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The Sinking of the Titanic

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THE SINKING OF THE TITANIC | CONTENTS
Literacy Overview

Reading Selections
• Building the Titanic (history article)
• The Night the Titanic Sank (firsthand accounts)
• Alvin the Submersible (engineering article)
• Titanic’s Artifacts (opinion piece)

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS

CC.5.RI.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CC.5.RI.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CC.5.RI.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.

CC.5.RI.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.

CC.5.RI.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.

CC.5.RI.6 Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.

CC.5.RI.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).

CC.5.RI.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing Standards (pages 17 and 19)

CONTENT GOAL

Students will read four selections in The Sinking of the Titanic. The selections examine the building, sinking, and exploration of Titanic and its artifacts. Students will learn about the physical properties of the materials used to construct Titanic (including mass, density, buoyancy, and brittleness) and the role these materials and properties played in the Titanic disaster.

COMPREHENSION GOAL

Remind students that as thinking-intensive readers they must listen to their inner voice to monitor and repair comprehension as they read. Find opportunities to model and teach active thinking strategies to help students access content. You may want to focus on the following strategies for The Sinking of the Titanic.

• Ask Questions: Readers expand understanding when they ask themselves questions as they read and when they ask others questions as they discuss the content. Self-questioning propels readers to discover answers, ask more questions, and do further research.

• Infer and Visualize: A writer doesn’t always tell everything. Readers have to use their background knowledge and pay attention to the text and picture clues to make inferences and visualize to construct meaning.
Draw the graphic organizer shown above. Ask: What do you think you already know about the sinking of Titanic?

Model for students by describing a personal observation. You might say something similar to the following: I once went on a cruise ship and was amazed that such a huge, heavy thing could float. Because of this experience, I know that some objects can be very heavy and still float. I wonder what made it float.

Explain that there are two factors that determine whether an object will sink or float—the materials the object is made from, and the design or shape of the object itself. You might say: A solid block of wood will always float, and a solid block of iron will always sink. But if we make the iron into a different shape, such as a bowl, it may be able to float upright on the water. This is because the inside of the bowl is filled with air rather than solid metal.

Ask students to Turn and Talk about what they already know about the sinking of Titanic.

Students can then Share what they already know or what they wonder about the sinking of Titanic.

You may want to return to the graphic organizer to add more information after students read each selection.

BUILD SCIENCE BACKGROUND

Pages 4–6 of this teacher’s guide address how certain science concepts relate to each selection in The Sinking of the Titanic. This information will provide you with science background knowledge as you plan your teaching for this book.

Help students access background knowledge related to the science concepts. Support the concept of properties of matter in ways that are familiar to your students.

- **mass:** Have students observe two objects that are made of the same material but different in size, such as a large lump of clay and a small lump of clay, or a cup filled with beads and a cup with only a few beads. Ask students to identify which objects have greater mass.

- **density:** Have students hold two objects which are similar in size but different in mass, such as an inflated beach ball and a basketball, or a golf ball and a table tennis ball. Ask students to identify which object is more dense and which is less dense.

- **buoyancy:** Use a clear container filled with water to demonstrate that some materials sink while others float. Have students identify which materials are buoyant and not buoyant.
Science concepts are a critical part of each selection in *The Sinking of the Titanic*. These pages will help you build content knowledge so that you may have effective discussions with students as they read each selection in the book.

The following big idea science concepts apply to several selections in the book.

- **Mass** (student book, p. 6) is a property of matter which measures the amount of matter, or “stuff,” in an object. High mass objects contain more matter than low mass objects. While mass is related to weight, there is an important difference. Weight will change if gravity changes, so objects will change weight on other planets, and are “weightless” in space. However, the amount of matter in an object is the same no matter where it is in the universe. For example, when astronauts brought back rocks from the moon, the rocks weighed more on Earth because gravity is stronger here. But because the rocks are made of exactly the same amount of matter on Earth and on the moon (and anywhere else), the mass of the rocks never changed.

- **Density** (student book, pp. 3, 12, 22) is a property of matter which measures how “tightly packed” mass is in different materials. Dense materials contain more mass in a certain volume than less dense materials do. For example, an iron ball bearing and a plastic bead may be the same size, but the ball bearing will have a greater mass than the bead because iron as a material is much denser than plastic.

- **Buoyant** (student book, p. 22) objects float in water. Buoyancy is a property of matter. An object is only buoyant if its density is lower than the density of the fluid it is placed in. Objects with a greater density than water will sink. For example, cork is much less dense than water and will always float, but most metals are denser than water and will sink. However, metal can float if formed into the right shape (such as a bowl), because the air inside lowers the overall density. Therefore, objects can be buoyant because of the type of material they are made from, or because of the shape and design of the object.

Pages 5–6 in this teacher’s guide describe how the science concepts above relate to each selection. Additional science background information is given for each selection.
BUILDING THE TITANIC

Student Book, pp. 2–9
Teacher’s Guide, pp. 7–8

Students will read the history of how Titanic was designed and built to be unsinkable. They will examine the physical properties of the materials used to build Titanic, such as density (student book, p. 3), mass (student book, p. 6), and brittleness. Parts of this selection focus on the problems associated with using certain materials and potential design flaws, allowing students to infer how these factors may have played a part in Titanic’s sinking.

