

Grade 5 Informational Mini-Assessment

“Bubblology”

This grade 5 mini-assessment is based on a text about bubbles. This text is considered worthy of students’ time to read and also meets the expectations for text complexity at grade 5. Assessments aligned to the Common Core State Standards will employ quality, complex texts such as this one.

Questions aligned to the CCSS should be worthy of students’ time to answer and therefore do not focus on minor points of the text. Questions also may address several standards within the same question because complex texts tend to yield rich assessment questions that call for deep analysis. In this mini-assessment there are selected-response questions that address the Reading Standards listed below and one constructed-response question that addresses the Writing Standards. There are also items that replicate how technology may be used on assessments, but in paper and pencil format.

We encourage educators to give students the time that they need to read closely, answer the questions, and write to the source. Although we know that it is helpful to have students complete the mini-assessment in one class period, we encourage educators to allow additional time as necessary.

The questions align to the following standards:

RI.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.5.2	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
RI.5.3	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.
RI.5.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
RI.5.6	Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.
RI.5.8	Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).
W.5.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.

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The assessment questions in this document align with the CCSS and reflect the instructional shifts implied by the standards. To learn more about these topics, please go to the following link:

www.achievethecore.org

Grade 5 Mini-Assessment – “Bublology”

Today you will read a passage about bubbles. You will then answer several questions based on the passage. I will be happy to answer questions about the directions, but I will not help you with the answers to any questions. You will notice as you answer the questions that some of the questions have two parts. You should answer Part A of the question before you answer Part B.

Take as long as you need to read and answer the questions. If you do not finish when class ends, come see me to discuss the ways you may have additional time.

Now read the passage and answer the questions. I encourage you to write notes in the margin as you read.

Bublology

(bŭb' l-ŏl -jē) n. The study of bubbles.

- 1 There is a lot to be learned from a bubble! Bubbles can teach us about life, light and strength. The wall of a bubble has three parts. There is an outer wall made of soap or detergent, a center wall made of water, and an inner wall that is also made of soap or detergent. The inside of the bubble is filled with air. This structure of the bubble's wall is very similar to that of membranes found in living creatures like us.
- 2 Did you ever wonder how the food you eat gets from inside your stomach to inside your muscles? To get to your muscles, the food must first be digested. Then it must pass through a set of membranes into your blood. The nutrients then circulate through your arteries to your muscles, where they pass through another set of membranes into your muscles. The next time that you blow bubbles, look for a cluster of them, and watch closely. If they don't pop too quickly, you will see that the air from the smaller bubbles will pass through the bubble wall into a larger bubble on the other side. This is very similar to the way that oxygen passes from your lungs through a membrane and into your blood stream. The larger bubbles are sturdier, because their walls are not curved as much as the walls of smaller bubbles.
- 3 Bubbles can also teach us about light. The light from the sun is made up of many different colors. Mixed together, they look white. However, it is possible to separate the different colors of light from each other with a prism. Small drops of water or ice crystals can work like a prism. You have seen this for yourself if you have ever seen a rainbow. The wall of a bubble can work the same way. That is why bubbles are iridescent. When light hits a bubble, it may look blue, or it may look red. The colors seem to dance around on the surface. The colors that we see depend upon the thickness of the wall of the bubble and how much it is bent. As water evaporates from the bubble, the bubble's wall becomes thinner, and the colors change. Also, as the wind blows a bubble around, its wall bends, changing the color.

- 4 Bubbles can also teach us how to make things stronger. Bubbles are usually very fragile. They can easily pop. But if we add sugar to the bubble solution, the bubbles are much sturdier. They will last for two or three times as long. This is because the sugar strengthens the wall of the bubble. The sugar dissolves in the water layer of the bubble's wall and takes the place of some of the water. Since the sugar does not evaporate as quickly as the water, the bubbles last longer. In addition, the sugar molecules are very large and stiff compared to water molecules. Like a large board nailed to the wall of a house, the sugar molecules brace the wall of the bubble to make it stronger.

