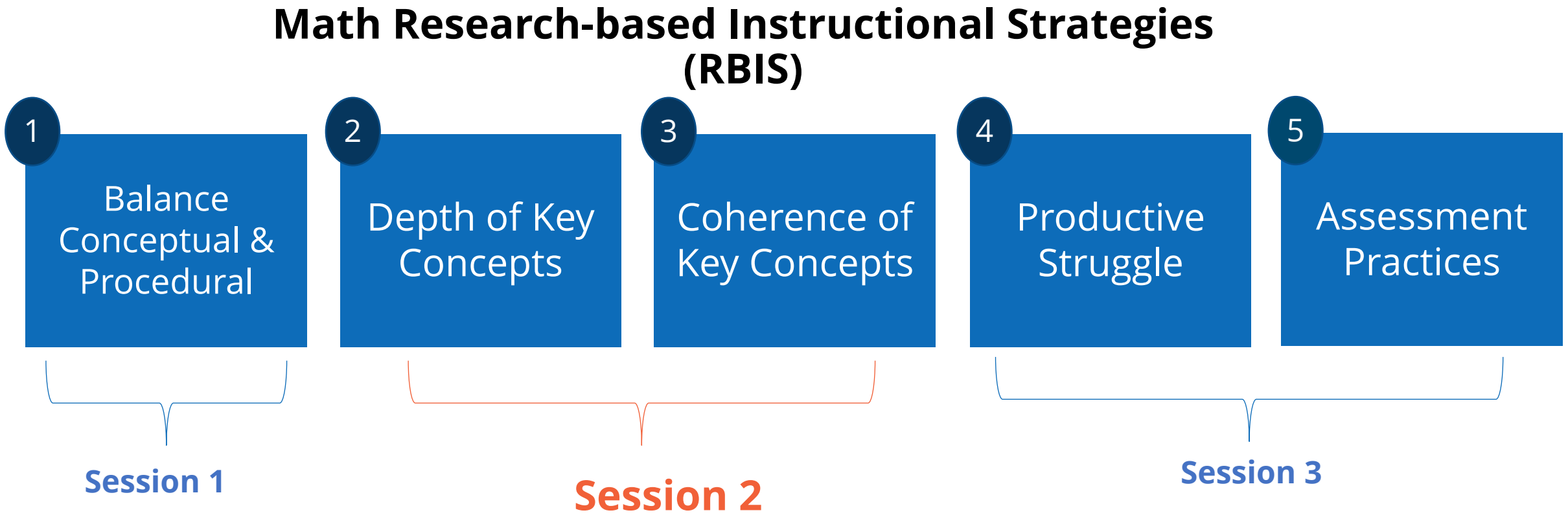
Throughout this session we will:

- Explore the role of HQIM in supporting teachers and students
- Understand how depth and coherence of key concepts are integral to supporting conceptual and procedural understanding.

Agenda

- Opening
- RBIS 2: Depth of Key Concepts
- RBIS 3: Coherence of Key Concepts
- Closing

Math RBIS Series Overview



Do Now

- Order the following elementary level math problems to illustrate the correct grade level progression. Justify your reasoning.

A

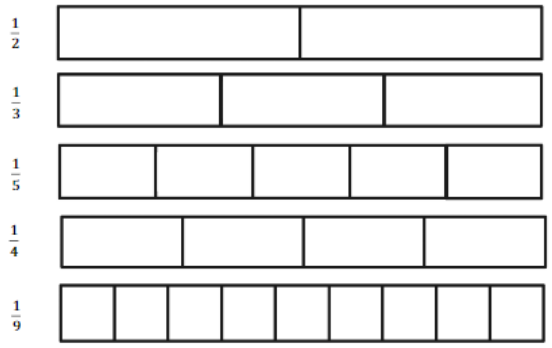
1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer, if possible.

a. $\frac{1}{3}-\frac{1}{4}=$

b. $\frac{2}{3}-\frac{1}{2}=$

B

1. Each fraction strip is 1 whole. All the fraction strips are equal in length. Color 1 fractional unit in each strip. Then, answer the questions below.



2. Circle *less than* or *greater than*. Whisper the complete sentence.

a. $\frac{1}{2}$ is less than / greater than $\frac{1}{3}$

b. $\frac{1}{9}$ is less than / greater than $\frac{1}{2}$

c. $\frac{1}{4}$ is less than / greater than $\frac{1}{2}$

d. $\frac{1}{4}$ is less than / greater than $\frac{1}{9}$

e. $\frac{1}{5}$ is less than / greater than $\frac{1}{3}$

f. $\frac{1}{5}$ is less than / greater than $\frac{1}{4}$

g. $\frac{1}{2}$ is less than / greater than $\frac{1}{5}$

h. 6 fifths is less than / greater than 3 thirds

C

1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing >, <, or = on the line. The first two have been partially done for you. Each rectangle represents 1.

a. $\frac{1}{2}$ _____ < _____ $\frac{2}{3}$

$\frac{1\times3}{2\times3}=\frac{3}{6}$

$\frac{2\times2}{3\times2}=\frac{4}{6}$

b. $\frac{4}{5}$ _____ $\frac{3}{4}$

c. $\frac{3}{5}$ _____ $\frac{4}{7}$

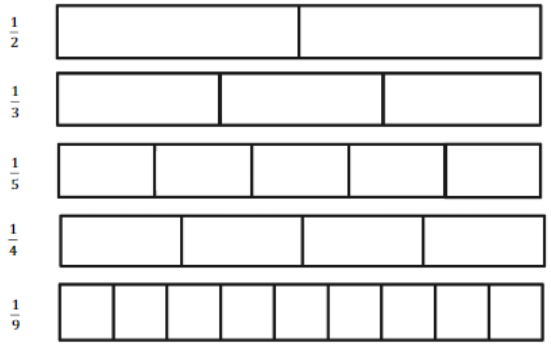
d. $\frac{3}{7}$ _____ $\frac{2}{6}$

Depth & Coherence of Key Concepts Examples

How do these examples tell a connected, coherent story about the progression of the skills students must build around fractions?

B 3rd Grade

1. Each fraction strip is 1 whole. All the fraction strips are equal in length. Color 1 fractional unit in each strip. Then, answer the questions below.



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d. $\frac{1}{4}$ is less than / greater than $\frac{1}{9}$

e. $\frac{1}{5}$ is less than / greater than $\frac{1}{3}$

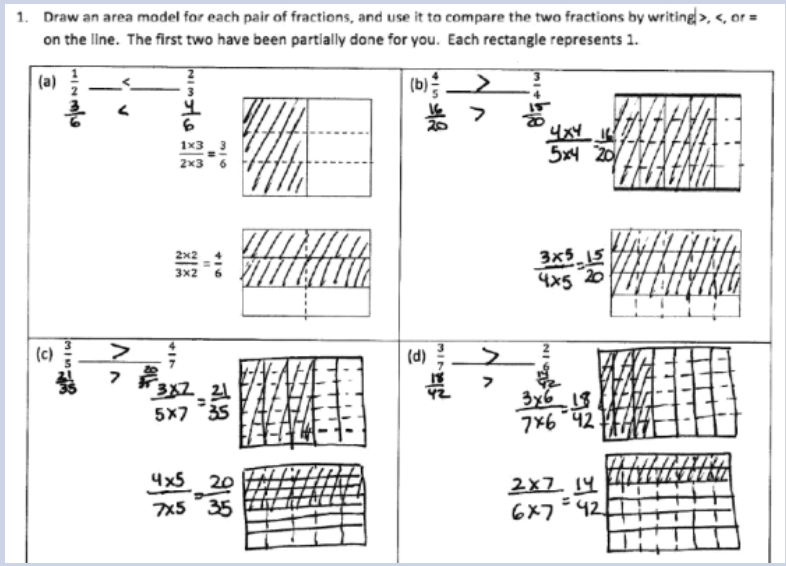
f. $\frac{1}{5}$ is less than / greater than $\frac{1}{4}$

g. $\frac{1}{2}$ is less than / greater than $\frac{1}{5}$

h. 6 fifths is less than / greater than 3 thirds

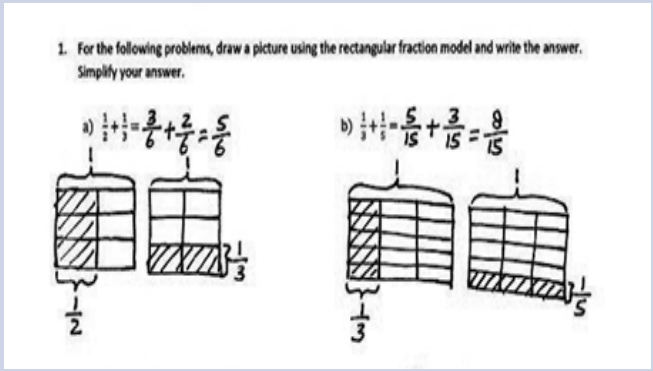
C 4th Grade

1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing >, <, or = on the line. The first two have been partially done for you. Each rectangle represents 1.



A 5th Grade

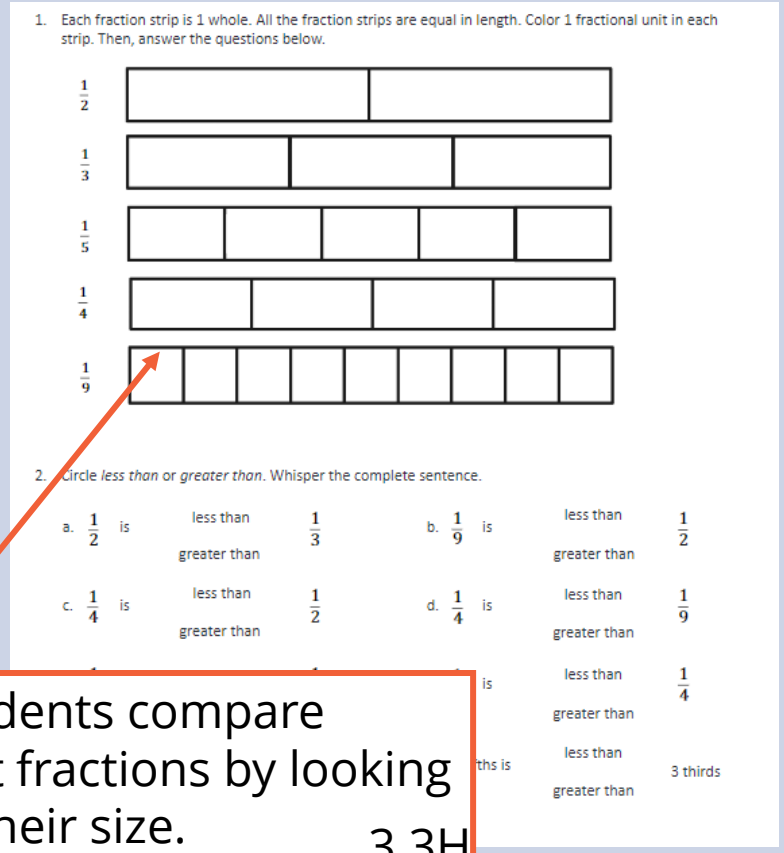
1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer.



