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Environmental Science

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UNIT 1: ENVIRONMENTAL SCIENCE SEMESTER ONE

Assignment	Summary	Video Demo	Supplies
Lab: Introduction to Lab Safety	In this lab, you will perform a variety of operations with non-harmful materials to help you see the importance of complying with safety standards.	No	• An area to perform some lab maneuvers • Old clothes or a paint smock • Latex gloves • Water • Food coloring • An onion • 4 glasses or glass beakers • 2 tall plastic cups • Glass stirring rod • Notebook • Digital camera • Kitchen knife and spoon
Lab: Air Pressure	The power of pressure in our atmosphere can be demonstrated in the following soda can experiment.	No	• Hot plate or kitchen stove • Aluminum Soda Cans • Bucket • Ice • Water • Tongs • Thermometer • Timing Device • Heat resistant Gloves • Safety Goggles • Laboratory Notebook • Optional: Camera or Video Camera
Lab: Atmospheric Circulation and Patterns	In this experiment, you will be collecting historical weather data from your area to examine the fluctuations in these weather variables.	No	• Computer with Internet connection • Paper • Pencil • Calculator • Excel Spreadsheet (or another type of data collection and graphing program) • Laboratory notebook to record data
Project: Earth's Water	Design a radio or TV commercial to educate your community about where their drinking water comes from and the amount of freshwater that is available to all humans. Include at least three ways to conserve water in your commercial.	No	• drawing paper • pencil • drawing software (optional) • research resources

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Lab: Soapy Water	The purpose of this lab is to determine the appropriate amount of soap to use when cleaning dishes. Additionally, you will calculate the concentration and observe the solubility of this material in water.	No	• tap water • liquid dish soap • graduated cylinder or beaker • pipette • disposable gloves or dish gloves • camera • first aid kit • laboratory notebook
Project: Water Use	Identify your home state in each of the eight categories of water usage. Record the range of water used per categories to get a total amount. Write a 2–3 paragraph report of at least 225 words on the factors that you believe contribute to the different category values for your home state. Explain how much risk you think your area has for water scarcity.	No	• internet access
Lab: Water Conservation	In this lab, we will take this estimate one step further by tracking your water use for 2 days and calculating the water that can be saved with effort.	No	• Computer with Internet connection • Paper • Pencil • measuring cup • large bowls to collect water • stopwatch • Calculator • Excel Spreadsheet
Lab: Rocks Rock!	In today's experiment, you will be examining rocks in your local area to determine if they are igneous, metamorphic, or sedimentary rocks. In addition, you will be testing the hardness of the rock, the streak or the color it makes when you scrape it on a hard surface, and the presence or absence of calcium carbonate.	No	• Sample of five or more rocks in your area • Field journal or laboratory notebook • Hammer or rock hammer • Protective eyewear (goggles, sunglasses) • Hand magnifying glass • Shovel or trowel • Water • Paper clip or tweezers • Penny • Vinegar • Two eyedroppers • Optional: Rock and Mineral Field ID book • Optional: Digital camera

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Project: Rock Cycle	Compose a creative, imaginative story in which you take a rock and follow it through millions of years as it journeys through the rock cycle. Guidelines: Your story is at least 450 words. Content is scientifically correct and goes through each process of the rock cycle. Story is creative and engaging. Story is written with logical flow of ideas and grammatically correct.	No	N/A
Lab: Digging for Soil	You will examine the soil in your area.	No	• String • Ruler or tape measure • Digging equipment (spade or shovel) • Pen or pencil to use as pegs • Plastic wrap • Permission to dig up a little soil • Camera or phone camera • Lab Manual for submission
Lab: Erosion Virtual Experiment	Study the effects of mechanical and chemical weathering. Examine the impact humans can have on this process. This lab will take about 2 hours to complete.	No	• Computer with Internet connection • Lab journal
Project: Soil Conservation	Write a 225 word report on why each of the factors (R, K, L, S, C, and P) are important factors needed to determine the amount of erosion that occurs on a piece of agricultural land.	No	N/A
Project: Ecology	Design and create a "Basics of Ecology" poster or multimedia presentation.	No	• research resources

