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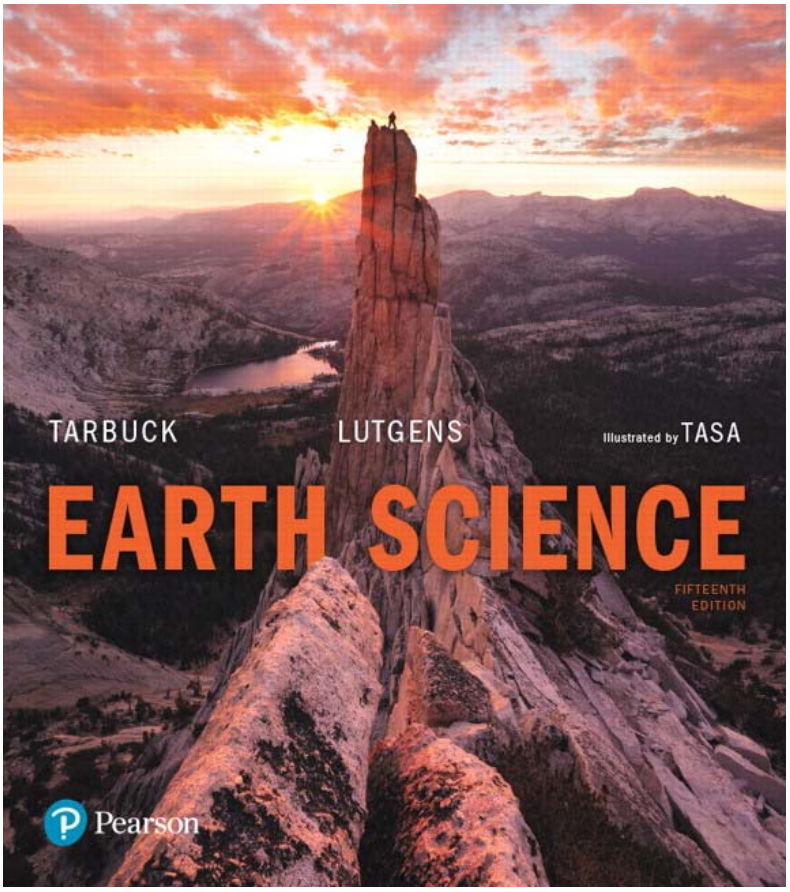

To the

Utah Core Science Standards

High School Earth Science

Pearson

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To the
Utah Science Core Standards for High School Earth Science

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To the
Utah Science Core Standards for High School Earth Science

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Standard 3 Students will understand the atmospheric processes that support life and cause weather and climate.	
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c. Describe how human activity influences the carbon cycle and may contribute to climate change.	**SE/TE:** Carbon Dioxide (CO_2), 488-489 SmartFigure 16.6 Monthly CO_2 concentrations, 489 Aerosols, 489 SmartFigure 16.7 Aerosols, 489 20.8 Human Impact on Global Climate, 621-625 Figure 20.17 U.S. energy consumption, 622 Eye on Earth 20.2, 622 Figure 20.18 Tropical deforestation, 623 Figure 20.19 CO_2 concentrations over the past 800,000 years, 623 Figure 20.22 Methane, 625 Figure 20.23 Human-generated aerosols, 625 Concept Checks 20.6, Questions 1, 3, & 4, 625 Chapter 20 Concepts in Review, 20.8 Human Impact on Global Climate, 632 Chapter 20 Give It Some Thought, Question 3, 633 Chapter 20 Examining the Earth System, Question 3, 634

