Grade 9 Informational Mini-Assessment

"A Big Surprise from the Edge of the Solar System" Text and Video

This grade 9 mini-assessment is based on a text and video about a recent discovery by NASA. The subject matter and the stimuli allow for the testing of the Common Core State Standards (CCSS) for Literacy in Science and Technical Subjects and the Reading Standards for Informational Texts. The text is worthy of students' time to read, and the video adds a multimedia component to make the task a more complete and authentic representation of research. The text meets the expectations for text complexity at grade 9. Assessments aligned to the CCSS will employ quality, complex texts such as these, and some assessments will include multimedia stimuli as demonstrated by this mini-assessment.

Questions aligned to the CCSS should be worthy of students' time to answer and therefore do not focus on minor points of the texts. Several standards may be addressed within the same question because complex texts tend to yield rich assessment questions that call for deep analysis. In this mini-assessment there are nine selected response questions that address the Reading Standards for Informational Texts and/or Reading Standards for Literacy in Science and Technical Subjects. There is also one constructed-response item that address the Reading, Writing, and Language Standards below.

We encourage educators to give students the time that they need to read closely and write to sources. Please note that this mini-assessment is likely to take at least two class periods. While 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.

Note for teachers of English Language Learners (ELLs): This assessment is designed to measure students' ability to read and write in English. Therefore, educators will not see the level of scaffolding typically used in instructional materials to support ELLs—these would interfere with the ability to understand their mastery of these skills. If ELL students are receiving instruction in grade-level ELA content, they should be given access to unaltered practice assessment items to gauge their progress. Passages and items should not be modified; however, ***additional information about accommodations you may consider when administering this assessment to ELLs is available in the teacher section of this resource.***

The ten questions align to the following standards:

RI.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
RI.9-10.2	Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
RI.9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

RI.9-10.5	Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).
RI.9-10.6	Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.
RI.9-10.7	Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.
RST.9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
RST.9-10.2	Determine the central ideas or conclusions of text; trace the text's explanation or depiction of a complex process, phenomenon or concept; provide an accurate summary of the text.
RST.9-10.5	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
RST.9-10.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g. in an equation) into words.
RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
SL.9-10.3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
W.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
W.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
W.9-10.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
L.9-10.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
L.9-10.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

L.9-10.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

Contents

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 9 Mini-Assessment

"A Big Surprise from the Edge of the Solar System"

Today you will read an article and watch a video about a recent discovery made by NASA (National Aeronautics and Space Administration). You will then answer several questions based on the text and the video. 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 need to answer Part A of the question before you answer Part B, but you may return to Part A if needed.

Take as long as you need to read and answer the questions. It is likely that it will take you at least a class period to finish the questions, not including the essay. If you do not finish, we will discuss ways to secure some extra time to complete.

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

A Big Surprise from the Edge of the Solar System

by Dr. Tony Phillips of NASA's Goddard Space Flight Center

1 NASA's Voyager probes are truly going where no one has gone before. Gliding silently toward the stars, 9 billion miles from Earth, they are beaming back news from the most distant, unexplored reaches of the solar system.

2 Mission scientists say the probes have just sent back some very big news indeed.

3 It's bubbly out there.

4 According to computer models, the bubbles are large, about 100 million miles wide, so it would take the speedy probes weeks to cross just one of them. Voyager 1 entered the "foam-zone" around 2007, and Voyager 2 followed about a year later. At first researchers didn't understand what the Voyagers were sensing--but now they have a good idea.

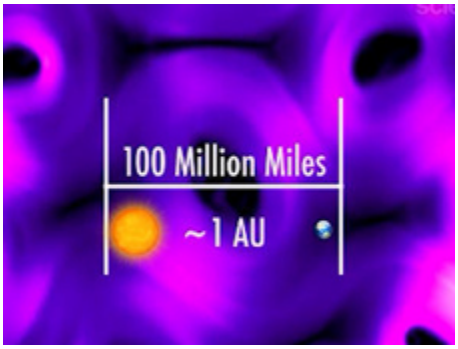


Figure 1: Magnetic bubbles at the edge of the solar system are about 100 million miles wide--similar to the distance between Earth and the Sun. **Credit:** NASA

5 "The sun's magnetic field extends all the way to the edge of the solar system," explains Opher[1]. "Because the sun spins, its magnetic field becomes twisted and wrinkled, a bit like a ballerina's skirt. Far, far away from the sun, where the Voyagers are now, the folds of the skirt bunch up."

