

Grade 3 Mathematics Item Specification C1 TH

Claim 1: Concepts and Procedures

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Content Domain: **Measurement and Data**

Target H [m]: Represent and interpret data. (DOK 2)

Tasks associated with this target should involve using information presented in scaled bar graphs to solve one- and two-step “how many more” and “how many less” problems. Technology might be used to enable students to draw a scaled picture graph and a scaled bar graph to represent a data set with up to four categories. Other tasks can involve the cycle indicated in 3.MD.B.4 (measure to generate data and show the data by making a line plot); such tasks should indeed involve fractional measurement values.

<p>Standards: 3.MD.B, 3.MD.B.3, 3.MD.B.4</p>	<p>3.MD.B Represent and interpret data.</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></p> <p>3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.</p>
<p>Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling: 2.MD.A, 2.MD.A.4 2.MD.D, 2.MD.D.9, 2.MD.D.10, 4.MD.B, 4.MD.B.4</p>	<p>Related Grade 2 Standards</p> <p>2.MD.A Measure and estimate lengths in standard units.</p> <p>2.MD.A.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.</p> <p>2.MD.D Represent and interpret data.</p> <p>2.MD.D.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</p> <p>Related Grade 4 Standards</p> <p>4.MD.B Represent and interpret data.</p> <p>4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <i>For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</i></p>

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DOK Level:	2
RANGE Achievement Level Descriptor (Range ALD) Target H: Represent and interpret data.	Level 1 Students should be able to draw a picture graph and a bar graph to represent a data set with up to four categories; generate measurement data by measuring length using rulers marked with one inch intervals; and create a line plot to represent a data set where the horizontal scale is marked in whole unit intervals.
	Level 2 Students should be able to solve one-step "how many more?" and "how many less?" problems using information presented in picture and bar graphs; generate measurement data by measuring lengths using rulers marked with half-inch intervals; and represent measurement data on a line plot with a horizontal scale marked in half-unit intervals.
	Level 3 Students should be able to draw a scaled picture graph and a scaled bar graph to represent a data set; solve two-step "how many more?" and "how many less?" problems using information presented in a scaled bar graph; generate measurement data by measuring length using rulers marked with quarter-inch intervals; and create a line plot with a horizontal scale marked in quarter-unit intervals.
	Level 4 No Descriptors
Evidence Required:	<ol style="list-style-type: none"> 1. The student creates a scaled picture graph and a scaled bar graph to represent a data set with up to four categories. 2. The student solves one-and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. 3. The student generates measurement data by measuring lengths using rulers marked with halves and fourths of an inch and makes a line plot with fractional measurement values.
Allowable Response Types:	Hot Spot; Equation/Numeric
Allowable Stimulus Materials:	scaled bar graph, scaled picture graph, and line plot
Construct-Relevant Vocabulary:	scaled bar graph, scaled picture graph, line plot
Allowable Tools:	
Target-Specific Attributes:	Line plots can be marked off using fractional units of halves and quarters as well as whole numbers.
Non-targeted Constructs:	
Accessibility Guidance:	<p>Item writers should consider the following Language and Visual Element/Design guidelines¹ when developing items.</p> <p>Language Key Considerations:</p> <ul style="list-style-type: none"> • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses

¹ 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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	<ul style="list-style-type: none"> • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references <p>Visual Elements/Design Key Considerations:</p> <ul style="list-style-type: none"> • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics <p>Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models.</p> <p>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.²</p>
Development Notes:	Items where students are required to generate measurement data and make a line plot (per CCSS 3.MD.B.4) will be covered in Claims 2 and 4.

² For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

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Task Model 1

Response Type:
Hot Spot

DOK Level 2

3.MD.B.3

Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

Evidence Required:

1. The student creates a scaled picture graph and a scaled bar graph to represent a data set with up to four categories.

Tools: None

Accessibility Note:

Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

Prompt Features: The student is prompted to generate a scaled picture graph or a scaled bar graph.