Despite the great mass of the materials used to construct Titanic, it could float because its overall density was less than the density of the water. Even though Titanic’s hull was made of steel and iron, which are much denser than water and normally sink, the rooms and compartments of Titanic were large and filled mostly with air. Air is an invisible gas mixture with a very low density. Having these spacious air-filled rooms lowered the density of the ship as a whole and allowed it to float.

Several special design features were also meant to make Titanic unsinkable. The outer hull was made with thick, overlapping steel plates that were riveted together. The ship was also divided into 16 separate compartments that could be sealed off if a leak occurred. Between the thick plating and the sealable compartments, designers thought it would be impossible for a single leak to sink Titanic.

However, the properties of certain other materials used to build Titanic also likely played a role in its sinking. Brittle iron rivets replaced some of the stronger steel rivets in certain parts of the ship. Materials which are brittle are stiff and more likely to break when bent, unlike more flexible materials such as steel. Additionally, slag was added to the iron in the rivets, which made them become even more brittle at lower temperatures.

THE NIGHT THE TITANIC SANK

Student Book, pp. 10–19
Teacher’s Guide, pp. 9–10

This selection introduces students to the scientific concepts of temperature, density (student book, p. 12), and ocean currents, and the role these had in the sinking of Titanic.

Temperature is a measurement of how hot or cold something is. In science, temperature is most often measured in Celsius. The freezing point of fresh water in Celsius is 0°C (rather than 32°F) and its boiling point is 100°C (212°F).

All materials, not just water, have a freezing point and boiling point. These points are a property of every material, and give the temperatures at which a material will change between its solid, liquid, and gas states under normal circumstances. The melting point is lower, and gives the temperature that a solid changes into a liquid (sometimes called the freezing point). The boiling point is higher, and gives the temperature at which a liquid changes into a gas. Freezing and boiling points are different for every material. For example, water freezes at 0°C and boils at 100°C, but iron freezes (or melts) at 1538°C, and vaporizes into gas at 2861°C.

Icebergs can only exist because of two important properties of water. First, while most materials become denser when they freeze, solid ice is actually less dense than liquid water, allowing it to float. Second, the freezing point for salt water is -2°C, which is lower than for fresh water. This means the ocean remains liquid at 0°C, but icebergs (which are made of freshwater ice, broken off from glaciers) will still be cold enough to stay frozen solid.

Currents are like flowing rivers under the ocean, which transport hot and cold water. The Labrador Current is a cold-water current that carried the iceberg from the North Atlantic Ocean to Titanic.
In this selection, students will learn about the problem posed to explorers seeking to locate and investigate the wreckage of Titanic. They will read how engineers solved this problem by using Alvin, a submersible which can change its density (student book, p. 22) so it can either sink deep into the ocean from gravity, or become buoyant (student book, p. 22) and float on the surface.

Engineers use science and technical knowledge to design solutions to real world problems. In order to investigate the wreckage of Titanic, explorers needed to be able to find large objects on the ocean floor. The development of sonar enabled them to do this. An active sonar device emits a short sound into the water, waits for the sound to bounce off the ocean floor or an object, and then detects the return sound. The time it takes for the echo to return reveals the location and distance of the object.

Another issue engineers faced was how to control the buoyancy of an underwater vessel. Titanic sank because water filled the compartments, increasing the ship’s density. Explorers needed a vessel which could control its density so it could both sink and float. Submersibles have ballast tanks that can be filled with air to decrease the ship’s density or pumped full of water to increase the ship’s density. Alvin also uses steel weights to increase its density enough to descend to the ocean floor.

Yet another problem was the tremendous pressure a submersible must withstand to reach the ocean floor. At the depth of Titanic’s wreckage, the pressure is about 5,500 pounds per square inch.

Explorers of Titanic noticed that the ship’s steel plates, mostly made of iron, were crumbling into rust through a chemical reaction. Over time, iron combines with oxygen in water to produce rust, a new material. The wooden deck had also been consumed by deep-sea organisms. Titanic had decayed on the ocean floor because of many different chemical, biological, and physical processes.
**Summary**  “Building the Titanic” is a history article about the construction of Titanic. The original designers considered Titanic unsinkable because they thought its thick steel hull and separate compartments would prevent the ship from being flooded by any single leak. Some of the materials that were used to make Titanic, however, had certain physical properties that possibly contributed to the ship’s sinking.

**BUILD BACKGROUND FOR THE GENRE**
Let students know that they will read a history article that explains how Titanic was built. Guide them in understanding that the events described in the article actually occurred. Tell students that “Building the Titanic” has the following elements:

- It provides information based on real people and events.
- The events are presented in the order in which they happened.
- Some facts are presented through photos, captions, and diagrams.

Lead students to understand that the article also should be considered an engineering article because it focuses on the design and construction of Titanic.

