Environmental Systems

Subject: Science
Grade: 12
Num Expectations: 59
Num Breakouts: 226

(a) Introduction.

(1) Environmental Systems. In Environmental Systems, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include biotic and abiotic factors in habitats, ecosystems and biomes, interrelationships among resources and an environmental system, sources and flow of energy through an environmental system, relationship between carrying capacity and changes in populations and ecosystems, natural changes in the environment, and human activities that impact the natural environment.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.

(3) Scientific hypotheses and theories. Students are expected to know that:

(A) hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(4) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(A) Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(B) Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.

(5) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(6) Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide tools for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(7) Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(b) Knowledge and Skills Statements

(1) Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

Breakouts

(i) ask questions based on observations or information from text, phenomena, models, or investigations

(ii) define problems based on observations or information from text, phenomena, models, or investigations

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

Breakouts

(i) apply scientific practices to plan descriptive investigations

(ii) apply scientific practices to plan comparative investigations

(iii) apply scientific practices to plan experimental investigations

(iv) apply scientific practices to conduct descriptive investigations

(v) apply scientific practices to conduct comparative investigations

(vi) apply scientific practices to conduct experimental investigations

(vii) use engineering practices to design solutions to problems

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

Breakouts

(i) use appropriate safety equipment during laboratory investigations as outlined in Texas Education Agency-approved safety standards

(ii) use appropriate safety equipment during classroom investigations as outlined in Texas Education Agency-approved safety standards

(iii) use appropriate safety equipment during field investigations as outlined in Texas Education Agency-approved safety standards

(iv) use appropriate safety practices during laboratory investigations as outlined in Texas Education Agency-approved safety standards

(v) use appropriate safety practices during classroom investigations as outlined in Texas Education Agency-approved safety standards

(vi) use appropriate safety practices during field investigations as outlined in Texas Education Agency-approved safety standards

(D) use appropriate tools such as meter sticks, metric rulers, pipettes, graduated cylinders, standard laboratory glassware, balances, timing devices, pH meters or probes, various data collecting probes, thermometers, calculators, computers, internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, binoculars, field guides, water quality test kits or probes, soil test kits or probes, 30 meter tape measures, tarps, shovels, trowels, screens, buckets, rock and mineral samples equipment, air quality testing devices, cameras, flow meters, Global Positioning System (GPS) units, Geographic Information System (GIS) software, computer models, densiometers, spectrophotometers, stereomicroscopes, compound microscopes, clinometers, field journals, various prepared slides, hand lenses, hot plates, Petri dishes, sampling nets, waders, leveling grade rods (Jason sticks), protractors, inclination and height distance calculators, samples of biological specimens or structures, core sampling equipment, and kick nets;

Breakouts

(i) use appropriate tools

(E) collect quantitative data using the International System of Units (SI) and qualitative data as evidence;

Breakouts

(i) collect quantitative data using the International System of Units (SI)

(ii) collect qualitative data as evidence

(F) organize quantitative and qualitative data using probeware, spreadsheets, lab notebooks or journals, models, diagrams, graphs paper, computers, or cellphone applications;

Breakouts

(i) organize quantitative data using probeware, spreadsheets, lab notebooks or journals, models, diagrams, graphs paper, computers, or cellphone applications

(ii) organize qualitative data using probeware, spreadsheets, lab notebooks or journals, models, diagrams, graphs paper, computers, or cellphone applications

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

Breakouts

(i) develop models to represent phenomena, systems, processes, or solutions to engineering problems

(ii) use models to represent phenomena, systems, processes, or solutions to engineering problems

(H) distinguish between scientific hypotheses, theories, and laws.

Breakouts

(i) distinguish between scientific hypotheses, theories, and laws

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

Breakouts

(i) identify advantages of models

(ii) identify limitations of models

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

Breakouts

(i) analyze data by identifying significant statistical features

(ii) analyze data by identifying patterns

(iii) analyze data by identifying sources of error

(iv) analyze data by identifying limitations

(C) use mathematical calculations to assess quantitative relationships in data; and

Breakouts

(i) use mathematical calculations to assess quantitative relationships in data

(D) evaluate experimental and engineering designs.