Eureka Math TEKS Edition. Grade 3, Module 5, Lesson 11
Eureka Math TEKS Edition. Grade 4, Module 5, Lesson 14
Eureka Math TEKS Edition. Grade 5, Module 3, Lesson 3

Depth & Coherence of Key Concepts Examples

B 3rd Grade


1. Each fraction strip is 1 whole. All the fraction strips are equal in length. Color 1 fractional unit in each strip. Then, answer the questions below.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{4}$ $\frac{1}{9}$

2. Circle *less than* or *greater than*. Whisper the complete sentence.

a. $\frac{1}{2}$ is less than / greater than $\frac{1}{3}$

b. $\frac{1}{9}$ is less than / greater than $\frac{1}{2}$

c. $\frac{1}{4}$ is less than / greater than $\frac{1}{2}$

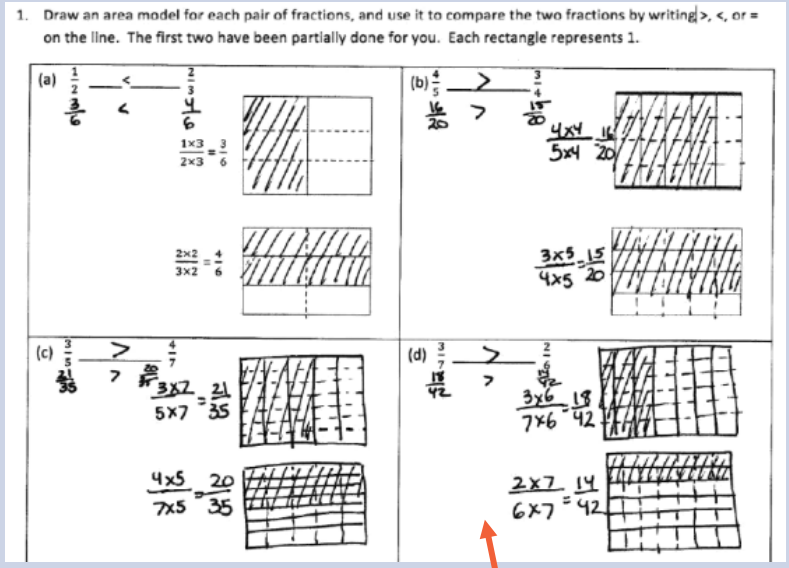
d. $\frac{1}{4}$ is less than / greater than $\frac{1}{9}$

is less than / greater than $\frac{1}{4}$

ths is less than / greater than 3 thirds

Students compare unit fractions by looking at their size. 3.3H

C 4th Grade


1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing >, <, or = on the line. The first two have been partially done for you. Each rectangle represents 1.

(a) $\frac{1}{2}$ ___ $\frac{2}{3}$ $\frac{3}{6}$ < $\frac{4}{6}$ $\frac{1\times3}{2\times3}=\frac{3}{6}$ $\frac{2\times2}{3\times2}=\frac{4}{6}$

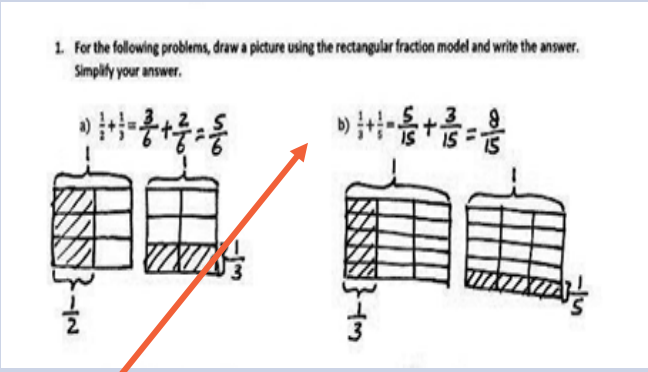
(b) $\frac{4}{5}$ ___ $\frac{3}{4}$ $\frac{16}{20}$ > $\frac{15}{20}$ $\frac{4\times4}{5\times4}=\frac{16}{20}$ $\frac{3\times5}{4\times5}=\frac{15}{20}$

(c) $\frac{3}{5}$ ___ $\frac{4}{7}$ $\frac{21}{35}$ > $\frac{20}{35}$ $\frac{3\times7}{5\times7}=\frac{21}{35}$ $\frac{4\times5}{7\times5}=\frac{20}{35}$

(d) $\frac{3}{7}$ ___ $\frac{2}{6}$ $\frac{18}{42}$ > $\frac{14}{42}$ $\frac{3\times6}{7\times6}=\frac{18}{42}$ $\frac{2\times7}{6\times7}=\frac{14}{42}$

Students begin to compare fractions with different numerators and denominators. 4.3D

A 5th Grade


1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer.

a) $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$ $\frac{1}{2}$ $\frac{1}{3}$

b) $\frac{1}{3}+\frac{1}{5}=\frac{5}{15}+\frac{3}{15}=\frac{8}{15}$ $\frac{1}{3}$ $\frac{1}{5}$

Students represent and solve addition and subtraction of fractions with unequal denominators 5.3H

RBIS 2: Depth of Key Concepts

What are the essential best practices in mathematics instruction?

Math Research-based Instructional Strategies (RBIS)

1	2	3	4	5
Balance Conceptual & Procedural	Depth of Key Concepts	Coherence of Key Concepts	Productive Struggle	Assessment Practices
Pursue **rigor by balancing conceptu al understanding, procedural skill and fluency**, and **application** as required by the standards in the TEKS.	Focus on math content that **aligns to and meets the rigor of the TEKS** for each grade level, **while concentrating time and effort** on going deep on the **most important topics** for the grade level.	**Connect concepts wi thin and across grades** along a strategic progression of learning so that new understandings are built on previous foundations. Mathematics tells a **continuous, connected story**.	Students engage in productive problem solving, engaging in **multiple opportunities for practice, discussion, representations, and writing** that requires them to explain and revise their thinking.	Leverage HQIM **embedded assessments** to drive instruction.

Depth of Key Concepts

2

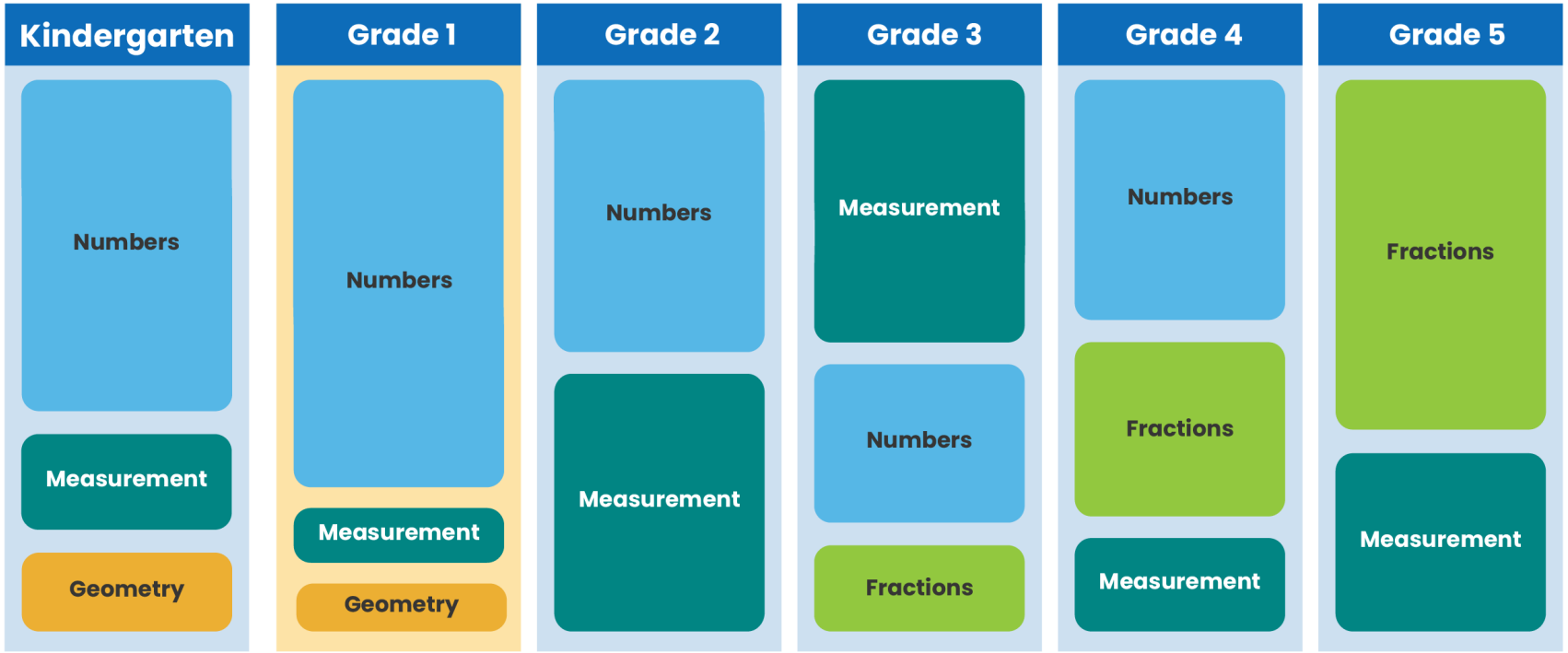
Depth of Key Concepts

Focus on math content that **aligns to and meets the rigor of the TEKS** for each grade level, **while concentrating time and effort** on going deep on the **most important topics** for the grade level.

Meet rigor of the TEKS	Prepare students to identify appropriate concepts to tackle real-world, relevant tasks through an alignment to the TEKS and a balance of conceptual and procedural fluency.
Concentrate time and effort	Utilize high-quality instructional materials to ensure that the majority of class time is spent going deep on the most important topics for the grade level or course.
Most important topics	Identify the focal points that build coherence across grade levels and provide a foundation for strong mathematics understanding of algebra and beyond.

Depth of Key Concepts Examples

How does this graphic illustrate where students are focusing their time in first grade?

