Exploration Merit Badge

Troop 344 and 9344
Pemberville, OH

This presentation was put together with the goal of an expedition to the Appalachian trail for the participants. It can easily be modified to reflect whatever expedition the youth working on the merit badge would prefer to do.

Exploration Merit Badge Requirements

1. **General Knowledge.**
   Do the following:
   a. Define exploration and explain how it differs from adventure travel, trekking or hiking, tour-group trips, or recreational outdoor adventure trips.
   b. Explain how approaches to exploration may differ if it occurs in the ocean, in space, in a jungle, or in a science lab in a city.
2. **History of Exploration.**
   Discuss with your counselor the history of exploration. Select a field of study with a history of exploration to illustrate the importance of exploration in the development of that field (for example, aerospace, oil industry, paleontology, oceanography, etc.).
3. **Importance of Exploration.**
   Explain to your counselor why it is important to explore. Discuss the following:
   a. Why it is important for exploration to have a scientific basis
   b. How explorers have aided in our understanding of our world
   c. What you think it takes to be an explorer

Exploration Merit Badge Requirements

4. **Real-Life Exploration.**
   Do ONE of the following:
   a. Learn about a living explorer. Create a short report or presentation (verbal, written, or multimedia slide presentation) on this individual's objectives and the achievements of one of the explorer's expeditions. Share what you have learned with your counselor and unit.
   b. Learn about an actual scientific exploration expedition. Gather information about the mission objectives and the expedition's most interesting or important discoveries. Share what you have learned with your counselor and unit. Tell how the information gained from this expedition helped scientists answer important questions.
   c. Learn about types of exploration that may take place in a laboratory or scientific research facility (medicine, biology, chemistry, physics, astronomy, etc.). Explain to your counselor how laboratory research and exploration are similar to field research and exploration.

Exploration Merit Badge Requirements

5. **Exploration in Lab and Field.**
   Do ONE of the following, and share what you learn with your counselor:
   a. With your parent's permission and counselor's approval, visit either in person or via the internet an exploration sponsoring organization (such as The Explorers Club, National Geographic Society, Smithsonian Institution, Alpine Club, World Wildlife Fund, or similar organization). Find out what type(s) of exploration the organization supports.
   b. With permission and approval, visit either in person or via the internet a science lab, astronomical observatory, medical research facility, or similar site. Learn what exploration is done in this facility.

Exploration Merit Badge Requirements

6. **Expedition Planning.**
   Discuss with your counselor each of the following steps for conducting a successful exploration activity. Explain the need for each step.
   a. Identify the objectives (establish goals).
   b. Plan the mission. Create an expedition agenda or schedule. List potential documents or permits needed.
   c. Budget and plan for adequate financial resources. Estimate costs for travel, equipment, accommodations, meals, permits or licenses, and other expedition expenses.
   d. Determine equipment and supplies required for personal and mission needs for the length of the expedition.
   e. Determine communication and transportation needs. Plan how to keep in contact with your base or the outside world, and determine how you will communicate with each other on-site.
   f. Establish safety and first aid procedures (including planning for medical evacuation). Identify the hazards that explorers could encounter on the expedition, and establish procedures to prevent or avoid those hazards.
   g. Determine team selection. Identify who is essential for the expedition to be successful and what skills are required by the expedition leader.
   h. Establish detailed recordkeeping (documentation) procedures. Plan the interpretation and sharing of information at the conclusion of the expedition.

Exploration Merit Badge Requirements

7. **Prepare for an Expedition.**
   With your parent's permission and counselor's approval, prepare for an actual expedition to an area you have not previously explored; the place may be nearby or far away. Do the following:
   a. Make your preparations under the supervision of a trained expedition leader, expedition planner, or other qualified adult experienced in exploration (such as a school science teacher, museum representative, or qualified instructor).
   b. Use the steps listed in requirement 6 to guide your preparations. List the items of equipment and supplies you will need. Discuss with your counselor why you chose each item and how it will be of value on the expedition. Determine who should go on the expedition.
   c. Conduct a pre-expedition check, covering the steps in requirement 6, and share the results with your counselor. With your counselor, walk through the Sweet Sixteen of BSA Safety for your expedition. Ensure that all foreseeable hazards for your expedition are adequately addressed.

Exploration Merit Badge Requirements

8. **Go on an Expedition.**
   Complete the following:
   a. With your parent's permission and under the supervision of your merit badge counselor or a counselor-approved qualified person, use the planning steps you learned in requirement 6 and the preparations you completed in requirement 7 to personally undertake an actual expedition to an area you have not previously explored.
   b. Discuss with your counselor what is outdoor ethics and its role in exploration and enjoying the outdoors responsibly.
   c. After you return, compile a report on the results of your expedition and how you accomplished your objective(s). Include a statement of the objectives, note your findings and observations, include photos, note any discoveries, report any problems or adverse events, and have a conclusion (whether you reached your objective or not). The post-expedition report must be at least one page and no more than three; one page can be photos, graphs, or figures.
9. **Career Opportunities.**
   Identify three career opportunities in exploration. Pick one and explain to your counselor how to prepare for such a career. Discuss what education and training are required, and why this profession might interest you.

Requirement 1

General Knowledge.
Do the following:

a. Define exploration and explain how it differs from adventure travel, trekking or hiking, tour-group trips, or recreational outdoor adventure trips.
b. Explain how approaches to exploration may differ if it occurs in the ocean, in space, in a jungle, or in a science lab in a city.

Exploration

- **Exploration** is the act of searching, with its goal being the discovery of information or resources.
  - It is the pursuit of knowledge, has a scientific basis, and information is collected and usually shared.
- **Adventure travel and recreational trips** are generally more focused on pursuing a certain activity, or seeking a thrill.
  - These involve a predetermined effort to satisfy a personal need.

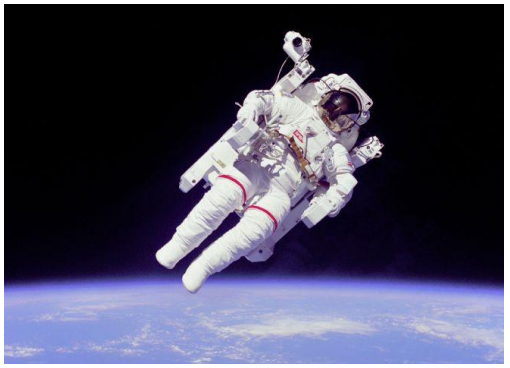
Requirement 1

General Knowledge.
Do the following:

a. Define exploration and explain how it differs from adventure travel, trekking or hiking, tour-group trips, or recreational outdoor adventure trips.
b. Explain how approaches to exploration may differ if it occurs in the ocean, in space, in a jungle, or in a science lab in a city.

Approaches to Exploration

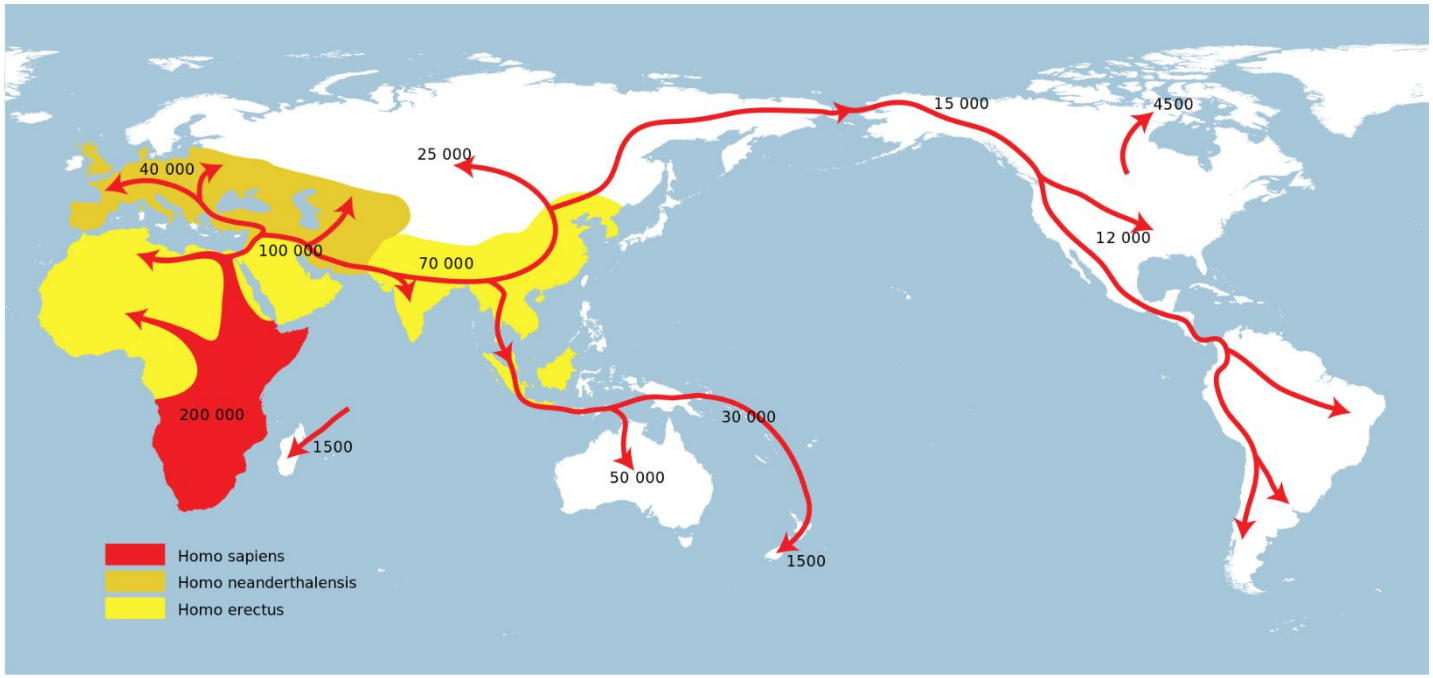
- The frontier being explored may require differing approaches depending upon where it occurs.
- Exploration in the ocean, in space, in a jungle, or in a science lab often require different technologies, processes, and techniques.