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d. Explain the differences between air pollution and climate change and how these are related to society's use of fossil fuels.	**SE/TE:** Rising CO_2 Levels, 622-623 Figure 20.17 U.S. energy consumption, 622 Chapter 20 Concepts in Review, 20.8 Human Impact on Global Climate, 632 Chapter 20 Give It Some Thought, Question 3, 633 Chapter 20 Examining the Earth System, Question 3, 634
e. Investigate the current and potential consequences of climate change (e.g., ocean acidification, sea level rise, desertification, habitat loss) on ecosystems, including human communities.	**SE/TE:** 20.8 Human Impact on Global Climate, 621-625 Figure 20.18 Tropical deforestation, 623 Figure 20.19 CO_2 concentrations over the past 800,000 years, 623 Figure 20.20 Global temperatures, 624 Figure 20.23 Human-generated aerosols, 625 Concept Checks 20.8, Question 2, 625 20.10 Some Possible Consequences of Global Warming, 627-630 SmartFigure 20.26 Rising sea levels, 628 Table 20.1 IPCC Projections for the Late Twenty-First Century, 628 SmartFigure 20.28 Climate change spurs plant growth beyond 45^0 north, 629 Chapter 20 Concepts in Review, 20.10 Some Possible Consequences of Global Warming, 633 Chapter 20 Give It Some Thought, Question 3, 633 Chapter 20 Data Analysis, Climate Classification and Climate Change, Questions 4 & 11, 635

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Science language students should use: Please note that Earth Science terminology has been incorporated into the indicators above and have been underlined. Students and teachers should integrate these terms into normal daily conversations around science topics.	
Standard 4 Students will understand the dynamics of the hydrosphere.	
Objective 1 Characterize the water cycle in terms of its reservoirs, water movement among reservoirs and how water has been recycled throughout time.	
a. Identify oceans, lakes, running water, frozen water, ground water, and atmospheric moisture as the reservoirs of Earth's water cycle, and graph or chart the relative amounts of water in each.	**SE/TE:** Figure 1.18 The hydrologic cycle, 19 9.1 Earth as a System: The Hydrologic Cycle, 268-269 SmartFigure 9.1 The hydrologic cycle, 268 9.2 Running Water, 269-272 Figure 9.2 Drainage basin and divide, 269 SmartFigure 9.3 Mississippi River drainage basin, 270 9.9 Groundwater, 288-290 Figure 9.27 Earth's freshwater, 288 Figure 9.29 Water beneath the surface, 289 Figure 9.31 Groundwater movement, 290 Concept Checks 9.9, Questions 1, 4, & 5, 290 9.10 Wells, Artesian Systems, and Springs, 291-294 SmartFigure 9.33 Artesian systems, 292 Concept Checks 9.10, Questions 3, 4, & 5, 294 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300 Chapter 9 Concepts in Review, 9.2 Running Water, 300 Chapter 9 Concepts in Review, 9.9 Groundwater: Water Beneath the Surface, 302 Chapter 9 Concepts in Review, 9.10 Wells, Artesian Systems, and Springs, 302 Chapter 9 Give It Some Thought, Question 10, 305 Chapter 9 Data Analysis, Streamflow Rates Near You, Questions 2, 4, 5, 305 10.1 Glaciers and the Earth System, 308-313 SmartFigure 10.2 Ice sheets, 309 GEOGRAPHICS 10.1 Antarctic Fact File, 310-311 Chapter 10 Concepts in Review, 10.1 Glaciers and the Earth System, 340

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Continued	13.1 The Vast World Ocean, 409 Figure 13.1 North versus south, 408 SmartFigure 13.2 Distribution of land and water, 409 Chapter 13 Concepts in Review, 13.1 The Vast world Ocean, 426
b. Describe how the processes of evaporation, condensation, precipitation, surface runoff, ground infiltration and transpiration contribute to the cycling of water through Earth's reservoirs.	**SE/TE:** Figure 1.18 The hydrologic cycle, 19 9.1 Earth as a System: The Hydrologic Cycle, 268-269 SmartFigure 9.1 The hydrologic cycle, 268 Concept Checks 9.1, Questions 2 & 3, 269 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300
c. Model the natural purification of water as it moves through the water cycle and compare natural purification to processes used in local sewage treatment plants.	**SE/TE:** Figure 1.18 The hydrologic cycle, 19 9.1 Earth as a System: The Hydrologic Cycle, 268-269 SmartFigure 9.1 The hydrologic cycle, 268 Concept Checks 9.1, Question 1, 269 Groundwater contamination, 296 Figure 9.39 Comparing two aquifers, 296 Concept Checks 9.11, Question 2, 296 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300