6 When a magnetic field gets severely folded like this, interesting things can happen. Lines of magnetic force criss-cross and "reconnect." (Magnetic reconnection is the same energetic process underlying solar flares.) The crowded folds of the skirt reorganize themselves, sometimes explosively, into foamy magnetic bubbles.

7 "We never expected to find such a foam at the edge of the solar system, but there it is!" says Opher's colleague, University of Maryland physicist Jim Drake.

8 Theories dating back to the 1950s had predicted a very different scenario: The distant magnetic field of the sun was supposed to curve around in relatively graceful arcs, eventually folding back to rejoin the sun. The actual bubbles appear to be self-contained and substantially disconnected from the broader solar magnetic field.

9 Energetic particle sensor readings suggest that the Voyagers are occasionally dipping in and out of the foam—so there might be regions where the old ideas still hold. But there is no question that old models alone cannot explain what the Voyagers have found.

10 Says Drake: "We are still trying to wrap our minds around the implications of these findings."

[1] Dr. Merav Opher was born in Haifa, Israel in 1970. She received her B.Sc. in Physics at the University of Sao Paulo, Brazil in 1992. In 1998, she received her Ph.D. from the Institute of Astronomy and Geophysics at the University of Sao Paulo, Brazil. Her research interests are in the area of plasma effects in space physics and astrophysics.

11 The structure of the sun's distant magnetic field—foam vs. no-foam—is of acute scientific importance because it defines how we interact with the rest of the galaxy. Researchers call the region where the Voyagers are now "the heliosheath." It is essentially the border crossing between the Solar System and the rest of the Milky Way. Lots of things try to get across—interstellar clouds, knots of galactic magnetism, cosmic rays and so on. Will these intruders encounter a riot of bubbly magnetism (the new view) or graceful lines of magnetic force leading back to the sun (the old view)?

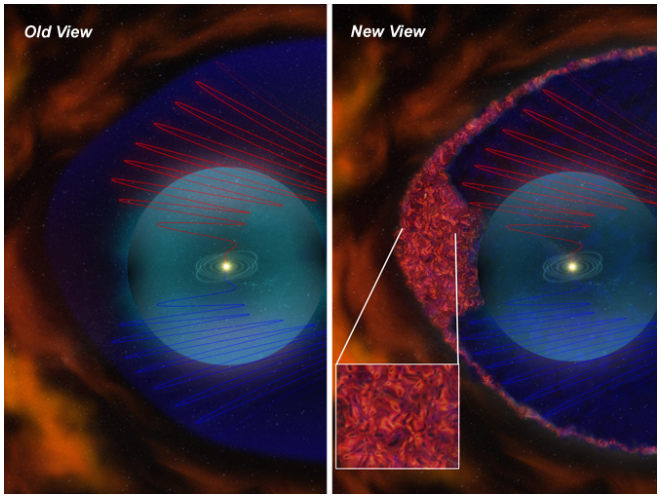


Figure 2: Old and new views of the heliosheath. Red and blue spirals are the gracefully curving magnetic field lines of orthodox models. New data from Voyager add a magnetic froth (inset) to the mix. Credit: NASA

12 The case of cosmic rays is illustrative. Galactic cosmic rays are subatomic particles accelerated to near-light speed by distant black holes and supernova explosions. When these microscopic cannonballs try to enter the solar system, they have to fight through the sun's magnetic field to reach the inner planets.

13 "The magnetic bubbles appear to be our first line of defense against cosmic rays," points out Opher. "We haven't figured out yet if this is a good thing or not."

14 On one hand, the bubbles would seem to be a very porous shield, allowing many cosmic rays through the gaps. On the other hand, cosmic rays could get trapped inside the bubbles, which would make the froth a very good shield indeed.

15 So far, much of the evidence for the bubbles comes from the Voyager energetic particle and flow measurements. Proof can also be obtained from the Voyager magnetic field observations and some of this data is also very suggestive. However, because the magnetic field is so weak, the data takes much longer to analyze with the appropriate care. Thus, unraveling the magnetic signatures of bubbles in the Voyager data is ongoing.

16 "We'll probably discover which is correct as the Voyagers proceed deeper into the froth and learn more about its organization," says Opher. "This is just the beginning, and I predict more surprises ahead."

Source: www.nasa.gov

Second Stimulus: Video – Heliosphere Surprise

When the class is ready, we will watch the video together. To signal that you are ready to watch the video, please turn your mini-assessment face down on your desk.

We will watch the video twice, as some of the questions later in this mini-assessment will be asking you to remember specific information from it.

