



Lesson Plan

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Science
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Answer Key: *Studying Snowflakes*

page 10-Text vs. Images

Sample responses are shown.

Concept	What I Learn in the Text	What I Learn in the Images
Snowflakes stick to our clothes. (pages 12–13)	They are covered with spiky crystals.	Spikes attach to hair and fabric.
There are many snowflake shapes. (pages 16–17)	Scientists sort snowflake shapes into 39 groups.	I learn what the shapes of the 39 groups of snowflakes look like.

page 11-Cold Weather Report

Students should draw five weather symbols, one into each day of the five-day forecast. Then, students should write at least one sentence about clothing to wear during the cold weather, which may include jackets, hats, mittens, warm pants, and boots.

page 17-Studying Snowflakes Quiz

1.	D
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- **2.** B
- **3.** B
- 4. Snowflakes stick to things because of their spiky parts.

Unit 5: The Natural World

Studying Snowflakes

Materials

- Studying Snowflakes books
- copies of student activity sheets (pages 9–19)
- index cards
- STEAM Challenge materials include but are not limited to the following:
 - ✓ glue ✓ marshmallows
- ✓ sugar cubes
- ✓ tape
- ✓ toothpicks
- metal washerspacking peanuts
- ✓ paper plates

Learning Objective

- Reading: Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.
- Writing: Participate in shared research and writing projects.



- **Speaking and Listening:** Participate in collaborative conversations with diverse partners about grade appropriate topics and texts with peers and adults in small and larger groups.
- **Engineering:** Define an engineering problem, design and evaluate solutions, and optimize a design based on test results.

Phenomena

Snowflakes fall to the ground. Snowflakes come in many different shapes.

Lesson Timeline

Day I	Day 2	Day 3	Day 4	Days 5–10
Introductory and Before Reading Activities (page 4)	During Reading Ac	tivities (page 5)	After Reading Activities (page 5)	STEAM Challenge and Assessments (pages 6–8)
Define the STEAM Challenge and find information in the text and in an image.	Research snowflakes between information text and from image design solutions.	, distinguish 1 learned from the s, and brainstorm	Write weather reports, including clothing suggestions.	Design, build, test, improve, reflect on, and share igloos. Complete the assessments.

STEAM Vocabulary

gravity ice crystal symmetrical temperature

l scientists re

Introductory Activity

Define the Problem

- I. Display the photographs on pages 18–19 of *Studying Snowflakes*. Ask students if they are familiar with the type of weather shown in the photographs. Discuss snowy weather with students by asking questions about snow (e.g., *What do you do in the snow? What is the temperature like when it snows? What do you wear in the snow?*).
 - If students do not have first-hand experience with snow, ask them to think about snow they have seen in books and on television or show images of people in snow.
- **2.** Distribute the *Studying Snowflakes* books to students. Reveal the STEAM Challenge by reading aloud to students pages 20–21 of the book.
 - Display the Interactiv-eBook for a more digitally enhanced introduction to the challenge.
- **3.** Distribute *Make a Plan* (page 9) to students. Have them summarize the STEAM Challenge. Summaries should include all the goals of the challenge.
 - **Support** students with the following sentence frame to help them summarize: *Design an* ______ *that is* ______ *and strong enough to* ______.

Before Reading

- Complete a carousel vocabulary activity with students. Write the vocabulary words on separate sheets of chart paper and discuss their meanings as a group. Post the sheets of chart paper around the room. Have groups of students rotate around the room, drawing pictures and writing words that relate to each vocabulary word. Discuss how the words and drawings relate to each vocabulary word. Keep the chart papers as a reference for students to use throughout the lesson.
- 2. Turn to page 4 in *Studying Snowflakes*. Read the text on page 4 to students, and describe what you see in the diagram. Explain to students that diagrams and other images in books help explain concepts that may be difficult to understand. Both the text and the images help readers understand the concepts.
 - On the board, write information from the text and diagram about how dust makes a snowflake. (Text: A drop of cold water grabs onto a speck of dust and the drop becomes an ice crystal that grows;
 Diagram: Dust from the ground goes into the air where a drop grabs onto it and turns it into a flake that grows.)
- **3.** Ask students if they would understand where the dust comes from without the diagram. Ask students if they would understand the diagram without reading the text.

During Reading

Research and Brainstorm

- I. Distribute the *Studying Snowflakes* book to students. Read the text aloud as students follow along. Stop to discuss the images and how they can help readers better understand the text.
 - Display the Interactiv-eBook for a more digitally enhanced reading experience. You may wish to have students annotate the PDFs as you read.
 - Play the audio recording as students follow along to serve as a model of fluent reading. This may be done in small groups or at a listening station. The recording will help English language learners practice fluency and aid in comprehension.
- 2. Distribute *Text vs. Images* (page 10) to students. Have students reread the books in small groups, taking turns reading pages. Have them complete their activity sheets, describing what they learned from the text and images.
- **3.** Return to the STEAM Challenge on pages 20–21. Ask students what they should consider as they design their igloos and ask guiding questions (e.g., *What size, shape, weight, or materials will work best?*).
 - Provide students time to brainstorm some ideas as a group. Record their ideas on a sheet of chart paper.



