

Grade 3 Sample - Roadmap to Implementing High Quality Mathematics Instruction



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 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 3 Breaking Down a Standard sample for KY.3.OA.8:](#)
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 3 Assignment Review Protocol for “Do you have enough money?”:](#)
A protocol intended to help answer the question, “Does this task give students the opportunity to meaningfully engage in worthwhile grade-appropriate content?”

<i>KAS for Mathematics</i>	Cluster:	Learning Experience:
KY.3.OA.8	Solve problems involving the four operations and identify and explain patterns in arithmetic.	Do you have enough money?
Identify the Target of the Standard(s):		
<input type="checkbox"/> 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. <input type="checkbox"/> 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 <input checked="" type="checkbox"/> Application provides a valuable context for learning and the opportunity to solve problems in a relevant and 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		
<input checked="" type="checkbox"/> MP.1. Make sense of problems and persevere in solving them. <ul style="list-style-type: none"> • What information do you have? • What do you need to find out? • What do you think the answer might be? <input type="checkbox"/> MP.5. Use appropriate tools strategically.		

- Can you draw a picture?
 - How could you make this problem easier to solve?
 - Have you compared your work with anyone else?
 - What are you having trouble with?
- [MP.2.](#) Reason abstractly and quantitatively.
 - [MP.3.](#) Construct viable arguments and critique the reasoning of others.
 - [MP.4.](#) Model with mathematics.
 - What do you already know about solving this problem?
 - What connections do you see?
 - Why do the results make sense?
 - Is this working or do you need to change your model?
 - Would it help to create a diagram? Draw a picture? Make a table?
 - [MP.6.](#) Attend to precision.
 - [MP.7.](#) Look for and make use of structure.
 - [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.1 and MP.4 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)	
<input type="checkbox"/> EMTP 1: Establish mathematics goals to focus learning.	<input type="checkbox"/> EMTP 5: Pose purposeful questions.
<input checked="" type="checkbox"/> EMTP 2: Implement tasks that promote reasoning and problem solving.	<input type="checkbox"/> EMTP 6: Build procedural fluency from conceptual understanding.
<input type="checkbox"/> EMTP 3: Use and connect mathematical representations.	<input type="checkbox"/> EMTP 7: Support productive struggle in learning mathematics.
<input type="checkbox"/> EMTP 4: Facilitate meaningful mathematical discourse.	<input type="checkbox"/> EMTP 8: Elicit and use evidence of student thinking.
Teacher Actions:	Student Actions:

<ul style="list-style-type: none"> ✓ Motivating students' learning of mathematics through opportunities for exploring and solving problems that build on and extend their current mathematical understanding. This problem begins with the goal of determining if you have enough money to purchase the game. This is where you want to ask students "How can we figure out if we have enough money?" Students should come up with the idea that we need to find out how much is in the bank. Once they ask for that information, show students the first video. Then ask: <ul style="list-style-type: none"> • How do you know if you have enough information, your coin bank to buy the game? • If there is extra money, how much extra do you have? • If there is not enough money, how much more do you need? □ Selecting tasks that provide multiple entry points through the use of varied tools and representations. □ Posing tasks on a regular basis that require a high level of cognitive demand. ✓ Supporting students in exploring tasks without taking over student thinking. As you progress through the scaffolded videos of the coins within the bank. Remind students that a mathematical model used to represent a problem's solution is a 'work-in-progress' and may be revised as needed. □ Encouraging students to use varied approaches and strategies to make sense of and solve tasks. 	<ul style="list-style-type: none"> ✓ Persevering in exploring and reasoning through tasks. MP.1 Students engage in making sense of the problem by thinking how to count all the different amounts of money/coins to see if they have enough to buy the game. ✓ Taking responsibility for making sense of tasks by drawing on and making connections with their prior understanding and ideas. MP.4 Students will model with mathematics by sorting and counting the groups of coins. They might make arrays to use multiplication instead of counting each individual coin. □ Using tools and representations as needed to support their thinking and problem solving. ✓ Accepting and expecting that their classmates will use a variety of solution approaches and that they will discuss and justify their strategies to one another. As students discuss the meaning of the problem with classmates. Let them take a gallery walk to see other students making choices about which solution path they took. Students can ask one another questions by providing question stems to check answers and make sure solutions are reasonable and make sense. <ul style="list-style-type: none"> • What connections do you see? • Why do the results make sense? • Is this working or do you need to change your model?
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How did we get here:

EMTP 2 is a natural fit for teachers to engage students in solving real-world tasks as required by the Operations and Algebraic thinking domain. Giving students a non-straightforward story situation about seeing if they have enough money to buy a game is a valid context and providing students the opportunity to decide on ways to make sense of the problem is required within the *KAS for Mathematics*.

Within the Student Actions above it is possible to increase the [Cognitive Complexity](#) of this task to a level three by removing access to the scaffolded videos of the coins being structured into groups and then an array. The task as written does have students solving the problem that entails an application of mathematics and requires an interpretation of the context to determine the procedure or concept (may include extraneous information). The mathematics is not immediately obvious. Solving the problem requires students to decide what to do.



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

Model good decision-making. Establish classroom discussion norms that support facilitating discourse among students to build a shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments (NCTM, 2014). Making intentional choices about the language used when modeling “think aloud” strategies can be impactful. Given a non-straightforward story situation like in [Operations and Algebraic Thinking: Solve problems involving the four operations and identify and explain patterns in arithmetic](#).

Teacher Reflection Questions from [Integrating SEAD within the KAS for Mathematics](#) Grade Level Resource

What strengths and values might I highlight from the community in which I teach?

Maybe the community I teach in typically does not have extra funds for board games therefore what do they do for entertainment or how could I relate this problem to their lives?

What steps am I taking to offer students opportunities to actively engage and use their voice within my classroom? Is there anything I might want to shift about my current approach? How might I support that same active engagement and voice beyond my classroom and beyond my school?

Students may have never played Hedbanz before, therefore give students the opportunity to find a game that their family plays to use instead.

How did we get here:

Responsible decision-making is a natural fit for this task. When reading story situations like in [Operations and Algebraic Thinking, Cluster: Represent and solve problems involving multiplication and division](#), students seek to make sense of the story and its quantities (MP.1). Students do not just lift numbers out or use keywords. To help make sense of the problem, students might decide to write an equation, use a number line and/or draw a picture. In other words, they ‘mathematize’ the situation (MP.4) and have to make responsible decisions based on the situation/context at hand.