Click on the link to view the video.

http://www.nasa.gov/mission_pages/voyager/heliosphere-surprise.html

Source: www.nasa.gov

QUESTIONS:

1. **As used in paragraph 11 of "A Big Surprise from the Edge of the Solar System," which meaning of the word *acute* best applies?**

   A. clear

   B. dire

   C. crucial

   D. intense

2. **The following question has two parts. Answer Part A, then answer Part B.**

   Part A: Read the caption under Figure 2 in the text. What is the meaning of the word *orthodox* as used in the caption?

   A. official

   B. legitimate

   C. conservative

   D. traditional

   Part B: Which word in the caption under Figure 2 provides the strongest clue to the meaning of the word *orthodox*?

   A. old

   B. views

   C. models

   D. mix

3. **What is the relationship between the terms *magnetic reconnection* and *magnetic bubbles* as they are used in the article?**

   A. Magnetic reconnection is what allows magnetic bubbles to create solar flares.

   B. Magnetic reconnection is what causes the magnetic bubbles to form.

   C. Magnetic reconnection occurs when magnetic bubbles rejoin the sun.

   D. Magnetic reconnection is what solar flares use to create magnetic bubbles.

4. The following question has two parts. Answer Part A, then answer Part B.

Part A: Why does the author provide an explanation of the graceful-arc theory of the sun's magnetic field?

A. to establish the idea that current data from Voyager probes seems to contradict previously held theories

B. to show what the Voyager is attempting to find as it reaches the outer edge of the Sun's magnetic field

C. to demonstrate the relationship between the Sun's magnetic field and the rate at which Voyager can send information back to Earth

D. to introduce the beliefs about our solar system that the Voyager mission was designed to disprove

Part B: How does this explanation contribute to the author's purpose in the article?

A. It gives an example that explains one of the Voyager's primary goals.

B. It provides support for the idea that scientific theories change as new information becomes available.

C. It provides support for the claim that the Voyager is NASA's primary tool for making discoveries in space.

D. It gives an example of one way that scientists can learn new things from old experiments.

5. In the article, the author reveals Opher's claim that "The magnetic bubbles appear to be our first line of defense against cosmic rays . . ." Choose <u>two</u> sentences from the article that most help to develop this claim.

A. "When a magnetic field gets severely folded like this, interesting things can happen."

B. "The crowded folds of the skirt reorganize themselves, sometimes explosively, into foamy magnetic bubbles."

C. "The actual bubbles appear to be self-contained and substantially disconnected from the broader solar magnetic field."

D. "Lots of things try to get across—interstellar clouds, knots of galactic magnetism, cosmic rays, and so on."

E. "When these microscopic cannonballs try to enter the solar system, they have to fight through the sun's magnetic field to reach the inner planets."

F. "On the other hand, cosmic rays could get trapped inside the bubbles, which would make the froth a very good shield indeed."

6. Create a summary of the article by writing the ideas from the "Possible Ideas" table in the "Summary" table in the order in which they were introduced and discussed in the article. Not all ideas will be used.

Summary			
First	Second	Third	Fourth

Possible Ideas					
Cosmic rays are subatomic particles that travel at near-light speed.	In the 1950's, the magnetic field of the sun was believed to be in the shape of an arc.	Scientists expect to make further discoveries based on data recorded by the Voyager craft.	Scientists believe the foam-like magnetic fields are caused by the spinning of the sun.	A new theory of magnetic foam is based on information gathered by the Voyager craft.	The border between the Milky Way and the Solar System is known as "the heliosheath."

7. Which excerpt from the video <u>best</u> demonstrates the central idea?

A. "The two Voyager spacecraft have been travelling away from earth for more than thirty-three years, and they are finally in the outer edge of the solar system." (0:14-0:20)

B. "The sun's magnetic field spins on opposite directions on the North and South Poles, creating a sheet where the two spins meet." (0:46-0:52)

C. "The smooth, streamlined look is gone, replaced with a bubbly, frothy outer layer." (1:20-1:23)

D. "When they arrive at the bubble region, they slowly move from bubble to bubble until they can reach smooth magnetic field lines, and follow them toward the sun." (1:31-1:38)

8. This item has two parts. Answer Part A and then answer Part B.

Part A: Why does the author of the article compare cosmic rays to cannonballs?

A. to clarify the role dangerous cosmic rays play in space

B. to explain the technical topic of cosmic rays using a familiar object

C. to illustrate the explosive nature of the process of forming cosmic rays

D. to describe the shape and trajectory of cosmic rays

Part B: Which excerpt from the video demonstrates a technique similar to the answer to Part A?

