

Discovery Place Science Merit Badge Workshops 2018

Saturday, January 20, 9:15 am to 12:15 pm	Energy	3 hours
Saturday, January 20, 12:45 pm to 4:45 pm	Engineering	4 hours
Sunday, January 21, 12:30 pm to 4:45 pm	Chess	4:15 hours
Sunday, January 21, 12:30 pm to 4:45 pm	Sustainability	4:15 hours
Saturday, February 3, 9:15 am to 4:45 pm	Robotics	7 hours
Saturday, February 3, 9:15 am to 12:15 pm	Weather	3 hours
Sunday, February 4, 12:30 pm to 4:45 pm	Space Exploration	4:15 hours
Saturday, March 3, 9:15 am to 12:15 pm	Pulp and Paper	3 hours
Saturday, March 3, 9:15 am to 12:15 pm	Oceanography	3 hours
Saturday, March 3, 12:45 am to 4:45 pm	Programming	4 hours
Sunday, March 4, 12:30 pm to 4:45 pm	Chemistry	4:15 hours
Sunday, March 4, 12:30 pm to 4:45 pm	Sustainability	4:15 hours
Saturday, May 5, 9:15 am to 12:15 pm	Oceanography	3 hours
Saturday, May 5, 9:15 am to 12:15 pm	Energy	3 hours
Saturday, May 5, 12:45 am to 4:45 pm	Space Exploration	4 hours
Sunday, May 6, 12:30 pm to 4:45 pm	Chess	4:15 hours
Saturday, June 2, 9:15 am to 12:15 pm	Electricity	3 hours
Saturday, June 2, 9:15 am to 12:15 pm	Weather	3 hours
Saturday, June 2, 12:45 pm to 4:45 pm	Chemistry	4 hours
Sunday, June 3, 12:30 pm to 4:45 pm	Electronics	4:15 hours
Saturday, August 25, 9:15 am to 12:15 pm	Energy	3 hours
Saturday, August 25, 12:45 pm to 4:45 pm	Engineering	4 hours
Sunday, August 26, 12:30 pm to 4:45 pm	Chess	4:15 hours
Sunday, August 26, 12:30 pm to 4:45 pm	Sustainability	4:15 hours
Saturday, September 22, 9:15 am to 4:45 pm	Robotics	7 hours
Saturday, September 22, 9:15 am to 12:15 pm	Oceanography	3 hours
Sunday, September 23, 12:30 pm to 4:45 pm	Space Exploration	4:15 hours

Saturday, November 3, 9:15 am to 12:15 pm	Weather	3 hours
Saturday, November 3, 9:15 am to 12:15 pm	Programming	3 hours
Saturday, November 3, 12:45 am to 3:45 pm	Pulp and Paper	3 hours
Sunday, November 4, 12:30 pm to 4:45 pm	Chess	4:15 hours
Saturday, December 1, 9:15 am to 12:15 pm	Electricity	3 hours
Saturday, December 1, 12:45 pm to 4:45 pm	Chemistry	4:15 hours
Sunday, December 2, 12:30 pm to 4:45 pm	Electronics	4:15 hours
Sunday, December 2, 12:30 pm to 4:45 pm	Sustainability	4:15 hours

Merit Badge Counselors:

Chess	Rachael Marks, Ben Pulley
Chemistry	Rachael Marks, Ben Pulley
Electricity	Rachael Marks, Ben Pulley
Electronics	Rachael Marks, Ben Pulley
Energy	Rachael Marks, Ben Pulley
Engineering	Rachael Marks, Ben Pulley
Oceanography	Riana Clark
Programming	Rachael Marks, Ben Pulley
Pulp and Paper	Riana Clark
Robotics	Rachael Marks, Ben Pulley
Space Exploration	Rachael Marks, Ben Pulley
Sustainability	Riana Clark
Weather	Riana Clark

How to Register for Discovery Place Science Merit Badge Workshops in 2018

How to register: Scouts, with parent guidance, should themselves call Discovery Place Science to make inquiries about course content and/or prerequisites and to register for courses at Discovery Place Science and Nature Museum. Discovery Place Science will respond to the inquiry and/or registration with an email document with course details and expectations and pre-course homework assignments, following BSA Youth Protection guidelines with a copy of the email to an adult. Scouts will be expected to collaborate with Counselors by email and/or phone on completing prerequisites before the course session on merit badges requiring Counselor review of notes or outlines of talks or presentations or other assignments. For any pre-course questions, Scouts are expected to call Discovery Place Science to speak to their Merit Badge Counselor.

Schedule your own merit badge course with your own unit: Discovery Place Science offers “schedule your own” merit badge courses for Scouts, patrols, or troops who would like a customized schedule for one of the designated Discovery Place Science merit badges. The group must achieve a minimum class size. The scheduling must work with space, staff, date and time resources available at Discovery Place Science. A lead Scout, with adult supervision, should call Discovery Place Science to plan the event.

Website(s): <https://science.discoveryplace.org/>
<https://science.discoveryplace.org/programs-and-classes/scout-programs>
<https://science.discoveryplace.org/explore/events>

Location of event: Discovery Place Science, 301 N Tryon St, Charlotte, NC 28202,
 Phone: 704 372 6261

Hours of operation:

Sunday:	noon - 5:00 p.m.
Monday through Friday:	9:00 a.m.- 4:00 p.m.
Saturday:	9:00 a.m.- 5:00 p.m.

Minimum class size: 8

Maximum class size: 20

Cost: Cost is \$35 for each class lasting 1/2 day on Saturday or Sunday. Robotics is a full day class on Saturdays and costs \$55. Scouts may register for 1 or 2 or 3 classes during any one weekend.

Discovery Place Science is not able to offer a refund if a Scout is not able to attend. However, if a Scout is not able to attend, he may notify Discovery Place Science of his situation and either recruit a Scout to take his place or ask Discovery Place Science to apply his paid fee toward his registration for a future merit badge program.

How to register: Please call the Discovery Place Science at 704 372 6261 ext. 300 to register. Scouts must register in advance to participate.

Registration opens: On Monday 6 weeks before the date of the class

Registration closes: On Wednesday 1 day before the weekend course or when class is full.

Age guidelines and suggestions for maturity and knowledge:

Ages 12 to 17 for Chemistry, Chess, Electricity, Electronics, Energy, Engineering, Oceanography, Pulp and Paper, Space Exploration, Sustainability, Weather
Ages 13 to 17 for Programming, Robotics

Questions: Scouts, not parents or unit leaders, should call Discovery Place Science to speak directly with the Merit Badge Counselor about pre-course homework, equipment, projects, observation assignments, or scheduling follow-up meetings for reviewing requirements and signing off blue cards. Scout calls and communications should be supervised by parents and unit leaders to follow BSA Youth Protection guidelines.

Blue card requirement: Each Scout must present to the counselor a separate blue card signed by their Scoutmaster indicating permission to participate in the course(s). Scouts should fill out the requirement grid portion of the card and have the Merit Badge Counselor initial this section of the card for each completed requirement. When the Scout has completed all requirements, the Merit Badge Counselor must sign and date the card on 2 places. Each Scout is responsible to obtain these signatures and to turn the card in to his Scoutmaster so that merit badge can be registered and awarded.

Parents are welcome to attend all sessions.

Partial or Full Completion: Full completion of any of these merit badges is possible IF Scouts complete above preparations before, during, and after class. If a Scout does not finish all requirements, he can work with his Counselor to list and initial requirements completed on his blue card for later completion with the Counselor or with a Counselor identified by his Scoutmaster. Scouts should follow the buddy system with 2-deep adult leadership for all merit badge sessions and for all meetings with a Counselor. A Scout's buddy can be "a friend, parent, guardian, brother, sister, or other relative—or better yet, another Scout working on the same badge—along with him attending the session." (from *BSA Guide to Advancement 2015*, page 49)

A Scout who is unable to complete one or more requirements can schedule later sessions with the Counselor to demonstrate his knowledge or skills or requirement completions.

Food: For Scouts participating in all-day merit badge workshops, all Scouts must pack their own lunches, including food and drinks, and eat them in the dining area at Discovery Place Science. Scouts will not have time to purchase food in the Discovery Place Science Community Cafe. Eating or drinking during the class sessions will not be allowed.

Clothing: Scouts are expected to wear their field uniform ("Class A" uniform) with Scouts pants and shirt to demonstrate participation as a Scout and to reinforce Scouting values and behavior during the course. Scouts must wear closed-toe shoes or boots (not sandals) with socks to classes for safety. Neckerchiefs and merit badge sashes and medals are not expected or required.

Scouts enrolled in Space Exploration will be outside for part of the course. Be Prepared for inclement weather with layers and rain gear, if needed. Wear hats and sunblock.

Cell phones: A Scout is courteous. Scouts may have cell phones with them during the course, but cell phones should be turned completely off during all class sessions. If a Scout chooses to send text messages or talk on his cell phone during class, he will be expected to loan his cell phone to the instructor or to his parent or to a Scout leader for safe keeping during the rest of the day, to be returned when the class ends.

Arrival time and place:

Please enter Discovery Place Science 15 minutes before class starts at the entrance at the corner of 6th Street and North Church Street. Please enter Discovery Place Science only at this entrance. This is where you will meet your Counselor.

Discharge time and place:

Scouts will leave Discovery Place Science at the entrance at the corner of 6th Street and North Church Street. Please leave Discovery Place Science only at this entrance. Parents should pick up Scouts to go home at this entrance.