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Objective 2 Analyze the characteristics and importance of freshwater found on Earth's surface and its effect on living systems.	
a. Investigate the properties of water: exists in all three states, dissolves many substances,exhibits adhesion and cohesion, density of solid vs. liquid water.	Supporting Content: **SE/TE:** Figure 1.18 The hydrologic cycle, 19 9.1 Earth as a System: The Hydrologic Cycle, 268-269 SmartFigure 9.1 The hydrologic cycle, 268 Concept Checks 9.1, Questions 2 & 3, 269 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300 Density Variations, 435 Density Variation with Depth, 435-436 SmartFigure 14.8 Variations in ocean water density with depth for low- and high-latitude regions, 436
b. Plan and conduct an experiment to investigate biotic and abiotic factors that affect freshwater ecosystems.	Supporting Content: **SE/TE:** 1.4 Earth as a System, 14-21 Chapter 1 Concepts in Review, 1.4 Earth as a System, 27 Chapter 7 Examining the Earth System, Question 2, 231 Plants and Animals, 245-246 Food Chains and Food Webs, 445-446
c. Using data collected from local water systems, evaluate water quality and conclude how pollution can make water unavailable or unsuitable for life.	Supporting Content: **SE/TE:** Figure 9.39 Comparing two aquifers, 296 Chapter 9 Give It Some Thought, Question 4, 303 Chapter 9 Give It Some Thought, Question 10, 304

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d. Research and report how communities manage water resources (e.g., distribution, shortages, quality, flood control) to address social, economic, and environmental concerns.	**SE/TE:** Floods and Flood Control, 285-287 Figure 9.26 Birds Point-New Madrid Floodway, 287 Concept Checks 9.8, Questions 2 & 3, 287 Distribution of Groundwater, 289 Shortage and Movement of Groundwater, 289 Figure 9.34 City water systems, 292 Chapter 9 Concepts in Review, 9.8 Floods and Flood Control, 302 Chapter 9 Data Analysis, Streamflow Rates Near You, 305 Chapter 10 Data Analysis, The Aral Sea, 345
Objective 3 Analyze the physical, chemical, and biological dynamics of the oceans and the flow of energy through the oceans.	
a. Research how the oceans formed from outgassing by volcanoes and ice from comets.	**SE/TE:** Earth's Primitive Atmosphere, 379 Figure 12.6 Outgassing produced Earth's first enduring atmosphere, 379 Evolutions of Earth's Oceans, 380-381 Concept Checks 12.3, Questions 1, 4, & 5, 381 Chapter 12 Concepts in Review, Origin and Evolution of the Atmosphere and Oceans, 402 Chapter 12 Give It Some Thought, Question 5, 404

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b. Investigate how salinity, temperature, and pressure at different depths and locations in oceans and lakes affect saltwater ecosystems.	**SE/TE:** 14.1 Composition of Seawater, 432-434 SmartFigure 14.2 Variations in surface temperature and salinity with latitude, 433 Concept Checks 14.1, Question 1, 434 14.2 Variations in Temperature and Density with Depth, 435-437 SmartFigure 14.8 Variations in ocean water density with depth for low-and high-latitude regions, 436 Concept Checks 14.2, Questions 1 & 3, 437 Marine Life Zones, 439-441 SmartFigure 14.12, Benthos, 439 Concept Checks 14.3, Questions 2 & 3, 441 14.4 Ocean Productivity, 441-445 Figure 14.15 Productivity in tropical oceans, 444 SmartFigure 14.16 Productivity in midlatitude oceans (Northern Hemisphere), 444 GEOGRAPHICS 14.1 Deep-Sea Hydrothermal Vents, 442-443 Chapter 14 Concepts in Review, 14.1 Composition of Seawater, 447 Chapter 14 Concepts in Review, 14.2 Variations in Temperature and Density with Depth, 447 Chapter 14 Concepts in Review, The Diversity of Ocean Life, 447 Chapter 14 Concepts in Review, 14.4 Oceanic Productivity, 448 Chapter 14 Give It Some Thought, Question 4, 448 Chapter 14 Examining the Earth System, Question 3b, 449

