

Grade 6 Mathematics Item Specification C1 TI

<p><b>Claim 1:</b> Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.</p>	
<p>Content Domain: <b>Statistics and Probability</b></p>	
<p><b>Target I [a]:</b> Develop an understanding of statistics variability. (DOK 2) Tasks for this target will ask students to identify questions that lead to variable responses; identify a reasonable center and/or spread for a given context.</p>	
<p>Standards: 6.SP.A, 6.SP.A.1, 6.SP.A.2, 6.SP.A.3</p>	<p><b>6.SP.A Develop understanding of statistical variability.</b> <b>6.SP.A.1</b> Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i> <b>6.SP.A.2</b> Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. <b>6.SP.A.3</b> Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p>
<p>Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 5.MD.B, 5.MD.B.2  7.SP.B, 7.SP.B.3</p>	<p><b>Related Grade 5 Standards</b>  <b>5.MD.B Represent and interpret data.</b> <b>5.MD.B.2</b> Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</i></p> <p><b>Related Grade 7 Standards</b>  <b>7.SP.B Draw informal comparative inferences about two populations.</b> <b>7.SP.B.3</b> Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. <i>For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.</i></p>
<p>DOK Level:</p>	<p>2</p>
<p><b>Achievement Level Descriptors:</b></p>	
<p><b>RANGE Achievement Level Descriptor (Range ALD)</b> Target I: Develop understanding of statistical variability.</p>	<p><b>Level 1</b> Students should be able to identify questions that lead to variable responses posed in familiar contexts and recognize that such questions are statistical questions. <b>Level 2</b> Students should be able to recognize that questions that lead to variable responses are statistical questions and vice versa, and they should relate the concept of varying responses to the notion of a range of possible responses. They should develop an</p>

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	<p>understanding that the responses to a statistical question will have a representative center and a given set of numerical data. They should be able to identify a reasonable measure of central tendency with respect to a familiar context.</p> <p><b>Level 3</b> Students should be able to pose statistical questions and understand that the responses to a statistical question have a distribution described by its center, spread, and overall shape. They should also understand that a measure of center summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. They should be able to identify a reasonable center and spread with respect to a context.</p> <p><b>Level 4</b> Students should be able to justify the reasonableness of their identified center and spread with respect to an unfamiliar context. They should be able to create or complete a data set with given measures (e.g., mean, median, mode, interquartile range).</p>
Evidence Required:	<ol style="list-style-type: none"> <li>1. The student recognizes a statistical question as one that anticipates variability.</li> <li>2. The student identifies statements that describe the center and/or spread, and/or overall shape of a set of data.</li> <li>3. The student recognizes that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</li> </ol>
Allowable Response Types:	Multiple Choice, single correct response; Matching Tables
Allowable Stimulus Materials:	Dot/line plots, lists of numbers, tables, graphs, or other visual graphics to display a set of numbers
Construct-Relevant Vocabulary:	variation (variability), interquartile range, range, mean absolute deviation, center, spread, mean, median, outliers, shape (pertaining to statistics such as gap, cluster, peak, skew, bell curve, and uniform distribution)
Allowable Tools:	Calculator
Target-Specific Attributes:	
Non-Targeted Constructs:	
Accessibility Guidance:	<p>Item writers should consider the following Language and Visual Element/Design guidelines<sup>1</sup> when developing items.</p> <p>Language Key Considerations:</p> <ul style="list-style-type: none"> <li>• Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context</li> <li>• Avoid sentences with multiple clauses</li> <li>• Use vocabulary that is at or below grade level</li> <li>• Avoid ambiguous or obscure words, idioms, jargon, unusual names and references</li> </ul>

<sup>1</sup> For more information, refer to the General Accessibility Guidelines at: <http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf>

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	<p>Visual Elements/Design Key Considerations:</p> <ul style="list-style-type: none"> <li>• Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context</li> <li>• Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary</li> <li>• Avoid crowding of details and graphics</li> </ul> <p>Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.<sup>2</sup></p>
<p>Development Notes:</p>	<p>Tasks for this target will ask students to identify and pose questions that lead to variable responses; identify a reasonable center and/or spread for a given context.</p> <p>In Grade 6, the focus on assessment for the SP standards should be in Claim 4. The most important concept is distribution, which is a foundational idea for all future statistical work. Other concepts include shape, center, and spread of a distribution (not the more technical details often associated with those).</p>

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<sup>2</sup> For more information about student accessibility resources and policies, refer to [http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced\\_Guidelines.pdf](http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf)

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<p><b>Task Model 1</b></p> <p><b>Response Types:</b> Multiple Choice, single correct response; Matching Tables</p> <p><b>DOK Level 2</b></p> <p><b>6.SP.A.1</b> Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.</i></p> <p><b>Evidence Required:</b> 1. The student recognizes a statistical question as one that anticipates variability.</p> <p><b>Tools:</b> Calculator</p> <p><b>Version 3 Update:</b> Retired TM2 and TM3 as they are more appropriately assessed in Claim 4.</p>	<p><b>Prompt Features:</b> The student is prompted to identify whether questions are statistical in nature based on whether they anticipate variability in the answer data.</p> <p><b>Stimulus Guidelines:</b> Context should be familiar to students 11 to 13 years old.</p> <p><b>TM1a</b> <b>Stimulus:</b> The student is presented with questions based on a statistical scenario.</p> <p><b>Example Stem:</b> Julie is writing a report about rainbows and needs to gather data from her classmates.</p> <p>Which is a statistical question Julie could ask her classmates?</p> <p>A. What are the colors of the rainbow? B. When was the first rainbow seen? C. Is there really a pot of gold at the end of a rainbow? D. How many rainbows have you seen this month?</p> <p><b>Rubric:</b> (1 point) Student selects the statistical question (e.g., D)</p> <p><b>Response Type:</b> Multiple Choice, single correct response</p> <p><b>TM1b</b> <b>Stimulus:</b> The student is presented with three statistical and non-statistical questions.</p> <p><b>Example Stem:</b> A statistical question anticipates variability in the data related to it. Determine whether each question can be classified as a statistical question. Select Yes or No for each question.</p> <table border="1" data-bbox="678 1234 1256 1512"> <thead> <tr> <th>Question</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>How many hours a week do people exercise?</td> <td></td> <td></td> </tr> <tr> <td>How many hours are there in a day?</td> <td></td> <td></td> </tr> <tr> <td>How many rainbows have students seen this month?</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>Rubric:</b> (1 point) Student identifies all three questions correctly (e.g., Y, N, Y). At least one question should be statistical.</p> <p><b>Response Type:</b> Matching Tables</p>	Question	Yes	No	How many hours a week do people exercise?			How many hours are there in a day?			How many rainbows have students seen this month?		
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