From Data-Driven Dialogue to Instructional Improvement: Building High-Performing Data Teams

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# From Data-Driven Dialogue to Instructional Improvement: Building High-Performing Data Teams

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Building the Bridge Between Data and Results

Structured Collaboration: The Using Data Process

Consensogram Questionnaire

1. To what degree do you believe in the need for collaborative inquiry? (BLUE)  
   1 (not at all)  2 (somewhat)  3 (strongly)  4 (very strongly)

2. How often do teachers who teach the same content (middle, high school) or grade level (elementary) meet together to analyze data for the purpose of improving teaching and learning in your school? (YELLOW)  
   1 (never)  2 (2-4X/year)  3 (monthly)  4 (weekly)

3. For how many teachers in your school does the time spent collaborating with their colleagues result in improvements in their teaching? (PINK)  
   1 (few)  2 (some)  3 (most)  4 (all)

4. Rate your own skills in facilitating collaborative inquiry. (ORANGE)  
   1 (low)  2 (moderate)  3 (high)  4 (very high)

5. How many teachers and administrators in your school act in alignment with the following value: “We are collectively responsible for the learning and achievement of each and every student in our school—no excuses”? (GREEN)  
   1 (few)  2 (some)  3 (most)  4 (all)
**Data-Driven Dialogue**

**PHASE 1**
**Predict**
- Surfacing experiences, possibilities, expectations
  - With what assumptions are we entering?
  - What are some predictions we are making?
  - What are some questions we are asking?
  - What are some possibilities for learning that this experience presents us with?

**PHASE 2**
**Go Visual!**

**PHASE 3**
**Observe**
- Analyzing the data
  - What important points seem to “pop out”?
  - What are some patterns or trends that are emerging?
  - What seems to be surprising or unexpected?
  - What are some things we have not explored?

**PHASE 4**
**Infer/Question**
- Generating possible explanations
  - What inferences and explanations can we draw?
  - What questions are we asking?
  - What additional data might we explore to verify our explanations?
  - What tentative conclusions might we draw?

Write your answer to open-response question 7 in the space provided.

7. Sue is making the bar graph below to show the favorite art supplies of the students in her art class.

![Bar Graph](image)

There are 25 students in Sue’s art class. All of the students chose crayons, paint, clay, or markers as their favorite art supply.

Complete the bar graph to show the number of students who chose paint as their favorite art supply. Explain how you got your answer.

**Standard:** 3.D.3 **Construct and draw conclusions from representations of data sets in the forms of tables, line plots, pictographs, tallies, and bar graphs.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The student response demonstrates an exemplary understanding of the Data Analysis, Statistics, and Probability concepts involved in constructing and drawing conclusions from representations of data sets in the form of bar graphs. The response includes an explanation of the student's reasoning.</td>
</tr>
<tr>
<td>2</td>
<td>The student response demonstrates a fair understanding of the Data Analysis, Statistics, and Probability concepts involved in constructing and drawing conclusions from representations of data sets in the form of bar graphs. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 1 point.</td>
</tr>
<tr>
<td>1</td>
<td>The student response contains insufficient evidence of an understanding of the Data Analysis, Statistics, and Probability concepts involved in constructing and drawing conclusions from representations of data sets in the form of bar graphs to merit any points.</td>
</tr>
</tbody>
</table>

Student Work Sample A
Question 7

Sue is making the bar graph below to show the favorite art supplies of the students in her art class.

Favorite Art Supplies

<table>
<thead>
<tr>
<th>Art Supplies</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crayons</td>
<td>4</td>
</tr>
<tr>
<td>Paint</td>
<td>10</td>
</tr>
<tr>
<td>Clay</td>
<td>8</td>
</tr>
<tr>
<td>Markers</td>
<td>2</td>
</tr>
</tbody>
</table>

There are 25 students in Sue's art class. All of the students chose crayons, paint, clay, or markers as their favorite art supply.

Complete the bar graph to show the number of students who chose paint as their favorite art supply. Explain how you got your answer.

Student Work Sample B
Question 7

Sue is making the bar graph below to show the favorite art supplies of the students in her art class.