**BUILD VOCABULARY & CONCEPTS**
- density
- temperatures
- mass

Remind students that Using Context Clues is a strategy to infer the meaning of an unfamiliar word. They can “read around” the word, or read a few sentences before and after it, to make meaning from the context. Remind them to look at the photographs, too.

Try the strategy Becoming Wordkeepers. Say that a wordkeeper is responsible for knowing the meaning, part of speech, and spelling of a certain word. Students can go to the wordkeeper to learn about the word, especially its meaning. Ask for a wordkeeper for density. Write the word on a card and give it to the wordkeeper. Discuss the meaning of density as it appears on page 3, and have the wordkeeper write the meaning on the back of the card. Follow the same steps with the words temperatures and mass.

Designate wordkeepers for other important words, such as girder, keel, and wharf.
READ

The content goal for The Sinking of the Titanic is for students to read about the building, sinking, and exploration of Titanic and its artifacts. As students read “Building the Titanic” they will learn about the materials used to build Titanic and their physical properties, such as density, buoyancy, and brittleness, and how these may have played a role in Titanic’s sinking. Point out the Read to find out statement at the top of page 2 in the student book: Read to find out about the materials used to build Titanic.

Help students achieve the comprehension goal of understanding content by asking questions as they read. Model by reading the first sentence on page 3. Say: This sentence tells us about plans for an unsinkable ship. I know that Titanic sank, so it obviously wasn’t unsinkable! I wonder what made Titanic sink.

Before students begin reading, say: As you read, ask yourself questions. You may be able to discover answers yourself by further reading or by research. In some cases, you may want to ask others questions when you discuss the text.

TURN & TALK

Revisit the Read to find out statement. Have students turn and talk about the different materials used to build Titanic and how they were used. (Steel was used to construct the doors of Titanic’s 16 compartments. Steel was also used to make the girders, plates on the hull, and most of the ship’s rivets. Iron and slag were used to make some of the rivets. To check understanding, have students turn and talk about the Check In question: During construction, which decisions might have led to the Titanic disaster? (Possible response: Using rivets, especially ones with too much slag, to hold parts of the ship together may have led to the disaster.)

Determine Main Ideas Share that it is important to find the main idea of a text and that an article with different sections often contains several main ideas. Tell students that the main ideas of the article can often be determined from the title and headings. In some cases, a main idea is specifically stated. Ask students to read the title and section headings of “Building the Titanic” Then have them turn and talk to summarize several main ideas. (Possible response: Titanic was the largest ship of its time and was designed with many features intended to make the ship unsinkable.) Encourage students to share details that support the main ideas.

Explain Relationships Tell students that considering how concepts in an article are related will help their understanding. Have students read pages 3 and 5 and then turn and talk about the relationship between the steel doors that separated the compartments of Titanic and the rivets. Ask: Why were the rivets such an important factor in keeping Titanic afloat? (The rivets held together the steel plates in Titanic’s hull, keeping the compartments airtight. The air was needed to keep Titanic afloat.) Invite students to turn and ask each other questions about anything they do not understand.

Describe Text Structure Explain to students that text structure refers to the kind of information in a text and how it is organized. Identifying the structure of text helps clarify the meaning. Remind students that “Building the Titanic” is a history article. Have students skim the article again and then turn and talk about how the historical information in the article is organized. (Possible response: The information is presented in chronological order—making a plan for Titanic, framing the ship, fitting out the ship, and launching it.)

WRITE & ASSESS

You may want to have students do a “quick write” to assess understanding. It’s always helpful to have students reflect on both the content and their thinking process.

- Why are the physical properties of Titanic’s materials important?
- What are some strengths and weaknesses of the different materials used to build Titanic?
- What questions do you still have about the structure of Titanic or the properties of its materials?
Summary  “The Night the Titanic Sank” presents firsthand accounts of the sinking of Titanic. The article also describes how near-freezing ocean temperatures prevented icebergs from melting, which allowed ocean currents to carry them into Titanic’s path. The low temperatures may also have made some rivets brittle enough to break when Titanic struck the iceberg.

BUILD BACKGROUND FOR THE GENRE

Lead students to an understanding of a firsthand account. Explain that each firsthand account in “The Night the Titanic Sank” has the following elements:

• It is a report of an event by someone who was present.
• The person who reports the event speaks directly to the reader using pronouns such as I, we, and our.
• The events are described in chronological order and sometimes include dates, times, places, and people involved.

BUILD VOCABULARY & CONCEPTS

• temperature  • density  • current

Remind students that Using Context Clues is a strategy to infer the meaning of an unfamiliar word. They can “read around” the word, or read a few sentences before and after it, to make meaning from the context. Remind them to look at the photographs, too.

Another strategy to try is Using Graphic Organizer Notes. It guides students in using context clues to determine word meanings. Display a four-column chart. Label the column headings Word, Inferred Meaning, Clue, and Sentence or Picture. Have students write temperature in the first column. Ask students to turn to page 12 of the selection and read the sentence containing temperature in bold. Then have students turn and talk about what they infer temperature means and write the meaning in the second column. They should write the clue that helped them make this inference in the third column. In the fourth column, students should write a sentence or draw a picture that shows the meaning of the word.

