STANDARD FOR MATHEMATICAL PRACTICE #4

MODEL WITH MATHEMATICS

I'M USING THIS SMP WHEN...

- I pose questions in the real-world about something I want to know, do or understand and consider how math can help me.
- I identify important quantities in a real-world situation and how they are connected.
- I think about what I know, what I need to know, and what assumptions and estimates I can make that will help me.
- I use mathematical expressions. equations and/or diagrams to represent the situation and answer real-world questions.
- I think about my answer to see if it makes sense and adjust my assumptions or process as needed.

TEACHING ACTIONS TO ENGAGE STUDENTS IN THIS PRACTICE

- Use pictures, stories, and student experiences to support students in posing questions based on real-world situations.
- Prompt students to identify what problem elements they know and what they need to know.
- Encourage students to consider which quantities they can find (e.g. through research, measuring, or experimentation), and which they may need to estimate.
- Prompt students to use equations, graphs, tables, diagrams, or other representations to model relationships.
- Encourage students to revise their thinking based on feedback, new information, or insights gained during the process.
- Ask students to explain their models, consider applications, and communicate their findings clearly.

SMP 4: Model with Mathematics

Mathematically proficient students can apply the mathematics they know to solve problems that arise in everyday life. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts, and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Kentucky Department of Education (2019, p. 13)

- What is the real-world situation I'm trying to represent?
- What important quantities or relationships do I need to consider?
- What do the results of my calculations mean in the real-world context?
- Can I use the model to answer the question or make a prediction?
- How can I improve my model to make it more accurate or useful?

STUDENT ASK-YOURSELF QUESTIONS

SMP#4