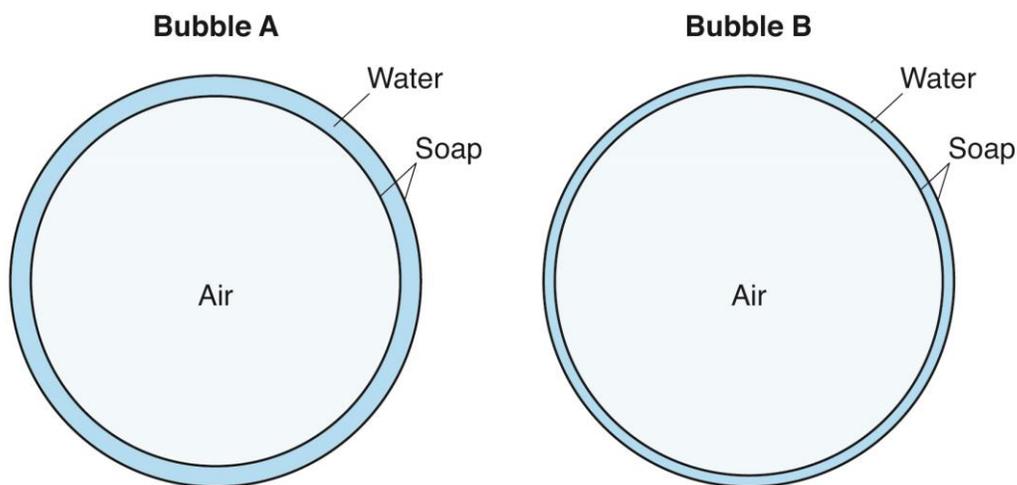


Figure 1: Bubble A and Bubble B were made from the same soapy water solution, but Bubble A is newer than Bubble B.

- 5 Bubbles are pretty incredible, but who knew? The observations that people have made about them have led to many questions and interesting answers that help explain the world around us.

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QUESTIONS:

1. Based on information in the article, what are two ways that a bubble is like a membrane?

- A. It has walls that curve.
- B. It is very colorful.
- C. It is thin and delicate.
- D. It can separate light.
- E. It lets substances pass through.
- F. It lasts only a short time.

2. According to the article, which of the following bubbles would last the longest?

- A. A small bubble before the air inside passes to a larger bubble.
- B. A small bubble with thin, tightly curved walls.
- C. A large bubble made with soap or detergent and sugar.
- D. A large bubble with walls that bend in the wind and change colors.

3. The following question has two parts. Answer Part A and then answer Part B.

Part A: In paragraph 4, what does the word *brace* mean?

- A. fasten
- B. prepare
- C. support
- D. awaken

Part B: Which two phrases from paragraph 4 best help the reader understand the meaning of *brace*?

- A. "can easily pop"
- B. "two or three times"
- C. "strengthens the wall"
- D. "dissolves in the water"
- E. "does not evaporate as quickly"
- F. "very large and stiff"

4. What does Figure 1 help the reader understand about bubbles?

- A. Figure 1 shows that Bubble B is likely to pop soon because some of the water has evaporated.
- B. Figure 1 shows that bubbles are usually the same shape and size.
- C. Figure 1 shows that bubbles are fragile because they are made of only air, soap, and water.
- D. Figure 1 shows that air can move from one bubble to another.

5. Using the ideas below from “Bubbology”, decide which two items on the list are main ideas from the article, and write them on the chart. Then use the list again to write in one supporting detail for each main idea you have chosen. One main idea and one supporting detail have already been written in the chart for you as an example. Note that you will NOT use all the details listed.

Details from “Bubbology”

Bubbles act like prisms. Bubble walls are made of soap. Bubbles appear colorful. Bubbles with sugar last longer	Walls of houses are made strong with boards. Bigger bubbles are sturdier. Adding things to the soapy water can strengthen bubbles.
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Main Idea	Supporting Detail
Bubbles show a process that is similar to something that happens in our bodies.	Air moves between bubbles.

6. The following question has two parts. Answer Part A and then answer Part B.

Part A: What is the main point the article makes?

- A. The structure of bubbles makes them quick to pop.
- B. Many things can affect a bubble's color and strength.
- C. Bubbles can be used to help explain several science concepts.
- D. Living creatures have bubble-like structures in their bodies.

Part B: How does the structure of the article help support the answer to Part A?

- A. The article demonstrates how bubble walls are like membranes, prisms, and the walls of houses.
- B. The article explains the causes and effects of making bubbles last longer.
- C. The article uses chronological order to examine the effect of light and wind on bubbles.
- D. The article presents the steps involved in the process of human digestion.

7. In paragraph 1, the author says that bubbles can teach us about life. Circle the sentence in paragraph 2 that provides evidence for this claim.

8. (Optional) Using information from the article, describe what is the same and what is different between big bubbles and small bubbles. Be sure to use details from the article to support each part of your answer. Use the lines on the next page for your response.

