

FROGS, TOADS AND WETLANDS
WHAT THE AMPHIBIANS SAY ABOUT OUR ENVIRONMENT

2010 IDOE Content Standards

NOTE: Literacy standards have not been included in this list because they are too numerous and vary in session versions. Please inquire if this is a standard you want to cover in the session.

KINDERGARTEN Core Standards

Standard 3: Life Science

Observe living organisms, compare and contrast their characteristics, and ask questions about them.

K.3.2 Describe and compare living animals in terms of shape, texture of body covering, size, weight, color and the way they move.

KINDERGARTEN Core Standards

Standard 1: History

Students examine the connections of their own environment with the past. They begin to distinguish between events and people of the past and the present, and use a sense of time in classroom planning and participation.

K.1.4 Identify and order events that take place in a sequence.

Standard 2: Civics and Government

Students learn that they are citizens of their school, community and the United States; identify symbols of the nation; and understand the importance of being a responsible citizen who knows why rules are needed and follows them.

K.2.1 Give examples of people who are community helpers and leaders and describe how they help us. (Individuals, Society and Culture).

K.2.4 Give examples of how to be a responsible family member and member of a group. (Individuals, Society and Culture)

Standard 3: Geography

K.3.3 Locate and describe places in the school and community.

K.3.5 Describe and give examples of seasonal weather changes and illustrate how weather affects people and the environment.

K.3.6 Identify and compare similarities and differences in families, classmates, neighbors and neighborhoods, and ethnic and cultural groups. (Individuals, Society and Culture)

K.3.7 Recommend ways that people can improve their environment at home, in school and in the neighborhood.

Standard 4: Economics

Students explain that people do different jobs and work to meet basic economic wants.

K.4.2 Identify and describe different kinds of jobs that people do and the tools or equipment used in these jobs.

K.4.3 Explain why people in a community choose different jobs.

K.4.4 Give examples of work activities that people do at home.

Standard 1: Physical Science

Observe, manipulate, sort and generate questions about objects and their physical properties.

K.1.1. Use all senses as appropriate to observe, sort and describe objects according to their composition and physical properties, such as size, color and shape. Explain these choices to others and generate questions about the objects.

K.1.2. Identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas.

GRADE 1 Core Standards

Standard 3: Life Science

Observe, describe and ask questions about living things and their relationships to their environments.

- 1.3.1 Classify living organisms according to variations in specific physical features (e.g. body coverings, appendages) and describe how those features may provide an advantage for survival in different environments.
- 1.3.3 Observe and explain that plants and animals have basic needs for growth and survival: plants need to take in water and need light, and animals need to take in water and food and have a way to dispose of waste.
- 1.3.4 Describe how animals' habitats, including plants meet their needs for food, water, shelter and an environment in which they can live.
- 1.3.5 Observe and describe ways in which animals and plants depend on one another for survival.

Standard 1: Physical Science

Describe objects in terms of materials that compose them and in terms of their physical properties.

- 1.1.1 Use all senses as appropriate to identify the component parts of objects and the materials from which they are made.
- 1.1.2 Characterize materials as solid or liquid, investigate their properties, record observations and explain the choices to others based on evidence (i.e. physical properties).
- 1.1.3 Experiment with simple methods for separating solids and liquids based on their properties.

Standard 4: Science, Engineering and Technology

Determine properties of natural and man-made materials and their most important uses.

- 1.4.1 Use all senses as appropriate to sort objects as being composed of materials that are naturally occurring, human made or a combination of the two.

Standard 1: History

Students will identify community and change in the different environments around them, including school and neighborhood communities, and identify individuals, events and symbols that are important to our country.

- 1.1.1 Compare the way individuals in the community lived in the past with the way they live in the present.

Standard 2: Civics and Government

Students will explain the meaning of government; explain why rules and laws are needed in the school and community. They identify individual rights and responsibilities, and use a variety of sources to learn about the functions of government and roles of citizens.

- 1.2.1 Identify rights that people have and identify the responsibilities that accompany these rights. (Individuals, Society and Culture)
- 1.2.2 Define and give examples of rules and laws in the school and the community
- 1.2.3 Explain why rules and laws exist and describe the benefits of having rules and laws.
- 1.2.4 Describe ways that individual actions can contribute to the common good of the community. (Individuals, Society and Culture)
- 1.2.5 Describe what a citizen is and describe the characteristics of good citizenship. (Individuals, Society and Culture)

Standard 3: Geography

Students will identify the basic elements of maps and globes and explain basic facts concerning the relationship of the sun to daily and seasonal weather. They will identify selected geographic characteristics of their home, school and neighborhood.

- 1.3.4 Identify and describe physical features and human features of the local community including home, school and neighborhood.

