Session 4

Getting a Charge From Electricity

Engineering Fundamentals

In This Session:

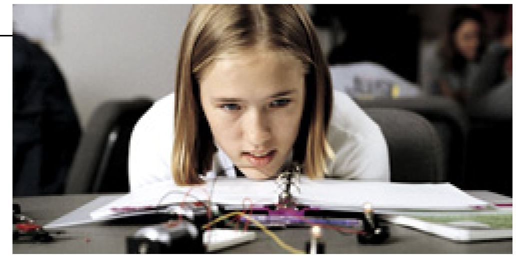
A) Basic Electrical Concepts in a Flash (20 minutes)
- Student Handout

B) Turn it On and Off (60 Minutes)
- Student Handout
- Student Reading

C) Short Circuits (20 Minutes)
- Student Handout

D) Light-Emitting Diodes (50 Minutes)
- Student Handout

Home Improvement
- Student Handout



In *Getting a Charge From Electricity,* you will work in pairs to explore electricity basics. *4A: Basic Electrical Concepts in a Flash* reviews simple circuitry using a common household item: a flashlight. This helps prepare you for any electrical circuitry that you may need to incorporate into your own project later.

In *4B: Turn It On and Off*, learn the differences between a simple, series, and parallel circuit. Here, you are introduced to using breadboards. Then try wiring circuits on the breadboards with switches and buzzers (optional). In *4C: Short Circuits*, learn about short circuits and the relationship between resistance and the current. In *4D: Light-Emitting Diodes*, make your favorite numbers light up with an LED display. *Electric House Hunt*, the Home Improvement activity, entails looking at your own house from an electrical perspective.

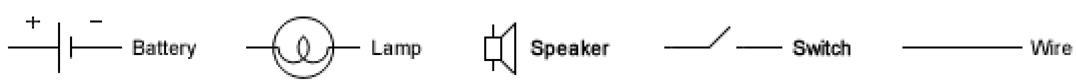
Basic Electrical Concepts in a Flash

Handout: Session 4, Activity A

Who invented the flashlight? It all started with an idea to light up a flower pot. Joshua Lionel Crown invented a flower pot that would light up when a button was pressed. However, it didn't sell. In 1898, he sold the idea to his salesman, Conrad Hubart, a Russian immigrant. Hubart took parts of the flower pot idea and turned them into an "electric hand torch." Because the bulbs and the batteries weren't very powerful, the torch gave only a "flash" of light. The company became the American Ever-Ready Company. Although Hubart arrived from Russia with no money, he died in 1928 with an estate worth over $15 million. Ever since then the company has kept going and going and going...

Directions
You should have a flashlight and some wire in front of you. A flashlight is a great way to understand how a simple circuit works. Take the flashlight apart and try to make the lightbulb light with a battery and a wire. This is called a simple circuit. Do the following activities and record your results in your design notebook.

Symbols



1. Draw a diagram of the circuit to show how you made the bulb light. Use the symbols above.

2. What additional features do you think would make a flashlight better or more useful? What would this flashlight look like? (Draw a sketch.)

What Do Engineers Do?

Reading: Session 4, Activity A

Engineers help to design and manufacture just about everything—from the tallest skyscrapers to the smallest computer chips, from cars to space shuttles, from miracle fabrics to artificial heart valves. Even though their efforts are all around us, the work of engineers can seem like a mystery to those outside the profession.

"You grow up knowing what teachers and doctors and lawyers do. But unless your parents happen to be engineers, you probably don't have a clue what their work involves," says a woman who grew up to be a successful environmental engineer.

What do engineers really do? Let's take a look.

Types of Engineering: The "Big Four"
In the most general terms, engineers are problem-solvers. They apply the concepts of mathematics and science to solving real-world challenges.

The engineering profession includes many different disciplines. In fact, engineering may offer more career options than any other profession. Engineers are a diverse group, contributing to projects that improve the quality of life on every continent. A background in engineering can also lead to a career in law, education, medicine, or public policy.

Here's a look at four of the largest categories within the profession: chemical engineering, civil engineering, electrical and computer engineering, and mechanical engineering.

