

NAME \_\_\_\_\_

## Science SOL 4.3 – Electricity



When you pull a wool sweater quickly over your head, you might look like this. When your feet rub the carpet before you touch a metal doorknob you might get a shock or see a spark. Why? **Static electricity**. Static electricity is the



result of electrons being pulled from one surface to another when two objects rub together. This can happen if you take off a sweater too fast or when you scuff your feet on the carpet. Your feet pick up extra electrons from the carpet and become negatively charged. Those electrons jump off your finger as a spark when your finger comes close to a metal object like a doorknob.

- Which of the following creates static electricity?
  - Taking a bath
  - Plugging a power cord into the wall outlet.
  - Rubbing feet on the carpet.**

- What might cause foam squares to stick to this cat?
  - glue
  - magnetism
  - static electricity**



- Sometimes clothes from the dryer will cling to you. Why?
  - Magnetism
  - Static electricity**
  - Resistance

**Lightning** is caused by static electricity.

Friction in the clouds can cause the bottom of a cloud to become negatively charged. A big spark of lightning can “jump” between the negatively charged cloud and the positively charged ground.



- Which of the pictures above shows static electricity?
  - The spark jumping off the finger
  - The lightning
  - Both**
- The heat of a lightning bolt can cause the surrounding air to expand suddenly. This causes:
  - fires
  - thunder**
  - rain

- Who discovered that lightning was a form of electricity?
  - Thomas Edison
  - Benjamin Franklin**
  - Michael Faraday

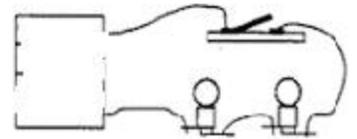
**Electric current** powers many things in our homes.

**Current electricity** is the flow of electrons through a conductor. Most home appliances need current electricity running through an electrical circuit in order to work.

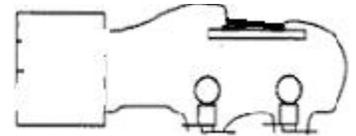
An **open circuit** is a circuit with a break in it that will not allow the flow of electrons. A **closed circuit** allows the flow of electrons.

- A(n) \_\_\_\_\_ will allow the flow of electricity.
  - open circuit
  - closed circuit**

- The diagram shows a(n)
  - closed circuit
  - open circuit**



- The diagram shows a(n)
  - closed circuit**
  - open circuit



- Which will cause electric lights to turn on?
  - an open circuit
  - a closed circuit**
- An electric current can only flow through a circuit that is
  - open
  - magnetic
  - closed**
  - charged
- \_\_\_\_\_ is the continuous flow of electrons through a conductor.
  - Static electricity
  - Electric current**
  - Mechanical energy

Materials that conduct electricity do so because they allow the flow of negatively charged electrons. Those materials are called **conductors**. **Insulators** do not allow the flow of electrons, and therefore do not conduct electricity. Metals like copper are excellent conductors. Rubber and plastic are good insulators.

13. Which of these material is the best conductor of electricity

- a. Dirt
- b. **Copper wire**
- c. A wool sweater
- d. Leather

14. Can liquids conduct electricity?

- a. No, only solids can
- b. **Yes, water contains minerals that conduct electricity.**
- c. Only liquid metals conducts electricity

15. Air, rubber, glass, and plastic are good

- a. conductors
- b. magnets
- c. **insulators**
- d. circuits

16. Many metals, especially copper and aluminum, are good:

- a. **conductors**
- b. generators
- c. insulators
- d. circuits

17. Which of the following are good conductors of electricity?

- a. Cotton
- b. Paper
- c. **Steel**
- d. Rubber
- e. **Aluminum**
- f. Glass
- g. Plastic
- h. **Copper**
- i. **Iron**
- j. **Water**

18. Does water conduct electricity?

- a. **Yes (unless it's pure H<sub>2</sub>O which is very rare).**
- b. No

19. Most wires are coated with plastic because:

- a. plastic is a good conductor of electricity
- b. **plastic is a good insulator**

20. Which of the following is not a source of electricity?

- a. **A wire**
- b. A battery
- c. An outlet

21. Any path along which electrons can flow is an:

- a. electric outlet
- b. **electric circuit**

Some materials are neither conductors nor insulators. Some materials don't completely stop the flow of electrons, but they resist the flow in some way. These materials are called **resistors**. A material's

**resistance** is the measure of how freely it allows the flow of electrons.

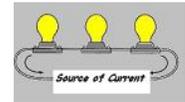
22. **True** or False - The filament in a light bulb is a useful resistor because the resistance produces so much heat it causes the light bulb to glow.

23. True or **False** – A thick wire has more resistance than a thin wire.

In a **series circuit**, there is only one path for the electrons. If one of the bulbs burns out, all the other bulbs go out because the circuit is broken and the electric current stops flowing. In a **parallel circuit**, each bulb is on a separate path. If one of the bulbs burns out, the others stay lighted because the electric current continues to flow.

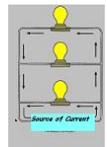
24. This is a:

- a. parallel circuit
- b. **series circuit**



25. This is a:

- a. **parallel circuit**
- b. series circuit



26. What kind of circuit would cause all lights to go out if one light went out?

- a. Parallel
- b. **Series**
- c. Closed

27. A circuit with several paths for electricity to travel is a:

- a. series circuit
- b. **parallel circuit**

28. What famous scientist used electricity to bring light into our homes?

- a. Michael Faraday
- b. **Thomas Edison**
- c. Benjamin Franklin

29. Magnets can be made by wrapping wire around a metal rod and running electric current through the wire. These magnets are called:

- a. **electromagnets**
- b. permanent magnets

30. Electromagnets are considered temporary magnets because:

- a. **they can be turned on and off by controlling the flow of electricity**
- b. they can be easily destroyed

32. \_\_\_\_\_ made important discoveries in electromagnetism.

- a. Michael Faraday
- b. Alexander Graham Bell
- c. Thomas Edison
- d. Ben Franklin

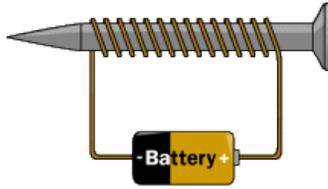
33. Which statement about electromagnets is false?

- a. They can easily be turned on and off
- b. They are used frequently in the home appliances
- c. They are weaker than permanent magnets

34. True or False – Electricity and magnetism are very closely related

35. Adding more coils to this electromagnet will:

- a. do nothing
- b. make the magnet weaker
- c. make the magnet stronger



#### FORCES (4.3 REVIEW)

36. A force that slows or stops a moving object is:

- a. inertia
- b. speed
- c. friction

37. Contact with which type of surface causes the most friction?

- a. Smooth
- b. Rough
- c. Icy

38. A push or a pull is \_\_\_\_\_ that will cause an object to move.

- a. a force
- b. friction
- c. energy

39. A force can change the motion of an object by:  
(circle all correct answers)

- a. making it go faster or slower
- b. starting or stopping it
- c. changing its direction

40. Objects with more \_\_\_\_ are harder to move (require a stronger force).

- a. volume
- b. size
- c. mass

41. Massive objects: (circle all correct)

- a. are hard to set in motion
- b. are hard to stop

42. How far an object moves within a certain period of time is:

- a. inertia
- b. friction
- c. speed
- d. gravity