Preparation for All Merit Badges before class:

1. Scouts must read the merit badge book before class.

2. Scouts can print Merit Badge requirements from

<http://www.scouting.org/meritbadges.aspx>

or from

http://www.meritbadge.org/wiki/index.php/Merit_Badge_Worksheets

Scouts should bring these pages and blank paper and pen to the course for their notes and research. These items will not be supplied by the course instructors.

Printed workbooks are optional and not mandatory but Scouts will find that workbooks from the www.meritbadge.org site will be very helpful in organizing their work.

3. All Scouts are expected to bring pre-course homework assignments with them to class and present these notes and projects to the merit badge counselor as evidence of your preparation.

Preparation for All Merit Badges during class:

All Scouts are expected to take notes and to write down answers to requirement questions as the information is presented during the course. These notes should be available at the end of the day to show the Merit Badge Counselor on-site and to demonstrate your participation and learning to your Scoutmaster and other troop leaders. Scouts should keep these notes to avoid any concerns about the level of participation or accomplishment at Boards of Review or Scoutmaster Conferences.



Chemistry Merit Badge

Chemistry Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Chemistry.pdf
or
<http://meritbadge.org/wiki/index.php/Chemistry>
or
workbook at <http://usscouts.org/mb/worksheets/Chemistry.pdf>
3. Scouts must Be Prepared by researching requirements 6 b, c, d, 7 b before class and by writing down some information about these topics in their notebooks.
You must bring this information with you to class.



Chess Merit Badge

Chess Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Chess.pdf
or
<http://meritbadge.org/wiki/index.php/Chess>
or
workbook at <http://meritbadge.org/wiki/images/e/e4/Chess.pdf>
2. Before class, Scouts must Be Prepared by working on **requirement 1**. Write an outline of the history of chess.
3. Before class, Scouts must Be Prepared by working on **requirement 3**. Know what the EDGE method of teaching is. Check out pages 11-12-13 of <http://www.scouting.org/filestore/pdf/26-242.pdf>
Write down what E and D and G and E stand for.
Write down definitions for castling and en passant capture.
4. Before class, Scouts must Be Prepared by working on **requirement 4**.
For 4c, write down four opening principles.
For 4d, write down four rules for castling.
For 4e, write down definitions for “scholar’s mate” and “fool’s mate.”
5. Before class, Scouts must Be Prepared by working on **requirement 5**.
For 5b, write down definitions of 5 or more of tactics listed.



Cyber Chip

Cyber Chip is not a merit badge but earning the Cyber Chip is required for completion of Digital Technology and Programming Merit Badges.

Cyber Chip courses are not offered at Discovery Place Science in 2017.

Digital Technology Merit Badge course will not be offered at Discovery Place Science in 2018.

To complete Programming Merit Badge, each Scouts **must** complete Cyber Chip requirements on his own, working with parents and Scout leaders from their troops.

BSA launched the age-appropriate Cyber Chip program in 2012 in collaboration with BSA Program Innovation, Youth Protection, and content expert Netsmartz, part of the National Center for Missing and Exploited Children and training expert for many law enforcement agencies.

Learn about Cyber Chip at

<http://www.scouting.org/filestore/youthprotection/pdf/100-053.pdf>

and

<http://www.scouting.org/cyberchip.aspx>

and

<http://www.scouting.org/Training/YouthProtection/CyberChip/Grades6-8.aspx>

and

<http://www.scouting.org/Training/YouthProtection/CyberChip/Grades9-12.aspx>

You can purchase your Cyber Chip card and patch from your local Scout Shop or online at www.scoutstuff.org

Note: All Cyber Chips will expire annually. Each Scout will need to “recharge” the chip by going back to the Netsmartz Recharge area. This space will hold new information, news, and a place for the Scout to recommit to net safety and netiquette. Then, with the unit leader, the Scout can add the new date to the Cyber Chip card or certificate.

Internet Safety Pledge
For Boy Scouts, Venturers, Varsity Scouts, Sea Scouts
For Grades 6-8, 9-12

Level II Internet Safety Pledge from NetSmartz. (BSA Cyber Chip green card)

1. I will think before I post.
2. I will respect other people online.
3. I will respect digital media ownership.
4. I won't meet face-to-face with anyone I meet in the digital world unless I have my parent's permission.
5. I will protect myself online.

This is to certify that the bearer

Boy Scout, Venturer, Varsity Scout, Sea Scout Name

has read the internet safety rules at
www.scouting.org/cyberchip.
He knows how to be responsible online
and what to do if he discovers unsafe
internet practices. He accepts this
responsibility and is hereby
granted cyber rights.

Unit Leader Signature, Date

Copied from: <http://www.scouting.org/filestore/youthprotection/pdf/100-053.pdf>

Cyber Chip Requirements for Grades 6-8

<http://www.scouting.org/Training/YouthProtection/CyberChip/Grades6-8.aspx>

En Español

http://www.scouting.org/Training/YouthProtection/CyberChip.aspx?sc_lang=es-MX

1. Read and sign the Level II Internet Safety Pledge from NetSmartz (BSA Cyber Chip green card) above.
2. Write and sign a personalized contract with your parent or guardian that outlines rules for using the computer and mobile devices, including what you can download, what you can post, and consequences for inappropriate use.
3. Watch the video “Friend or Fake,” along with two additional videos of your choosing, to see how friends can help each other to stay safe online.
(www.netsmartz.org/scouting)
4. As an individual or with your patrol, use the EDGE method and mini lessons to teach Internet safety rules, behavior, and “netiquette” to your troop or another patrol. You are encouraged to use any additional material and information you have researched. Each member of the patrol must have a role and present part of the lesson.
(www.netsmartz.org/scouting)
5. Discuss with your unit leader the acceptable standards and practices for using allowed electronic devices, such as phones and games, at your meetings and other Scouting events.

Cyber Chip Requirements for Grades 9-12

<http://www.scouting.org/Training/YouthProtection/CyberChip/Grades9-12.aspx>

En Español

http://www.scouting.org/Training/YouthProtection/CyberChip.aspx?sc_lang=es-MX

1. Read and sign the Level II Internet Safety Pledge from NetSmartz (BSA Cyber Chip green card) above.
2. Write and sign a personalized contract with your parent or guardian that outlines rules for using the computer and mobile devices, including what you can download, what you can post, and consequences for inappropriate use.
3. Discuss with your parents the benefits and potential dangers teenagers might experience when using social media. Give examples of each.
4. Watch three “Real-Life Story” videos to learn the impact on teens.
(www.netsmartz.org/scouting)

5. As an individual or patrol, use the EDGE method and the Student Project Kit to teach Internet safety rules, behavior, and “netiquette” to your troop or another patrol. You are encouraged to use any additional material and information you have researched. Each member of the patrol must have a role and present part of the lesson.
(www.netsmartz.org/scouting)

Review EDGE method:

Explain how it is done.

Demonstrate the steps.

Guide learners as they practice.

Enable them to succeed on their own.

References:

<https://blog.scoutingmagazine.org/2017/05/05/living-on-the-edge-this-is-the-correct-way-to-teach-someone-a-skill/>

Alludes to 13th edition of *Boy Scout Handbook*, page 38

<https://scoutingmagazine.org/2016/12/use-edge-method-outdoors/>

<http://www.scouting.org/filestore/outdoorethicsguide/pdf/TeachingEdgeMethod.pdf>

Trainer’s EDGE course syllabus, pages 11-13, 50

<http://www.scouting.org/filestore/pdf/26-242.pdf>

6. Discuss with your unit leader the acceptable standards and practices for using allowed electronic devices such as phones and games at your meetings and other Scouting events.

With a buddy or your patrol, organize and execute a program to teach “netiquette” to your patrol or troop. You may include Scout leaders and parents.

Topics might include:

Posting information, news, photos

Maintaining privacy

Appropriate use of social media

Chatting with strangers

Document your activity in your workbook.

Sample Personalized Contract for Using the Computer and Mobile Devices

What can I search for:

What I can download:

What I can post:

Consequences for inappropriate use:

Youth, Date

Parent, Date

The Scout Law and Cybersafety and Cyberbullying

Copied from: http://www.scouting.org/filestore/youthprotection/pdf/100-055_WB.pdf

Today we are online more than ever before. We use technology to save us time with research, connect with others, navigate, and have fun. Here are some ideas of how the digital world and the Scouting community can live side by side.

Trustworthy. Be truthful with others online, and be very careful of the information you share. Do the right thing when sharing other people's words or pictures. Make sure you have the owner's permission before using them.

Loyal. Share information about others only if you have their permission to share it. Uphold appropriate agreements you make with friends when you play games with them.

Helpful. Alert others to scams, cheats, and suspicious sites. Point them to reliable and accurate sources of information. Encourage people to report bad behavior online.

Friendly. Reach out to support others who are doing good things, like posting quality creative works. Support those who are bullied.

Courteous. Be polite and respectful. When you use other people's work, be sure to ask permission when necessary, follow fair use standards, and give credit to the people who created and own the work.

Kind. Treat people with respect when you are on social networks, playing games, talking or texting on a cellphone, or in other digital activities.

Obedient. When using digital devices, follow the rules set by your parents/guardians, teachers, and Scout leaders. Abide by the rules established by sites, services, devices, and games.

Cheerful. Use games, messaging tools, and social forums to build your relationships with others while having fun.

Thrifty. Be a smart consumer. Know your voice, text, and data plans and use them wisely. Be sure to study digital devices and services you want. Before buying them, make sure you're not overspending on functions and features you won't need. Be careful not to run up charges on apps and sites.