Chemical Engineering
Take a walk through your grocery store, pharmacy, or paint store, and you'll see hundreds of examples of what chemical engineers create. Chemical engineers combine the science of chemistry with the principles of engineering to produce better plastics, fuels, fibers, semiconductors, medicines, building materials, cosmetics, and much more. Their know-how has helped to develop reduced-calorie sweeteners, lead-free paint, fibers that can withstand the heat of forest fires, and thousands of other products.

Chemical engineers work in a variety of settings, from research laboratories to food-processing plants to pharmaceutical companies. They tackle challenges relating to agriculture, environmental pollution, and energy production. Sometimes they even work at the molecular level to create brand-new synthetic materials.

Interested in the field of chemical engineering? Visit the American Institute of Chemical Engineers (AIChE) (www.aiche.org*) to learn how a chemical engineering background can prepare you for a career in manufacturing, research, biomedicine, quality control, law, sales and marketing, and related fields.

Civil Engineering
Civil engineers help to create the building blocks of modern society. From dams and highways to bridges and buildings, the products of civil engineering are all around us. Civil engineers

belong to one of the oldest and largest branches of engineering. They use cutting-edge technologies and advanced materials to solve challenges in new ways.

A background in civil engineering opens the door to a variety of career options. According to the American Society of Civil Engineers, areas of focus include construction engineering, environmental engineering, geotechnical engineering, structural engineering, as well as transportation, urban planning, and water resources.

Interested in the field of civil engineering? Visit the American Society of Civil Engineers (ASCE), (www.asce.org*.)Also visit Manufacturing Is Cool!,(www.manufacturingiscool.com/cgi-bin/mfgcoolhtml.pl?/home.html*,) a K-12 site developed by the Society of Manufacturing Engineers which offers curriculum, displays, and resources.

Electrical and Computer Engineering
Electrical engineering has been one of the fastest-growing fields in recent decades, as breakthroughs in technology have led to rapid advancements in computing, medical imaging, telecommunications, fiber optics, and related fields.

Electrical engineers work with electricity in all its forms, from tiny electrons to large-scale magnetic fields. They apply scientific knowledge of electricity, magnetism, and light to solving problems that relate to cell phones, computer software, electronic music, radio and television broadcasting, air and space travel, and a wide range of other areas. According to the Institute of Electrical and Electronics Engineers, a background in electrical or computer engineering can lead to a career in aerospace, bioengineering, telecommunications, power, semiconductors, manufacturing, transportation, or related fields.

Electrical engineers often work in teams with other specialists to develop sophisticated devices such as lasers to use in medical treatments, or robots that can perform complex operations in space. In addition to technical expertise, engineers contribute problem-solving skills and interpersonal communications to successful team projects.

To find out more about the fields relating to electrical engineering, visit the Institute of Electrical and Electronics Engineers (IEEE), (www.ieee.org*.)

Mechanical Engineering
Mechanical engineers turn energy into power and motion. What does that mean? "Anything that moves or uses power, there's a mechanical engineer involved in designing it," explains a member of this large branch of engineering.

Mechanical engineers work in all areas of manufacturing, designing automobiles or sporting goods, water treatment facilities or ocean-going ships. In a field like biomechanics, their expertise can improve the quality of life by designing artificial joints or mechanical heart valves.

Interested in the field of mechanical engineering? Find out more about mechanical engineering from the American Society of Mechanical Engineers (ASME), (www.asme.org*).

4A Reading: What Do Engineers Do? (continued)

Other Engineering Disciplines

Aeronautical and Aerospace Engineering
Aircraft, space vehicles, satellites, missiles, and rockets are some of the projects that are developed by aeronautical and aerospace engineers. They get involved in testing new materials, engines, body shapes, and structures that increase speed and strength of a flying vehicle.

Aerospace engineers work in commercial aviation, national defense, and space exploration. Some engineers work in labs testing aircraft, while others investigate system failures such as crashes to determine the cause and prevent future accidents. They are specialists in fields such as aerodynamics, propulsion, navigation, flight testing, and more.

Agricultural Engineering
Agricultural engineers work with farmers, agricultural businesses, and conservation organizations to develop solutions to problems relating to the use and conservation of land, rivers, and forests. They look for solutions to problems such as soil erosion. They also develop new ways of harvesting crops and improving livestock and crop production.

