Grade 6 Sample - Roadmap to Implementing High Quality Mathematics Instruction (Version 2)

The Roadmap to Implementing High-Quality Mathematics resource, as well as the Roadmap Overview, are available on www.kystandards.org.

The Roadmap to Implementing High Quality Mathematics Instruction seeks to **ground instruction in the *Kentucky Academic Standards (KAS) for Mathematics*, thus reaffirming a commitment to equitable learning opportunities for all Kentucky students.**

How did we get here: As much of the information in this first section of the Roadmap relates to clarity around the standard(s) and ensuring the learning experience is aligned to grade-level *KAS for Mathematics*, educators might begin by exploring the connection between these two resources:

- Grade 6 Breaking Down a Standard sample for KY.6.G.2:
  Designed to mirror the architecture of the *KAS for Mathematics*, the Breaking Down a Mathematics Standard resource supports clarity by guiding educators to look deeply at the components of the architecture of the standards, contributing to a holistic understanding of the *KAS for Mathematics*, and the instructional implications resulting from that exploration, including the impact on student learning.
- Grade 6 Assignment Review Protocol for Girl Scout Cookies 3-Act Task
  A protocol intended to help answer the question, "Does this task give students the opportunity to meaningfully engage in worthwhile grade-appropriate content?"

KAS for Mathematics	Cluster:	Learning Experience:
KY.6.G.2	Solve real-world and mathematical problems involving area, surface area and volume.	Girl Scout Cookies Three Act Task

Identify the Target of the Standard(s):

☐ **Conceptual Understanding** refers to understanding mathematical concepts, operations and relations. Conceptual understanding is more than knowing isolated facts and methods; students should be able to make sense of why a mathematical idea is important and the kinds of contexts in which it is useful. Conceptual understanding allows students to connect prior knowledge to new ideas and concepts.

☐ **Procedural Skill/Fluency** is the ability to apply procedures accurately, efficiently, flexibly and appropriately. It requires speed and accuracy in calculation while giving students opportunities to practice basic skills. Students' ability to solve more complex application and modeling tasks is dependent on procedural skill and fluency

✓ **Application** provides a valuable context for learning and the opportunity to solve problems in a relevant and a meaningful way. It is through real-world application that students learn to select an efficient method to find a solution, determine whether the solution(s) makes sense by reasoning and develop critical thinking skills.

Identify the Practice Standard(s):

May reference *Engaging the SMPs: Look fors & Question stems*

☐ MP.1. Make sense of problems and persevere in solving them.

✓ MP.2. Reason abstractly and quantitatively.
- Can you explain what you've done so far?
- Have you thought of all the possibilities?

☐ MP.5. Use appropriate tools strategically.

✓ MP.6. Attend to precision.
- Compare your answer to ___'s answer.
- Can you explain what you did to solve the problem?

☐ MP.3. Construct viable arguments and critique the reasoning of others.	☐ MP.7. Look for and make use of structure.
✓ MP.4. Model with mathematics. • Why do the results make sense? • Would it help to create a diagram? Draw a picture? Make a table?	☐ MP.8. Look for and express regularity in repeated reasoning.

How did we get here: As educators begin considering what this learning experience might look like and feel like with students, the *Engaging the SMPs: Look fors and Question Stems* can be a really great place to start. For this learning experience, questions from MP.2, MP.4 and MP.6 felt like a natural fit to keep in mind when considering how to move student thinking forward while not taking away the thinking away from the student.

Note: To demonstrate the idea that educators can take different routes and still arrive at the same destination, there are two samples available related to this same Grade 6 learning experience. As this first section focuses more on grounding in the standards and ensuring the task engages students in grade-level content, you will see less variation in this section of the sample Roadmaps than in the other two that follow.

The Roadmap to Implementing High Quality Mathematics Instruction seeks to **support intentional integration of evidence-based instructional practices.**

Identify Evidence-based Instructional Practice(s) May reference *Effective Mathematics Teaching Practices (NCTM)*	
☐ EMTP 1: Establish mathematics goals to focus learning.	☐ EMTP 5: Pose purposeful questions.
☐ EMTP 2: Implement tasks that promote reasoning and problem solving.	☐ EMTP 6: Build procedural fluency from conceptual understanding.
☐ EMTP 3: Use and connect mathematical representations.	☐ EMTP 7: Support productive struggle in learning mathematics.
✓ EMTP 4: Facilitate meaningful mathematical discourse.	☐ EMTP 8: Elicit and use evidence of student thinking.

Teacher Actions:	**Student Actions:**
☐ Engaging students in purposeful sharing of mathematical ideas, reasoning, and approaches, using varied representations.	✓ Presenting and explaining ideas, reasoning, and representations to one another in pair, small-group, and whole-class discourse. As students are working in pairs or small-groups during Act 2, Student Discourse Moves support students in working with ideas. (Note: If these haven't been used before, students may need to practice using these with one another prior to engaging with them during the task.)
☐ Selecting and sequencing student approaches and solution strategies for whole-class analysis and discussion.	
✓ Facilitating discourse among students by positioning them as authors of ideas, who explain and defend their approaches. • After students watch the video for Act 1, engage the class in an I Notice, I Wonder routine.	☐ Listening carefully to and critiquing the reasoning of peers, using examples to support or counterexamples to refute arguments.

