14—Magnets, Magnetism, and Electromagnetism

A [1]Remember that a force is a push or a pull—and forces are needed to do work. [2]Gravity and electricity are some familiar forces. [3]Magnetism is a force, too, and we'll explore it in this lesson. [4]If you have magnets and steel paper clips, you might want to get them out.

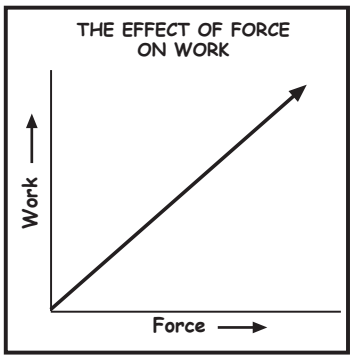
B [5]What is a magnetic force? [6]You can experience a magnetic force by holding a magnet near a piece of steel like a paper clip. [7]What happens? [8]The magnet pulls on the paper clip and moves it. [9]The magnet did work. [10]Therefore, a magnet produces force. [11]A **magnet** is a substance that attracts only objects that contain iron or steel. [12]A **magnetic force** is the force produced by a magnet.

C [13]A magnet attracts only the metal objects that are near it. [14]If you hold a magnet far enough away from a paper clip, it cannot move it. [15]The area around a magnet where magnetic forces can do work is called a **magnetic field**. [16]The stronger the magnet, the larger its magnetic field.

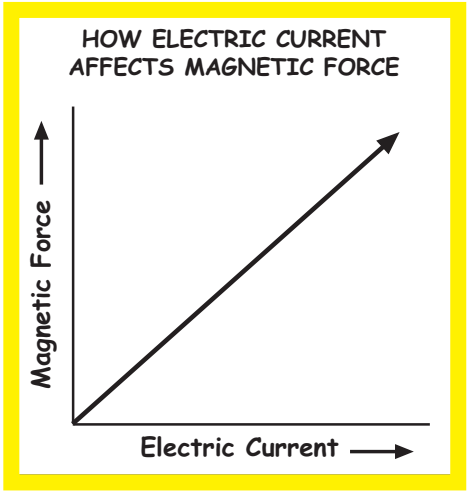
D [17]Most magnets have two ends. [18]Each end is called a pole. [19]A **pole** is the region of a magnet where it produces strong magnetic forces.

E [20]Look at the diagram of a *typical* magnet above. [21]Like most magnets, it has a north pole (N) and a south pole (S). [22]If you have two magnets and hold the opposite poles near each other (N to S), they will attract each other. [23]If you hold the same poles near each other (N to N, or S to S), they will push away or *repel* each other.

F [24]Most magnets used to do work are created using electricity and are called **electromagnets**. [25]Electromagnets are made by passing an electric current through iron or steel. [26]Some typical electromagnetic devices are electric motors, doorbells, and buzzers. [27]Think how much work is done when an electromagnet is used in a junk yard to lift an automobile! [28]This graph shows how force and work are related.



G [29]The graph below shows how the strength of an electromagnet is changed by the amount of electric current going through it. [30]Notice that the strength of an electromagnet increases as the electric current is increased. [31]If less magnetic force is produced, what could you conclude about the amount of electric current flowing through the magnet?



1. For each statement, circle T or F for true or false. In each blank, write the number of the PARAGRAPH that gives the best evidence for your answer.

   a. Only people can change the environment. T F ___

   b. Building an airport can harm the environment. T F ___

   c. Changing the environment can help people survive. T F ___

2. What is the most likely meaning of *immense* as it is used in sentence 4?

   a. strange c. small
   b. usual d. large

3. When settlers came to America, they cut down many forests. How did this change the environment? Explain your answer using complete sentences.

   _____

   _____

   _____

4. How does the creation of a national park, like Yellowstone, help the environment? Use complete sentences to explain your answer.

   _____

   _____

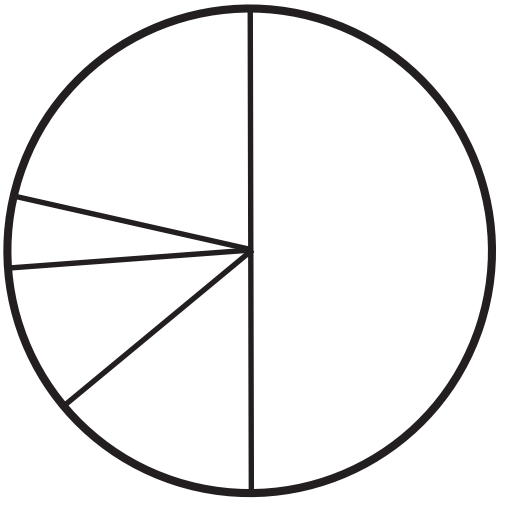
   _____

5. In one area, the endangered species include 5 kinds of fish, 10 reptiles, 15 birds, 20 mammals, and 50 plants.

   Use this information to complete the table and pie graph below.