Stimulus Guidelines:

- Follow any stated guidelines on allowable number ranges.
- Scaled picture graphs and bar graphs should be equally distributed among the following types:
 - generates scaled picture graph or bar graph; includes key of 2, 5, or 10
 - generates scaled picture graph or bar graph; includes key of 3 or 4
- Data categories should be presented and equally distributed in the following types:
 - two, three, or four categories
- Graph orientation of scaled picture graphs and bar graphs should be equally distributed among the following types:
 - Data for each category is entered either vertically or horizontally

TM1a


Stimulus: The student is presented with a data set with two to four categories.

Example Stem 1: Marco and Beth each read the number of books shown.





Student	Number of Books Read
Marco	12
Beth	21


Click in each row to create a picture graph that shows the number of books each student read.

Student	Number of Books Read
Marco	
Beth	

Key
 represents 3 books

Rubric: (1 point) The student creates a picture or a bar graph to show the correct number for each category of data (e.g., shown below).

Student	Number of Books Read
Marco	   
Beth	     

Key
 represents 3 books

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Task Model 1

Response Type:
Hot Spot

DOK Level 2

3.MD.B.3

Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

Evidence Required:

1. The student creates a scaled picture graph and a scaled bar graph to represent a data set with up to four categories.

Tools: None

Accessibility Note:

Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

Version 3 Update:

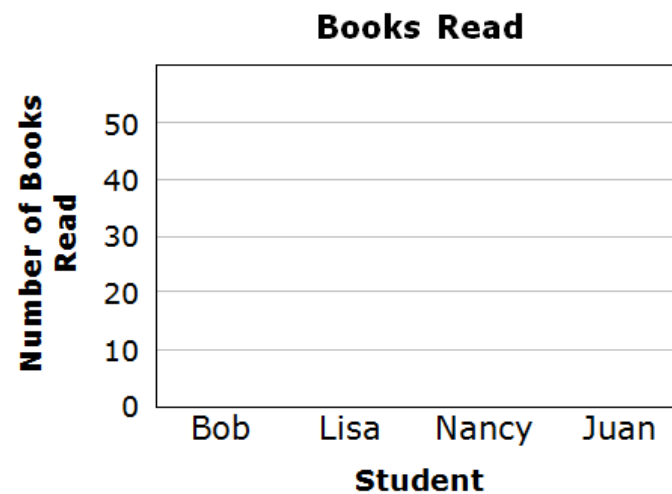
Retired TM1b.

TM1a (continued)

Example Stem 2: Four students read the number of books shown.

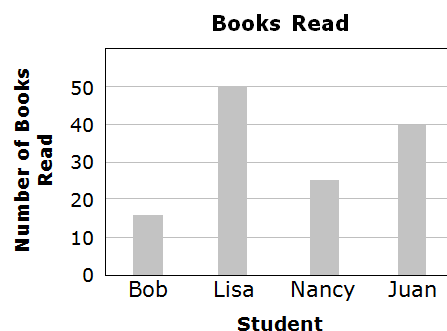
Student	Number of Books Read
Bob	15
Lisa	50
Nancy	25
Juan	40

Click in each column to create a bar graph that shows the number of books that each student read.

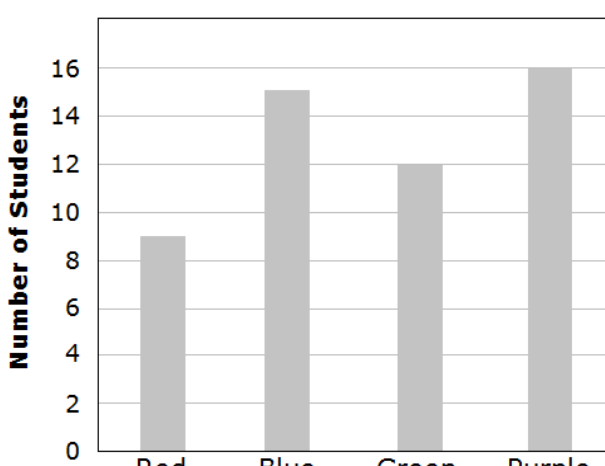


Rubric: (2 points) The student creates a picture or a bar graph to show the correct number for each category of data (e.g., shown below).

(1 point) The student creates a picture or bar graph to show the correct number for all but one category and the single error is in the level of precision (off by one scaled unit), not in understanding.



