

Muse®

Ice-Cold

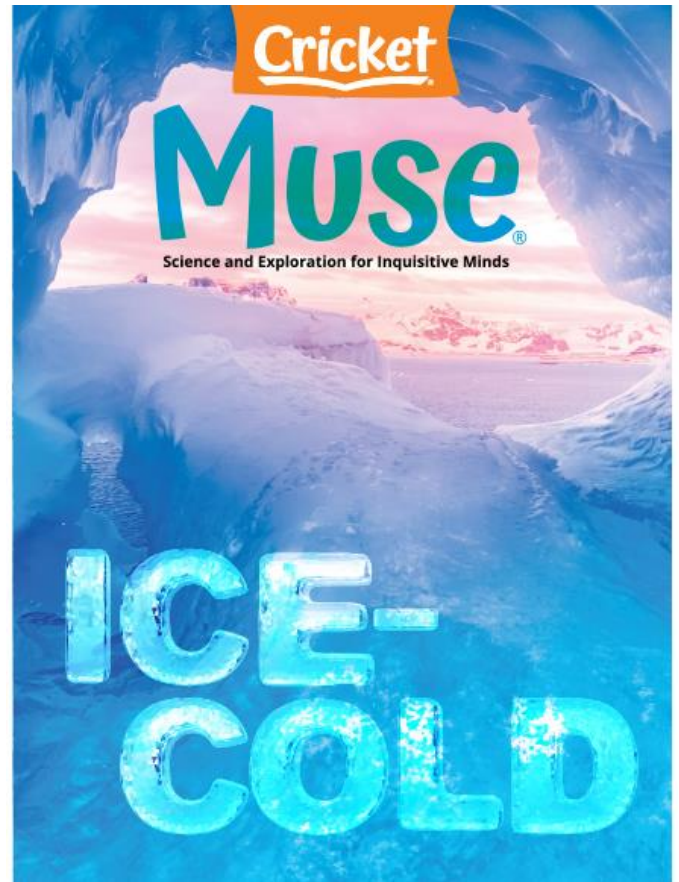
Winter weather can usher in a dazzling wonderland or be the cause of both physical and mental stress. This issue of MUSE explores the adaptability of nature and humans and their ability to survive and thrive in cold temperatures.

CONVERSATION QUESTION

How does nature survive the cold?

TEACHING OBJECTIVES

- Students will learn how climate warming is endangering emperor penguins.
- Students will learn about the strategies used by creatures in the wild to survive the cold.
- Students will learn about the construction of the Icehotel in Sweden.
- Students will examine a cause-and-effect relationship.
- Students will construct explanations.
- Students will sequence a process.
- Students will research a threatened species in Antarctica.
- Students will represent Fahrenheit and Celsius temperatures on a thermometer.
- Students will plot geographical locations on a world map.



In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

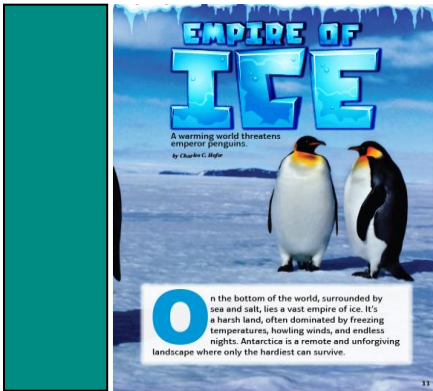
SELECTIONS

- **Empire of Ice**
Expository Nonfiction
- **Animal Popsicles and Glassy Plants**
Expository Nonfiction
- **From Ice to Oasis**
Expository Nonfiction

Empire of Ice

pp. 10–14, Expository Nonfiction

The rapidly warming world is having a dramatic impact on the animals of Antarctica. Readers will learn how climate change is profoundly affecting emperor penguins in this cold, remote region of the Southern Hemisphere.



RESOURCES

- Cause and Effect: Penguin Problems

OBJECTIVES

- Students will learn how climate change is endangering emperor penguins.
- Students will examine a cause-and-effect relationship.
- Students will research a threatened species in Antarctica.

KEY VOCABULARY

- **dominated** (p. 11) severely affected by something
- **transformation** (p. 12) a thorough or dramatic change in form or appearance
- **imperiled** (p. 13) endangered

ENGAGE

Conversation Question: How does nature survive the cold?

Entice students into a game of “20 Questions” in which they will try to guess the topic of the article (penguins). In this game, the players are allowed to ask yes/no questions in order to unravel the mystery. Instead of calling out the answer, have students write their guess on a piece of paper after each question. At the end of the questions, ask the students if they all wrote the word *penguins*?

INTRODUCE VOCABULARY

Post and review the three vocabulary words and definitions. Allow students to roll a die for vocabulary activities for each word.

