

## Study Island

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1. Static electricity is the buildup of electric charges. Which of the following is an example of a natural discharge of static electricity?

- A. ocean waves
  - B. northern lights
  - C. lightning
  - D. Earth's magnetic poles
- 

2. Which of the following describes an example of current electricity?

- A. A balloon sticks to the wall after being rubbed with a piece of wool.
  - B. A student feels a shock when she touches a doorknob after walking across a carpeted surface.
  - C. A lightning bolt produces sound and light.
  - D. A battery connected to a motor in a toy car allows the car to move.
- 

3. Which of the following objects is most likely to be a conductor of electricity?

- A. a wooden shelf
  - B. a rubber tire
  - C. an iron nail
  - D. a plastic spoon
- 

4. Which of the following is caused by static electricity?

- A. a magnet being attracted to a refrigerator
- B. a stove getting hot when it is turned on
- C. a lightning strike during a storm
- D. a light bulb coming on when a switch is turned on

5. The diagram below shows a simple circuit that includes a switch, a light bulb, and a battery connected by a metal wire. Electricity flows through the circuit when the switch is turned on.

Lightning is another type of electricity. How is lightning different from a circuit?

- A. Electricity is quickly released at once when lightning strikes, whereas electricity flow can be controlled using a circuit.
- B. Electricity is quickly released at once when it flows through a circuit, whereas electricity flow can be controlled using a circuit.
- C. Electricity produced from a lightning strike can produce light energy, but a circuit cannot be used to produce light energy.
- D. Electricity produced from a circuit can produce light energy, but a lightning strike does not produce light energy.

6. Jason and Candice are studying electricity in their science class. They want to make a table that compares static and current electricity.

	Static	Current
How It Travels	moves in a steady flow in a circuit	jumps from one object to another
Example	flashlight switched on	lightning

**W.**

	Static	Current
How It Travels	jumps from one object to another	moves in a steady flow in a circuit
Example	lightning	flashlight switched on

**X.**

	Static	Current
How It Travels	jumps from one object to another	moves in a steady flow in a circuit
Example	flashlight switched on	lightning

**Y.**

	Static	Current
How It Travels	moves in a steady flow in a circuit	jumps from one object to another
Example	lightning	flashlight switched on

**Z.**

Which table correctly compares static and current electricity?

- A. Y
  - B. Z
  - C. X
  - D. W
- 

7. Which of the following materials is a good conductor of electricity?

- A. rubber
  - B. air
  - C. glass
  - D. silver
- 

8. Electrical cords are made up of two layers. The wire inside is made of metal. This is surrounded by a cover made of plastic or rubber. How do the wire and cover compare in their ability to conduct or insulate electricity?

- A. The wire is a conductor, and the cover is an insulator.
  - B. Both the wire and the cover are conductors.
  - C. The wire is an insulator, and the cover is a conductor.
  - D. Both the wire and the cover are insulators.
- 

9. Static electricity is the buildup of electric charges on an object. Which of the following is the best way to create static electricity?

- A. rubbing two insulators together
  - B. touching a looped wire to a battery
  - C. plugging an electrical device into a power outlet
  - D. pouring water over a conductor
- 

10. Which of the following objects would be the best conductor of electricity?

- A. a carrot
- B. a plastic toy
- C. a rubber band

- D. a safety pin
- 

11. What is a closed circuit?

- A. a connection of components which prevents electricity from flowing
- B. the complete path of an electrical current
- C. a circular path that electricity is unable to travel through
- D. an interrupted path of electricity
- 

12. Which of the following school supplies is a good conductor of electricity?

- A. a rubber band
- B. a pencil eraser
- C. a highlighter
- D. a paper clip
- 

13.



When you move the switch of a flashlight to "on," the light goes on. When you move the switch of a flashlight to "off," the light goes off. How does this happen?

- A. The terminals of the flashlight are the battery and the bulb. When these are connected, the bulb will light.