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Lab: Species Diversity	In this lab, you will be measuring the species diversity of woody plants in your neighborhood. Determine if one species is more common in a particular area.	No	• 100 ft appraisers' tape, tape measure, or meter stick • String or rope • Survey flags • Camera • Local Plant/ Tree Field Guide • Computer with Internet access • Paper or field journal/laboratory notebook • Pencil
Project: Evolution and Biodiversity	Write a three-paragraph report of 350 words to address the following: Explain and give examples of both species and genetic diversity. Explain how biological evolution occurs because of natural selection. Explain the role of mutations in the biological evolution of species.	No	N/A
Lab: Local Food Webs	Examine your local neighborhood or ecosystem for the different organisms that live there. Construct a real-life food web for your area based on your observations. Label the tropic level for each organism (producer, primary consumer, secondary consumer, etc.).	No	• Field notebook/laboratory notebook or small computer for data entry • Binoculars • Hand lens • Field ID book for plants, animal, and fungi • Camera • Optional: video camera
Project: Energy Flow in Ecosystems	Draw and describe a food chain that shows the flow of energy between IMAGINARY organisms. Be sure to create at least seven make-believe organisms. Draw an energy pyramid for at least three of the organisms from your food web.	No	• drawing paper • pencil

Assignment	Summary	Video Demo	Supplies
Lab: Building a Model Watershed	In today's laboratory, you will be creating a model of a watershed, examining how water flows through it, and evaluating the impacts of human development and activities in your local watershed.	No	• Clay • Sand • Rectangular Tupperware container or cooking pan • Wax paper • Graph paper • Blue and red string (any two colors will do) • Eyedropper • Water • Food coloring • Note paper or journal • Colored pencils • Permanent marker • Camera • Computer with Internet connection • Laboratory notebook • Optional: GPS coordinates of your area (Google Earth) • Optional: Gravel
Lab: Oil Spill Experiment	Study the absorption rate of oil on different materials.	No	• Plastic cup or container • Water • Cooking oil • Materials with absorbent properties (at least five different materials) • Computer with Internet connection • Paper • Pencil • Calculator • Excel spreadsheet (or another type of data collection and graphing program)
Project: Threatened and Endangered Species	For this assignment, conduct some independent research on the raccoon and mountain gorilla. You may do your research online or from library books and magazines.	No	• research resources
Project: Protecting Biodiversity	This assignment will be based on information from this lesson and the previous lesson. It has several parts for you to complete.	No	• research resources
Project: Terrestrial Biomes	Create your own world tour of biomes project. Put together a slide show.	No	• computer software that will create a slideshow such as PowerPoint©

Assignment	Summary	Video Demo	Supplies

Lab: Descending into the Depths	Determine the ways in which adjusting pressure can affect buoyancy.	No	• Clear plastic soda bottle with cap (1-liter size works great) • Ketchup packets • Bowl • Water • Ruler	• Computer with Internet connection • Paper • Pencil • Calculator • Excel spreadsheet (or another type of data collection and graphing program)
Lab: Freshwater Life Zones	In this lab you will simulate three wetland environments.	No	• Computer with Internet connection • Paper • Pencil • four sponges (if possible, three of one color and one of another) • 2 pieces of colored construction or crepe paper • large flat cookie sheet or paper plates (a Styrofoam plate will not work) • 4 small white towels (or several white wash cloths or paper towels)	• scissors • measuring cup • water • some dirt • spray bottle • digital camera • your lab notebook • Calculator • Excel Spreadsheet (or another type of data collection and graphing program)
Project: Population Age Structure	Create age structure diagrams.	No	N/A	