After Reading

- Have students turn to the glossary on pages 22–23 of *Studying Snowflakes*. Review the words by discussing the photo chosen for each word and the definition. Write each vocabulary word on the board. Then, place students into pairs, and have each pair write a riddle, or clues, for one of the words. For example, a riddle for the word *gravity* might be, "You can't see me, but you can see what I do. I pull things to the ground. What am I?"
 - Have student pairs take turns saying their riddles and guessing the answers. Students can do this in a large group, or they can wander around the room and tell each other their riddles.
 - **Support** students by providing the riddles and having them guess answers.
 - Tell students that people want to know what the weather will be so they can plan activities and know what clothing to wear. People watch or read weather reports each day.
- **3.** Distribute *Cold Weather Report* (page 11) to students. Have them imagine they are weather reporters who are reporting on a week of incoming cold weather. Guide students to complete the five-day forecast with various types of precipitation (see page 9 of the book) and write some clothing suggestions. Encourage students to look at the clothing people are wearing in the book (pages 13, 16, and 18–19).
- **4.** Have students share or act out their weather reports with partners. Ask them to compare the clothing items they suggested. Encourage students to update or change their weather reports after talking to partners.

Prep

- Review all designs prior to building.
- Prepare all materials for the STEAM Challenge.
- If doing the STEAM Challenge with multiple groups at once, you may choose to invite volunteers to help monitor and facilitate group work.

STEAM Challenge

Design and Build

- **I.** As a group, discuss the following questions to connect the reading to the STEAM Challenge.
 - What are some shapes that can be found in snowflakes? Refer students to the diagrams of snowflake shapes on page 17, and ask them to share the shapes they see.
 - How does the shape of a snowflake help it catch and stick to things? Guide students to pages 12–13 of the book to reread that snowflakes are covered with spiky crystals that cause them to stick to things. Explain that the shape of something affects what it is able to do. Students should consider this when building their igloos.
- 2. Review the STEAM Challenge on pages 20–21 together. List materials on the board. Encourage students to feel the metal washer, and provide time to examine all the materials they may choose to work with.
 - You may encourage students to explore the materials further by having them try to combine the marshmallows, sugar cubes, or packing peanuts in different ways (e.g., stacking, gluing, or using toothpicks).
- **3.** Ask students to independently sketch and label two designs on their *Make a Plan* activity sheets. Encourage them to label their designs with materials.

- **4.** Organize students into teams of two or more. Distribute one copy of *Team Designs* (page 12) to each team. Ask teams to have members share their designs. Then, have each team
 choose, sketch, and label a team design.
 - Review team designs and offer guidance as needed.
 - Explain to students that teams may choose to use one team member's design or combine ideas from multiple designs.
 - Challenge students by adding goals (e.g., the igloo must have a specific shape, or the igloo must hold more weight).
- 5. Explain to students that they must follow their design plans when they build their models. Reassure them that they will have an opportunity to change and improve their designs after they present them. Review classroom expectations for working with materials. Then, allow teams time to gather materials and build their igloos.
 - Digitally record students' processes to share at a later date with students and parents.
- **6.** Distribute *Think about It* (page 13) to each student. Explain that reflection is an important part of the engineering design process. Read aloud number 1 on the activity sheet and have students write their responses. Ask volunteers to share.

Prep

- Review all designs prior to building.
- Prepare all materials for the STEAM Challenge.

STEAM Challenge

Test and Improve

- **I.** As a group, discuss the following questions to connect the reading to the STEAM Challenge:
 - ► What did scientists do when they found more snowflake shapes? Direct students to reread pages 16–17 and identify that scientists now sort snowflakes into 39 shapes rather than the 7 original shapes. Discuss with students how scientists make improvements on their scientific tools and knowledge as they discover new things.
 - After watching other teams test their igloos, how can you use what you learned to improve your team's igloo? Guide students to understand that they should observe the materials other groups used as well as the shapes. Materials and designs that work well can be incorporated into their designs to improve them.
- 2. Gather teams for testing. Explain that teams will offer feedback after the test. Use *Friendly Feedback* (page 14) to review best practices for giving feedback.
- **3.** Distribute *Igloo Challenge Test Results* (page 15) to students, and ask them to record results for each team.
- **4.** Gather students together. Identify which team's igloo will be tested first. Discuss the design to assess if it is hollow inside. Then, place the washer on the igloo and set a timer for one minute. Observe the igloo and see if it holds the washer without breaking. Continue testing until all igloos have been tested. Ask volunteers to offer feedback after each test.