- B. When the switch is moved to the "on" position, it opens the circuit, and electricity flows through the flashlight bulb.
  - C. The switch in the "on" position closes the circuit, and the electricity flows through the flashlight bulb.
  - D. The wire in the flashlight is considered an insulator, and when the insulator is "on", you will have a closed circuit, lighting the bulb.
- 

**14.** The image below shows a device that can be used to test whether an object is an electrical conductor.

Which of the following describes the best method of using the device to test whether a particular object is an electrical conductor?

- A. Touch the object to only one of the metal terminals.
  - B. Remove the batteries, and place the object in the battery case.
  - C. Touch the object to both metal terminals at the same time.
  - D. Disconnect the light bulb, and connect the object to one of the two wires where the light bulb was.
- 

**15.** Which of the following materials is the best conductor of electricity?

- A. wood
  - B. plastic
  - C. rubber
  - D. iron
- 

**16.** Which of the following kitchen items is a good conductor of electricity?

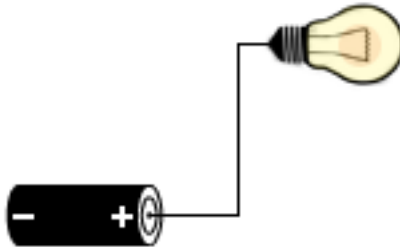
- A. an oven mitt
  - B. a milk jug
  - C. a glass jar
  - D. a soda can
- 

**17.** Which of the following describes an example of static electricity?

- A. A radio plays music loudly even though it is not plugged into an outlet.
- B. A motor spins continuously because of electricity and magnetism.

- C. A plastic comb attracts small pieces of paper after it is rubbed with another object.
  - D. When a switch is flipped, a light immediately turns on.
- 

18. The diagram below shows a light bulb connected to a battery by a wire.



What will happen to the light bulb?

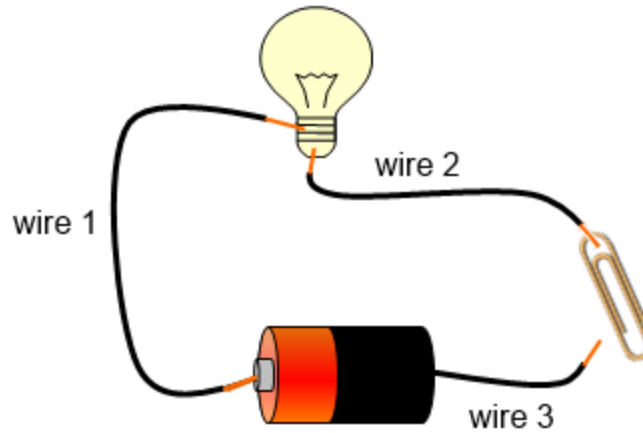
- A. It will not light up because a complete loop of wires is needed.
  - B. It will not light up because the battery is not charged.
  - C. It will light up because the wire is electrically charged.
  - D. It will light up using energy from the battery.
- 

19. Ashley constructed the device shown below to test whether certain objects can conduct electricity.

Ashley is going to test four different objects - a wooden toy, a rubber eraser, an iron nail, and a plastic fork. One at a time, she will place each object to both metal terminals at the same time. Which object will most likely cause the light bulb to light up when she touches it to both terminals at the same time?

- A. the rubber eraser
  - B. the wooden toy
  - C. the iron nail
  - D. the plastic fork
- 

20. Marcus has a circuit that uses a battery to light up a light bulb. He needs three wires to make his circuit. He changes the circuit to have a paper clip attached to wire 2 as shown in the picture below.



What should Marcus predict will happen when he connects wire 3 to the paper clip?

- A. The battery will die.
  - B. The paper clip will turn black.
  - C. The light bulb will light up.
  - D. The light bulb will break.
- 

**21.** Objects that conduct electricity can easily carry an electrical charge. Which of the following materials best conducts electricity?

- A. copper wire
  - B. plastic tubing
  - C. cotton string
  - D. rubber sheets
- 

**22.** Objects that stop the flow of electricity are good insulators. Which of the following materials would be the best insulator for an electrical wire?