Assignment	Summary	Video Demo	Supplies
Project: Effects of a Growing Human Population	Consider that agricultural and technological advances allow for a much larger carrying capacity of humans on the planet. Would you be in favor of this? Based on what you have learned throughout the lesson and web research you will conduct, outline at least three consequences that you may be able to foresee occurring with such a scenario.	No	• Research resources
Lab: Food Resources	In this lab activity, you will investigate food resources in your area. You will compile data that may reveal how poverty, education, and access are all affecting the food resources for people who work and live in or near your community.	No	• Computer with Internet connection • access to a phone and phone book • Paper • Pencil • Calculator • Excel Spreadsheet (or another type of data collection and graphing program)
Project: Pest Management	Recall information given in previous lesson. Complete the table in the assignment.	No	N/A
Project: Forestry	In this project you will answer some questions about forestry.	No	N/A
Project: Rangelands	Write a 300 word report to explain how grassland can become like a desert by the action of livestock like cows.	No	• research resources
Project: Land Conservation	Research and answer questions about land conservation.	No	• research resources
Project: Mining	Research and answer questions about mining.	No	• research resources
*Special Project	Use this Special Project template to create your own assignment for this unit.	No	N/A

UNIT 2: ENVIRONMENTAL SCIENCE SEMESTER TWO

Assignment	Summary	Video Demo	Supplies
Project: Fossil Fuels	Formulate a complete response to each question in this project about Fossil Fuels.	No	• research resources
Lab: The Effects of an Oil Spill	For this lab, you will cover four different items with two types of oil.	No	• Notebook • Pencil or pen • Digital camera • Black permanent marker • Ruler or tape measure • Two spray bottles • Several kinds of oil • Four different objects • An old bowl • Dish or laundry detergent • A few pieces of paper or something to line your work area • Balance or scale • Internet connection
Project: Coal	Create a bar graph for types of coal by carbon percentage.	No	• research resources
Lab: Energy of an Alternate Fuel Source	This lab will use a traditional calorimeter set-up to assess the energy provided by peanut oil.	No	• Paper • Pencil or pen • Empty fruit or vegetable can • Thermometer • Balance or kitchen scale • Tongs • Pot holders • Calculator • Water • Measuring cup • At least three peanuts • A needle • A long pin or twisted paper clip • A cork • Matches (Fireplace matches work best)
Project: Introduction to Nuclear Energy	Research and answer questions about nuclear energy.	No	• research resources

Assignment	Summary	Video Demo	Supplies
Lab: Nuclear Chain Reaction	Understand and analyze the process of a nuclear chain reaction.	No	• Notebook • Pencil or pen • Computer with Internet access • Digital camera • Stopwatch • Metric ruler or tape measure • Twenty-one ping pong balls • Twenty mousetraps • Large plastic or Plexiglas aquarium
Project: Nuclear Power Plants	Research and answer questions about nuclear power plants.	No	• research resources
Project: Nuclear Energy and the Environment	Research and answer questions about nuclear energy and the environment.	No	• research resources
Project: Hydroelectric Power	Compose an essay on hydroelectric power of at least 400 words.	No	• research resources
Project: Tides and Waves	Research and answer questions about tides and waves	No	• research resources
Lab: What Can a Wave Do?	Ascertain the power of water in order to compare water as an energy source.	No	• Notebook • Pencil or pen • Calculator • Ruler or tape measure • Meter stick • Thermometer • Digital camera • Spray bottle • Hose • Three different-sized balls • A few pieces of strong paper for wadding up • Balance or scale • Stopwatch • String
Lab: Solar Energy	Measure the energy produced by passive solar energy and by a solar oven that you design.	No	• Notebook • Pencil or pen • Thermometer • Metal can • Measuring cup • Aluminum foil • Stopwatch • Cardboard • Digital camera

Assignment	Summary	Video Demo	Supplies
Project: Wind Power	Suppose people in your community are looking for a suitable source of renewable energy. Someone suggests wind power. Prepare a report of at least 700 words, which may include text, illustrations, graphs, or maps, to educate your community about wind power.	No	• research resources
Project: Geothermal Power	Research and answer questions about geothermal power.	No	• research resources
Project: Hydrogen Fuel	Research and answer questions about hydrogen fuel.	No	• research resources
Lab: Energy Use and Your Family	In this lesson, you will analyze your home's energy efficiency, review some energy audit practices, and evaluate the ways in which your family can work to conserve energy and decrease your carbon footprint.	No	• Computer with Internet connection • Paper • Pencil • Calculator • Energy bills from your home • Excel Spreadsheet (or another type of data collection and graphing program)
Project: Energy Efficiency	In no more than two typed pages, describe the role, either for good or for bad, of the list in the assignment in achieving energy sustainability:	No	• research resources
Project: Introduction to Air Pollution	Submit your air quality report for your area, showing seven days, the air quality color for each day, and each day's major pollutants.	No	• research resources