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c. Design and conduct an experiment comparing chemical properties (e.g., chemical composition, percent salinity) and physical properties (e.g., density, freezing point depression) of freshwater samples to saltwater samples from different sources.	Supporting Content: **SE/TE:** 9.1 Earth as a System: The Hydrologic Cycle, 268-269 9.2 Running Water, 269-272 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300 Chapter 9 Concepts in Review, 9.2 Running Water, 300 14.1 Composition of Seawater, 432-434 SmartFigure 14.2 Variations in surface temperature and salinity with latitude, 433 Concept Checks 14.1, Question 1, 434 14.2 Variations in Temperature and Density with Depth, 435-437 SmartFigure 14.8 Variations in ocean water density with depth for low-and high-latitude regions, 436 Concept Checks 14.2, Questions 1 & 3, 437 Chapter 14 Concepts in Review, 14.1 Composition of Seawater, 447 Chapter 14 Concepts in Review, 14.2 Variations in Temperature and Density with Depth, 447

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d. Model energy flow in the physical dynamics of oceans (e.g., wave action, deep ocean tides circulation, surface currents, land and sea breezes, El Nino, upwellings).	**SE/TE:** 15.1 The Ocean's Surface Circulation, 452-455 SmartFigure 15.2 Major surface-ocean currents, 453 Figure 15.3 The chilling effect of a cold current, 454 Concept Checks 15.1, Question 3, 455 15.2 Upwelling and Deep-Ocean Circulation, 455-456 SmartFigure 15.5 Coastal upwelling, 455 SmartFigure 15.7 Idealized conveyor-belt circulation, 456 15.4 Ocean Waves, 459-461 SmartFigure 15.13 Waves approaching the shore, 461 15.5 The Work of Waves, 461-464 15.9 Tides, 476-478 Chapter 15 Concepts in Review, 15.1The Ocean's Surface Circulation, 479 Chapter 15 Concepts in Review, 15.2 Upwelling and Deep-Ocean Circulation, 479 Chapter 15 Concepts in Review, 15.4 Ocean Waves, 479 Chapter 15 Concepts in Review, 15.5 The Work of Waves, 480 Chapter 15 Concepts in Review, 15.9 Tides, 481 Land and Sea Breezes, 563-564 SmartFigure 18.9 Sea and land breezes Concept Checks 18.5, Questions 2 & 3, 565 El Niño, 567 Global Impact of El Niño, 567
e. Evaluate the impact of human activities (e.g., sediment, pollution, overfishing) on ocean systems.	**SE/TE:** People Influence Earth Processes, 6-7 13.7 Resources from the Seafloor, 424-426 Figure 13.21 Disaster in the Gulf of Mexico, 425 Human Activity, 457 Chapter 13 Concepts in Review, 13.7 Resources from the Seafloor, 468 Pacific Coast, 470-471 Figure 15.26 Pacoima Dam and Reservoir, 471 Concept Checks 15.7, Question 4, 471 Changing Land Uses, 475