Agricultural engineers also design and build equipment, machinery, and buildings that are important in the production and processing of food, fiber, and timber. For example, they might design specialized greenhouses to protect and grow exotic plants such as orchids.

For more information about agricultural engineering, visit the American Society of Agricultural Engineers, (www.asae.org*.)

Biomedical Engineering
Biomedical engineers, or bioengineers, use engineering principles to solve complex medical problems in health care and medical services. They work with doctors and medical scientists to develop and apply the latest technologies, such as microcomputers, electronics, and lasers.

Biomedical engineers might develop biomaterials to speed tissue repair in burn victims, or design medical devices that aid doctors in surgery. They might help to build bionic legs, arms, or hands to improve the lives of accident victims.

The biomedical field is changing rapidly as new technologies emerge. Bioengineers work in hospitals, government agencies, medical device companies, research labs, universities, and corporations. Many biomedical engineers have degrees in chemical or electrical engineering, and some go to medical school.

To find out more about biomedical engineering, visit the Biomedical Engineering Society (BMES), (www.bmes.org*.)

Environmental Engineering
Environmental engineers develop methods to solve problems related to the environment. They assist with the development of water distribution systems, recycling methods, sewage treatment

plants, and other pollution prevention and control systems. Environmental engineers often conduct hazardous-waste management evaluations to offer solutions for treatment and containment of hazardous waste. Environmental engineers work locally and globally. They study and attempt to minimize the effects of acid rain, global warming, automobile emissions, and ozone depletion.

To learn more about the work of environmental engineers, visit the American Academy of Environmental Engineers, (www.aaee.net*.)

Industrial Engineering
Industrial engineers make things work better, more safely, and more economical. They often work in manufacturing—dealing with design and management, quality control, and the human factors of engineering. They are problem-solvers who analyze and evaluate methods of production and ways to improve the methods. Based on their evaluation, they may determine how a company should allocate its resources.

Interested in the field of industrial engineering? To find out more, visit the Institute of Industrial engineers, (www.iienet.org*.)

Materials Engineering
Materials engineers work with plastics, metals, ceramics, semiconductors, and composites to make products. They develop new materials from raw materials and improve upon existing materials. Whether it's creating higher performance skis or a biodegradable coffee cup, materials engineers can be found applying their expertise.

Materials engineers specializing in metals are metallurgical engineers, while those specializing in ceramics are ceramic engineers. Metallurgical engineers extract and refine metals from ores, process metals into products, and improve upon metalworking processes. Ceramic engineers develop ceramic materials and the processes for making ceramic materials into useful products. Ceramic engineers work on products as diverse as glassware, automobile and aircraft engine components, fiber-optic communication lines, tile, and electric insulators.

Mining Engineering
Mining engineers figure out how to get valuable resources out of the ground. Along with geologists, they locate, remove, and appraise minerals they find in the earth. Mining engineers plan, design, and operate profitable mines. They are also responsible for protecting and restoring the land during and after a mining project so that it may be used for other purposes.

For more information about mining engineering, visit the Society for Mining, Metallurgy, and Exploration Inc., (www.smenet.org*.)

Nuclear Engineering
Nuclear engineers research and develop methods and instruments that use nuclear energy and radiation. They may work at nuclear power plants and be responsible for the safe disposal of nuclear waste. Some nuclear engineers specialize in the development of nuclear power for

4A Reading: What Do Engineers Do? (continued)

spacecraft; others find industrial and medical uses for radioactive materials, such as equipment to diagnose and treat medical problems.

Petroleum Engineering
Petroleum engineers are found wherever there is oil, working to remove oil from the ground. Petroleum engineers might be involved in drilling or developing oil fields. They might also ensure that the oil drilling process is safe, economical, and environmentally friendly.

To learn more about the field of petroleum engineering, visit the Society of Petroleum Engineers, (www.spe.org*.)

Systems Engineering
Systems engineers are like team captains who are responsible for bringing all the pieces of an engineering project together and making them work harmoniously, while still meeting performance and cost goals, and keeping on schedule. Systems engineering takes an interdiscipli0nary approach to a project, from concept to production to operation. Systems engineers consider both the business and technical needs of a project.

