

STAAR CONNECTION™ Developmental Series™

Science
4
teacher



KAMICO®
Instructional Media, Inc.

STAAR CONNECTION™

Science
4
teacher

Developmental Series™

IV/vi/MMXV
Version 1



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Texas Essential Knowledge and Skills Grade 4 Science

Scientific Investigation and Reasoning Skills

- (4.1) **Scientific investigation and reasoning:** The student conducts classroom and outdoor investigations, following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to
- (A) demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations
 - Is This Practice Safe? 11
 - Assessment 17
 - (B) make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans, and plastic
 - Resource Rescue 20
 - Assessment 29
- (4.2) **Scientific investigation and reasoning:** The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to
- (A) plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions
 - Ask, Infer, Select! 33
 - Assessment 41
 - (B) collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals such as labeled drawings, writing, and concept maps
 - Descriptive Data 44
 - Assessment 54
 - (C) construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data
 - Construction Zone 59
 - Assessment 69

(D)	analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured		
		Data Analysis and Explanation	75
		Assessment	80
(E)	perform repeated investigations to increase the reliability of results		
		Over and Over	84
		Assessment	87
(F)	communicate valid, oral, and written results supported by data		
		Communications Officer	91
		Assessment	94
(4.3)	Scientific investigation and reasoning: The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to		
(A)	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student		
		Believable Science	99
		Assessment	113
(B)	draw inferences and evaluate accuracy of services and product claims found in advertisements and labels such as for toys, food, and sunscreen		
		Advertising Inference	116
		Assessment	119
(C)	represent the natural world using models such as rivers, stream tables, or fossils and identify their limitations, including accuracy and size		
		Natural World Models	124
		Assessment	131
(D)	connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists		
		Historic Connection	136
		Assessment	148

- (4.4) **Scientific investigation and reasoning:** The student knows how to use a variety of tools, materials, equipment, and models to conduct science inquiry. The student is expected to
- (A) collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, pan balances, triple beam balances, graduated cylinders, beakers, hot plates, meter sticks, compasses, magnets, collecting nets, and notebooks; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums

Tools Do the Job	151
Assessment	162

 - (B) use safety equipment as appropriate, including safety goggles and gloves

Safety First	168
Assessment	172

**Reporting Category 1:
Matter and Energy**

- (4.5) **Matter and energy:** The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to
- (A) measure, compare, and contrast physical properties of matter, including size, mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float

Properties Matter	176
Assessment	193

 - (B) predict the changes caused by heating and cooling such as ice becoming liquid water and condensation forming on the outside of a glass of ice water

Heated Changes	197
Assessment	202

 - (C) compare and contrast a variety of mixtures and solutions such as rocks in sand, sand in water, or sugar in water

What a Mix-Up!	205
Assessment	209

Reporting Category 2: Force, Motion, and Energy

- (4.6) **Force, motion, and energy:** The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. The student is expected to
- (A) differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal
 - Full of Energy 212
 - Assessment 227
 - (B) differentiate between conductors and insulators
 - Stop and Go 231
 - Assessment 235
 - (C) demonstrate that electricity travels in a closed path, creating an electrical circuit, and explore an electromagnetic field
 - Electric Avenue 237
 - Assessment 243
 - (D) design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism
 - "Use the Force" 247
 - Assessment 255

Reporting Category 3: Earth and Space

- (4.7) **Earth and space:** The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to
- (A) examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants
 - Examine That Soil! 259
 - Assessment 266
 - (B) observe and identify slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice
 - It Takes Time 269
 - Assessment 272

(C) identify and classify Earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation	Resource Bingo	276
	Assessment	282
(4.8) Earth and space: The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to		
(A) measure and record changes in weather and make predictions using weather maps, weather symbols, and a map key	Rain or Shine	284
	Assessment	289
(B) describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process	Water, Water, Everywhere	295
	Assessment	299
(C) collect and analyze data to identify sequences and predict patterns of change in shadows, tides, seasons, and the observable appearance of the Moon over time	Patterns of Change	303
	Assessment	317

**Reporting Category 4:
Organisms and Environments**

(4.9) Organisms and environments: The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to		
(A) investigate that most producers need sunlight, water, and carbon dioxide to make their own food, while consumers are dependent on other organisms for food	Food to Make, Food to Eat	322
	Assessment	328
(B) describe the flow of energy through food webs, beginning with the Sun, and predict how changes in the ecosystem affect the food web such as a fire in a forest	Let the Energy Flow	330
	Assessment	337