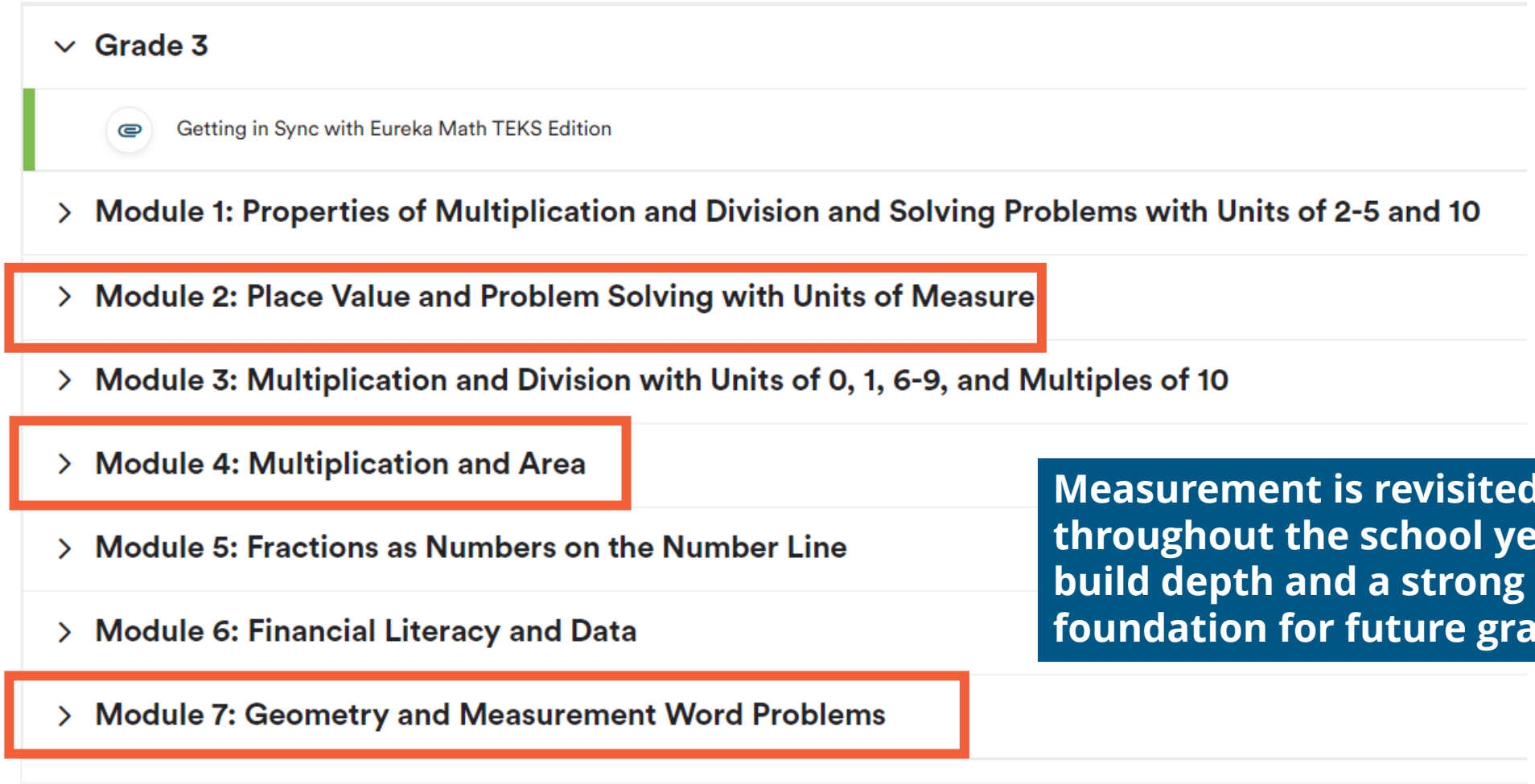


Eureka Math TEKS Edition K-5 Overview

Creating Depth with HQIM

Grade 3

- **Measurement**
- **Numbers**
- **Fractions**

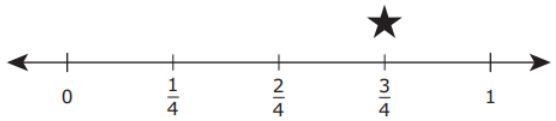


Measurement is revisited throughout the school year to build depth and a strong foundation for future grades.

STAAR Released Question - 2017

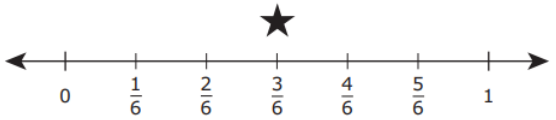
Solve. What do students need to KNOW and be able to DO?

20 Eddie marked the fraction $\frac{3}{4}$ with a star on the number line shown.

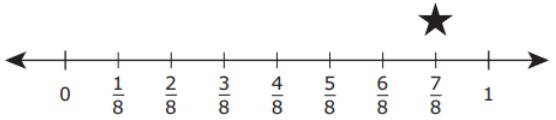


Which of these number lines shows a fraction equivalent to $\frac{3}{4}$ marked with a star?

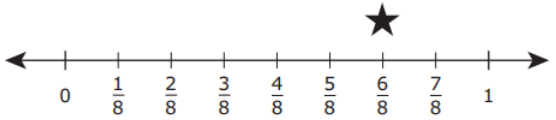
F



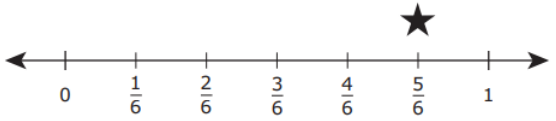
G



H



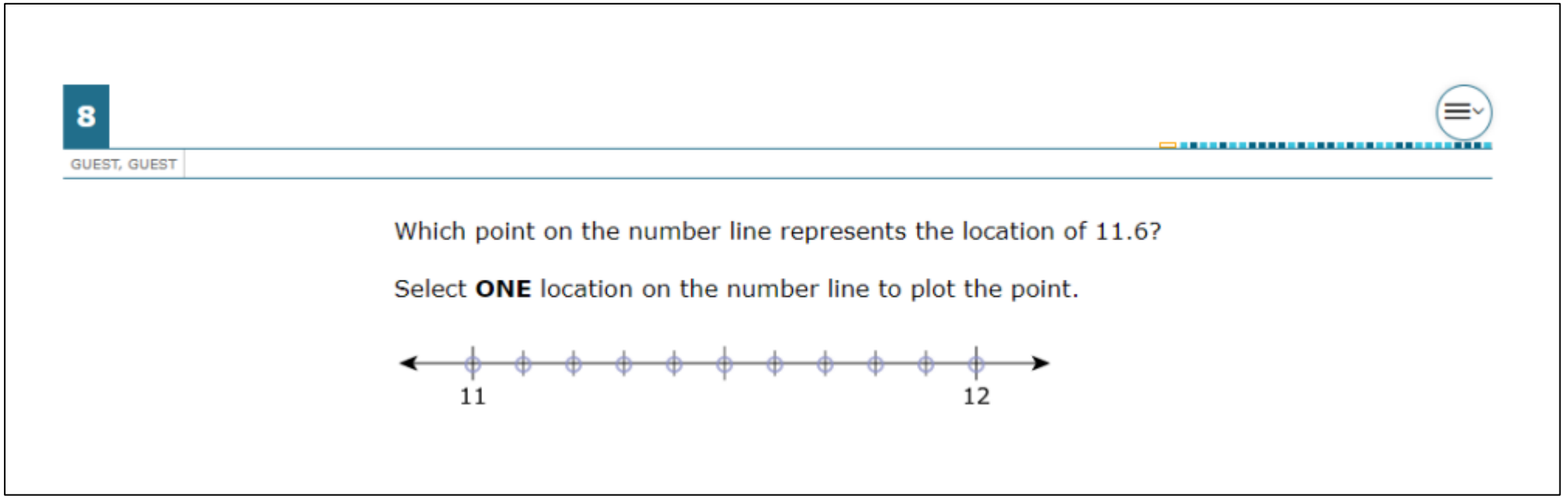
J



3(3)(F) The student is expected to represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines.

STAAR Redesign Math Question

What do students need to KNOW and be able to DO?



This fourth grade STAAR Redesign example shows how students will be expected to select one or more specific areas on a graphic

4(2)(H) The student is expected to determine the corresponding decimal to the tenths or hundredths place of a specified point on a number line

Depth of Key Concepts - Task 1

Solve. What skills are students demonstrating when completing this task?

Equivalent Fractions (only numerators missing)

Grade 3 Fractions Worksheet

Complete the equivalent fractions.

1. $\frac{2}{5} = \frac{\quad}{30}$
2. $\frac{\quad}{2} = \frac{6}{12}$
3. $\frac{2}{3} = \frac{\quad}{27}$
4. $\frac{1}{2} = \frac{\quad}{18}$
5. $\frac{\quad}{3} = \frac{12}{18}$
6. $\frac{4}{5} = \frac{\quad}{25}$

TEKS: 3(3)(F)

Depth of Key Concepts - Task 2

Solve. What skills are students demonstrating when completing this task?

1. Jerry put 7 equally spaced hooks on a straight wire so students could hang up their coats. The whole length is from the first hook to the last hook.

   a. On the picture below, label the fraction of the wire's length where each hook is located.

   b. At what fraction is Betsy's coat if she hangs it at the halfway point?

   c. Write a fraction that is equivalent to your answer for Part (b).

2. Jerry used the picture below to show his son how to find a fraction equal to $\frac{2}{3}$. Explain what Jerry might have said and done using words, pictures, and numbers.

TEKS: 3(3)(F)

Depth of Key Concepts Comparison

Equivalent Fractions (only numerators missing)

Grade 3 Fractions Worksheet

Complete the equivalent fractions.

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2. $\frac{\quad}{2} = \frac{6}{12}$
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6. $\frac{4}{5} = \frac{\quad}{25}$

3(3)(F) The student is expected to represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines.

1. Jerry put 7 equally spaced hooks on a straight wire so students could hang up their coats. The whole length is from the first hook to the last hook.

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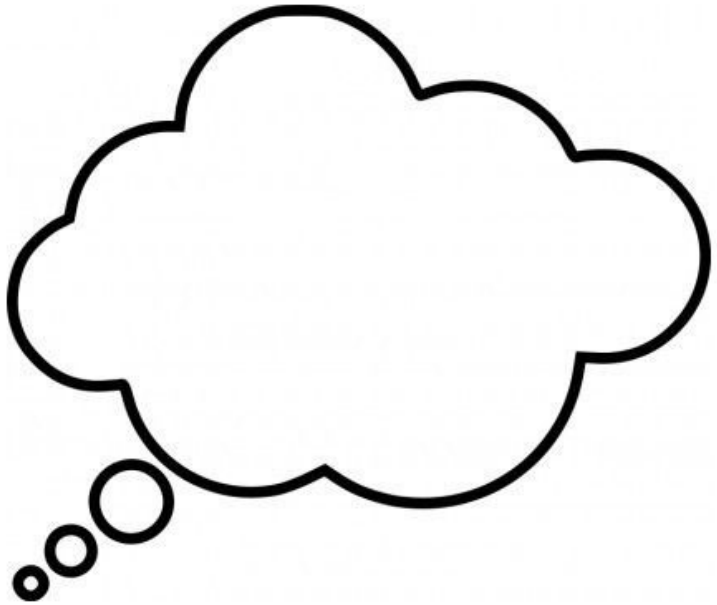
   c. Write a fraction that is equivalent to your answer for Part (b).