Sources

- Discover Engineering www.discoverengineering.org/home.asp*
- Engineer Girl! The National Academies—National Academy of Engineering www.engineergirl.org/nae/cwe/egcars.nsf/webviews/Careers+By+Engineering+Field?OpenDocument&count=50000
- Baine, Celeste, *Is There an Engineer Inside You? A Comprehensive Guide to Career Decisions in Engineering,* 2d ed. Ruston, LA: Bonamy Publishing, 2001.

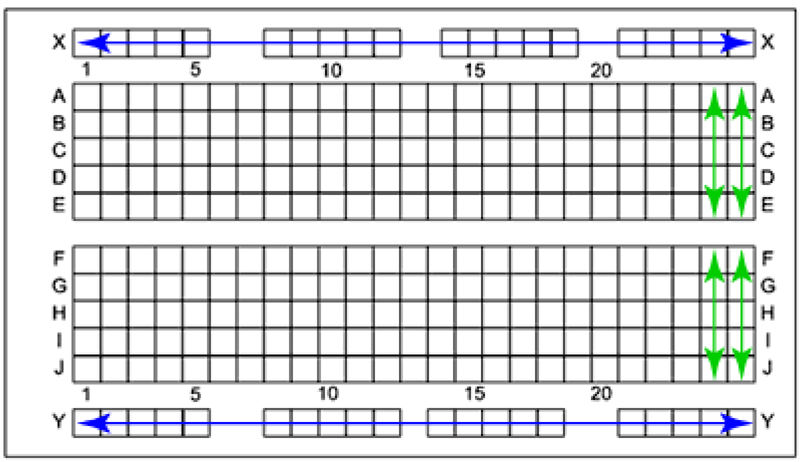
Turn It On and Off

Handout: Session 4, Activity B

You may find that you want to develop a prototype for a product that calls for the use of light or sound. If this is the case, you'll find that you need to wire some circuits. This activity will help familiarize you with the different types of circuits.

In this activity, you will be wiring on a breadboard. Electrical engineers use breadboads to test circuits before soldering them to a circuit board. The purpose of the breadboard is to provide a flexible way to wire circuits. Underneath the plastic cover are little metal pieces that hold wires and make connections between holes. You only need to stick ends of wire into the breadboard holes to make connections between electrical devices like lightbulbs and batteries.

A breadboard is arranged this way: The two long sets of holes (called channels), labeled X and Y on the diagram, are connected horizontally. The power supply is connected to these rows. The other row of holes (A-J) are connected vertically in blocks of five, (A-E) and (F-J) on the diagram. Each block of five holes is not connected to each other across the center between rows E and F.



Breadboard

Symbols

Directions for Wiring a Simple Circuit

1. Insert the end of one of the battery wires into one of the holes in row X.
2. Insert the other battery wire into one of the holes in row Y. Trace the flow of electricity. Is this a complete circuit?

4B Handout: Turn It On and Off (continued)

3. Insert one of the wires from the bulb holder into row X and the other into row Y. What happens? Trace the flow of electricity. Is this a complete circuit?

4. Explore how the breadboard circuitry is arranged. Move the wires to new holes and predict if the bulb will light or not. Trace the flow of electricity in each new arrangement.

5. Try to wire the breadboard to light the bulb using two additional wires so that the lightbulb is not plugged into the power channels (rows X and Y). Draw a diagram of this in your notebook.

Directions for a Series Circuit

1. To build a series circuit, you will need two batteries and two bulbs. Identify the positive (cathode) and negative (anode) terminals of the battery.

2. For the first battery, attach the positive wire to channel X on the breadboard. Next, attach the negative wire to any set of five holes in the middle of the board.

3. For the second battery, attach the negative wire to channel Y on the breadboard. Next, attach the positive to the same set as with battery one.

4. For the first bulb, plug one wire into channel X on the breadboard. Plug the other wire into one of the five sets of holes in the middle of the board—make sure it is not plugged into one of the sets of five holes that the batteries are plugged into.

5. Take the second bulb and plug one wire into channel Y on the breadboard. Plug the second wire into the same set of five holes that the other bulb is connected to. What happens?

6. Make a diagram of a series circuit in your notebook.

Directions for a Parallel Circuit

1. Remove the two bulbs from the breadboard from the previous steps, but keep the batteries wired as they were for a series circuit.