Brave. Stand up for what is right. Do not participate in mocking and bullying others, even if your friends are doing it. Report suspected abuse to a trusted adult, like your parent or leader; call 911 or call the Cyber Tip line at 1-800-843-5678. If the incident involves any part of the Scouting program, call your council Scout executive immediately or email youth.protection@scouting.org.

Clean. Use clean language and discuss only appropriate topics when using digital devices to communicate with others.

Reverent. Respect the feelings of other people. Do not use digital devices to spread

Remember that life is a balance. In Scouting, we focus on a balanced life through our aims: character, physical fitness, and citizenship. Technology is a tool to help us. It is not there to take the place of family, friends, the Scout Law, and staying physically fit. Stay ScoutSTRONG!

Youth: _____ Parent: _____ Leader: _____ Date: _____



Electricity Merit Badge

Electricity Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Electricity.pdf
or
<http://meritbadge.org/wiki/index.php/Electricity>
or
workbook at <http://usscouts.org/mb/worksheets/Electricity.pdf>
3. Scouts must Be Prepared by completing requirement 2 before class and must bring their completed home inspection checklist signed by an adult with them to class. The workbook at <http://usscouts.org/mb/worksheets/Electricity.pdf> contains a Home Inspection Checklist for requirement 2 on pages 7 and 8.
4. Scouts must Be Prepared by completing complete requirements 8 and 9a at home and bring written results with them to class. Here is information on how to read an electric meter:
<http://energy.gov/energysaver/articles/how-read-your-electric-meter>
and/or
<https://www.youtube.com/watch?v=VQQCtKLZpwQ>
and/or
<https://www.youtube.com/watch?v=k2ogwitaAh4>



Electronics Merit Badge

Electronics Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_RegandRes/Electronics.pdf
or
<http://meritbadge.org/wiki/index.php/Electronics>
or
workbook at <http://meritbadge.org/wiki/images/e/ee/Electronics.pdf>
3. Scouts must Be Prepared by working on requirement 5a before class. Write down a definition of *electrical current*, *voltage*, *electrical resistance*, *Ohm's Law*. You can find good information at http://en.wikipedia.org/wiki/Electric_current
Look for other sources of information also. You must bring this written homework with you to class.
4. Scouts must Be Prepared by working on requirement 5b before class. Write down the names of 3 kinds of test instruments used in electronics. You can find good information at http://en.wikipedia.org/wiki/Electrical_and_electronic_measuring_equipment
and
<http://www.electropedia.org/iev/iev.nsf/index?openform&part=313>
Write down basic information about an ammeter, voltmeter, and ohmmeter.
You must bring this written homework with you to class.
5. Scouts must Be Prepared by working on requirement 6 at home and must write down information about careers in electronics and about the training and education needed for these careers. You must bring this written homework with you to class.
6. Although not required, Scouts should complete Electricity Merit Badge before working on Electronics Merit Badge.



Energy Merit Badge

Energy Merit Badge preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
 2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Energy.pdf
or
<http://meritbadge.org/wiki/index.php/Energy>
or
workbook at <http://meritbadge.org/wiki/images/a/ab/Energy.pdf>
 3. Scouts must Be Prepared by completing **requirement 4** before class: “**Conduct an energy audit of your home. Keep a 14-day log that records what you and your family did to reduce energy use.**”
You can find an Sample Home Energy Audit checklist on page 18 of the merit badge workbook at
<http://meritbadge.org/wiki/images/a/ab/Energy.pdf>
- Here are other sources of information:
<http://energy.gov/energysaver/do-it-yourself-home-energy-audits>
and
<http://www.usc.edu/org/edisonchallenge/2008/ws3/HomeEnergyAudit.pdf>
Look for other sources of information also. You must bring this written homework with you to class.

4. Scouts must Be Prepared by completing **requirement 6** before class. Scouts should print appropriate materials and make notes and bring those materials with them to class.

Here are some references for **requirement 6**:

6. a. The energy resources that supply the United States with most of its energy
What are the major sources and users of energy in the United States?
http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm

6. b. The share of energy resources used by the United States that comes from other countries

<http://www.ei.lehigh.edu/learners/energy/usenergy2.html>

and

<http://www.eia.gov/todayinenergy/detail.cfm?id=20812>

6. c. The proportion of energy resources used by homes, businesses, industry, and transportation

http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm

6. d. The fuels used to generate America's electricity

http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm

6. e. The world's known and estimated primary energy resource reserves

<http://www.euronuclear.org/info/encyclopedia/p/primary-energy-reserves.htm>

and

http://en.wikipedia.org/wiki/World_energy_resources

Another resource:

<http://www.eia.doe.gov/emeu/aer/eh/frame.html>

5. Scouts must Be Prepared by completing **requirement 8** before class.

Do research on careers in energy. Write down several possible careers. Find out about education and training for at least one of these that interest you.

You must bring this written homework with you to class.

6. Scouts are encouraged to read the article “Energy in the United States: 1635-2000”. This article was originally published about 2003 on the Department of Energy, Energy Information Agency website. It is currently available at

http://www.mnforsustain.org/energy_in_the_united_states_1635-2000.htm

Energy in the United States: 1635-2000

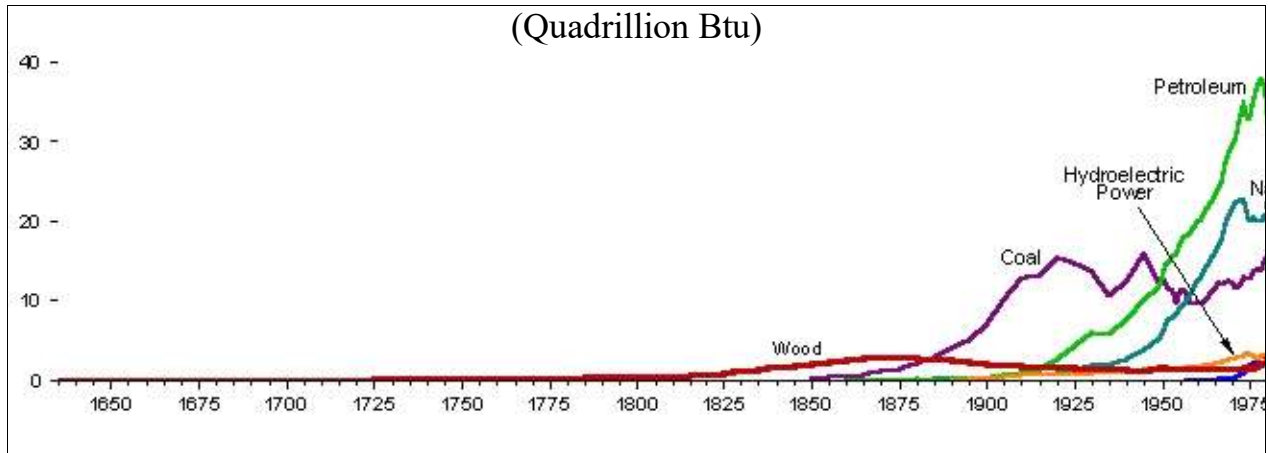
Energy is essential to life. Living creatures draw on energy flowing through the environment and convert it to forms they can use. The most fundamental energy flow for living creatures is the energy of sunlight, and the most important conversion is the act of biological primary production, in which plants and sea-dwelling phytoplankton convert sunlight into biomass by photosynthesis. The Earth's web of life, including human beings, rests on this foundation.

Over millennia, humans have found ways to extend and expand their energy harvest, first by harnessing draft animals and later by inventing machines to tap the power of wind and water. Industrialization, the watershed social and economic development of the modern world, was enabled by the widespread and intensive use of fossil fuels. This development freed human society from the limitations of natural energy flows by unlocking the Earth's vast stores of coal, oil, and natural gas. Tapping these ancient, concentrated deposits of solar energy enormously multiplied the rate at which energy could be poured into the human economy.

The result was one of the most profound social transformations in history. The new river of energy wrought astonishing changes and did so with unprecedented speed. The energy transformations experienced by traditional societies--from human labor alone to animal muscle power and later windmills and watermills--were very slow, and their consequences were equally slow to take effect. In contrast, industrialization and its associated socioeconomic changes took place in the space of a few generations.

The history of energy use in the United States reflects these general themes. Wood energy, for example, has been a significant part of the U.S. energy mix since colonial times (Figure 1). In fact, fuelwood was overwhelmingly the dominant energy source from the founding of the earliest colonies until late in the last century. But thereafter, the modern era is notable for the accelerated appearance of new sources of energy, in contrast to the imperceptible pace of change in earlier times. Coal ended the long dominance of fuelwood in the United States about 1885, only itself to be surpassed in 1951 by petroleum and then by natural gas a few years later. Hydroelectric power and nuclear electric power appeared about 1890 and 1957, respectively. Solar photovoltaic, advanced solar thermal, and geothermal technologies represent further recent developments in energy sources. The most striking of these entrances, however, is that of petroleum and natural gas. The curves depicting their consumption remain shallow for several decades following the success of Edwin Drake's drilling rig in 1859, but begin to rise more steeply in the 1920s. Then, interrupted only by the Depression, the curves climb at increasingly alpine angles until 1973. Annual consumption of petroleum and natural gas exceeded that of coal in 1947 and then quadrupled in a single generation. Neither before nor since has any source of energy become so dominant so quickly.