2. Jerry used the picture below to show his son how to find a fraction equal to $\frac{2}{3}$. Explain what Jerry might have said and done using words, pictures, and numbers.

Reflection

- Compare these two tasks. How do they give students the opportunity to engage with the TEKS and Student Expectations in depth?

- How can we support teachers and leaders to focus on the most important content?



Depth of Key Concepts Comparison

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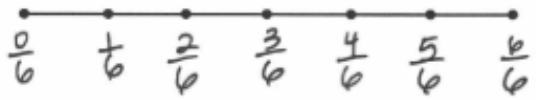
5. $\frac{\quad}{3} = \frac{12}{18}$
6. $\frac{4}{5} = \frac{\quad}{25}$

- Grade 3 students should be using a **<u>variety of objects, models, or the number line</u>** to develop their understanding of fraction equivalence.
- Students should be demonstrating that they can recognize and generate simple equivalent fractions on a number line or area model and **<u>explaining</u>** why they are equivalent.

1. Jerry put 7 equally spaced hooks on a straight wire so students could hang up their coats. The whole length is from the first hook to the last hook.

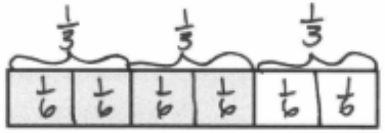
   a. On the picture below, label the fraction of the wire's length where each hook is located.



   b. At what fraction is Betsy's coat if she hangs it at the halfway point? $\frac{3}{6}$

   c. Write a fraction that is equivalent to your answer for Part (b). $\frac{1}{2}$

2. Jerry used the picture below to show his son how to find a fraction equal to $\frac{2}{3}$. Explain what Jerry might have said and done using words, pictures, and numbers.



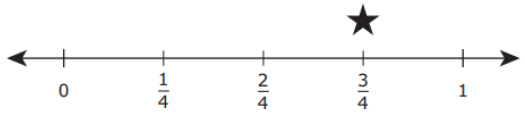
$\frac{2}{3} = \frac{4}{6}$

I made each $\frac{1}{3}$ into 2 smaller, equal parts. So then it wasn't just thirds anymore, it was sixths too! I can see from the shading that $\frac{2}{3}$ is the same as $\frac{4}{6}$.

STAAR Released Question (2017) Revisited

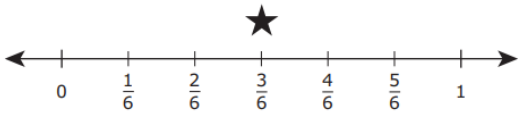
Reflecting on the previous approach, how would students be better prepared to master this question and standard?

20 Eddie marked the fraction $\frac{3}{4}$ with a star on the number line shown.



Which of these number lines shows a fraction equivalent to $\frac{3}{4}$ marked with a star?

F



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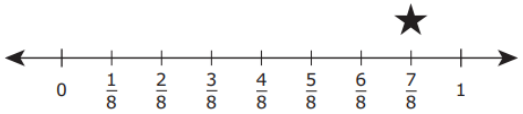

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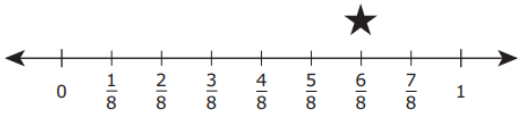
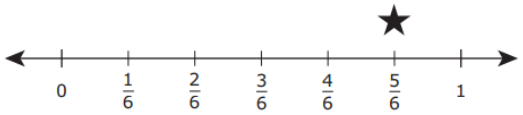


J



3(3)(F) The student is expected to represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines.

Connection to coherence: understanding equivalence of fractions and number lines are key to middle school math standards addressing proportions and understanding/ordering real numbers. This also impacts the ability for students to understand equivalent forms in high school math courses.

Zoom Out

Key Facilitation Strategy:

Planning and Preparation

Stop and Jot:

How did the facilitator do the following?

- Describe the purpose of RBIS 2 and its connection to HQIM
- Cite examples from HQIM

RBIS 3: Coherence of Key Concepts

What are the essential best practices in mathematics instruction?

Math Research-based Instructional Strategies (RBIS)

1	2	3	4	5
Balance Conceptual & Procedural	Depth of Key Concepts	Coherence of Key Concepts	Productive Struggle	Assessment Practices
Pursue **rigor by balancing conceptu al understanding, procedural skill and fluency**, and **application** as required by the standards in the TEKS.	Focus on math content that **aligns to and meets the rigor of the TEKS** for each grade level, **while concentrating time and effort** on going deep on the **most important topics** for the grade level.	**Connect concepts within and across grades** along a strategic progression of learning so that new understandings are built on previous foundations. Mathematics tells a **continuous, connected story**.	Students engage in productive problem solving, engaging in **multiple opportunities for practice, discussion, representations, and writing** that requires them to explain and revise their thinking.	Leverage HQIM **embedded assessments** to drive instruction.

Coherence of Key Concepts

3

Coherence of Key Concepts

Connect concepts wit hin and across grades along a strategic progression of learning so that new understandings are built on previous foundations. Mathematics tells a **continuous, connected story**.

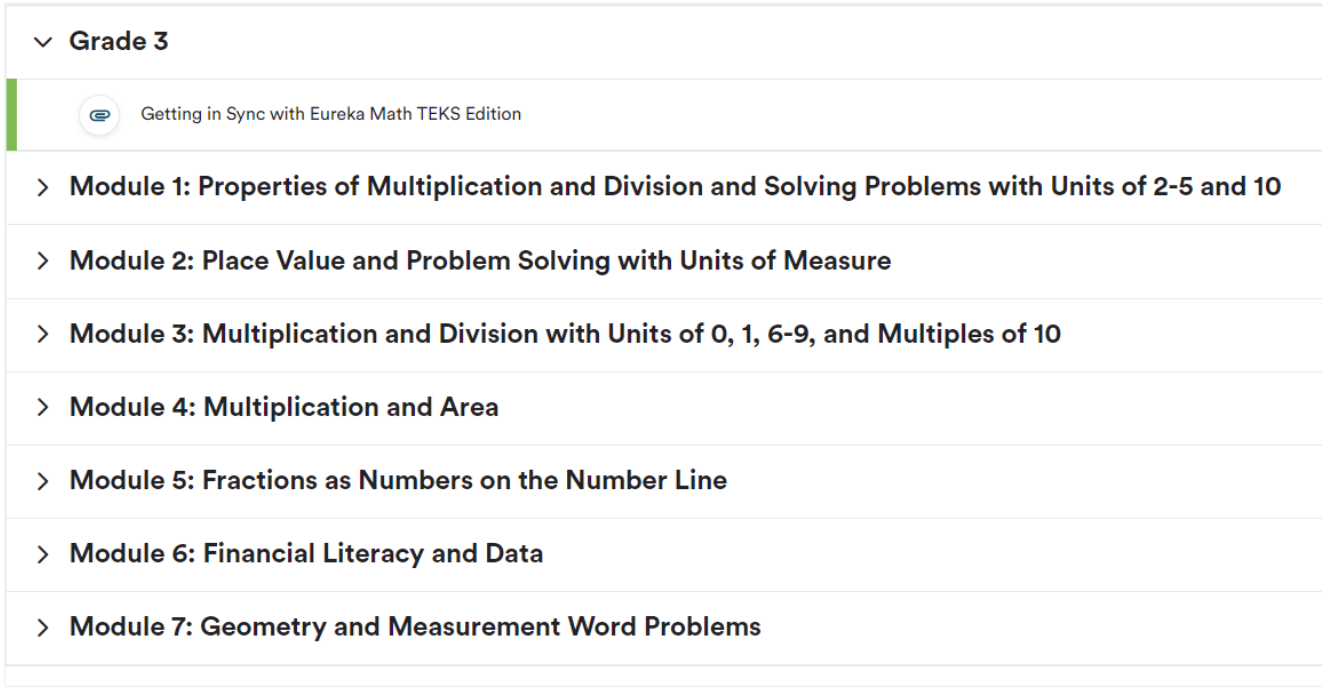
Within grade levels	During a school year, build new ideas on the foundation of what students learned in previous lessons.
Across grade levels	Build upon key concepts in previous and current grade levels as foundational knowledge that could serve as gatekeepers for new ideas in the next grade level and future math courses.
Continuous, connected story	Mathematics concepts and skills create an ongoing, coherent learning experience throughout a students' educational journey.

Coherence within the grade level

Compare these two Grade 3 "year-at-a-glance." Which one shows a coherent approach to the grade level concepts? Why?

- **Unit 1:** Routines, Review, & Assessment
- **Unit 2:** Adding & Subtracting Whole Numbers
- **Unit 3:** Linear Measures in Area
- **Unit 4:** Multiplication & Division
- **Unit 5:** Place Value in Whole Numbers & Decimals
- **Unit 6:** Geometry
- **Unit 7:** Fractions
- **Unit 8:** Data
- **Unit 9:** Probability
- **Unit 10:** STAAR Countdown Review

Each of these units stands alone and can create challenges for students throughout the school year.



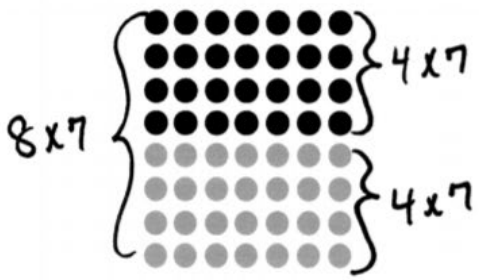
Each of these modules build on one another and spiral concepts throughout the year, telling a continuous connected story.

HQIM Coherence Examples Within Grade 3

Module 3: Multiplication and Division with Units of 0, 1, 6-9, and Multiples of 10

3. There are 4 rows of 7 chairs setup for the magic show. A worker sees the large number of people lined up and doubles the number of rows of chairs. They are shown below.

Explain and label to show how the array represents both 8 × 7 and 2 × (4 × 7).