Breakouts

(i) evaluate experimental designs

(ii) evaluate engineering designs

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories;

Breakouts

(i) develop explanations supported by data consistent with scientific ideas

(ii) develop explanations supported by data consistent with scientific principles

(iii) develop explanations supported by data consistent with scientific theories

(iv) develop explanations supported by models consistent with scientific ideas

(v) develop explanations supported by models consistent with scientific principles

(vi) develop explanations supported by models consistent with scientific theories

(vii) propose solutions supported by data consistent with scientific ideas

(viii) propose solutions supported by data consistent with scientific principles

(ix) propose solutions supported by data consistent with scientific theories

(x) propose solutions supported by models consistent with scientific ideas

(xi) propose solutions supported by models consistent with scientific principles

(xii) propose solutions supported by models consistent with scientific theories

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

Breakouts

(i) communicate explanations individually in a variety of settings

(ii) communicate explanations individually in a variety of formats

(iii) communicate explanations collaboratively in a variety of settings

(iv) communicate explanations collaboratively in a variety of formats

(v) communicate solutions individually in a variety of settings

(vi) communicate solutions individually in a variety of formats

(vii) communicate solutions collaboratively in a variety of settings

(viii) communicate solutions collaboratively in a variety of formats

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

Breakouts

(i) engage respectfully in scientific argumentation using applied scientific explanations

(ii) engage respectfully in scientific argumentation using empirical evidence

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;

Breakouts

(i) analyze scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(ii) analyze scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(iii) analyze scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(iv) analyze scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(v) evaluate scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(vi) evaluate scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(vii) evaluate scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(viii) evaluate scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(ix) critique scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(x) critique scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(xi) critique scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(xii) critique scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content; and

Breakouts

(i) relate the impact of past research on scientific thought, including research methodology

(ii) relate the impact of past research on scientific thought, including cost-benefit analysis

(iii) relate the impact of past research on scientific thought, including contributions of diverse scientists as related to the content

(iv) relate the impact of past research on society, including research methodology

(v) relate the impact of past research on society, including cost-benefit analysis

(vi) relate the impact of past research on society, including contributions of diverse scientists as related to the content

(vii) relate the impact of current research on scientific thought, including research methodology

(viii) relate the impact of current research on scientific thought, including cost-benefit analysis

(ix) relate the impact of current research on scientific thought, including contributions of diverse scientists as related to the content

(x) relate the impact of current research on society, including research methodology

(xi) relate the impact of current research on society, including cost-benefit analysis

(xii) relate the impact of current research on society, including contributions of diverse scientists as related to the content

(C) research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

Breakouts

(i) research STEM careers

(ii) explore resources in order to investigate STEM careers

(5) Science concepts. The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes. The student is expected to:

(A) identify native plants and animals within a local ecosystem and compare their roles to those of plants and animals in other biomes, including aquatic, grassland, forest, desert, and tundra;

Breakouts

(i) identify native plants within a local ecosystem

(ii) identify native animals within an ecosystem

(iii) compare [the] roles [of native plants] to those of plants in other biomes including aquatic

(iv) compare [the] roles [of native plants] to those of plants in other biomes including grassland

(v) compare [the] roles [of native plants]to those of plants in other biomes including forest

(vi) compare [the] roles [of native plants] to those of plants in other biomes including desert

(vii) compare [the] roles [of native plants] to those of plants in other biomes including tundra

(viii) compare [the] roles [of native animals] to those of animals in other biomes including aquatic

(ix) compare [the] roles [of native animals] to those of animals in other biomes including grassland

(x) compare [the] roles [of native animals] to those of animals in other biomes including forest

(xi) compare [the] roles [of native animals] to those of animals in other biomes including desert

(xii) compare [the] roles [of native animals] to those of animals in other biomes including tundra

(B) explain the cycling of water, phosphorus, carbon, silicon, and nitrogen through ecosystems, including sinks, and the human interactions that alter these cycles using tools such as models;

Breakouts

(i) explain the cycling of water through ecosystems, including sinks, using tools

(ii) explain the cycling of phosphorous through ecosystems, including sinks, using tools

(iii) explain the cycling of carbon through ecosystems, including sinks, using tools

(iv) explain the cycling of silicon through ecosystems, including sinks, using tools

(v) explain the cycling of nitrogen through ecosystems, including sinks, using tools

(vi) explain the human interactions that alter [the cycling of water] using tools

(vii) explain the human interactions that alter [the cycling of phosphorus] using tools

(viii) explain the human interactions that alter [the cycling of carbon] using tools

(ix) explain the human interactions that alter [the cycling of silicon] using tools

(x) explain the human interactions that alter [the cycling of nitrogen] using tools

(C) evaluate the effects of fluctuations in abiotic factors on local ecosystems and local biomes;

