Power Up

This module is designed to help Venturers or Sea Scouts explore how technology affects their life each day.

1. Choose A or B or C and complete ALL the requirements.
    A. Watch about three hours total of technology-related shows or documentaries that involve transportation or transportation technology. Then do the following:
        (1) Make a list of at least two questions or ideas from each show.
        (2) Discuss two of the questions or ideas with your counselor.

Some examples include—but are not limited to—shows found on PBS ("NOVA"), Discovery Channel, Science Channel, National Geographic Channel, and TED Talks (online videos). You may choose to watch a live performance or movie at science museum instead of watching a media production. You may watch online productions with your counselor's approval and under your parent's or guardian's supervision.

    B. Read (about three hours total) about transportation or transportation technology. Then do the following:
        (1) Make a list of at least two questions or ideas from each article.
        (2) Discuss two of the questions or ideas with your counselor.

Examples of magazines include—but are not limited to—Odyssey, Popular Mechanics, Popular Science, Science Illustrated, Discover, Air & Space, Aviation Week, Astronomy, Science News, Natural History, Robot, Servo, and Scientific American.

    C. Do a combination of reading and watching (about three hours total). Then do the following:
        (1) Make a list of at least two questions or ideas from each article or show.
        (2) Discuss two of the questions or ideas with your counselor.

2. Choose ONE STEM field of interest from the following list. Complete ALL the requirements for a STEM exploration in that field. See separate document for the requirements. (If you have already completed a Venturing STEM exploration in one of these fields, please choose a different field for this award.)

Automotive Maintenance	Energy	Rowing
Aviation	Farm Mechanics	Small-Boat Sailing
Canoeing	Kayaking	Space Exploration
Cycling	Motorboating	Truck Transportation
Drafting	Nuclear Science	
Electricity	Railroading	

3. Do ALL the following.
    A. Using the requirements from the above list of STEM explorations:
        (1) Tell your counselor the energy source(s) used in these STEM explorations.
        (2) Discuss the pros and cons of each energy source with your counselor.
    B. Make a list of sources of energy that may be possible to use in transportation. (See the list earlier in this section.)
    C. With your counselor:
        (1) Discuss alternative sources of energy.
        (2) Discuss the pros and cons of using alternative energy sources.

4. Design and build a working model vehicle (not from a kit).
    A. Make drawings and specifications of your model vehicle before you begin to build.
    B. Include one of the following energy sources to power your vehicle (do not use gasoline or other combustible fuel source): solar power, wind power, or battery power.
    C. Test your model. Then answer the following questions:
        (1) How well did it perform?
        (2) Did it move as well as you thought it would?
        (3) Did you encounter problems? How can these problems be corrected?
    D. Discuss with your counselor:
        (1) Any difficulties you encountered in designing and building your model
        (2) Why you chose a particular energy source
        (3) Whether your model met your specifications
        (4) How you would modify your design to make it better

5. Discuss with your counselor how technology affects your everyday life.

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Power Up Counselor's notes

3A (1) : Using the requirements from the science explorations, Tell your counselor the energy sources used

- **Automotive Maintenance—Gasoline, diesel fuel, electric, blended gasoline, biodiesel, hybrid**
- **Aviation—Aviation fuel and kerosene**
- **Canoeing—Human power**
- **Cycling—Human power**
- **Drafting—Human power, electricity**
- **Electricity—Electromagnetism, chemical**
- **Energy—Biomass digesters, cogeneration, fossil fuel power, fuel cells, geothermal power, nuclear power, solar power, tidal energy, wave energy, ocean thermal energy, wind**
- **Farm Mechanics—Diesel fuel**
- **Kayaking – Human power**
- **Motorboating—Gasoline, diesel fuel, blended gasoline, biodiesel**
- **Nuclear Science—Nuclear energy**
- **Railroading—Diesel fuel**
- **Small-Boat Sailing—Wind**
- **Space Exploration—Most common solid: ammonium perchlorate mixed with powdered aluminum**
    - **Liquids for first-stage rockets—RP-1**
    - **Liquids for second-stage rockets—Liquid hydrogen, liquid oxygen**
- **Truck Transportation—Diesel fuel**

- Tell your counselor the energy source(s) used in these STEM explorations.
- Discuss the pros and cons of each energy source with your counselor.

Helpful Links

The following links are places to start when researching the pros and cons of fuel types

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"Diesel Reborn": Edmunds.com
Website: https://www.edmunds.com/fuel-economy/diesel-reborn.html
"Aviation Jet Fuel Information": CSGNetwork.com
Website: http://www.csgnetwork.com/jetfuel.html

A. Make a list of sources of energy that may be possible to use in transportation. (See the list earlier in this section.)
B. With your counselor:
    (1) Discuss alternative sources of energy.
    (2) Discuss the pros and cons of using alternative energy sources.

Helpful Links

The following links are places to start when researching alternative fuels. It is not an exhaustive list. You can also search "Air Force alternative fuels" using your favorite search engine. Be sure you have your parent's or guardian's permission to use the Internet.

"Alternative& Advanced Vehicles": U.S. Department of Energy
Website: https://afdc.energy.gov/fuels/electricity_benefits.html
Energy Sources and Uses: U.S. Department of Energy, Energy Information Administration:
https://www.eia.gov/
"Alternative Fuels": U.S. Department of Energy
Website: https://www.fueleconomy.gov/feg/current.shtml
"Alternative Fuel": Popular Mechanics
Website: https://www.popularmechanics.com/cars/hybrid-electric/

Nuclear Power: U.S. Department of Energy, Energy Information Administration:
https://www.eia.gov/energyexplained/nuclear/

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