2. Take the first bulb and plug one wire into channel X on the breadboard and plug the second wire into channel Y. What happens? Now repeat this for the second bulb. What happens?

3. Remove one wire from one of the bulbs. What happens? What do you notice about the brightness of the bulb? This is a parallel circuit. Repeat this for the other bulb.

4. Make a diagram of a parallel circuit in your notebook.

Adding a Switch
If you decide to work on a project that requires some electronics, you may find that while you

4B Handout: Turn It On and Off (continued)

need a light or sound, you probably don't always want to have it on. Therefore, you'll need to learn to wire a switch. It should be easy now that you know how to wire a circuit.

1. Wire a simple circuit.
2. Be sure that the switch is wired and ready to go.
3. You will probably need to remove a wire and place it elsewhere—which wire is this? Remove it and place it where you think it should go.
4. How will you connect the bulb wire and the switch wire? (Hint: you may need to use a third wire that is not the bulb or switch wire.)
5. Where should the two switch wires go? Place them where you think they should go.
6. Try to open and close the switch to turn the bulb on and off. Does it work? If so, congratulations! You can now wire a switch. If not, keep trying!
7. Draw a diagram with symbols of a circuit with a switch in your notebook.

Wiring a Buzzer (Optional)
Ding dong! Ever wonder how a bell works? Here's your chance to wire a buzzer. It's easy now that you know how to wire circuits and a switch.

1. Wire a buzzer to the breadboard.
2. Now wire a light, switch, and buzzer with two batteries.
3. Draw a diagram using the symbols. You can use the speaker symbol for the buzzer.

Meet a Computer Engineer

Reading: Session 4, Activity B

May Tee
Computer Engineer
Portland, Oregon

A career in computer engineering has taken May Tee around the world, from the Pacific Northwest to New York to Italy. She has worked on everything from software applications for high fashion design to cutting-edge technical projects for the computer industry. Currently, as an engineer for Intel® Innovation in Education, she helps to develop online learning tools that teachers use with their students. What kind of student might be well-suited to her profession? "If you like fast change, new challenges, and being able to solve problems creatively," she says, "computer engineering could be the field for you."

An Unexpected Path

Tee grew up in Malaysia, dreaming of becoming an artist. She didn't see her first computer until she was in junior high school, and then was unimpressed. "The teacher did all this stuff to make the screen print out 'Hello.' I thought, that's it?" She was baffled by the whole idea of computer engineering. "I thought engineers only built concrete things, like bridges. But a computer screen is two-dimensional, not tangible. I had no clue what a computer engineer does."

Her high school teachers encouraged students to consider professions like medicine, law, or architecture. "In a developing country like Malaysia, those are the areas that are most needed," she says. Because she excelled in chemistry, she first planned to become a pharmacist. She came to the U.S. to start college and quickly changed gears. "Even though I was doing well in chemistry, I didn't like all the memorization. I only like the problem-solving part of chemistry." She explored other fields. "I took an accounting class, where I sat in the back row and fell asleep. When I wasn't sleeping, I was busy doing my homework for computer science. That class was much more interesting."

Tee says she was fortunate to have "a very good first instructor, so I fell in love with computer science. It takes a teacher who is knowledgeable in the field, and also good at teaching and explaining." Computer science can be hard to grasp at first, she admits, because the programming is hidden from what you see on the monitor. As she learned more about the field, she was attracted by "the problem-solving aspects. It's mathematical, logical. I used to play

4B Reading: Meet a Computer Engineer (continued)

chess, which takes step-by-step reasoning, so that's a thinking process I have."

After her first two years of college in Portland, attending both Portland Community College and Portland State University, she completed her degree in computer science at the University of Hawaii.

Launching Her Career

Tee graduated from college in 1996, when the technology sector was booming. The growth of the World Wide Web opened new opportunities, too, especially for a computer engineer with an eye for design and passion for visual art.

Her first engineering job, with Step Technologies in Portland, involved working on solutions using Microsoft software. She worked alongside veteran engineers, all with 10 to 15 years of experience. "I was the guinea pig, hired fresh out of college. They wanted to see what ideas some young blood would bring to an organization, and I was looking for someone to mentor me."

After three years there, she had a solid technical foundation and was ready for new challenges. "A lot of computer engineers have a creative side. They are photographers, artists, or musicians, something that's their passion." She followed her own passion and spent a few months in London studying art.

