Engaging the SMPs: Look-fors & Question stems

Standard for Mathematical Practice 1: Make sense of problems and persevere in solving them.

Possible Student Actions: Students are...	Possible Teacher Actions: Teachers are...	Possible Questions to Promote: Teachers ask...
❑ Working and reading rich problems carefully. ❑ Analyzing information (givens, constraints, relationships, goals). ❑ Drawing pictures, diagrams, tables, or using objects to make sense of the problem. ❑ Discussing the meaning of the problem with classmates. ❑ Making choices about which solution path to take. ❑ Trying out potential solution paths and making changes as needed. ❑ Checking answers and making sure solutions are reasonable and make sense. ❑ Exploring other ways to solve problems. ❑ Persisting in efforts to solve challenging problems, even after reaching a point of frustration. ❑ Relating current situations to concepts or skills previously learned and connect mathematical ideas to one another. Comments:	❑ Providing rich problems aligned to the standards. ❑ Providing appropriate time for students to engage in the productive struggle of problem solving. ❑ Providing opportunities for students to solve problems that have multiple solutions. Comments:	❑ What information do you have? ❑ What do you need to find out? ❑ What do you think the answer might be? ❑ Can you draw a picture? ❑ How could you make this problem easier to solve? ❑ Have you compared your work with anyone else? ❑ How is ___'s way of solving the problem like/different from yours? ❑ Does your plan make sense? Why or why not? ❑ What tools/manipulatives might help you? ❑ What are you having trouble with? ❑ How can you check this? ❑ What do you think about what ___ said? Do you agree? Why or why not? ❑ How might you use one of your previous problems to help you begin? ❑ What are some other problems that are similar to this one? Comments:

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Standard for Mathematical Practice 2: Reason abstractly and quantitatively.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Using mathematical symbols to represent situations. ❑ Taking quantities out of context to work with them (decontextualizing). ❑ Putting quantities back in context to see if they make sense (contextualizing). ❑ Considering units when determining if the answer makes sense in terms of the situation. ❑ Using properties of operations flexibly. Comments:	❑ Providing a variety of problems in different contexts that allow students to arrive at a solution in different ways. ❑ Using think aloud strategies as they model problem solving. ❑ Attentively listening or strategies students are using to solve problems. ❑ Encouraging the flexible use of properties, objects, and solution strategies when solving problems. Comments:	❑ What does the number ___ represent in the problem? ❑ How can you represent the problem with symbols and numbers? ❑ Can you make chart, table or graph? ❑ Can you explain what you've done so far? ❑ Why did you decide to use this method? ❑ Can you think of another method that might have worked? ❑ Is there a more efficient strategy? ❑ Do you think this may work with other numbers? ❑ Have you thought of all the possibilities? ❑ How can you be sure? Comments:

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Standard for Mathematical Practice 3: Construct viable arguments and critique the reasoning of others.

Possible Student Actions: Students are...	Possible Teacher Actions: Teachers are...	Possible Questions to Promote: Teachers ask...
❑ Making and testing conjectures. ❑ Using counterexamples to explore and support ideas. ❑ Explaining and justifying their thinking using words, objects, and drawings. ❑ Listening to the ideas of others and deciding if they make sense. ❑ Asking useful questions. ❑ Identifying flaws in logic when responding to the arguments of others. ❑ Elaborating with a second sentence (spontaneously or prompted by the teacher or another student) to explain their thinking and connect it to their first sentence. ❑ Talking about and asking questions about each other's thinking, in order to clarify or improve their own mathematical understanding. ❑ Revising their work based upon the justification and elaborations of others. ❑ Comparing two arguments and determine correct or flawed logic. Comments:	❑ Posing tasks that require students to explain, argue, or critique. ❑ Providing many opportunities for student discourse in pairs, groups and during whole group instruction. Comments:	❑ Why or why not? ❑ How do you know? ❑ Can you explain that? ❑ Do you agree? ❑ How is your answer different than ___'s? ❑ What math language will help you prove your answer? ❑ What examples could prove or disprove your argument? ❑ What questions do you have for ___? ❑ How did you test whether your approach worked? ❑ Did you try a method that did not work? Why didn't it work? Would it ever work? Why or why not? ❑ How could you demonstrate a counter-example? Comments:

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Standard for Mathematical Practice 4: Model with mathematics.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Using mathematical models (i.e. formulas, equations, symbols) to solve problems in the world. ❑ Using appropriate tools such as objects, drawings, and tables to create mathematical models. ❑ Making connections between different mathematical representations (concrete, verbal, algebraic, numerical, graphical, pictorial, etc.) ❑ Checking to see if an answer makes sense within the context of a situation and changing the model as needed. Comments:	❑ Providing opportunities for students to solve problems in real life contexts. ❑ Identifying problem solving contexts connected to student interests. ❑ Encouraging student use of developmentally and content-appropriate mathematical models (i.e. variables, equations, coordinate grids). ❑ Reminding students that a mathematical model used to represent a problem's solution is a 'work-in-progress' and may be revised as needed. Comments:	❑ Can you write a number sentence to describe this situation? ❑ 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? ❑ What formula might apply in this situation? Comments:

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Standard for Mathematical Practice 5: Use appropriate tools strategically.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Using technological tools to explore and deepen understanding of concepts. ❑ Deciding which tool will best help solve the problem. Examples may include calculators, concrete models, digital technology, pencil/paper, ruler, compass, protractor, etc. ❑ Estimating solutions before using a tool. ❑ Comparing estimates to solutions to see if the tool was effective. ❑ Using available tools, recognizing the strengths and limitations of each. Comments:	❑ Making a variety of tools readily accessible to students and allowing them to select appropriate tools for themselves. ❑ Helping students understand the benefits and limitations of a variety of math tools. Comments:	❑ How could you use manipulatives or a drawing to show your thinking? ❑ Which tool/manipulative would be best for this problem? ❑ 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? ❑ Why was it helpful to use ____? Comments:

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Standard for Mathematical Practice 6: Attend to precision.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Communicating precisely using clear language and accurate mathematics vocabulary. ❑ Deciding when to estimate or give an exact answer. ❑ Calculating accurately and efficiently, expressing answers with an appropriate degree of precision. ❑ Using appropriate units; appropriately labeling diagrams and graphs. Comments:	❑ Explicitly teaching mathematics vocabulary. ❑ Insisting on accurate use of academic language from students. ❑ Modeling precise communication. ❑ Requiring students to answer problems with complete sentences, including units. ❑ Providing opportunities for students to check the accuracy of their work. Comments:	❑ Did you use or learn any new mathematical words today? What do they mean? ❑ Can you explain what you did to solve the problem? ❑ Compare your answer to ___'s answer. ❑ What labels could you use? ❑ 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 ___? ❑ What if you could only use ____? ❑ What are the key points or big ideas in this lesson? Comments:

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Standard for Mathematical Practice 7: Look for and make use of structure.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Finding structure and patterns in numbers. ❑ Finding structure and patterns in diagrams and graphs. ❑ Using patterns to make rules about math. ❑ Using these math rules to help them solve problems. ❑ Seeing complicated things as single objects or as being composed of several objects. Comments:	❑ Providing sense-making experiences for all students. ❑ Engaging students in discussions emphasizing relationships between particular topics within a content domain or across content domains. ❑ Allowing students to do the work of using structure to find the pattern for themselves rather than doing this work for students. ❑ Providing activities in which students demonstrate their flexibility in representing mathematics in a number of ways. Comments:	❑ Why does this happen? ❑ How is ___ related to ___? ❑ Why is this important to the problem? ❑ What do you know about ___ that you can apply to this situation? ❑ 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? Comments:

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Standard for Mathematical Practice 8: Look for and express regularity in repeated reasoning.		
Possible Student Actions: **Students are...**	**Possible Teacher Actions:** **Teachers are...**	**Possible Questions to Promote:** **Teachers ask...**
❑ Looking for patterns when working with numbers, diagrams, tables, and graphs. ❑ Observing when calculations are repeated. ❑ Using observations from repeated calculations to take shortcuts. ❑ Seeing the overall process of the problem and still attending to the details. ❑ Continually evaluating the reasonableness of their intermediate results. Comments:	❑ Providing sense making experiences for all students. ❑ Allowing students to do the work of finding and using their own shortcuts rather than doing this work for students. ❑ Urging students to continually evaluate the reasonableness of their results. Comments:	❑ What predictions or generalizations can you make? ❑ Can you find a shortcut to solve the problem? ❑ How would your shortcut make the problem easier? ❑ How could this problem help you solve another problem? ❑ Can you think of a counter example? ❑ What assumptions are you making? ❑ Is this always true, sometimes true or never true? ❑ How would we prove that ____? ❑ Is there a mathematical rule for ___? Comments:

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