Requirement 2

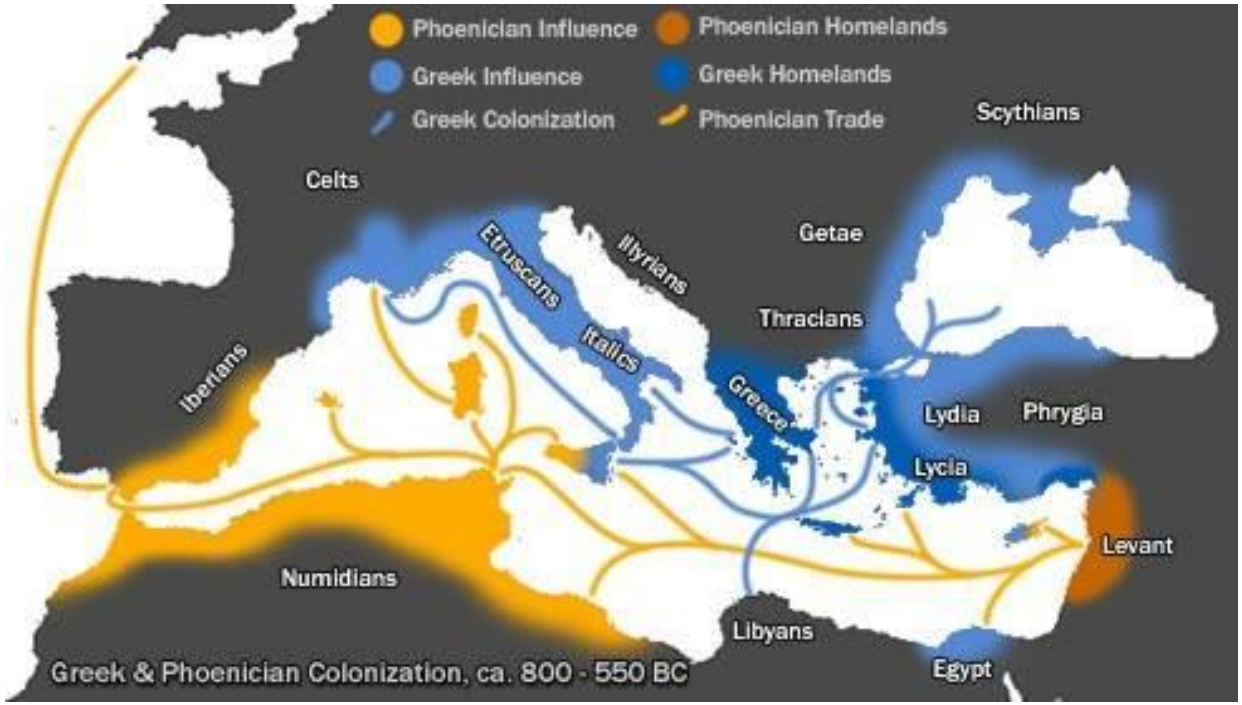
History of Exploration.
Discuss with your counselor the history of exploration. Select a field of study with a history of exploration to illustrate the importance of exploration in the development of that field (for example, aerospace, oil industry, paleontology, oceanography, etc.).

History of Exploration



- Human beings have a natural tendency to explore.
- This innate or instinctive urge to explore is one reason human ancestors left Africa in prehistorical times to eventually populate the rest of the planet.

History of Exploration

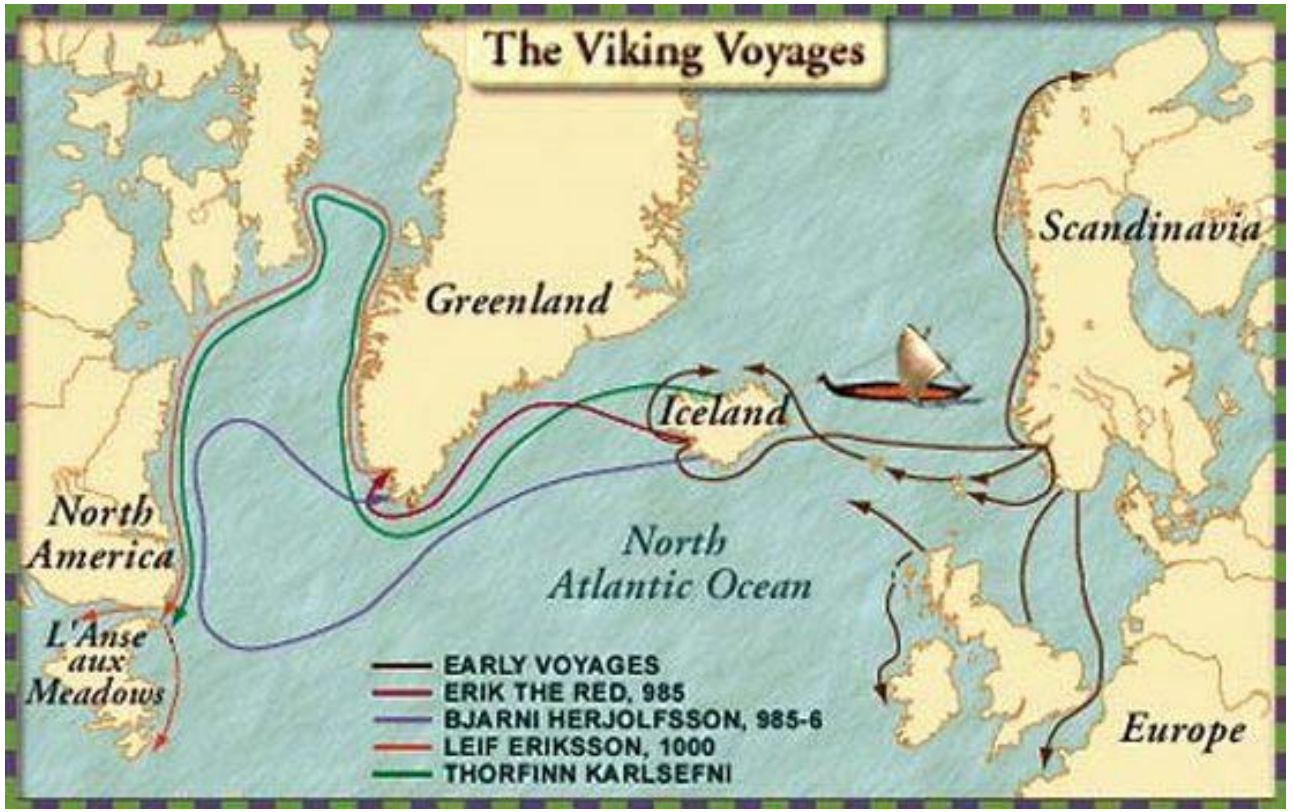


- The ancient Phoenicians, Greeks, and other Mediterranean civilizations explored at least as far as Britain and northern Africa.

History of Exploration

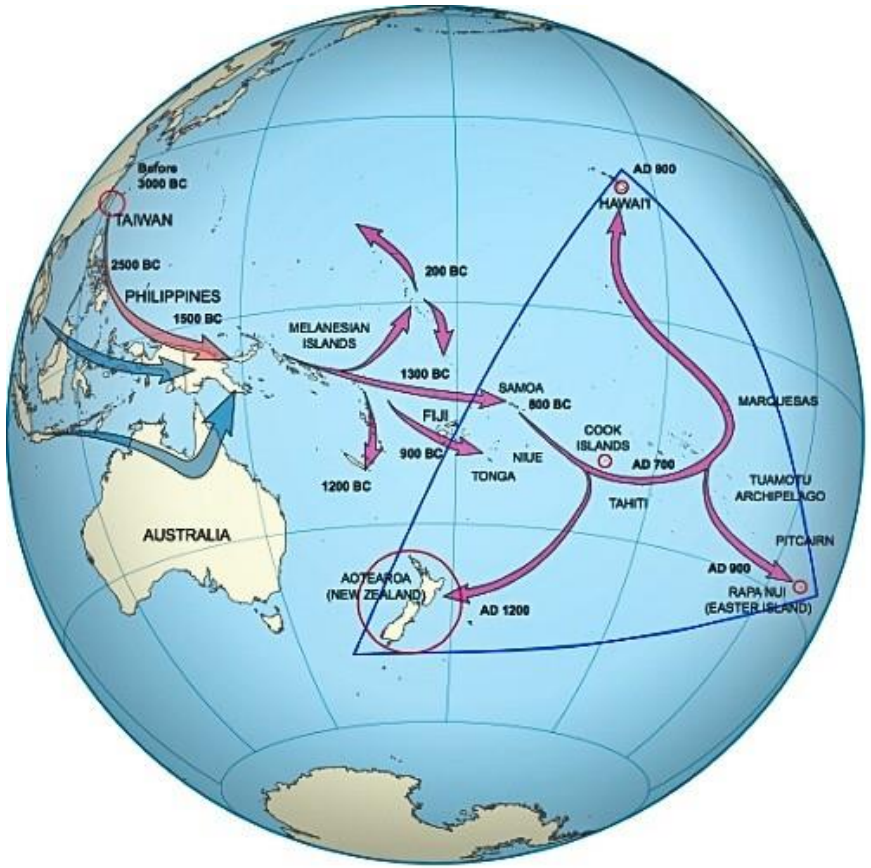
- More than 2,000 years ago Chinese voyagers began exploring the eastern parts of the Northern Hemisphere, including India, Southeast Asia, and Eastern Africa.

History of Exploration



- Around 1,000 years ago the Vikings roamed throughout the western Northern Hemisphere and were the first Europeans to arrive in the New World.

History of Exploration



- Much of the Pacific was explored and its islands settled by seafaring Polynesians over a few thousand years lasting into the Middle Ages.

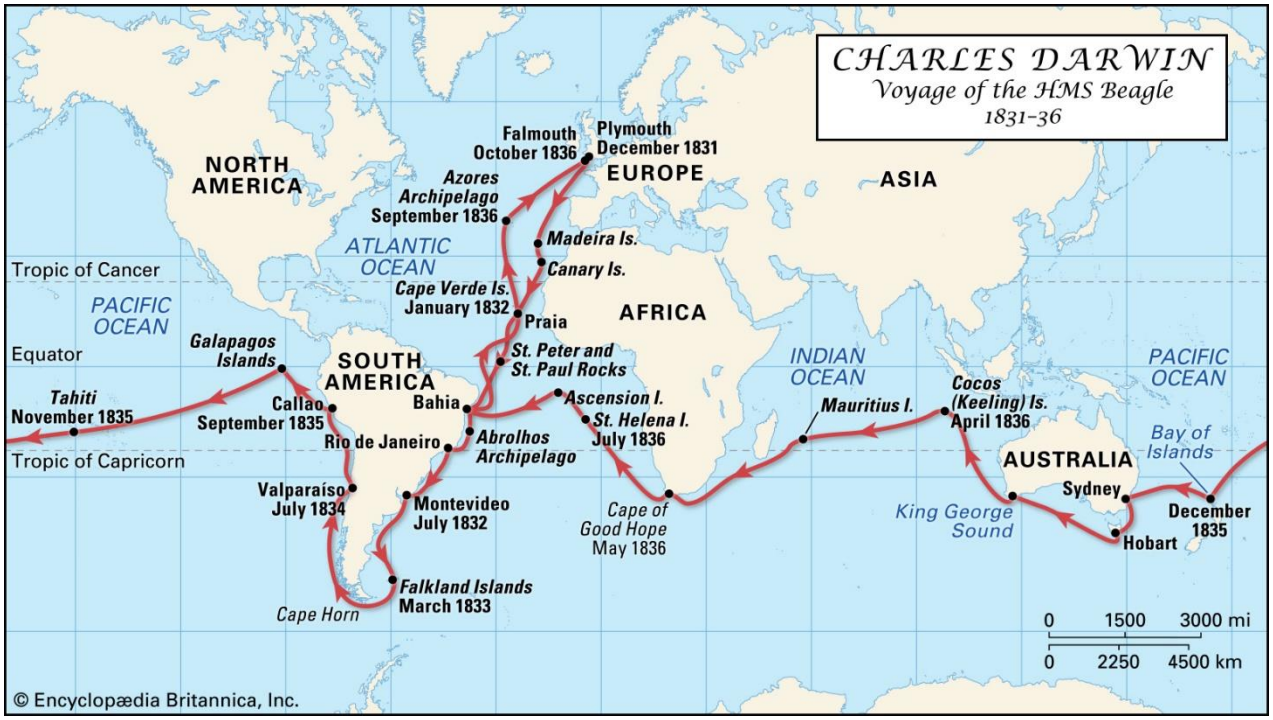
The Age of Discovery

- In European history, a period of long-distance exploration began in the 15th century.
- It began with the Portuguese discoveries of scattered islands in the Atlantic Ocean.
- It included the discovery of the Americas by Christopher Columbus in 1492.