(4.10) Organisms and environments: The student knows that organisms undergo similar life processes and have structures that help them survive within their environment. The student is expected to	
(A) explore how adaptations enable organisms to survive in their environment such as comparing birds' beaks and leaves on plants	
Adapted Organisms	341
Assessment	347
(B) demonstrate that some likenesses between parents and offspring are inherited, or passed from generation to generation, such as eye color in humans or shapes of leaves in plants. Other likenesses are learned such as table manners or reading a book and seals balancing balls on their noses	
Is It Inherited or Learned?	351
Assessment	357
(C) explore, illustrate, and compare life cycles in living organisms such as butterflies, beetles, radishes, or lima beans	
Cycles of Life	360
Assessment	370
Answer Key	374
Student Bubble Answer Sheet	386
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Reporting Category 2: Force, Motion, and Energy

TEKS 4.6A

Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

ACTIVITY

Full of Energy

Materials

Full of Energy game board for each group of three or four students

Full of Energy score sheet for each student

Full of Energy game cards for each group of three or four students

Number cube for each group of three or four students

Game token for each student

Background

We use different forms of energy every day to carry out activities. Modern conveniences such as microwave ovens use electrical, light, and heat energy to cook food. We rely on sound energy to notify us when we receive phone calls or when a guest arrives at the front door. Energy is used even in remote areas lacking modern conveniences. Mechanical energy supplied by humans is used to draw a bucket of water from the bottom of a well. No matter where we go, we encounter different forms of energy.

Procedure

Explain that the classroom is full of energy. Students identify objects in the classroom that require energy to function and name the form of energy used by the object. Discuss how we use different forms of energy in our daily lives. Inform students that they will play a game to differentiate among different forms of energy.

Divide the class into groups of three or four students. Distribute the *Full of Energy* game board, the *Full of Energy* game cards, and a number cube to each group. Distribute the *Full of Energy* score sheet and a game token to each student.

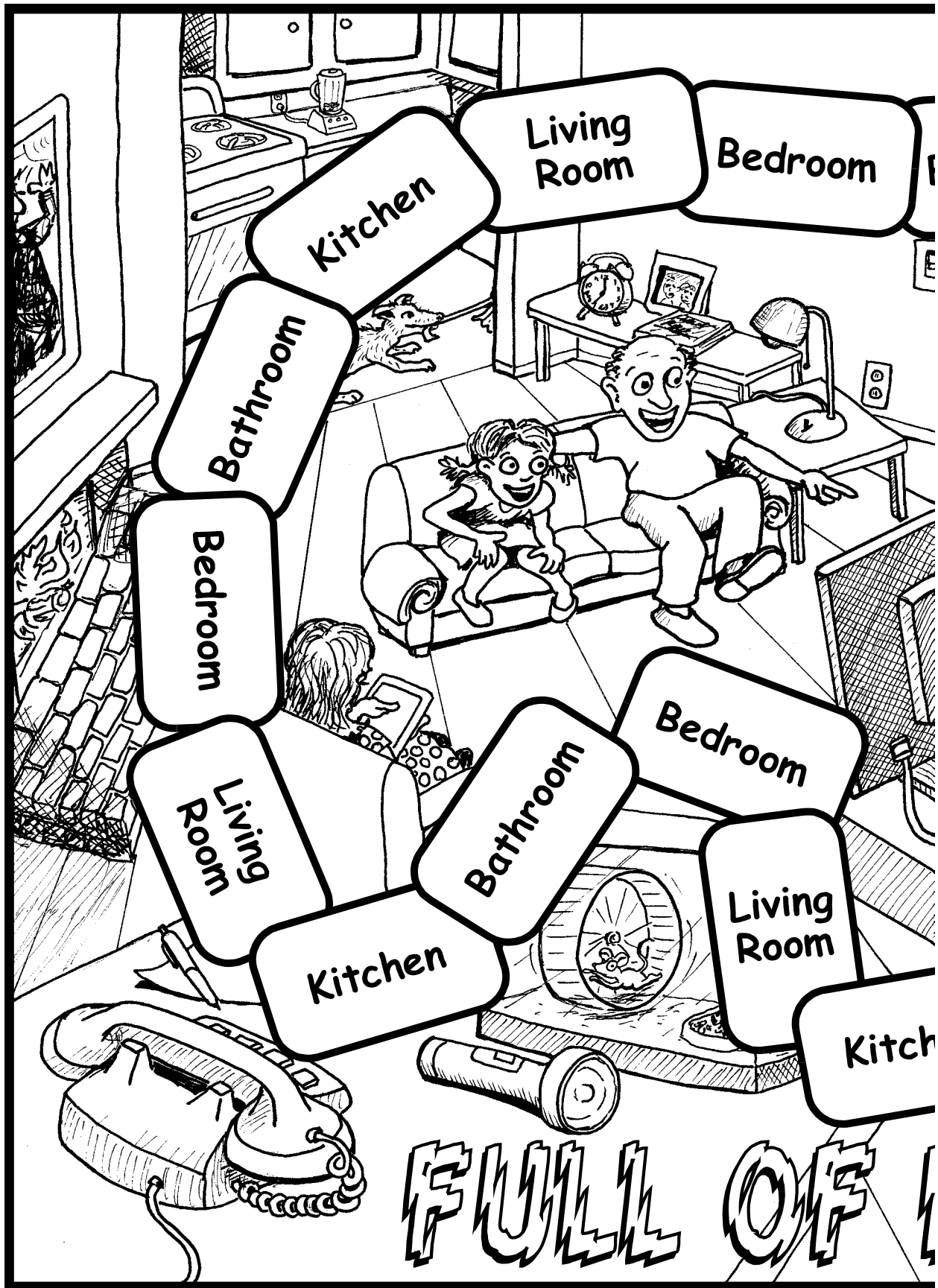
To begin, players place their game tokens on any square on the game board. One player shuffles the cards and places them facedown on the game board.