A. "As the solar wind travels out from the sun, it pushes against the galactic medium and abruptly slows down." (0:29 – 0:33)

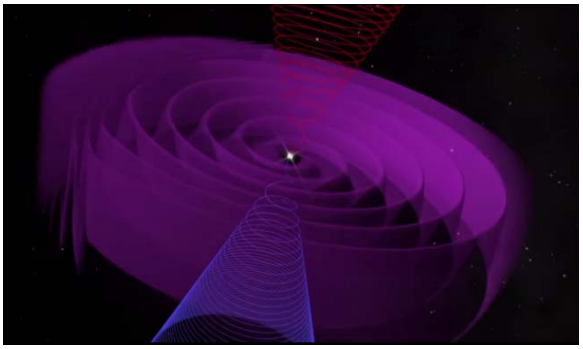
B. "This sheet gently ripples as it travels outward, and the ripples get bigger as they go." (0:53 – 0:57)

C. "When this sheet reaches the termination shock, it starts to compress, like water hitting a wall." (0:59 – 1:04)

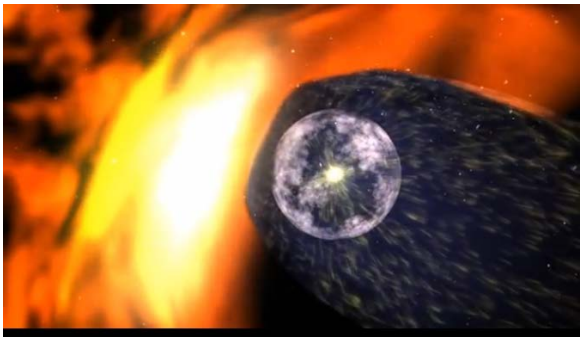
D. "This new layer also changes our understanding of how extremely fast-moving particles, called cosmic rays, enter our solar system." (1:24 – 1:31)

9. In paragraph 9 of the article, the author claims that "Energetic particle sensor readings suggest that the Voyagers are occasionally dipping in and out of the foam—so there might be regions where the old ideas still hold." Circle the image from the video that <u>best</u> supports this claim?

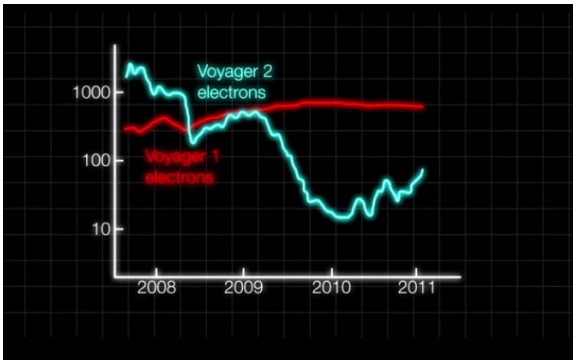
A



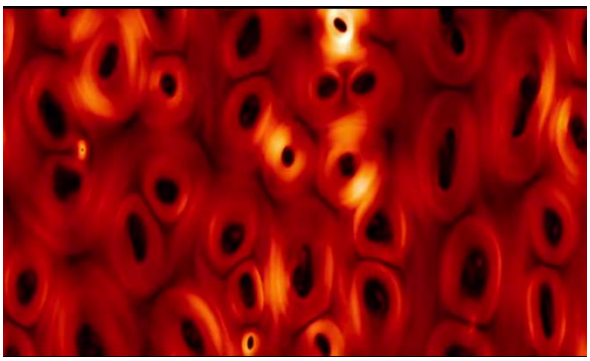
C



B



D



10. The article and the video both describe the appearance and function of the heliosheath. Write an essay to explain how watching the video helps add meaning to information from the text. Be sure to include details from both the video and the text in your response.

Your response will be scored on how well you:

- **Demonstrate your understanding of the ideas of the text**
- **Use evidence from the text to help develop and support your ideas**
- **Organize your response in a logical manner**
- **Demonstrate an appropriate writing style through the use of precise word choice and varied sentences**
- **Use standard conventions for writing**

Information for Teachers: Quantitative and Qualitative Analyses of the Texts

Regular practice with complex texts is necessary to prepare students for college and career readiness, as outlined in Reading Standard 10. The text and stimulus for this mini-assessment have been placed at grade 9, and the process used to determine this grade level placement is described below. "Appendix A of 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 one[2] 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 or excerpt at a **grade-level** based on a qualitative analysis.