• During Act 2, while students are working to estimate the capacity of the trunk and the dimensions of the cookie box, discourse will be supported using:
  ○ Teacher and Student Discourse Moves.
  ○ Talk Moves
• At the conclusion of Act 2, students will do a Gallery Walk, using sticky notes to provide feedback on the work from other groups.
 	
Within the task, additional discussion prompts are provided, such as:
• The Girl Scouts are considering a Super Box of cookies which is twice as long, tall, and wide. How many Super Boxes would the trunk hold?
• If your mathematical answer was different from the actual answer, what might explain the difference?
 	
☐ Ensuring progress toward mathematical goals by making explicit connections among student approaches and reasoning.
	✓ Seeking to understand the approaches used by peers by asking clarifying questions, trying out others' strategies, and describing the approaches used by others.
	During the Gallery Walk, students will need a feedback structure to use. Using the Peer Feedback Choice Board would allow for student choice as to which type of feedback they offer, such as:
	• Greatest Strength
	• Tiny Tweaks
	• Celebrate Surprises
	• Hungry for More
	• Mind Blown
	• Clarifying Confusion
	
	☐ Identifying how different approaches to solving a task are the same and how they are different.

How did we get here: The Three Act Task is a common framework to provide multiple pathways for success. As students have various entry points into the task and strategies to find a solution, this learning experience offers an opportunity for educators to "facilitate meaningful mathematical discourse". This Roadmap elevates teacher actions and student actions that empower students to take ownership of their learning and engage with peers to consider their own approach more deeply.

Three Act Tasks often require many different skills, including sifting through information and deciding what is relevant, interpreting graphs, locating information needed to solve a problem and making simplifying assumptions. Facilitating discussion using the Student Discourse Moves will invite students to consider their approach ("We should change our model to show that…") and how it relates to the context of the video ("But that doesn't explain what we saw when…"). Building on one another's ideas and challenging ideas is how students "construct viable arguments and critique the reasoning of others" (MP.3).

The Roadmap to Implementing High Quality Mathematics Instruction seeks to **expand educator familiarity with strategies to interweave the development of social emotional competencies with development of mathematics content.**

Identify the Competency Intended to Support the Evidence-Based Instructional Practice: May reference *Integrating SEAD within the KAS for Mathematics* resource library				
☐ SELF-AWARENESS	☐ SELF-MANAGEMENT	☐ SOCIAL AWARENESS	✓ RELATIONSHIP SKILLS	☐ RESPONSIBLE DECISION-MAKING

Specific Design Considerations from *Integrating SEAD within the KAS for Mathematics* Grade Level Resource
Intentionally use collaborative work groups to reinforce the importance of working together to solve problems and achieve goals. Position students as

mathematically competent by encouraging students to construct mathematical arguments and engage in the reasoning of others. Empower students to give and receive constructive feedback. As students engage in learning experiences that require them to listen to the argument of others, decide if they make sense and ask useful questions to clarify or improve the argument, it may be useful to implement discussion protocols to provide a safe environment for students to share their developing thinking (MP.3). In Grade 6 students could elicit feedback when working collaboratively to make sense of real-world problems involving area, volume and surface area (KY.6.G.1).

Teacher Reflection Questions from *Integrating SEAD within the KAS for Mathematics* Grade Level Resource

Which student(s) do I typically call on to participate in class discussions? Is there anything I might want to shift about my current approach?

I focused a lot on empowering students to communicate and collaborate in this lesson. I have a lot of evidence of their thinking and the feedback they provided their peers. One thing I might want to do is to ask someone to support me in this (a partner teacher, coach, administrator, etc.) to track participation in my classroom and offer me that data to reflect on.

How might I utilize and engage with problems that have complex, competing or multiple answers?

This task offers the opportunity for rich discussion around competing answers and limits the possibility for students to simply try to guess the right answer. Students might bring up the fact that all Girl Scout Cookie boxes aren't the same dimension (as seen in the video) and want to use the dimensions of the box for their favorite flavor to make their estimate.

How might I support students in giving feedback in specific situations? Are there specific strategies I might employ to help students improve their communication skills?

In this learning experience, I wanted to equip students to give more specific feedback. Sometimes the feedback they give one another is more of a judgement than specific feedback on what was effective and what might be improved. The Peer Feedback Choice Board worked well for this because it gave students an idea for where to even start with their feedback – a place to start along with what they might share. Using this more often moving forward (and modeling it within my own feedback to students/groups) is something I want to focus on moving forward.

How did we get here:

Focusing on relationship skills is a natural fit to support EMTP 4, especially as student action, "Presenting and explaining ideas, reasoning, and representations to one another in pair, small-group, and whole-class discourse" was selected as being elevated in this particular Roadmap. Relationship skills can also be elevated by providing sentence stems for students to choose from when formulating questions, such as:

- Analysis: "How would you explain…? What is the importance of …?"
- Clarification: "Explain how … What is meant by …?"
- Cause and Effect: "What connection is there between …?"
- Comparison: "What is the difference between …? How are they alike?"

Encouraging students to use the question stems when they are stuck will offer students options for what to say other than "I don't know what to do", equipping them to ask questions to help move their own thinking forward as well as the moving the thinking of their peers forward. Supporting student relationship skills was critical to engaging students fully in the mathematics of this learning experience.