Assignment	Summary	Video Demo	Supplies	
Lab: Temperature Inversion	Observe the effects of pollution and resultant temperature fluctuations.	No	• Notebook • Pencil or pen • Digital camera • Stopwatch • 1 clear wide-mouthed jar (with lid) • 1 frozen ice pack (or sealed bag of ice) • 2 sealed zipper bags (sandwich size) filled with hot tap water	• Duct tape (or regular tape) • 1 sheet of black paper • 1 drinking straw • Matches • Computer with Internet connection
Lab: Acid Rain, Part One—Analysis	In this lab you will learn about the pH of rainfall in your area.	No	• Computer with Internet connection • Paper • Pencil	• Calculator • Excel Spreadsheet (or another type of data collection and graphing program)
Lab: Acid Rain, Part Two—Hands-on	In this lab, you will collect rain during 1–3 rain events in order to determine the acidity of the rain in your area.	No	• At least three glass-collecting jars or bowls. (These should be clear glass so that the acid content does not change from the collecting utensil.) • Metric ruler or measuring tape. • pH paper (see note)	• The graphs you made for the acid rain lab analysis • Paper to take notes or your lab notebook • Graph paper • Pencils • An electronic medium, such as a computer, to anticipate rainfalls in your area.
Project: Acid Deposition	Submit the graphs you made for your lab activity.	No	• research resources	

Assignment	Summary	Video Demo	Supplies	
Lab: Greenhouse Gasses and Climate Change	The goal of this lab is to compare atmospheres with two different levels of CO_2.	No	• Notebook • Pencil or pen • Sharpie or other waterproof marker • Stopwatch • Three thermometers • Two Ziploc bags	• Vinegar • Baking soda • Empty water or soft drink bottle • Balloon • Rubber band • Digital camera
Project: Climate Change	Research and answer questions about climate change.	No	• research resources	
Lab: How Green Is Your Car?	Compare carbon emissions and fuel efficiency among automobiles.	No	• Computer with Internet connection • Paper • Pencil	• Calculator • Excel Spreadsheet (or another type of data collection and graphing program)
Project: Reducing Air Pollution	Research and answer questions about reducing air pollution	No	• research resources	
Project: Noise Pollution	Compose a 300-word letter to one of your state's representatives about noise pollution.	No	• research resources	
Lab: Solubility	In this lab, you will investigate the effects of such dissolved ions upon our ecosystems.	No	• Notebook • Pencil or pen • Calculator • Distilled water • Small sample of saltpeter • Epsom salts • Table salt (check to make sure it is NaCl) • Water	• Several beakers or an accurate measuring cup • Plastic or glass sample cups or jars • Two disposable spoons • Thermometer • Kitchen scale or triple beam balance
Project: Solid Waste	Research and answer questions about solid waste.	No	• research resources	

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Lab: Solid Waste	In this lab, you will complete three tasks. You will collect, categorize, and record your solid wastes for a five-day period. You will also accompany your parent(s) on a family shopping trip, record your purchases, and analyze your habits. Finally, you will spend 1-2 days changing your waste management habits and analyze these changes.	No	• Household scale (preferably kitchen scale) • Ruler or tape measure • A container to store your waste for five days	• Notebook • Pencils and pens • Digital camera
Project: Hazardous Waste	Compose a 450 word report on the responsibilities of hazardous waste technicians and how they keep themselves safe during their job duties.	No	• research resources	
Project: Environmental Health	Research and answer questions about environmental health.	No	• research resources	
Project: Sustainable Cities	Research and answer questions about sustainable cities.	No	• research resources	
Project: Environmental Economics	Research and answer questions about environmental economics.	No	• research resources	
Lab: An Environmental Science Field Trip	Visit a local area and investigate the impact it has on the environment.	No	• Paper • Pencil	• Digital camera
*Special Project	Use this Special Project template to create your own assignment for this unit.	No	N/A	

(*) indicates an alternative assignment