- A. aluminum pipes
  - B. copper wire
  - C. plastic tubing
  - D. water
- 

**23.** Which of these is required to make a circuit?

- A. a closed loop
- B. static electricity

- C. two batteries
  - D. a light bulb
- 

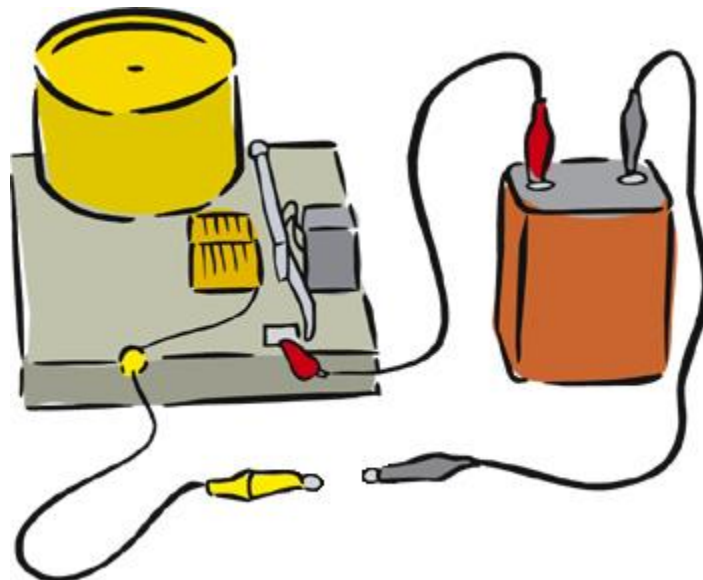
24. Vacuum cords are coated with rubber or plastic coating to protect people from the electricity that runs through the cord. Why is this?

- A. Rubber looks pretty.
  - B. Rubber is easy to handle.
  - C. Rubber is an electric conductor.
  - D. Rubber is an electric insulator.
- 

25. Which of the following objects would be the best conductor of electricity?

- A. a piece of paper
  - B. a peanut
  - C. a staple
  - D. a basketball
- 

26. Charlotte is doing a science project to find out what materials complete the circuit shown below to make the bell ring. She closed the circuit with a plastic pen cap and then a wooden craft stick.



Why did the bell not ring?



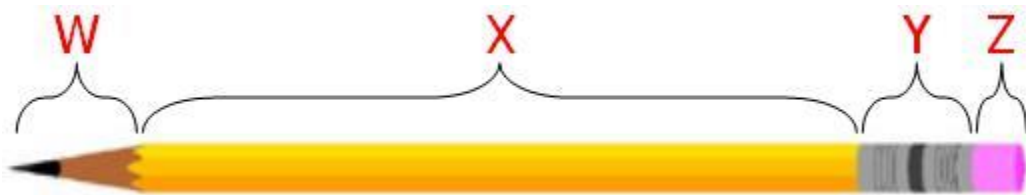
- A. The plastic and the wood have too much power.
  - B. The plastic and the wood are conductors.
  - C. The plastic and the wood were wet.
  - D. The plastic and the wood are insulators.
- 

27. Eva constructed the device shown below to test whether certain objects can conduct electricity.

Eva touched a particular object to both metal terminals at the same time. The light bulb did not light up. What is most likely true about the object?

- A. It had static electricity.
  - B. It was a conductor.
  - C. It produced electricity.
  - D. It was an insulator.
- 

28. The picture shows a wooden pencil.



Which part of the pencil is most likely to be a good conductor of electricity?

- A. Z
  - B. W
  - C. Y
  - D. X
- 

29. Sandy and Andre are studying electricity in their science class. They want to make a table that compares static electricity to current electricity. The table is shown below, but it is not yet complete.

	Static	Current
<b>How It Travels</b>	jumps from one object to another	moves in a steady flow in a circuit
<b>Example</b>	X	a house light is switched on

Which of the following would be best to replace the X in the table?

