WONDERS OF ENERGY

Answer Key: Grades 7–8 Lesson Extensions

Notes:

- This answer key should be used as a guide for basic responses to the questions and instructions found in the grades 7–8 lesson extensions. The children should be encouraged to make their science journals tidy, beautiful, and exceptionally well done.
- Encourage the children to write their answers in their own words, with definitions being a possible exception.
- There are two types of answers provided in this answer key:

  Sample answers: Most questions are open ended, so the children's answers will not match the provided text exactly or include everything provided in the sample answer. However, some answers should match more closely (for example, vocabulary word definitions, copied charts, etc.).

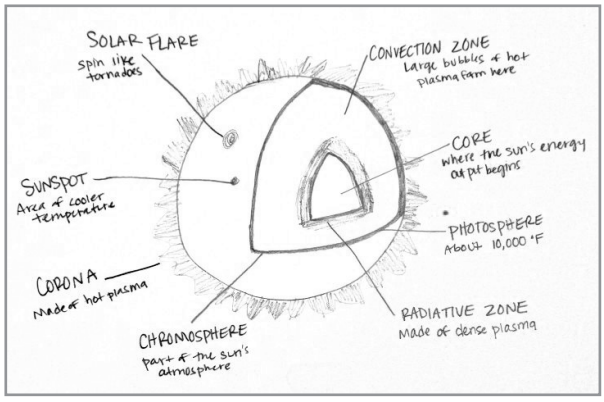
  Answers will vary: This is used when there will be great variation in the children's answers. Refer to the text in the lesson to check these answers.

Lesson 1

1. On the blank page, draw an image of the sun like the one below. (See answer following #2.)

2. Read the article and use the information to label the parts of the sun you drew on your journal page. Write one fact about each layer below its label. You may enhance your picture with color and other graphics if you wish.

Sample answer:



Lesson 2

1. Read the information below and take notes about who James Joule was, what he discovered, and how he was honored. Then answer the question below.

Sample answer:

Notes on James Joule:

- He was born in England in 1818 and mostly learned at home.
- He loved science.
- He discovered Joule's Law and helped discover the First Law of Thermodynamics.
- To honor him, the scientific community named a unit of energy after him.

2. If the force of a model airplane is 0.25 newtons over a distance of 10 meters, how much work (measured in joules) would the plane expend? Write the equation for a joule and your answer in your science journal.

Sample answer:

joule (J): W = F x D

0.25 newtons x 10 meters = 2.5 J

Lesson 3

2. Write at least one fact about each inventor.

Sample answer:

Daniel Gabriel Fahrenheit was a German physicist who invented the Fahrenheit temperature scale.

Anders Celsius was a Swedish astronomer who invented a scale that simplified the boiling and melting points of water.

Lord William Thomson Kelvin was a British scientist who invented a scale as a means of measuring the extremes of hot and cold. This scale, the Kelvin scale, was named after him.

3. Calculate the following, using a calculator if desired. Determine if each temperature is hot or cold. 25 °C = ____ °F 327 K = ____ °C 10 °F = ____ °C

Sample answer:

25 °C = 77 °F (warm)

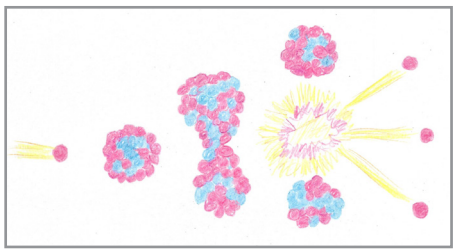
327 K = 53.85 °C (hot)

10 °F = -12.22 °C (cold)

Lesson 4

2. Draw a copy of the nuclear fission diagram, and then explain below your drawing what is happening in it.

Sample answer:



The small red ball in the image above is a neutron. The first big ball it hits represents a uranium atom. When the neutron hits the atom, it releases heat and radiation and creates more neutrons that spread out from the original.

3. Write one reason nuclear power is useful and one way it is dangerous.

Sample answer:

Nuclear power is useful because it generates electricity. It is also dangerous, though, because it produces radioactive waste.

Lesson 5

2. Write two or three things you learned about Thomas Edison.

Sample answer: Thomas Edison didn't invent the light bulb, but his version performed better than others. In 1879 he bought a patent for glass cylinder lamps and tinkered with the filament and found a material that would last 1,200 hours. He invented things like switches, fuses, and lamp holders. He invented the Edison screw, which is now the standard socket fitting for light bulbs. He also worked to improve electricity generation by starting power companies and developing electric meters.

3. Describe what you feel is the most important contribution to the history of lighting and why.

Answers will vary. Answers should reflect the information presented in the time line in the lesson extension.

Lesson 6

2. Copy each definition, and then answer the questions below.

Sample answer:

Emissivity: the amount of thermal energy that radiates off a surface

Theoretical blackbody: a nonexistent physical body that can absorb all radiation emitted by an object

Absorptivity: the amount of radiated energy taken in by an object

3. Why is it important to understand how energy interacts with a given material?

Sample answer:

It is important to understand how energy interacts with different materials so that you can use the correct material for the task you are trying to accomplish. If you want to produce a mirror, you need a material that light will bounce off of; and if you want solar panels, you need a material that will absorb as much light as possible.