Figure 1. Energy Consumption by Source, 1635-2000



As for the social, economic, and ecological consequences of evolving energy sources, they are too deep and numerous to do more than give suggestive examples. One of the most significant is the shift between muscle- and machine power. Horses, mules, and other draft animals were invaluable prime movers well into the first half of the 20th century, and despite increasing reliance on fossil fuels and the engines they powered, the number of draft animals in the United States continued to rise until about 1920. As late as 1870, draft animals accounted for more than half of the total horsepower of all prime movers. Their displacement by fossil-fuel engines meant, eventually, the disappearance from city and farm alike of millions of animals, along with the vast stables that housed the city-based animals, the mountains of dung they left on city streets, and many of the English sparrows that fed on the grain therein.

As fossil fuels and the machines that ran on them proliferated, the nature of work itself was transformed along with the fundamental social, political, and geopolitical circumstances of the Nation. In the middle of the 19th century, most Americans lived in the countryside and worked on farms. The country ran mainly on wood fuel and was relatively unimportant in global affairs. A hundred years later, after the Nation had become the world's largest producer and consumer of fossil fuels, most Americans were city-dwellers and only a relative handful were agricultural workers. The United States had roughly tripled its per-capita consumption of energy and become a global superpower.

Although coal, oil, and natural gas are the world's most important energy sources, their dominance does not extend to all corners of the globe. In most places and times diversity and evolution in energy supplies has been the rule. In many areas muscle power and biomass energy remain indispensable or even primary. The shifting emphasis over time is clear not only in the long sweep of history but also in the short term, especially in the industrialized world. Electricity, for example, was essentially unavailable until the 1880s; now it is ubiquitous. And in the span of a few decades nuclear electric power in the United States was born, peaked, and began to decline in its contribution to total energy production.

No doubt we have not seen the end of evolution in energy sources. The paragraphs that follow briefly discuss the major energy sources now in use in the United States, including a bit of history, trends, and snapshots of consumption and production patterns as of 2000. The story they tell is one of diversity and transformation, driven by chance, the play of economic forces, and

human ingenuity. Whatever energy future awaits us, that part of the story seems unlikely to change.

Total Energy

The United States has always been a resource-rich nation, but in 1776, the year the Nation declared its independence from Great Britain, nearly all energy was still supplied by muscle power and fuelwood. America's vast deposits of coal and petroleum lay untapped and mostly undiscovered, although small amounts of coal were used to make coke, vital for casting the cannon that helped win the war. Mills made use of waterpower, and of course the wind enabled transport by ship.

Fuelwood use continued to expand in parallel with the Nation's economic growth, but chronic shortages of energy in general encouraged the search for other sources. During the first 30 years or so of the 19th century, coal began to be used in blast furnaces and in making coal-gas for illumination. Natural gas also found limited application in lighting during the period. Even electricity sought a niche; for example, experiments were conducted with battery-powered electric trains in the 1840s and 1850s. Still, muscle power remained an important source of energy for decades. Although a number of mechanical innovations appeared, including the cotton gin and the mechanical reaper, they had the effect of multiplying the productivity of human and animal muscle power rather than spurring the development of machine power. It was not until well after mid-century that the total work output from all types of engines exceeded that of work animals.

The westward expansion helped change that. As railroads drove west to the plains and the mountains, they left behind the fuelwood so abundant along the eastern seaboard. Coal became more attractive, both because deposits were often found near the new railroad rights of way and because its higher energy content increased the range and load of steam trains. Demand for coal also rose because the railroads were laying thousands of miles of new track and the metals industry needed an economical source of coke to make iron and steel for the rails and spikes. The transportation and industrial sectors in general began to grow rapidly during the latter half of the century, and coal helped fuel their growth.

Petroleum got its start as an illuminant and ingredient in patent medicines and did not catch on as a fuel for some time. At the end of World War I, coal still accounted for about 75 percent of U.S. total energy use. About the same time, the horse and mule population reached 26 million and then went into permanent decline. The beginning of the transition from muscle power was over.

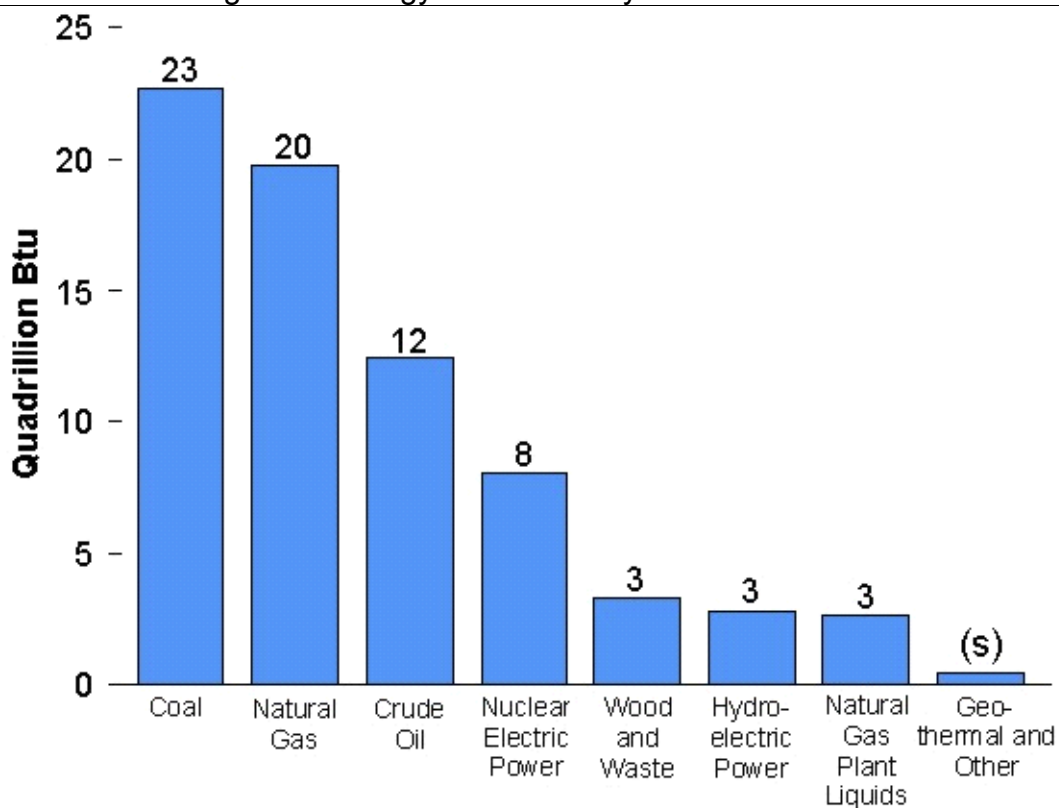
America's appetite for energy as it industrialized was prodigious, roughly quadrupling between 1880 and 1918. Coal fed much of this growth, while electricity expanded in applications and total use alike. Petroleum got major boosts with the discovery of Texas's vast Spindletop Oil Field in 1901 and with the advent of mass-produced automobiles, several million of which had been built by 1918.

In the years after World War II, "Old King Coal" relinquished its place as the premier fuel in the United States. The railroads lost business to trucks that ran on gasoline and diesel fuel, and also

began switching to diesel locomotives themselves. Labor troubles and safety standards drove up coal production costs. The declining demand for natural gas as an illuminant forced that industry to look for other markets, and because heating applications had obvious potential, natural gas replaced coal in many household ranges and furnaces. The coal industry survived, however, mainly because nationwide electrification created new demand for coal among electric utilities despite regional competition from hydroelectric and petroleum-fired generation.

Most energy produced today in the United States, as in the rest of the industrialized world, comes from fossil fuels--coal, natural gas, crude oil, and natural gas plant liquids (Figure 2). Although U.S. energy production takes many forms, fossil fuels together far exceed all other sources of energy. In 2000 they accounted for 80 percent of total energy production and were valued at an estimated \$148 billion (nominal dollars).

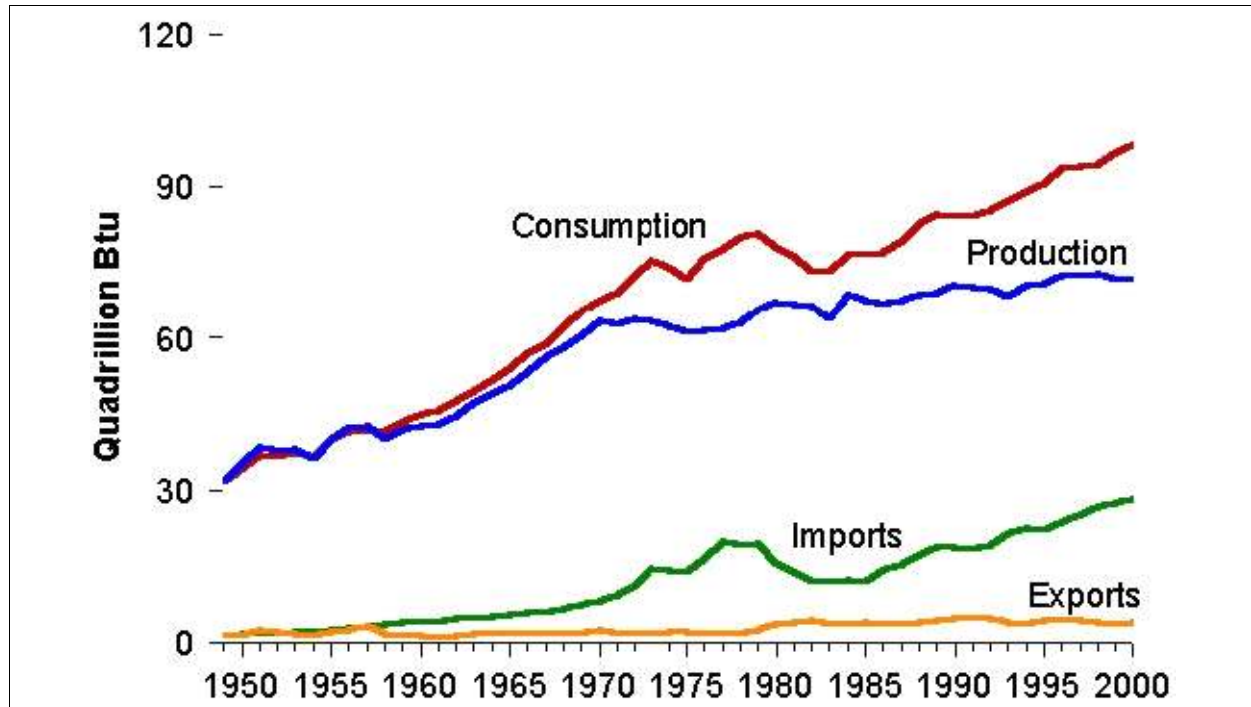
Figure 2. Energy Production by Source for 2000