Back in the U.S., she took part in a complex project for Intel involving how users interface with computers. That let her bring together the technical side of how computers work with the graphic elements that affect the user's experience. "I could play with how things look on the screen, and saw how the right visual elements could help the user."

Tee's next projects took her to New York to work for Prada, a leading fashion house, and then on to Italy to see how computers are used in all facets of the textile industry. She enjoyed taking on each new set of challenges, using her technical skills to create a better result. "I began working directly with the people who use the software, seeing how they behave and what works for them. I could see the kind of frustration people have if the software does not meet their needs."

Each new assignment has made Tee's work more satisfying. "I realize I can make a difference visually, and that helps people feel like this is a usable tool. I love that part-to communicate to people through the software. It makes my work interesting and satisfying."

Always Something New

Currently, in her role of developing interactive tools for online learning, Tee works with diverse colleagues. She attends meetings to talk with clients and understand the design requirements and instructional purpose for each tool. She meets with graphic designers who bring in

4B Reading: Meet a Computer Engineer (continued)

expertise about color, typefaces, animations, and other visual elements. Human factor engineers add another perspective, bringing an analysis of how well tools will work for intended users. And through the whole process, Tee collaborates with fellow computer engineers, figuring out the technical solutions that will make everything work smoothly on the World Wide Web. "You learn so much from all these other people," she says.

Tee says her career moves may not be typical for engineers, but the variety has kept her excited about computer engineering and learning new skills. "I love the constant stimulation. It's the right fit for me," she says. "The creative part of computer science lets me fulfill my desire to be able to solve problems creatively, like an artist.

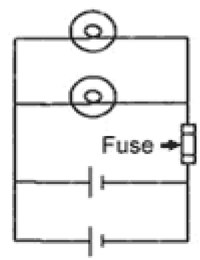
Advice for Students
Tee advises students heading into computer engineering to seek out the best professors they can find. "Ask your classmates. They always know who the best teachers are." And she encourages students to learn all they can by interviewing engineers and arranging internships. "That's the best way to see all the different aspects of the field. It's not just sitting in front of the computer."

Short Circuits

Handout: Session 4, Activity C

Imagine what happens when a tree falls across a power line, a hair dryer that's plugged in falls into the bathtub, or a clothes dryer is plugged into a circuit that can't handle that much power—a short circuit occurs. The current takes the easy route, the one with less resistance.

1. Your pair will join with another pair. One pair should make a series circuit with two bulbs and one battery.



2. Everyone in the group should look at the series circuit. Hold a wire *very briefly* so that one end touches one terminal on one side of the bulb holder and the other end touches the other terminal on the same holder. In your notebook, explain what happens.

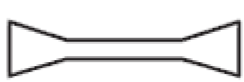
3. The other pair should make a parallel circuit with two bulbs and one battery. Repeat the same activity as above with the parallel circuit. Explain what happens.

Fuses (Optional Activity)
Have you ever had to change a fuse? If so, you probably know that fuses are designed to break a circuit before the wire gets too hot and catches on fire. In this activity, you'll see how a fuse works.

1. Wire a parallel circuit with two batteries and two bulbs. (Ignore the fuse symbol for now.)

2. Change the wiring by moving one end of each bulb's wire from one power channel to the same inside block of holes (either A-E or F-J). Then insert one end of a new a wire into the same block of holes in that channel and one end of another wire into the empty power channel. Now touch the ends of those two wires together to test the circuits. The bulbs should light.

    A. Make a fuse by cutting the shape below out of a piece of aluminum foil.



4C Handout: Short Circuits (continued)

B. Hold the two extra wires to the ends of the fuse (foil).

C. Short out the circuit by holding another wire so that one end touches one terminal of one of the bulb holders and the other end touches the other terminal of that same bulb holder. Be careful. You may see smoke!

Record your observations and explain what caused this to happen.