Endangered Species

Organisms	Number
Fish	
Reptiles	
Birds	
Mammals	
Plants	



1. For each statement, circle T or F for true or false. In each blank, write the number of the SENTENCE that gives the best evidence for your answer.
   a. A meteorologist is a scientist who studies meteors. T F ___
   b. Temperature increases from the center of the earth towards its surface. T F ___
   c. The earth is completely solid. T F ___

2. In sentence 20, *sphere* probably means
   a. cube. c. ball.
   b. circle. d. rock.

3. Which unit of length is longer, a mile or a kilometer? _____

   Write the number of the sentence that gives the best evidence for your answer. ___

4. Use the information in the lesson to complete the table below.

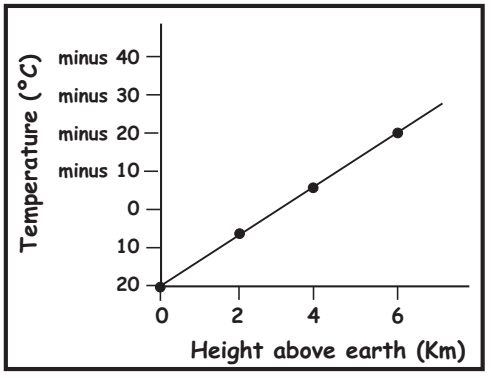
What is studied	Science	Scientist
rocks		
		astronomer
	meteorology	
oceans		

5. Next to each temperature, write the correct layer of the earth.
   a. 2600° _____
   b. 2000° _____
   c. 180° _____
   d. 5900° _____
   e. 20° _____

6. The temperature changes the higher you go above the earth. Use the table and graph below to answer the questions that follow.

TEMPERATURE OF THE ATMOSPHERE ABOVE EARTH

Height (Km)	Temp. (°C)
0	20
2	5
4	minus 5
6	minus 20



   a. What two things are listed in the data table? _____ and _____ .

   b. What is the distance between numbers on the horizontal (across) axis ?_____ km

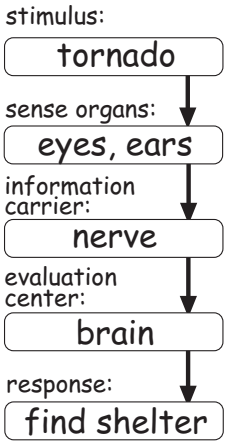
   c. What happens to the temperature as you go higher above the earth?
   _____
   _____

   d. What is colder, minus 10° or minus 20°? _____

   e. At 1 km above the earth, what is the temperature? _____°

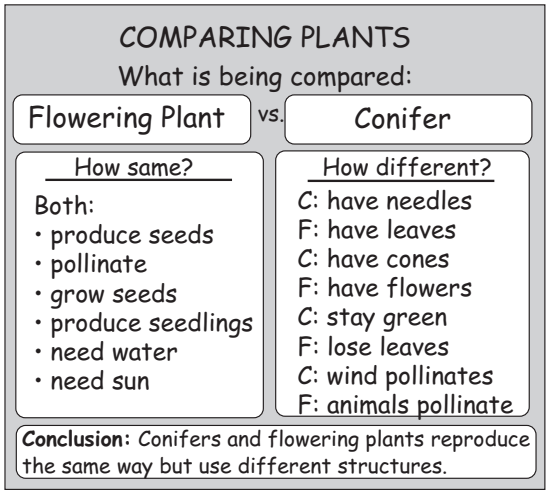
6. a. sight, smell, touch
   b. sight, smell
   c. sight, sound
   d. sight, sound
   e. sight, smell, sound
   f. sight, smell, taste

7.



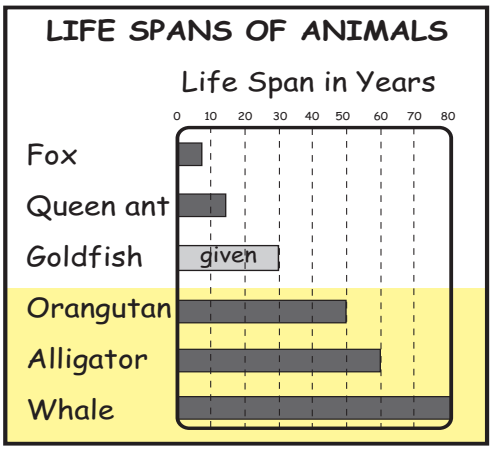
Lesson 23, pp. 48–49

1. a. F 1, b. T 14, c. T 9, d.T 19, 20
2. b
3. c
   C, D (see sentences 17 and 29)
4. Bright colors and smells of flowers attract insects.
5. The function of a flower is to produce pollen and attract birds and insects.
6.



Lesson 24, pp. 50–51

1. a. T F, G; b. F E; c. T C; d. F F, G
2. c
3. Cycles have no beginning or end. Death is an end. E
4. a. No b. No
5.