(s)=less than 0.5 quadrillion Btu

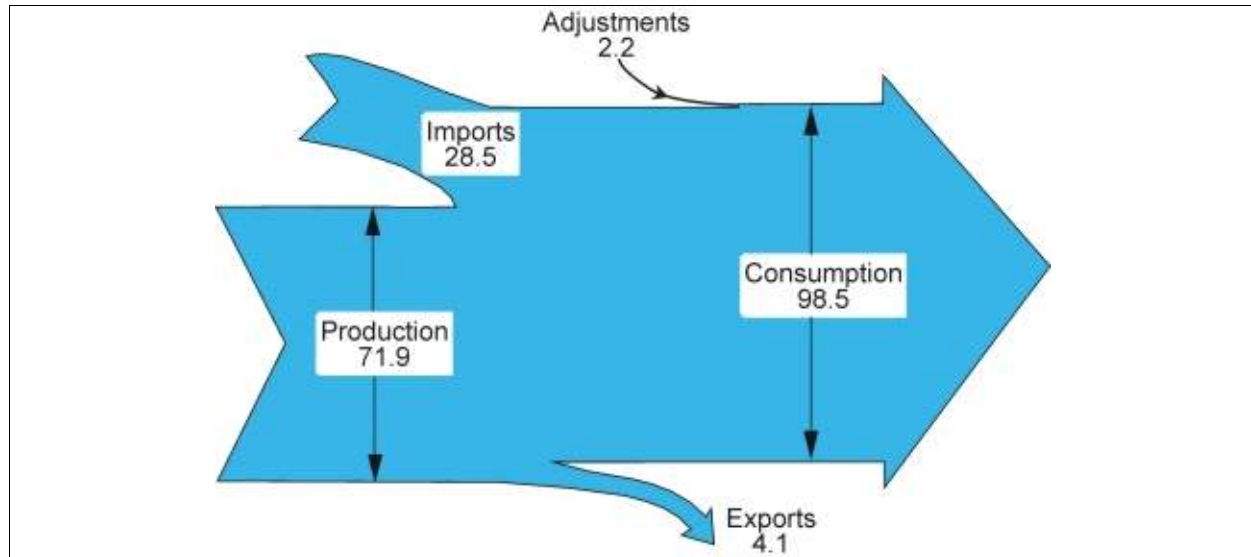
For much of its history, the United States was mostly self-sufficient in energy, although small amounts of coal were imported from Britain in colonial times. Through the late 1950s, production and consumption of energy were nearly in balance. Over the following decade, however, consumption slightly outpaced domestic production and by the early 1970s a more significant gap had developed (Figure 3).

Figure 3. Energy Overview



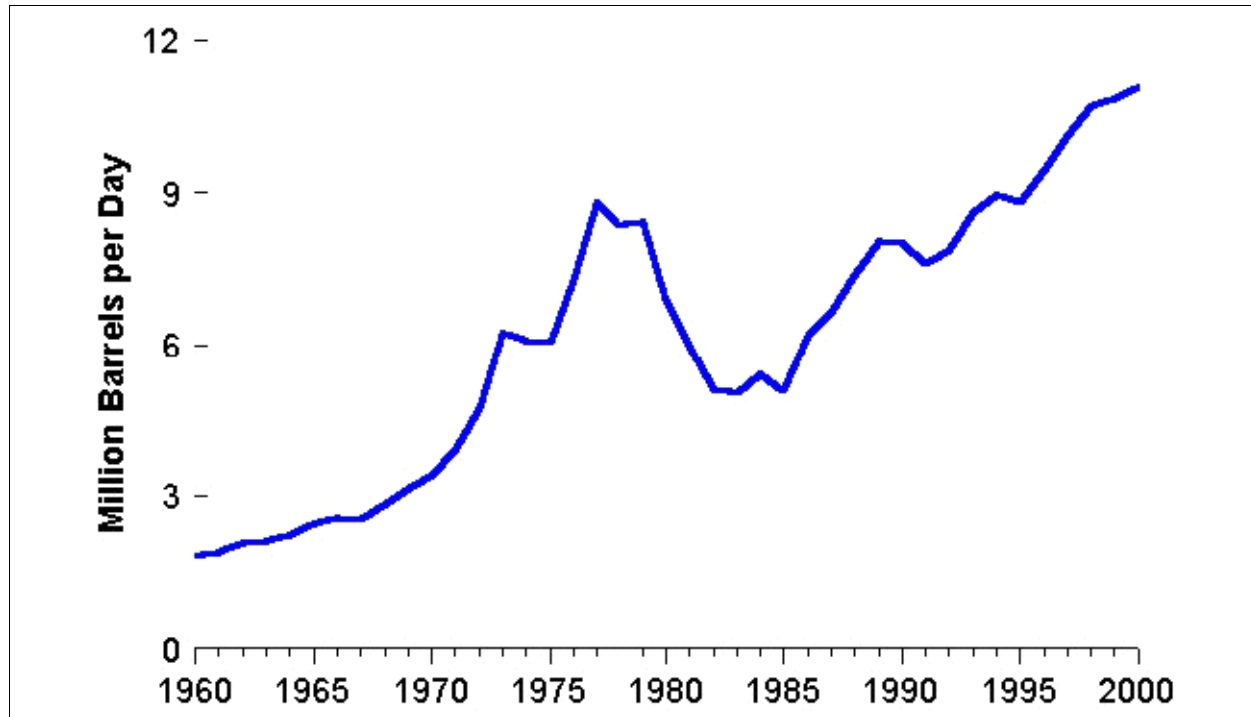
In 2000 the United States produced just under 72 quadrillion British thermal units (Btu) of energy and exported roughly 4 quadrillion Btu. Consumption totaled about 98 quadrillion Btu, requiring imports of almost 29 quadrillion Btu (Figure 4), 19 times the 1949 level.

Figure 4. Energy Overview, 2000



This appetite for imported energy is driven by petroleum consumption. U.S. petroleum imports in 1973 totaled 6.3 million barrels per day (3.2 million barrels per day of crude oil and 3.0 million barrels per day of petroleum products). In October 1973, however, the Arab members of the Organization of Petroleum Exporting Countries (OPEC) embargoed the sale of oil to the United States, prices rose sharply, and petroleum imports fell for two years (Figure 5). They increased again until the price of crude oil rose dramatically (roughly 1979 through 1981) and suppressed imports. The rising-import trend resumed by 1986 and, except for slight dips in 1990, 1991, and 1995, has continued ever since. In 2000 U.S. petroleum imports reached an annual record level of 11 million barrels per day.

