

South Hadley Public Schools

Subject: Environmental Science

School: High School

Big Idea/Essential Question: Why is it that the more developed a society becomes, the less knowledge it has about its environment?

Standards	Learning Expectations	Skills	Assessments	Content
1. Identify the three types of human societies. 2. Compare and contrast the three types of human societies. 3. Identify a resource as renewable or nonrenewable.	LE 1: Read, write, and communicate effectively. LE 3: Study and work productively both independently and in groups. LE 4: Demonstrate personal, social, and civic responsibility. LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.	1. Identify the three types of human societies as hunter-gatherer, agricultural, and industrial. 2. Compare and contrast the three types of human societies in terms of lifestyle, technology, resource use, environmental knowledge, health, environmental impact, and energy usage. 3. Describe the difference between a renewable and nonrenewable resource, a give significant examples of each.	lab - nonrenewable resources and population growth test - chapter 12	text - sections 12.2 and 12.3

Big Idea/Essential Question: Human population is growing at an unprecedented rate. When and how will it end?

Standards	Learning Expectations	Skills	Assessments	Content
<ol style="list-style-type: none"> 1. Describe the growth of the human population over its history. 2. Associate current population growth rates with developing and industrialized nations. 3. Relate population growth to demands on energy and natural resources, and on the spread of disease. 	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<ol style="list-style-type: none"> 1. Graphically depict the human population over a timeline of its entire history. 2. Prepare age histograms for the current population of developing and industrialized nations. 3. Infer population trends from age histograms. 4. describe how the structure of society and population effects disease transmission. 	<p>lab - population dynamics</p> <p>lab - estimating population size</p> <p>lab - world diseases</p> <p>lab - demographic study of the United States, Massachusetts, and South Hadley</p> <p>test - chapter 13</p>	<p>debate - limiting population growth</p> <p>video - ebola</p> <p>demo - modeling disease transmission</p> <p>text - 13.1, 13.2, 13.3</p>

Big Idea/Essential Question: Why are there people who go without food when the world produces more food per person than at any other point in history?

Standards	Learning Expectations	Skills	Assessments	Content
<p>1. Relate economic conditions to the production and distribution of food.</p> <p>2. Describe prevalent farming techniques, both historical and present.</p> <p>3. Describe the basic components of sustainable agriculture.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<p>1. Describe the effect of the green revolution of the 1960's on the worldwide production and distribution of food.</p> <p>2. Define a cash crop, and identify its role in agriculture.</p> <p>3. Identify and describe major innovations in agriculture such as mechanization, consolidation, chemical applications, monocultures, and genetic engineering.</p> <p>4. Describe sustainable agriculture in terms of crop rotation, reduced soil erosion, integrated pest management, and minimal use of soil additives.</p>	<p>lab - food consumption</p> <p>lab - caloric content of foods</p> <p>lab - iron content in foods</p> <p>lab - moisture retention of soils</p> <p>lab - soil erosion study</p> <p>test - chapter 14</p>	<p>text - 14.2, 14.3, 14.4</p> <p>video - feed the world</p> <p>debate - genetically engineered and irradiated foods</p> <p>issues - food irradiation (8)</p> <p>issues - aquaculture (10)</p> <p>issues - soil erosion (14)</p> <p>issues - pesticides (11)</p>

Big Idea/Essential Question: Will I be driving gasoline powered cars my whole life?

Standards	Learning Expectations	Skills	Assessments	Content
<p>1. Explain how changes in human society have changed the demands for energy.</p> <p>2. Identify and describe the formation and usage of fossils fuels.</p> <p>3. Identify and describe the formation and usage of biomass fuels.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<p>1. Describe a per person energy usage for the world today and in the past, and relate these changes to the structure of society.</p> <p>2. Prepare a graphic that shows how industrialized societies use energy.</p> <p>3. Prepare a graphic that shows what sources the United States uses for energy.</p> <p>4. Identify the benefits and drawbacks of each type of fossil fuel.</p>	<p>lab - oil to burn</p> <p>lab - remediation of oil contaminated soils</p> <p>lab - energy content of organic fuels</p> <p>test - chapter 15</p>	<p>text - 15.1, 15.2, 15.3, 15.4</p> <p>debate - green cars or mass transit</p> <p>issues - green cars (12)</p> <p>issues - oil spills (18)</p>

Big Idea/Essential Question: The United States uses nuclear power for about 7% of its energy consumption. Is this too much, too little, or just right?

Standard(s)	Learning Expectations	Skills	Assessment	Content
1. Describe fission and fusion nuclear energy. 2. Identify nuclear energy as a source of radioactive wastes 3. State the unique problems associated with the disposal of radioactive wastes	LE 1: Read, write, and communicate effectively. LE 2: Define, analyze, and solve complex problems and communicate results. LE 3: Study and work productively both independently and in groups. LE 4: Demonstrate personal, social, and civic responsibility. LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge. LE 8: Identify and apply appropriate technologies.	1. Describe nuclear fission and fusion in terms of role of the nucleus, present usage, advantages, and drawbacks. 2. Identify the sources of radioactive wastes, and disposal option for them.	lab - nuclear waste containment test - chapter 16	text: 16.2, 16.3 issues - nuclear wastes (13) issues - Yankee Rowe video - Chernobyl

Big Idea/Essential Question: What other energy options are there?

