

G4 U1 Energy Transfer and Transformation - MATERIALS AND EQUIPMENT

The unit requires a variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Part A: Introduction to Energy

Lesson 1

- electric pencil sharpener and unsharpened pencil
- internet access and the means to project images/video for whole-class viewing (rocket launch)
- index cards for student vocabulary deck (3 per student)

Lesson 2

- flashlight with removable batteries
- large plastic cup
- balloon (dark color)
- table salt (a pinch)
- mobile phone or mobile audio device with a small speaker
- candle
- matches or a lighter

Part B: Energy and Motion

Lesson 3

- assorted marbles
- index cards for student vocabulary deck (2 per student)

Lesson 4

- books (to elevate ramps)
- cardboard (for ramp surfaces)
- 2 small, dense rubber balls of the same size and weight
- 2 paper cups
- pennies or pebbles for place markers
- shoeboxes (1 per group)
- play sand (about 5 pounds)
- index cards for student vocabulary deck (1 per student)

Lesson 5

- books (to elevate a ramp)
- cardboard (for a ramp surface)
- rubber ball
- a few lightweight blocks
- index cards for student vocabulary deck (1 per student)

Part C: Energy Transfer

Lesson 6

- sticky note paper (approximately 3 inches square, 1 piece per student)
- plastic cups (1 per student)
- internet access and the means to project images/video for whole-class viewing
- index cards for student vocabulary deck (2 per student)

Lesson 7

- index cards for student vocabulary deck (2 per student)
- flashlight
- hot plate
- spiral-cut paper plate on a string
- internet access and the means to project images/video for whole-class viewing

Lesson 8

- flashlight
- paintbrush (2–4 inches wide)
- chalk powder (finely crushed chalk)
- plate
- hot plate
- beaker
- ice cubes
- ice chest or ice box
- plastic bucket
- tongs
- tablet or cell phone (with low battery charge and a visible “charging” icon)
- tablet or cell phone charging cord
- surge protector with off/on switch

Lesson 9

- internet access and the means to project images for whole-class viewing

Part D: Collisions

Lesson 10

- 2 smaller toy cars
- 2 larger toy cars
- 2 clipboards
- 3–4 hardcover books for each ramp
- modeling clay
- index cards for student vocabulary deck (2 per student)

Lesson 11

- empty cans or water bottles (1 per group)
- plastic or wooden toy vehicles with wheels
- 2-foot-long ramps made of cardboard or wood (1 per group)
- small items such as marbles, dry beans
- internet access and the means to project images/video for whole-class viewing

Part E: Energy Transformation and Engineering for Energy

Lesson 12

- wind-up timer (or timer app on phone)
- index cards for student vocabulary deck (3 per student)

Lesson 13

A broad selection of materials from which students may choose for a design solution, such as:

- boxes
- aluminum foil
- clear plastic wrap
- craft paper
- springs
- rubber bands
- containers
- string
- table tennis and tennis balls
- cups
- sticks
- cardboard tubes of various sizes
- blocks
- glue
- clipboards for making ramps
- tape
- electric clock or pencil sharpener

G4 U2 Investigating Waves - MATERIALS AND EQUIPMENT

The unit requires a variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Part A: Waves Transfer Energy

Lesson 1

- ropes or cords, 2 feet in length (1 rope per 2 students)
- small desk fan
- clear plastic bins (ideally 5–7 inches deep; 1 per group of students; 1 for teacher demonstration)
- colored ribbon (1 per team)
- water (enough to fill each bin with 2–3 inches of water)
- corks or other floating objects (1 per group)
- rulers (1 per group)
- black markers (1 per group)
- small cardboard or plastic panels (1 per student)
- paper towels/cloths
- internet access and the means to project images/video for whole-class viewing

Lesson 2

- internet access and the means to project images/video for whole-class viewing
- index cards for student vocabulary deck (5 per student)

Lesson 3

- poster board (assorted colors)
- construction paper (assorted colors)
- markers
- scissors
- glue bottles/glue sticks
- shoeboxes (or small box/container; 1 per student)
- colored pencils (or crayons)
- yarn
- spring toy
- stopwatch (1 per group)
- measuring tapes or rulers (2 per group)
- internet access and the means to project images/video for whole-class viewing
- index cards for student vocabulary deck (2 per student)

Part B: Sound Waves Transfer Energy

Lesson 4

- shoebox with lid (1 per student; 1 for teacher demonstration)
- rubber bands (4–6 per student/box)
- unsharpened pencil (1 per student)
- scissors (1 per student)
- internet access and the means to project images/video for whole-class viewing
- index cards for student vocabulary deck (4 per student)

