Big Idea: Energy Transformations (Unifying Concepts) Grade 7
Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple Earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

Academic Expectations
2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
2.3 Students identify and analyze systems and the ways their components work together or affect each other.
2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

<table>
<thead>
<tr>
<th>Program of Studies: Understandings</th>
<th>Program of Studies: Skills and Concepts</th>
<th>Related Core Content for Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-7-ET-U-1 Students will understand that most of the energy that powers the Earth’s systems comes from the sun. Energy from inside the Earth, however, is responsible for some important phenomena (volcanism, plate tectonics).</td>
<td>SC-7-ET-S-1 Students will investigate a variety of Earth systems that are powered by solar (e.g. water cycle, climate, carbon cycle) and/or geothermal (e.g. plate tectonics, volcanism) energy</td>
<td>SC-07-4.6.1 Students will understand that Earth systems have sources of energy that are internal and external to the Earth. The Sun is the major external source of energy.</td>
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</tbody>
</table>
| SC-7-ET-U-2 Students will understand that the amount of energy in a closed system remains the same, so that the energy lost by a hot object equals the energy gained by a cold one. | SC-7-ET-S-3 Students will explain where energy comes from (and goes next) in a variety of real-world examples (e.g. burning, respiration, residential lighting, dry cell batteries) involving different forms of energy (e.g. heat, light, kinetic, chemical) | SC-07-4.6.2 Students will:  
  • describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).  
  • Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object. |
| SC-7-ET-S-6 Students will describe the kinetic molecular theory of matter | SC-7-ET-S-6 Students will experiment with heat flow inside closed and open systems to explore the concept of thermal equilibrium | The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of |
Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by the collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together, to expand or contract them or tear them apart all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat gained by cold object. This is an energy conservation statement.

Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.

<table>
<thead>
<tr>
<th>SC-7-ET-U-3</th>
<th>SC-7-ET-S-3</th>
<th>SC-7-ET-S-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will understand that all energy must have a source and may change forms or be transferred in a wide variety of ways, including via waves.</td>
<td>Students will explain where energy comes from (and goes next) in a variety of real-world examples (e.g. burning, respiration, residential lighting, dry cell batteries) involving different forms of energy (e.g. heat, light, kinetic, chemical)</td>
<td>Students will identify forms of energy that are transferred via waves</td>
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SC-07-4.6.3 Students will understand that waves are one way that energy is transferred. Types of waves include sound, light, earthquake, ocean and electromagnetic.
<table>
<thead>
<tr>
<th>SC-7-ET-U-4</th>
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<th>SC-7-ET-S-6</th>
</tr>
</thead>
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<tr>
<td>Students will understand that thermal energy and motion are inseparable when viewed at the molecular level.</td>
<td>Students will equate work done on an object with change in energy of the object.</td>
<td>Students will describe the kinetic molecular theory of matter.</td>
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**SC-07-4.6.2**

Students will:

- describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).
- Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object.

The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of energy in a system. Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by the collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together, to expand or contract them or tear them apart all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat gained by cold object. This is an energy conservation statement. Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.

* DOK 3
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<td>Students will understand that the role various organisms play within an ecosystem can be determined by observing the flow of energy between them.</td>
<td>Students will model, explain and analyze the flow of energy in ecosystems and draw conclusions about the role of organisms in an ecosystem.</td>
<td>Students will describe or represent the flow of energy in ecosystems, using data to draw conclusions about the role of organisms in an ecosystem.</td>
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For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism in food webs.

**DOK 3**

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| Students will understand that systems tend to change until they become stable and remain that way unless conditions change. | Students will equate work done on an object with change in energy of the object. | Students will:

- describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).
- Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object.

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<th>Skills</th>
<th>Reasoning</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of energy (heat, electrical, light, motion of objects, chemical, etc.)</td>
<td>Measure temperature of objects</td>
<td>Describe transfer/transformation of energy</td>
<td>Model energy conservation</td>
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<tr>
<td>Energy transfer</td>
<td>Make models</td>
<td>Model energy transformations</td>
<td>Explain heat transfer methods</td>
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<tr>
<td>Energy transformations (ex. Burning, respiration, residential lighting, dry cell battery)</td>
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<tr>
<td>Heat transfer (conduction, radiation, convection)</td>
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<td>Heat lost by objects = heat gained by other objects</td>
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<td>Energy conservation</td>
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<tr>
<td>“What I need to know?”</td>
<td>“What I can do with what I know?”</td>
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</tbody>
</table>

1. I can give examples of energy.
2. I can give examples of energy transfer. That means when energy is moved from one object to another.
3. I can give examples of energy transformations. That means when energy is changed from one form to another form.
4. I can describe the exchange of energy between hot objects and cold objects.
5. I can explain how heat energy is transferred.
6. I can describe examples of systems that are powered by energy.