Voyager Finds Magnetic Foam at Solar System's Edge	**Quantitative Measure #1**	**Quantitative Measure #2**
	RMM: 10.6	Flesch-Kinkaid: 9.1

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 results from various measures can be converted to grade bands.

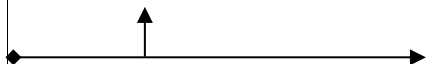
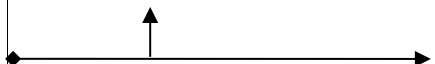
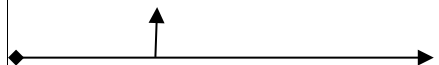
Figure 1: Updated Text Complexity Grade Bands and Associated Ranges from Multiple Measures[7]

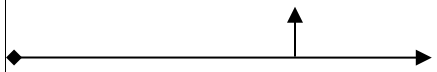
Common Core Band	ATOS	Degrees of Reading Power®	Flesch-Kincaid[8]	The Lexile Framework®	Reading Maturity	SourceRater
2nd – 3rd	2.75 – 5.14	42 – 54	1.98 – 5.34	420 – 820	3.53 – 6.13	0.05 – 2.48
4th – 5th	4.97 – 7.03	52 – 60	4.51 – 7.73	740 – 1010	5.42 – 7.92	0.84 – 5.75
6th – 8th	7.00 – 9.98	57 – 67	6.51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

Overlap exists between the two indices at the 9/10 grade band.

[2] 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 provide additional assurance that the text selected is appropriate for the band.

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 by doing a qualitative analysis can be found in Appendix A of the CCSS. (www.corestandards.org).

Qualitative Analysis	**"A Big Surprise from the Edge of the Solar System" Text**	**Where to place within the band?**					
Category	**Notes and comments on text, support for placement in this band**	Too Low	Early-mid 9	Mid-end 9	Early – mid 10	End 10	**NOT suited to band**
Structure: (both story structure or form of piece)	The text's underlying structure is main idea (NASA has "very big news"), developed by supporting details explaining what the probes have found. Intermingled throughout to develop the details are comparison and contrast (e.g., the magnetic field is "a bit like a ballerina's skirt") and cause and effect (the explanation of what happens when a magnetic field gets folded). The piece concludes with the idea that research is ongoing, and more data will be gathered. The graphics aid in student comprehension of difficult scientific concepts.						
Language Clarity and Conventions	Although some scientific terminology is used (interstellar, heliosheath, galactic magnetism), the majority of the vocabulary is accessible, as the author uses more commonly known words and images to explain the scientific facts. The sentence structure varies, but the majority of the sentences are simple or compound, with very little use of unique punctuation.						
Knowledge Demands (life, content, cultural/literary)	Basic background knowledge of what a solar system is would be helpful, but students should still be able to understand the concepts discussed in the text without it, as long as they are aware of the vastness of space.						
Levels of Meaning (chiefly literary)/Purpose (chiefly informational)	There is one main level of meaning in the text: NASA has made a discovery about space. To understand the discovery and its impact, there are lesser emphasized purposes such as explaining that although this is new knowledge, it may not be the last word on the subject; space exploration and discovery is constant.						
Overall placement: Grade 9	**Justification: Although the concepts discussed in the text are rather abstract, the author uses a variety of organizational structures and devices to make them readily accessible. The vocabulary is most often simplistic, and when it isn't there is context to help students determine meaning. The single purpose of the text is clearly stated.**						

Qualitative Analysis	"Heliosphere Surprise" Video	Where to place within the band?					
Category	**Notes and comments on text, support for placement in this band**	Too Low	Early-mid 9	Mid-end 9	Early – mid 10	End 10	**NOT suited to band**
Structure: (both story structure or form of piece)	The video begins with an explanation of the organization of the solar system, especially the heliosphere, and introduces the Voyager spacecraft. The video then gives a series of chronological graphics showing the process of how the heliosheath becomes bubbly. Then additional explanation is given to Voyagers findings. The video ends with the idea that there are still unanswered questions but the Voyagers will play a role in answering them.						
Language Clarity and Conventions	The presenter speaks clearly and slowly, explaining the more abstract concepts with graphics and oral interpretation. Some domain specific words, such as termination shock, heliosheath, and heliosphere are used, but they are explained. The technical approach in the video is more complicated than in the text.						
Knowledge Demands (life, content, cultural/literary)	While the content is relatively advanced, and some background knowledge on the solar system would be helpful, the video's heavy use of graphics makes the content more accessible, especially to students who learn visually.						
Levels of Meaning (chiefly literary)/Purpose (chiefly informational)	There are two main purposes: to explain how Voyager spacecraft have benefitted the space program and to give an example of a recent discovery made by the Voyagers, which has changed our understanding of an aspect of space. While not directly stated, the purposes are largely explicit, and easy for students to grasp.						
Overall placement: Grade 9	**Justification:** **When compared to the text, the video is much more dense and technical. Therefore, it is rated as more complex. This video, though challenging, is still appropriate for a 9th grade student when paired with the accompanying article.**						