The Age of Discovery

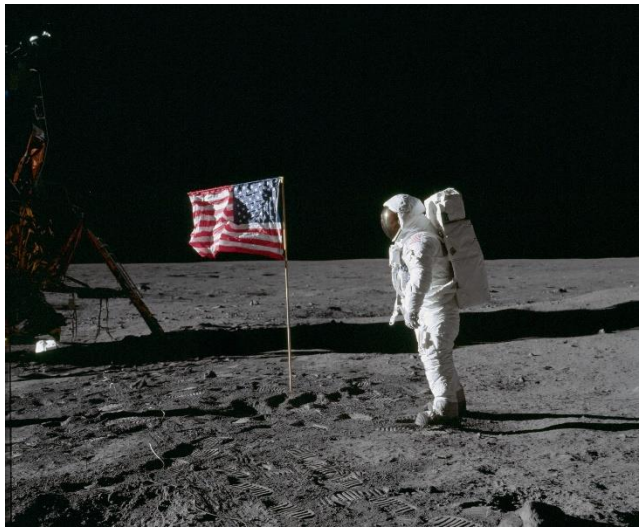
- It continued into the 17th and 18th centuries with European naval expeditions crossing the Atlantic and later the Pacific Ocean.
- During this time, Europeans explored large areas of the Americas, Africa, Asia, and the islands of the tropical Pacific.

The Age of Discovery



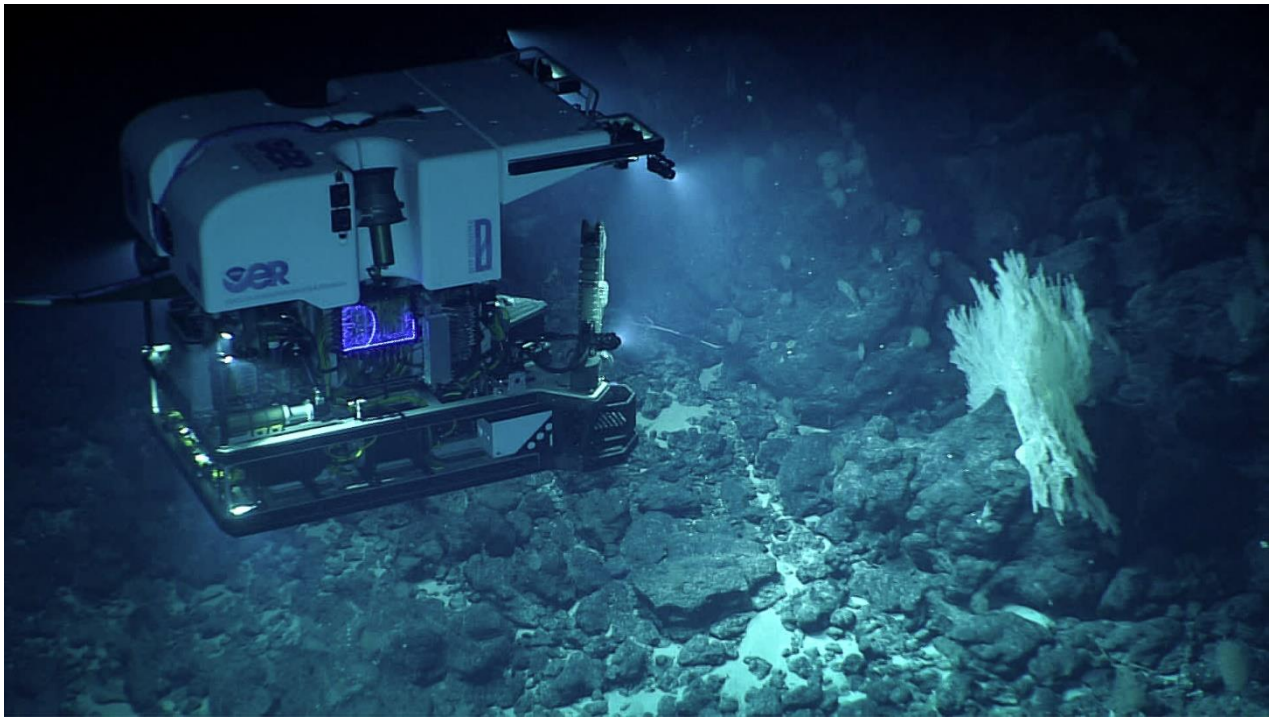
- After this age, further explorations brought knowledge from the voyage of Charles Darwin as well as regions of the North and South Poles.

Modern Exploration



- The history of exploration up until the early 20th century focused largely on geographical description.
- Then came the explorations of the Space Age made possible by the development of rocket technology during World War II.

Modern Exploration



- Today, explores are expanding on these earlier ventures and are also exploring new frontiers like the deep ocean and molecular biology.

Importance of Exploration to the Aerospace Program

- Each time we engage in exploration and press the limits of human endurance and technological capability a bit further, remarkable benefits are returned to our society in terms of new knowledge, advanced capabilities, novel industries, and inspiration to press even further.
- The following brief timeline illustrates the importance of exploration in the development of the Aerospace program.

Brief Timeline of Aerospace Exploration

- **March 16, 1926:** Robert Goddard, sometimes referred to as the "Father of Modern Rocketry," launches the first successful liquid-fueled rocket.
- **July 17, 1929:** Robert Goddard launches a rocket that carries with it the first set of scientific tools — a barometer and a camera — in Auburn, Mass. The launch was Goddard's fourth.
- **Oct. 3, 1942:** Germany successfully test launches the first ballistic missile, the A4, more commonly known as the V-2, and later uses it near the end of European combat in World War II.
- **Oct. 4, 1957:** A modified R-7 two-stage ICBM launches the satellite Sputnik 1 from Tyuratam. The Space Race between the Soviet Union and the United States begins.

Brief Timeline of Aerospace Exploration

- **Oct. 7, 1958:** NASA publicly announces NASA's manned spaceflight program along with the formation of the Space Task Group, a panel of scientist and engineers from space-policy organizations absorbed by NASA. The announcement came just six days after NASA was founded.
- **Jan. 2, 1959:** The U.S.S.R. launches Luna 1, which misses the moon but becomes the first artificial object to leave Earth orbit.
- **Aug. 7, 1959:** NASA's Explorer 6 launches and provides the first photographs of the Earth from space.
- **April 12, 1961:** Yuri Gagarin becomes the first man in space with a 108-minute flight on Vostok 1 in which he completed one orbit.

Brief Timeline of Aerospace Exploration

- **May 25, 1961:** In a speech before Congress, President John Kennedy announces that an American will land on the moon and be returned safely to Earth before the end of the decade.
- **Feb. 20, 1962:** John Glenn makes the first U.S. manned orbital flight aboard Mercury 6.
- **Aug. 27, 1962:** Mariner 2 launches and eventually performs the first successful interplanetary flyby when it passes by Venus.
- **July 14, 1965:** Mariner 4 executes the first successful Mars flyby.
- **July 20, 1969:** Six years after U.S. President John F. Kennedy's assassination, the Apollo 11 crew lands on the Moon, fulfilling his promise to put an American there by the end of the decade and return him safely to Earth.

Brief Timeline of Aerospace Exploration

- **Nov. 13, 1971:** The Mariner 9 probe became the first craft to orbit another world - Mars.
- **March 3, 1972:** Pioneer 10, the first spacecraft to leave the solar system, launches from Cape Kennedy, Fla.
- **Dec. 19, 1972:** Apollo 17, the last mission to the moon, returns to Earth.
- **May 14, 1973:** A Saturn V rocket launches Skylab, the United States' first space station.
- **March 29, 1974:** Mariner 10 becomes the first spacecraft to fly by Mercury.
- **Nov. 13, 1971:** Mariner 9 becomes the first spacecraft to orbit Mars and provides the first complete map of the planet's surface.
- **July 20, 1976:** The U.S. Viking 1 lands on Mars, becoming the first successful Mars lander.

Brief Timeline of Aerospace Exploration

- **April 12, 1981:** Space Shuttle Columbia lifts off from Cape Canaveral, beginning the first space mission for NASA's new astronaut transportation system.
- **April 25, 1990:** The Space Shuttle Discovery releases the Hubble Space Telescope into Earth orbit.
- **July 23, 1999:** The Chandra X-ray observatory, NASA's flagship mission for X-ray astronomy, launches aboard the Space Shuttle Columbia.
- **Nov. 2, 2000:** First resident crew to occupy the International Space Station.
- **Jan. 4, 2004:** The first Mars Exploration Rover, Spirit, lands on Mars. Its twin, Opportunity lands Jan. 25.

Brief Timeline of Aerospace Exploration

- **July 1, 2004:** Cassini-Huygens becomes the first spacecraft to orbit Saturn.
- **Jan. 14, 2005:** Huygens probe of the Cassini-Huygens spacecraft is the first spacecraft to land on the moon of a planet other than Earth (Saturn's moon Titan).
- **June 13, 2010:** The Hayabusa from Japan is the first spacecraft to return to Earth with samples from an asteroid.
- **November 12, 2014:** Philae from the European Space Agency is the first spacecraft to land on a comet.
- **July 14, 2015:** New Horizons is the first spacecraft to fly by Pluto and return detailed photographs.
- **December 21, 2015:** The Falcon 9 from Space X is the first rocket stage to return to its launch site.

Requirement 3

Importance of Exploration.
Explain to your counselor why it is important to explore. Discuss the following:

a. Why it is important for exploration to have a scientific basis
b. How explorers have aided in our understanding of our world
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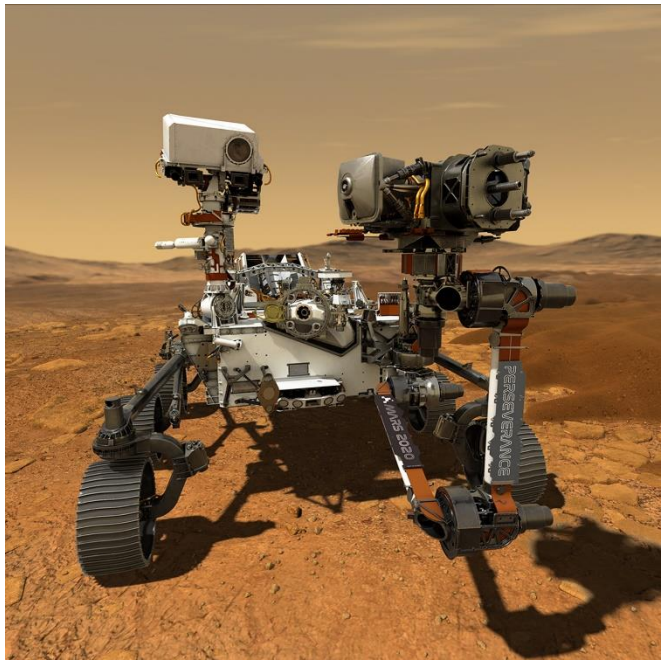
Scientific Basis of Exploration

- Exploration has a scientific basis so that information can be collected and shared to contribute to scientific knowledge.
- We need exploration to spur medical discoveries that help people live healthier lives, to seek ways of being more energy efficient, to protect our planet's resources, to better understand Earth's oceans and atmosphere, and to learn about worlds other than our own.