Breakouts

(i) evaluate the effects of fluctuations in abiotic factors on local ecosystems

(ii) evaluate the effects of fluctuations in abiotic factors on local biomes

(D) measure the concentration of dissolved substances such as dissolved oxygen, chlorides, and nitrates and describe their impacts on an ecosystem;

Breakouts

(i) measure the concentration of dissolved substances

(ii) describe [the] impact of [dissolved substances] on an ecosystem

(E) use models to predict how the introduction of an invasive species may alter the food chain and affect existing populations in an ecosystem;

Breakouts

(i) use models to predict how the introduction of an invasive species may alter the food chain

(ii) use models to predict how the introduction of an invasive species may affect existing populations in an ecosystem

(F) use models to predict how species extinction may alter the food chain and affect existing populations in an ecosystem; and

Breakouts

(i) use models to predict how species extinction may alter the food chain in an ecosystem

(ii) use models to predict how species extinction may affect existing populations in an ecosystem

(G) predict changes that may occur in an ecosystem if genetic diversity is increased or decreased.

Breakouts

(i) predict changes that may occur in an ecosystem if genetic diversity is increased or decreased

(6) Science concepts. The student knows the interrelationships among the resources within the local environmental system. The student is expected to:

(A) compare and contrast land use and management methods and how they affect land attributes such as fertility, productivity, economic value, and ecological stability;

Breakouts

(i) compare and contrast land use methods

(ii) compare and contrast land management methods

(iii) compare and contrast how [land use methods] affect land attributes

(B) relate how water sources, management, and conservation affect water uses and quality;

Breakouts

(i) relate how water sources affect water uses

(ii) relate how water management affect[s] water uses

(iii) relate how water conservation affect[s] water uses

(iv) relate how water sources affect water quality

(v) relate how water management affect[s] water quality

(vi) relate how water conservation affect[s] water quality

(C) document the use and conservation of both renewable and non-renewable resources as they pertain to sustainability;

Breakouts

(i) document the use of renewable resources as they pertain to sustainability

(ii) document the use of non-renewable resources as they pertain to sustainability

(iii) document the conservation of renewable resources as they pertain to sustainability

(iv) document the conservation of non-renewable resources as they pertain to sustainability

(D) identify how changes in limiting resources such as water, food, and energy affect local ecosystems;

Breakouts

(i) identify how changes in limiting resources affect local ecosystems

(E) analyze and evaluate the economic significance and interdependence of resources within the local environmental system; and

Breakouts

(i) analyze the economic significance of resources within the local environmental system

(ii) analyze the interdependence of resources within the local environmental system

(iii) evaluate the economic significance of resources within the local environmental system

(iv) evaluate the interdependence of resources within the local environmental system

(F) evaluate the impact of waste management methods such as reduction, reuse, recycling, upcycling, and composting on resource availability in the local environment.

Breakouts

(i) evaluate the impact of waste management methods on resource availability in the local environment

(7) Science concepts. The student knows the sources and flow of energy through an environmental system. The student is expected to:

(A) describe the interactions between the components of the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere;

Breakouts

(i) describe the interactions between the components of the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere

(B) relate biogeochemical cycles to the flow of energy in ecosystems, including energy sinks such as oil, natural gas, and coal deposits;

Breakouts

(i) relate biogeochemical cycles to the flow of energy in ecosystems, including energy sinks

(C) explain the flow of heat energy in an ecosystem, including conduction, convection, and radiation; and

Breakouts

(i) explain the flow of heat energy in an ecosystem, including conduction

(ii) explain the flow of heat energy in an ecosystem, including convection

(iii) explain the flow of heat energy in an ecosystem, including radiation

(D) identify and describe how energy is used, transformed, and conserved as it flows through ecosystems.

Breakouts

(i) identify how energy is used as it flows through ecosystems

(ii) identify how energy is transformed as it flows through ecosystems

(iii) identify how energy is conserved as it flows through ecosystems

(iv) describe how energy is used as it flows through ecosystems

(v) describe how energy is transformed as it flows through ecosystems

(vi) describe how energy is conserved as it flows through ecosystems

(8) Science concepts. The student knows the relationship between carrying capacity and changes in populations and ecosystems. The student is expected to:

(A) compare exponential and logistical population growth using graphical representations;

Breakouts

(i) compare exponential and logistical population growth using graphical representations

(B) identify factors that may alter carrying capacity such as disease; natural disaster; available food, water, and livable space; habitat fragmentation; and periodic changes in weather;

Breakouts

(i) identify factors that may alter carrying capacity

(C) calculate changes in population size in ecosystems; and

Breakouts

(i) calculate changes in population size in ecosystems

(D) analyze and make predictions about the impact on populations of geographic locales due to diseases, birth and death rates, urbanization, and natural events such as migration and seasonal changes.