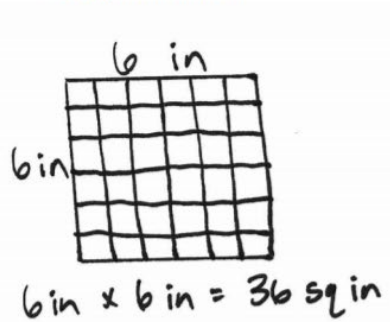


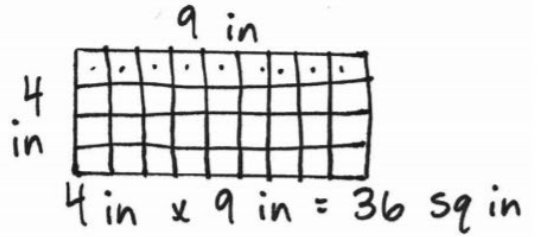
You can see the array 2 ways. You can see the total array as 8 rows of 7, or you can see 4 rows of 7 two times (the black rows and gray rows). They both have the same total of 56 chairs.

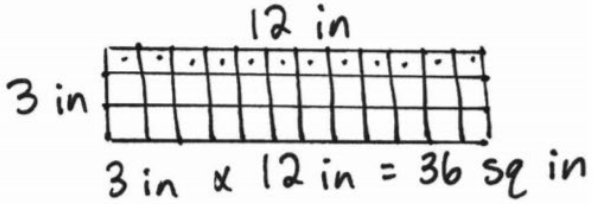
TEKS:
3(4)(E)
3(4)(K)

Module 4: Multiplication & Area

2. Draw three different arrays that you could make with 36 square inch tiles. Label the side lengths on each of your arrays. Write multiplication sentences for each array to prove that the area of each array is 36 square inches.







TEKS:
3(6)(C)

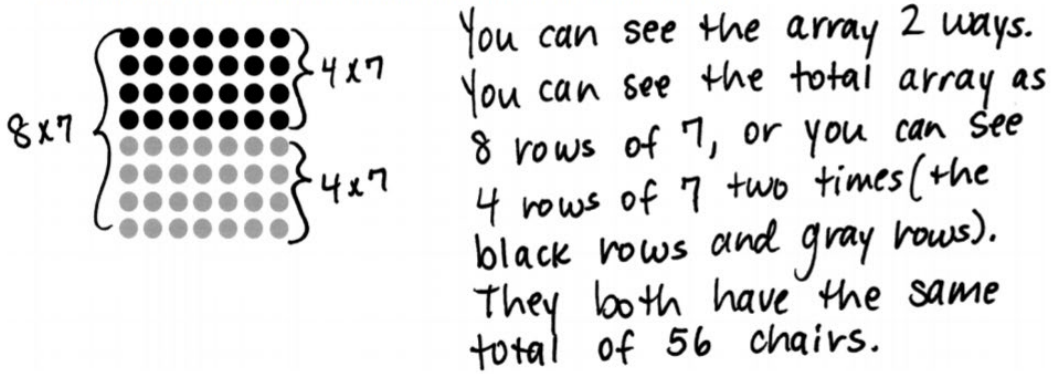
Eureka Math TEKS Edition. Grade 3. Module 3. MM Assessment
Eureka Math TEKS Edition. Grade 3. Module 4. EOM Assessment

HQIM Coherence Examples Within Grade 3

Module 3: Multiplication and Division with Units of 0, 1, 6-9, and Multiples of 10

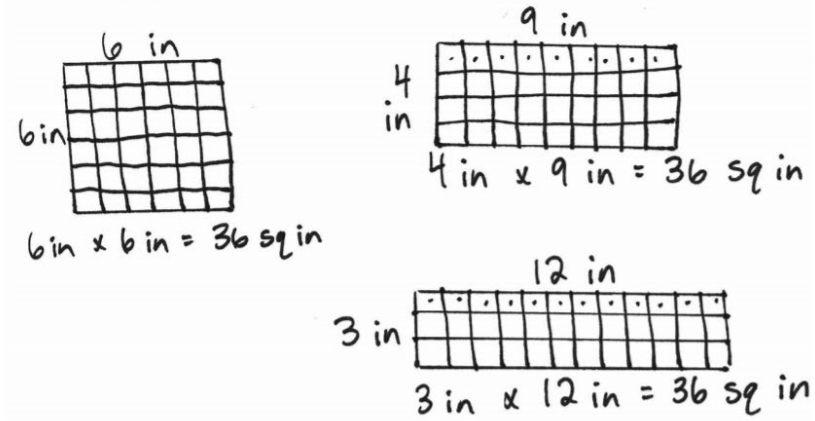
3. There are 4 rows of 7 chairs setup for the magic show. A worker sees the large number of people lined up and doubles the number of rows of chairs. They are shown below.

Explain and label to show how the array represents both 8 × 7 and 2 × (4 × 7).



Module 4: Multiplication & Area

2. Draw three different arrays that you could make with 36 square inch tiles. Label the side lengths on each of your arrays. Write multiplication sentences for each array to prove that the area of each array is 36 square inches.



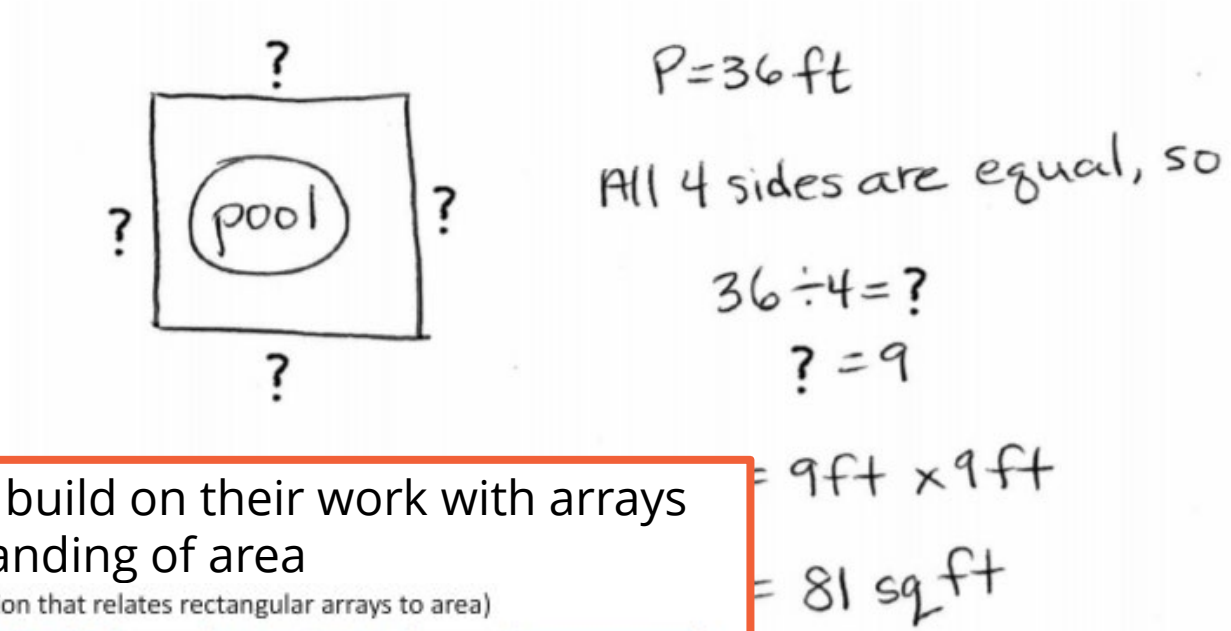
How do the Module 3 & Module 4 examples prepare students for success on this Module 7 question?

c. Katy and Jane build a square fence around the castle's pool. It has a perimeter of 36 feet. What is the area that the fence encloses? Show your work.

Module 7: Geometry and Measurement

How do the Module 3 & Module 4 examples prepare students for success on this Module 7 question?

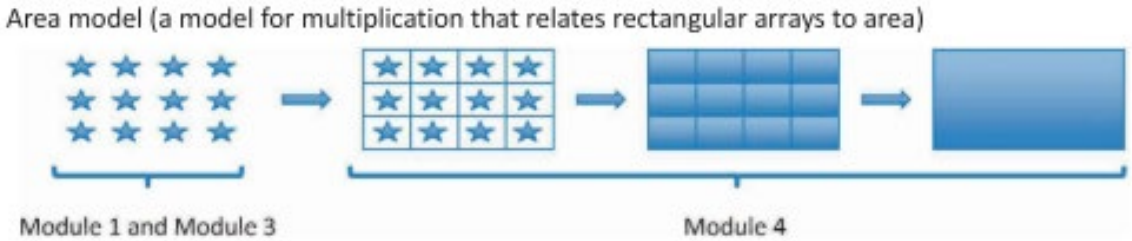
c. Katy and Jane build a square fence around the castle's pool. It has a perimeter of 36 feet. What is the area that the fence encloses? Show your work.



Module 7: Use all four operations to solve problems involving perimeter
and unknown measurements.

Module 3: Multiplication & Division

Module 4: students build on their work with arrays to develop understanding of area



TEKS:
3(4)(K)
3(5)(B)

The Impact of Incoherence

How would this teacher's choice to move units/modules around impact student learning?