Information for Teachers: Quantitative and Qualitative Analyses of the Text

Regular practice with complex texts is necessary to prepare students for college and career readiness, as outlined in Reading Standard 10. The text for this mini-assessment has been placed at grade 5, and the process used to determine the grade level placement is described below. “Appendix A to the Common Core” and the Supplement to Appendix A, “New Research on Text Complexity,” lay out a research-based process for selecting complex texts:

1. Place a text or excerpt within a **grade band** based on at least one¹ quantitative measure according to the research-based conversion table provided in the Supplement to Appendix A: “New Research on Text Complexity” (www.corestandards.org/resources).
2. Place a text at a **grade level** based on a qualitative analysis.

Quantitative Analysis

“Bubbology”	Quantitative Measure #1	Quantitative Measure #2
	Flesch-Kincaid: 5.7	Lexile: 880

After gathering the quantitative measures, the next step is to place the quantitative scores in the Conversion Table found in the Supplement to Appendix A (www.corestandards.org/resources) and determine the **grade band** of the text.

Figure 1 reproduces the conversion table from the Supplement to Appendix A, showing how the initial results from the Flesch-Kincaid and Reading Maturity measures were converted to grade bands.

Figure 1: Updated Text Complexity Grade Bands and Associated Ranges from Multiple Measures⁷

Common Core Band	ATOS	Degrees of Reading Power [®]	Flesch-Kincaid [§]	The Lexile Framework [®]	Reading Maturity	SourceRater
2 nd – 3 rd	2.75 – 5.14	42 – 54	1.98 – 5.34	420 – 820	3.53 – 6.13	0.05 – 2.48
4 th – 5 th	4.97 – 7.03	52 – 60	4.51 – 7.73	740 – 1010	5.42 – 7.92	0.84 – 5.75
6 th – 8 th	7.00 – 9.98	57 – 67	6.51 – 10.34	925 – 1185	7.04 – 9.57	4.11 – 10.66
9 th – 10 th	9.67 – 12.01	62 – 72	8.32 – 12.12	1050 – 1335	8.41 – 10.81	9.02 – 13.93
11 th – CCR	11.20 – 14.10	67 – 74	10.34 – 14.2	1185 – 1385	9.57 – 12.00	12.30 – 14.50

Quantitative data shows that placement in grade 4 or 5 would be appropriate. To find the **grade level** of the text within the designated grade band, engage in a systematic analysis of the characteristics of the text. The characteristics that should be analyzed during a qualitative analysis can be found in Appendix A of the CCSS. (www.corestandards.org)

¹ For higher stakes tests, it is recommended that two corresponding text complexity measures be used to place a text in a grade band. When two measures are used, both placing the text in the same **band**, the results provides additional assurance that the text selected is appropriate for the band.

Qualitative Analysis of “Bubblology”

Category	Notes and comments on text, support for placement in this band	Where to place within the band?				
		Too low	Early to mid 4	Mid- 4 to low 5	Mid to high 5	NOT suited to band
Structure: (both story structure or form of piece)	The structure of this text is main idea (bubbles can teach us about life) supported by supporting details (three major scientific concepts that are illustrated by bubbles). The structure is clearly signaled by the first sentences of the main paragraphs.					
Language Clarity and Conventions (including vocabulary load)	Mostly simple sentence structures are used throughout. However, there are several academic and domain-specific vocabulary words that increase the complexity of this text (e.g., membrane, prism, oxygen, molecules). The use of scientific terms and concepts makes the text complex.					
Knowledge Demands (life, content, cultural/literary)	Students who do not have some basic knowledge of digestion and breathing may be challenged by this text, although it is reasonable to expect fifth graders to have encountered these basic science concepts. Also, the text describes each concept briefly. Additionally, students who lack an understanding of how a prism works may find the text challenging, although this topic also is explained briefly in the text.					
Levels of Meaning (chiefly literary)/ Purpose (chiefly informational)	The central message (we can learn from bubbles) and purpose (explanation of what we can learn) are explicitly stated. Additionally, there is strong use of evidence, including examples and comparisons. The illustration should assist students in understanding one of the basic concepts described in the text, but the passage remains very complex due to the challenging scientific concepts.					
Overall placement: Grade 5	Justification: The concepts covered by the text, as well as the examples used, make this text very complex. Additionally, some of the domain-specific vocabulary will present challenges to students. This text is most suited for use at the end of grade 5.					