Breakouts

(i) analyze the impact on populations of geographic locales due to diseases

(ii) analyze the impact on populations of geographic locales due to birth rates

(iii) analyze the impact on populations of geographic locales due to death rates

(iv) analyze the impact on populations of geographic locales due to urbanization

(v) analyze the impact on populations of geographic locales due to natural events

(vi) make predictions about the impact on populations of geographic locales due to diseases

(vii) make predictions about the impact on populations of geographic locales due to birth rates

(viii) make predictions about the impact on populations of geographic locales due to death rates

(ix) make predictions about the impact on populations of geographic locales due to urbanization

(x) make predictions about the impact on populations of geographic locales due natural events

(9) Science concepts. The student knows that environments change naturally. The student is expected to:

(A) analyze and describe how natural events such as tectonic movement, volcanic events, fires, tornadoes, hurricanes, flooding, and tsunamis affect natural populations;

Breakouts

(i) analyze how natural events affect natural populations

(ii) describe how natural events affect natural populations

(B) explain how regional changes in the environment may have global effects;

Breakouts

(i) explain how regional changes in the environment may have global effects

(C) examine how natural processes such as succession and feedback loops can restore habitats and ecosystems;

Breakouts

(i) examine how natural processes can restore habitats

(ii) examine how natural processes can restore ecosystems

(D) describe how temperature inversions have short-term and long-term effects, including El Niño and La Niña oscillations, ice cap and glacial melting, and changes in ocean surface temperatures; and

Breakouts

(i) describe how temperature inversions have short-term effects, including El Niño oscillations

(ii) describe how temperature inversions have short-term effects, including La Niña oscillations

(iii) describe how temperature inversions have short-term effects, including ice cap melting

(iv) describe how temperature inversions have short-term effects, including glacial melting

(v) describe how temperature inversions have short-term effects, including changes in ocean surface temperatures

(vi) describe how temperature inversions have long-term effects, including El Niño oscillations

(vii) describe how temperature inversions have long-term effects, including La Niña oscillations

(viii) describe how temperature inversions have long-term effects, including ice cap melting

(ix) describe how temperature inversions have long-term effects, including glacial melting

(x) describe how temperature inversions have long-term effects, including changes in ocean surface temperatures

(E) analyze the impact of natural global climate change on ice caps, glaciers, ocean currents, and surface temperatures.

Breakouts

(i) analyze the impact of natural global climate change on ice caps

(ii) analyze the impact of natural global climate change on glaciers

(iii) analyze the impact of natural global climate change on ocean currents

(iv) analyze the impact of natural global climate change on surface temperatures

(10) Science concepts. The student knows how humans impact environmental systems through emissions and pollutants. The student is expected to:

(A) identify sources of emissions in air, soil, and water, including point and nonpoint sources;

Breakouts

(i) identify sources of emissions in air including point sources

(ii) identify sources of emissions in soil including point sources

(iii) identify sources of emissions in water, including point sources

(iv) identify sources of emissions in air including nonpoint sources

(v) identify sources of emissions in soil including nonpoint sources

(vi) identify sources of emissions in water including nonpoint sources

(B) distinguish how an emission becomes a pollutant based on its concentration, toxicity, reactivity, and location within the environment;

Breakouts

(i) distinguish how an emission becomes a pollutant based on its concentration

(ii) distinguish how an emission becomes a pollutant based on its toxicity

(iii) distinguish how an emission becomes a pollutant based on its reactivity

(iv) distinguish how an emission becomes a pollutant based on its location within the environment

(C) investigate the effects of pollutants such as chlorofluorocarbons, greenhouse gases, pesticide runoff, nuclear waste, aerosols, metallic ions, and heavy metals, as well as thermal, light, and noise pollution;

Breakouts

(i) investigate the effects of pollutants

(D) evaluate indicators of air, soil, and water quality against regulatory standards to determine the health of an ecosystem; and

Breakouts

(i) evaluate indicators of air quality against regulatory standards to determine the health of an ecosystem

(ii) evaluate indicators of soil quality against regulatory standards to determine the health of an ecosystem

(iii) evaluate indicators of water quality against regulatory standards to determine the health of an ecosystem

(E) distinguish between the causes and effects of global warming and ozone depletion, including the causes, the chemicals involved, the atmospheric layer, the environmental effects, the human health effects, and the relevant wavelengths on the electromagnetic spectrum (IR and UV).