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Science language students should use: Please note that Earth Science terminology has been incorporated into the indicators above and have been underlined. Students and teachers should integrate these terms into normal daily conversations around science topics.	
Standard 5 Students will understand how Earth science interacts with society.	
Objective 1 Characterize Earth as a changing and complex system of interacting spheres.	
a. Illustrate how energy flowing and matter cycling within Earth's biosphere, geosphere, atmosphere, and hydrosphere give rise to processes that shape Earth.	**SE/TE:** 1.4 Earth as a System, 14-21 Chapter 1 Concepts in Review, 1.4 Earth as a System, 27 Eye on Earth 3.3, 87 Discovering the Causes of Earthquakes, 128-130 Figure 5.2, Earthquakes can trigger fires, 129 Chapter 5 Examining the Earth System, Question 1, 159 6.8 Volcanic Hazards, 177-180 Figure 6.21 Volcanic Hazards, 179 Chapter 6 Concepts in Review, 6.8 Volcanic Hazards, 197 Chapter 6 Examining the Earth System, Question 1, 199 Chapter 7 Examining the Earth System, Question 1, 231 Chapter 8 Examining the Earth System, Question 4, 264 9.1 Earth as a System: The Hydrologic Cycle, 268 SmartFigure 9.1 The hydrologic cycle, 268 Concept Checks 9.1, Question 1, 269 Chapter 9 Concepts in Review, 9.1 Earth as a System: The Hydrologic Cycle, 300 Figure 10.6 Measuring the movement of a glacier, 314 20.10 Some Possible Consequences of Global Warming, 627-630 Chapter 20 Concepts in Review, 20.10 Some Possible Consequences of Global Warming, 633

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b. Explain how Earth's systems are dynamic and continually react to natural and human caused changes.	**SE/TE:** 1.4 Earth as a System, 14-21 Chapter 1 Concepts in Review, 1.4 Earth as a System, 27 6.1 Mount St. Helens Versus Kilauea, 162-163 Gases, 168 6.8 Volcanic Hazards, 177-180 Figure 6.21 Volcanic hazards, 179 Concept Checks 6.8, Question 3, 180 Chapter 6 Concepts in Review, 6.1 Mount St. Helens Versus Kilauea, 195 Chapter 6 Concepts in Review, 6.8 Volcanic Hazards, 196 Chapter 6 Examining the Earth System, Question 1, 199 Chapter 9 Examining the Earth System, Question 1, 304 Figure 20.25 Separating human and natural influences on climate, 627 Chapter 20 Examining the Earth System, Question 4, 634

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c. Explain how technological advances lead to increased human knowledge (e.g., satellite imaging, deep sea ocean probes, seismic sensors, weather radar systems) and ability to predict how changes affect Earth's systems.	**SE/TE:** Eye on Earth 1.1, 11 Eye on Earth 4.2, 117 5.7 Earthquakes: Predictions, Forecasts, and Mitigation, 146-152 Chapter 5 Concepts in Review, 5.7 Earthquakes: Predictions, Forecasts, and Mitigation, 157 Eye on Earth 7.1, 209 Figure 10.6 Measuring the movement of a glacier, B, 314 Eye on Earth 10.3, 337 13.2 An Emerging Picture of the Ocean Floor, 409-413 Figure 13.3 HMS *Challenger*, 410 Figure 13.4 Echo sounder, 410 Figure 13.5 Side scan and multibeam sonar, 411 SmartFigure 24.6 Satellite altimeter, 411 Concept Checks 13.2, Question 2, 413 Figure 13.13 The Challenger Deep, 417 Figure 13.14 Seismic profile, 418 Figure 13.15 The deep-diving submersible *Alvin*, 419 Chapter 13 Concepts in Review, 13.2 An Emerging Picture of the Ocean Floor, 426 Doppler Radar, 595 The Role of Satellites, 600-601 Computer Models of Climate: Important yet imperfect tools, 626 Concept Checks 20.9, Question 3, 627
d. Design and conduct an experiment that investigates how Earth's biosphere, geosphere, atmosphere, or hydrosphere reacts to human-caused change.	Supporting Content: **SE/TE:** Eye on Earth 3.3, 87 Chapter 20 Examining the Earth System, Question 4, 634 Chapter 9 Examining the Earth System, Question 1, 304 Figure 20.25 Separating human and natural influences on climate, 627 Chapter 20 Examining the Earth System, Question 4, 634