Player A rolls the number cube and advances his or her token the number of spaces indicated in a counterclockwise direction. Player A reads aloud the name of the room on the space. The player draws the top card from the deck and states the type of energy named on the card. The player then identifies an object found in the named room that uses the type of energy listed on the card. Next, the player describes how the object uses the type of energy.

If the player correctly identifies an object that reasonably can be found in the named room and can describe how the object uses the specified type of energy, (s)he can place a check on his or her score card in the square designated for the name of the room and the type of energy. If the player is unable to correctly identify an object or how the object uses the specified type of energy, (s)he cannot place a check on his or her score card. If players are in disagreement about a response, they raise their hands so that the teacher can referee and make the final decision.

Player A returns the drawn card to the bottom of the deck, and the turn passes to Player B, the player on the right. Play continues in a counterclockwise direction, as players try to get a check for every square on their score cards. If a player lands on a game board space and draws a card for a room-energy combination that (s)he has already identified, (s)he may take one more turn to try to get a room-energy combination (s)he still needs. If on the second turn, the player still does not get a room-energy combination (s)he needs, his or her turn is over and play passes to the next player.

The first player to get checks in all the squares on his or her score card is the winner.

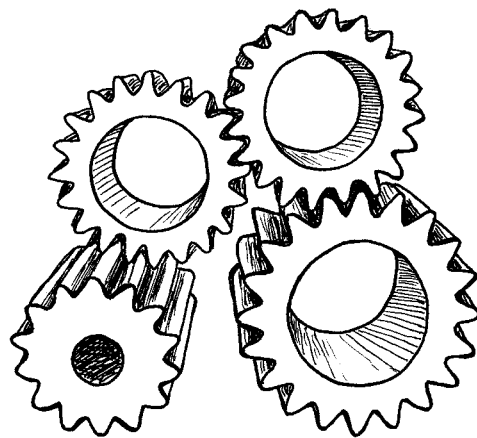
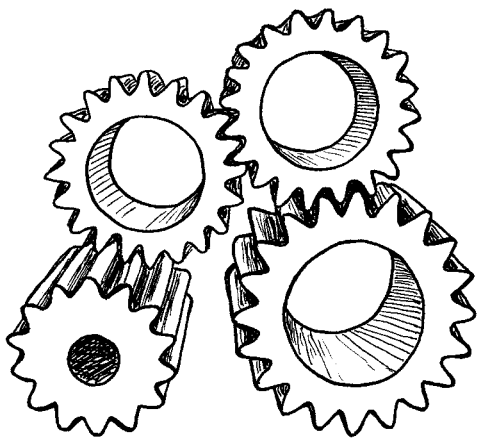
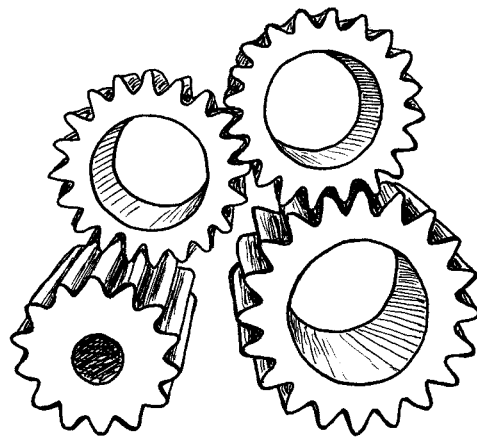
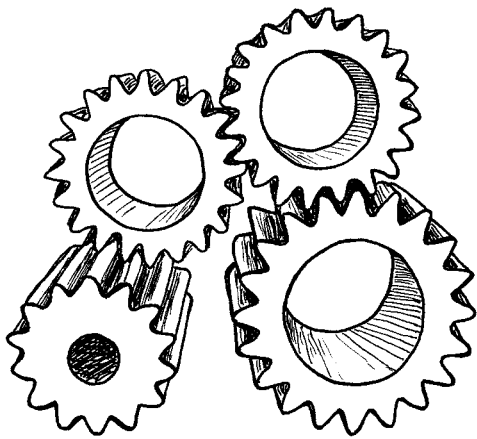
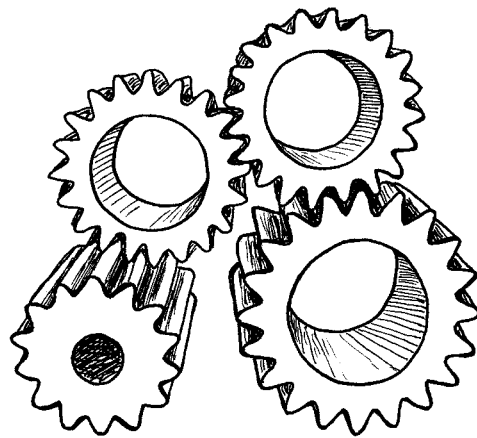
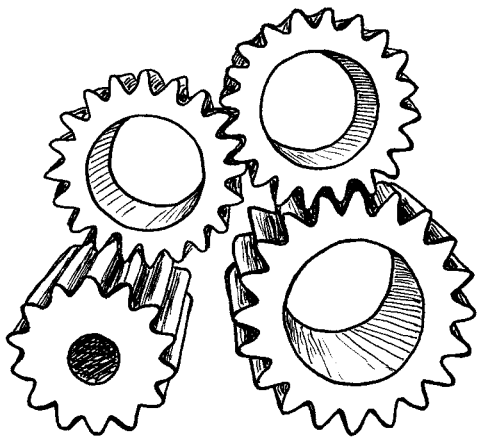




Full of Energy Score Card

Place a check (✓) in the appropriate square matching the room with the energy type.	Name of Room			
	Kitchen	Bathroom	Living Room	Bedroom
Mechanical Energy				
Electrical Energy				
Light Energy				
Sound Energy				
Heat/Thermal Energy				

Place a check (✓) in the appropriate square matching the room with the energy type.	Name of Room			
	Kitchen	Bathroom	Living Room	Bedroom
Mechanical Energy				
Electrical Energy				
Light Energy				
Sound Energy				
Heat/Thermal Energy				