Question Annotations and Correct Answer and Distractor Rationales

Question Number	Correct Answer(s)	Standards	Rationales for Answer Options
1	C, E	RI.5.3, RI.5.1	<p>A. “Walls that curve” is a characteristic of bubbles, but not a characteristic of a membrane as described in the article.</p> <p>B. “Very colorful” describes the appearance of bubbles acting as a prism, but the article does not apply this characteristic to membranes in humans.</p> <p>C. This is a correct answer. Because both bubble walls and membranes are thin and delicate, air can pass through a bubble wall much like oxygen can pass through membranes, moving from the blood stream into the lungs.</p> <p>D. “It can separate light” describes the ability of bubbles to act as prisms, but the words do not describe a characteristic of membranes as described in the article.</p> <p>E. This is a correct answer. Both bubbles and membranes allow substances to pass through their walls. The air in smaller bubbles passes through into larger bubbles, as oxygen passes from the lungs into the bloodstream.</p> <p>F. “It only lasts a short time” refers to the lifespan of a bubble cluster, but does not describe membranes in living things.</p>
2	C	RI.5.3, RI.5.1	<p>A. Small bubbles do not last as long as large bubbles because the curve of the wall is more severe, which makes the walls weaker so they pop quickly.</p> <p>B. Small bubbles with thin walls are likely to be very fragile and pop quickly.</p> <p>C. This is the correct answer. Large bubbles last longer than small bubbles because their walls are less curved and therefore stronger, and the addition of soap or detergent and sugar will make the walls even sturdier.</p> <p>D. All bubbles, regardless of size, will bend in the wind and change colors.</p>

<p>3 Part A</p>	<p>C</p>		<p>A. “Fasten” is not a correct meaning for “brace” because it refers to how large boards are affixed to the wall of a house, not how sugar molecules strengthen the wall of a bubble.</p> <p>B. “Prepare” is not a correct meaning for “brace” because it does not refer to the fact that the sugar molecules support the walls of the bubble.</p> <p>C. This is the correct answer. “Support” describes how the sugar molecules provide additional strength to the bubble walls.</p> <p>D. “Awaken” is not the correct meaning for “brace” because it does not apply to the role of the sugar molecules, which give strength to the walls of the bubble.</p>
<p>3 Part B</p>	<p>C, F</p>	<p>RI.5.4, RI.5.1</p>	<p>A. “Can easily pop” refers to bubbles without sugar added to the solution and does not help the reader understand the meaning of “brace.”</p> <p>B. “Two or three times” refers to the increased lifespan of bubbles made with sugar, not the role of the sugar helping to “brace” the walls of the bubble.</p> <p>C. This is a correct answer. “Strengthens the wall” explains the role of sugar molecules that fortify the bubble.</p> <p>D. “Dissolves in water” explains what happens to sugar when added to a bubble solution, not the purpose of the sugar molecules in helping to “brace” the walls of the bubble.</p> <p>E. “Does not evaporate as quickly” refers to the difference between sugar and water, not the benefit of this difference.</p> <p>F. This is a correct answer. “Very large and stiff” describes the strengthening, or “bracing,” characteristics of sugar molecules.</p>
<p>4</p>	<p>A</p>	<p>RI.5.6, RI.5.1</p>	<p>A. This is the correct answer. Bubble B has less water between the outer and inner soap walls and, therefore, will burst sooner than Bubble A. This concept is also described in the text.</p> <p>B. Although the sizes of the bubbles are similar, this fact does not add to reader understanding of bubbles.</p> <p>C. The sturdiness of bubbles isn’t determined by the fact that they are made up of only air, soap, and water. Instead, it is determined by the amount of soap and water and other ingredients. Because both bubbles in Figure 1 are made from the same batch of soapy water, the illustration does not add to reader understanding.</p> <p>D. Figure 1 does not show air moving from one bubble to another. Air passes through bubbles whose walls touch one another, not bubbles separated like Bubbles A and B.</p>