- 1.3.6 Explain the effect of seasonal change on plants, animals, and people.
- 1.3.9 Give examples of natural resources found locally and describe how people in the school and community use these resources.
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Standard 4: Economics

Students will explain how people in the school and community use goods and services and make choices as both producers and consumers.

- 1.4.1 Identify goods that people use.
- 1.4.2 Identify services that people do for each other.
- 1.4.3 Describe how people in the school and community are both producers and consumers.
- 1.4.5 Explain that people have to make choices about goods and services because of scarcity.
- 1.4.6 Explain that people exchange goods and services to get the things they want.
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GRADE 2 Core Standards

Standard 3: Life Science

Observe, ask questions about and describe how organisms change their forms and behaviors during their life cycles.

- 2.3.2 Compare and contrast details of body plans and structures within the life cycles of plants and animals.
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Standard 1: Physical Science

Observe and describe that the properties of materials can change, but not all materials respond in the same way to the same action

Standard 4: Science, Engineering and Technology

Describe how technologies have been developed to meet human needs.

- 2.4.2 Identify technologies developed by humans to meet human needs. Investigate the limitations of technologies and how they have improved quality of life
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Standard 1: History

Students will differentiate between events that happened in the past and recently, recognize examples of continuity and change in local and regional communities, and consider ways that people and events of the past and present influence their lives.

Identify individuals who had a positive impact on the local community. (Individuals, Society and Culture)

- 2.1.4 Identify and describe community celebrations, symbols and traditions and explain why they are important. (Individuals, Society and Culture)
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Standard 2: Civics and Government

Students will explain why communities have government and laws, demonstrate that people in the United States have both rights and responsibilities, and identify individual actions that contribute to the good of the community and nation.

- 2.2.4 Describe how people of different ages, cultural backgrounds and traditions contribute to the community and how all citizens can respect these differences. (Individuals, Society and Culture.)
- 2.2.5 Identify people who are good citizens and describe the character traits that make them admirable.
- 2.2.6 Discuss and explain the meaning of the Pledge of Allegiance and identify other ways citizens can affirm their citizenship.
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Standard 3: Geography

Students will locate their community, state and nation on maps and globes; identify major geographic characteristics of their community; and explore geographic relationships between the physical and environmental characteristics of their community.

- 2.3.3 Compare neighborhoods in your community and explain how physical features of the community affect people living there.
- 2.3.7 Identify ways that recreational opportunities influence human activity in the community.

Standard 4:

Economics

Students will describe how people in a community use productive resources, create a variety of businesses and industries, specialize in different types of jobs, and depend on each other to supply goods and services.

- 2.4.1 Define the three types of productive resources (human resources, natural resources and capital resources) and identify productive resources used to produce goods and services in the community.
 - 2.4.2 Identify community workers who provide goods and services for the rest of the community and explain how their job benefits people in the community.
 - 2.4.3 Explain that a price is what people pay when they buy a good or service and what people receive when they sell a good or service.
 - 2.4.5 Explain that because of scarcity, people must make choices and incur opportunity costs.
 - 2.4.6 Define specialization and identify specialized jobs in the school and community.
 - 2.4.7 Explain that income that people do not spend on goods and services is called savings.
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GRADE 3 Core Standards

Standard 2: Earth Science

Observe and describe how natural materials meet the needs of plants and animals (including humans).

- 3.2.5 Describe natural materials and give examples of how they sustain the lives of plants and animals.
 - 3.2.6 Describe how the properties of earth materials make them useful to humans in different ways. Describe ways that humans have altered these resources to meet their needs for survival.
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Standard 4: Science, Engineering and Technology

Define a real world problem and list criteria for a successful solution

- 3.4.2 Define the uses and types of simple machines and utilize simple machines in the solution to a “real world” problem.
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Standard 2: Civics and Government

Students will explain what it means to be citizens of their community, state and nation; be able to identify the functions and major services provided by local governments; use a variety of resources to gather information about their local, state and national governments; and demonstrate understanding of democratic principles and practices.

- 3.2.1 Discuss the reasons governments are needed and identify specific goods and services that governments provide.
 - 3.2.5 Explain the importance of being a good citizen of the state and the nation. Identify people in the state who exhibit the characteristics of good citizenship.
 - 3.2.6 Explain the role citizens have in making decisions and rules within the community, state and nation.
 - 3.2.7 Use a variety of information resources to gather information about local, state and regional leaders and civic issues.
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Standard 3: Geography

Students will explain that simple grid systems (latitude and longitude) are used to locate places on maps and globes, and will begin to understand the Earth/sun relationship, identify the distinctive physical and cultural features of their community, and explain the geographic relationships within their own community with the state and other states within the region.