Lesson 5

- pairs of different-sized water bottles, 0.5 liter and 2 liter, for example (1 for each pair of students)
- block of wood (1 for each pair of students)
- cell phone tone or music box
- books
- string phone made with paper cups and 20 feet of string
- shoebox guitars from previous lesson
- internet access and the means to project images/video for whole-class viewing

Lesson 6

- medium-size container
- water
- cup or pitcher
- musical chimes or bell
- rattle or musical shaker
- textbook
- variety of recorded sounds and an electronic device for playback
- portable fan or hair dryer
- internet access and the means to project images/video for whole-class viewing
- index card for student vocabulary deck (1 per student)

Lesson 7

- shoebox guitars (from Lesson 4)

Part C: Light Waves Transfer Energy

Lesson 8

- lamp with light bulb
- candle (for teacher demonstration only)
- matches/candle lighter
- glow sticks
- prism
- flashlight
- glow-in-the-dark stickers
- white poster board sheets (2)
- piece of clear glass
- wooden block
- index cards for student vocabulary deck (5 per student)

Lesson 9

- tracing paper
- flashlight
- clear glass
- water
- straw
- internet access and the means to project images/video for whole-class viewing
- index cards for student vocabulary deck (2 per student)

Lesson 10

- 3 clear balloons
- black balloon
- magnifying glass
- scissors
- glue bottles/glue sticks
- pizza box (or similar small box)
- aluminum foil
- black construction paper
- ruler
- transparent plastic wrap
- pencils
- crayons (with paper removed)
- small amount of butter
- rock
- (optional) other objects that will change in a solar oven
- internet access and the means to project images/video for whole-class viewing

Lesson 11

- microwave
- food item or liquid in a cup
- internet access and the means to project images/video for whole-class viewing

Part D: People Use Waves to Transfer Information

Lesson 12

- flashlight
- smoke alarm
- index cards for student vocabulary deck (4 per student)

Lesson 13

- penlights
- flashlights
- hand mirrors
- colored fabric
- colored paper
- colored films
- plain paper
- grid paper
- string
- cardboard tubes
- pencils
- scissors
- tape
- rubber bands
- paper clips

Lesson 14

- coded message
- code key
- index cards for student vocabulary deck (4 per student)

Unit Review

- front board
- front board markers (or chalk)
- question and answer cards/sheets
- timer (or phone)

G4 U3 Structures and Functions of Living Things - MATERIALS AND EQUIPMENT

The unit requires a variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Part A: Structure Is Related to Function

Lesson 1

- bunches of celery with leaves (enough for 3 stalks per group)
- food coloring (red, blue, yellow per group)
- large clear plastic cups (3 per group)
- water
- knife (for teacher use)
- paper towels or other cleanup materials

Lesson 2

- plastic building blocks of assorted sizes and colors (a large number)
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 3

- plastic bottle
- plastic straw
- elastic band
- balloons (2)
- modeling clay
- scissors
- index cards for student vocabulary deck (5 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 4

- sticky notes (6 colors, plus yellow)
- colored paper (6 pieces, same colors as sticky notes, except yellow)
- pin board (or whiteboard)
- pins (or sticky tape)
- string
- scissors

Lesson 5

- images of 10 animals, including various mammals, birds, reptiles, amphibians, fish, and invertebrates
- pin board (or whiteboard)
- pins (or sticky tape)
- sticky notes (5 colors)
- index cards for student vocabulary deck (4 per student)

Lesson 6

- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 7

- writing and recording materials, such as paper and writing utensils
- internet access, books, magazines, and other research materials

Part B: Structures and Functions of Eyes and Ears

Lesson 8

- mirrors (1 per pair of students)
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 9

- scissors (1 pair per group)
- index cards for student vocabulary deck (1 per student)

Lesson 10

- rulers (1 per pair of students)
- scissors
- glue sticks

Part C: Sensory Structures, Functions, and Survival

Lesson 11

- craft feathers (1 per pair of students)
- internet access and the means to project images/video for whole-class viewing

Lesson 12

- drumstick
- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 13

- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 14

- resource catalogue and/or reference materials
- internet access and the means to project images/video for whole-class viewing

Unit Review

- packs of small beads
- glue
- internet access and the means to project images/video for whole-class viewing

G4 U4 Processes that Shape Earth - MATERIALS AND EQUIPMENT

The unit requires a variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Part A: Problem-Based Learning Introduction

Lesson 1

- highlighters
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Part B: The Structure of Our Earth

Lesson 2

- modeling clay
- index cards for student vocabulary deck (3 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 3