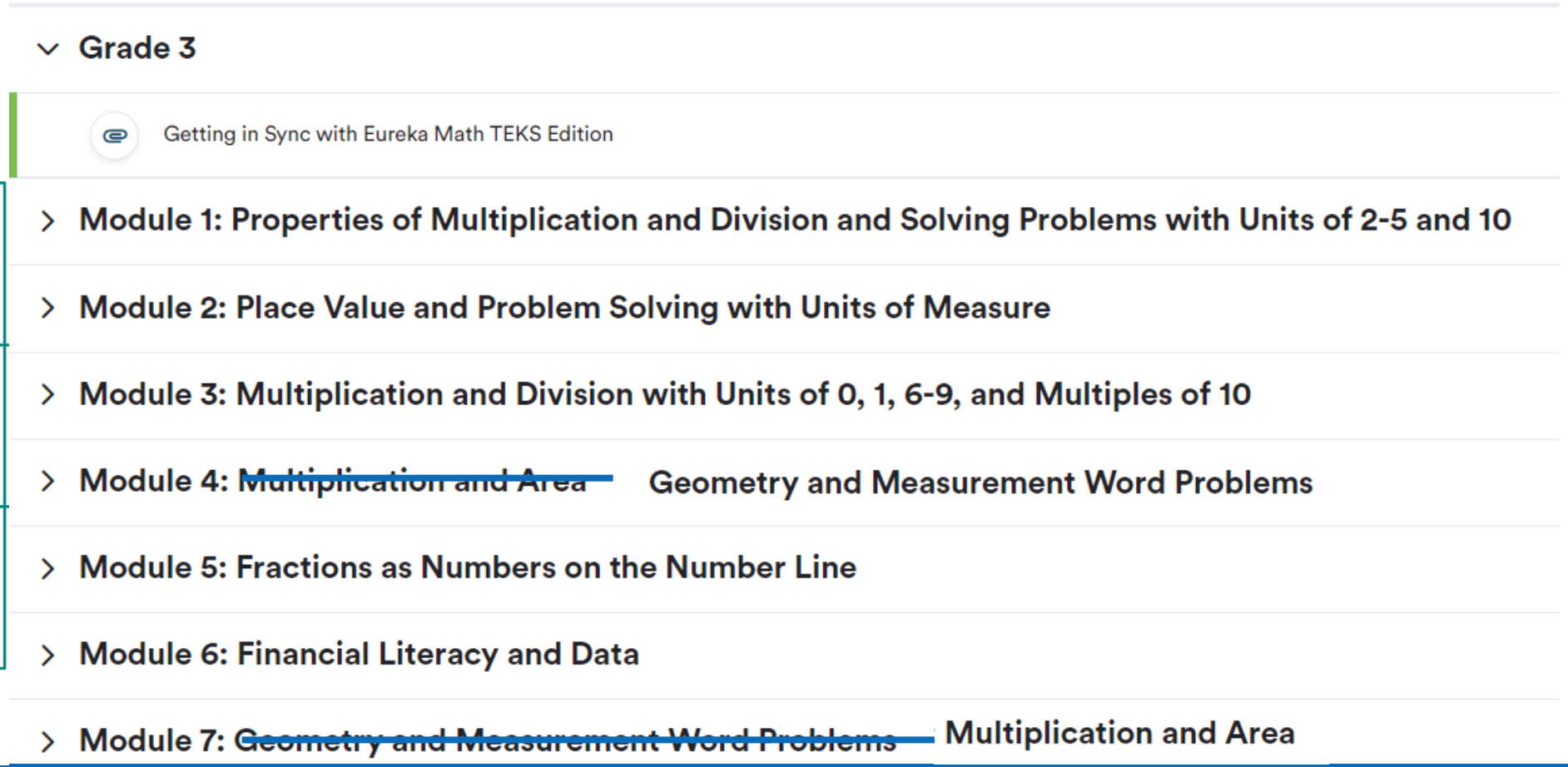
Grade 3

Module 2
Place Value and Problem Solving with Units of Measure

Module 4
Multiplication and Area

Module 6
Financial Literacy and Data

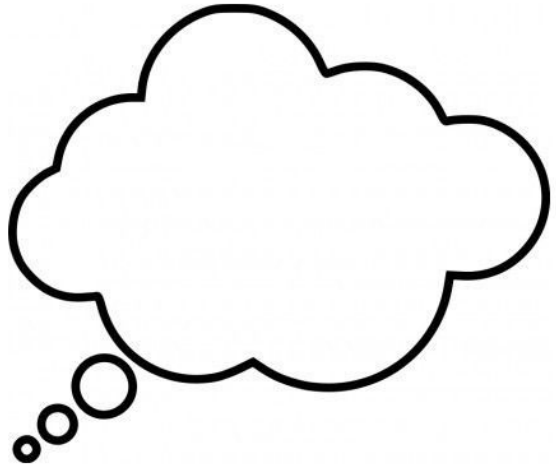
Module 7
Geometry and Measurement Word Problems



Reflection

- How would an educator's choice to move units/modules around impact the student's ability to build on prior knowledge and connections throughout the grade level?

- How could we work to improve the practice of educators adhering to a strong, coherent scope and sequence?



Zoom Out

Key Facilitation Strategy:

Establish Effective Learning Environment

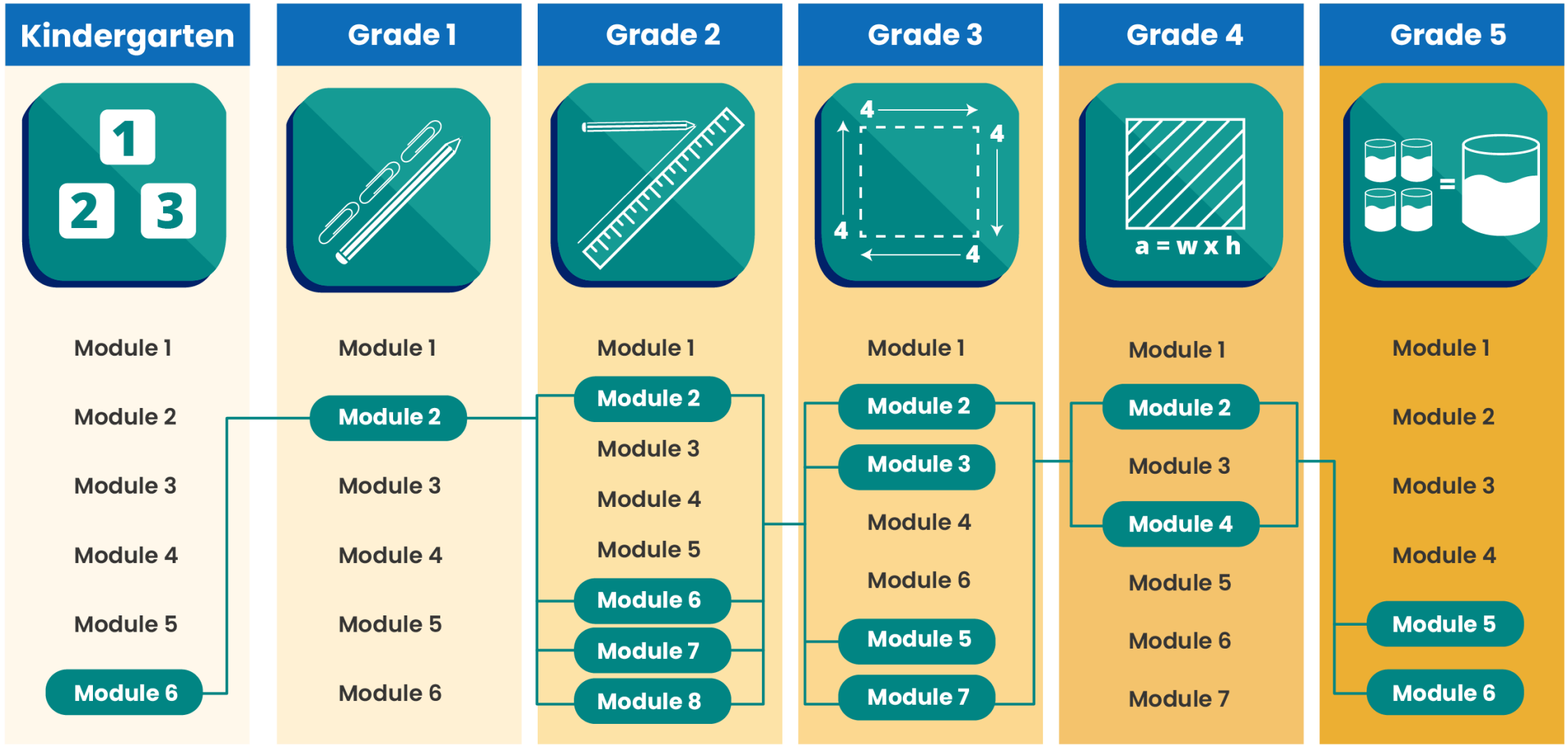
Stop and Jot:

How did the facilitator do the following?

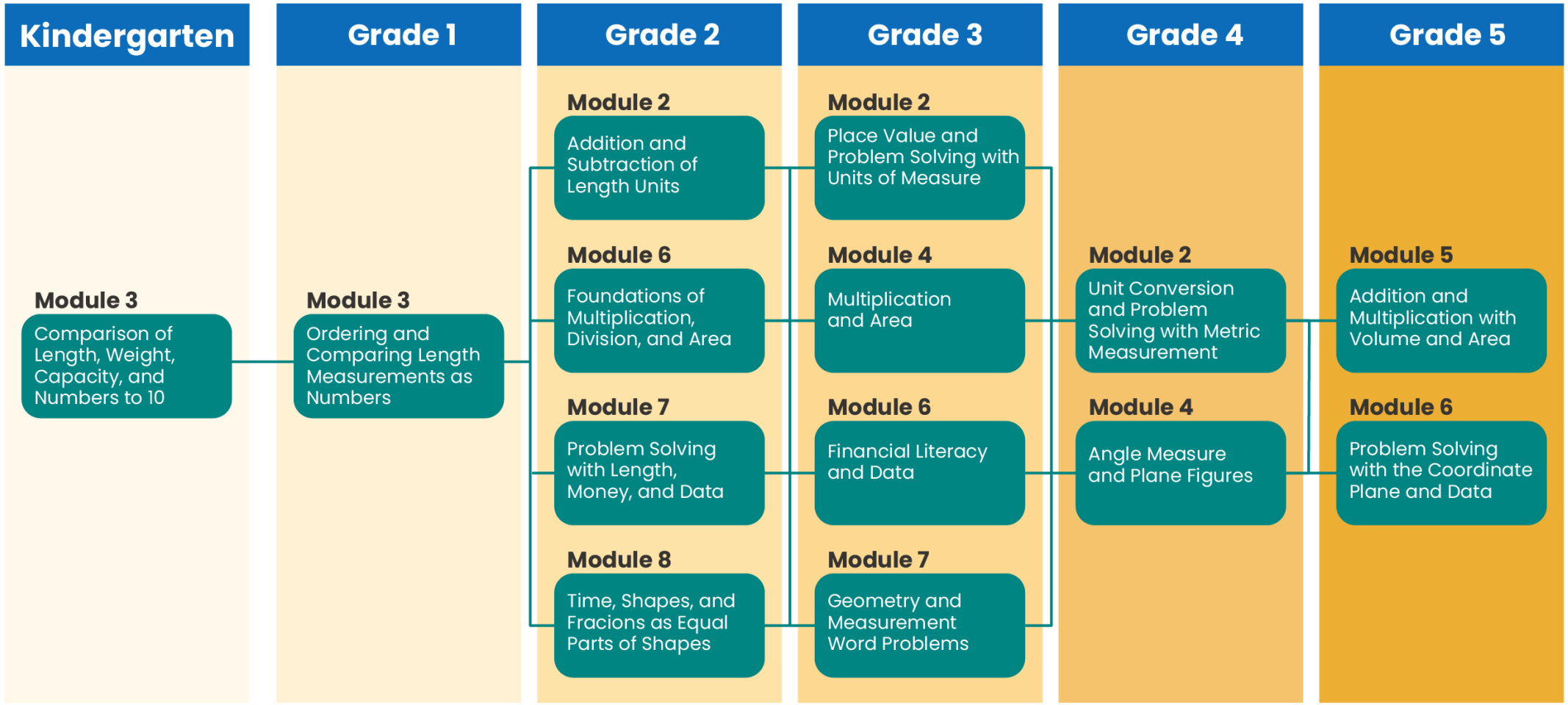
- Actively seek to understand perspective and experience of participants; operate with empathy
- Created a space for participants to ask questions and share ideas (feel safe to do so)

Coherence of Key Concepts

Over time, students develop knowledge of key mathematical concepts. Concepts connect within and across grades along a strategic learning progression.



