Success on STAAR

What does success on STAAR look like, not just for this year, but for every year?

We want all students to have a deep mathematical understanding and see themselves as thinkers and doers of mathematics, which includes sustained achievement and growth on annual assessments. To be a thinker and doer of mathematics and to meet achievement and growth year after year on STAAR, students must acquire, understand, retain, and apply mathematical concepts to increasingly complex units and abstract representations. Students accomplish this goal by building new learning on previous learning and frequent and distributed practice using mathematical models, strategies, and algorithms.

One of the most significant barriers to sustained growth on STAAR is when students learn mathematics as a set of disconnected, isolated processes that do not extend into subsequent grade levels. The coherence and vertical alignment of the TEKS address this barrier by connecting new learning to previous learning and ensuring students understand mathematical concepts – for example, using a model to show decomposing one ten into ten ones – before students are expected to be fluent with the abstract representations (i.e., standard algorithms). Unfortunately, the pressure to show progress on STAAR *this year* undermines our collective goal of sustained success on STAAR *every year*. Instead of a coherent approach, we are compelled to isolate instruction *only* to the specific models used on previous STAAR exams (even if those models are not used again), to the end-of-year goals of fluency with standard algorithms (instead of building mathematical understanding through concrete and pictorial models), and to the question types on STAAR (which will constantly evolve as assessments become more complex).

We need an approach that addresses our goals for this year and future years. That approach begins by asking ourselves, “Are students doing mathematics aligned to the coherence of key concepts and balance of procedural and conceptual learning as written in the TEKS? Are students connecting this year’s learning to last year’s? Will what students learn this year connect to next year’s learning?” If yes, students can take the reins of their learning and apply their thinking to new contexts and situations. (Hattie, Fisher, Frey, Gojak, Moore, and Mellnab, 2017, pg. 31).

Using High-Quality Instructional Materials (HQIM) such as Eureka Math TEKS Edition to prepare students for STAAR begins by understandings how the HQIM aligns with the coherence & balance of procedural and conceptual understanding of the TEKS. In Eureka Math TEKS, new learning is layered on concepts previously taught (e.g., via Concept Development) and distributed over time (e.g., via Fluency Practice and the Application Problem). This distributed practice and coherent approach address the dual goals of student mastery of TEKS growth and achievement on STAAR year after year.

We are often asked about the relationship between the standards and the assessment. For example,

- “Grade 4 STAAR includes 2-digit by2-digit multiplication. Do my students need to master the standard algorithm in Grade 4 to be successful on the STAAR? Should I focus instruction on a process students can use for 2-digit by 2-digit multiplication, or should I build understanding through models and strategies?”
- “Do students need to practice the same part-whole or fraction models used on previously released STAAR?”

The most direct answer to these and related questions is this: if we use HQIM aligned to the TEKS and the Researched Based Instructional Strategies, students will transfer their learning to answer any question on the STAAR assessment. Here is what that looks like in your classrooms.

TEKS

4.4D: The student is expected to use **strategies and algorithms,** including the standard algorithm, to multiply up to a four-digit number by a one-digit number and to multiply a two-digit number by a two-digit number. **Strategies may include mental math, partial products, and the commutative, associative, and distributive properties.**

STAAR Example

A basketball team plays 82 games each year. How many games will the team play in 25 years?

A 1,050

B 2,040

C 2,090

D 2,050

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To align to the rigor of the TEKS, students should learn multiple strategies including mental math, partial products, and the commutative, associative, and distributive properties. In Eureka Math TEKS Edition students will have a balance of conceptual and procedural understanding. Having this balance will allow students to be able to problem solve real-world situations along with college and career work.

Teaching only procedural allows for students to have in the moment understanding that does not last. In Eureka Math TEKS Edition students will learn how to solve the above STAAR example by being exposed to multiple strategies, as stated in the TEKS. When kids draw and associate things connected to the algorithm, the more likely they can pull things out.