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Electrical Energy

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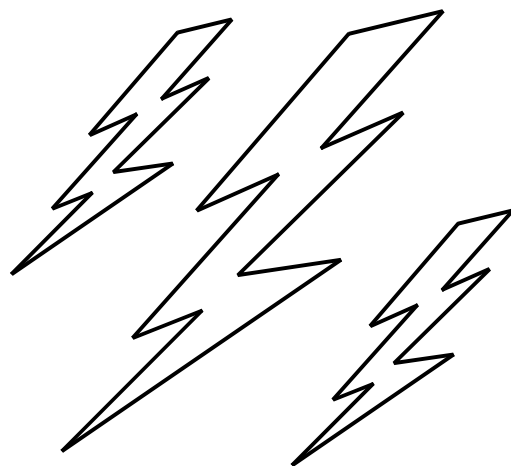
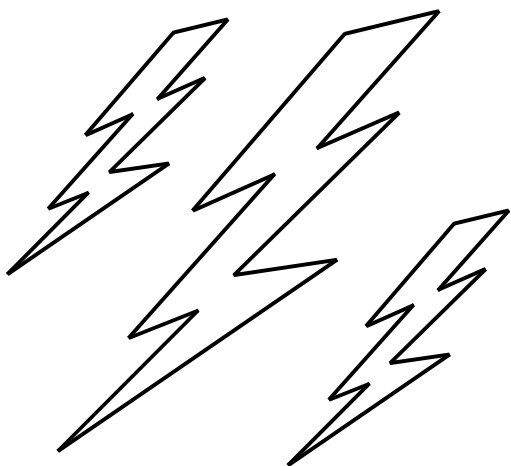
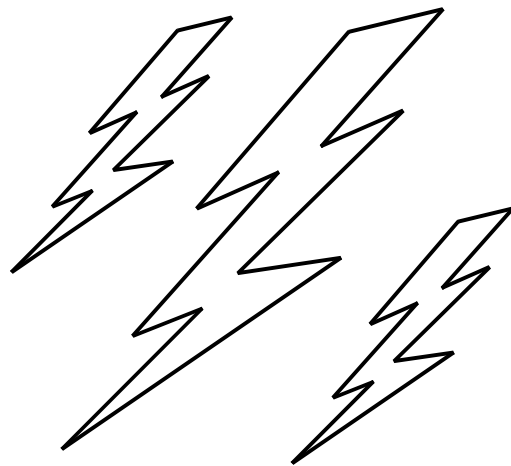
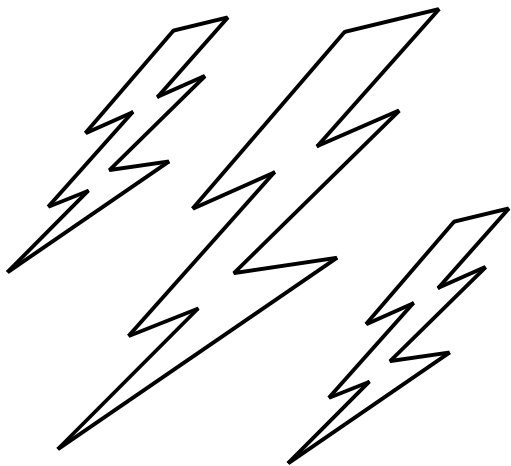
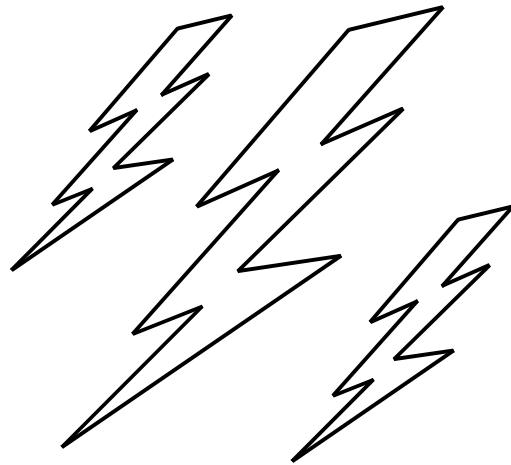
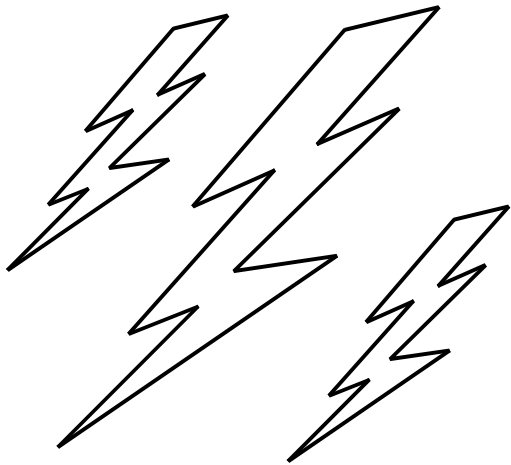
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Electrical Energy