- A. a flashlight is turned on using a switch
  - B. a plastic stick rubbed with wool attracts rice grains
  - C. a computer cord is plugged into an outlet
  - D. a battery-powered toy robot starts to move
- 

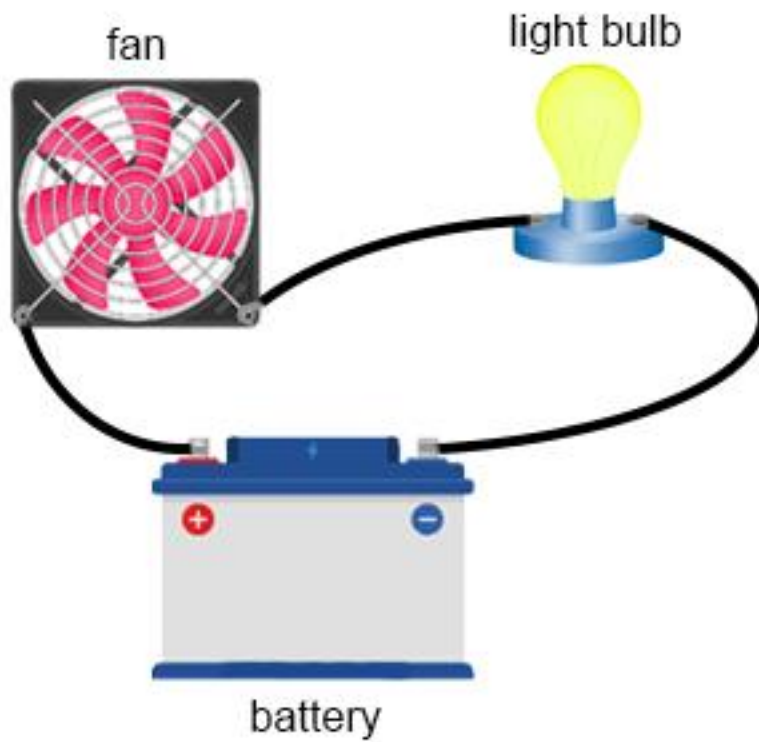
**30.** Mrs. Grayson asked her class to bring one object from home to complete the electric circuit that they built in class. Some of the items that students brought are listed below.

- paper clip
- string
- fishing line
- pencil
- penny

The only things that made the circuit's light bulb light were the paper clip and the penny. Why is that?

- A. The penny and paper clip are insulators.
  - B. The string, fishing line, and pencil were not tried.
  - C. The paper clip and the penny are conductors.
  - D. The string, fishing line, and pencil were wet.
- 

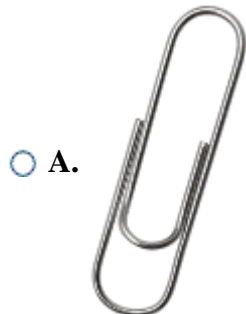
**31.** The picture below shows an electric circuit.



What is the source of electric energy in the circuit?

- A. the battery
  - B. the light bulb
  - C. the wires
  - D. the fan
- 

32. Which of the following objects is the best insulator of electricity?





B.

C.



D.



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## Answers

1. C
2. D
3. C
4. C
5. A
6. C
7. D
8. A
9. A
10. D
11. B
12. D
13. C
14. C
15. D
16. D
17. C
18. A
19. C
20. C
21. A
22. C
23. A

- 24. D
- 25. C
- 26. D
- 27. D
- 28. C
- 29. B
- 30. C
- 31. A
- 32. C

## Explanations

1. **Lightning** forms from a buildup of static electricity in clouds. The differences in electrical charges between clouds and the ground causes the rapid electric discharge that is known as lightning.

2. The lightning, shock from the doorknob, and balloon all describe examples of static electricity. That is, there is a build up of a charge without a continuous electric current. The toy car has a battery connected to its motor. In order for the motor to work properly, both the motor and battery must be part of an electric circuit.

When the switch of the toy car is turned on, a circuit is closed so that electricity can run through it continuously. A battery gives the power for current electricity, and it must be connected in a circuit. That is how **a battery connected to a motor in a toy car allows the car to move.**

3. A *conductor* of electricity is a material in which electric charges flow easily. The charges flow easily because some of the material's electrons can move freely. Most metals are good conductors.

An *insulator* of electricity is a material in which electric charges do not flow easily. This is because the material's electrons cannot move freely. Rubber, plastic, wood, glass, and air are good insulators.