Have students follow the same steps with the words density and current as well as other important words in the selection, such as slag, hull, and rivets.
READ

The **content goal** for *The Sinking of the Titanic* is for students to read about the building, sinking, and exploration of *Titanic* and its artifacts. Remind students that each selection in *The Sinking of the Titanic* relates to this goal. Explain that "The Night the Titanic Sank" contains direct quotes from passengers and crew about their experiences on *Titanic* immediately before and after its sinking. Point out the **Read to find out** statement at the top of page 10 in the student book: *Read to find out observations about how and why Titanic sank.*

Help students with the **comprehension goal** of accessing content by inferring and visualizing. Model by reading page 12 aloud. Say: Titanic's crew included lookouts searching for icebergs. I can visualize them standing and shivering in the cold darkness. I know when I'm cold outside, I want to run inside. The lookouts stayed out in the cold, so it must have been important to keep watch. I can infer from this that the crew of Titanic knew that icebergs were a serious threat, even if people said the ship was unsinkable.

Before students begin reading, say: *Picturing what the author is describing will help you infer meanings that are not directly stated in the text.*

TURN & TALK

Revisit the **Read to find out** statement. Have students turn and talk about the firsthand observations about how and why Titanic sank. To check understanding, have students turn and talk about the **Check In** question: *How were the physical properties of Titanic changed after she hit the iceberg?* (The freezing temperatures may have made the rivets brittle. Water flooding into the hull increased the ship's mass and density.)

**Analyze Point of View** Explain that one meaning of *point of view* refers to who is speaking. Firsthand accounts are told from the point of view of a person who was present at the event. Read aloud the firsthand account in the right column of page 15. Have students turn and talk about the point of view of the person who wrote the account. (The account was written from the point of view of a woman who experienced the events. She was on one of Titanic's lifeboats and tells about being rescued by the *Carpathia.*) Ask: *How might a firsthand account of an event differ from an account by someone who did not witness it?* (Possible response: A firsthand account can describe details about what the person saw and felt.)

**Determine Word Meaning** Remind students that some words have more than one meaning. When students read such a word, they can use the context to determine which meaning of the word is being used. Read aloud the sentence containing the word *current* on page 12. Have students turn and talk about the meaning of *current* in this context. Then ask them to identify the context clues they used.

**Make Inferences** Remind students that an important part of understanding text is trying to infer information that is not specifically stated. Visualizing is useful because it can help make connections between details. Have student pairs re-read the last paragraph on page 14. Encourage students to visualize the scene on the ship. Ask: *What can you infer about Caroline's thoughts when she heard that Titanic had hit an iceberg?* Have students turn and talk about their inferences. (Possible response: Caroline was not concerned at all. She saw the event as an exciting chance to see an iceberg and not as a life-threatening danger.) Ask students to quote the evidence from the text that helped them make their inference.

WRITE & ASSESS

You may want to have students do a “quick write” to assess understanding. It’s always helpful to have students reflect on both the content and their thinking process.

- **What changes could have made Titanic safer?**
- **What do you still wonder about the sinking of Titanic?**
**Summary**  
“Alvin the Submersible” is an engineering article about the effort to locate and investigate the wreckage of Titanic. The selection describes Alvin, an underwater vessel with technology to locate the wreckage as well as the ability to alter its density and buoyancy in order to sink or float.

**BUILD BACKGROUND FOR THE GENRE**

Lead students to an understanding of the elements of an engineering article. Explain that “Alvin the Submersible” is an engineering article with the following elements:

- It tells about problems that engineers faced and explains how the problems were solved.
- It uses facts and details to present information about the problems and solutions.
- Some information is presented through photos, captions, and illustrations.

**BUILD VOCABULARY & CONCEPTS**

- gravity  
- density  
- buoyant  
- current

Remind students that Using Context Clues is a strategy to infer the meaning of an unfamiliar word. They can “read around” the word, or read a few sentences before and after it, to make meaning from the context. Remind them to look at the photos and illustration, too.

You can also use the strategy Sketching Words. Read the sentence that contains the word gravity on page 22. Ask students to sketch examples or their ideas of the word’s meaning on a sticky note. Allow a minute or so for them to do this, and then have them turn and share their sketches with a partner. Tell students to explain, compare, and contrast their sketches. Have students follow the same steps with the words buoyant, density, and current.

Point out other important words in the selection, such as footage, debris, and navigator. Have pairs make sketches or use context clues to determine their meaning. Some words lend themselves to sketching; others may not. Decide which of these strategies is most appropriate for each word.
READ

The content goal for The Sinking of the Titanic is for students to read about the building, sinking, and exploration of Titanic and its artifacts. As students read "Alvin the Submersible," they will learn how engineers solved numerous problems facing deep-sea explorers, and how submersibles like Alvin can float or sink by controlling its density. Point out the Read to find out statement at the top of page 20 in the student book: Read to find out how science and technology found the Titanic.