- **5.** Provide time for teams to brainstorm ways to improve their designs based on test results and feedback. Refer students back to their *Team Designs* activity sheets. Ask them to sketch their improved designs and explain any changes.
 - Review improved designs and offer guidance as needed.
 - **Challenge** successful teams with additional goals for the second design (e.g., the igloo must hold more weight, the igloo must be a certain size).
- **6.** Have teams gather materials to improve their designs. Then, have them make their improvements and retest their igloos.
- **7.** Have students complete numbers 2 and 3 on their *Think about It* activity sheets.

STEAM Challenge

Reflect and Share

- I. Select five different snowflake shapes from page 17 of the book. Draw the shapes on index cards (one shape per card) so that each student gets a shape. Distribute one card to each student, and have students with the same shapes form groups. Have students share answers 1–3 from their *Think about It* activity sheets with their groups, giving students the opportunity to hear about the processes and discoveries made by other students.
- **2.** Have students complete number 4 on their *Think about It* activity sheets.
- **3.** Distribute *Engineering Design Process* (page 16) to students, and review how they used each step to complete the challenge. Annotate the infographic together with details specific to this challenge.
- **4.** Read "Career Advice" on page 24 of the book. Ask students to brainstorm other tips for a career studying the weather.

Assessment Activities

- **I.** Have students complete a short posttest, *Studying Snowflakes Quiz* (page 17), to assess this lesson's reading objective.
 - Students may use the Interactiv-eBook activities in the Digital Resources for assessment purposes (optional).
- 2. Have students complete *Teamwork Rubric* (page 18) and *Engineering Design Process Checklist* (page 19) to reflect on and evaluate their work and collaboration skills.
- **3.** Have students complete the Think and Do questions from the book.

Name: _____

Date:



Make a Plan

Directions: Write the challenge in your own words. Sketch two designs. Then, circle the one you like best.



Name: ____

Date:

Text vs. Images

Directions: Write what you learn about each fact. Use the text and the images. The first one has been done for you.

Fact	What I Learn in the Text	What I Learn in the Images
Snowflakes have symmetry. (pages 6–7)	lf you fold the shape in half, both sides will match.	Both sides are exactly the same shape and size.
Snowflakes stick to our clothes. (pages 12–13)		
There are many snowflake shapes. (pages 16–17)		

Name:

Date: ___



Cold Weather Report

Directions: Make a weather forecast for a cold place. Draw a symbol for each day. Then, write suggestions for how to dress.

Five-Day Weather Forecast									
Mon.	Tues.	Wed.	Thurs.	Fri.					
Clothing Sug	gestions:								



Team Members: ____

Date:

Team Designs

Directions: Sketch your team's design in the first box. Sketch your team's new design in the second box.



Nar	ame: Date:	
	Think about It	+
I.	I helped my team when	
2.	Our plan (worked/did not work) because	
3.	Our second plan was (better/worse) because	
4.	. My favorite part was	

Name: _____

Date:

Friendly Feedback

Directions: Feedback from others can help you. Use these sentence stems. Give feedback to your peers.



Name:

Date:

Igloo Challenge Test Results

Directions: Read the goals in the table. Circle *yes* or *no* to tell if each team met the goals. Then, answer the question.

Team	Is the igloo	hollow?	Does the igloo hold a metal washer without breaking?				
	yes	no	yes	no			
	yes	no	yes	no			
	yes	no	yes	no			
	yes	no	yes	no			
	yes	no	yes	no			

What ideas from other teams can you try in your design?



Name: _____

Date: _____

Engineering Design Process





Studying Snowflakes Quiz

Directions: Read each question. Fill in the bubble for the best answer. Then, answer the last question.



Name:

Date:



Teamwork Rubric

Directions: Think about how you worked in your team. Score each item on a scale of 4 to 1.

4 = Alv	ways 3 = Often	2 = Som	ietimes	=	Never
	I listened to people on my team.	4	3	2	I
	I helped people on my team.	4	3	2	I
	I shared ideas with people on my team.	4	3	2	I
	We made choices as a team.	4	3	2	I
Total				\land	
Teache	er Notes:				



Engineering Design Process Checklist

Directions: Read the list. Check the boxes to show what you did.



Research and Brainstorm	together? Why can igloos only	be made in freezing places?		work? What materials will you		Place a metal washer on top	of your igloo for one minute.	uta ine igiou siay witole? Dia it break? Can you make	it better? Try again.	Reflect and Share	How big do you think an igloo	else could be built from snow	or ice?	
		CH ALLENGE	-i- The Problem	You are going to the Arctic to study snowflakes. First, you must build an	igloo to live in. It will be made of blocks of snow. What shape should	your igloo be so that it stays strong?	The Goals	Make a model of your igloo with	and/or glue.	Make the igloo hollow so there is	 Make the igloe strong enough 	to hold a metal washer without	Dreaking.	

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