**An iron nail** is made of metal, which makes it a good conductor of electricity.

4. The lightning strikes that occur during storms are the result of static electricity. Chunks of ice in the clouds bang against each other causing a large imbalance of electrons at the bottom of the cloud. Once this imbalance is large enough, the electrons will jump to the ground, causing lightning.

5. Lightning is made when charge builds up in the sky. This charge is released in the form of static electricity, or lightning. The image shows a setup that is an electric circuit that can be controlled, and runs continuously if wanted. Therefore, **electricity is quickly released at once when lightning strikes, whereas electricity flow can be controlled using a circuit.**

6. This table compares static electricity and current electricity correctly.

7. **Conductors** are materials that can easily conduct electricity. Some examples of conductors are copper, aluminum, steel, **silver**, and gold. Metals are often good conductors. Objects made out of these conducting materials will be able to conduct electricity.

Insulators are materials that do not conduct electricity. Some examples of insulators are plastic, wood, rubber, cloth, air, and glass. Objects made out of these insulating materials will not be able to conduct electricity.

8. A *conductor* is a material that electric current can easily move through. Most metals are good conductors.

An *insulator* is material that electric current cannot easily move through. Rubber, plastic, wood, glass, and air are good insulators.

**The wire is a conductor** because it is made of metal. **The cover is an insulator** because it is made of rubber or plastic.

9. Static electricity is often created by friction when insulators rub against each other and charges build up on their surface.

10. A *conductor* of electricity is a material in which electric charges flow easily. The charges flow easily because some of the material's electrons can move freely. Most metals are good conductors.

An *insulator* of electricity is a material in which electric charges do not flow easily. This is because the material's electrons cannot move freely. Rubber, plastic, wood, glass, and air are good insulators.

A **safety pin** is made of metal, which makes it a good conductor of electricity.

11. A closed circuit is one through which **electricity is able to travel**. A closed circuit will allow light, heat, or sound to be produced. An open circuit is one in which electricity is unable to travel.

12. **Conductors** are materials that can easily conduct electricity. Some examples of conductors are copper, aluminum, **steel**, silver, and gold. Metals are often good conductors. Objects made out of these conducting materials will be able to conduct electricity.

Insulators are materials that do not conduct electricity. Some examples of insulators are plastic, wood, rubber, cloth, air, and glass. Objects made out of these insulating materials will not be able to conduct electricity.

**Paper clips** are made out of thin steel wire, so they will conduct electricity.

Erasers and rubber bands are made out of rubber, so they will not conduct electricity.  
Highlighters are made from plastic, so they will not conduct electricity.

13. The switch is the part of the circuit that can complete or break the circuit. When the switch is on, it completes the circuit, creating a **closed circuit**, and the light bulb will turn on. When the switch is off, the circuit is broken, or open, and the light bulb will not light.

14. The device shown in the image can be used to find out if an object conducts electricity. When touching both metal terminals at the same time, the object becomes part of a complete circuit. If the object is an electrical conductor, there will be a current and the bulb will light up. Therefore, the best way to test the object's electrical conductivity is to **touch the object to both metal terminals at the same time**.

15. A *conductor* of electricity is a material in which electric charges flow easily. The charges flow easily because some of the material's electrons can move freely. Most metals are good conductors.

An *insulator* of electricity is a material in which electric charges do not flow easily. This is because the material's electrons cannot move freely. Rubber, plastic, wood, glass, and air are good insulators.

**Iron** is a metal, which makes it a good conductor of electricity.

16. **Conductors** are materials that can easily conduct electricity. Some examples of conductors are copper, **aluminum**, steel, silver, and gold. Metals are often good conductors. Objects made out of these conducting materials will be able to conduct electricity.

Insulators are materials that do not conduct electricity. Some examples of insulators are plastic, wood, rubber, cloth, air, and glass. Objects made out of these insulating materials will not be able to conduct electricity.

**Soda cans** are made out of aluminum, so they will conduct electricity.  
Milk jugs are made out of plastic, so they will not conduct electricity.  
Oven mitts are made out of cloth, so they will not conduct electricity.  
Glass jars will not conduct electricity.

