## Standards for Mathematical Practice Look Fors

### Student Behaviors

#### 1. Make sense of problems and persevere in solving them.

*Students are:*
  - Working and reading rich problems carefully (TKES 3)
  - Drawing pictures, diagrams, tables, or using objects to make sense of the problem (TKES 3)
  - Discussing the meaning of the problem with classmates (TKES 4)
  - Making choices about which solution path to take (TKES 5)
  - Trying out potential solution paths and making changes as needed (TKES 8)
  - Checking answers and making sure solutions are reasonable and make sense (TKES 6)
  - Exploring other ways to solve the problem (TKES 8)
  - Persisting in efforts to solve challenging problems, even after reaching a point of frustration. (TKES 8)

#### 2. Reason abstractly and quantitatively.

*Students are:*
  - Using mathematical symbols to represent situations (TKES 3)
  - Taking quantities out of context to work with them (decontextualizing) (TKES 3)
  - Putting quantities back in context to see if they make sense (contextualizing) (TKES 3)
  - Considering units when determining if the answer makes sense in terms of the situation (TKES 3)

#### 3. Construct viable arguments and critique the reasoning of others.

*Students are:*
  - Making and testing conjectures (TKES 8)
  - Explaining and justifying their thinking using words, objects, and drawings (TKES 6)
  - Listening to the ideas of others and deciding if they make sense (TKES 4)
  - Asking useful questions (TKES 3)
  - Identifying flaws in logic when responding to the arguments of others (TKES 4)
  - 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. (TKES 8)
  - Talking about and asking questions about each other’s thinking, in order to clarify or improve their own mathematical understanding. (TKES 4)
  - Revising their work based upon the justification and explanations of others. (TKES 8)

#### 4. Model with mathematics.

*Students are:*
  - Using mathematical models (i.e. formulas, equations, symbols) to solve problems in the world (TKES 3)
  - Using appropriate tools such as objects, drawings, and tables to create mathematical models (TKES 3)
  - Making connections between different mathematical representations (concrete, verbal, algebraic, numerical, graphical, pictorial, etc.) (TKES 8)
  - Checking to see if an answer makes sense within the context of a situation and changing the model as needed (TKES 8)

#### 5. Use appropriate tools strategically.

*Students are:*
  - Using technological tools to explore and deepen understanding of concepts (TKES 3)
  - Deciding which tool will best help solve the problem. Examples may include: (TKES 3)
    - Calculator
    - Concrete models
    - Digital Technology
    - Pencil/paper
    - Ruler, compass, protractor
  - Estimating solutions before using a tool (TKES 3)
  - Comparing estimates to solutions to see if the tool was effective (TKES 3)

#### 6. Attend to precision.

*Students are:*
  - Communicating precisely using clear language and accurate mathematics vocabulary (TKES 1)
  - Deciding when to estimate or give an exact answer (TKES 1)
  - Calculating accurately and efficiently, expressing answers with an appropriate degree of precision (TKES 1)
  - Using appropriate units; appropriately labeling diagrams and graphs (TKES 1)

#### 7. Look for and make use of structure.

*Students are:*
  - Finding structure and patterns in numbers (TKES 1)
  - Finding structure and patterns in diagrams and graphs (TKES 1)
  - Using patterns to make rules about math (TKES 1)
  - Using these math rules to help them solve problems (TKES 1)

#### 8. Look for and express regularity in repeated reasoning.

*Students are:*
  - Looking for patterns when working with numbers, diagrams, tables, and graphs (TKES 1)
  - Observing when calculations are repeated (TKES 8)
  - Using observations from repeated calculations to take shortcuts(TKES 8)

*Please note that most of the teacher and student behaviors listed can be paired with more than one TKES indicator.*
### Standards for Mathematical Practice Teacher Behaviors