TEKS

5.4E describe the meaning of parentheses and brackets in a numeric expression;
5.4F simplify numerical expressions that do not involve exponents, including up to two levels of grouping.

STAAR Example

16 A basketball team scored points by making baskets worth different numbers of points during a game.

- The team made 6 baskets worth 3 points each.
- The team made 21 baskets worth 2 points each.
- The team scored 16 points by making baskets worth 1 point each.

This equation can be used to find p, the total number of points the basketball team scored during the game.

$$p = 6(3) + 21(2) + 16$$

What is the total number of points the basketball team scored during the game?

F 76

G 48

H 94

J 60

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Teaching in context rather than by rule seems to be a much more effective way for students to understand grouping intuitively rather than beginning with the rules around PEMDAS . The way students use and see grouping symbols (especially around the work in Module 6 and the coordinate plane) has a bigger impact ultimately on retention of order of operations without the backlash of rule overgeneralization.

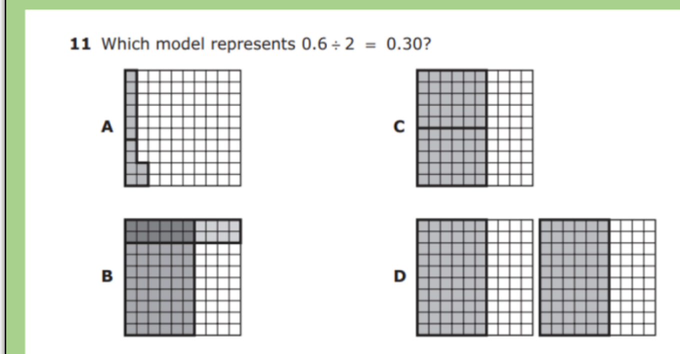
Students taught with Eureka Math will hear and see what is needed to be “grouped” because of the context of the problems. The “type of number” is immaterial when it comes to order of operations. When students translate words to expressions and expressions to words (Module 1 and 6) they are also working on order of operations. For example, to write an expression for “Three times as much as the sum of 5 and 6,” 3 x (5+6) students are working on order of operations. They hear in the words “why” the grouping (and addition) is necessary before multiplication. This is a much more conceptual approach than teaching PEMDAS which usually creates many persistent misconceptions (like multiplication must be done before division).

Eureka Math includes expressions with parenthesis and brackets in Lessons 12 & 25 and Order of Operations in the Fluency Practice for Lesson 25. To customize, consider adding some of the problems in topics C and F to include only whole numbers and decimals rather than both fractions and decimals and add more STAAR-like questions that emphasize the Order of Operations, excluding exponents.

TEKS

5.3J represent division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as 1/3 ÷ 7 and 7 ÷ 1/3 using objects and pictorial models, including area models.

STAAR Example



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Eureka Math maximizes coherence across grade levels, which is the most effective approach to helping students master mathematical concepts. The consistent use of the same models and problem-solving strategies leads to deeper understanding of new concepts. Eureka Math is a layering curriculum. A grade level's various modules are strategically and intentionally ordered so they work as foundations for each other.

Students come into Grade 5 with the understanding of equivalent decimals. In Grade 4 Module 6 Topic B, students use pictorial models (hundred charts) to represent equivalent fractions. They have the understanding that 0.6 is equivalent to 0.60.

In Grade 5 Module 4 Lessons 17-19, students use strip diagrams and number lines to reason about the division of a whole number by a unit fraction and a unit fraction by a whole number. Grade 5 Module 2 Lesson 26-31, students practice dividing decimals by whole numbers during the Fluency component. Teachers have the option to customize the fluency by bringing in scaffolds as needed. If students need additional support, teachers are encouraged to bring in a hundred chart duringFluency.

A coherent HQIM allow students to take what they have learned previously and apply it to new learning. Students should be able to identify which model shows 0.6 or 0.60. With the understanding of division, they know that they are dividing 0.6 into two parts, which gives them the answer of 3 hundredths (0.30) in each of those parts.