Question Annotations: Correct Answer(s) and Distractor Rationales

Question Number	Correct Answer(s)	Standards	Rationales for Answer Options
1	**C**	**RST.9-10.1, RI.9-10.4, RI.9-10.1**	**A.** According to paragraph 10, scientists "are still trying to wrap our minds around the implications of these findings," suggesting that this information is not clear. **B.** Although the information is important, the findings do not suggest a negative outcome, which "dire" implies. **C.** This is the correct answer. These findings are of crucial importance because "it defines how we interact with the rest of the galaxy." **D.** Although the information is important, the findings do not suggest a potentially negative outcome, which "intense" implies.
2, Part A	**D**	**RI.9-10.4, RI.9-10.1**	**A.** "Orthodox" refers to a traditional way of thinking, which may or may not be official. **B.** While an "orthodox" view may be legitimate, it is defined as a traditional way of thinking. **C.** "Orthodox" views may be cautious beliefs, but they are not defined as such. **D.** This is the correct answer. The "orthodox" model illustrates the traditional view of the heliosheath.
2, Part B	**A**		**A.** This is the correct answer. A new model that illustrates the latest data has replaced the traditional view of the heliosheath. **B.** "Views" refers to the models of the heliosheath, not which version is the orthodox example. **C.** "Models" refers to the two renderings of the heliosheath, but does not explain which version is the orthodox example. **D.** "Mix" refers to new material added into the existing model, not which version is the orthodox example.
3	**B**	**RST.9-10.5, RI.9-10.1**	**A.** According to paragraph six, "Magnetic reconnection is the same energetic process underlying solar flares," but this does not indicate a causal relationship between the two. **B.** This is the correct answer. According to paragraph six, "Lines of magnetic force criss-cross and 'reconnect'…into foamy magnetic bubbles." **C.** Magnetic bubbles are found at the edge of the solar system, rather than close to the sun. **D.** Magnetic bubbles are created by the reorganization of magnetic force lines, not solar flares.
4, Part A	**A**	**RST.9-10.6, RST.9-10.1, RI.9-10.6, RI.9-10.1**	**A.** This is the correct answer. The "big surprise from the edge of the solar system" is new information that contradicts the traditional magnetic field model. **B.** In paragraph seven, Jim Drake states, "We never expected to find such a foam at the edge of the solar system," which suggests that the Voyager was not attempting to find evidence of magnetic bubbles as part of its initial mission. **C.** Although information on the new theory was sent to Earth from the Voyager, the article does not outline if the information transmission is impacted by the Sun's magnetic fields. **D.** The Voyager mission was not intended to prove or disprove any theories, but rather to investigate the solar system.

<table>
<tr><th>Question Number</th><th>Correct Answer(s)</th><th>Standards</th><th>Rationales for Answer Options</th></tr>
<tr><td>4, Part B</td><td>B</td><td></td><td>A. The primary goals of the Voyager's mission are not explicitly stated; however, based on the title, we can infer that this theory was a surprise.
B. This is the correct answer. The surprise at the edge of the solar system led scientists to produce a new model of the sun's magnetic field.
C. Although it was the Voyager mission that discovered this information, the author does not suggest that NASA relies primarily on the Voyager to explore space.
D. Although scientists learned new information from the Voyager mission, this information was not gained from old experiments.</td></tr>
<tr><td>5</td><td>E, F</td><td>RI.9-10.5, RI.9-10.1</td><td>A. This sentence explains a general result of folded magnetic fields, not the protective qualities of magnetic bubbles.
B. This sentence describes the structure and effects of folded magnetic fields, not the protective qualities of magnetic bubbles.
C. This sentence describes the magnetic bubbles' appearance and location, not their protective qualities.
D. This sentence describes the variety of things, including cosmic rays, that attempt to move across the magnetic field, not how the bubbles defend against them.
E. This is a correct answer. This sentence explains how magnetic bubbles offer protection from cosmic rays.
F. This is a correct answer. This sentence provides a second example of how magnetic bubbles offer protection from cosmic rays.</td></tr>
<tr><td>6</td><td>See right column</td><td>RST.9-10.2, RST.9-10.1, RI.9-10.2, RI.9-10.1</td><td>KEY: Summary Table<table><tr><th>First</th><th>Second</th><th>Third</th><th>Fourth</th></tr><tr><td>A new theory of magnetic foam is based on information gathered by the Voyager spacecraft.