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<th>Practice</th>
<th>Teacher Behaviors</th>
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<tr>
<td>1. Make sense of problems and persevere in solving them.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Providing rich problems aligned to the standards (TKES 1)&lt;br&gt;• Providing appropriate time for students to engage in the productive struggle of problem solving (TKES 8)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• What information do you have? What do you need to find out? What do you think the answer might be?&lt;br&gt;• Can you draw a picture? How could you make this problem easier to solve?&lt;br&gt;• How is ___’s way of solving the problem like/different from yours? Does your plan make sense? Why or why not?&lt;br&gt;• What tools/manipulatives might help you? What are you having trouble with? How can you check this?</td>
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<td>2. Reason abstractly and quantitatively.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Providing a variety of problems in different contexts that allow students to arrive at a solution in different ways (TKES 4)&lt;br&gt;• Using think aloud strategies as they model problem solving (TKES 3)&lt;br&gt;• Attentively listening for strategies students are using to solve problems (TKES 5)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• What does the number ____ represent in the problem? How can you represent the problem with symbols and numbers?&lt;br&gt;• Can you make a chart, table or graph?</td>
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<td>3. Construct viable arguments and critique the reasoning of others.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Posing tasks that require students to explain, argue, or critique (TKES 8)&lt;br&gt;• Providing many opportunities for student discourse in pairs, groups, and during whole group instruction (TKES 4)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• Why or why not? How do you know? Can you explain that? Do you agree?&lt;br&gt;• How is your answer different than ____’s? What math language will help you prove your answer?&lt;br&gt;• What examples could prove or disprove your argument? What questions do you have for ____?</td>
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<td>4. Model with mathematics.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Providing opportunities for students to solve problems in real life contexts (TKES 3)&lt;br&gt;• Identifying problem solving contexts connected to student interests (TKES 4)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• Can you write a number sentence to describe this situation? What do you already know about solving this problem?&lt;br&gt;• What connections do you see? Why do the results make sense? Is this working or do you need to change your model?</td>
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<td>5. Use appropriate tools strategically.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Making a variety of tools readily accessible to students and allowing them to select appropriate tools for themselves (TKES 3)&lt;br&gt;• Helping students understand the benefits and limitations of a variety of math tools (TKES 8)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• How could you use manipulatives or a drawing to show your thinking?&lt;br&gt;• Which tool/manipulative would be best for this problem? What other resources could help you solve this problem?</td>
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<td>6. Attend to precision.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Explicitly teaching mathematics vocabulary (TKES 1)&lt;br&gt;• Insisting on accurate use of academic language from students (TKES 8)&lt;br&gt;• Modeling precise communication (TKES 10)&lt;br&gt;• Requiring students to answer problems with complete sentences, including units (TKES 10)&lt;br&gt;• Providing opportunities for students to check the accuracy of their work (TKES 5)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• What does the word ____ mean? Explain what you did to solve the problem.&lt;br&gt;• Compare your answer to ____’s answer. What labels could you use?&lt;br&gt;• How do you know your answer is accurate? Did you use the most efficient way to solve the problem?</td>
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<td>7. Look for and make use of structure.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Providing sense making experiences for all students (TKES 2)&lt;br&gt;• Allowing students to do the work of using structure to find the patterns for themselves rather than doing this work for students (TKES 8)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• Why does this happen? How is ____ related to ____? Why is this important to the problem?&lt;br&gt;• What do you know about ____ that you can apply to this situation? How can you use what you know to explain why this works?&lt;br&gt;• What patterns do you see?</td>
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<td>8. Look for and express regularity in repeated reasoning.</td>
<td><strong>Teachers are:</strong>&lt;br&gt;• Providing sense making experiences for all students (TKES 2)&lt;br&gt;• Allowing students to do the work of finding and using their own shortcuts rather than doing this work for students (TKES 8)&lt;br&gt;<strong>Teachers ask:</strong>&lt;br&gt;• What generalizations can you make? Can you find a shortcut to solve the problem?&lt;br&gt;• How would your shortcut make the problem easier? How could this problem help you solve another problem?</td>
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