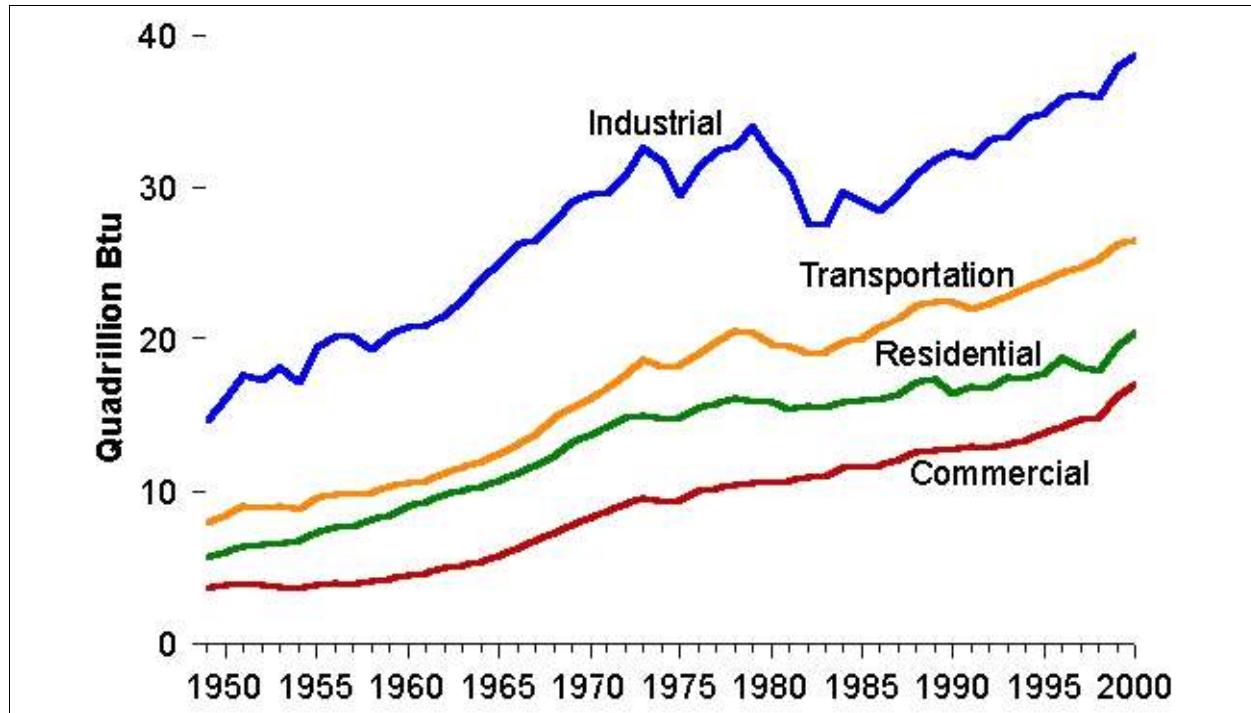
Figure 5. Petroleum Imports, 1960-2000



The efficiency with which Americans use energy has improved over the years. One such measure is the amount of energy consumed to produce a (constant) dollar's worth of gross domestic product (GDP). By that yardstick, efficiency improved 49 percent between 1949 and 2000, as the amount of energy required to generate a dollar of output (chained 1996 dollars) fell from 20.6 thousand Btu to 10.6 thousand Btu. Nevertheless, a growing population and economy drove total energy use up. As the U.S. population expanded from 149 million people in 1949 to 281 million in 2000 (an increase of 89 percent), total energy consumption grew from 32 quadrillion Btu to 98 quadrillion Btu (up 208 percent). Per-capita energy consumption rose 63 percent, from 215 million Btu in 1949 to 350 million Btu in 2000.

Energy plays a central role in the operation of the industrialized U.S. economy, and energy spending is commensurately large. In recent years, American consumers have spent over half a trillion dollars a year on energy. That energy is consumed in four broad sectors: residential, commercial, industrial, and transportation. Industry is historically the largest consuming sector of the economy. In contrast to the relatively smooth trends in the other sectors, industrial energy use has fluctuated sharply (Figure 6).

Figure 6. Energy Consumption by End Use



Sectoral energy sources have changed dramatically over time. In the residential and commercial sectors, for example, coal was the leading source as late as 1951 but then disappeared rapidly (Figure 7). Petroleum usage grew slowly to its peak in 1972 and then subsided. Natural gas became an important resource, growing strongly until 1972, when its growth essentially stalled. Electricity, only an incidental source in 1949, expanded in almost every year since then, as did the energy losses associated with producing and distributing the electricity. (See "Electricity" section below for an explanation of these losses.)

Figure 7. Residential and Commercial Energy Consumption

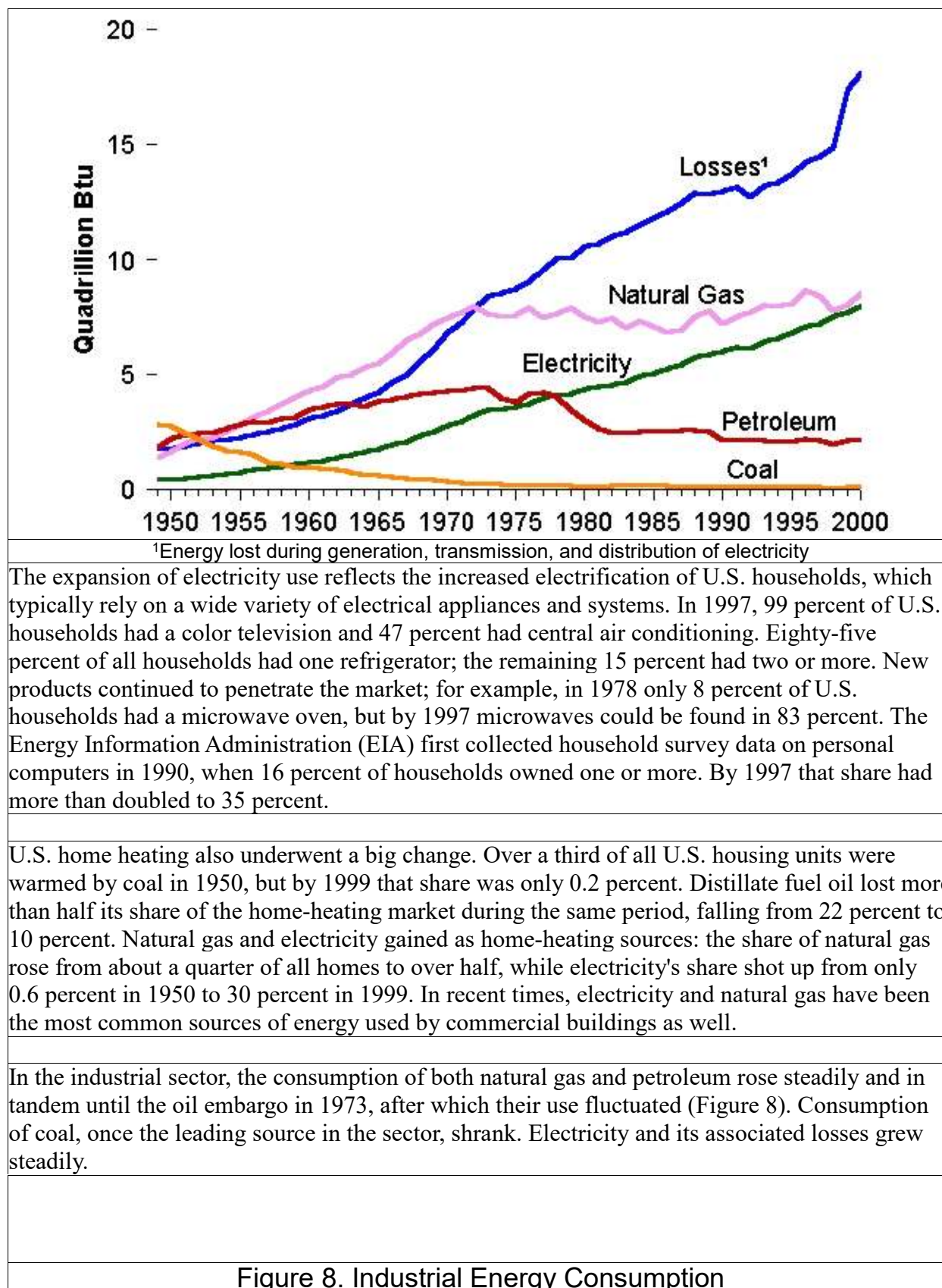
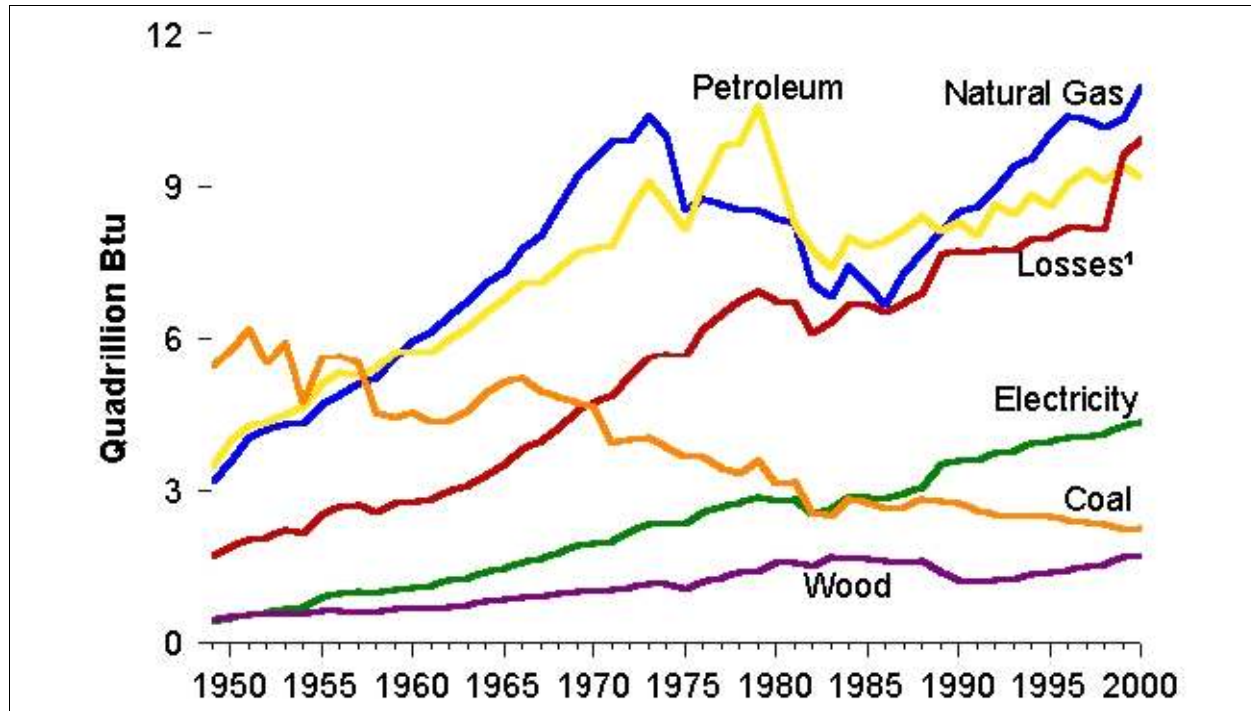