Benefits of Exploration

10 Everyday Spinoffs from NASA

- **Water Filter -** NASA created the ion purification technology for Apollo. This spinoff created a multimillion dollar industry producing filters for pools, fountains, and drinking water.
- **Air Purifier -** NASA developed an air purifier for astronauts to grow crops in space. Now it's used by companies like Whole Foods to help preserve food and by hospitals to make their air sanitary. They are used in hotels and homes as well.
- **Memory Foam -** Originally created for more comfortable airline seating, this technology has created a huge industry. The primary use is for mattresses and orthopedic seating.
- **Computer Mouse -** NASA invested money in a study that led to the creation of the computer mouse.
- **Cell Phone Camera -** 1 out of 3 cell phone cameras use technology developed for space cameras.
- **Long Distance Communication -** NASA's developments have enhanced the use of satellites for uses like clear long distance communication.
- **Ear Thermometer -** NASA collaborated with Diatek to develop an 8 ounce aural thermometer which uses the same technology used to measure the temperature of stars and planets.
- **Breast Cancer Detection -** Originally conceived for the use in terrestrial remote sensing applications, NASA's Hierarchical Segmentation (HSEG) software is used to enhance imaging in mammograms and X-rays.
- **Fire Fighter Gear -** Much of the fire fighter gear used in the U.S. is based on NASA's development of lightweight, fire resistant clothing.
- **Airplane Winglets -** In 1977, NASA, Boeing, and the U.S. Air Force created winglets to reduce drag during flight. By 2010, the technology had saved 2 billion gallons of jet fuel. That's a savings of $4 billion and 21.5 million tons of carbon dioxide emissions.

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Space Exploration

- Space explorers discover new celestial bodies – including stars, planets, moons, asteroids, and comets – and observe the known ones.
- New technologies for human spaceflight and robotic probes are constantly expanding the possibilities for the physical exploration of space.

Subterranean Exploration

- Below ground discoveries of new animals and microscopic species are helping us understand the complex interactions of living things underground and how species adapt to lower levels of light and oxygen.
- Physical exploration is extending our knowledge of large underground cave systems.

Polar Exploration

- Environmental science studies are being done in both polar regions.
- Permanent international research stations in Antarctica study marine life, environmental changes, the effects of ocean currents, and other topics and sciences including weather, geology, and paleontology.

Tropical Exploration

- Up to two-thirds of all known plants and animals live in the lush rain forests of the tropics.
- New discoveries are constantly added to the millions of species that are known to live in rain forests.
- Increasing deforestation poses problems that require significant research and exploration to understand the effects of the destruction and to find practical solutions to balance or prevent such loss.
- Bioprospecting is the search for plant and animal species from which valuable new products and medicines can be obtained.

Marine Exploration

- Some ocean explorers search beneath the waves to locate and identify historic shipwrecks.
- Other marine researchers seek sustainable fishing and food sources, track the environmental effects of ocean pollution, study the effects of ocean currents on climate, seek to understand and protect coral reefs, or do geological research on the seafloor.

High Altitude Exploration

- High-altitude explores may identify and analyze mineral resources in the mountains or weather patterns and their effects on environment.
- Researchers study the effects of thin air on the human body and brain.

Geological Exploration

- Early geological explores were mostly interested in describing geographic features and searching for riches.
- The emphasis now is on greater understanding of our world and more efficient, sustainable use of natural resources.
- Oil and mineral exploration continues to be of vital importance.

Anthropology and Exploration

- Anthropology is the study of humans, both ancient and modern.
- Anthropology connects to the social and biological sciences and commonly is divided into broad categories of cultural anthropology, biological or physical anthropology, archaeology, and linguistics.
- Cultural anthropologists examine social patterns and how people live together in particular places, and study differences and similarities of race, class, gender, and nationality.
- This type of research and exploration often involves living among the group being studied and observing their practices in everyday life.

Requirement 3

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What Does It Take to Be an Explorer

- Exploration is incredibly diverse with many different areas.
- However, explorers seem to have certain traits in common:
  - Inquisitiveness; continuously asking questions and seeking answers.
  - Passion about the subjects of their exploration and driven by a desire to learn, understand, explain, and share their findings.
  - Persistent in their quest; driven sometimes to go against conventional thought while standing by their convictions.

What Does It Take to Be an Explorer

- Explorers are also:
  - leaders.
  - problem solvers.
  - informed, curious, and capable individuals who are committed to making the world a better place.
  - have a sense of responsibility and respect for other people, cultures, and the natural world.
  - empowered to make a difference, pursue bold ideas, and persist in the face of challenges.
  - observe, document, and engage with the world around them.
  - tell stories that inspire others.
  - create and foster a global community committed to a sustainable future.
  - committed to supporting diversity, equity, and inclusion in their respective fields.

Requirement 4

Real-Life Exploration.
Do ONE of the following:

a. Learn about a living explorer. Create a short report or presentation (verbal, written, or multimedia slide presentation) on this individual's objectives and the achievements of one of the explorer's expeditions. Share what you have learned with your counselor and unit.
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c. Learn about types of exploration that may take place in a laboratory or scientific research facility (medicine, biology, chemistry, physics, astronomy, etc.). Explain to your counselor how laboratory research and exploration are similar to field research and exploration.

Living Explorers

Aerospace Exploration: To Infinity, and Beyond

"We as humans have an innate sense of curiosity and a thirst for taking on great challenges, and this is certainly at the core of America's greatness, past, present, and future. Each time we press the limits of human endurance and technological capability a bit further, remarkable benefits are returned to our society in terms of new knowledge, advanced capabilities, novel industries, and inspiration to press even further.

"The story of America overcoming its underdog status in the early space race with the Soviet Union is well-known, ultimately achieving crewed lunar landings in the late 1960s and early 1970s. What came as a huge surprise to 'second generation astronauts' like myself is that the U.S. and Russian space programs would eventually come together to build and operate the International Space Station, along with partners from Europe, Canada, and Japan.

"What's taking place in space today is no less exciting, with commercial enterprises like SpaceX and Virgin Galactic aiming to make space accessible for more than a select few astronauts. NASA and space agencies around the world are targeting a human presence on Mars in the coming decades.

"I've had to retire and hang up my spacesuit, but they'll be looking for bright, well-rounded, and well-prepared astronauts for these missions in a few years. Will you be onboard?"

—Scott Parazynski, M.D.
Astronaut; Distinguished Eagle Scout; Fellow, The Explorers Club

Astronaut and physician Scott Parazynski aboard the space shuttle

Dr. Parazynski, anchored to a foot restraint, prepares to work on a damaged solar array at the International Space Station.

Living Explorers

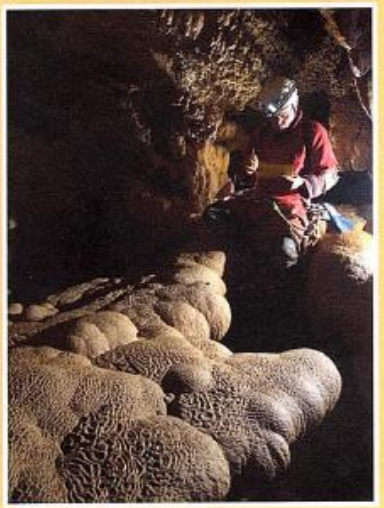
Cave Exploration

"In 1980 I was co-leader of an expedition which explored the first cave outside of Europe over 1,000 meters deep (3,280 feet). It was the seventh one in the world that deep. Today there are over 100 caves [known to be] that deep. I am still co-leader of the international project exploring that cave in Mexico, the deepest cave in the Western Hemisphere.

"There are an unknown number of more caves to be discovered, explored, and studied. It will take many lifetimes before all of the caves on Earth are explored and mapped. In them live new species of life-forms including organisms that live in low oxygen or other conditions impossible for us to live in. These extremophiles are of great interest to science because of how they have adapted and for the products they produce.

"Caves are not all small and confining. Some are vast in length and dimensions. Some have single rooms larger than giant sports stadiums. Others have underwater passages requiring sophisticated scuba gear and cautious procedures. Some even await new technologies to be able to explore them."

—C. William Steele
Distinguished Eagle Scout; Fellow, National Speleological Society; Fellow Emeritus, The Explorers Club



Cave explorer Bill Steele in a tight spot, *above*, exploring Twinkie's Cave, Comal County, Texas, where he and others have found the remains of prehistoric beasts, such as the skull of a saber-toothed tiger. At *right*, inside Mexico's Sistema Huautla, the Western Hemisphere's deepest cave system, he sketches a map of the cave.

Living Explorers

Polar Exploration and Dentistry: Understanding the Narwhal Tusk

"Why would a dentist travel 2,000 miles north to a latitude between the North Pole and Arctic Circle to understand the tooth of an arctic whale? First, the knowledge gained about an extraordinary sensory organ system gave insight into all mammalian teeth including our own. [Also], insights from traditional Inuit knowledge and science could be integrated to better understand this whale and its ecosystem.

"The function of the narwhal tusk has eluded scientific discovery for over 500 years. A harsh arctic environment with forbidding weather conditions and ice, the elusive behavior of the narwhal, and the novel methods of conducting scientific experiments in frigid waters on live captured-and-released narwhals provided formidable obstacles. The rewards and lessons are great. Patience and persistence were among the key attributes for success. Innovation, creativity, and interdisciplinary study of the various fields of science needed for such research were essential to a successful outcome.

"[This work showed] how teams of scientists from different disciplines could integrate ideas with the traditional knowledge of Inuit elders and hunters to solve one of nature's most perplexing mysteries. Results have changed the perceptions and understanding for this whale, for other toothed mammals, and sensory organs as well as providing insights into a changing arctic. There is much exploration yet to do."

—Martin T. Nweeia, D.M.D., D.D.S.
Harvard School of Dental Medicine; Fellow, The Explorers Club

Narwhals, a type of arctic whale

Dentist and polar marine biologist Martin Nweeia, *left*, examines a narwhal tusk up close.

Living Explorers

Exploration in the Treetops

"Whereas astronomers explore outer space, arbornauts explore the treetops. The exploration of forest canopies is relatively new. Scuba gear to explore coral reefs was developed in the 1950s, rockets to reach the moon were designed in the 1960s, but ropes and harnesses were rigged to explore the treetops as late as 1979. Only in the last 30 years have scientists discovered that almost half of Earth's biodiversity lives in the tops of trees. This makes forest canopies one of the last unexplored regions of the planet. Today, canopy scientists use ropes, hot-air balloons, walkways, ladders, or even construction cranes to explore the tops of trees.