Help students with the comprehension goal of accessing content by asking questions as they read. Model by reading the first two paragraphs on page 20. Then say: I know from watching science programs that it’s difficult for scientists to explore the deep ocean. And Titanic is really deep. I wonder what kind of technology engineers came up with that would allow a vehicle to safely go so deep and come back up. I think if I read on I’ll find the answer.

Before students begin reading, say: Remember to ask yourself questions as you are reading. The photos, illustrations, and captions sometimes tell you the answers. You can also read on to find the answers. Remember that some of your questions may be answers; others may not.

TURN & TALK

Revisit the Read to find out statement. Have students turn and talk about how science and technology were used to find Titanic. (Possible response: Scientists located Titanic with sonar.) To check understanding, have students turn and talk about the Check In question: What were some problems that had to be solved before it was possible to find the Titanic? (Possible responses: Scientists needed a way to find large objects on the ocean floor. They also needed a ship that could sink to the depths of the ocean and then return to the surface, as well as withstand the high water pressure of the deep ocean.)

Determine Main Ideas Remind students that identifying the main ideas of a selection can increase their understanding of the text. One way to do this is to use the title and headings as well as graphics. Tell students to spend a minute or two reading the headings and looking at the photos and illustrations of "Alvin the Submersible." Then have them turn and talk to determine one or more main ideas. (Possible responses: The diagram shows that Alvin needed many special features in order to make it to the ocean floor, as well as explore the wreck of Titanic. The photographs show that Alvin was able to make it to the ocean floor and photograph Titanic rusting.)

Describe Text Structure Remind students that "Alvin the Submersible" tells how engineers solved many problems related to deep-sea exploration. Its primary text structure is problem/solution. Have students review the text and turn and talk to identify instances of problems and their solutions.

Explain Relationships Encourage students to look for relationships between concepts as they read. Read aloud the sentence about gravity and buoyancy on page 22. Ask students to look at the captions for the illustration on pages 22 and 23. Ask: Which of these captions relates to the question I just read? Have students turn and talk about their ideas. (Possible response: The caption about density at the bottom of page 22 relates to the question. Changing the density of Alvin will change its buoyancy and allow it to rise or sink.)

WRITE & ASSESS

You may want to have students do a "quick write" to assess understanding. It’s always helpful to have students reflect on both the content and their thinking process.

- In what ways were science and technology important in finding Titanic?
- What did you find most interesting about Alvin the submersible?
Summary  “Titanic’s Artifacts” is an opinion piece that explores both sides of the question, Should the artifacts of Titanic be left on the ocean floor or brought to the surface for public exhibition? Arguments in favor of leaving the artifacts are primarily from Robert Ballard, the scientist who first explored the wreckage. Arguments in favor of removing and exhibiting the artifacts are primarily from RMS Titanic, Inc., a salvage group that owns rights to the artifacts.

BUILD BACKGROUND FOR THE GENRE

Tell students that all opinions should be backed up with facts and logical reasoning, but because individuals have different values, there are often different opinions about what is right or wrong in a certain situation. In opinion pieces such as “Titanic’s Artifacts,” the writer presents differing opinions on the same issue but does not take sides. Explain that this opinion piece has the following elements:

• The writer states opinions and presents facts in an organized way.
• Reasons, evidence, and personal values support or influence the opinions.
• The piece includes both pro and con opinions.

BUILD VOCABULARY & CONCEPTS

• bacteria

Remind students that Using Context Clues is a strategy to infer the meaning of an unfamiliar word. They can “read around” the word, or read a few sentences before and after it, to make meaning from the context. Remind them to look at the photographs, too.

Another strategy to try is Using Background Knowledge. Ask students to locate the sentence with bacteria on page 29. Then read the sentence aloud. Have students turn and talk about what they know about bacteria. (Possible responses: Bacteria are germs and can make you sick. Bacteria are tiny organisms that are too small to see.) Tell students to keep their background knowledge in mind as they read to understand how bacteria are connected to Titanic.

Point out other important words in the selection, such as artifacts, decay, and salvaging, for which students may be able to use their background knowledge and context clues to determine meaning.
READ

The content goal for *The Sinking of the Titanic* is for students to read about the building, sinking, and exploration of *Titanic* and its artifacts. "Titanic’s Artifacts" examines opinions about salvaging artifacts from *Titanic*. Explain that artifacts are objects made by humans. Point out the Read to find out statement at the top of page 26 in the student book: Read to find out different people’s ideas about salvaging.

Help students with the comprehension goal of accessing content by inferring and visualizing. Read aloud the first paragraph on page 27. Model visualizing what Robert Ballard and his team saw when they first visited the site of Titanic’s wreckage. Say: The photos help me visualize what the site looked like—the ink-black water all around, Alvin shining a ghostly-white light on the wreckage and the artifacts. This scene reminds me that many people lost their lives here. These artifacts were their belongings. Then say: The text says Ballard’s team decided not to take any artifacts. I can infer that they felt that the artifacts should be left on the ocean floor. Perhaps they felt that it was wrong to remove them.

Before students begin reading, say: As you read, think about what you can visualize and infer from the text about these artifacts. Visualizing the situation can help you make inferences.