Figure 8. Industrial Energy Consumption

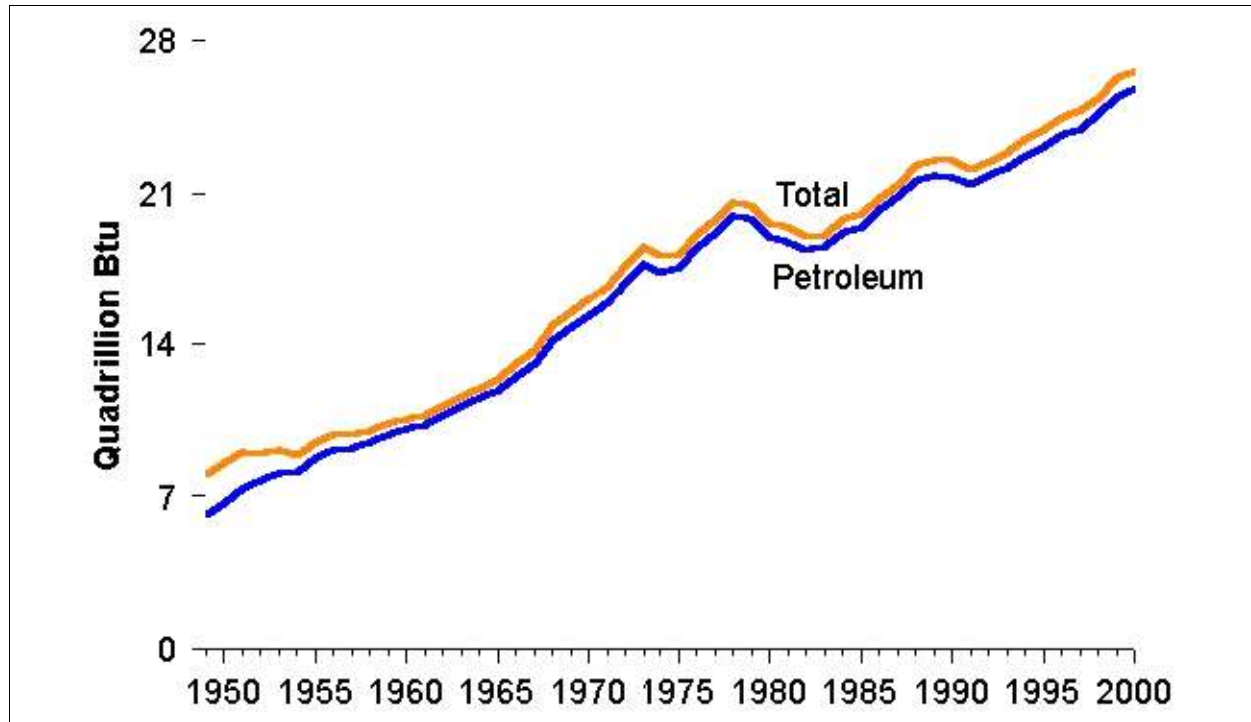


¹Energy lost during generation, transmission, and distribution of electricity

About three-fifths of the energy consumed in the industrial sector is used for manufacturing. The remainder goes to mining, construction, agriculture, fisheries, and forestry. Within manufacturing, large consumers of energy are the petroleum and coal products, chemicals and allied products, paper and allied products, and primary metal industries. Natural gas is the most commonly consumed energy source in manufacturing. The predominant end-use activity is process heating, followed by machine drive and then facility heating, ventilation, and air conditioning combined. About 7 percent of all energy consumed in the United States is used for nonfuel purposes, such as asphalt and road oil for roofing products and road building and conditioning; liquefied petroleum gases for feedstocks at petrochemical plants; waxes for packaging, cosmetics, pharmaceuticals, inks, and adhesives; and still gas for chemical and rubber manufacture.

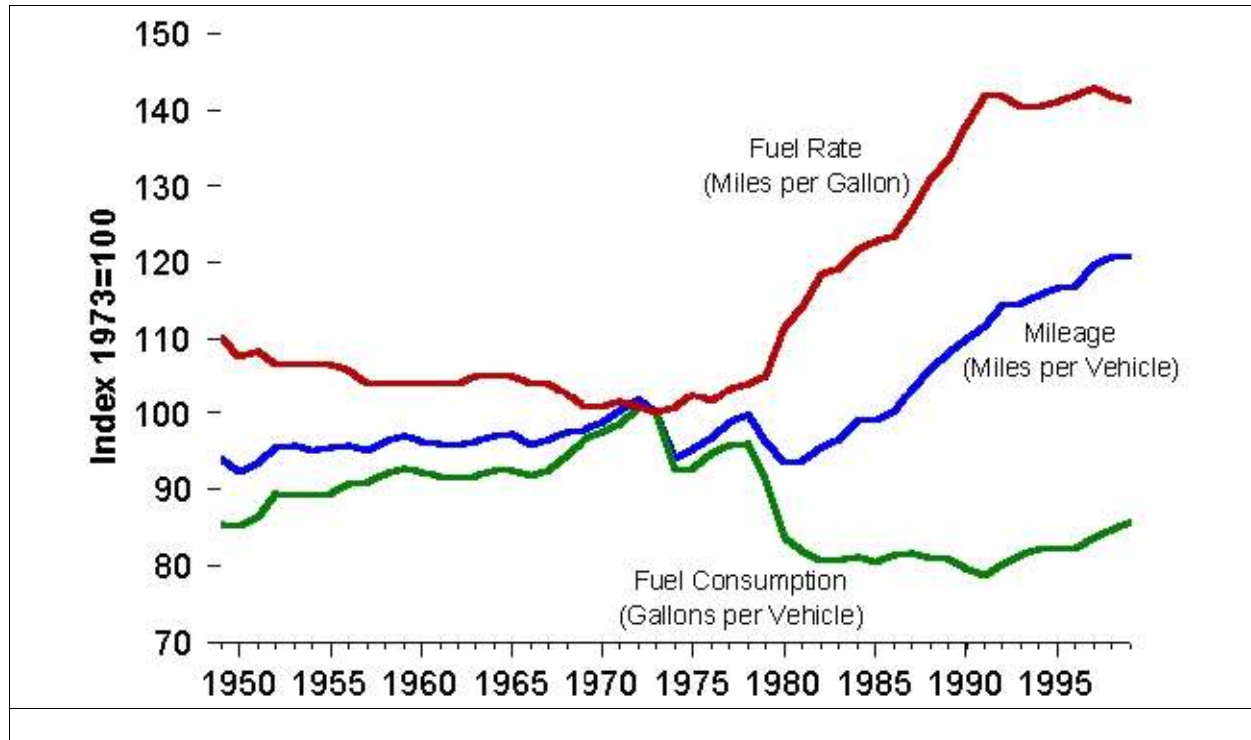
While variety and change in energy sources are the hallmarks of the industrial, residential, and commercial sectors, transportation has relied almost totally on petroleum since 1949 (Figure 9).

Figure 9. Transportation Energy Consumption



Compared with trends just prior to the oil embargo of 1973, fuel consumption per motor vehicle fell in the two decades that followed, miles traveled per vehicle generally fell until the early 1980s and then resumed a pattern of increase, and the fuel rate (i.e., miles per gallon) improved greatly before essentially leveling off in the 1990s (Figure 10).

Figure 10. Motor Vehicle Indicators





Engineering Merit Badge

Engineering Merit Badge preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Engineering.pdf
or
<http://meritbadge.org/wiki/index.php/Engineering>
or
workbook at <http://meritbadge.org/wiki/images/f/fc/Engineering.pdf>
2. Scouts must Be Prepared by completing **requirement 2** before class.
If you need ideas, check out <http://www.greatachievements.org/>
Gather information on your engineering achievement form other sources and write down notes and/or write a report to review with your counselor. You must bring this written homework with you to class.
3. Scouts must Be Prepared by completing **requirement 4** before class. Your visit with an engineer, who may be a parent or troop leader or neighbor, should address the topics in requirement 4. Make notes and bring these notes with you to class.
4. Scouts must Be Prepared by completing **requirement 5** before class. You might start by writing down a definition of “systems engineering”. Using your definition, write a list of the component systems that your camping plan or your camping equipment design must address. Add details to complete your plans. If your plan is complete, you could hand your written plan to another Scout and he could accomplish your plan for you.
5. For **requirement 7**, learn what a registered Professional Engineer is. Check out <http://www.nspe.org/resources/licensure/what-pe>
6. For **requirement 8**, learn about the Engineer’s Code of Ethics and the Engineer’s Creed. Check out <http://www.nspe.org/resources/ethics/code-ethics>

and

<http://www.nspe.org/resources/ethics/code-ethics/engineers-creed>

7. Scouts must Be Prepared by completing **requirement 9** before class. Do research on careers in engineering. Write down several possible careers. Find out about education and training for at least one of these that interest you.



Oceanography Merit Badge

Oceanography Merit Badge preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Please consider printing Merit Badge requirements and workbook from http://meritbadge.org/wiki/index.php/Merit_Badge_Worksheets
The workbook can be very helpful in organizing your work, but is not required.
You must bring pen and paper to the class.
3. Before class, make notes on requirements 1, 3, 6, and 9. Bring your notes to class.
4. Discovery Place Science has a marine aquarium that Scouts tour as part of their merit badge class. They may be able to write their 500 word paper as part of the class, or my complete the paper later and review the paper with the Counselor to complete this requirement.

If you choose to complete part a, communicate with your Merit Badge Counselor at Discovery Place Science and review your choice of books and obtain his or her approval before reading the book and writing your report.