1. Use the word in a sentence.
2. Draw a picture that demonstrates the word.
3. List two antonyms for the word.
4. List two synonyms for the word.
5. Break the word into syllables and list the part of speech.
6. Make a connection between the word and your life/a book/a movie.

READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups to answer the questions below. Share responses.

1. How does the emperor penguin differ from other types of penguins?
2. How are humans contributing to the biodiversity crisis?
3. Why do emperor penguins occupy a unique position among imperiled species?
4. What did Fretwell’s satellite images reveal about the emperor penguins in the Bellingshausen Sea region?
5. How does the U.S. government get involved once a species is determined to be threatened?

SKILL FOCUS: Cause and Effect

INSTRUCT: Lead the students in a discussion that guides them to recognize the primary cause-and-effect relationship (a relationship in which one event makes another event happen) presented in this article. Introduce the *Cause and Effect: Penguin Problems* graphic organizer. Advise students that they will be explaining the effects of climate change on emperor penguins.

ASSESS: Review worksheet. Discuss: How can humans help?

EXTEND

Environmental Research: Explain that in addition to the emperor penguin, many animals in Antarctica have been impacted by our rapidly warming planet. The retreating glaciers are threatening species across the continent. Have students select a threatened species of Antarctica and research and write about its role in the ecosystem. Students should describe the animal and the cause of its endangered status. They should also present ideas for saving the animal.

Penguin Problems

Cause and Effect In the spaces below, explain how climate change is affecting each aspect of life for the emperor penguins.

Habitat:

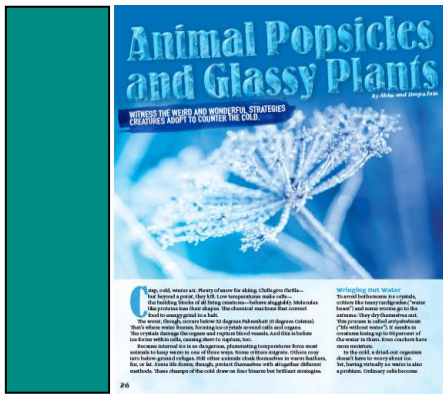
Population:

Food Supply:

Animal Popsicles and Glassy Plants

pp. 26–27, Expository Nonfiction

Although cold temperatures and snow usher in the thrill of skiing and sledding, they also signal the beginning of a dangerous period for many creatures in the wild. This article examines the various ways that nature adapts to the cold.



RESOURCES

- Construct Explanations: Behold the Cold
- Thermometer template

OBJECTIVES

- Students will learn about the strategies used by creatures in the wild to survive the cold.
- Students will construct explanations.
- Students will represent Fahrenheit and Celsius temperatures on a thermometer.

KEY VOCABULARY

- **rupture** (p. 26) to break or burst
- **refuge** (p. 26) a place that provides shelter or protection
- **deploy** (p. 27) utilize for a deliberate purpose

ENGAGE

Conversation Question: How does nature survive the cold?

Have the students discuss changes in their clothing, activities, and lifestyle during the colder months. Pose this question: *As humans, what steps do we take to prepare ourselves and our homes for a seasonal drop in temperatures?* Then have them consider how plants and animals in nature prepare for the cold. Introduce and distribute the article “Animal Popsicles and Glassy Plants.”

INTRODUCE VOCABULARY

Display the following statements and underline the key vocabulary terms. Review how to infer the meanings of new words by using context clues and background knowledge. Then have partners work together to determine the meaning of each underlined word. Reveal definitions.

1. The hose ruptured, flooding the driveway.
2. The warm cabin was a cozy refuge after a day of sledding.
3. Deploy your umbrella when it rains, and you will stay dry.

READ & DISCUSS

Reinforce comprehension of the concepts presented in the article by using the following questions to direct discussion.

1. How does extreme cold affect living organisms?
2. What are the three ways that animals keep warm when temperatures plummet?
3. What are the pros and cons of anhydrobiosis?
4. What process makes trees hardy in the cold?
5. How do freeze-avoidant creatures lower the temperature at which their body fluids freeze?

SKILL FOCUS: Construct Explanations

INSTRUCT: Advise students to review the article and to study the four strategies that plants and animals in nature use to survive the cold. Distribute the *Construct Explanations: Behold the Cold* graphic organizer. Tell students they will use information from the article to explain each technique.