This idea is developed in paragraphs 1–5.</td><td>Scientists believe the foam-like magnetic fields are caused by the spinning of the sun.

This idea is developed in paragraphs 5–6.</td><td>In the 1950's the magnetic field of the sun was believed to be in the shape of an arc.

This idea is developed in paragraph 8.</td><td>Scientists expect to make further discoveries based on data recorded by the Voyager craft.

This idea is developed in paragraphs 15–16.</td></tr></table></td></tr>
<tr><td>7</td><td>C</td><td>RST.9-10.2, RST.9-10.1</td><td>A. Although this detail is discussed at the beginning of the video, it is a supporting detail rather than the central idea.
B. This detail helps viewers understand the context of the central idea, but is not itself the central idea.
C. This is the correct answer. This sentence explains the new information discovered by the Voyager mission.
D. This detail explains what happens to cosmic rays at the edge of the solar system, which is an important supporting detail, but not the central idea of the video.</td></tr>
</table>

Question Number	Correct Answer(s)	Standards	Rationales for Answer Options
8, Part A	**B**	**RST.9-10.7, RST.9-10.6, RST.9-10.1, SL.9-10.3**	**A.** Although a cannonball evokes a sense of danger, the author does not specify what damage cosmic rays can cause. **B.** This is the correct answer. While difficult to imagine cosmic rays, most readers are familiar with the concept of a cannonball. **C.** Although cosmic rays are "accelerated …by…supernova explosions", the author uses a cannonball to provide a familiar point of comparison. **D.** The cannon ball comparison describes the movement and destructive nature of the cosmic rays, not their appearance.
8, Part B	**C**		**A.** Although this sentence includes an unfamiliar idea (galactic medium), it is not compared to a known idea. **B.** Although this sentence includes a familiar idea (a rippling sheet), it is not compared to an unknown idea. **C.** This is the correct answer. The video compares a difficult concept (termination shock) with a familiar concept (water hitting a wall). **D.** This sentence does not include a comparison to help viewers understand new concepts.
9	**B**	**RST.9-10.9, RST.9-10.7, RST.9-10.1, RI.9-10.7, RI.9-10.1**	**A.** This image depicts the rippling sheet analogy, rather than the location of the magnetic foam as compared to the Voyagers. **B.** This is the correct answer. This image shows the differing amounts of energetic particles each of the Voyager missions has encountered on their respective routes. **C.** This image illustrates the termination shock concept, rather than the location of the magnetic foam as compared to the Voyagers. **D.** This image depicts magnetic bubbles, rather than the location of the magnetic foam as it relates to the Voyagers.
10	**See right column**	**W.9-10.2, W.9-10.7, W.9-10.8, W.9-10.9, RI.9-10.7, RI.9-10.1, RST.9-10.9, L.9-10.1, L.9-10.2, L.9-10.3**	A top score response should include: The text provides an initial definition of the heliosheath. It states that it is "essentially a border crossing between the Solar System and the rest of the Milky Way." The video gives introduces several new, but related concepts, for example *heliosphere*, and *termination shock*. These terms (as well as the images associated with their descriptions in the video), provide further clarity around the information in paragraphs five and six of the text. The concept of the heliosphere also provides greater clarity of where exactly it is (in the solar system) that the magnetic bubbles form. Both the passage and the video discuss the appearance of the heliosheath region. The passage provides additional context around the historical views of the heliosheath's appearance, while the video provides a larger image of the heliosheath in both the traditional, and new "bubbly" view. Finally, both the passage and the video discuss how cosmic rays interact with the heliosheath. Both explain how they bounce around from bubble to bubble, but the video goes on to explain what happens to the rays once they have exited the heliosheath and "reach smooth magnetic field lines, and follow them toward the sun."

Using the Mini-Assessments with English Language Learners (ELLs)

Mini-Assessment Design and English Language Learners

Each mini-assessment is designed using the best practices of test design. English Language Learners will benefit from the opportunity to independently practice answering questions about grade-level complex texts.