17. The descriptions of the light, radio, and electric motor are all examples involving current electricity. Current electricity can run continuously. When a switch is turned on, a circuit is closed. Because of this, an electric current is able to run through the complete circuit.

When a comb is rubbed with an object, the comb can become oppositely charged from the pieces of paper. This causes an attraction between the paper and comb. **That is how a plastic comb attracts small pieces of paper after it is rubbed with another object.**

18. An electrical circuit must begin and end at the same place, forming a loop. An electrical circuit is, in other words, a complete, closed path through which electric charges flow. If the



circuit is not a loop, the electricity will not flow. So, **the light bulb will not light up because a complete loop of wires is needed.**

19. The device is constructed so that it is almost a complete electrical circuit. In order for the light bulb to light, an object that conducts electricity would have to touch both metal terminals at the same time. The iron nail is a metal object which conducts electricity, so when she tests **the iron nail** the bulb should light up.

20. The original circuit was able to light the light bulb. Marcus then disconnected the circuit to add a paper clip. When the circuit is disconnected, the light bulb will not light.

He then connected the paper clip to wire 2. The paper clip is made of metal which is a conductor. So when he touches wire 3 to the paper clip, it will be a complete circuit again.

So, it is most reasonable to predict that **the light bulb will light up** once again.

21. Rubber, plastic, and cotton are all insulators that stop the flow of electricity. Metal, water, ceramics, and so on are all conductors of electricity. These materials allow charged particles to easily flow through them.

22. Rubber, plastic, and cotton are all insulators that stop the flow of electricity. Metals and water tend to be conductors of electricity. These materials allow charged particles to flow through them easily.

23. An electrical circuit requires an energy source and **a closed loop** for electricity to flow. For the circuit to do meaningful work, it should also include a load (an electrical appliance).

24. Rubber is a good insulator of electricity. Rubber-coated cords help protect people from getting injured by the electricity that runs through the cord. This is why it is so dangerous to use a vacuum or other appliance with a damaged cord.

25. A *conductor* of electricity is a material in which electric charges flow easily. The charges flow easily because some of the material's electrons can move freely. Most metals are good conductors.

An *insulator* of electricity is a material in which electric charges do not flow easily. This is because the material's electrons cannot move freely. Rubber, plastic, wood, glass, and air are good insulators.

**A staple** is made of metal, which makes it a good conductor of electricity.

26. **The pieces of plastic and wood did not make the bell ring because they are insulators.** Insulators are materials that do not allow electricity to flow through them.

27. If the object that Eva touched to the metal terminals was a conductor, it would have completed the circuit and the bulb would have lit up. The bulb did not light up, so that means the

object Eva tested did not allow electrical current to go through it. In other words, the object **was an insulator**.

28. A *conductor* is a material that electric current can easily move through. Most metals are good conductors.

An *insulator* is material that electric current cannot easily move through. Rubber, plastic, wood, glass, and air are good insulators.

The metal part of the pencil, labeled **Y**, is a good conductor of electricity. The wooden and rubber parts are good insulators.

29. The table is constructed to compare static and current electricity. An example of static electricity is needed to complete the table. Current electricity is a flow of electrical current through a closed circuit. Static electricity, on the other hand, occurs when charge is built up, and it moves in one quick discharge. One example of static electricity is when an object becomes charged by rubbing with another object. Therefore, an example would be **a plastic stick rubbed with wool attracts rice grains**.

30. **The paper clip and the penny are conductors.** Conductors are objects that conduct electricity, or allow electricity to flow through them.

The string, fishing line, and pencil are insulators, which means that they do not allow electricity to flow through them.

31. Circuits are made up of three parts:

- an energy source, such as a battery
- the wires that connect the parts of the circuit together
- a load, such as a light bulb or fan

In the circuit shown, the source of electric energy is **the battery**.

32. A *conductor* is a material that electric current can easily move through. Most metals are good conductors.

An *insulator* is material that electric current cannot easily move through. Rubber, plastic, wood, glass, and air are good insulators.

**The chair** is made of wood, which makes it a good insulator of electricity.