TURN & TALK

Revisit the Read to find out statement. Have students turn and talk about different people’s ideas about salvaging Titanic. To check understanding, have students turn and talk about the Check In question: What do you think should be done with artifacts from Titanic? Use statements from Ballard and RMS Titanic, Inc. to support your opinion. (Possible response: The artifacts should be left on the ocean floor. People could learn about them by watching a video. There’s no need to handle the objects. As Ballard says, “You don’t go to the Louvre and stick your finger on the Mona Lisa.”) Accept opinions that are based on facts and reasoning as well as personal values.

Make Inferences Remind students that not all information they can learn from a text is stated directly. Instead, during and after reading, they should merge text evidence with their own thinking to explore relationships between the facts presented. Ask students to read the third paragraph on page 27. Then ask them why they think RMS Titanic, Inc. is salvaging the wreck (Possible responses: The company wants to study the artifacts. They want to make money from exhibiting them. They want to salvage them before they decay further.) Ask students to cite the text that helped them make their inference.

Explain Author’s Reasoning Explain that an author offers evidence and reasoning to support an argument. As an example, explain that one viewpoint the author presents is that the artifacts should be retrieved from the ocean floor and displayed. Read aloud the first paragraph on page 28. Ask: What evidence does the author offer in this paragraph to support the argument? (The author points out that many people agree that the artifacts should be on display.) Ask student pairs to identify other places in “Titanic’s Artifacts” where the author supports arguments either in favor of retrieving the artifacts or in favor of leaving them on the ocean floor. Students should identify the evidence supporting the argument and discuss their reasoning. They can use a T-chart to organize the information.

WRITE & ASSESS

You may want to have students do a “quick write” to assess understanding. It’s always helpful to have students reflect on both the content and their thinking process.

- What did the artifacts look like after being underwater for so long? How did their physical properties change?
- What are some other questions you have about salvaging Titanic’s artifacts?
Discuss

CONTENT & COMPREHENSION GOALS
Foster a discussion about the selections in The Sinking of the Titanic. Ask: What did you learn about the sinking of Titanic? (Possible responses are given in the chart. Students may have more or different information.)

KWL CHART

<table>
<thead>
<tr>
<th>What did you learn about the sinking of Titanic?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What We Think We Know</td>
</tr>
<tr>
<td>Titanic sank, it struck an iceberg.</td>
</tr>
<tr>
<td>What We Wonder</td>
</tr>
<tr>
<td>Where did it sink?</td>
</tr>
<tr>
<td>How big was Titanic?</td>
</tr>
<tr>
<td>What We Learned</td>
</tr>
<tr>
<td>The cold ocean water probably made Titanic’s materials weaker.</td>
</tr>
</tbody>
</table>

The four selections in The Sinking of the Titanic are a history article, firsthand accounts, an engineering article, and an opinion piece. Physical science concepts (buoyancy, density, mass, and physical properties of objects) thread through the selections. Guide a discussion about these science concepts.

What makes the selections especially interesting, though, is the interdisciplinary context—real-life stories and events that include not only physical science but also history, engineering, technology, and personal opinions. Have students turn and talk about the interdisciplinary nature of the selections. You might ask: How is reading The Sinking of the Titanic different from reading a textbook about properties of matter? Also ask them to consider differences in the ways the selections were written (such as genre, text structure, and point of view), and how the writing style helps the science concepts come alive.
**DISCUSS**

Have students collaboratively answer the questions on page 32 as you move about the room and listen in to support and scaffold student conversations and clarify misconceptions.

1. **How did the information in “Building the Titanic” supply you with background information for the other three pieces in the book?** (Possible responses:
   - “Building the Titanic” gives details about how Titanic was built and what it was made of. It tells that some rivets holding the steel plates together were made of iron containing slag that could make them brittle when cold. “The Night the Titanic Sank” says it was very cold the night Titanic struck the iceberg, and the cold probably made the rivets weaker.
   - “Building the Titanic” describes density, and how a compartment filled with air can float, but the same compartment filled with water sinks. These facts provide background for “Alvin the Submersible” and how Alvin can switch between floating and sinking.
   - “Building the Titanic” makes it clear that many things were not attached to the ship, so it makes sense that in “Titanic’s Artifacts” so many objects were scattered about the ocean floor.

2. **Based on the information in “Building the Titanic” and “The Night the Titanic Sank,” cite two pieces of evidence that you think were the biggest reasons for loss of life.** (Answers will vary, but students might cite evidence about how the rivets were made and what they were made of, the number of lifeboats, or damaging cold temperatures, among other reasons.)

3. **Use examples from “Alvin the Submersible” to explain how engineers considered physical properties of materials when building Alvin.** (Possible response: Materials would need to be strong enough to withstand great pressure. They would also need to be able to hold in heat in the cold water but lightweight enough so that Alvin could be made to float, sink, and maneuver easily.)

4. **Both Alvin and Titanic could sink and float. How does the concept of density relate to this statement?** (Possible response: Both relied on the difference in density of water and air. Titanic had compartments filled with air that enabled it to float. When the compartments filled with water, the overall density of the ship increased, and it sank. Alvin has tanks that can be filled with dense water in order to sink, or filled with less dense air in order to float upward.)