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e. Research and report on how scientists study feedback loops to inform the public about Earth's interacting systems.	**SE/TE:** 20.9 Climate-Feedback Mechanisms, 626-627 Figure 20.24 Sea ice as a feedback mechanism, 626 Concept Checks 20.9, Questions 1-3, 627 Chapter 20 Concepts in Review, 20.9 Climate-Feedback Mechanisms, 633
Objective 2 Describe how humans depend on Earth's resources.	
a. Investigate how Earth's resources (e.g., mineral resources, petroleum resources, alternative energy resources, water resources, soil and agricultural resources) are distributed across the state, the country, and the world.	**SE/TE:** Resources, 6 GEOGRAPHICS 2.1 Gold, 36-37 2.6 Minerals: A Nonrenewable Resource, 50-51 Figure 2.35 Aerial view of Bingham Canyon copper mine near Salt Lake City, Utah, 51 Chapter 2 Concepts in Review, 2.6 Minerals: A Nonrenewable Resource, 54 Chapter 2 Examining the Earth System, Question 1, 55 Chapter 2 Data Analysis, Global Mineral Resources, 55 3.5 Resources from Rocks and Minerals, 82-87 Table 3.2 Occurrences and Uses of Nonmetallic Minerals, 84 Figure 3.36 Coal Fields of the United States, 85 Chapter 3 Concepts in Review, 3.5 Resources from Rocks and Minerals, 89 Chapter 3 Data Analysis, Fossil Fuels Near You, Questions 1-6, 91 8.3 Soil: An Indispensable Resource, 243-244 Figure 8.17 Global soil regions, 249 Chapter 8 Concepts in Review, 8.3 Soil: An Indispensable Resource, 261 The Importance of Groundwater, 288 Distribution of Groundwater, 288-289 Treating Groundwater as a Nonrenewable Resource, 294-295 Figure 9.37 Mining groundwater, 295

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b. Research and report on how human populations depend on Earth resources for sustenance and how changing conditions over time have affected these resources (e.g., water pollution, air pollution, increases in population)	**SE/TE:** Resources, 6 People Influence Earth Processes, 6 Figure 1.4 People influence the atmosphere, 6 Chapter 2 Examining the Earth System, Questions 1 & 2, 55 Coal, 85 Hydraulic Fracturing, 86-87 Figure 3.38 Hydraulic fracturing ("fracking"), 87 Eye on Earth 3.3, Questions 1 & 2, 87 8.6 Soil Erosion: Losing a Vital Resource, 250-251 Concept Checks 8.6, Question 2, 251 Chapter 8 Concepts in Review, 8.6 Soil Erosion: Losing a Vital Resource, 261 9.11 Environmental Problems Related to Groundwater, 294-296 Figure 9.37 Mining groundwater, 295 Chapter 9 Concepts in Review, 9.11 Environmental Problems Related to Groundwater, 302
c. Predict how resource development and use alters Earth systems (e.g., water reservoirs, alternative energy sources, wildlife preserves).	**SE/TE:** Chapter 2 Examining the Earth System, Questions 1 & 2, 55 8.6 Soil Erosion: Losing a Vital Resource, 250-251 Chapter 8 Concepts in Review, 8.6 Soil Erosion: Losing a Vital Resource, 261
d. Describe the role of scientists in providing data that informs the discussion of Earth resource use.	**SE/TE:** 1.2 The Nature of Scientific Inquiry, 8-11 Figure 1.8 Steps frequently followed in scientific investigations, 10 Concept Checks 1.2, Question 2 Chapter 1 Concepts in Review, 1.2 The Nature of Scientific Inquiry, 26 Eye on Earth 1.1, Question 1, 11 Controlling Soil Erosion, 251 Figure 8.20 Soil conservation, 251