Breakouts

(i) distinguish between global warming and ozone depletion, including the causes

(ii) distinguish between global warming and ozone depletion, including the chemicals involved

(iii) distinguish between global warming and ozone depletion, including the atmospheric layer

(iv) distinguish between global warming and ozone depletion, including the environmental effects

(v) distinguish between global warming and ozone depletion, including the human health effects

(vi) distinguish between global warming and ozone depletion, including the relevant wavelengths on the electromagnetic spectrum (IR and UV)

(11) Science concepts. The student understands how individual and collective actions impact environmental systems. The student is expected to:

(A) evaluate the negative effects of human activities on the environment, including overhunting, overfishing, ecotourism, all-terrain vehicles, and personal watercraft;

Breakouts

(i) evaluate the negative effects of human activities on the environment, including overhunting

(ii) evaluate the negative effects of human activities on the environment, including overfishing

(iii) evaluate the negative effects of human activities on the environment, including ecotourism

(iv) evaluate the negative effects of human activities on the environment, including all-terrain vehicles

(v) evaluate the negative effects of human activities on the environment, including personal watercraft

(B) evaluate the positive effects of human activities on the environment, including habitat restoration projects, species preservation efforts, nature conservancy groups, game and wildlife management, and ecotourism; and

Breakouts

(i) evaluate the positive effects of human activities on the environment, including habitat restoration projects

(ii) evaluate the positive effects of human activities on the environment, including species preservation efforts

(iii) evaluate the positive effects of human activities on the environment, including nature conservancy groups

(iv) evaluate the positive effects of human activities on the environment, including game and wildlife management

(v) evaluate the positive effects of human activities on the environment, including ecotourism

(C) research the advantages and disadvantages of "going green" such as organic gardening and farming, natural methods of pest control, hydroponics, xeriscaping, energy-efficient homes and appliances, and hybrid cars.

Breakouts

(i) research the advantages of "going green"

(ii) research the disadvantages of "going green"

(12) Science concepts. The student understands how ethics and economic priorities influence environmental decisions. The student is expected to:

(A) evaluate cost-benefit trade-offs of commercial activities such as municipal development, food production, deforestation, over-harvesting, mining, and use of renewable and non-renewable energy sources;

Breakouts

(i) evaluate cost-benefit trade-offs of commercial activities

(B) evaluate the economic impacts of individual actions on the environment such as overbuilding, habitat destruction, poaching, and improper waste disposal;

Breakouts

(i) evaluate the economic impacts of individual actions on the environment

(C) analyze how ethical beliefs influence environmental scientific and engineering practices such as methods for food production, water distribution, energy production, and the extraction of minerals;

Breakouts

(i) analyze how ethical beliefs influence environmental scientific practices

(ii) analyze how ethical beliefs influence environmental engineering practices

(D) discuss the impact of research and technology on social ethics and legal practices in situations such as the design of new buildings, recycling, or emission standards; and

Breakouts

(i) discuss the impact of research on social ethics in situations

(ii) discuss the impact of research on legal practices in situations

(iii) discuss the impact of technology on social ethics in situations

(iv) discuss the impact of technology on legal practices in situations

(E) argue from evidence whether or not a healthy economy and a healthy environment are mutually exclusive.

Breakouts

(i) argue from evidence whether or not a healthy economy and a healthy environment are mutually exclusive

(13) Science concepts. The student knows how legislation mediates human impacts on the environment. The student is expected to:

(A) describe past and present state and national legislation, including Texas automobile emissions regulations, the National Park Service Act, the Clean Air Act, the Clean Water Act, the Soil and Water Resources Conservation Act, and the Endangered Species Act; and

Breakouts

(i) describe past state legislation, including Texas automobile emissions regulations

(ii) describe past national legislation, including the National Park Service Act

(iii) describe past national legislation, including the Clean Air Act

(iv) describe past national legislation, including the Clean Water Act

(v) describe past national legislation, including the Soil and Water Resources Conservation Act

(vi) describe past national legislation, including the Endangered Species Act

(vii) describe present state legislation

(viii) describe present national legislation

(B) evaluate the goals and effectiveness of past and present international agreements such as the environmental Antarctic Treaty System, the Montreal Protocol, the Kyoto Protocol, and the Paris Climate Accord.

Breakouts

(i) evaluate the goals of past international agreements

(ii) evaluate the goals of present international agreements

(iii) evaluate the effectiveness of past international agreements

(iv) evaluate the effectiveness of present international agreements