- 12-inch rulers, ideally with both metric and standard rulings (1 per team)
- modeling clay or dough (4 different colors)
- rolling pins or soup cans (1 per team)
- straightened paper clips (1 per team)
- dental floss (1 30-centimeter length per team)
- markers, colored pencils, or crayons (colors to match clay or dough)
- index cards for student vocabulary deck (3 per student)

Lesson 4

- samples of igneous, metamorphic, and sedimentary rocks
- modeling clay
- putty knife

Lesson 4, continued

- index cards for student vocabulary deck (3 per student)
- internet access and the means to project images/video for whole-class viewing

Part C: Earth's Moving Crust

Lesson 5

- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 6

- pizza boxes (large or individual size)
- scissors
- marbles (10–20 marbles per box)
- ruler
- small rubber bands (4 per box)
- stapler
- mini-marshmallows
- plastic coffee stirrers (or dried spaghetti)
- internet access and the means to project images/video for whole-class viewing

Lesson 7

- 2-liter plastic soda bottle with cap
- small gravel (fish tank gravel)
- water
- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 8

- index cards for student vocabulary deck (4 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 9

- globe (optional)
- highlighters
- internet access and the means to project images/video for whole-class viewing

Part D: Other Changes on Earth's Surface

Lesson 10

- small milk cartons (2)
- plaster of paris
- balloons (2)
- water
- access to a freezer
- sand
- loamy garden soil
- small piece of grass-covered soil
- piece of cardboard
- index cards for student vocabulary deck (4 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 11

- stream table
- catch bucket (if not in the kit)
- sand
- ruler
- water
- three sizes of blocks (if the stream table does not include a way to change its slope)

Lesson 11, continued

- water flow cup (if not in the kit), with a small hole near the bottom
- measuring cups, graduated cylinder, or scale (depending on what property students decide to measure)
- internet access and the means to project images/video for whole-class viewing

Lesson 12

- sand or sandy soil
- shoebox
- construction paper or thin cardboard
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 13

- empty half-gallon paper drink cartons (2 per team, 1 with cap in place)
- scissors (1 per team)
- potting soil or sand (slightly moist)
- plastic bins (1 per team, large enough to hold the carton on its side at an angle)

Part E: Managing the Effects of Earth's Natural Processes in Our Area

Unit Capstone

- online image library for the entire unit
- internet access and the means to project images/video for whole-class viewing
- name tags for students and event attendees

G4 US Using Natural Resources for Energy - MATERIALS AND EQUIPMENT

The unit requires a variety of materials to support various ways of learning (including doing, discussing, listening, watching, reading, and writing). Prepare in advance by collecting the materials and equipment needed for all the demonstrations and hands-on investigations.

Part A: Problem-Based Learning Introduction

Lesson 1

- sticky notes (2 per student)
- index cards for student vocabulary deck (2 per student)

Part B: Natural Resources: Renewable and Nonrenewable

Lesson 2

- bag of popcorn (or candy, pennies)
- pencils
- pieces of paper
- index cards for student vocabulary deck (4 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 3

- internet access and the means to project images/video for whole-class viewing

Part C: Using Nonrenewable Resources for Energy

Lesson 4

- internet access and the means to project images/video for whole-class viewing

Lesson 5

- box (at least 6 inches deep)
- sand
- mud
- pebbles (or cat litter)

Lesson 5, continued

- black shoe polish (2 cans)
- tape
- sticks or pencils
- clear container or fish tank
- several plastic straws
- pin
- water
- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 6

- access to the internet or library
- printed source materials about fossil fuels

Lesson 7

- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 8

- access to the internet or library
- printed source materials about nuclear power

Part D: Using Renewable Resources for Energy

Lesson 9

- pencils
- pieces of paper
- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 10

- access to the internet or library
- printed source materials about wind energy

Lesson 11

- household materials to assemble a water wheel
- pencils
- pieces of paper
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 12

- access to the internet or library
- printed source materials about hydroelectric power

Lesson 13

- solar oven materials: cardboard boxes, aluminum foil, polystyrene, newspaper, plastic wrap
- pencils
- pieces of paper
- index cards for student vocabulary deck (2 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 14

- access to the internet or library
- printed source materials about solar power

Lesson 15

- pencils
- pieces of paper
- index cards for student vocabulary deck (1 per student)
- internet access and the means to project images/video for whole-class viewing

Lesson 16

- access to the internet or library
- printed source materials about geothermal power

Lesson 17

- pencils
- pieces of paper
- index cards for student vocabulary deck (3 per student)
- internet access and the means to project images/videos for whole-class viewing

Part E: Sharing the Costs and Benefits of Natural Resource Use

Capstone

- name tags for students and event attendees
- poster board
- old magazines for images
- internet access and the means to project online article for whole-class viewing