Response Type: Hot Spot

<p>Task Model 2</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></p> <p>Evidence Required: 2. The student solves one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</p> <p>Tools: None</p>	<p>Prompt Features: The student is prompted to identify the solution involving “how many less” or “how many more” using information presented in scaled bar graphs.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> Follow any stated guidelines on allowable number ranges. Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> Solving one- or two-step word problems should be among the following types: <ul style="list-style-type: none"> one-step “how many less” or “how many more” problems with or without regrouping two-step “how many less” or “how many more” problems with or without regrouping Scaled picture graphs and bar graphs should be among the following types: <ul style="list-style-type: none"> scaled bar graph; includes key of 1 scaled bar graph; includes key of 2, 5, or 10 scaled bar graph; includes key of 3 or 4 Data categories should be presented and equally distributed in the following types: <ul style="list-style-type: none"> two, three, or four categories Orientation of scaled picture graphs and bar graphs should be equally distributed among the following types: <ul style="list-style-type: none"> Data for each category is displayed either vertically or horizontally <p>TM2</p> <p>Stimulus: The student is presented with a one- or two-step word problem and is expected to solve by using information displayed in the graph.</p> <p>Example Stem 1: Students voted for their favorite colors. Use the bar graph to answer the question.</p> <div data-bbox="503 1344 1104 1911"> <p style="text-align: center;">Favorite Colors</p>  <table border="1"> <thead> <tr> <th>Color</th> <th>Number of Students</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>9</td> </tr> <tr> <td>Blue</td> <td>15</td> </tr> <tr> <td>Green</td> <td>12</td> </tr> <tr> <td>Purple</td> <td>16</td> </tr> </tbody> </table> </div> <p>How many more students voted for purple than red?</p>	Color	Number of Students	Red	9	Blue	15	Green	12	Purple	16
Color	Number of Students										
Red	9										
Blue	15										
Green	12										
Purple	16										

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<p>Task Model 2</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></p> <p>Evidence Required: 2. The student solves one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</p> <p>Tools: None</p>	<p>TM2 (continued)</p> <p>Example Stem 2: Students voted for their favorite colors. Use the bar graph to answer the question.</p> <p>How many fewer students voted for red than purple?</p> <p>Example Stem 3: Students voted for their favorite colors. Use the bar graph to answer the question.</p> <p>How many more students voted for purple and blue than green?</p> <p>Example Stem 4: Students voted for their favorite colors. Use the bar graph to answer the question.</p> <p>How many fewer students voted for red than purple and blue?</p> <p>Rubric: (1 point) Student enters correct answer for the graph (e.g., 7; 7; 19; 22).</p> <p>Response Type: Equation/Numeric</p>
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Task Model 3

Response Type:
Hot Spot

DOK Level 2

3.MD.B.4

Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

Evidence Required:

3. The student generates measurement data by measuring lengths using rulers marked with halves and fourths of an inch and makes a line plot with fractional measurement values.

Tools: None

Accessibility Note:

Hot spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

Prompt Features: The student is prompted to make a line plot using given measurement data.

Stimulus Guidelines:

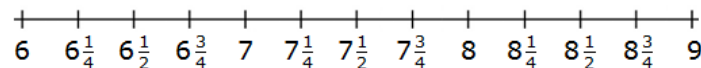
- Follow any stated guidelines on allowable number ranges.
- Tables of measured data should be equally distributed among the following types:
 - 5 measured items on the table in order
 - 5 measured items on the table in random order
- Line plots using measurement data should be equally distributed among the following types:
 - a horizontal scale marked in whole units
 - a horizontal scale marked in half units
 - a horizontal scale marked in quarter units

TM3

Stimulus: The student is presented with a table of measurement data and is expected to create a line plot to represent the data.

Example Stem: A boy measures the length of some items in his desk. This chart shows the length, in inches, of each item.

School Supply	Length (in)
Pencil	$7\frac{1}{4}$
Paper	$8\frac{1}{2}$
Stapler	$6\frac{3}{4}$
Paintbrush	$8\frac{1}{2}$
Marker	$6\frac{1}{2}$



Length of School Supplies (in)

Click above the tick marks to complete the line plot that displays the data.

Rubric: (1 point) The student correctly marks all 5 points to create the line plot.

Response Type: Hot Spot