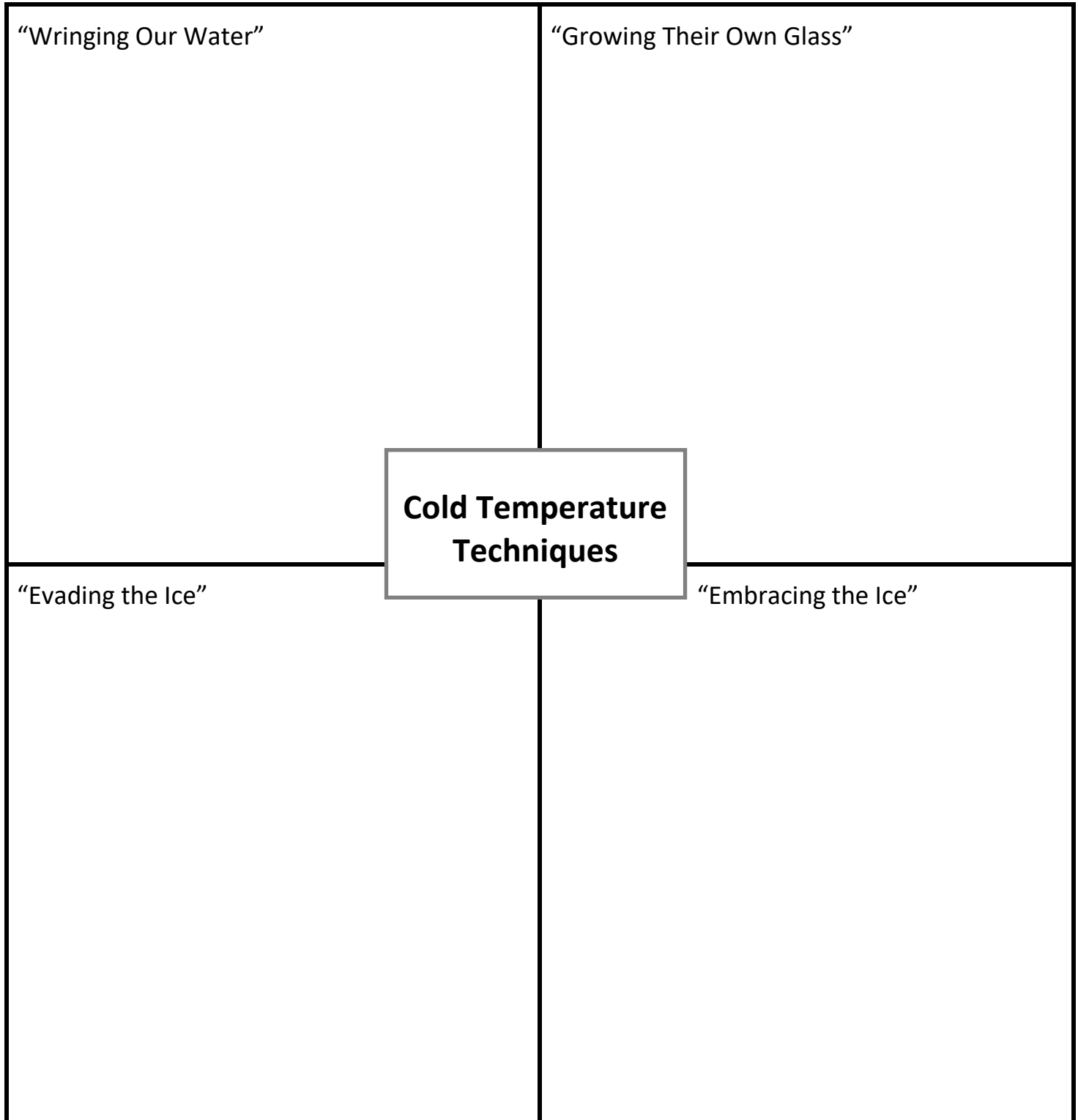
ASSESS: Review the chart and then revisit the discussion from the Engage activity to compare the strategies that humans use to survive plunging temperatures.

