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| **Summary of Standards for Mathematical Practice** | **Questions to Develop Mathematical Thinking** |
| 1. **Make sense of problems and persevere in solving them.*** Interpret and make meaning of the problem looking for starting points. Analyze what is given to explain to themselves the meaning of the problem.
* Plan a solution pathway instead of jumping to a solution.
* Can monitor their progress and change the approach if necessary.
* See relationships between various representations.
* Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another.
* Can understand various approaches to solutions.
* Continually ask themselves; “Does this make sense?”
 | * How would you describe the problem in your own words?
* How would you describe what you are trying to find?
* What do you notice about?
* What information is given in the problem?
* Describe the relationship between the quantities.
* Describe what you have already tried.
* What might you change?
* Talk me through the steps you’ve used to this point.
* What steps in the process are you most confident about?
* What are some other strategies you might try?
* What are some other problems that are similar to this one?
* How might you use one of your previous problems to help you begin?
* How else might you organize, represent, and show?
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| 2. **Reason abstractly and quantitatively.*** Make sense of quantities and their relationships.
* Are able to decontextualize (represent a situation symbolically and manipulate the symbols) and contextualize (make meaning of the symbols in a problem) quantitative relationships.
* Understand the meaning of quantities and are flexible in the use of operations and their properties.
* Create a logical representation of the problem.
* Attends to the meaning of quantities, not just how to compute them.
 | * What do the numbers used in the problem represent?
* What is the relationship of the quantities?
* How is related to ?
* What is the relationship between and ?
* What does mean to you? (e.g. symbol, quantity,

diagram)* What properties might we use to find a solution?
* How did you decide in this task that you needed to use?
* Could we have used another operation or property to solve this task? Why or why not?
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| 3. **Construct viable arguments and critique the reasoning of others.*** Analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments.
* Justify conclusions with mathematical ideas.
* Listen to the arguments of others and ask useful questions to determine if an argument makes sense.
* Ask clarifying questions or suggest ideas to improve/revise the argument.
* Compare two arguments and determine correct or flawed logic.
 | * What mathematical evidence would support your solution? How can we be sure that ? / How could you prove that. ? Will it still work if. ?
* What were you considering when. ?
* How did you decide to try that strategy?
* How did you test whether your approach worked?
* How did you decide what the problem was asking you to find? (What was unknown?)
* Did you try a method that did not work? Why didn’t it work? Would it ever work? Why or why not?
* What is the same and what is different about. ?
* How could you demonstrate a counter-example?
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| 4. **Model with mathematics.*** Understand this is a way to reason quantitatively and abstractly (able to decontextualize and contextualize).
* Apply the math they know to solve problems in everyday life.
* Are able to simplify a complex problem and identify important quantities to look at relationships.
* Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation.
* Reflect on whether the results make sense, possibly improving or revising the model.
* Ask themselves, “How can I represent this mathematically?”
 | * What number model could you construct to represent the problem?
* What are some ways to represent the quantities?
* What’s an equation or expression that matches the diagram, number line, chart, table?
* Where did you see one of the quantities in the task in your equation or expression?
* Would it help to create a diagram, graph, table?
* What are some ways to visually represent?
* What formula might apply in this situation?
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| 5. **Use appropriate tools strategically.*** Use available tools recognizing the strengths and limitations of each.
* Use estimation and other mathematical knowledge to detect possible errors.
* Identify relevant external mathematical resources to pose and solve problems.
* Use technological tools to deepen their understanding of mathematics.
 | * What mathematical tools could we use to visualize and represent the situation?
* What information do you have?
* What do you know that is not stated in the problem?
* What approach are you considering trying first?
* What estimate did you make for the solution?
* In this situation would it be helpful to use: a graph, number line, ruler, diagram, calculator, manipulative?
* Why was it helpful to use. ?
* What can using a show us, that \_may not?
* In what situations might it be more informative or helpful to use. ?
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| 6. **Attend to precision.*** Communicate precisely with others and try to use clear mathematical language when discussing their reasoning.
* Understand meanings of symbols used in mathematics and can label quantities appropriately.
* Express numerical answers with a degree of precision appropriate for the problem context.
* Calculate efficiently and accurately.
 | * What mathematical terms apply in this situation?
* How did you know your solution was reasonable?
* Explain how you might show that your solution answers the problem.
* Is there a more efficient strategy?
* How are you showing the meaning of the quantities?
* What symbols or mathematical notations are important in this problem?
* What mathematical language, definitions, properties can you use to explain. ?
* How could you test your solution to see if it answers the problem?
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| 7. **Look for and make use of structure.*** Apply general mathematical rules to specific situations.
* Look for the overall structure and patterns in mathematics.
* See complicated things as single objects or as being composed of several objects.
 | * What observations do you make about. ?
* What do you notice when. ?
* What parts of the problem might you eliminate, simplify?
* What patterns do you find in. ?
* How do you know if something is a pattern?
* What ideas that we have learned before were useful in solving this problem?
* What are some other problems that are similar to this one?
* How does this relate to. ?
* In what ways does this problem connect to other mathematical concepts?
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| 8. **Look for and express regularity in repeated reasoning.*** See repeated calculations and look for generalizations and shortcuts.
* See the overall process of the problem and still attend to the details.
* Understand the broader application of patterns and see the structure in similar situations.
* Continually evaluate the reasonableness of their intermediate results.
 | * Will the same strategy work in other situations?
* Is this always true, sometimes true or never true?
* How would we prove that. ?
* What do you notice about. ?
* What is happening in this situation?
* What would happen if. ?
* What Is there a mathematical rule for. ?
* What predictions or generalizations can this pattern support?
* What mathematical consistencies do you notice?
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