7. I can use models to show the transformation of energy in a system. That means I can show the energy forms that enter a system and how they change form until they leave the system.
8. I can use models to show that the amount of energy in a system is conserved. That means the total amount of energy stays the same, no matter how it has been transferred or transformed.
Transformation of Energy Pre-Assessment

Name: __________________________

1. What are 3 examples of different forms of energy?

2. Give an example of energy being moved (or transferred) from one object to another.

3. Give an example of energy being changed (or transformed) from one type of energy to another.

4. What direction does heat energy move in?

5. You have a cold container with a hot container on top of it. What will happen to the temperatures of the containers?

6. What is an example of a man-made system (parts working together to do something) that is powered by energy?

7. What is an example of a natural system that is powered by energy?

8. What happens to the electrical energy that powers a toaster?

9. What happens to the electrical energy in a battery (batteries do run out of energy, don’t they)?

10. How can you get heat energy from one object to another object?
Transformation of Energy Study Guide

Name: _____________________________

I can give examples of energy.
The seven major categories of energy are: heat, light, chemical, mechanical, sound, electrical, and nuclear. You are generally familiar with heat, light, sound, and electrical. Mechanical energy is contained in objects that are moving, or could be moving if released. Chemical energy is contained in any object that could burn. It is also contained in food. Nuclear energy is the energy that is stored within atoms. You will not have any questions about nuclear energy on the test.

I can give examples of energy transfer. That means when energy is moved from one object to another.

During an energy transfer, energy is moved from one object to another. The energy form remains the same, it’s just where the energy is located that is different. Examples of energy transfer would be hitting a baseball, throwing a football, or hitting a golf ball (mechanical energy transferred from one object to the other). Other examples would be cooking bacon in a skillet (heat energy transferring from the burner to the skillet to the bacon), sticking your hand into hot water (heat energy transferring from the water to your hand), or a car running into the bumper of another car (mechanical energy transferring from one car to the other).

I can give examples of energy transformations. That means when energy is changed from one form to another form.

During an energy transformation, energy is changed from one form to a different form. Energy transformations occur around us all the time. We use the chemical energy in the food we eat to power our muscles. We change the chemical energy into mechanical energy. Some of the chemical energy gets changed into heat energy also. That explains why we get hot when we run around a lot (we are changing bunches of chemical energy into mechanical and heat energy). The chemical energy in a candle is transformed into heat and light energy. The mechanical energy in a car is transformed into heat energy when the brakes are used.

The most common energy transformation involves electrical energy. We use electrical energy every day for a variety of purposes. We transform it into sound energy for our radios and iPods. We transform it into heat/mechanical/sound energy with hairdryers. We transform it into heat for our homes. We change it into light for our cars, homes, and schools. Electrical energy is so common because it is relatively easy to move from one place to another through wires. All of our electrical energy is produced through the transformation of other energy types into electricity. Mechanical energy (moving water, wind, tides) is used to turn turbines that generate electrical energy. The chemical energy in coal and gas is transformed into electrical energy as well. Light energy (solar) is transformed into electrical energy through solar panels.

I can describe the exchange of energy between hot objects and cold objects.

Heat energy is exchanged between objects that are different temperatures. Objects with lower temperatures with gain heat energy from their surroundings. Objects with higher temperatures than their surroundings will lose heat energy. For example a hot cup of chocolate will gradually lose energy to its cooler surroundings. The transfer of heat energy will stop when the objects reach the same temperature. Likewise, a block of ice will absorb heat from warmer objects around it. Remember though that if we put a cup that’s 32 degrees Fahrenheit in a room that is 0 degrees Fahrenheit the cup will lose heat energy to the room because it is warmer than the room.
I can explain how heat energy is transferred.

Heat is transferred by three different methods: conduction, convection, and radiation. Conduction occurs in solid objects. The heat travels through the objects by causing their particles to vibrate more, then those particles bounce into their neighbors causing them to bounce, and this continues through the object. Some objects are better conductors (metals are good conductors of heat) than others (wood and plastic are poor conductors of heat).