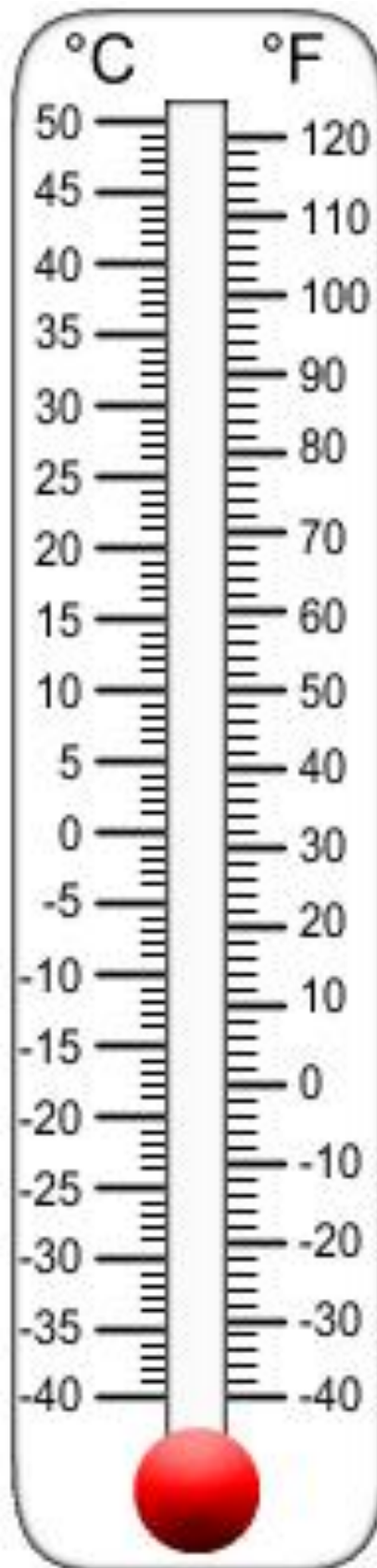
EXTEND

Mathematics: Article page 26 reminds readers that freezing occurs at 32 degrees Fahrenheit and 0 degrees Celsius. Discuss the two scales of temperature. Have students practice representing Fahrenheit and Celsius temperatures on the thermometer template page included in this guide. Laminate the temperature template for the students or have them place it in a protective plastic sleeve. This will make the template reusable with dry erase markers.

Behold the Cold

Construct Explanations Use information from the text to explain the strategies that nature uses to combat the cold.



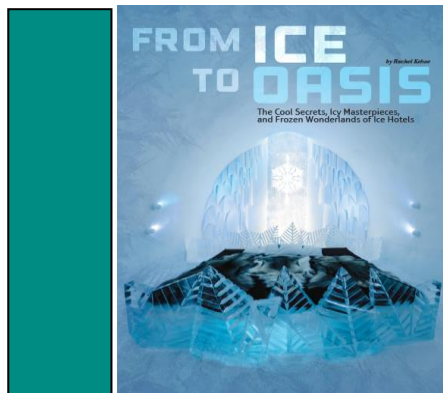


Muse® Teacher Guide: January 2024

From Ice to Oasis

pp. 42–45, Expository Nonfiction

Visitors to ice hotels witness a unique combination of nature, art, and innovation. This article takes the reader on a journey to discover the process and the magic of rooms built of ice.



RESOURCES

- Sequencing a Process: Beyond the Brick

OBJECTIVES

- Students will learn about the construction of the Icehotel in Sweden.
- Students will sequence a process.
- Students will plot geographical locations on a world map.

KEY VOCABULARY

- snice** (p. 44) a portmanteau or combination of the words *snow* and *ice*

ENGAGE

Conversation Question: How does nature survive the cold?

Display the title of the article, “From Ice to Oasis” and have students predict the content. Then read aloud the subtitle, “The Cool Secrets, Icy Masterpieces and Frozen Wonderlands of Ice Hotels.” Guide students to note why subtitles are sometimes added beneath a title. Discuss what it might be like to stay in an ice hotel. State this astounding fact: *Each brick used in the construction of the Icehotel weighs two tons. Approximately 1,200 bricks are used.* **Ask:** How many tons of bricks are used? (**2,400 tons**) How many pounds of bricks are used? (**4,800,000 lbs.**)

INTRODUCE VOCABULARY

Point out that the word *snice* is an example of a portmanteau word, or a word that is created by blending the sounds and meanings of two different words into one word. Have students work in pairs to guess the two winter-related words that make up the word *snice* (*snow* + *ice*). Next, list these other portmanteau words on the board and have pairs identify the two blended words in each one: *frenemy*, *smog*, *spork*, *glamping*, *hangry*. Invite students to share their ideas.

READ & DISCUSS

Pose the following questions to prompt meaningful discussion. Students should use complete sentences and details to answer each question.

- Describe the experience at an ice hotel.
- Where is the first and oldest ice hotel located?
- Who typically enters the Icehotel competition? Why?
- Who developed the idea for the Icehotel? Why?
- How does the unpredictability of nature affect the building?
- How did the founder of the Icehotel make the hotel a year-round tourist attraction?

SKILL FOCUS: Sequence

INSTRUCT: Review the article and guide students to notice that there is a specific process involved in constructing a hotel from ice and snow. Distribute the *Sequencing a Process: Beyond the Brick* graphic organizer. Instruct students to condense the process into four important steps that detail the how artists, designers, and builders construct the Icehotel every year in Sweden.

ASSESS: Circulate as students are working and have them use the graphic organizer to retell the process in their own words. Then collect the graphic organizers and evaluate them for accuracy.

EXTEND

Geography: Page 43 of the article lists the locations of five ice hotels around the world. Display a world map and have students plot the locations. Ask: *What do these locations have in common? Why might a particular location be poorly suited for the construction of an ice hotel?* Have students work in groups to discuss and answer the questions.

Beyond the Brick

Sequencing a Process Reread the article and highlight sentences that detail the building process of the Icehotel in Sweden. Condense the process into four steps and explain each step in the correct order.

First...

Next...

Then...

Finally...