- 3.3.7 Describe how climate and the physical characteristics of a region affect the vegetation and animal life living there.
- 3.3.10 Use a variety of information resources to identify regional environmental issues and examine the ways that people have tried to solve these problems.
- 3.3.11 Identify and describe the relationship between human systems and physical systems and the impact they have on each other.

Standard 4: Economics

Students will explain how people in the local community make choices about using goods, services and productive resources; how they engage in trade to satisfy their economic wants; how they use a variety of sources to gather and apply information about economic changes in the community; and how they compare costs and benefits in economic decision making.

- 3.4.1 Give examples from the local community that illustrate the scarcity of productive resources. Explain how this scarcity requires people to make choices and incur opportunity costs.
- 3.4.2 Give examples of goods and services provided by local business and industry.
- 3.4.4 Define interdependence and give examples of how people in the local community depend on each other for goods and services.
- 3.4.6 Identify different ways people save their income and explain advantages and disadvantages of each.
- 3.4.7 Explain that buyers and sellers interact to determine the prices of goods and services in markets.
- 3.4.8 Illustrate how people compare benefits and costs when making choices and decisions as consumers and producers.
- 3.4.9 Gather data from a variety of information about a change that will have an economic impact on the community.

GRADE 4 Core Standards

Standard 2: Earth Science

Describe how the supply of natural resources is limited and investigate ways that humans protect and harm the environment.

- 4.2.4 Investigate earth materials that serve as natural resources and gather data to determine which ones are limited by supply.
- 4.2.5 Describe methods that humans currently use to extend the use of natural resources.
- 4.2.6 Describe ways in which humans have changed the natural environment. Explain if these changes have been detrimental or beneficial.

Standard 3: Life Science

Observe, describe and ask questions about structures of organisms and how they affect their growth and survival.

- 4.3.2 Observe, compare and record the physical characteristics of living plants or animals from widely different environments. Describe how each plant or animal is adapted to its environment.
- 4.3.3 Design investigations to explore how organisms meet some of their needs by responding to stimuli from their environments.
- 4.3.4 Describe a way that a given plant or animal might adapt to a change arising from a human or non-human impact on its environment.

Standard 1: History

- 4.1.9 Give examples of Indiana's increasing agricultural, industrial, political and

business development in the nineteenth century.

- 4.1.11 Identify and describe important events and movements that changed life in Indiana in the early twentieth century.
- 4.1.12 Describe the transformation of Indiana through immigration and through developments in agriculture, industry and transportation. (Individuals, Society and Culture)
- 4.1.13 Identify and describe important events and movements that changed life in Indiana from the mid-twentieth century to the present.

Standard 2: Civics and Government

Students will describe the components and characteristics of Indiana’s constitutional form of government; explain the levels and three branches of Indiana’s government; understand citizenship rights and responsibilities; investigate civic and political issues and problems; use inquiry and communication skills to report findings in charts, graphs, written and verbal forms; and demonstrate responsible citizenship by exercising civic virtues and participation skills.

- 4.2.6 Define and provide examples of civic virtues in a democracy.

Standard 3: Geography

Students will explain how the Earth/sun relationship influences the climate of Indiana; identify the components of Earth’s physical systems; describe the major physical and cultural characteristics of Indiana; give examples of how people have adapted to and modified their environment, past and present; and identify regions of Indiana.

- 4.3.4 Map and describe the physical regions of Indiana and identify major natural resources and crop regions.
- 4.3.8 Identify the challenges in the physical landscape of Indiana to early settlers and modern day economic development. (Individuals, Society and Culture).

Standard 4: Economics

- 4.4.2 Define productivity and provide examples of how productivity has changed in Indiana during the past 100 years.
- 4.4.3 Explain that prices change as a result of changes in supply and demand for specific products.
- 4.4.4 Describe Indiana’s emerging global connections.
- 4.4.9 Identify important goods and services provided by state and local governments by giving examples of how state and local tax revenues are used.

GRADE 5 Core Standards

Standard 3: Life Science

Observe, describe and ask questions about how changes in one part of an ecosystem create changes in other parts of the ecosystem.

- 1.3.1 Observe and classify common Indiana organisms as producers, consumers, decomposers, predator and prey based on their relationships and interactions with organisms in their ecosystem.

Standard 1: History

Students will describe the historical movements that influenced the development of the United States from pre-Columbian times up to 1800, with an emphasis on the American Revolution and the founding of the United States.

- 5.1.1 Identify and describe early cultures and settlements that existed in North America prior to contact with Europeans. (Individuals, Society and Culture).

Standard 2: Civics and Government

- 5.2.8 Describe group and individual actions that illustrate civic virtues, such as civility, cooperation, respect and responsible participation. (Individuals, Society and

Culture).

