

ELECTRICITY

PROJECTS & ACTIVITIES

1. What is electricity? What are the two kinds of electricity? What makes the energy in electricity?
2. How is current electricity made? List as many ways as you can. Make a graph and compare the pros (good things) and cons (bad things) about each way to generate electricity. Also tell whether each form of energy is renewable or nonrenewable.
3. What problems exist in moving towards more renewable forms of energy? How can these be solved?
4. Pick one way of generating electricity (from #2 above) and make a diagram showing its path from when it is generated to when a home or business uses that electricity.
5. How does Denver generate its electricity? What problems does this create? What advantages are there? Should Colorado move to another form of energy? Why or why not?
6. Scientists are working on using tides and waves as an energy source. What other forms of energy are scientists looking at? What ideas do you have for future energy sources?



7. What do you think transportation will look like 25 years from now? How will electricity play a role in these new forms of transportation?
8. How fast does an electric current travel? Can you compare its speed to something that you experience every day?
9. Ask your parent(s) to see your electric meter. This measures how much electricity your family uses and tells the electric company how much to charge your family.

10. Make a list of all of the items in your home that require electricity to run. Make a chart that shows which ones are essential and which ones are optional.



11. Is your family interested in reducing its use of electricity? If so, have a family meeting. Show your family your chart (from #10) and see if family members (including you!) are willing to decrease their use of nonessential items. Do this for a month and then see if your new electric bill is less than the one from the month before. Discuss if family members are willing to keep their changes permanent!
12. Ask your parent(s) to look at the circuit board (or breaker panel) for your home. **DO NOT ATTEMPT THIS ON YOUR OWN!** Do some research. What is the purpose of the circuit breakers? What does it mean if they switch off? How are they switched back on?

13. Batteries are another form of generating electricity (although for a limited time). How do batteries work? Create a diagram to show what is inside a battery and label these parts. Explain how it generates electricity. **DO NOT OPEN A BATTERY!! IT CONTAINS CHEMICALS THAT CAN BURN YOU!!**
14. What is static electricity? What causes us to get shocks when we drag our feet on the carpet and then touch something? Can you explain your answer showing your understanding of atomic particles?
15. Did you know that lightning is a form of static electricity? Draw a diagram that shows what causes lightning.
16. It is said that in 1752, Ben Franklin flew a kite with a key attached to the string during a thunderstorm. When the kite's string was charged by lightning, the charge flowed down the string into the metal key. When Franklin touched the key, he got a shock and deduced that lightning was a form of electricity.



Do you believe this story? Why or why not?

Some people believe that Ben Franklin would have received an electrical jolt strong enough to kill him. Others believe that since some people have lived after being hit by lightning, Franklin could have survived.

Watch *MythBusters* (using the link below) and see what they think! Then write about your own opinion paper giving scientific facts to support your ideas.

<http://dsc.discovery.com/tv-shows/mythbusters/mythbusters-database/ben-franklin-electricity.htm>

17. Describe your thoughts and feelings as if you were Ben Franklin and had just traveled in a time machine to the present time.
18. Humans are not the only ones that can generate electricity! There are kinds of fish that can produce a strong electric charge and those that make a weaker charge. Research electric fish and tell which species are "shocking," how they generate an electric charge, and how that charge helps them to survive.
19. Thomas Edison invented a long-lasting (for that time) light bulb in 1879. He is credited with saying, "Genius is one percent inspiration, ninety-nine percent perspiration." What do you think this means? After reading more about Edison, do you think that this quote is a fair description of him? Explain why or why not.
20. Thomas Edison created many inventions. Make a PowerPoint presentation showing his other inventions and their connection to electricity.
21. What would Thomas Edison think of a neon sign? An electric car? Solar power? A computer? A nuclear power plant?
22. Compare incandescent light bulbs, compact florescent lights (CFLs), and LED bulbs. What are the pros (good things) and cons (bad things) of each kind of light bulb? Which should we use and why?
23. The word "electricity" comes from the Greek work "elektron," meaning amber. What is the connection between amber and electricity? (If you need help finding that answer, try researching Thales of Miletus.)



