

Grade 5 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 5 Breaking Down a Standard sample for KY.5.G.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 5 Assignment Review Protocol for Battleship using Grid Paper:](#)
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.5.G.1	Graph points on the coordinate plane to solve real-world and mathematical problems.	Battleship using Grid Paper

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](#)

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| <ul style="list-style-type: none"> <input type="checkbox"/> MP.1. Make sense of problems and persevere in solving them. | <ul style="list-style-type: none"> ✓ MP.5. Use appropriate tools strategically. <ul style="list-style-type: none"> • What other resources could help you solve this problem? • Why did you use this method to solve the problem? • What can using a ____ show us that ____ may not? |
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| <input type="checkbox"/> MP.2 . Reason abstractly and quantitatively. | <input checked="" type="checkbox"/> MP.6 . Attend to precision. <ul style="list-style-type: none"> • How do you know your answer is accurate? • Did you use the most efficient way to solve the problem? • What if you had started with ___ rather than ___? • Did you use or learn any new mathematical words today? What do they mean? |
| <input type="checkbox"/> MP.3 . Construct viable arguments and critique the reasoning of others. | <input checked="" type="checkbox"/> MP.7 . Look for and make use of structure. <ul style="list-style-type: none"> • How can you use what you know to explain why this works? • What uses of mathematics can you find in current events? • Can you give an example of ___? • What patterns do you find in ___? • How do you know ___ is a pattern? |
| <input type="checkbox"/> MP.4 . Model with mathematics. | <input type="checkbox"/> MP.8 . Look for and express regularity in repeated reasoning. |

Notes on Key Lesson Components

The students will need grid paper and colored pencils; some color for the ships and (for example) red for explosions on their ships and their enemy's ships. This is how they will keep track of what ordered pairs have been called. This task allows students to practice plotting points in the first quadrant as well as naming coordinates of points. Correct vocabulary usage during play should occur. Students notice a coordinate axis, is in fact, coordinating a horizontal number line with a vertical number line.

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.5, MP.6 and MP.7 felt like a natural fit to keep in mind when considering how students are conceptually plotting points within the first quadrant of a graph since this is the first time understanding this concept.



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 \(NCTM\)](#)

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| <input checked="" type="checkbox"/> EMTP 1 : Establish mathematics goals to focus learning. | <input type="checkbox"/> EMTP 5 : Pose purposeful questions. |
| <input 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:
<p><input type="checkbox"/> Identifying and communicating goals that are specific to the lesson and clear to students (not simply a standard). Students practice plotting points in the first quadrant as well as naming coordinates of points. Correct vocabulary usage during play should occur.</p> <p><input type="checkbox"/> Revisiting goals throughout the lesson. Ask students questions throughout like:</p> <ul style="list-style-type: none"> <input type="checkbox"/> How do you know your answer is accurate? <input type="checkbox"/> Did you use the most efficient way to find the coordinates? <input type="checkbox"/> What if you had started with ___ rather than ___? <input type="checkbox"/> What if you could only use ___? <input type="checkbox"/> What are the key points or big Ideas in this lesson? <p><input type="checkbox"/> Teacher explicitly models for students how to play, teaching vocabulary and modeling precise communication. Require students to answer their partner with complete sentences including their coordinates. Provide opportunities for students to check the accuracy of where their ships are.</p>	<p><input type="checkbox"/> Engaging in discussions of the mathematical purpose and goals related to their current work. Students practice plotting points in the first quadrant as well as naming coordinates of points. Correct vocabulary usage during play should occur.</p> <p><input type="checkbox"/> Using learning goals to stay focused on their progress in improving their understanding of mathematics content and practices. Students begin by folding the grid paper in half. They need to draw coordinate axes on both the top half and the bottom half and label the x and y axes with the numbers 1–10 on each axis. The students will need to draw in 5 ships on ordered pairs and label the ordered pairs. They should draw:</p> <ul style="list-style-type: none"> ○ Two ships that are sitting on 2 ordered pairs, ○ One ship that is sitting on 3 ordered pairs, ○ One ship that is sitting on 4 ordered pairs, and ○ One ship sitting on 5 ordered pairs. <p><input type="checkbox"/> Connecting their current work with the mathematics that they studied previously and seeing where the mathematics is going. Students are drawing on prior knowledge of working with number lines and then preparing for Grade 6 where students will plot points in all 4 quadrants.</p> <p><input type="checkbox"/> Assessing and monitoring their own understanding and progress toward the mathematics learning goal. Students play in pairs sitting opposite each other and take turns calling out ordered pairs. Players should keep a list of the ordered pairs they call out written in (x, y) form on a piece of paper that both players can see so there is no disagreement later about what has been called (it is common for students to transpose the coordinates). Then they are to mark the ordered pair they call out on the top coordinate plane. They should mark in black if they missed and red if they hit their opponent’s boat. On the bottom half of the grid paper, they are to color black for the ordered pairs their opponent calls out and color red for the ordered pairs that hit their ship.</p>

How did we get here: Clearly focusing and establishing the goal to where students are conceptually understanding what perpendicular number lines are/look like, know vocabulary: axes, origin, coordinate plane, ordered pair, coordinates so that they are able to identify the exact location of a given point. Students will also

have to connect back to prior knowledge of number lines to conceptually create perpendicular number lines with appropriate labels. Using the questions from MP. 5, 6 and 7 will allow the teacher and students to revisit the goal for understanding this standard and the connections that it must have to prior and future learning.



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				
<input type="checkbox"/> SELF-AWARENESS	<input type="checkbox"/> SELF-MANAGEMENT	<input type="checkbox"/> SOCIAL AWARENESS	<input checked="" type="checkbox"/> RELATIONSHIP SKILLS	<input type="checkbox"/> RESPONSIBLE DECISION-MAKING
Specific Design Considerations from Integrating SEAD within the KAS for Mathematics Grade Level Resource				
<p>Promote skills in cooperation and communication. Collaborative learning experiences also can serve to reinforce self-management skills. One way to do this might be to urge students to continually evaluate and talk to their peers about the reasonableness of their results. The students will be able to demonstrate understanding of ordered pairs by playing this game. The teacher can assess the students' understanding through listening, watching, and checking the students' work as they play with a partner. The partners will also make sure the other student is not cheating because you can reward the winner with a prize for using precise mathematical language.</p>				
Teacher Reflection Questions from Integrating SEAD within the KAS for Mathematics Grade Level Resource				
<p>What steps am I taking to ensure all my students get the same opportunities to communicate and collaborate through classroom discussions? 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?</p> <p style="padding-left: 20px;">This task allows all students to oversee their learning as they will have to communicate and collaborate with a partner to see whose ship sinks.</p> <p>How might I use modeling in my classroom to support students in understanding where they are in their own learning?</p> <p style="padding-left: 20px;">Modeling this task before releasing students will allow them to see/hear expectations for the task and to reiterate why this will get them ready for KY.6.NS.6.</p>				

How did we get here: Focusing on relationship skills is a natural fit to supporting this task. Students can check one another to see if they are able to understand that the first number indicates how far to travel from the origin in the direction of one axis and the second number indicates how far to travel in the direction of the second.