READ DRAW WRITE

Students use the RDW process to make sense of and solve word problems. By reading and drawing, they create a model that accurately represents the scenario and includes a question mark or letter for the unknown. Students then use their model to write number sentences and then use the number sentences to find the missing value(s). Systematic use of the RDW process, beginning in the primary grades, prepare students to be successful on STAAR in grades G3-G5 .

TEKS

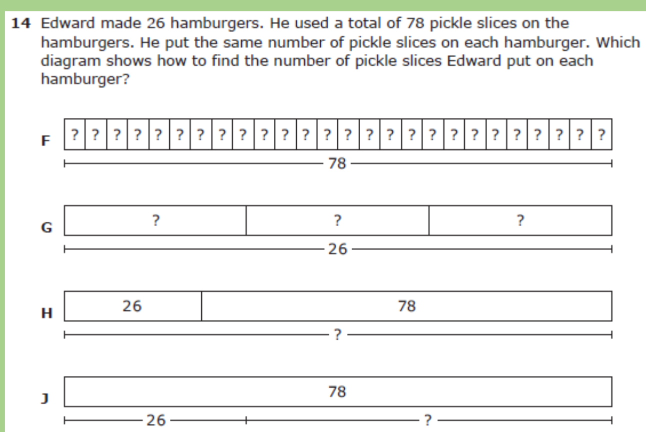
3.4K Solve one-step and two-step problems involving multiplication and division within 100 using strategies based on objects; pictorial models, including arrays, area models, and equal groups; properties of operations; or recall of facts

3.5B Represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations

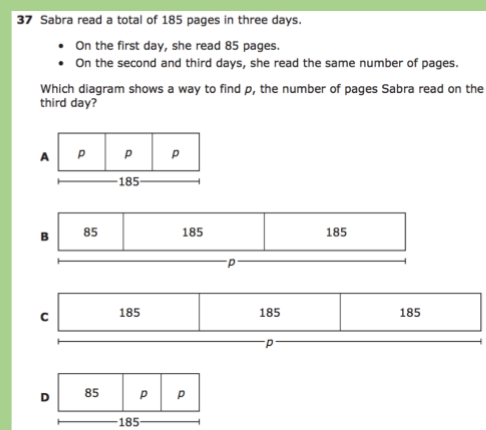
4.4H Solve with fluency one- and two-step problems involving multiplication and division, including interpreting remainders

4.5A Represent multi-step problem involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity

Grade 3


14 Edward made 26 hamburgers. He used a total of 78 pickle slices on the hamburgers. He put the same number of pickle slices on each hamburger. Which diagram shows how to find the number of pickle slices Edward put on each hamburger?

Grade 4


37 Sabra read a total of 185 pages in three days.

- On the first day, she read 85 pages.
- On the second and third days, she read the same number of pages.

Which diagram shows a way to find *p*, the number of pages Sabra read on the third day?

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There is no universal list of steps for solving all word problems because all word problems are different. The value of the Read Draw Write process is that it is transferable and teaches students habits for thinking, representing, and solving by using tools and strategies that work for them. As the problem's situation demands, students can move flexibly, make sense of the part-whole relationships within it by drawing, and then writing a number sentence or equation. The goal of using RDW is for students to internalize a framework for problem-solving that will allow them to independently make meaning of and solve any word problems they encounter. Instead of asking students to find the keywords ("less" doesn't always mean subtract!) or "What operation is this problem?", we ask students to draw a model and let the model dictate the computational strategy that makes the most sense to them.

Over time, students will be fluent with the RDW process and able to apply it to any word problem on STAAR.

References:

Retrieved from: https://tea.texas.gov/student-assessment/testing/staar/staar-released-test-questions

Hattie, J., Fisher, D., Frey, N., Gojak, L., Moore, S., Mellman W. (201 7) *Visible Learning/or Mathematics: What Works Best to Optimize Student Learning.* Thousand Oaks, California: Corwin Publishing Company.