Convection occurs in liquids and gasses. During convection, liquids or gasses that are near the heat source gain heat energy. This causes them to expand and become less dense. The less dense liquid or gas rises, while more dense liquid or gas sinks to take its place. Convection will move heat from the bottom of a liquid or gas to the top.

Radiation occurs when heat energy is transferred without the help of solids, liquids, or gasses. Heat energy is transferred as waves (similar to how light is transferred) by radiation. The heat energy from the sun travels this way to the earth.

I can describe examples of systems that are powered by energy.

A system is parts working together to do something. All systems need energy to do their work. A TV is a system. It requires electrical energy (which it transforms into heat/light/sound energy) to work. A car is a system that requires chemical energy (which it transforms into heat/sound/mechanical energy) to function.

An ecosystem is powered by energy. Plants transform light energy (from the sun) into chemical energy (food). Animals eat the chemical energy and transform it into mechanical, heat, sound energy. Some of the chemical energy is stored in the animal (that’s how we can eat a hamburger and get chemical energy from it). Without these energy transfers and transformations ecosystems would not function.

The weather is a system that is powered by energy. The heat energy from the sun warms the earth. This causes water to evaporate, eventually producing precipitation over different parts of the earth. The heat energy also warms the atmosphere causing warmer less dense air to rise and cooler more dense air to sink (thereby producing wind). Without these energy transfers and transformations there would be no precipitation or movement of the atmosphere (wind).

I can use models to show the transformation of energy in a system. That means I can show the energy forms that enter a system and how they change form until they leave the system.

Diagrams help show the types of energy that enter a system and the types that exit the system. For example:

- Electrical → TV
- Heat
- Light
- Sound

I can use models to show that the amount of energy in a system is conserved. That means the total amount of energy stays the same, no matter how it has been transferred or transformed.

The amount of energy that enters a system (like a TV) is equal to the amount that leaves the system. The only difference is the form it takes. With a TV the energy arrives as electricity but leaves as heat, light, and sound. If we total the amount of electricity and compare it to the total amount of heat, light and sound, we will find that they come to the same amount.
Transformation of Energy Test Plan

Name: ____________________________________________

#1 - I can give examples of energy.
1. Which of the following four energy sources are forms of chemical energy:
   I. Oil   II. Geothermal   III. Solar   IV. Coal
   A. I and II   B. II and III   C. I and IV   D. I, III, and IV

2. An ecosystem could not survive without this form of energy.
   A. Electrical Energy
   B. Sound Energy
   C. Mechanical Energy
   D. Light Energy

3. A moving car, a book held above a table, and a thrown football each contain this type of energy:
   A. Electrical Energy
   B. Sound Energy
   C. Mechanical Energy
   D. Light Energy

#2 - I can give examples of energy transfer. That means when energy is moved from one object to another.

4. We dropped a golf ball from 100 cm in class. It bounced back to 60 cm. Why did it not return to the 100 cm mark?
   A. Energy was lost while it fell.
   B. Energy was added to it when it hit the ground.
   C. Energy was transferred when it hit the ground.
   D. Energy was lost while it rose back up.

5. A light bulb shines on a glass of water. The water’s temperature rises. This is an example of:
   A. heat transfer
   B. light transfer
   C. light to solar transformation
   D. heat to light transformation

6. You swing a golf club and hit a golf ball. Mechanical energy is transferred in this process. The transfer is from:
   A. your arm to the golf ball
   B. the golf club to the golf ball
   C. the golf ball to the golf club
   D. the golf club to your arm

7. A material that slows down the passage of heat or electricity is called a(n):
   A. insulator   B. conductor   C. radiator   D. thermal amplifier
#3 - I can give examples of energy transformations. That means when energy is changed from one form to another form.

8. Mark places new batteries in his CD player and turns it on. Identify the correct energy transformation.
   A. Electrical → chemical → mechanical and sound
   B. Chemical → electrical → mechanical and sound
   C. Sound → chemical → mechanical and electrical
   D. Mechanical → chemical → electrical and sound

9. This type of energy transformation occurs when you burn something.
   A. solar to heat/light  B. chemical to heat/light
   C. heat/light to chemical  D. chemical to heat

10. When energy changes from one form to another (for example, chemical energy → heat → light), it is know as:
    A. energy transfer  B. energy transformation
    C. light/heat change  D. fossil change

11. Becky was exercising on her treadmill and became warm. In order to cool off she turns on a fan. Identify the correct energy transformations as she plugs up the fan and turns it on.
    A. Electrical → mechanical(fan) → mechanical(wind)
    B. Mechanical(wind) → mechanical(wind) → electrical
    C. Mechanical(wind) → electrical → mechanical(fan)
    D. Electrical → mechanical(wind) → mechanical(fan)

12. We transform energy into other forms for use in our homes (light, heat, sound, etc.). What is the most common energy we start this transformation with in our homes?
    A. sound  B. electrical  C. mechanical  D. chemical

#4 - I can describe the exchange of energy between hot objects and cold objects.

