

Lessons 24–26

Windmills at Work

Prepare

In Lessons 24 through 26, students synthesize their learning from throughout the module and articulate their understanding of energy in a Socratic Seminar and End-of-Module Assessment. In Lesson 24, students discuss the Essential Question in a Socratic Seminar and capture their thoughts in writing. They briefly revisit the driving question board to reflect on their progress and then individually complete the End-of-Module Assessment in Lesson 25. During the End-of-Module Assessment, students apply their knowledge of patterns and systems to construct explanations about energy, how it transfers from place to place, and how it transforms. In this module’s culminating lesson, Lesson 26, students debrief the assessment and look ahead to the next module.

Student Learning

Knowledge Statement

In a system, specific indicators of energy can be generated through energy transfers and transformations.

Application of Concepts

Task

Socratic Seminar
End-of-Module Assessment

Phenomenon Question

How do windmills change wind to light? (Essential Question)

Objectives

- Lesson 24: Explain changes in a system as the transfer and transformation of energy. (Socratic Seminar)
- Lesson 25: Explain changes in a system as the transfer and transformation of energy. (End-of-Module Assessment)
- Lesson 26: Explain changes in a system as the transfer and transformation of energy. (End-of-Module Assessment Debrief)

Texas Essential Knowledge and Skills Addressed

- 4.2C **Construct** simple tables, charts, bar graphs, and **maps** using tools and current technology **to organize**, examine, and evaluate data. (Addressed)
- 4.2D **Analyze data and interpret patterns to construct reasonable explanations** from data **that can be observed** and measured. (Addressed)
- 4.2F **Communicate valid oral and written results supported by data.** (Addressed)
- 4.3B **Represent the natural world using models** such as the water cycle and stream tables and identify their limitations, including accuracy and size. (Addressed)
- 4.6A **Differentiate among forms of energy, including mechanical, sound, electrical, light, and thermal.** (Mastered)
- 4.6C **Demonstrate that electricity travels** in a closed path, **creating an electrical circuit.** (Mastered)

English Language Proficiency Standards Addressed

- 2F Listen to and derive meaning from a variety of media such as audio tape, video, DVD, and CD ROM to build and reinforce concept and language attainment.
- 3G Express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.

Materials

		Lesson 24	Lesson 25	Lesson 26
Student	Science Logbook (Lesson 24 Activity Guides A, B, and C)	●		
	End-of-Module Assessment		●	
	End-of-Module Assessment Rubric			●
	Sample of End-of-Module Assessment responses that meet expectations (either sample responses from Teacher Edition or sample from class)			●
Teacher	Anchor chart	●		●
	Anchor model	●		
	Driving question board		●	●
Preparation	Score End-of-Module Assessments and write individual feedback.			●
	Select End-of-Module Assessment responses to share with students.			●
	Prepare visual for student connections between module learning and content standards (see Lesson 26 Resource).			●

Lesson 25

Objective: Explain changes as the transfer and transformation of energy. (End-of-Module Assessment)

Launch 8 minutes

Provide an example of energy transfers or transformations for students: turn the classroom lights off and on, slide a textbook across a table, or flip a water bottle in the air. Ask students to Think–Pair–Share about the following prompts.

- ▶ How do you think people without an understanding of energy would describe what happened?
 - *The textbook moved because you used your arm to push it.*
 - *The light switch turned the lights on.*
 - *The water bottle flipped because you threw it in the air.*

- ▶ Using what you know now about energy, describe what happened.
 - *When you pushed the book, energy from your arm transferred to the book because I saw it slide across the table. The energy from your arm transformed into mechanical energy, a different kind of energy.*
 - *When you flipped the light switch, you caused energy to travel through a wire and to the light bulb. The light bulb transforms electrical energy into light.*
 - *When you flipped the water bottle, you transferred the energy from your hand to the bottle, and you transformed the energy from your arm into mechanical and sound energy.*

Return to the driving question board, and ask students to share reflections on how their understanding of energy has grown since applying what they have learned in this module. 

Ask students to share any new questions that might lead to future investigations. 

Agenda

Launch (8 minutes)

Learn (35 minutes)

- Complete the End-of-Module Assessment (35 minutes)

Land (2 minutes)



Teacher Note

Display the driving question board with the anchor chart and anchor model to help students make connections.