Favorite Art Supplies

<table>
<thead>
<tr>
<th>Art Supplies</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crayons</td>
<td>4</td>
</tr>
<tr>
<td>Paint</td>
<td>10</td>
</tr>
<tr>
<td>Clay</td>
<td>8</td>
</tr>
<tr>
<td>Markers</td>
<td>2</td>
</tr>
</tbody>
</table>

There are 25 students in Sue's art class. All of the students chose crayons, paint, clay, or markers as their favorite art supply.

Complete the bar graph to show the number of students who chose paint as their favorite art supply. Explain how you got your answer.

I got my answer by adding all of the favorite things to use in art and adding to that until I got 25.
Student Work Sample C

Question 7

Sue is making the bar graph below to show the favorite art supplies of the students in her art class.

There are 25 students in Sue's art class. All of the students chose crayons, paint, clay, or markers as their favorite art supply.

Complete the bar graph to show the number of students who chose paint as their favorite art supply. Explain how you got your answer.

8 students like paint. First add 3 + 4 + 10 = 17. If that's how many students like crayons, clay, and markers as paint. 25 students. So paint would make 25.

Student Work Sample D

Question 7

Sue is making the bar graph below to show the favorite art supplies of the students in her art class.

There are 25 students in Sue's art class. All of the students chose crayons, paint, clay, or markers as their favorite art supply.

Complete the bar graph to show the number of students who chose paint as their favorite art supply. Explain how you got your answer.

You cannot make the number equal in any way I tried. Twice and there was no way to make it equal.

A comet passed by Earth in the year 1835. It passes by Earth every 60 years. Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035  
B. 2060  
C. 2075  
D. 2080

Show your work.
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035  
B. 2060  
C. 2075  
D. 2080

Show your work.

\[
\begin{align*}
60 & \times 10 \\
\underline{600} \\
\end{align*}
\]

\[
\begin{align*}
1835 & \div 60 \\
\underline{2435} \\
\end{align*}
\]

\[
\begin{align*}
3 \times 60 & \div 3 \\
\underline{140} \\
\end{align*}
\]

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2007, p. 304. www.doe.mass.edu.
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035  
B. 2060  
C. 2075  
D. 2080

Show your work.

\[
\begin{align*}
1835 & \quad + \quad 60 \\
1890 & \quad + \quad 60 \\
1950 & \quad + \quad 60 \\
2010 & \quad + \quad 60 \\
2130 &
\end{align*}
\]
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

(A) 2035  
B. 2060  
C. 2075  
D. 2080  

Show your work.

\[
\begin{align*}
1835 & \quad \frac{60}{1815} \\
& \quad \frac{160}{1975} \\
& \quad \frac{60}{2035}
\end{align*}
\]
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035
B. 2060
C. 2075
D. 2080

Show your work.

I looked at the year 1835 and the year 1860 so then I compared it to the two and then I saw it above and that is how I got it.
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035  
B. 2060  
C. 2075  
D. 2080

Show your work.

\[
\begin{align*}
\text{2035} & \quad 1895 \\
\text{2060} & \quad \frac{1955}{\text{1955}} \\
\text{2075} & \quad \frac{1955}{\text{1955}} \\
\text{2080} & \quad \frac{2135}{\text{2135}}
\end{align*}
\]
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035  
B. 2060  
C. 2075  
D. 2080

Show your work.

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2007, p. 304. www.doe.mass.edu.
34. A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2005
B. 2060
C. 2075
D. 2080

Show your work.

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2007, p. 304. www.doc.mass.edu.
Grade 6 Overview

Ratios and Proportional Relationships

- Understand ratio concepts and use ratio reasoning to solve problems.

The Number System

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Expressions and Equations

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Geometry

- Solve real-world and mathematical problems involving area, surface area, and volume.

Statistics and Probability

- Develop understanding of statistical variability.
- Summarize and describe distributions.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
Question 8: Reading and Literature

It takes more than just baseball players to make Fenway Park exciting for Boston Red Sox fans. Read "Fenway Park, Behind the Scenes" to find out more, and answer the questions that follow.

1 The bases are loaded with two outs in the bottom of the ninth. The home team is down by one run. The pitcher looks in at his catcher for the sign. The batter digs his back foot in the dirt in the batter's box. All eyes are on the field.

