Grade 1 Sample - Roadmap to Implementing High Quality Mathematics Instruction

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 1 Breaking Down a Standard sample for KY.1.NBT.1
  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 1 Assignment Review Protocol for How Many Ducklings Are There?
  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.1.NBT.1	Extend the counting sequence.	How Many Ducklings Are There?

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.
- What information do you have?
- What do you need to find out?

☐ MP.2. Reason abstractly and quantitatively.

☐ MP.5. Use appropriate tools strategically.

☐ MP.6. Attend to precision.

☐ 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.	✓ MP.8. Look for and express regularity in repeated reasoning. • How could this problem help you solve another problem? • How would we prove that _____?

Notes on Key Lesson Components
For more information on how to implement these types of tasks, visit problem-based lesson/3 Act Task.

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.1 and MP.8 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.

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:
✓ Providing time for students to grapple with tasks. • Day 1: Introduce the task, create a list of problems that may make the task difficult to complete (see chart below) this will be done by the whole group, then come up with solutions as a group of ways to solve the problems that we may face. • Day 2: Begin working on the task, if students encounter a problem that we had previously listed, use our chart to see the solution that we came up with. Following the completion of the task, we will compare answers, students will share their strategy of choice, and	✓ Struggling at times with mathematics tasks but knowing that breakthroughs often emerge from confusion and struggle. Students evaluate the task and decide how they would like to approach the task (some may choose to count all the ducklings one at a time, some may have the skill set to be able to group the ducklings into groups of 2, 5, or 10 and count that way). If students feel confusion or struggle with the task, what did they learn from their first attempt? What can they do differently the second (or third) time to lessen confusion and keep the struggle to a minimum?

students will be able to discuss each other's answers).

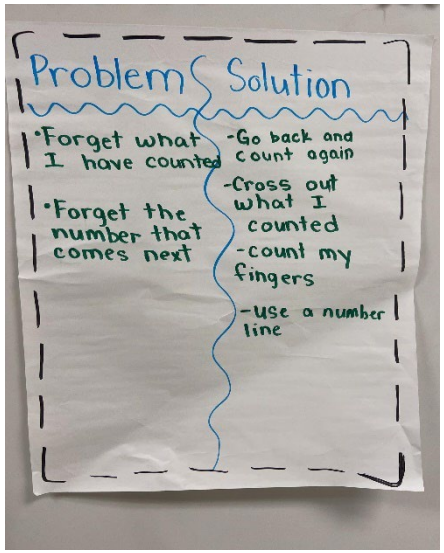
✓ Discussing the value of making multiple attempts and persistence.

- Prior to introducing the task, we read a book related to persistence (When Sophie Thinks She Can't) and that we never say we "can't," we say, "not yet."
- Connect to Leader in Me Habit 7 (Begin with the End in Mind)
- What happens if we cannot solve this task the first time? What can we do to work toward solving the task? Why is it important to not give up on this task?

✓ Facilitating discussion on mathematical error(s), misconception(s) or struggle(s) and how to overcome them.

- As students begin the work on Day 2 begin focusing on misconceptions that could arise from the task (notice the task says "ducklings" not "ducks").
- Be aware of struggles that students may have (this could be struggles indicated on the chart we created the previous day or others that could arise; some that I thought of were students losing count and feeling frustrated if they had to start over/maybe not having the ability to count a large group of objects - how can I make accommodations for those students?)

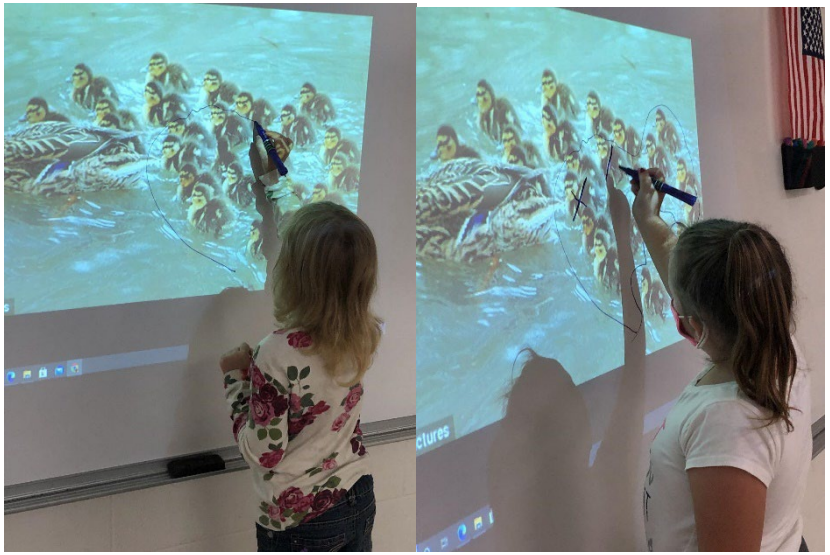
☐ Asking questions that purposefully scaffold students' thinking without stepping in to do the work for them.



☐ Asking questions that are related to the sources of their struggles and will help them make progress in understanding and solving tasks.

✓ Persevering in solving problems and realizing that it is acceptable to say, "I don't know how to proceed here," but it is not acceptable to give up. Students need to be aware of their own abilities in regard to counting and/or identifying a counting pattern. Can students apply their own personal skill set to this task by looking for a pattern and using that to reason in order to determine how many ducklings there are?

☐ Helping one another without telling their classmates what the answer is or how to solve the problem.



How did we get here: EMTP 7 feels like a natural fit since this problem-based lesson gives students a situation and they have to persevere to solve. Problem based lessons/3 Act Tasks provide students the opportunities to reason and take the first initial step to solve the problem in a real-world context.

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

Routinely ask questions that encourage students to reflect on barriers they may encounter and help them think about ways they can overcome challenges: Consistently provide students, individually and collectively, with opportunities and support to engage in productive struggle as they grapple with mathematical ideas and relationships (NCTM, 2014). Promote student engagement and identity by embedding systems and routines, such as Routines for Reasoning, to allow students to engage in productive struggle and take ownership of their progress and growth toward intended learning outcomes.

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

How might I use student mistakes as an opportunity for learning?

- Use of the "My Favorite No" activity
- Allow students to correct their work

What opportunities for student reflection are embedded within my plan for instruction?

- Allowing students to look at each other's work, reflect on their own thinking process and how that compares to other students' process.
- Use of math-Talk Moves

How might I model self-discipline and self-motivation during my instruction?

- Use real-life examples of times when I have struggled and how I used self-discipline and self-motivation to keep going.
- "Talk out" problem solving with my students and my thinking process with them/Maybe intentionally make a mistake and see if students can catch the mistake and talk me through it.

How did we get here: Focusing on self-management is a natural fit to support EMTP 7, especially as student action, "Preserving in solving problems and realizing that it is acceptable to say, "I don't know how to proceed here", but it is not acceptable to give up in this Roadmap. Another way to support student self-management is to provide opportunities for students to take the initiative for their own learning. Embedding time and space for student reflection can have a significant impact on how well students are able to manage their emotions and express personal agency around the mathematics being learned. Consider how to support and equip students to take the initiative and move learning forward. For example, in number talks for addition and subtraction within 20 and choral counting within 120, position every student as a competent mathematical thinker, as seen in KY.1.OA.6 (MP.7).