Coherence of Key Concepts



Example: Coherence in Geometry and Measurement

Beginning with "Length, Weight, Capacity, and Numbers to 10" in kindergarten and progressing all the way up to "Problem Solving with the Coordinate Plane and Data" in grade 5, Eureka Math TEKS Edition builds coherence in the foundations of geometry and measurement.

Coherence of Key Concepts: Grades 6-8

Texas Education Agency

Grade 6	Grade 7	Grade 8
	Representing Linear Relationships	
(6) Expressions, equations, and relationships. The student applies mathematical process standards to use multiple representations to describe algebraic relationships. The student is expected to:	(7) Expressions, equations, and relationships. The student applies mathematical process standards to represent linear relationships using multiple representations. The student is expected to:	(5) Proportionality. The student applies mathematical
	(A) represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to $= mx + b$.	
(B) wr repre betw depe table.		(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.
(C) re situat descr and e kx or		(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$.
		(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems.

(I) Write an equation in the form y = mx + b to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations

(B) write an equation that represents the relationship between independent and dependent quantities from a table

Grade 8

Module 2: Linear Relationships
Topic 1: From Proportions to Linear Relationships
Topic 2: Linear Relationships

Grade 7

Module 1: Thinking Proportionally
Topic 3: Proportionality

Module 3: Reasoning Algebraically
Topic 4: Multiple Representations of Equations

Grade 6

Module 4: Determining Unknown Quantities
Topic 3: Graphing Quantitative Relationships

TEXAS MATH SOLUTION

Building Coherence Across Grade Levels with Terminology

What is the impact of coherence within materials' terminology, resource tools, and representations on student understanding? How does inconsistency impact student understanding?

Grade 3 Example:

Suggested Tools and Representations

- Area model
- Array
- Grid paper (inch and centimeter)
- Rulers (both centimeter and inch measurements)
- Unit squares in both inch and centimeter lengths (e.g., square tiles used for measuring area—can be made out of paper if plastic or wood tiles are not available)

Scaffolds

The scaffolds integrated into *A Story of Units*® give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are organized by Universal Design for Learning (UDL) principles and are applicable to more than one population.

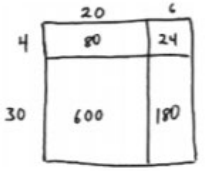
Source: Eureka Math TEKS Edition: Grade 3, Module 4

Grade 4 Example:

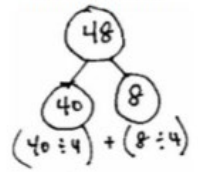
Suggested Tools and Representations

- Area model
- Grid paper
- Number bond
- Place value disks: suggested minimum of 1 set per pair of students (18 ones, 18 tens, 18 hundreds, 18 thousands, 1 ten thousand)

Area Model

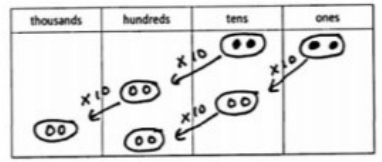


Number Bond



Place Value Disks

Thousands Place Value Chart



- Strip diagram
- Ten thousands place value chart (Lesson 7 Template)
- Thousands place value chart (Lesson 4 Template)

Source: Eureka Math TEKS Edition: Grade 4, Module 3

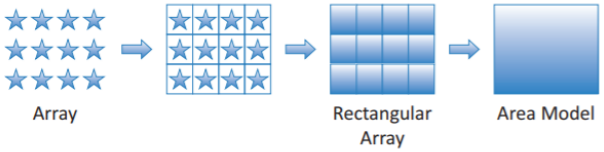
Building Coherence Across Grade-Levels with Terminology

Grade 2 Example:

Terminology

New or Recently Introduced Terms

- Area (the amount of two-dimensional space in a bounded region)
- Area model (a model for multiplication that relates rectangular arrays to area)



- Array (an arrangement of objects in rows and columns)
- Columns (the vertical groups in a rectangular array)
- Even number (a whole number whose last digit is 0, 2, 4, 6, or 8)
- Odd number (any number that is not even)
- Repeated addition (e.g., 2 + 2 + 2)
- Rows (the horizontal groups in a rectangular array)
- Square unit (a unit of area—specifically square centimeters, inches, feet, and meters)
- Tessellation (tiling of a plane using one or more geometric shapes with no overlaps and no gaps)
- Tile (to cover a region without gaps or overlaps)
- Unit square (e.g., given a length unit, it is a 1 unit by 1 unit square)
- Whole number (e.g., 0, 1, 2, 3, ...)

Source: Eureka Math TEKS Edition: Grade 2, Module 6 Overview

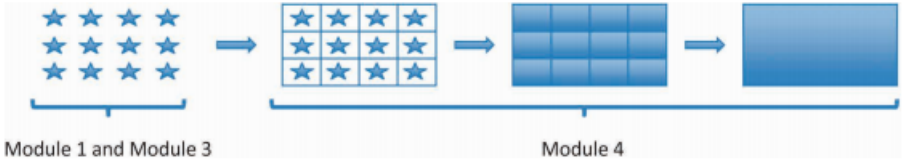
Grade 3 Example:

Use of visuals, manipulatives, and/or modeling to pre-teach consistent vocabulary is a key instructional strategy for supporting emergent bilingual learners

Terminology

Familiar Terms and Symbols[1]

- Area (the amount of two-dimensional space in a bounded region)
- Area model (a model for multiplication that relates rectangular arrays to area)



- Array (a set of numbers or objects that follow a specific pattern: a matrix)
- Commutative property (e.g., rotate a rectangular array 90 degrees to demonstrate that factors in a multiplication sentence can switch places)
- Distribute (e.g., $2 \times (3 + 4) = 2 \times 3 + 2 \times 4$)
- Geometric shape (a two-dimensional object with a specific outline or form)
- Length (the straight-line distance between two points)
- Multiplication (e.g., $5 \times 3 = 15$)
- Rows and columns (e.g., in reference to rectangular arrays)
- Square unit (a unit of area—specifically square centimeters, inches, feet, and meters)
- Tile (to cover a region without gaps or overlaps)
- Unit square (e.g., given a length unit, it is a 1 unit by 1 unit square)
- Whole number (an integer, i.e., a number without fractions)

Source: Eureka Math TEKS Edition: Grade 3, Module 4

Teacher access to materials with consistent terminology helps to create coherence in what students are taught and how the concepts and terminology are referenced in current and future grade levels.

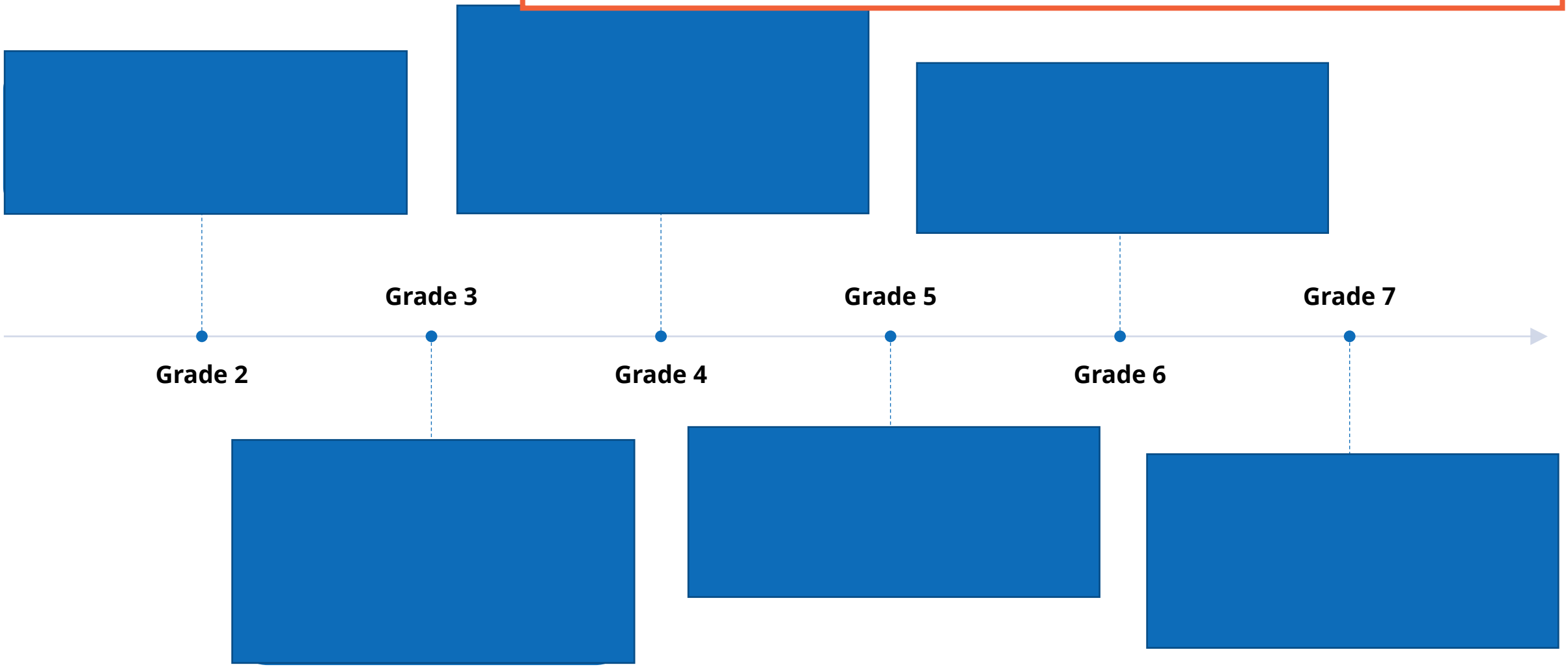
Activity: Coherence Across Grades

- Materials
  - Set of TEKS
  - Set of HQIM Tasks
  - Grades 2-7 Labels
- Directions
  - Match the TEKS to HQIM Tasks
  - Order the sets from grade 2 to grade 7

How do the TEKS coherently build on each grade level within a single concept? How do the tasks from HQIM show a similar coherence?