2 But while the fans focus on the players, the action on the field isn’t the only action happening in the park. Behind the scenes, another team is at work. Although these players don’t wear uniforms, their play is almost as important to the atmosphere of the game as that of the slugger who comes up with the game-winning hit.

3 Hours before the game, the park’s "second" team is busy preparing for game time. Grass needs to be cut, highlights from the previous night's game need to be prepared, and Fenway Franks (hot dogs) need to be steamed and made ready to eat. Throughout the night, it is the support staff’s job to keep the fans informed and entertained.

4 Most Red Sox fans agree that Fenway Park, built in 1912 and one of the oldest parks in the country, is an exciting place to watch the game. Its small size (it takes only about 35,000 people to fill the seats) gives fans the feeling of being right on top of the game. However, the play of their beloved team is only one reason that fans keep filing into the park. The entire park experience makes a trip to Fenway Park a special event.

5 The first thing most fans notice when they enter Fenway Park is the towering left-field wall known as the Green Monster. At 37 feet high, the wall can be either a hitter’s best friend (by turning a routine fly ball out into a hit) or his nemesis (turning a sure home run into a long single).

6 A manual scoreboard takes up much of the face of the Green Monster. While most of today’s ballparks rely on only computer-operated scoreboards, Fenway’s manual scoreboard is part of Fenway’s charm.

7 "It's the first thing most fans look at," says Chris Elias, who has been in charge behind the Green Monster for more than 14 seasons.
Which means that Elias and his two helpers must stay on their toes. If one of them puts up the wrong number, the crowd is quick to let them know. Although keeping score of one baseball game might seem easy, consider that the men also continually need to update the out-of-town scores for all other games going on in both the National and American Leagues. (They keep track of the other games via a laptop with Internet access.) Most Sox fans would consider the manual scoreboard job a dream job. However, like any job, it can get tedious. Rain delays are the worst—the guys just hope that someone brought a newspaper. Inside the cramped Monster, it can get very hot on summer days. And a bathroom? Not in the Green Monster.

However, all it takes is one great play or a clutch hit to remind the men that they are lucky to be part of the Fenway team.

"This is the best summer job I ever had," says Garrett Tingle, who began working the scoreboard during the 2003 season. "We get to see things that fans watching on TV don't get to see."

For the most part, the players are nice, the men say. A few, usually the left fielder, will come to the scoreboard and talk to them through the holes in the wall. The walls inside the Monster are covered with autographs of players, reporters, and fans who have been lucky enough to get a peek inside the wall.

Most of today's fans, however, need more than the manual scoreboard to entertain them throughout the game. When there is a lull in action or the game is between innings, most fans' eyes will shift to the huge Jumbo-tron-screen located above the bleacher seats in center and right field.

Throughout the game, the fans can watch replays from the current game (although controversial plays are avoided so as to not show up the umpires), play trivia games (one of the most popular is guessing the night's attendance), or even catch a glimpse of themselves as the camera scans the stands for enthusiastic fans.

Closely related to the Jumbo-tron is the music. It is the job of the ballpark "DJ" to keep the crowd upbeat and into the game, even if the home team is losing. Fans who visit the ballpark regularly know when to expect Sweet Caroline by Neil Diamond to come blasting out of the speakers (the middle of the eighth inning). Fans will also start to realize that they can tell who is next to come to bat by the music playing.
Megan Kaiser, who controlled the music for most of the team's 2004 season, says that most players pick their own songs. That right is reserved for members of the Red Sox only—visiting players get whatever Kaiser feels like playing—who call it part of home field advantage.

Fenway Park has seen many changes in its 90-plus years, but one thing remains the same: Fans continue to visit the historic ballpark to cheer on the old town team.

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2008. www.doe.mass.edu.
**Question 8:** Reading and Literature

Based on the article, what do Fenway Park workers do to help fans have an enjoyable experience at the ballpark? Support your answer with important details from the article.