If you choose to complete part b before class, aquarium visit sites in our region might include <https://www.visitsealife.com/charlotte-concord/>

<http://www.ncaquariums.com/fort-fisher>

<http://www.ncaquariums.com/pine-knoll-shores>

<http://www.ncaquariums.com/roanoke-island>

<http://www.ncaquariums.com/jennettes-pier>

<http://www.greensboroscience.org/visit/what-to-see/index.html>

<https://www.ripleyaquariums.com/gatlinburg/>

<http://www.georgiaaquarium.org/experience/visit>

Please review your visit with your Merit Badge Counselor.

If you choose to complete part c, “before making your speech, show your speech outline to your counselor for approval.”



Programming Merit Badge

Programming Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Before class, Scouts must Be Prepared by completing their Cyber Chip. Please bring evidence of completion to class.
3. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Programming.pdf
or
<http://meritbadge.org/wiki/index.php/Programming>
or
workbook at <http://meritbadge.org/wiki/images/a/a7/Programming.pdf>
4. Before class, Scouts must Be Prepared by researching requirement 1b. Make notes on your definitions of repetitive stress injuries, eyestrain. Write down definitions for carpal tunnel syndrome, cubital tunnel syndrome, tendonitis, tennis elbow.
See <http://rsi.unl.edu/>
5. Before class, Scouts must Be Prepared by researching requirements 2, 3, 4, and 6, and making written notes.
6. Before class, Scouts must Be Prepared by checking out this BSA website:
<http://boyslife.org/merit-badges/programming-merit-badge/>

The Programming merit badge website, <http://www.boyslife.org/programming>, has a number of sample programs that you could use for requirement 5a. However, you have the option of finding a program on your own. It's a good idea to seek your merit badge counselor's guidance.

In the section, Get Started Programming:

Click on a programming language you are familiar with, or a new one, follow the instructions to download the freeware, with permission from a parent.

Become familiar with how this process works.

Repeat the process with a new programming language.



Pulp and Paper Merit Badge

Pulp and Paper Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Pulp_and_Paper.pdf
or
http://meritbadge.org/wiki/index.php/Pulp_and_Paper
or
workbook at http://meritbadge.org/wiki/images/3/32/Pulp_and_Paper.pdf
3. Before class, Scouts must Be Prepared by researching requirements 1, 2, 3, 4, 5, 5, 6, 7e, 8 and make notes in your workbook. Be Prepared to present your notebook to the Merit Badge Counselor when the course begins. Scouts will review these topics during the course.
4. Before or after the course, Scouts may plan on their own to visit one of the sites listed in requirement 7 a, b, c, d. A site visit to one of these locations will not be part of the Discovery Place workshop.

For a Scout to complete this merit badge during this course instruction time, he must complete requirement 7 before class begins.

A Scout may obtain a partial merit badge completion and then complete requirement 7 after the course. He would then contact the Discovery Place Science counselor to arrange review of requirement 7 to secure the counselor's signature on his blue card.



Robotics Merit Badge

Robotics Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Robotics.pdf
or
<http://meritbadge.org/wiki/index.php/Robotics>
or
workbook at <http://meritbadge.org/wiki/images/7/7a/Robotics.pdf>
3. Scouts must Be Prepared by researching requirement 3 before class and by writing down some information about these topics in their notebooks. Take photos or videos to illustrate 3 of the 5 major fields of robotics or find links to web pages that show these fields, and bring this information to class on a memory stick or on smart phone or printed or written on paper
4. Requirement 6 has a choice of 2 activities for completion.

Because local robotics competitions are rare, Scouts are encouraged to choose requirement 6 b. Choice b is to find out information on robotics competitions.

Scouts must Be Prepared by researching requirement 6 b before class and by writing down some information about these topics in their notebooks.

Check out information on youth robotics competitions in North Carolina at <http://ncfirstrobotics.org/>

Check out youtube.com. You might search for “youth robot competition” or “youth robot competition Lego”.

Here is information on a local robotics team at CPCC: <http://www.yetirobotics.org/wp/>

Here is source for information on robotics teams, camps, and competitions for youth: <http://queencityrobotics.org/>

Check out the dancing robot from Gastonia at <http://www.cyberkidsrobotics.com/>

Check out <http://zerorobotics.mit.edu/>

Check out

<http://skillsusa.org/competitions/skillsusa-championships/contest-descriptions/>

Open the panels for

Robotics: Urban Search and Rescue (Demonstration)

and view some of the videos showing robots in competition settings.

5. Scouts must Be Prepared by researching requirement 7 before class and by writing down some information about these topics in their notebooks.



Space Exploration Merit Badge

Space Exploration Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
 2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Weather.pdf
or
http://meritbadge.org/wiki/index.php/Space_Exploration
or
workbook at http://meritbadge.org/wiki/images/7/7a/Space_Exploration.pdf
 3. Scouts must Be Prepared by completing all parts of **requirement 1 abcd** at home before class and must bring their written information with them to class to discuss.
 4. Scouts must Be Prepared by completing **requirement 2** at home before class and must bring written results with them to class.
 5. Scouts must Be Prepared for **requirement 3** by drawing a diagram of a rocket and labeling the parts from requirement 3. A Google search shows many examples of rocket diagrams. You must bring your rocket diagram to class.
 6. Scouts must Be Prepared by completing both parts of **requirement 5a** at home before class and must bring written results with them to class.
For information on robotic missions, see <http://robots.open.ac.uk/space/missions.html>
and
<http://robots.open.ac.uk/space/pastmissions.html>
- For information on US manned space missions (Mercury, Gemini, Apollo, Space Shuttle), see <http://www.nasa.gov/missions/index.html#.VGbBEDTF8l8>
7. Scouts must Be Prepared by completing **requirement 8** at home before class and must bring written results with them to class.



Sustainability Merit Badge

Space Exploration Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Sustainability.pdf
or
<http://meritbadge.org/wiki/index.php/Sustainability>
or
workbook at <http://meritbadge.org/wiki/images/f/fe/Sustainability.pdf>
3. Scouts must Be Prepared by completing **requirement #1**. Bring your written notes to the course and discuss with your counselor. Include the date and time of your family meeting. Have a parent sign off on your completion of family meetings.
4. For **requirement 2**, Scouts must Be Prepared by completing **requirement A for each of the 5 parts, namely, Water, Food, Community, Energy, Stuff**. Meet with your family and discuss your family's **Water, Food, and Energy**, usage. Take notes and come up with a few ways to reduce your family's consumption of water and energy. Find out from a parent about your family's energy costs for utilities (electricity, natural gas or oil for heat) and for transportation. Bring these notes to class. Include the date and time of your family meeting. Have a parent sign off on your completion of family meetings.

For **requirement 2**, Scouts will complete requirements B or C during class.

5. All Scouts are expected to take notes and to write down answers to requirement questions as the information is presented during the course. These notes should be available at the end of the day to show the Merit Badge Counselor on-site and to demonstrate your participation and learning to your Scoutmaster and other troop leaders.

Sustainability Merit Badge Preparation after class:

1. Scouts must complete parts of requirement #2 and all of requirement #5 **after** class. When the Scout has completed these requirements, he must contact the Merit Badge Counselor from Discovery Place Science and meet with the Counselor with a buddy and/or parent under BSA Youth Protection Guidelines to have his blue card signed off as completed, if he has mastered the material.



Weather Merit Badge

Weather Merit Badge Preparation before class:

1. Before class, Scouts must Be Prepared by reading the merit badge book.
2. Print Merit Badge requirements from http://www.scouting.org/filestore/Merit_Badge_ReqandRes/Weather.pdf
or
<http://meritbadge.org/wiki/index.php/Weather>
or
workbook at <http://meritbadge.org/wiki/images/a/a0/Weather.pdf>
3. Scouts must Be Prepared by completing requirement 1, 2, 4 in writing at home before class and must bring written results with them to class.
4. Scouts must Be Prepared by researching cloud types for requirement 5.
Check out:
<http://scied.ucar.edu/webweather/clouds/cloud-types>
and
<http://www.weatherwizkids.com/weather-clouds.htm>
5. Scouts must Be Prepared by completing requirement 6 in writing at home before class and must bring written results with them to class.
6. Scouts should learn about weather instruments. Please write out definitions of
wind vane
anemometer
rain gauge
hygrometer
barometer
thermometer
See <http://www.weatherwizkids.com/weather-instruments.htm>

Scouts will complete requirement 9b during the class.

7. To complete Weather MB on the day of the Weather MB class, Scouts must prepare an outline of a talk on a weather-related topic, such as,
lightning safety
flash flood safety
tornado safety
acid rain

For weather safety talks, know and explain weather warnings and weather watches.

Scouts must work with a parent or Scout leader to email a copy of their outline to the Weather MB counselor Riana Clark at RianaC@discoveryplace.org to obtain MB counselor review and approval before presenting the talk. After the counselor approves the outline, Scouts must give the talk and document the activity in their Weather MH notebook with a Scout leader signature to be able to complete the Weather MB requirement.

Scouts may also present their talks during the workshop with prior outline approval and prior arrangements made with the counselor. Number of presentations made may be limited by workshop attendance.

Alternatively, the Scout can present his weather safety talk outline to the Weather Merit Badge Counselor on the day of the course, return to his home troop to give his talk, document the activity in their Weather MH notebook with a Scout leader signature, and then contact Discovery Place Science to arrange a follow-up meeting at Discovery Place Science with the Merit Badge Counselor to get his blue card signed off to be able to complete the Weather MB requirement.

Good sources of information for a weather safety talk include:

<http://www.weather.gov/safety>

www.my.scouting.org

If you do not have an account, create one, then log in, click on My Training in the blue bar at the top, click on Training Center, then click on Boy Scout and Varsity, then click on **Weather Hazards**. Take the course and make notes on a topic that you can research further to give a weather talk about.