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Sound Energy

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Light Energy

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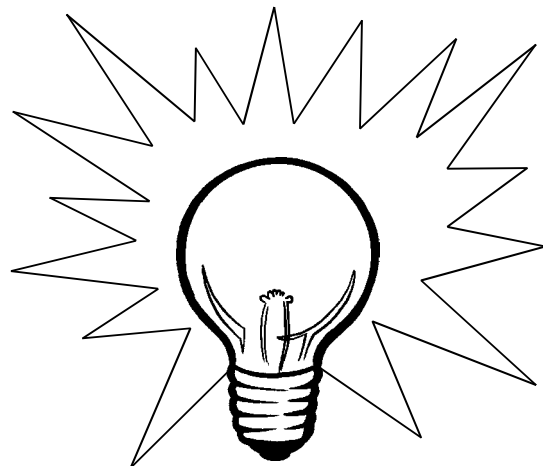
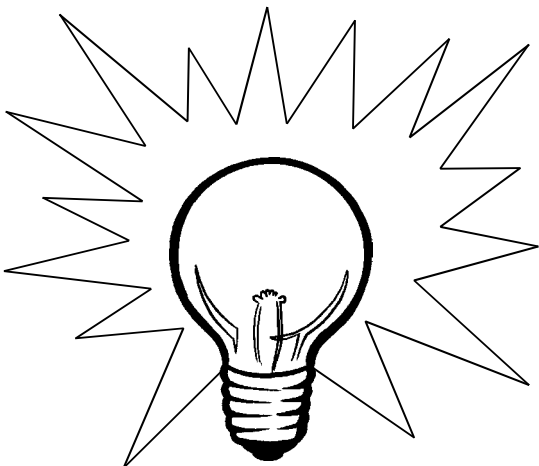
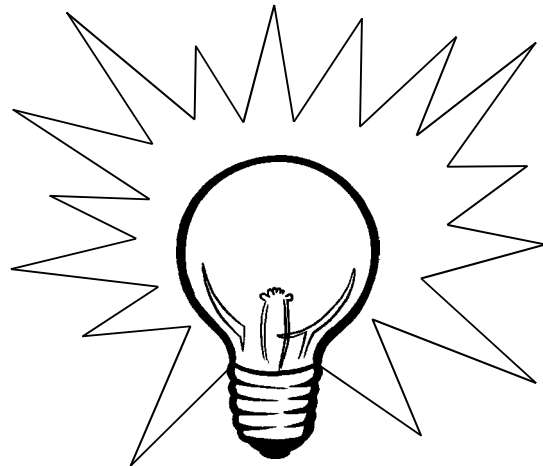
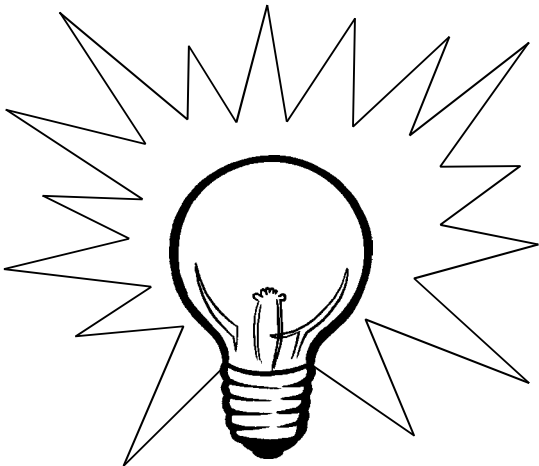
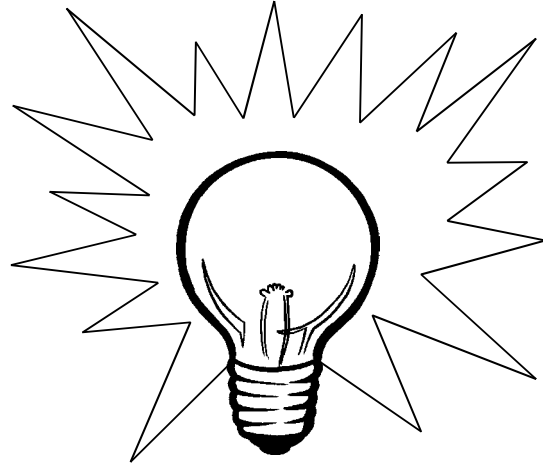
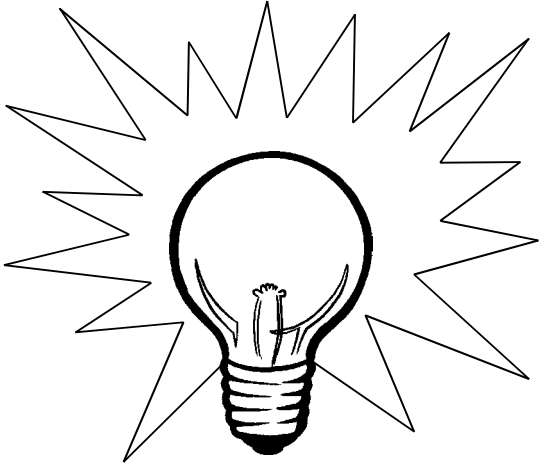
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Light Energy