**Scoring Guide and Sample Student Work**

Select a score point in the table below to view the sample student response.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The response is a clear, complete, and accurate explanation of what Fenway Park workers do to help fans have an enjoyable experience at the ballpark. The response includes important details from the article.</td>
</tr>
<tr>
<td>4</td>
<td>The response is a mostly clear, complete, and accurate explanation of what Fenway Park workers do to help fans have an enjoyable experience at the ballpark. The response includes relevant but often general details from the article.</td>
</tr>
<tr>
<td>3</td>
<td>The response is a partial explanation of what Fenway Park workers do to help fans have an enjoyable experience at the ballpark. The response includes limited details from the article and may include misinterpretations.</td>
</tr>
<tr>
<td>2</td>
<td>The response is a minimal explanation of what Fenway Park workers do to help fans have an enjoyable experience at the ballpark. The response includes little or no detail from the article and may include misinterpretations. OR The response relates minimally to the task.</td>
</tr>
<tr>
<td>1</td>
<td>The response is incorrect, irrelevant, or contains insufficient information to demonstrate comprehension.</td>
</tr>
<tr>
<td>0</td>
<td>The response is incorrect, irrelevant, or contains insufficient information to demonstrate comprehension.</td>
</tr>
</tbody>
</table>

(cont. next page)
The Fenway Park workers do many great things for the fans that come to enjoy the game. One of the many great things that the workers do for the fans is set up the ballpark. The workers set up the ballpark by cutting the grass, getting highlights from previous games ready, and preparing their famous Fenway Frankies (also known as hot dogs). The workers at Fenway Park also make sure to check the scoreboards and put up scores. If they didn’t check the scoreboards and put up scores who would? They also make sure that there is good music and that the right music is played for the right player. The music is sort of like a hint to what’s happening in the game (yet, no one takes their eyes off the field) it tells if our team losing, winning, tied or which player is coming up next. What kind people.
The workers at Fenway help the fans have an enjoyable experience by operating the scoreboard. People need the scoreboard to keep track of things, like if they didn’t hear the call they could look on the scoreboard. It says they need it when it says “It’s the first thing fans look at.” The workers also has a jumbo-tron-screen. They use this to entertain the people during a break. It will play trivia, and instant replays, and the fans sometimes see them! It says they like it when it says when there is a lull in action or the game is between innings, most fans’ eyes will shift to the huge jumbo-tron-screen located above the bleacher seats in center and right field. This says that without it they would get bored! Closely related to the jumbo-tron-screen is the music. People like the music it makes them happy. It says that when it says It is the job of the “DJ” to keep the crowd upbeat and into the game, even if the home team is losing. This says that even if they are sad that their team is losing the music brings them back. This is how the workers at Fenway make it enjoyable for the fans.
Question 8 - Sample C

The Fenway Park workers do a lot of things to make sure the fans have an enjoyable experience at the ballpark. They have to steam the Fenway Franks and make them ready to eat. They also have to cut the grass and prepare highlights of the previous game. During the game, the Fenway Park workers are still busy. One important job the workers have to do is change the score during the entire game. The other important job they have to do is change the music when different players come up to bat. But when the away team comes up to bat the music player plays whatever she wants. As you can see, the Fenway Park workers do a lot during the game to help the fans enjoy their experience at Fenway Park. They also help players enjoy the game too.
What the Fenway Park workers do to give the fans an enjoyable game is that the play songs to cheer them up before the game. The workers cook hot dogs to eat when the game is playing. The support staff informs and entertains the Red Sox fans during the game. That is what I think the Fenway Park workers do to make the fans’ game more enjoyable.
They get game reviews on. They cook hot dogs.
They keep score. They play music. Keep the field clean.
Question 8 - Sample F

Thay play ball for tham
and the people have fun.

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2008. www.doe.mass.edu.
## Reading Standards for Informational Text K-5

**Key Ideas and Details**

<table>
<thead>
<tr>
<th>Grade 3 students:</th>
<th>Grade 4 students:</th>
<th>Grade 5 students:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</td>
<td>1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td>1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
</tr>
<tr>
<td>2. Determine the main idea of a text; recount the key details and explain how they support the main idea.</td>
<td>2. Determine the main idea of a text and explain how it is supported by key details; summarize the text.</td>
<td>2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</td>
</tr>
<tr>
<td>3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</td>
<td>3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.</td>
<td>3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.</td>
</tr>
</tbody>
</table>