5. **After reading “Titanic’s Artifacts,” what more information would you need in order to decide if artifacts should be retrieved?** (Answers will vary, but students should explain their responses and identify methods such as Internet searches and talking with experts to find more information.)
In small groups or individually, offer students the chance to explore questions they have or ideas they still wonder about, based on their reading in The Sinking of the Titanic. You might use question 5 on the Discuss page of the student book as an example of further information related to the Titanic that students might research.

**EXPLORE**

Encourage students to express their curiosity in their own way. The questions students have matter. You might have students talk with peers, write about what they wonder, or create drawings based on what they learned from reading the different selections in The Sinking of the Titanic. Guide them to immerse themselves in resources related to what they are most interested in learning more about. They might ask questions or make statements about their interests, for example:

- What technology do ships use today to avoid icebergs?
- What materials are ships made of today? How do the physical properties of these materials make ships safer?
- How do engineers today make ships leak-proof and buoyant?

**GATHER INFORMATION**

After students explore, they should arrive at a question that will drive their research. Students may want to read, listen to, and view information with their question in mind. Guide students to use resources, such as reliable sites on the Internet, science texts and articles, library books, and magazines, that address the question they posed. Collecting information may lead students to revise or narrow their question.

You may want students to follow a specific note taking system as they gather information. In addition to taking notes, ask students to make a list of their sources. You may want to model how to take notes by interacting with text, jotting down your thoughts in the margins or on sticky notes, and demonstrating how to summarize the most important information. Remind students that their question will drive their research and note taking.

**OBJECTIVES**

- Ask questions based on reading The Sinking of the Titanic.
- Research, document, and share information.

**COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS**

CC.5.Write.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

CC.5.Write.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

CC.5.Write.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

CC.5.Write.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
ANALYZE & SYNTHESIZE

Guide students to carefully and thoughtfully review their notes to determine the big ideas related to their question. As students prepare to use the information they’ve gathered to formulate an answer to their question, support them as they analyze and synthesize. Be sure they do the following:

• Revise any misconceptions.
• Notice incongruities in their information.
• Evaluate all the various pieces of information.
• Pull together the most pertinent information that addresses their question.

While analyzing and synthesizing their research, students may realize that the more they learn, the more they wonder. To help focus their thinking, students may want to talk with classmates or write in a research notebook. Remind them that just as in real-world scientific research, there may not be a final answer to the question they posed.

SHARE

When students share their research, they become teachers, consider how their ideas were shaped by the investigation, and pose new questions. Students may express their knowledge by writing, speaking, creating a visual piece, or taking action in the community. The best culminating projects are ones with authentic purposes. For example, the student who is concerned about how changes have been made to make modern ships safer may want to do an interactive presentation about ship regulations established by the International Maritime Organization (IMO). He or she can share that the IMO sets construction and safety standards for ships, including what to do when an accident does happen. As part of the presentation, the student may ask classmates to role-play a situation where a ship they are on is in distress.

When students are given the time to gather information about a topic that interests them, they will find unique and individual ways to share what they learned. Some options you can suggest might include the following:

• eBooks with photos and text to share with other students who are building background on the topics
• Short films about their findings that can be viewed at school family nights or in the school library
• Hands-on exhibits of objects, materials, or models
Write

OBJECTIVES

• Use a mentor text as a writing model.
• Plan and research information on a topic.
• Write and revise an opinion piece.
• Publish and present an opinion piece.

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS

CC.5.Write.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
CC.5.Write.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
CC.5.Write.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
CC.5.Write.6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.
CC.5.Write.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

GENRE: OPINION PIECE

Hold up “Titanic’s Artifacts.” Review with students the elements of an opinion piece.

• The writer states an opinion and presents facts about the topic in an organized way.
• Reasons, evidence, or personal experiences and values support the opinion.
• The piece may include both pro and con sides of an opinion.

In addition, an opinion piece often has these elements:

• The writer cares about the topic and attempts to persuade the reader to accept or embrace his or her opinion.
• The writer generally concludes by emphasizing the opinion.

MENTOR TEXT

Use “Titanic’s Artifacts” as a mentor text, or a model, for student writing.

Model the elements of an opinion piece. Walk students through the selection, sharing your thinking as you go. Point out the references to Robert Ballard and to RMS Titanic, Inc. throughout the article. Say: This selection starts with a short introduction. It explains the opinion in favor of salvaging the artifacts. It follows that with an explanation of the opinion in favor of leaving the artifacts on the ocean floor.

Explain that students can use this article as a mentor text to help them write their own opinion piece. Tell students that our best writing teachers are the professional writers whose work we read. Suggest that they look closely at what the writer does to convey information in a clear way. Say: This article explains two different opinions about salvaging Titanic’s artifacts. As you write your own opinion piece, decide whether you want to support one opinion about an issue or explain both sides of the issue. Point out the headings on pages 28 and 30. Say: The writer used headings to summarize the opinions. This can be a useful way to help readers understand an opinion piece.