24. A "blackout" is when large numbers of people lose their electricity. When and where were the 5 biggest blackouts in the world?
25. If you were in a blackout, what do you think you would miss the most?
26. With permission from all members of your family, stage a one hour blackout by turning off all of the lights and electronic devices in your home. This includes the heat or air conditioning. For safety, make sure that everyone has a flashlight.

Try doing what you normally would do during that hour. Record the things that you are unable to do completely or unable to do easily. After the hour is up, meet as a family. Discuss what you couldn't do without electricity and what you had to do differently. Did your family have any creative solutions to having no electricity? What activities did you miss the most? What about other family members?

27. Which electrical appliances in your home could be replaced with an appliance that doesn't require electricity (an example might be a can opener)? Do an appliance inventory and see if any could be exchanged.
28. Think about the electronic devices that you feel that you couldn't live without. Narrow your list down to five and then, finally, to the one device you couldn't part with. Now develop a survey and ask your classmates which one electronic device each could not go without. Graph and analyze your results.



Now ask the same question to adults. Graph and analyze the results, thinking about how these results are similar or different to the results you found with your classmates.

29. Interview your grandparents or great grandparents and ask them how they:

- dried their hair
- kept cool in hot weather
- wrote a paper for school
- made copies
- added numbers
- paid for items at the store
- listened to music
- sharpened a pencil
- thawed frozen food
- made popcorn
- found out information
- wrote a letter to someone

30. How many times a day do you turn on something that requires electricity? Before you find out, make predictions for home and for school. Then record each time that you flip a switch, push a button, pull a string, turn a knob, etc. Compare your predictions to your actual amounts. Are you surprised? How might your findings change your use of electricity?

31. Create a poster or commercial about being “green.” Give examples of ways that others can cut back on electricity and help the environment.

32. Why don’t birds get electrocuted when they sit on power lines?

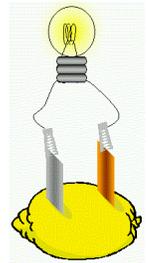
33. Why is electricity so dangerous to the human body? What happens when a person receives an electrical shock?



34. It is true that some people have lived after being hit by lightning. How can that be explained?

35. Create a safety poster outlining ways to keep safe during storms, around power lines, at home, etc. (Pick a topic of your choice.)

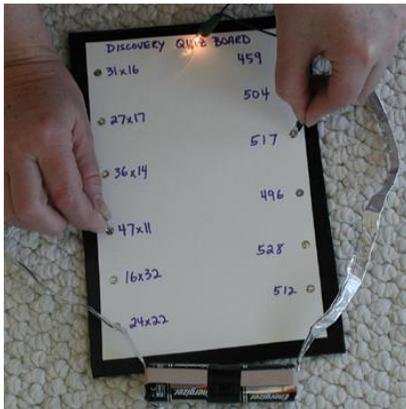
36. Using a battery, bulb, and wire, test various items to see if they are conductors or insulators. Chart your findings and draw conclusions about which materials are the best conductors and which are the best insulators.
37. Make a lemon battery! You can find the directions in books or on-line.
38. Make a tomato battery. Directions can be found at <http://www.hometrainingtools.com/tomato-battery-science-newsletter/a/1715/>
39. Create an invention that solves a problem that you have (such as making your bed) and that uses electricity. Draw up your plans and then create packaging, a commercial, and/or a slogan that could be used to market your invention.
40. Invent an electronic product that could be cordless. Explain the advantages of your new product over the old.
41. What do you think will be the next big invention in electronics?
42. If you could provide electricity to any culture, which would be first? Why? How would the introduction of electricity affect this culture? What are the pros and cons of having electricity for this culture? Do the pros outweigh the cons?
43. Pick an electronic device and research how it works. Then create a way to show what you have learned.
44. Before the common use of electricity, the day began at sunrise and ended at sundown. With electricity, we can function 24



hours a day. Do you think that the use of electricity has improved our lives or has hurt our lives? In what ways?