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e. Justify the claim that Earth science literacy can help the public make informed choices related to the extraction and use of natural resources.	**SE/TE:** People Influence Earth Processes, 6 Figure 1.4 People influence the atmosphere, 6 Chapter 2 Examining the Earth System, Questions 1 & 2, 55 Energy Resources, 85-87 Chapter 9 Examining the Earth System, Question 2, 304
Objective 3 Indicate how natural hazards pose risks to humans.	
a. Identify and describe natural hazards that occur locally (e.g., wildfires, landslides, earthquakes, floods, drought) and globally (e.g., volcanoes, tsunamis, hurricanes).	**SE/TE:** Natural Hazards, 6 Figure 1.3 Earthquake in Ecuador, 6 Chapter 1 Examining the Earth System, Question 3, 29 Chapter 1 Data Analysis, Swift Creek Landslide, 29 5.1 What Is an Earthquake?, 128-131 Figure 5.2 Earthquakes can trigger fires, 129 Concept Checks 5.1, Question 1, 131 5.5 Earthquake Destruction, 139-144 SmartFigure 5.27 Tsunami generated off the coast of Sumatra, 2004, 142 Table 5.2 Some Notable Earthquakes, 143 Figure 5.28 Japan tsunami, March 2011, 144 Damaging Earthquakes East of the Rockies, 145-146 Figure 5.30 Global earthquake belts, 145 Figure 5.31 Historical earthquakes east of the Rockies, 145 Figure 5.32 Damage to Charleston, South Carolina, caused by the August 31, 1886 earthquake, 146 Figure 5.33 Collapse of the double-decked section of I-880, 146 Chapter 5 Concepts in Review, 5.1 What Is an Earthquake?, 155 Chapter 5 Concepts in Review, 5.5 Earthquake Destruction, 156 Chapter 5 Concepts in Review, 5.6 Where Do Most Earthquakes Occur?, 156

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b. Evaluate and give examples of human activities that can contribute to the frequency and intensity of some natural hazards (e.g., construction that may increase erosion, human causes of wildfires, climate change).	**SE/TE:** People Influence Earth Processes, 6 Figure 1.4 People influence the atmosphere, 6 8.6 Soil Erosion: Losing a Vital Resource, 250-251 Concept Checks 8.6, Question 2, 251 Removal of Vegetation, 255 Chapter 8 Concepts in Review, 8.6 Soil Erosion: Losing a Vital Resource, 261 GEOGRAPHICS 9.1 Flash Floods, 286 Figure 9.26 Birds Point-New Madrid Floodway, 287 20.8 Human Impact on Global Climate, 621-625 Figure 20.18 Tropical deforestation, 623 Figure 20.23 Human-generated aerosols, 625 Chapter 20 Concepts in Review, 20.8 Human Impact on Global Climate, 632
c. Document how scientists use technology to continually improve estimates of when and where natural hazards occur.	**SE/TE:** Chapter 4 Data Analysis, Tectonic Plate Movement, Questions 1-8, 125 Instruments That Record Earthquakes, 132-133 Concept Checks 5.2, Question 1, 134 Tsunami Warning System, 144 Short-Range Predictions, 146-147 Earthquake Warning Systems, 151-152 Tornado Forecasting, 594-595 SmartFigure 19.25 Doppler radar, 595 Monitoring Hurricanes, 600-601

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d. Investigate and report how social, economic, and environmental issues affect decisions about human-engineered structures (e.g., dams, homes, bridges, roads).	**SE/TE:** People Influence Earth Processes, 6 Figure 1.4 People influence the atmosphere, 6 Earthquake-Resistant Structures, 151 Figure 5.36 Retrofitted building, 151 Flood Control, 285-287 Chapter 9 Examining the Earth System, Question 1, 304
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