"Anyone can discover something new in a forest canopy, because it is a new frontier. By climbing trees or even by reaching the lower branches, new species of insects, fungi, mosses, orchids, or tardigrades (also known as water bears) inhabit the leaf and bark surfaces. Because the treetops are where sunlight hits Earth, most of the leaves and flowers of trees and vines grow vigorously up there; and thus, many organisms gather up there to eat, or be eaten! By learning single rope techniques, or locating a canopy walkway or tree platform in a state park, you too can become an arbornaut, making observations and sometimes discoveries in the treetops!"

—Margaret Lowman, Ph.D.
Chief of Science and Sustainability at the California Academy of Sciences; Fellow, The Explorers Club

Tropical canopy biologist Meg Lowman on an afternoon swing

Dr. Lowman on her way to work

Living Explorers

Bioprospecting in the Kamchatka Peninsula

"Diversa (today part of BASF), the company I cofounded, mounted a microbial diversity research expedition to the Kamchatka Peninsula with the Russian Government and the U.S. Department of Energy. The region is a land of extremes best suited for hardy adventurers and scientists and contains unique fauna.

"Our search for unexplored microbes sought novel proteins in the microbes that might reduce the need for chemicals and, thereby, make cheaper and more environmentally friendly products. This expedition targeted the unearthly Geyser Valley, a boiling canyon of hot springs and calderas that belched bacteria and primitive bacteria-like organisms of unimaginable alien designs. The waters there are steaming and can exceed boiling temperatures in the superheated vents. Microbial populations there are referred to as *hyperthermophiles*, [and these organisms] have difficulty growing at [158 degrees Fahrenheit] since it is too cold for them. They grow best at temperatures ranging from [176 to 235 degrees].

"We collected water and mud samples among the geysers with a Russian soldier to protect us from unwanted bear visits. It was exhilarating to work in this most beautiful and pristine environment ... and we made breakthrough discoveries that led to products on the market today, likely used in the paper of this book. We have had other expeditions to areas of extreme conditions leading to other exciting discoveries. There is huge potential in this type of exploration."

—Jay M. Short, Ph.D.
Molecular biologist and entrepreneur; Fellow, The Explorers Club

Jay Short bioprospecting in the steaming calderas (volcanic craters) of the Kamchatka Peninsula, Russia

Living Explorers

Ocean Exploration

"The ocean covers nearly three-quarters of our planet. We rely on the sea for food, medicine, minerals, jobs, and untold hours of wonder and enjoyment, not to mention billions of dollars in economic revenue. The ocean is also part of Earth's life-support system, producing oxygen while absorbing carbon dioxide and heat. Yet less than 10 percent of the ocean has been explored!

"Through ocean exploration we have discovered unimagined ecosystems thriving in habitats devoid of sunlight, new mineral deposits, and features that reflect the inner workings of Earth. It is through this process of discovery that we gain critical information about our planet, the life living on it, and how to better our own lives.

"From a simple net dragged behind a ship to a high-tech remotely operated vehicle or free-swimming robot, we now have a multitude of tools to explore and study the ocean. Computer models, amazing visualizations, and satellite tracking tags are opening up new views of the sea and revealing more than ever before about the behavior of marine organisms. Many mysteries remain in the sea, but the future of ocean exploration is bright and exciting."

—Ellen Prager, Ph.D.
Marine scientist and author; Fellow, The Explorers Club

Ocean scientist and explorer Ellen Prager introducing herself to a grouper

The crewed submersible *Triton*

Living Explorers

Mountain Exploration

"Do you want to go somewhere unfamiliar, or accomplish a new challenge in the mountains? To be successful, you must prepare well. Learn all you can about where you want to go, and the skills that will be required. Talking to people who have been there before provides valuable information. Reading stories about explorers is a great way to understand the challenges of the mountains and how you must adapt to survive, when everything around you is changing.

"For over 40 years I have explored the world's great mountains, leading over 100 high-altitude expeditions. In 1999 I led the team that found the remains of the famous British climber George Mallory high on Mount Everest. Mallory and his partner Andrew Irvine had disappeared June 8, 1924, on their way to the summit. Did they really reach the top? We now have some clues to explain the events of that fateful day, but the final answer awaits a future explorer.

"The skills you develop close to home are the same skills you will use to accomplish future adventures in faraway places. Practice, practice, practice!"

—Eric Simonson
Distinguished Eagle Scout; American Mountain Guides Association (AMGA) certified Alpine and ski guide; Seven Summits; Fellow, The Explorers Club

Mountaineer and explorer Eric Simonson on the summit of Mount Everest

Living Explorers

Atmospheric Exploration

"Since the early days of the 20th century explorers have contributed to our knowledge of how the world's weather and climate work. This work continues today. Scientist-explorers and others who support their atmospheric science studies are in Antarctica, on land and at sea in the Arctic, aboard oceanographic research ships on the oceans, on airplanes flying into and around violent storms, and in trucks equipped with portable radar and other instruments chasing tornadoes across the Great Plains. Their work has provided great improvements in weather forecasts in recent years. But many questions remain.

"Scientist-explorers help answer important questions about how Earth's climate works and how it is changing. While the Arctic and Antarctic and much of the world's oceans are far from where most people live, what happens in these remote places affects both the day-to-day weather and the climate—the long-term average weather—for all of Earth as it changes.

"Explorer-journalists often accompany explorer-scientists to chronicle their work in print and online publications, books, television and film reports and documentaries, and pod casts. As weather editor for *USA Today* and USAToday.com, I was privileged to report about scientific research and daily life from Antarctica, Greenland, and northernmost Alaska, on a research icebreaker in the Arctic Ocean, in airplanes in hurricanes, and with scientific tornado chasers on the U.S. Great Plains."

—Jack Williams
Eagle Scout; Fellow, The American Meteorological Society; Fellow, The Explorers Club

Jack Williams cooking dinner at a U.S. Antarctic Program survival school

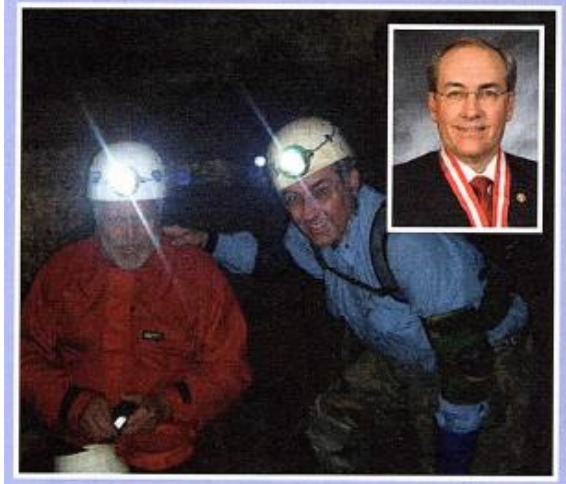
Living Explorers

Energy Exploration

"Exploration in the most remote parts of the world has been part of the oil and gas industry since its beginning. Intrepid geologists and engineers traveled the world looking for locations of the next great oil or gas discovery to help power the energy needs of the world's economy. Today, exploration takes place from the Arctic sea to the jungles of South America. Wells are drilled in 10,000 feet of water and hydrocarbons are produced utilizing multi-billion-dollar facilities that are among the greatest engineering projects in the world.

"To understand petroleum systems, energy scientists travel to field locations to observe and study rock sequences. They look for rock outcrops in river valleys and on mountain sides, cliffs, and road cuts. They dive into the waters of the oceans to study modern seafloor depositional systems (living reefs and river deltas) using Earth's surface as a natural laboratory to understand what happened millions of years ago."

—Glenn A. Adams
Distinguished Eagle Scout and leader in the field of shale gas exploration



Glenn Adams with fellow Eagle Scout Bill Steele, caving in Oklahoma at Jester Cave, the longest gypsum cave system in the Americas

Living Explorers

Exploring Human Origins

"Where did we come from? What can we discover about the ancient roots of our species?

"All exploration begins with curiosity. And curiosity leads to all sorts of interesting questions that make us get off our seats, travel, and find out new things about the world. Understanding our own beginnings—the origin of human beings as a species—offers one of the greatest adventures of all time. My own part in it involves travels to the Great Rift Valley of East Africa where my team of scientists and excavators slowly dig up the excitement of fossilized bones and the oldest Stone Age tools made by our ancestors.

"Many different people have a place in this adventure. Geologists study layer upon layer of dirt where the bones of our ancestors became embedded. Physicists measure how old the layers are back through time, and chemists figure out the long-ago changes in vegetation and climate. Digging is a matter of great care and skill, so excavators play a big role. Archaeologists explore how earlier species made tools, while paleontologists have clever ways of studying bones and discovering how our ancestors changed over time.

"Piecing these clues together, a picture of the past comes into view. At that amazing point, traveling the world to remote places becomes a way of traveling back through time to discover the great survival story that led to our own species being here, all over the globe."

Paleoanthropologist Rick Potts examining early human artifacts

—Richard Potts, Ph.D.
Director, Smithsonian Institution Human Origins Program, National History Museum; Fellow, The Explorers Club

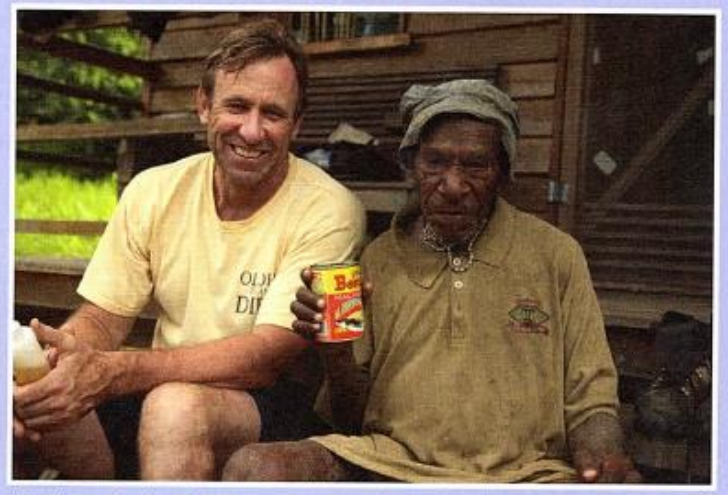
Living Explorers

Cultural Anthropology

"Cultural anthropologists study the customs, traditions, values, and ideas of a particular group of people. Anthropologists gain insights by living within the culture and working with a key informant who helps them interpret what they observe. I am interested in traditional environmental knowledge and its potential for conserving biodiversity. I have had the privilege of living with the Hewa people of New Guinea and traveling in their unexplored lands for over 25 years.

"My principal informant, a man named Tama, was a master naturalist who taught me the workings of the rain forest—information new to science. Tama knew over 300 trees and 200 pollinators/seed dispersal agents, and how human activity affected each of them. My explorations have led to the discovery of 50 new species, as well as a conservation plan for this region based on traditional knowledge."