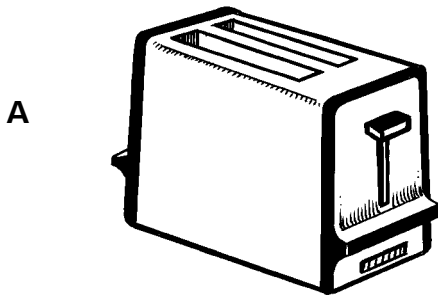
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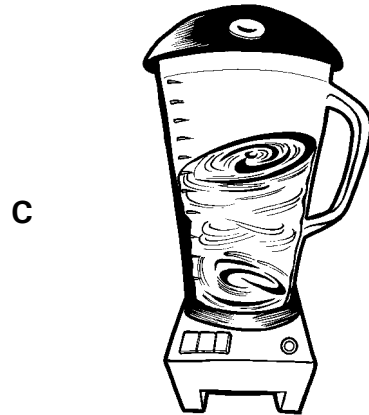


Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

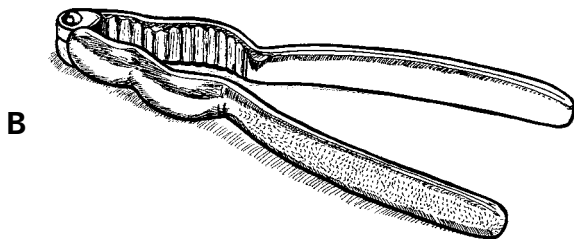
- 1 We use different forms of energy every day in our kitchens. Which object uses only mechanical energy to do its job?