13. Two cups of water (A and B) are sitting on a table in a room. Based on the graph, what is the room’s temperature?
    A. 5  B. 22  C. 37  D. 63

14. What **should** happen to the temperature of the cups after 60 minutes have passed?
    A. Cup B colder than Cup A  B. Cup A warmer than Cup B
    C. Cup B same temp as Cup A  D. Cup A cools off some more

15. Heat always moves from:
    A. warm temps to high temps  B. low temps to warm temps
    C. higher temps to lower temps  D. none of these, heat doesn’t move
#5 - I can explain how heat energy is transferred.

2. You are heating up a container of water. It is sitting on a hot burner.
   a. Describe the heat transfer method that is occurring between the burner and container.
   b. Describe the heat transfer method that is raising the temperature of the water.
   c. Explain what happens to the movement of the water molecules as they first heat up, and then turn into a gas.

16. Heat energy can be transferred by:
   A. conduction  B. convection  C. radiation  D. all of these

17. Convection occurs in:
   A. solids and gasses  B. liquids and solids  C. just solids  D. liquids and gasses

18. Which kind of heat transfer does not require matter (solid, liquid or gas)?
   A. conduction  B. convection  C. radiation  D. all of these

19. As a substance is heated, the particles that make up the substance:
   A. stop moving  B. move slower  C. move faster  D. don’t change their motion at all

20. When you place a pan on a burner and turn the stove on, the pan gets warm. This movement of heat is from:
   A. conduction  B. convection  C. radiation  D. heat transformation

#6 - I can describe examples of systems that are powered by energy.

21. Most of the energy that powers Earth’s systems comes from this source:
   A. geothermal  B. sun  C. inside the earth  D. electrical

22. This system is powered by heat energy from the sun.
   A. ecosystems  B. volcanoes  C. TVs  D. weather

23. Our body system is powered by which type of energy?
   A. Chemical Energy  B. Heat Energy  C. Mechanical Energy  D. Sound Energy

#7 - I can use models to show the transformation of energy in a system. That means I can show the energy forms that enter a system and how they change form until they leave the system.

1. Humans rely on energy transfers and transformations to meet our daily energy needs.
   a. Describe the energy transformations that occur when a hairdryer is used.
   b. Create a food chain, starting with the sun that shows how humans get our energy to live.
#8 - I can use models to show that the amount of energy in a system is conserved. That means the total amount of energy stays the same, no matter how it has been transferred or transformed.

24. In a completely controlled environment, you roll a ball with a force of 4N and it hits another ball. The first ball immediately stops while the other ball rolls away. Based on the Law of Conservation of Energy, if no energy has been transformed, what should the force of the second rolling ball be?
   A. 2N  B. 4N  C. 6N  D. 10N

25. The energy that a log has is transformed when burned. How does the chemical energy of the log compare to the heat and light energy it is transformed into?
   A. The amount of chemical energy is equal to the amount of heat and light energy.
   B. The amount of chemical energy is less than the amount of heat and light energy.
   C. The amount of chemical energy is more than the amount of heat and light energy.
   D. There is no way to know.
Energy Transfer and Transformations Unit Test

Answer the following two open-response questions on the paper provided. Do NOT write on the test booklet.

1. Humans rely on energy transfers and transformations to meet our daily energy needs.
   a. Describe the energy transformations that occur when a hairdryer is used.
   b. Create a food chain, starting with the sun that shows how humans get our energy to live.

2. You are heating up a container of water. It is sitting on a hot burner.
   a. Describe the heat transfer method that is occurring between the burner and container.
   b. Describe the heat transfer method that is raising the temperature of the water.
   c. Explain what happens to the movement of the water molecules as they first heat up, and then turn into a gas.
Multiple Choice Section – Use the bubble sheet provided to indicate your answers. Do NOT write in the test booklet. Make your mark heavy and dark. If you wish to change an answer, completely erase the old answer before making a new mark. Choose the answer that is most correct.