Light-Emitting Diodes

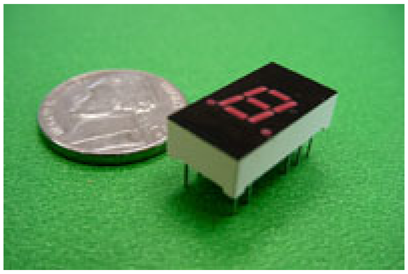
Handout: Session 4, Activity D

What Is an LED?
LED stands for "light-emitting diode." Basically, LEDs are tiny bulbs that fit easily into an electrical circuit. But unlike ordinary bulbs, they don't have a filament that will burn out, and they don't get very hot. They are illuminated solely by the movement of electrons in a semiconductor material. The light is emitted from the material used in the diode. Diodes are electrical components that allow the current to flow in only one direction. LEDs have an additional feature of lighting up when current is flowing through.

LEDs are everywhere—the numbers on digital clocks, the light on a curling iron or on the TV remote control perhaps. Collected together, they can even form images on a TV screen or illuminate a traffic light. Several LEDs are needed to display a number.

Try to make an LED light using a battery. What did you need to do?

Wiring an LED Number Display
In this activity you will experiment with different combinations of wiring to light up eight different LEDs that make up a number display. Study the LED Number Display chip and the information on the back of the packaging:



LED display (next to a U.S. nickel coin)

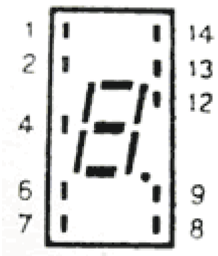


Diagram of pin location

Table of Pin Designations

1. Anode F	14. Anode A
2. Anode G	13. Anode B
3. No Pin Cathode	12. Common Cathode
4. Common Cathode	11. No Pin
5. No Pin	10. No Pin
6. Anode E	9. Anode RHDP
7. Anode D	8. Anode C

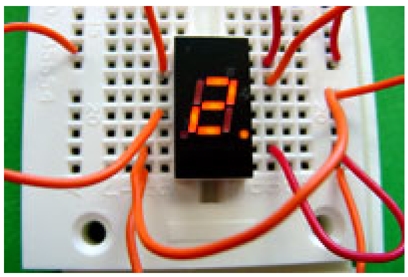
Follow the instructions below to light up the LED number display:

4D Handout: Light-Emitting Diodes (continued)

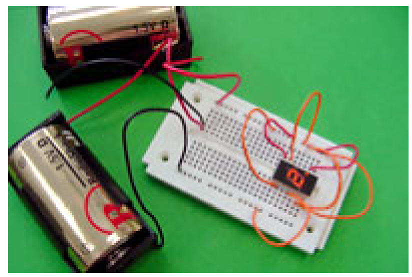
1. Power the breadboard by connecting two batteries in series to the power tracks.

2. Insert the LED number display so the pins on one side of the chip are in the E row and the other side are in the F row and the decimal point is at the bottom edge. If the display does not fit snugly on the breadboard, check to see that all pins are straight, aligned over holes, and press firmly.

3. Wire one cathode (referred to as a common cathode on the diagram) to the negative power track.



Close-up of LED number display with breadboard



LED number display circuit

4. To light the different LED segments, experiment with connecting wires between the positive track to the different anodes. Take notes on the results of your tests in your design notebook.

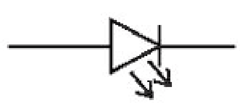
5. Try wiring the other cathode to the negative power track. Which wiring lights each segment? Did you figure out how to light up the right hand decimal point (RHDP)?

6. Now wire the necessary segments to display your favorite number.

7. Challenge: Can you wire a switch so that it displays your lucky number and then the lucky number of your partner? For example, one position of the switch will show the number "2" and the other position will show the number "6."

8. Bigger challenge: Wire a touch screen to display a number. How do you make a touch screen? How about using two pieces of aluminum foil arranged so that when you touch them in a particular place they complete a circuit? Take it from there!

9. Make a diagram of your circuit using an LED symbol.



LED

Electrical House Hunt

Handout: Session 4, Home Improvement

Have you ever considered the electrical units in your house? We are all accustomed to flipping a switch to turn on the lights or pressing a button on a microwave, but have you thought about how these things work? Here's a chance to take an electrical hunt through your home. Record your findings in your design notebook.

1. Locate circuit breakers (these act like fuses to prevent fires from short circuits). Where are they located?

2. Find 10 household items that use LEDs and list them.

3. Find 10 household items that have switches