45. Make an electronic quiz board using "shocking" terms (such as those below or pick your own) and their meanings:

- Volt
- Amp
- Circuit
- Ohm
- Diode
- Relay
- Battery
- Direct current
- Alternating current
- Conductor
- Filament
- Electromagnet
- Capacitor
- Transistor
- Insulator
- Watt
- Electrolyte
- Resistance
- Resistor
- Transformer



Directions can be found at <http://www.teachingtreasures.com.au/K-10Projects/quizboard/quizboard.htm>

46. Do you think you'd like to be an electrical engineer? What aspects of this job would you enjoy? Which wouldn't you enjoy?

47. What other careers are related to electricity and electric power?

48. With permission, organize a pop can relay race using static electricity and "charged" balloons as the way to move the pop cans.

49. Make a time line of advancements in electricity.

50. What would life be like without electricity? Write a paragraph or a story.
51. Build any of the following and explain to the class how your creation works.
- an electromagnet
 - an electric motor
 - a rheostat
 - an electroscope
 - a telegraph
 - a burglar alarm
 - a compass
52. Create a comic book for younger children to show how to be safe around electricity and electric appliances at home.



53. You can build a lamp using a pop can as the base. You will need an adult to help you purchase the lamp kit needed to complete the project and to help you with the construction. See directions at http://www.ehow.com/how_4826636_lamp-pop-can-base.html

54. Create a quiz for your classmates to take that tests them on their electricity trivia.

Try to find some ~~SHOCKING~~ facts, such as one lightning bolt has enough electricity to power 200,000 homes or enough sunlight falls on the earth's surface every minute to meet world energy demand for an entire year.

55. Research electric cars and try to develop solutions to any problems that still exist with them. You might find some ideas if you read the electric car's history and how they are used in other countries.

56. Electricity is very powerful, yet totally invisible. Create a drawing showing what life would be like if electricity was like water and we could see it, taste it and smell it.
57. Research groups that refuse to use power-line electricity. Why is this part of their beliefs?
58. Electricity occurs naturally in our world, but the following people have helped us to understand it better. Pick one of these energy pioneers and discover what he/she did to further our knowledge of electricity.

- Ben Franklin
- Thomas Edison
- Albert Einstein
- Michael Faraday
- James Joule
- James Watt
- Alessandro Volta
- Nikola Tesla
- Francis Hauksbee
- Samuel Morse
- Alexander Graham Bell
- Charles Parsons
- William Thomson (Lord Kelvin)
- Guglielmo Marconi
- Dr. William Gilbert
- Stephen Gray
- James West
- Philip Emeagwali
- Aprille Ericsson
- Lewis Howard Latimer
- Granville T. Woods
- Mark Dean
- Andre Ampere
- George Ohm
- Joseph Swan

59. Why are there so few women listed above? What does that reveal about the times in which many of these men lived?
60. How can you find out more about the scientific contributions of women? Do some investigating and try to research a female scientist.
61. Pretend you have just purchased a home in a neighborhood that has a tradition of decorating homes during the holiday season.

Everyone puts on elaborate displays, but you think that the lights (although beautiful and festive) are a waste of money and energy. What should you do?

62. What would happen if:

- electricity was available only 12 hours a day?
- all cars had to be electric?
- there were no telephones?
- electrical appliances were heavily taxed?
- batteries were illegal?
- amusement parks had no electricity?



63. How is the human body like an electrical power plant?

64. How is electricity like a river?

65. The following websites contain facts to read and activities to do:

- <http://www.sciencekids.co.nz/electricity.html>
- http://www.bbc.co.uk/schools/scienceclips/ages/8_9/circuit_s_conductors.shtml
- http://www.ngfl-cymru.org.uk/vtc/using_electricity/eng/Introduction/whiteboard.htm
- <http://www.engineeringinteract.org/resources/siliconspies/flash/concepts/buildingcircuits.htm>
- <http://www.neok12.com/Electricity.htm>
- <http://www.alliantenergykids.com/EnergyBasics/AllAboutElectricity/>

66. If you have a different project, please see your teacher.