—William H. Thomas, Ph.D.
Anthropologist, Montclair State University; Fellow, The Explorers Club



Anthropologist Bill Thomas and a native of Papua-New Guinea

Requirement 4

Real-Life Exploration.
Do ONE of the following:

a. Learn about a living explorer. Create a short report or presentation (verbal, written, or multimedia slide presentation) on this individual's objectives and the achievements of one of the explorer's expeditions. Share what you have learned with your counselor and unit.
b. Learn about an actual scientific exploration expedition. Gather information about the mission objectives and the expedition's most interesting or important discoveries. Share what you have learned with your counselor and unit. Tell how the information gained from this expedition helped scientists answer important questions.
c. Learn about types of exploration that may take place in a laboratory or scientific research facility (medicine, biology, chemistry, physics, astronomy, etc.). Explain to your counselor how laboratory research and exploration are similar to field research and exploration.

Famous Scientific Exploration Expeditions

- With your parents permission, use the internet to learn about an actual scientific exploration expedition.
- Gather information about the mission objectives and the expedition's most interesting or important discoveries.
- Tell how the information gained from this expedition helped scientists answer important questions.
- Some examples of famous scientific exploration expeditions include:
  - Captain James Cook and the Endeavor, 1768-1771.
  - Lewis and Clark expedition, 1803-1806.
  - Charles Darwin and the voyage of the Beagle, 1831-1836.
  - The HMS Challenger Expedition, 1873-1876.
  - Amundson expedition to the South Pole, 1912.
  - Thor Heyerdahl and the *Kon-Tiki* expedition, 1947.

Requirement 4

Real-Life Exploration.
Do ONE of the following:

a. Learn about a living explorer. Create a short report or presentation (verbal, written, or multimedia slide presentation) on this individual's objectives and the achievements of one of the explorer's expeditions. Share what you have learned with your counselor and unit.
b. Learn about an actual scientific exploration expedition. Gather information about the mission objectives and the expedition's most interesting or important discoveries. Share what you have learned with your counselor and unit. Tell how the information gained from this expedition helped scientists answer important questions.
c. Learn about types of exploration that may take place in a laboratory or scientific research facility (medicine, biology, chemistry, physics, astronomy, etc.). Explain to your counselor how laboratory research and exploration are similar to field research and exploration.

Exploration in Labs

- The main purpose of research and exploration, whether it is in a laboratory or in the field, is discovering information and contributing to scientific knowledge.
- One example of exploration in the lab is Molecular Exploration.
- Molecular science is a rapidly growing area of scientific discovery.
- Molecular exploration has led to the production of vaccines, techniques for treating illnesses, detecting diseases, and in the field of forensic science to help solve crimes.

Requirement 5

Exploration in Lab and Field.
Do ONE of the following, and share what you learn with your counselor:

a. With your parent's permission and counselor's approval, visit either in person or via the internet an exploration sponsoring organization (such as The Explorers Club, National Geographic Society, Smithsonian Institution, Alpine Club, World Wildlife Fund, or similar organization). Find out what type(s) of exploration the organization supports.
b. With permission and approval, visit either in person or via the internet a science lab, astronomical observatory, medical research facility, or similar site. Learn what exploration is done in this facility.

Exploration Sponsoring Organizations

- The following links will connect you to the websites of exploration sponsoring organizations.

- **The Explorer's Club**

- **The National Geographic Society**

Exploration Sponsoring Organizations

- The following links will connect you to the websites of exploration sponsoring organizations.
- **Smithsonian Institution**
- **The Alpine Club**

Exploration Sponsoring Organizations

- The following links will connect you to the websites of exploration sponsoring organizations.
- **World Wildlife Fund**

WWF

- **NOAA Office of Ocean Exploration and Research**

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Exploration Sponsoring Organizations

- The following links will connect you to the websites of exploration sponsoring organizations.
- **NASA**
- **National Science Foundation**

Requirement 5

Exploration in Lab and Field.
Do ONE of the following, and share what you learn with your counselor:

a. With your parent's permission and counselor's approval, visit either in person or via the internet an exploration sponsoring organization (such as The Explorers Club, National Geographic Society, Smithsonian Institution, Alpine Club, World Wildlife Fund, or similar organization). Find out what type(s) of exploration the organization supports.
b. With permission and approval, visit either in person or via the internet a science lab, astronomical observatory, medical research facility, or similar site. Learn what exploration is done in this facility.

Research Facilities

- **Institute for Astronomy**

- **Woods Hole Oceanographic Institute**

- **Brookhaven National Laboratory**

BROOKHAVEN
NATIONAL LABORATORY

Requirement 6

Expedition Planning.
Discuss with your counselor each of the following steps for conducting a successful exploration activity. Explain the need for each step.

a. Identify the objectives (establish goals).
b. Plan the mission. Create an expedition agenda or schedule. List potential documents or permits needed.
c. Budget and plan for adequate financial resources. Estimate costs for travel, equipment, accommodations, meals, permits or licenses, and other expedition expenses.
d. Determine equipment and supplies required for personal and mission needs for the length of the expedition.
e. Determine communication and transportation needs. Plan how to keep in contact with your base or the outside world, and determine how you will communicate with each other on-site.
f. Establish safety and first aid procedures (including planning for medical evacuation). Identify the hazards that explorers could encounter on the expedition, and establish procedures to prevent or avoid those hazards.
g. Determine team selection. Identify who is essential for the expedition to be successful and what skills are required by the expedition leader.
h. Establish detailed recordkeeping (documentation) procedures. Plan the interpretation and sharing of information at the conclusion of the expedition.

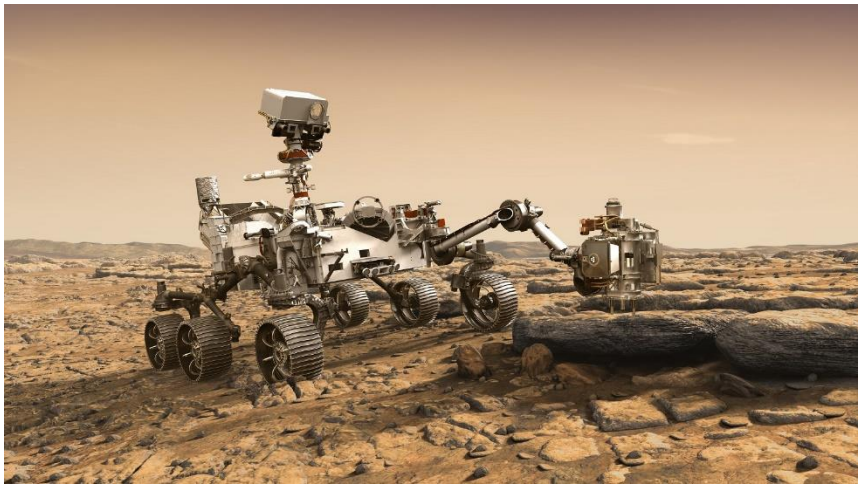
Expedition Planning

1. Develop a Concept
   - Longstanding interest or sudden curiosity.
   - Define concept further.
   - What is your objective?
   - What are you hoping to learn?
2. Do Your Research
   - To more fully understand what you're trying to learn and why.
   - Determine best timing.
     - Geography and climate.
   - If the area is unfamiliar.
     - Find out about cultural issues and differences.
     - Find current info on local unrest.
   - Check on local laws and restrictions that might limit your project.
   - Determine resources at the site.

Expedition Planning

3. Select Your Team.
   - Unless your expedition is designed to be individual AND you are certain you have the adequate skills necessary.
   - Consider:
     - Skills.
     - Behavior and personality.
     - Team chemistry.
   - Keep in mind that expeditions can be stressful and how someone reacts under stress may affect your activities.
     - Get to know their personalities.
     - Try and spot any warning signs.
     - Everyone’s availability.

Expedition Planning



4. Create an Agenda
   - Serves as a guide during preparation.
   - Provides a frame-work for the activities planned.
   - Outlines what needs to be done after you return.
   - Helps organize your exploration.
     - ID areas where obstacles may arise.
     - Assist in dealing with unexpected delays.
   - Time for each step.
   - Assigns tasks as appropriate so the team shares in the work.
     - Helps shorten preparation and exploration times.
   - Share your agenda with someone not going on the expedition.

Expedition Planning

5. Secure Expedition Financing.
   - A rough budget.
   - Alternate sources of funding.
   - Gifts and Grants from organizations and individuals.

Expedition Planning

6. Gather Equipment and Supplies.
   - Equipment will vary due to:
     - Location.
     - Climate.
     - Season.
     - Altitude.
     - Number of people.
   - Discuss all equipment and supplies with your team.
     - All are in agreement.
     - All are in the know.
   - Equipment needs to be carefully chosen and calculated as to weight and volume limitations (how much you can carry).
   - Consider extra batteries, bulbs, digital camera and memory card, cords, and other essentials.
   - Plan to pack everything out.
   - BE PRACTICAL.

Expedition Planning

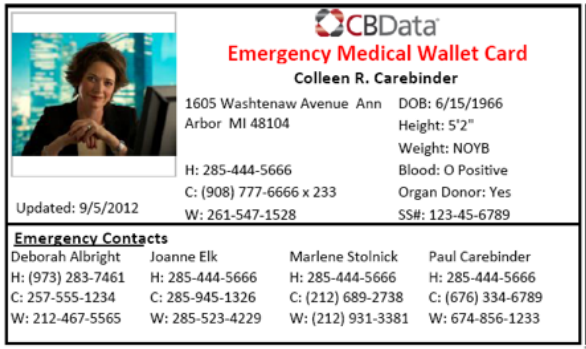
7. Make a Communication Plan.
   - For exploration in a remote area, communication equipment is essential.
   - Terrain is the major factor to be considered.
   - Simple cell phones work in urban areas and areas with clear lines of sight but remote areas may have sparse coverage.
   - Steep terrain can block cellular coverage.
   - Satellite phones and GPS have advantages but require triangulation.
   - They can be blocked by canyons and rain-forest canopies.
   - A mobile phone configured for the local mobile network is the most common and versatile communication tool.

Expedition Planning

8. Establish Safety and First-Aid Procedures.

- Make safety a priority.
  - Screen participants for medical conditions that could cause trouble later on.
    - Asthma, allergies, recent surgeries, etc.
    - All participants should have written clearance from a doctor (physical).
    - Vaccines updated.
    - Any expedition member with a medical condition should carry a medical history including any medications used.
  - Participants should obtain medical evacuation insurance if visiting remote areas.
  - Carry a SOAP Note to aid in evacuation (download copies).