Prior to delivering the mini-assessment, teachers should read through each item. If there is language in the question stems specific to the standards (e.g., plot, theme, point of view), make sure that students have been introduced to these concepts prior to taking the assessment. Teachers should not pre-teach specific vocabulary words tested in the assessment (e.g., words students are asked to define) and should only pre-teach language that would impede students from understanding what the question is asking.

The mini-assessments attend to the needs of all learners, and ELLs specifically, by including texts that:

- *Are brief and engaging:* Texts vary in length, but no individual text is more than three pages long.
- *Embed student-friendly definitions:* Footnotes are included for technical terms or words that are above grade level when those words are not surrounded by context that would help students determine meaning.

Informational text sets, such as those included in the mini-assessment, specifically attend to the needs of ELLs by:

- *Building student knowledge:* Mini-assessments often include multiple texts or stimuli on the same topic:
    - For sets with two texts or stimuli, the first text is generally broader, providing a foundation in the content and introducing key vocabulary, and the second text provides more detail or contrast on the same topic. This allows ELLs to dig into the features of the passage being assessed rather than being inundated with dissimilar content and vocabulary.
    - For sets with more than two texts or stimuli, there is an "anchor" text that provides introductory information on the topic.
- *Containing ideas that lend themselves to discussion from a variety of perspectives:* Often these pairs or sets of texts present multiple perspectives on the same topic.

The mini-assessments attend to the needs of all learners, and ELLs specifically, by including questions that:

- *Feature a variety of academic words:*
    - Each mini-assessment contains at least one vocabulary item. Items assessing vocabulary test one of the following:
        - The meaning of Tier 2 academic words in context.

        - The meaning of a figurative word/phrase in context.
        - The impact of word choice on meaning and/or tone.
    - MOST vocabulary items test Tier 2 words.
    - All tested words are chosen because:
        - They are central to the meaning of the text.
        - They are surrounded by sufficient context to allow students to determine meaning.
- *Highlight "juicy" sentences that feature grade-appropriate complex structures, vocabulary, and language features:* Most mini-assessments include at least one item assessing Reading for Literature or Reading: Informational text standard 5. These items point students to analyze the structure of the text. While standard 5 items specifically focus on the structure of the text, other items require the analysis of language features, vocabulary, and relationships between ideas, all of which build student understanding of texts.
- *Provide graphic organizers to help students capture and reflect on new knowledge:* Most mini-assessments include at least one item mimicking a "technology enhanced item." These items include things like tables and charts.
- *Provide writing activities that allow students to use new vocabulary and demonstrate knowledge of new concepts:* Most mini-assessments include an optional writing prompt that allows students to write about the text(s).

Administration Guidelines for ELLs

When assessing ELL students, appropriate accommodations may be considered. Modifications to the assessment itself should not be made. According to the *Accommodations Manual: How to Select, Administer, and Evaluate Use of Accommodations for Instruction and Assessment of English Language Learners, First Edition:*

- "Modifications refer to practices or materials that change, lower, or reduce state-required learning expectations. Modifications may change the underlying construct of an assessment."
- "Accommodations are accessibility supports [that] do not reduce learning expectations. They meet specific needs of students in instruction and assessment and enable educators to know that measures of a student's work produce valid results."

Teachers **may** choose to make accommodations that meet the unique needs of ELLs. Prior to delivering any practice assessment, especially if the mini-assessment is to be used in a more formal setting (e.g., as part of a district benchmark assessment), teachers should research what accommodations will be available to students during their state's summative assessment. For example, some states allow ELLs to use a bilingual dictionary during an assessment; other states do not allow this. Ensure your ELLs are practicing with the accommodations they can expect to see on the summative. Some examples of appropriate accommodations include:

- Reading the directions aloud to students multiple times.
- Providing student directions in student native language.
- Allowing students additional time to complete the mini-assessments.

- Exposing students to item types prior to the assessment.
- Reading the scoring expectations for the writing prompt aloud to students.

Because the goal of literacy mini-assessments is to measure grade-level literacy as students progress toward college- and career-readiness, teachers must be careful **not** to make modifications that may be commonly used in classroom instruction. Examples of modifications that should **not** be used include:

- Reading passages aloud for students.
- Adding student glossaries of unfamiliar terms.
- Pre-teaching tested vocabulary words.

In any testing setting, teachers must be careful to choose accommodations that suit the needs of each individual student.

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

Sample Scoring Rubric for Text-Based Writing
Prompts: http://achievethecore.org/content/upload/Scoring_Rubric_for_Text-Based_Writing_Prompts.pdf