Standards	Learning Expectations	Skills	Assessments	Content
<ol style="list-style-type: none"> 1. Identify alternative energy sources. 2. Describe the uses of solar energy. 3. Describe how moving water can produce electricity, and identify benefits and drawbacks. 4. Describe how wind can be harnessed to produce electrical energy. 5. Described how geothermal energy can be used. 	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<ol style="list-style-type: none"> 1. Identify the major alternative energy sources as solar, hydroelectric, wind, and geothermal energy. 2. Describe how solar energy can heat a house (both passive and active) and produce electricity through photovoltaic cells. 3. Describe the process by which the energy of moving water and wind can be harnessed by damns (both river and tidal) and windmills. 4. Describe how the heat of the interior of the earth can be used. 5. Compare the major alternative energy sources in terms of benefits and problems. 	<p>lab - solar properties of materials</p> <p>lab - building solar concentrators</p> <p>lab - build and test a passive solar house</p> <p>lab - build and test a windmill</p> <p>lab - build and test a water wheel</p> <p>lab - efficiency of solar collectors</p> <p>lab - light bulb efficiency</p> <p>test - chapter 17</p>	<p>text - 17.1, 17.2, 17.3, 17.4\</p> <p>video - Hoover damn</p>

Big Idea/Essential Question: Are we really six inches from the end of the world?

Standards	Learning Expectations	Skills	Assessments	Content
<p>1. Identify some important mineral and their uses.</p> <p>2. describe how minerals are obtained from the earth, and how these processes effect the environment.</p> <p>3. Identify soil types and their characteristics.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<p>1. List important minerals (copper, aluminum, etc.), where their deposits are located, and what their uses are.</p> <p>2. Describe the mining techniques like open-pit, subsurface, and dredging, and how each effects the environment.</p> <p>3. analyze soils and characterizes them as sandy, clayey, or loam.</p> <p>4. test soils for properties like porosity, permeability, and water retention.</p>	<p>lab - mining minerals</p> <p>lab - characterize the properties of sand, clay, and loam</p> <p>lab - analyze local soil deposits</p> <p>test - chapter 18</p>	<p>text - 18.1, 18.2, 18.3</p> <p>research - mineral resources</p>

Big Idea/Essential Question: Where does trash go after it leaves the can?

Standards	Learning Expectations	Skills	Assessments	Content
<ol style="list-style-type: none"> 1. Identify the typical composition of solid wastes. 2. Identify past and present methods for the disposal of solid wastes. 3. Identify the potential problems associated with hazardous wastes. 4. describe some of the hazardous waste disposal methods. 	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<ol style="list-style-type: none"> 1. Identify the relative proportions of paper (50%), plastic (10%), metal (6%), glass (1%), organic (13%), and other (20%) in the solid waste stream. 2. Describe historical solid waste disposal methods, as well as the current sanitary landfill. 3. Describe the sources and composition of the hazardous waste stream. 	<p>lab - designing packaging</p> <p>lab - non hazardous cleaners</p> <p>lab - hazardous waste containers</p> <p>test - chapter 19</p>	<p>text - 19.1, 19.2</p> <p>video - waste not, want not</p> <p>issues - toxic wastes (15)</p> <p>issues - pay as you throw (23)</p>

Big Idea/Essential Question: I see water from the facet to the drain. Where does it come from and where does it go?

Standards	Learning Expectations	Skills	Assessments	Content
<ol style="list-style-type: none"> 1. List the ways people use water. 2. Describe how water can be conserved. 3. Explain how water is stored and purified for use 4. Identify types of water pollutants and link water pollution to human disease. 5. Describe how water pollution is currently controlled. 	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<ol style="list-style-type: none"> 1. Breakdown societal water usage among agricultural, industrial, and residential usage. 2. Identify the amount of water usage per person. 3. Diagram a typical municipal water purification system. 	<p>lab - study of water quality from several local sources</p> <p>lab - build a water filtration system</p> <p>lab - build a model well and study pollution migration</p> <p>lab - purify contaminated water</p> <p>test - chapters 20 and 21</p>	<p>text - 20.1, 20.2, 20.3</p> <p>issues - water diversion (17)</p> <p>text - 21.1, 21.2, 21.3, 21.4</p> <p>issues - chemical pesticides (11)</p>

Big Idea/Essential Question: Is this stuff I breath all day clean?

Standards	Learning Expectations	Skills	Assessments	Content
<p>1. Identify common air pollutants and their sources.</p> <p>2. Describe the effects of air pollutants on human health and the environment.</p> <p>3. describe methods made to control air pollution.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 4: Demonstrate personal, social, and civic responsibility.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p> <p>LE 8: Identify and apply appropriate technologies.</p>	<p>1. Prepare a list of the major air pollutants (particulates, SO₂, CO₂, NO₂, O₃, and CFC's), their sources and associated health and environmental problems.</p> <p>2. Describe the causes and effects of indoor air pollution, acid rain, ozone depletion, and global warming.</p>	<p>lab - percent oxygen in air</p> <p>lab - test the effect of atmospheric carbon dioxide on heat retention.</p> <p>lab - particulate air pollution in school</p> <p>lab - model scrubber</p> <p>lab - sunscreen effectiveness</p> <p>test - chapter 22</p>	<p>text - 22.1, 22.2, 22.3, 22.4</p> <p>issues - antismoking laws (21)</p> <p>issues - global warming (3)</p> <p>issues - ozone depletion (19)</p>