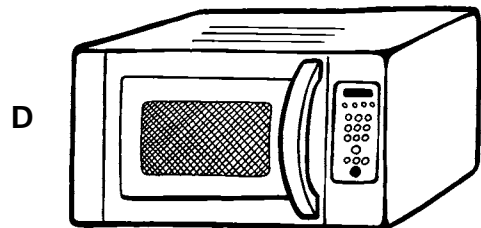
Toaster



Blender

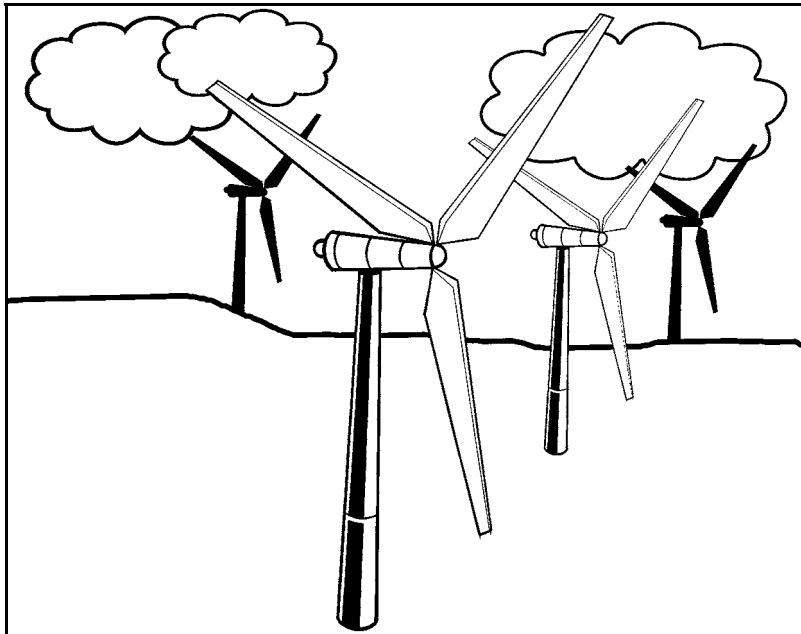


Nutcracker



Microwave Oven

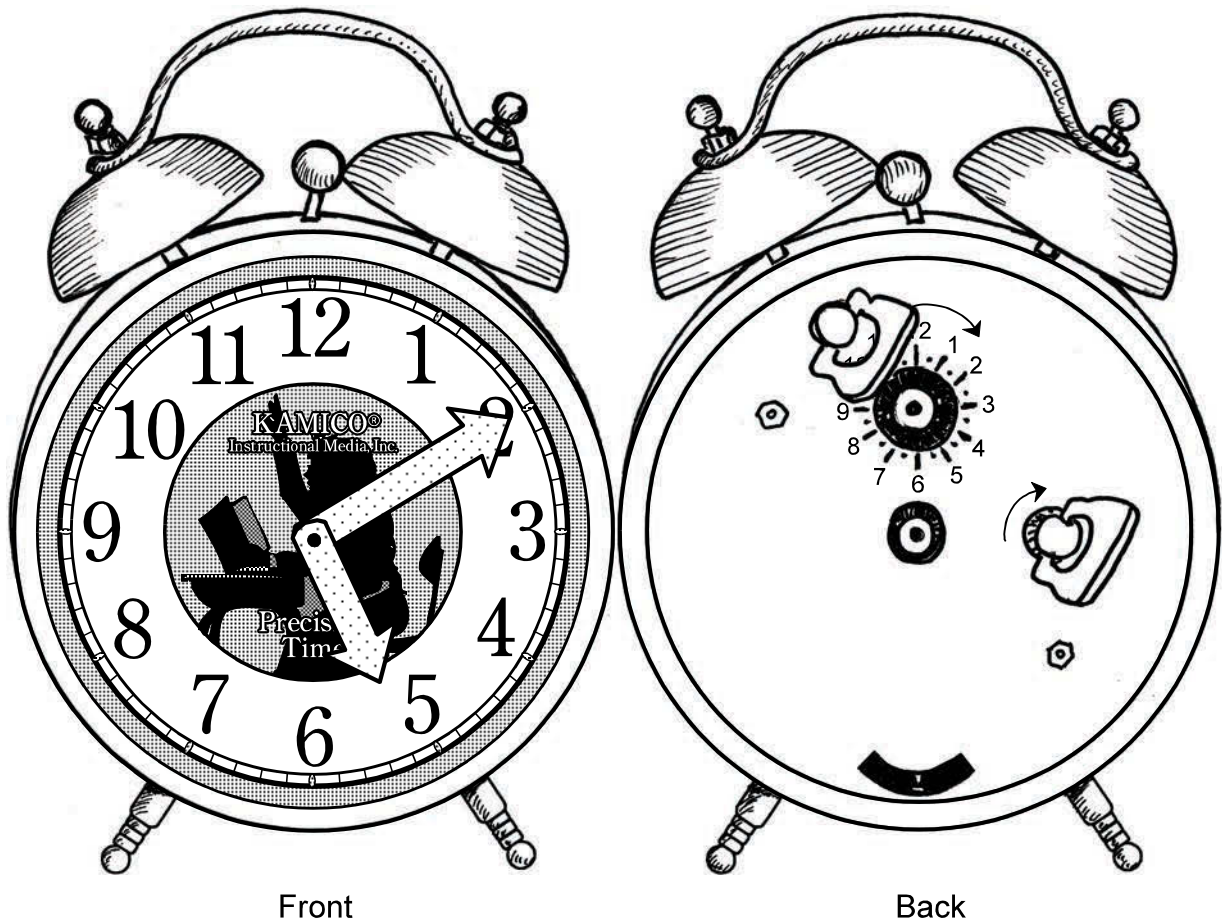
- 2 Many wind turbines can be found in West Texas.



Wind energy turns the blades on a wind turbine. What is the main form of energy produced by the turning blades?

- F mechanical energy
 - G thermal energy
 - H light energy
 - J sound energy
- 3 To make a piano produce music, the piano player presses down on the keys. The keys move hammers inside the piano that strike different metal strings, producing musical notes. Which two forms of energy are needed to produce music from a piano?
- A electrical energy and sound energy
 - B thermal energy and sound energy
 - C mechanical energy and sound energy
 - D mechanical energy and electrical energy

- 4 A wind-up alarm clock does not need a battery in order to work.



Turning the key in the back of the clock winds up a spring attached to gears. As the spring slowly unwinds, the clock's hands move to keep time. The bell on top of the clock is the alarm, which rings when the clock's hands reach the set time.

What type of energy gives power to move the hands of the alarm clock?

- F electrical energy
- G heat energy
- H sound energy
- J mechanical energy

- 5 A scoop of ice cream falls off a cone on to the ground on a hot summer day. The ice cream begins to melt. What form of energy from the sun causes the ice cream to melt?
- A light energy
 - B heat energy
 - C electrical energy
 - D mechanical energy
- 6 A troop of Boy Scouts explores an underground cave. For safety, each scout wears a hard hat with a headlamp attached to it.



What type of energy does the headlamp on the hard hat produce to help the scouts see things in the cave?

- F electrical energy
- G mechanical energy
- H heat energy
- J light energy