Front of Card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Emergency Medical Wallet Card

Colleen R. Carebinder

1605 Washtenaw Avenue Ann Arbor MI 48104

H: 285-444-5666
C: (908) 777-6666 x 233
W: 261-547-1528

DOB: 6/15/1966
Height: 5'2"
Weight: NOYB
Blood: O Positive
Organ Donor: Yes
SS#: 123-45-6789

Updated: 9/5/2012

Emergency Contacts

Deborah Albright	Joanne Elk	Marlene Stolnick	Paul Carebinder
H: (973) 283-7461	H: 285-444-5666	H: 285-444-5666	H: 285-444-5666
C: 257-555-1234	C: 285-945-1326	C: (212) 689-2738	C: (676) 334-6789
W: 212-467-5565	W: 285-523-4229	W: (212) 931-3381	W: 674-856-1233

Back of Card

Emergency Medical Wallet Card

Vital medical Information

Doctor	Phone
Dr. Jonathan Heartfelt	(800) 323-2999
Dr. Lloyd Werstein MD	(234) 487-3355
Dr. Neeta Mammo MD	234-686-4440
Dr. Wendy Welcome	(273) 894-9599

Health Insurance Carriers

AARP - Grp#: 83293856
Cigna - Grp#: G7
Medicare - Grp#: 3882746
United Healthcare - Grp#: 83293856

Medications

Acetominiphine
Lidoderm Patch
Vitamin D
Geratol
Omeprazole

Allergies

Bee Stings
Peanuts
Pennicillin
Shellfish
Wheat

Primary Medical Conditions

Arthritis
Hiatal Hernia

Expedition Planning

8. Establish Safety and First-Aid Procedures (continued).

- All participants should have a Personal First Aid Kit.
- Team Medical Kits must be practical, weigh as little as possible, and take up minimal space.
  - Download checklists for suggested supplies (both are found on the same form).

Expedition Planning

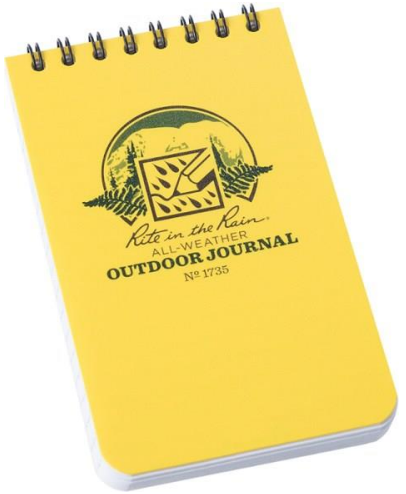
9. Obtain Necessary Documents.

- All travelers must have valid identification for domestic or international travel.
  - Valid passports are necessary to travel outside of the United States.
  - If visas are required, they may take several weeks to obtain.
  - Make photocopies of passports, visas, and vaccination records in case of loss or theft.
- Obtain any necessary permits to enter restricted areas.
- Understand the Legal Considerations.
  - Travel and exploration always pose some risks.
  - All participants must be fully informed of risks and that they are voluntarily accepting these risks.

Expedition Planning

10. Establish Recordkeeping Procedures.

- Keeping a personal journal is an excellent way to record your experiences and help you recall details later.
  - Use a waterproof journal or keep a small notebook in a Ziploc bag.
- Other important documentation:
  - Supply lists to keep track of inventory and warn of possible shortages.
  - A list should be kept of medications used from the team medical kit to help resupply.
  - Keep a log of any individual who was give medication, along with the symptoms, date, and time.
  - Document any adverse events or problems that arise.
    - Helps provide an accurate account of the event in case of legal or insurance issues.



Requirement 7

Prepare for an Expedition.
With your parent's permission and counselor's approval, prepare for an actual expedition to an area you have not previously explored; the place may be nearby or far away. Do the following:

a. Make your preparations under the supervision of a trained expedition leader, expedition planner, or other qualified adult experienced in exploration (such as a school science teacher, museum representative, or qualified instructor).
b. Use the steps listed in requirement 6 to guide your preparations. List the items of equipment and supplies you will need. Discuss with your counselor why you chose each item and how it will be of value on the expedition. Determine who should go on the expedition.
c. Conduct a pre-expedition check, covering the steps in requirement 6, and share the results with your counselor. With your counselor, walk through the Sweet Sixteen of BSA Safety for your expedition. Ensure that all foreseeable hazards for your expedition are adequately addressed.

Prepare for an Expedition

Appalachian Trail Expedition.

- Download the Appalachian Trail Trip Itinerary
- Download the Appalachian Trail Backpacking Guide
- Read the book: The Unlikely Thru-Hiker: An Appalachian Trail Journey by Derick Lugo (optional but highly recommended)
- Research the following (The Appalachian Trail Conservancy website is a great place to start):
  - History of the Appalachian Trail.
  - Construction of the Appalachian Trail.
  - Appalachian Trail maintenance.
  - Flora and fauna of the Appalachian Trail in Virginia.
  - Weather conditions of the Appalachian Trail in Virginia in July.
- Follow the procedures for expedition planning.

Equipment and Supplies

- Download the Appalachian Trail Backpacking Guide.
- Download the Backpacking Menu Planner.
- Download Backpacking Recipes.

Barbeque Chicken Stew
Servings: 3

Amount	Measure	Ingredient -- Preparation Method
1	7 oz	Chicken foil pack
2/3	cups	BBQ sauce dehydrated into a leather
3	cubes	Chicken Bouillon
3/4	cup	Hashbrowns, dehydrated
3/4	cup	Corn, dehydrated
3/4	cup	Butter Beans, dehydrated
3	cups	water

At Home: Combine dehydrated ingredients and unwrapped bouillon cubes in a small Ziploc bag and enclose with chicken foil pack in a larger Ziploc bag.
On the Trail: Combine all ingredients with 3 cups water in pot and soak for 30 minutes. Light stove, bring to a boil. Reduce heat and simmer for 5 to 10 minutes or until dehydrated ingredients are soft. Add additional water if necessary for desired consistency. Remove pot from stove and serve.

Team Members

- As you assemble the team members, download the following for help in determining team member roles and expectations:
  - High Adventure Duty Roster.
  - Backpacking Etiquette.

High Adventure Duty Roster

Crew Leaders:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Navigator							
Trash							
Fireman 1							
Fireman 2							
AM Water 1							
AM Water 2							
AM Water 3							
PM Water 1							
PM Water 2							
PM Water 3							
Showers 1							
Showers 2							
Cook 1							
Cook 2							
Cook 3							
KP 1							
KP 2							
KP 3							

Requirement 7

Prepare for an Expedition.
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b. Use the steps listed in requirement 6 to guide your preparations. List the items of equipment and supplies you will need. Discuss with your counselor why you chose each item and how it will be of value on the expedition. Determine who should go on the expedition.
c. Conduct a pre-expedition check, covering the steps in requirement 6, and share the results with your counselor. With your counselor, walk through the Sweet Sixteen of BSA Safety for your expedition. Ensure that all foreseeable hazards for your expedition are adequately addressed.

Pre-Expedition Check

- Pre-shakedown hike meeting to review each participants packs/personal equipment, Troop equipment, food, and supplies.
- Shakedown hike on the Zaleski Backpacking Trail.
- Post-shakedown hike review
  - What works, doesn't work, needs changed, etc.
- Pre-expedition trip meeting to review each participants packs/personal equipment, Troop equipment, food, and supplies.

Sweet Sixteen of BSA Safety

1. **QUALIFIED SUPERVISION**

   Every BSA activity should be supervised by a conscientious adult who understands and knowingly accepts responsibility for the well-being and safety of the children and youth in his or her care. The supervisor should be sufficiently trained, experienced, and skilled in the activity to be confident of his/her ability to lead and to teach the necessary skills and to respond effectively in the event of an emergency. Field knowledge of all applicable BSA standards and a commitment to implement and follow BSA policies and procedures are essential parts of the supervisor's qualifications.

2. **PHYSICAL FITNESS**

   For youth participants in any potentially strenuous activity, the supervisor should receive a complete health history from a health-care professional, parent, or guardian. Adult participants and youth involved in higher-risk activity (e.g., scuba) may require professional evaluation in addition to the health history. The supervisor should adjust all supervision, discipline, and protection to anticipate potential risks associated with individual health conditions. Neither youth nor adults should participate in activities for which they are unfit. To do so would place both the individual and others at risk.

3. **BUDDY SYSTEM**

   The long history of the buddy system in Scouting has shown that it is always best to have at least one other person with you and aware at all times as to your circumstances and what you are doing in any outdoor or strenuous activity.

4. **SAFE AREA OR COURSE**

   A key part of the supervisor's responsibility is to know the area or course for the activity and to determine that it is well-suited and free of hazards.

Sweet Sixteen of BSA Safety

5. **EQUIPMENT SELECTION AND MAINTENANCE**

   Most activity requires some specialized equipment. The equipment should be selected to suit the participant and the activity and to include appropriate safety and program features. The supervisor should also check equipment to determine that it is in good condition for the activity and is properly maintained while in use.

6. **PERSONAL SAFETY EQUIPMENT**

   The supervisor must ensure that every participant has and uses the appropriate personal safety equipment. For example, activity afloat requires a life jacket properly worn by each participant; bikers, horseback riders, and whitewater kayakers need helmets for certain activities; skaters may need protective gear; and all need to be dressed for warmth and utility depending on the circumstances.

7. **SAFETY PROCEDURES AND POLICIES**

   For most activities, there are common-sense procedures and standards that can greatly reduce the risk. These should be known and appreciated by all participants, and the supervisor must ensure compliance.

8. **SKILL LEVEL LIMITS**

   There is a minimum skill level requirement for every activity, and the supervisor must identify and recognize this minimum skill level and be sure that no participants are put at risk by attempting an activity beyond their ability. A good example of skill levels in Scouting is the venerable swim test, which defines conditions for safe swimming based on individual ability.

9. **WEATHER CHECK**

   The risk factors in many outdoor activities vary substantially with weather conditions. These variables and the appropriate response should be understood and anticipated.

Sweet Sixteen of BSA Safety

10. PLANNING

Safe activity follows a plan that has been conscientiously developed by the experienced supervisor or other competent source. Good planning minimizes risks and also anticipates contingencies that may require emergency response or a change of plan.

11. COMMUNICATIONS

The supervisor needs to be able to communicate effectively with participants as needed during the activity. Emergency communications also need to be considered in advance for any foreseeable contingencies.

12. PLANS AND NOTICES

Council office registration, government or landowner authorization, and any similar formalities are the supervisor's responsibility when such are required. Appropriate notification should be directed to parents, enforcement authorities, landowners, and others as needed, before and after the activity.

13. FIRST-AID RESOURCES

The supervisor should determine what first-aid supplies to include among the activity equipment. The level of first-aid training and skill appropriate for the activity should also be considered. An extended trek over remote terrain obviously may require more first-aid resources and capabilities than an afternoon activity in the local community. Whatever is determined to be needed should be available.

14. APPLICABLE LAWS

BSA safety policies generally run parallel or go beyond legal mandates, but the supervisor should confirm and ensure compliance with all applicable regulations or statutes.

Sweet Sixteen of BSA Safety

15. CPR RESOURCE

Any strenuous activity or remote trek could present a cardiac emergency. Aquatics programs may involve cardiopulmonary emergencies. The BSA strongly recommends that a CPR-trained person (preferably an adult) be part of the leadership for any BSA program. Such a resource should be available for strenuous outdoor activity.

16. DISCIPLINE

No supervisor is effective if he or she cannot control the activity and the individual participants. Youth must respect their leader and follow his or her direction.