Draw students’ attention to the photos in the article. Say: The writer used photos of Titanic’s artifacts to help readers understand the situation and form their own opinion.
Ask students to **Turn and Talk** about an issue that they think would be interesting to write about in an opinion piece. (Possible ideas: Are today’s ships truly safer than *Titanic*? Who—if anyone—should own the property of a shipwreck like *Titanic*?)

Have several students **Share** their ideas.

**Wrap up** by explaining that students will be writing their own short opinion piece, using “*Titanic’s Artifacts*” as a mentor text for their own writing. Students may need to do some research to find accurate information to support their opinion or to explain two sides of the issue that they write about.

### WRITING PROCESS

**Plan and Research** Once students have chosen a topic for their opinion piece, they may need to research by reading more about it. Guide students in finding appropriate resources. Let students know that another good way to plan an opinion piece is by asking other students their opinion and making notes about the responses.

**Write** Students can use their background knowledge, their planning, and their research notes to begin writing. Remind them to keep looking back at the mentor text to use as a model for their own writing of an opinion piece.

**Conference and Revise** Have students hold a writing conference with a partner to review their drafts. Ask them to look for elements of an opinion piece as they review their partner’s writing. Have them ask their partners the following questions:

- **What struck you about the piece?** (to highlight interesting parts.)
- **What do you wonder or want to know more about?** (to suggest ideas for adding information or revising.)
- **Are there any confusing parts?** (to pinpoint areas to revise for clarity and accuracy.)

After students get feedback from a partner, have them revise and edit their writing.

**Publish and Present** Find opportunities for students to publish and present in authentic, relevant, and significant ways. Use or adapt the following ideas to best reflect your classroom goals and individual student interests.

- Create an eBook to share with other classrooms or to post on a class website.
- Host a forum in which students read their opinion pieces aloud to the class or other classes. Invite listeners to comment and state their own opinion.
Correlation

Grade 5 Common Core State Standards for English Language Arts and A Framework for K–12 Science Education correlated to National Geographic Ladders Science

<table>
<thead>
<tr>
<th>Common Core State Standards for English Language Arts, Grade 5</th>
<th>The Sinking of the Titanic Teacher’s Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading Standards for Informational Text</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Key Ideas and Details</strong></td>
<td></td>
</tr>
<tr>
<td>1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td>Pages 9–10, 13–16</td>
</tr>
<tr>
<td>2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</td>
<td>Pages 7–8, 11–12</td>
</tr>
<tr>
<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>
<td>Pages 7–8, 11–12</td>
</tr>
<tr>
<td><strong>Craft and Structure</strong></td>
<td></td>
</tr>
<tr>
<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>
<td>Pages 9–10</td>
</tr>
<tr>
<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>
<td>Pages 7–8, 11–12</td>
</tr>
<tr>
<td>6. Analyze multiple accounts of the same event or topic, noting important similarities and differences in the points of view they represent.</td>
<td>Pages 9–10</td>
</tr>
<tr>
<td><strong>Integration of Knowledge and Ideas</strong></td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td>Pages 13–14</td>
</tr>
<tr>
<td>9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</td>
<td>Pages 15–16</td>
</tr>
<tr>
<td><strong>Range of Reading and Level of Text Complexity</strong></td>
<td></td>
</tr>
<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 4–5 text complexity band independently and proficiently.</td>
<td>If the entire NG Ladders Science grade 5 program is used throughout the year, students will have had exposure to multiple genres, multiple levels, and appropriate scaffolding.</td>
</tr>
<tr>
<td><strong>Writing Standards</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Text Types and Purposes</strong></td>
<td></td>
</tr>
<tr>
<td>1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
<td>Pages 19–20</td>
</tr>
<tr>
<td>2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</td>
<td></td>
</tr>
<tr>
<td>3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.</td>
<td></td>
</tr>
</tbody>
</table>

(Cont. on p. 22)
### Production and Distribution of Writing

4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.  
   Pages 19–20

5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.  
   Pages 19–20

6. With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.  
   Pages 19–20

### Research to Build and Present Knowledge

7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.  
   Pages 17–18

8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.  
   Pages 17–18

9. Draw evidence from literary or informational texts to support analysis, reflection, and research.  
   Pages 17–18

### Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  
    Pages 17–20

### A Framework for K–12 Science Education

**Core Idea PS1: Matter and Its Interactions**  
*How can one explain the structure, properties, and interactions of matter?*  
Pages 4–6, 11–12

**PS1.A: Structure and Properties of Matter**  
*How do particles combine to form the variety of matter one observes?*  
Pages 4–10, 13–16

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**THE SINKING OF THE TITANIC | CORRELATION**  

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bacteria (noun) certain kinds of one-celled living things
buoyant (adjective) able to float
current (noun) a steady flow of surface water in a certain direction
density (noun) the measure of the amount of matter in a certain amount of space
gravity (noun) a force that pulls things to the center of Earth
mass (noun) the amount of matter in an object
temperature (noun) a measure of how hot or cold something is

ACKNOWLEDGMENTS

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Credits


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Glossary

bacteria (noun) certain kinds of one-celled living things
buoyant (adjective) able to float
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