For questions 1-2, use the following graph:

1. Which of the following four energy sources are forms of chemical energy:
   I. Oil        II. Geothermal        III. Solar        IV. Coal
   A. I and II          B. II and III       C. I and IV       D. I, III, and IV

2. An ecosystem could not survive without this form of energy.
   A. Electrical Energy
   B. Sound Energy
   C. Mechanical Energy
   D. Light Energy

3. A moving car, flowing water, and a thrown football each contain this type of energy:
   A. Electrical Energy
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4. We dropped a golf ball from 100 cm in class. It bounced back to 60 cm. Why did it not return to the 100 cm mark?
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22. This system is powered by heat energy from the sun.
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   C. The amount of chemical energy is more than the amount of heat and light energy.
   D. There is no way to know.
Open Response #1

Name: _______________________________

SCIENCE

Teacher Use Only: 1___ 2___ 3___ 4___ 5___ 6___ 7___ 8___
Energy Types

Name: ___________________________

Today you will examine different examples of energy. At each station, you will decide what type of energy is going into the system and what type of energy is going out of the system. You will also decide whether there is an energy transfer, transformation, or both occurring at the station. An energy transfer happens when the same type of energy is moved from one object to another object. An energy transformation is when a type of energy is changed into another type of energy.

Station #1
When does the energy in a candle get released?
What energy type does a candle contain before it is lit?
How is a candle similar to paper, leaves, gasoline, and coal?

Station #2
What type of energy gets put into a hairdryer?
Does this energy get changed into any other types?
What happens to the energy that goes into it?

Station #3
Pull the string (pendulum) back and let it swing.
What type of energy was added to the pendulum?
Did the pendulum keep this energy or lose it?
What happened to the energy?

Station #4
Take the rubber ball, lift it into the air above the table, and let it go.
What type of energy gets put into the ball?
Does this energy get changed into any other types?
What happens to the energy that goes into it?

Station #5
Take the wire ends of the motor and connect them to the ends of the battery.
What type of energy gets put into the motor?
Does this energy get changed into any other types?
What happens to the energy that goes into it?

Station #6
Turn the radio on and keep the volume low.
What type of energy gets put into the radio?
Does this energy get changed into any other types?
What happens to the energy that goes into it?

Station #7
Turn on the light bulb by pulling the chain.
What type of energy gets put into the light bulb?
Does this energy get changed into any other types?
What happens to the energy that goes into it?
<table>
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<tr>
<th>Station #</th>
<th>Energy In</th>
<th>Energy Out</th>
<th>Transfer/Transformation</th>
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Energy Transfer Formative Assessment

Name: _____________________________

In the space below draw a picture that shows an energy transfer. Make sure you clearly indicate that energy is being transferred from one object to another.

Now give a written explanation of what is happening in your example.
Heat Energy Movement

Imagine that you have just made a fresh apple pie that you set on your kitchen table. When you took it out of the stove, you couldn’t even hold it in your hand. Now, several minutes later, you are able to cut a slice and eat it.

The apple pie has cooled, the question now is where has the heat gone. Select which of the following is most likely to have occurred:

A. The heat rose into the air.
B. The heat evaporated.
C. The heat went to the table.
D. The heat went to the table and the air.

In the space below describe your thinking. Provide an explanation for your answer.

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Energy Transfer and Transformation Target Practice

Learning Target #1 - I can give examples of energy.
Give two examples of each of the following forms of energy:

a. light
b. heat
c. chemical
d. mechanical
e. sound
f. electrical

Learning Target #2 - I can give examples of energy transfer. That means when energy is moved from one object to another.

a. List two examples of energy transfer.

b. Explain the energy transfer that is occurring in each example.

Learning Target #3 - I can give examples of energy transformations. That means when energy is changed from one form to another form.

a. List three examples of energy transformation.

b. Explain the energy transformation that is occurring in each example.

Learning Target #4 - I can describe the exchange of energy between hot objects and cold objects.
A room’s temperature is 74°F. You place a cup of water at 127°F on a table in the room. You also place a cup of water at 34°F on a different table in the room.

a. Describe what will happen to the temperature of the cup of 127°F water.
b. Describe what will happen to the temperature of the cup of 34°F water.
c. Explain what caused these temperature changes.