5	<table border="1"> <thead> <tr> <th>Main Idea</th> <th>Supporting Detail</th> </tr> </thead> <tbody> <tr> <td>Bubbles act like prisms.</td> <td>Bubbles appear colorful.</td> </tr> <tr> <td>Adding things to the soapy water can strengthen bubbles.</td> <td>Bubbles with sugar last longer.</td> </tr> </tbody> </table>	Main Idea	Supporting Detail	Bubbles act like prisms.	Bubbles appear colorful.	Adding things to the soapy water can strengthen bubbles.	Bubbles with sugar last longer.	RI.5.2, RI.5.1	<table border="1"> <thead> <tr> <th>Main Idea</th> <th>Rationale</th> <th>Supporting Detail</th> <th>Rationale</th> </tr> </thead> <tbody> <tr> <td>Bubbles act like prisms.</td> <td>This idea is repeated throughout paragraph 3, where the lesson about what bubbles teach us about light is introduced.</td> <td>Bubbles appear colorful.</td> <td>Bubbles are compared to rainbows because they both separate light into different colors.</td> </tr> <tr> <td>Adding things to the soapy water can strengthen bubbles.</td> <td>This idea is repeated throughout paragraph 4, where the lesson about how to strengthen things is discussed.</td> <td>Bubbles with sugar last longer.</td> <td>When sugar is added to the bubble solution, the resulting bubbles are stronger and last longer.</td> </tr> </tbody> </table>	Main Idea	Rationale	Supporting Detail	Rationale	Bubbles act like prisms.	This idea is repeated throughout paragraph 3, where the lesson about what bubbles teach us about light is introduced.	Bubbles appear colorful.	Bubbles are compared to rainbows because they both separate light into different colors.	Adding things to the soapy water can strengthen bubbles.	This idea is repeated throughout paragraph 4, where the lesson about how to strengthen things is discussed.	Bubbles with sugar last longer.	When sugar is added to the bubble solution, the resulting bubbles are stronger and last longer.
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<p>Bubbles contain soap – This idea is a supporting detail helping to describe the composition of bubbles.</p> <p>Walls of houses are made strong with boards – The article draws a comparison between the addition of sugar to bubbles and the boards on the walls of a house.</p> <p>Bigger bubbles are sturdier – This idea is a supporting detail helping to explain the characteristics of bubbles.</p>																					
6 Part A	C	RI.5.8, RI.5.1	<p>A. This sentence is a detail relating to the characteristics of small bubbles, not the main point the author makes in the article.</p> <p>B. This sentence states that there is a relationship between the composition of bubbles and the resulting characteristics rather than the main point the author makes in the article.</p> <p>C. This is the correct answer. This statement summarizes the main idea of the article, that bubbles can illustrate several scientific concepts.</p> <p>D. This sentence describes only one of the three scientific lessons explained in the article, not the article’s overall main idea.</p>																		
6 Part B	A		<p>A. This is the correct answer. The article is structured by a sequential description of three scientific concepts that bubbles help us understand.</p> <p>B. This statement identifies one cause-effect relationship within the article, rather than describing the overall structure.</p> <p>C. This statement explains one cause-effect relationship within the article, rather than describing the overall structure.</p> <p>D. This statement presents one process mentioned in the article, rather than describing the overall structure.</p>																		

7	This is very similar to the way that oxygen passes from your lungs through a membrane and into your blood stream.	RI.5.8, RI.5.1	This statement proves the author’s claim because it directly relates the process of air passing through different parts of a bubble cluster to oxygen passing through different parts of our bodies.
8 Optional Writing Prompt	See bullets to the right for possible ideas that could be included in a top-score response.	W.5.2, W.5.9, RI.5.3, RI.5.2, RI.5.1	<p>A good student response will include:</p> <ul style="list-style-type: none"> • Same <ul style="list-style-type: none"> ○ Both are round ○ Both act as prisms ○ Both teach us about/act like membranes ○ Both are made up of soap, water, and air (three walls) ○ Both can be made stronger with sugar ○ Both can teach us about life, light, and strength ○ Both have walls that act like membranes • Different <ul style="list-style-type: none"> ○ Big bubbles are stronger and last longer ○ Little bubbles are weaker and pop sooner ○ Little bubbles are more curved ○ Big bubbles are less curved ○ air from a smaller bubbles will pass into a larger bubble

Additional Resources For Assessment and CCSS Implementation

Shift 1 – Complexity: *Regular practice with complex text and its academic language*

- See Appendix B for examples of informational and literary complex texts
http://www.corestandards.org/assets/Appendix_B.pdf
- See the Text Complexity Collection on www.achievethecore.org

Shift 2 – Evidence: *Reading, writing, and speaking grounded in evidence from text, both literary and informational*

- See Close Reading Exemplars for ways to engage students in close reading on
<http://www.achievethecore.org/steal-these-tools/close-reading-exemplars>
- See the Basal Alignment Project for examples of text-dependent questions
<http://www.achievethecore.org/basal-alignment-project>

Shift 3 – Knowledge: *Building knowledge through content-rich nonfiction*

- See Appendix B for examples of informational and literary complex texts
http://www.corestandards.org/assets/Appendix_B.pdf