Requirement 8

Go on an Expedition.
Complete the following:

a. With your parent's permission and under the supervision of your merit badge counselor or a counselor-approved qualified person, use the planning steps you learned in requirement 6 and the preparations you completed in requirement 7 to personally undertake an actual expedition to an area you have not previously explored.
b. Discuss with your counselor what is outdoor ethics and its role in exploration and enjoying the outdoors responsibly.
c. After you return, compile a report on the results of your expedition and how you accomplished your objective(s). Include a statement of the objectives, note your findings and observations, include photos, note any discoveries, report any problems or adverse events, and have a conclusion (whether you reached your objective or not). The post-expedition report must be at least one page and no more than three; one page can be photos, graphs, or figures.

Undertake an Expedition

- Appalachian Trail from Damascus, VA to Partnership Shelter, 62.2 miles.

Requirement 8

Go on an Expedition.
Complete the following:

a. With your parent's permission and under the supervision of your merit badge counselor or a counselor-approved qualified person, use the planning steps you learned in requirement 6 and the preparations you completed in requirement 7 to personally undertake an actual expedition to an area you have not previously explored.
b. Discuss with your counselor what is outdoor ethics and its role in exploration and enjoying the outdoors responsibly.
c. After you return, compile a report on the results of your expedition and how you accomplished your objective(s). Include a statement of the objectives, note your findings and observations, include photos, note any discoveries, report any problems or adverse events, and have a conclusion (whether you reached your objective or not). The post-expedition report must be at least one page and no more than three; one page can be photos, graphs, or figures.

Outdoor Ethics

The Principles of Leave No Trace

1. **Plan ahead and prepare.** Consider your group's size, age, and skill level. Gather information (geography, weather, regulations)about the place you will be visiting, and allow enough time to get there.
2. **Travel and camp on durable surfaces.** Follow and use established trails and campsites.
3. **Dispose of waste properly.** Pack it in, pack it out. Pack out all leftover food and trash. This may include human waste, toilet paper, and hygiene products. Keep water sources clean.
4. **Leave what you find.** Examine cultural or historic structures, artifacts, rocks, plants, and other natural objects – but leave them alone.

Outdoor Ethics

The Principles of Leave No Trace

5. **Minimize campfire impacts.** Use lightweight stoves for cooking and battery-operated lanterns instead of campfires. If fires are permitted, use established fire rings, keep the small, and put them out cold.
6. **Respect wildlife.** Enjoy wildlife during the right time of year, from afar, and never feed them. Store rations and trash securely.
7. **Be considerate of other visitors.** Respect their privacy and property, and allow them to enjoy the outdoors peacefully.

Outdoor Ethics

Tread Lightly! Principles

- **Travel responsibly.** Stay on designated roads, trails, and areas. Cross streams and launch your watercraft only in designated areas.
- **Respect the rights of others.** This includes private property owners, all recreational trail users, campers, and others.
- **Educate yourself.** Plan for your trip by obtaining maps, regulations, and other information from public agencies. Know how to operate your equipment safely.
- **Avoid sensitive areas.** Many of these areas, such as historical, archaeological, and paleontological sites, are also protected by law.
- **Do your part.** Be a model user of the outdoors; leave the area better than you found it.

Outdoor Ethics

The Outdoor Code

As an American, I will do my best to –
Be clean in my outdoor manners.
Be careful with fire.
Be considerate in the outdoors.
Be conservation minded.

Requirement 8

Go on an Expedition.
Complete the following:

a. With your parent's permission and under the supervision of your merit badge counselor or a counselor-approved qualified person, use the planning steps you learned in requirement 6 and the preparations you completed in requirement 7 to personally undertake an actual expedition to an area you have not previously explored.
b. Discuss with your counselor what is outdoor ethics and its role in exploration and enjoying the outdoors responsibly.
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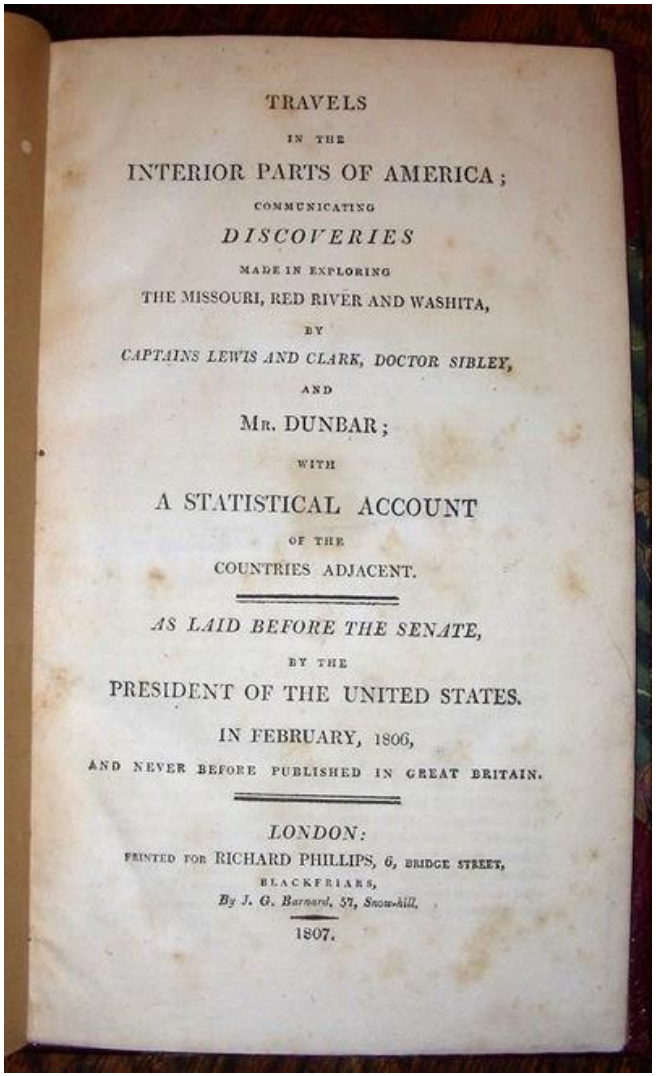
Expedition Report



TRAVELS

IN THE

INTERIOR PARTS OF AMERICA;

COMMUNICATING

DISCOVERIES

MADE IN EXPLORING

THE MISSOURI, RED RIVER AND WASHITA,

BY

CAPTAINS LEWIS AND CLARK, DOCTOR SIBLEY,

AND

MR. DUNBAR;

WITH

A STATISTICAL ACCOUNT

OF THE

COUNTRIES ADJACENT.

AS LAID BEFORE THE SENATE,

BY THE

PRESIDENT OF THE UNITED STATES.

IN FEBRUARY, 1806,

AND NEVER BEFORE PUBLISHED IN GREAT BRITAIN.

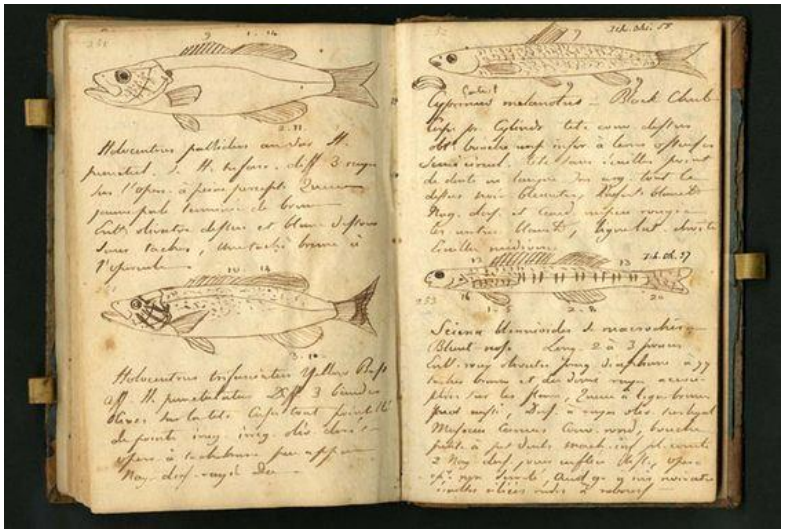
LONDON:

PRINTED FOR RICHARD PHILLIPS, 6, BRIDGE STREET,

BLACKFRIARS,

By J. G. Barnard, 57, Snow-hill.

1807.



Lewis and Clark Expedition Report

Requirement 9

Career Opportunities.
Identify three career opportunities in exploration. Pick one and explain to your counselor how to prepare for such a career. Discuss what education and training are required, and why this profession might interest you.

Career Opportunities in Exploration

- **Writers or Authors**
  - Writers and authors explore the world from the comfort of their own home or office, or they may travel to experience cultural practices or inspect significant sites related to their writing. They may perform extensive research on any topic and use what they learn to produce things like movie scripts, articles, or textbooks. Writers and authors usually hold a bachelor's degree.
- **Archeologists or Anthropologists**
  - Anthropologists explore how people lived in the past or how cultures and languages developed. Archeologists locate and preserve historic artifacts. It's common for anthropologists and archeologists to travel as part of their work and interact with people from different parts of the world as they explore cultures, languages or search for historic sites. Archeologists and anthropologists must have a master's or doctoral degree to work in their fields.

Career Opportunities in Exploration

- **Medical Scientists**
  - Medical scientists may never leave their laboratories to perform their work, but they provide critical information to healthcare professionals. They explore diseases and health treatments; their work involves research about how diseases originate, how they're spread and how to treat them. Whenever a new medication is being developed, medical scientists are on the front lines, exploring its effectiveness and safety. They are required to have a doctoral degree or a medical degree to work in this field.
- **Physicists or Astronomers**
  - Through their research and studies, physicists and astronomers explore time and space and may learn about how the universe formed or how it's currently changing. They conduct experiments to test their theories; they may be involved in monitoring comets or asteroids, or working with electrons. Although it may be possible to obtain entry-level work as a physicist with a bachelor's degree, astronomers and physicists usually need to have a doctoral degree in their field.

Career Opportunities in Exploration

- **Photographers**
  - Photographers capture images using cameras. Those that specialize in nature or wildlife photography, or that work as photojournalists, are more likely to travel extensively. Their travel introduces them to new species, habitats or information that they can document through photographs. Although formal training isn't always required, those that want to work as photojournalists typically need to have a degree, and those that are interested in photographing nature, wildlife or cultures may benefit from postsecondary training related to their area of interest.
- **Geoscientists**
  - Geoscientists explore Earth; they perform tests on soil and rock samples as part of their studies. They may also be involved in developing maps. Some work to discover where oil may be located, while others study the history of the Earth's development. Geoscientists usually need a license; a master's degree may be preferred, although it may be possible to start out in this field with a bachelor's degree.

Career Opportunities in Exploration

- **Police or Detectives**
  - Police and detectives are involved in exploration through the investigation of crimes; they study crime scenes, look for and test evidence, question witnesses and search for information that can help them solve a crime. Some law enforcement professionals also work as trained divers who locate evidence in a river, lake or ocean. Police academy training is required to work in this field, although additional training may be required for a position as a diver, and some law enforcement agencies require officers to have a degree.