**Craft and Structure**

<table>
<thead>
<tr>
<th>Grade 3 students:</th>
<th>Grade 4 students:</th>
<th>Grade 5 students:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.</td>
<td>4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 4 topic or subject area.</td>
<td>4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.</td>
</tr>
<tr>
<td>5. Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.</td>
<td>5. Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.</td>
<td>5. Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.</td>
</tr>
<tr>
<td>6. Distinguish their own point of view from that of the author of a text.</td>
<td>6. Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.</td>
<td>6. Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.</td>
</tr>
</tbody>
</table>

**Integration of Knowledge and Ideas**

<table>
<thead>
<tr>
<th>Grade 3 students:</th>
<th>Grade 4 students:</th>
<th>Grade 5 students:</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).</td>
<td>7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.</td>
<td>7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</td>
</tr>
<tr>
<td>8. Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).</td>
<td>8. Explain how an author uses reasons and evidence to support particular points in a text.</td>
<td>8. Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).</td>
</tr>
<tr>
<td>9. Compare and contrast the most important points and key details presented in two texts on the same topic.</td>
<td>9. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.</td>
<td>9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</td>
</tr>
</tbody>
</table>

**Range of Reading and Level of Text Complexity**

<table>
<thead>
<tr>
<th>Grade 3 students:</th>
<th>Grade 4 students:</th>
<th>Grade 5 students:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 2-3 text complexity band independently and proficiently.</td>
<td>10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.</td>
<td>10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.</td>
</tr>
</tbody>
</table>

**Question 38:** Physical Sciences
The diagram below shows a model in an open container. The model represents the arrangement of particles of matter in a solid phase.

![Solid](image)

a. Draw a diagram showing the arrangement of these particles in a liquid phase. Explain why the particles have this arrangement. Be sure to describe the energy of the particles.
b. Draw a diagram showing the arrangement of these particles in a gas phase. Explain why the particles have this arrangement. Be sure to describe the energy of the particles.

**Scoring Guide and Sample Student Work** Select a score point in the table below to view the sample student response.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The response demonstrates a thorough understanding of the effect of heat on particle motion. The response draws an accurate diagram showing the arrangement of the particles in a liquid phase and correctly explains why the particles have this arrangement. The response also draws an accurate diagram showing the arrangement of the particles in a gas phase and correctly explains why the particles have this arrangement.</td>
</tr>
<tr>
<td>3</td>
<td>The response demonstrates a general understanding of the effect of heat on particle motion.</td>
</tr>
<tr>
<td>2</td>
<td>The response demonstrates a limited understanding of the effect of heat on particle motion.</td>
</tr>
<tr>
<td>1</td>
<td>The response demonstrates a minimal understanding of the effect of heat on particle motion.</td>
</tr>
<tr>
<td>0</td>
<td>The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.</td>
</tr>
</tbody>
</table>

Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2007. www.doe.mass.edu.
If the particles of matter were changed into a liquid phase they would assume the shape of their container. The particles would begin moving faster, increasing their energy. The particles would stay together but not be as tightly packed as when they were a solid.

If the particles of matter in the container were changed from a liquid state to that of a gas there would be some drastic changes. The particles would start moving a lot faster. They would be warmer and have a lot more energy. The particles would try to spread out and fill up as much space as possible. Because of this the particles would not be as close and not colliding as often. When cooled they would change back into a liquid state (condensation). When they are formed into a gas they tend to rise when warmed and sink when cooled.
Grade 8 Science and Technology/Engineering
Question 38 - Sample B

a. The particles are in this arrangement because in a liquid, the particles are loose enough to move around but still stay in the container close together. This is because they have more energy.

b. The particles are in this arrangement because in a gas, the particles are in such a loose arrangement and they have so much energy that if they are not in a closed off space, they will escape.
a. The particles are arranged like this in a liquid state because they are more free to move around than solids. Also they are higher in energy than solids because the particles are bouncing around whereas in a solid they are just sitting there.

b. The particles are arranged like this in a gas state because they are even more able to move around than liquids. The energy of the particles is very higher, higher than in liquids because these particles are frantically bouncing around constantly.
The energy is high, it would have to have been heated to turn into a liquid.