Extension

Students can research or investigate these questions independently at work stations or as optional homework.

Learn

35 minutes

Complete the End-of-Module Assessment

35 minutes

Prepare students for the End-of-Module Assessment by explaining that the assessment is a way for them to show all the knowledge they have developed through their study of energy. Remind students to provide detailed explanations and to use the resources posted in the room if needed.

Distribute the End-of-Module Assessment. Read aloud the assessment items.  Students complete the End-of-Module Assessment individually. If needed, provide additional time for students to finish.



Teacher Note

To prepare for the next lesson, review End-of-Module Assessment responses to provide rubric scores and actionable feedback to students on a separate page from the assessment. (See the rubric and sample responses in the End-of-Module Assessment section of this book.) In the next lesson, students review their own assessment responses and then the teacher feedback. Also, select an exemplar student response to share with students, or plan to share the sample student responses provided in the Teacher Edition. If selecting student responses, remember to remove identifying information and to select diverse student responses.

When providing feedback, be sure to guide students to focus on specific areas of improvement to deepen their understanding of module concepts. For students who need remediation, offer opportunities to revisit portions of the module.



Differentiation

Provide an audio recording of the assessment items for students who need additional reading support (2F).

Land

2 minutes

Tell students that in the next lesson they will share their thinking about the End-of-Module Assessment questions.

Lesson 26

Objective: Explain changes as the transfer and transformation of energy. (End-of-Module Assessment Debrief)

Launch 8 minutes

Explain that in this lesson, students will review the End-of-Module Assessment, discuss responses, and then have an opportunity to revise their answers. First, they will review the assessment rubric and assess their own responses to begin reflecting on their learning.

Share the End-of-Module Assessment rubric with students and distribute their individual responses (without teacher feedback, if possible). Students reflect on their own responses, recording their self-assessment feedback on their copy of the rubric.

Next, distribute written teacher feedback on students' End-of-Module Assessments. Students review the teacher feedback of their own responses independently and write on sticky notes any questions they want to discuss with the class. Students post their questions, either anonymously or with their names. Quickly review students' questions as they post them and plan which questions to discuss first.

Agenda

Launch (8 minutes)

Learn (32 minutes)

- Debrief the End-of-Module Assessment (17 minutes)
- Revise End-of-Module Assessment Responses (10 minutes)
- Reflect on Content Standards (5 minutes)

Land (5 minutes)

Learn 32 minutes

Debrief the End-of-Module Assessment 17 minutes

Distribute copies of sample responses that meet expectations, one response per assessment item. Students compare the sample responses to the rubric criteria and annotate those responses with the evidence of each rubric criterion they demonstrate.

Discuss each assessment item, posing relevant student questions from the Launch. Provide sentence frames such as the following to encourage all students to participate in the discussion.

- In the sample response, I notice _____.
- That makes me wonder _____.
- That makes me realize _____.
- I thought _____. How does that relate to _____?
- I would add _____ because _____.

Discuss the remaining student questions. As needed, encourage students to review their Science Logbooks, the anchor model, the anchor chart, and other resources for evidence during the discussion.

Revise End-of-Module Assessment Responses 10 minutes

Students revise their End-of-Module Assessment responses by using a different color pen or pencil, applying new ideas from the debrief conversation to deepen their responses. 

Reflect on Content Standards 5 minutes

Show students the standards they focused on in this module and explain that standards are one tool teachers use to plan instruction. Read aloud each content standard, and ask students to point out evidence of related learning in their Science Logbooks, End-of-Module Assessment, or other resources.



Teacher Note

Depending on school and classroom guidelines and routines, decide whether to score and provide feedback on these revised responses.

Land

5 minutes

Students reflect on their learning by using a conversation routine, such as Mix and Mingle or Inside-Outside Circles. Ask questions such as the following, and have students switch discussion partners for each question.

- ▶ What do you want to teach others about energy?
- ▶ What else do you want to learn about energy?
- ▶ What helped you learn in this module?
- ▶ What do you hope to learn in the next module?

Optional Homework

Students compose a short message about energy to share with their family or community.