Lesson 25, pp. 52–53

1. a. T A, b. F E, c. F E, F
2. a
3. inherited
   Inherited traits come directly from parents, and learned traits come from the environment.
   E
4.

Animal Traits

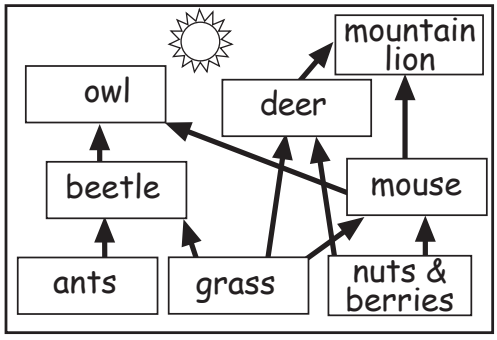
Animal Trait	Inherited	Learned
Size of a cat's paw	✓	
A dog's tricks		✓
Color of insect wing	✓	
Shape of shark's tooth	✓	
Hunting		✓

5.

Human Traits

Human Trait	Inherited	Learned
Eye color	✓	
Hair color	✓	
Reading ability		✓
Playing hockey		✓
Height	✓	
Dancing		✓
Cooking		✓
Curly hair	✓	

Lesson 26, pp. 54–55

1. a. F 6; b. T 7; c. T 3, 5; d. F 8
2. b
3. Plants get their energy from sunlight. Without the sun, plants would die. 3
4. No. Animals get energy from eating plants. They also get energy from eating animals that eat plants. Without plants, animals cannot get energy.
5. ant → beetle → owl
   nuts → mouse → cougar
6. sea grass → shrimp → fish → shark
7. 

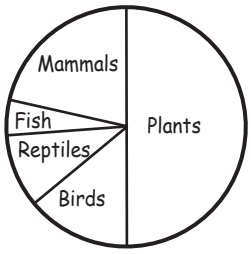
Lesson 27, pp. 56–57

1. a. F C, b. F E, c. T E, d. T H
2. c
3. Fewer hawks → More mice → Fewer wheat plants
4. If there were more plants, there would be less water and less room for fish to live in.
5. There would not be any water left because the pond would fill up with mud.

Lesson 28, pp. 58–59

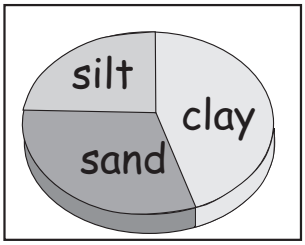
1. a. F A, b. T E, c. T E
2. d
3. The settlers made their own environment more comfortable. However, they destroyed homes and food for other animals.
4. It keeps people from harming the environment.
5.

Organisms	Number
Fish	5
Reptiles	20
Birds	15
Mammals	10
Plants	50



5. Marble can be weathered back into sediment. Pressure and heat can turn the sediment back into limestone.

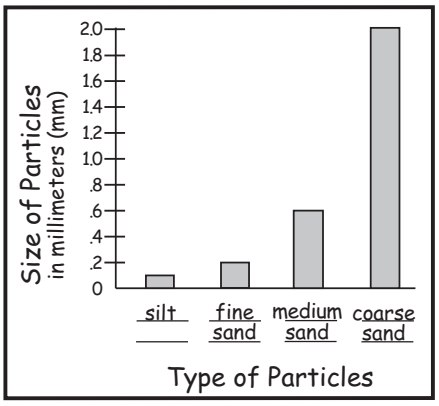
Lesson 33, pp. 70–71

1. a. T 2, 3; b. T 11; c. T 15
2. d
3. False
   About half is made up of gas (air) and liquid (water).
4. No
   Humus is made of once-living material, and no life has been found on the moon.
5. Asian, Indian, South American, North American, Arabian, Australian, African
6. 

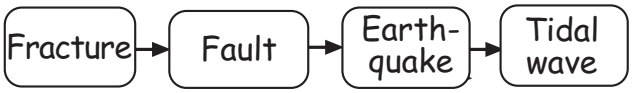
Lesson 34, pp. 72–73

1. a. F A, b. T F, c. F F, d. T D
2. b
3. Organisms are preserved where it is very hot and dry or very cold. Rain forests are very wet.
   H
4. a. 5. (Arizona layers 1, 2, 3, 5, and 6 have patterns that also appear in the layers in Utah.)
   b. Yes
   Both have the same pattern, so they must be the same age.

Lesson 35, pp. 74–75

1. a. T D, E; b. F B; c. T A; d. F F
2. c
3. The rocks crack into smaller and smaller particles by weathering.
4. sand and pebbles
5. SHORELINE MATERIALS BAR GRAPH


Lesson 36, pp. 76–77

1. a. T D, b. F D, c. F E, d. T G
2. a
3. It was formed by the buildup of cooled lava underwater until enough reached the surface to form islands.
   D
4. Gravity pulls loose objects down towards the earth.
5. 

6.