4. How can we use what we know about heat transfer to improve the way we live?

Sample answer: We can use our knowledge of heat transfer to create windows that don't lose too much heat in the winter or get too hot in the summer.

Lesson 7

2. Copy the definition of diffraction and list two examples of it.

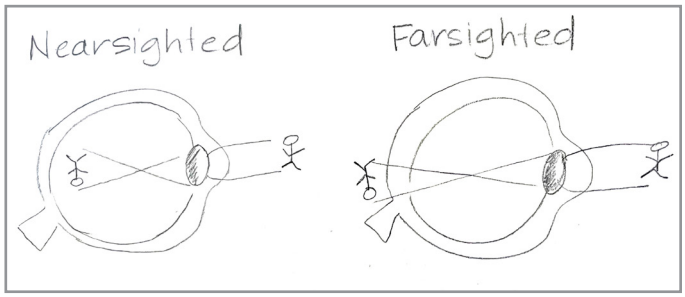
Sample answer:

Diffraction: the bending of waves around obstacles that cause interference; occurs with any type of wave—light, sound, electromagnetic, or water

Examples: 1) ocean waves crashing around a rock; 2) sound waves reaching around a corner

3. Draw and label an eye showing nearsightedness and another showing farsightedness.

Sample answer:



Lesson 8

2. Study the decibel graph. Listen for four sounds in your home or environment. Roughly where on the chart would you list the sounds you hear? Write your sounds on the chart where you estimate they would fall.

Answers will vary. Answers should reflect information found in the lesson extension.

Lesson 9

2. Follow the directions to calculate energy usage for 3–4 appliances from the example.

Sample answer:

Refrigerator: 500 watts x 24 hours = 12,000 watts

Hair Dryer: 120 volts x 12.5 amps = 1,500 watts

1,500 watts x 0.15 hours = 225 watts

Washing Machine: 2,200 watts x 2 hours = 4,400 watts

3. If desired, calculate energy usage for 2–3 appliances in your own home, using the directions in the right-hand column of the article.

Answers will vary. Answers should reflect information found in the lesson extension.

Lesson 10

2. Copy the information from the left column and list one example of each.

Sample answer:

Conductors: Materials that heat or electricity can pass through without difficulty. Example: copper

Insulators: Materials that heat or electricity cannot pass through easily. Example: plastic

Semiconductors: Materials that heat or electricity can sometimes pass through easily, but other times cannot. Example: silicon

3. Explain how the discovery of semiconductors has impacted your life.

Answers will vary. Answers should reflect information found in the lesson extension.

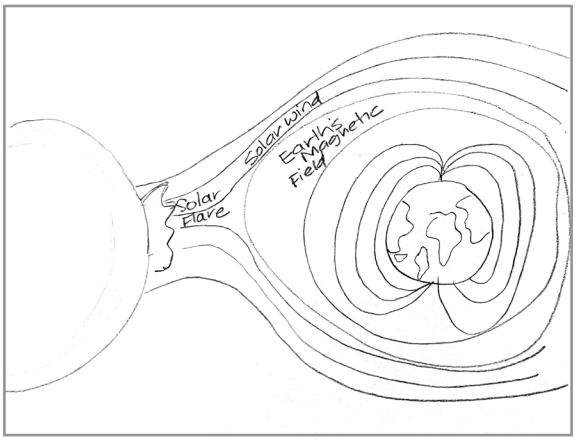
Lesson 11

1. Complete the "Magnetic Fields Experiment."

Note: The children should have completed the experiment and drawn their results. There should be two drawings: one labeled "Like Poles" and one labeled "Opposite Poles."

2. Read the information about "Earth's Magnetic Field," and then draw a picture of the magnetic field in your journal.

Sample answer:



Lesson 12

2. Write at least one way you or other people use each of the fuels listed under "Types of Fuel."

Sample answer:

People use many types of fuel:

Wood is used to make a fire.

Gasoline is used to fuel vehicles.

Propane is used for barbecue grills.

3. Explain how fuel produces energy.

Sample answer:

When fuel is burned, the added energy breaks existing chemical bonds and creates new bonds, a process which produces more energy than was originally added.

Lesson 13

2. Describe each type of home listed and how it conserves energy.

Sample answer:

Ancient cave homes are naturally insulated because they are carved in the rock.

Houses built on stilts with well-slanted roofs protect from flooding and roof damage.

Hanok houses were made with the seasons in mind so that they use less energy.

3. Pick one type of home you would enjoy living in and explain why.

Answers will vary. Answers should reflect information found in the lesson extension.

Lesson 14

2. Pick one story that is most interesting to you. Then write a letter of at least one paragraph in your student journal to one of the young people mentioned, telling them what inspired you.

Answers will vary. Answers should reflect information found in the lesson extension.