Learning Target #5 - I can explain how heat energy is transferred.

a. List an example for each heat transfer method: conduction, convection, and radiation.

b. Explain how heat is transferred in each example.
Learning Target #6 - I can describe examples of systems that are powered by energy.
   a. List three systems that are powered by energy (at least one must be a natural system).

   b. List the type of energy that powers each system.

   c. Describe what each system uses that energy type for.

Learning Target #7 - I can use models to show the transformation of energy in a system. That means I can show the energy forms that enter a system and how they change form until they leave the system.
Humans rely on energy transfers and transformations to meet our daily energy needs.
   a. Describe the energy transformations that occur when a television is used.

   b. Create a food chain, starting with the sun, which shows the energy transfers and transformations that occur for humans to get our energy to live.

   c. Describe the energy transformations that occur in humans.

Learning Target #8 - I can use models to show that the amount of energy in a system is conserved. That means the total amount of energy stays the same, no matter how it has been transferred or transformed.
You roll a ball across the floor. It contains mechanical energy. The Law of Conservation of Energy states that the amount of energy in the system stays the same; it cannot be created or destroyed. You notice the ball is slowing down.
   a. If the ball started with 20 units of energy, how much energy would there be when it stops moving?

   b. Explain what happened to the energy.

   c. An object in space keeps moving in a straight line. Use the Law of Conservation of Energy to explain why it doesn’t slow down.
Energy Transfer and Transformation Re-Test

This test contains one question for each learning target from our energy unit. You will only need to answer the questions that go with the learning targets you want to show improvement on. The questions are very open-ended (that means they have many different correct answers) so you will have choice in how you show understanding of the learning target. However, you should do your best to prove to me that you have a clear and complete understanding of the learning target in order to get a 3.

Learning Target #1 - I can give examples of energy.

a. List 3 different types of energy.
b. For each type of energy, give two examples of objects, systems, or organisms that use or contain that energy type.

Do not write on this page. Please write your answer to this open-response question on the open-response sheet provided.

Learning Target #2 - I can give examples of energy transfer. That means when energy is moved from one object to another.

a. List two examples of energy transfer.
b. Explain the energy transfer that is occurring in each example.

Do not write on this page. Please write your answer to this open-response question on the open-response sheet provided.

Learning Target #3 - I can give examples of energy transformations. That means when energy is changed from one form to another form.

a. List three examples of energy transformation.
b. Explain the energy transformation that is occurring in each example.

Do not write on this page. Please write your answer to this open-response question on the open-response sheet provided.

Learning Target #4 - I can describe the exchange of energy between hot objects and cold objects.

A room’s temperature is 72°F. You place a cup of water at 140°F on a table in the room. You also place a cup of water at 38°F on a different table in the room.

a. Describe what will happen to the temperature of the cup of 140°F water.
b. Describe what will happen to the temperature of the cup of 38°F water.
c. Explain what caused these temperature changes.
Learning Target #5 - I can explain how heat energy is transferred.
   a. List an example for each heat transfer method: conduction, convection, and radiation.
   b. Explain how heat is transferred in each example.

Do not write on this page. Please write your answer to this open-response question on the open-response sheet provided.

Learning Target #6 - I can describe examples of systems that are powered by energy.
   a. List three systems that are powered by energy (at least one must be a natural system).
   b. List the type of energy that powers each system.
   c. Describe how each system uses that energy type.

Do not write on this page. Please write your answer to this open-response question on the open-response sheet provided.

Learning Target #7 - I can use models to show the transformation of energy in a system. That means I can show the energy forms that enter a system and how they change form until they leave the system.
Humans rely on energy transfers and transformations to meet our daily energy needs.
   a. Describe the energy transformations that occur when a television is used.
   b. Create a food chain, starting with the sun, which shows the energy transfers and transformations that occur for humans to get our energy to live.
   c. Describe the energy transformations that occur in humans.

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Learning Target #8 - I can use models to show that the amount of energy in a system is conserved. That means the total amount of energy stays the same, no matter how it has been transferred or transformed.
You roll a ball across the floor. It contains mechanical energy. The Law of Conservation of Energy states that the amount of energy in the system stays the same; it cannot be created or destroyed. You notice the ball is slowing down.
   a. If the ball started with 20 units of energy, how much energy would there be when it stops moving?
   b. Explain what happened to the energy.
   c. An object in space keeps moving in a straight line. Use the Law of Conservation of Energy to explain why it doesn’t slow down.