Check our work

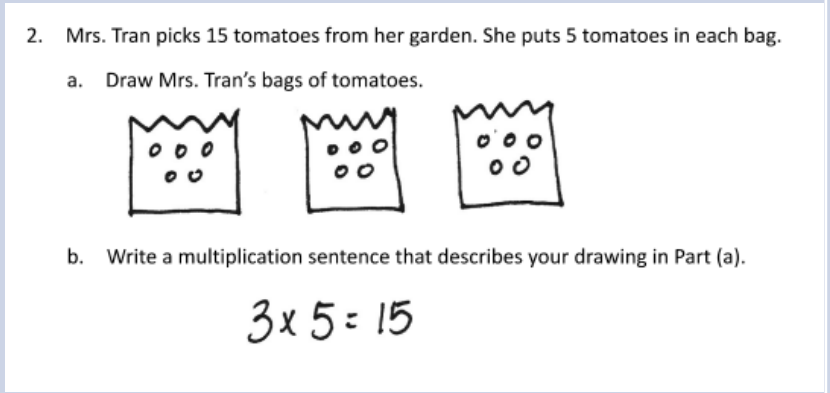
How do the TEKS coherently build on each grade level within a single concept? How do the tasks from HQIM show a similar coherence?



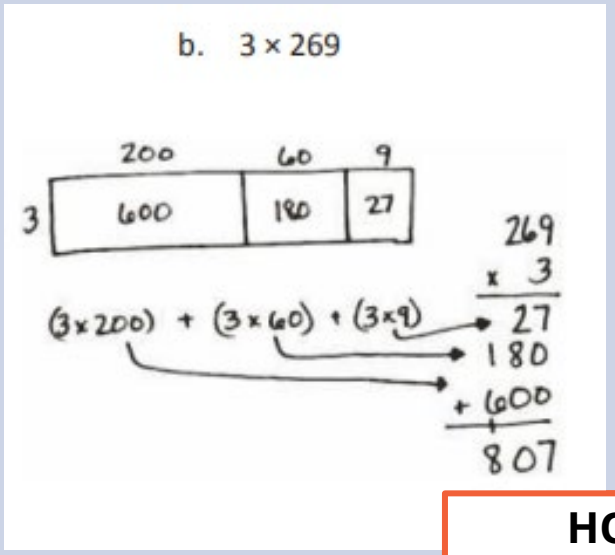
Kindergarten- Algebra 1 Vertical Alignment Chart, Page 13. https://www.texasgateway.org/resource/vertical-alignment-charts-revised-mathematics-teks

Task Coherence

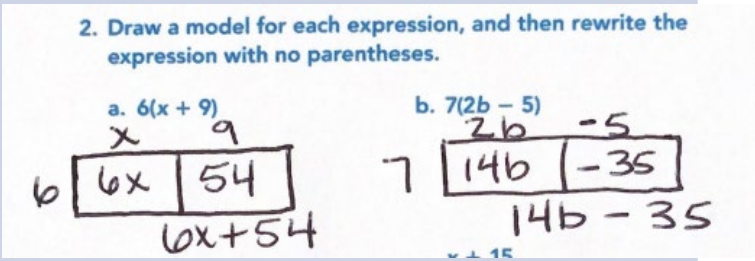
Grade 3	Grade 4	Grade 7
- repeated addition - equal sized groups -arrays	- area models - place value strategies	- area models - distributive property - simplify expressions



3(4)(E)



4(4)(D)



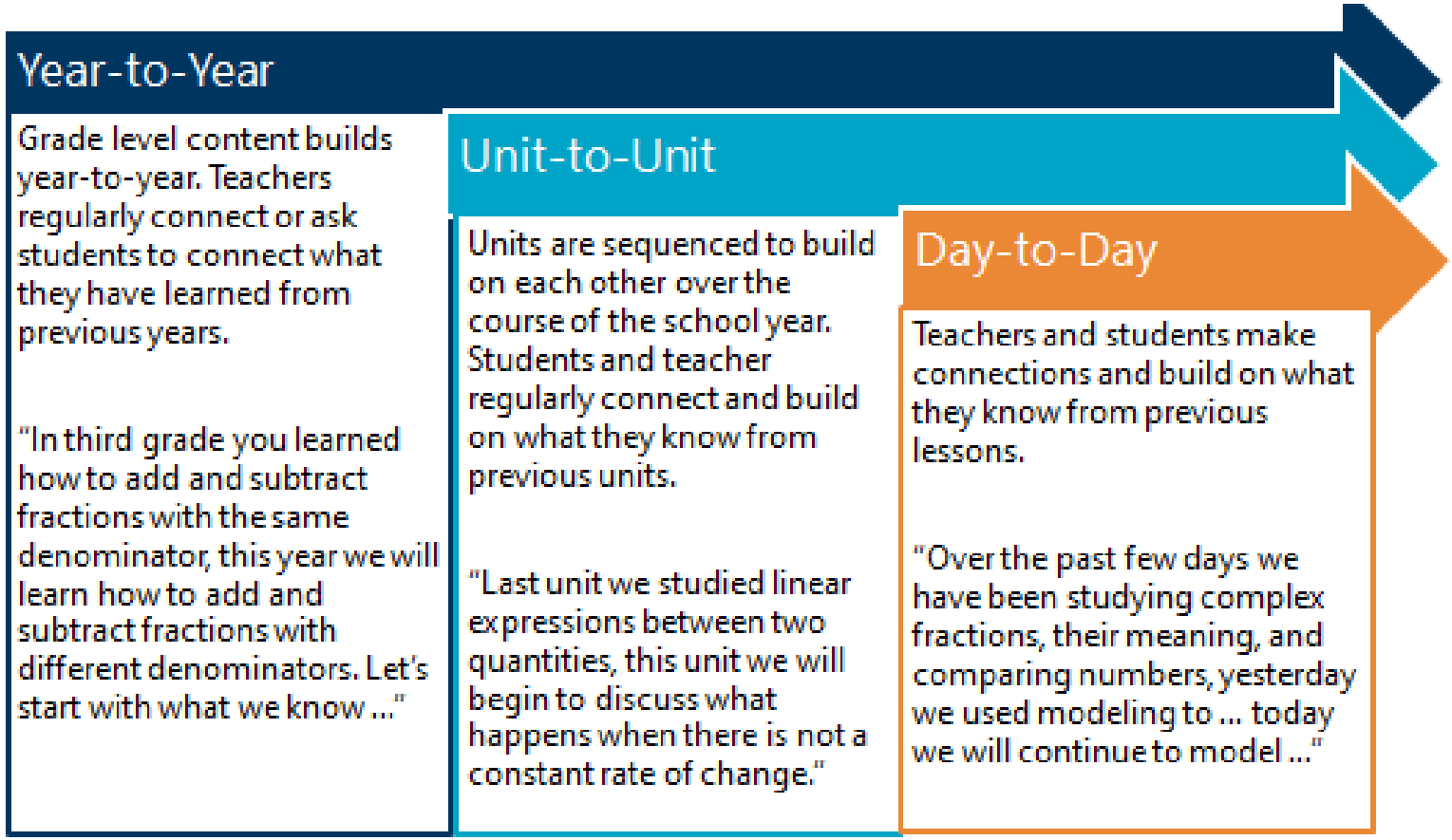
7(3)(B)

HQIM provide a common toolbox of terminology, resources, and representations that support students in their learning. How does the common toolbox support teachers in their lesson planning and execution?

Eureka Math TEKS Edition Grade 3 Module 1 Mid Module Assessment Task
Eureka Math TEKS Edition Grade 4 Module 3 Mid Module Assessment Task
Carnegie Learning Texas Math Solution 6-12 Grade 7 Module 3, Topic 2, Lesson 3

Types of Coherence

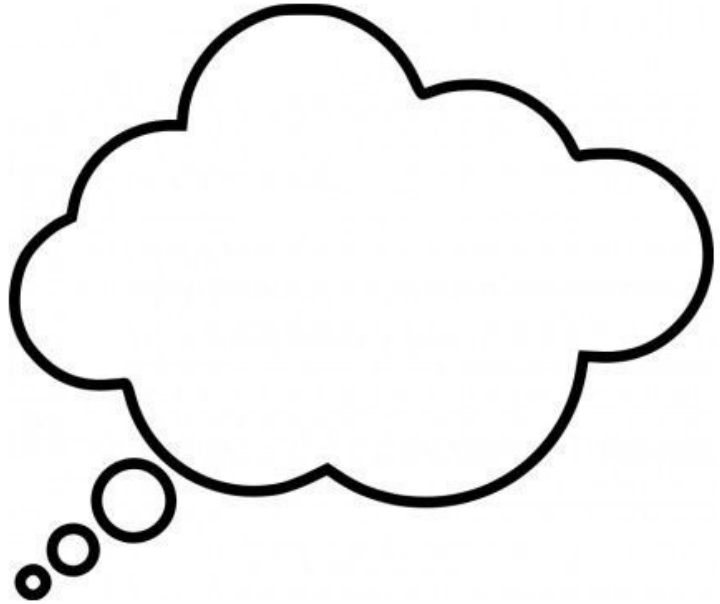
Within HQIM
Teachers and selected materials utilize consistent vocabulary terms and tools year-to-year from elementary to secondary levels to support all learners, including emergent bilingual students.



Closing Reflection Question

How are the Depth & Coherence of Key Concepts we discussed today connected to the Balance of Conceptual & Procedural understanding we discussed in our previous session?

What are some potential changes in practice educators should consider? How can you support changes in practice?



Zoom Out

Key Facilitation Strategy:

Differentiate Learning Experiences

Stop and Jot:

How did the facilitator do the following?

- Engage participants in relevant practice
- Use checks-for-understanding and reflection protocols

Day 1 Closing

Key Takeaways

Math RBIS 1: Balance Conceptual and Procedural

- **Experienced** the value and importance of balancing conceptual and procedural understanding by exploring problems.
- Learned what the **research** says about balancing conceptual and procedural understanding.
- Built a shared understanding of each of the **components** within the first Mathematics RBIS.
- Engaged in lesson components drawn from HQIM

Key Takeaways

Math RBIS 2 & 3: Depth and Coherence of Key Concepts

- **Explored** the importance of supporting depth of student understanding across key math concepts
- Built a shared **understanding** of the importance of building coherence across key math concepts, within and across grade levels
- Identified the role of HQIM in **supporting** teachers and students access to coherent instruction within and across grade levels
- Connected Math RBIS 2 & 3 as **integral** to supporting Math RBIS 1

Key Takeaways

Facilitation Practices

- Planning and Preparation
- Establish an Effective Learning Environment
- Differentiate Learning Experiences

Closing and Feedback Survey

- Thank you for joining us today. Next session is Math RBIS 3 & 4: Productive Struggle and Assessment

- Addition RBIS questions? Email them to meghan.lee@tntp.org

Session Feedback Survey:
https://bit.ly/RBISTOT