The energy is real high the liquid must have been heated a lot to turn it into a gas.
The particles have kinetic energy because there is liquid which separates the particles.

They have kinetic energy because there is no matter in the gas to hold them in place so they are bouncing rapidly back and forth.
Source: Adapted from the Massachusetts Department of Elementary and Secondary Education’s Massachusetts Comprehensive Assessment System (MCAS), 2007. www.doe.mass.edu.
Engage in Task Deconstruction and Data-Driven Dialogue with Student Work:
Data Coach Checklist

Preparation
☐ Ask team members to bring the task or item and the student work they will be analyzing (one set for each team member) or collect and prepare student work yourself
☐ Bring copies of relevant standards and rubrics related to the task
☐ Provide meeting agenda to team in advance
☐ Prepare necessary materials (e.g., chart paper, markers, Post-its)

Meeting Protocols
☐ Review purpose/agenda
☐ Assign group roles (e.g., timekeeper, recorder, dialogue monitor, materials manager)
☐ Agree to norms on which the team will focus
☐ Start and end on time
☐ Review tools or protocols being used (e.g., Data-Driven Dialogue)
☐ Review criteria for effective Data Team meetings (see last section below)

Task Deconstruction with Student Work Analysis
☐ State questions that guide inquiry into student work:
  o What evidence are we seeing of student mastery of the knowledge and skills required by the task?
  o What errors are students making?
  o What knowledge and skills seem to be missing?
  o What additional insights into student thinking are we gaining?
☐ Deconstruct the task: Ask team to:
  o Do the task and share solutions or strategies
  o Brainstorm, drawing on our own experience doing the task:
    • What do students need to know and be able to do to be successful at this task?
    • Write each piece of knowledge and each skill on a large Post-it, one item per Post-it
  o Refine what we have generated based on:
    • Consulting relevant standards and rubrics
    • Focusing on the three to six key concepts/skills in the content area being assessed
    • Focusing on ideas and skills that would inform re-teaching and extension
☐ Ask team to Predict (Phase 1) based on the following questions:
  • What do students need to know and be able to do to be successful at this task?
  • How do we think our students performed?
  • What do we think they had trouble with?
  • What kinds of errors or misconceptions do we anticipate?
  • Based on what assumptions?
☐ Record predictions on chart paper
☐ Pass out samples of student work

(cont. next page)
Go Visual (Phase 2)
  - Recreate the table below on chart paper

<table>
<thead>
<tr>
<th>Student (list below)</th>
<th>Know/Can Do</th>
<th>Know/Can Do</th>
<th>Know/Can Do</th>
<th>Know/Can Do</th>
<th>Know/Can Do</th>
<th>Error/Misconception</th>
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</tbody>
</table>

- Record students’ names in left-hand column
- Place Post-its with the knowledge and skills identified in task deconstruction in the top row, over the words “Know/Can Do”
- Next to each student’s name, place a check in each column where there is evidence that the student has demonstrated the requisite knowledge or skill identified
- Note student errors or misconceptions in the last column

Ask team to Observe (Phase 3) based on the following questions:
- What patterns or trends do we observe across several pieces of work (examine the table by columns)?
- What patterns in errors and misconceptions are emerging (examine last column)?
- What do we notice about individual students (examine the table by rows)?

Record observations on chart paper

Ask team to Infer (Phase 4) based on the following questions:
- What new insights have we gained about the student-learning problem?
- What might be contributing to students’ lack of understanding or skill? What errors are we noticing? What misconceptions are we seeing evidence of?
- What additional questions are raised by the student work?
- What additional data could be helpful?
- If relevant, consider if examination of student work confirms or refutes the tentative conclusions we drew from other data analysis
- Reflect on next steps and implications for action

Reflect on the Criteria for Effective Data Team Meetings
- Did we follow protocols (e.g., Data-Driven Dialogue)?
- Did we observe our norm/s?
- Did we avoid blame and culturally blind or destructive behaviors?
- Did we “look for love in all the right places,” that is, look for possible explanations and actions in those areas that impact student learning: curriculum, instruction, assessment, equity practices, and critical supports?
- Did we determine clear next steps that will impact students and their learning?
- How can we improve our Data Team meetings in the future?