- 5.2.9 Examine ways by which citizens may effectively voice opinions, monitor government, and bring about change in government including voting and participation in the election process.
- 5.2.10 Use a variety of information resources to identify and evaluate contemporary issues that involve civic responsibility, individual rights and the common good.

Standard 3: Geography

Students will describe the Earth/sun relationship and use global grid systems. They will identify regions; describe physical and cultural characteristics; and locate states, capitals and major physical features or the United States. They will also explain the changing interaction of people with their environment in regions of the United States and show how the United States is related geographically to the rest of the world.

- 5.3.7 Identify major sources of accessible fresh water and describe the impact of access on the local and regional communities.

GRADE 6 Core Standards

Standard 3: Life Science

Describe that all organisms, including humans, are part of complex systems found in all biomes (i.e. freshwater, marine, forest, desert, grassland and tundra).

Understand that the major source of energy for ecosystems is light produced by major nuclear reactions in the sun.

- 6.3.1 Describe specific relationships (i.e. predator and prey, consumer and producer, and parasite and host) between organisms and determine whether these relationships are competitive or mutually beneficial.
- 6.3.2 Describe how changes caused by organisms in the habitat where they live can be beneficial or detrimental to themselves or to native plants and animals.
- 6.3.3 Describe how certain biotic and abiotic factors—such as predators, quantity of light and water, range of temperatures and soil composition—can limit the number of organisms an ecosystem can support.
- 6.3.4 Recognize that plants use energy from the sun to make sugar (i.e. glucose) by the process of photosynthesis.
- 6.3.5 Describe how all animals, including humans, meet their energy needs by consuming other organisms, breaking down their structures, and using the materials to grow and function.
- 6.3.6 Recognize that food provides the energy for the work that cells do and is a source of molecular building blocks that can be incorporated into a cell's structure or stored for later use.

Standard 1: History

Students will explore the key historic movements, events and figures that contributed to the development of modern Europe and America from early civilizations through modern times by examining religious institutions, trade and cultural interactions, political institutions, and technological developments

- 6.1.15 Describe the impact of industrialization and urbanization on the lives of individuals and on trade and cultural exchange between Europe and the Americas and the rest of the world. (Individuals, Society and Culture).
- 6.1.17 Compare the opportunities and dangers related to the development of a highly technological society.

Standard 2: Civics and Government

Students will compare and contrast forms of government in different historical periods with contemporary political structures of Europe and the Americas and examine the rights and responsibilities of individuals in different political systems.

6.2.7 Define and compare citizenship and the citizen's role in selected countries of Europe and the Americas.

Standard 3: Geography

Students will identify the characteristics of climate regions in Europe and the Americas and describe major physical features, countries and cities of Europe and the Western Hemisphere.

6.3.3 Describe and compare major physical characteristics of regions in Europe and the Americas.

6.3.8 Identify major biomes of Europe and the Americas and explain how these are influenced by climate.

6.3.12 Compare the distribution of natural gas, oil, forests, uranium, minerals, coal, seafood and water in countries such as Brazil, Mexico, Canada, Great Britain and Russia.

6.3.13 Explain the impact of humans on the physical environment in Europe and the Americas.

6.3.14 Explain and give examples of how nature has impacted the physical environment and human populations in specific areas of Europe and the Americas.

Standard 4:

Economics

Students will examine the influence of physical and cultural factors upon the economic systems of countries in Europe and the Americas.

6.4.9 Identify situations in which the actions of consumers and producers in Europe or the Americas create helpful spillovers or harmful spillovers to people inside a country who are not directly involved in the consumption or production of a product.

6.4.10 Explain how saving and investing help increase productivity and economic growth and compare and contrast individual saving and investing options.

GRADE 7 Core Standards

Standard 1: History

Students will examine the major movements, events and figures that contributed to the development of nations in modern Africa, Asia and the Southwest Pacific from ancient civilizations to modern times by examining religious institutions, trade and cultural interactions, political institutions, and technological developments.

7.1.17 Describe the impact of industrialization, urbanization and globalization in post-colonial South Africa, India, China and Kenya. (Individuals, Society and Culture).

7.1.18 Identify and describe recent conflicts and political issues between nations or cultural groups. (Individuals, Society and Culture).

7.1.19 Create and compare timelines that identify major people and events and developments in the history of civilization and/or countries of Africa, Asia and the Southwest Pacific.

7.1.21 Analyze and effect relationship, bearing in mind multiple causation in the role of individuals, beliefs and chance in history.

7.1.22 Distinguish between unsupported expressions of opinion and informed hypotheses grounded in historical evidence.

Standard 2: Civics and Government

Students will trace the development of different forms of government in different historical eras and compare various contemporary political structures in Africa, Asia and the Southwest Pacific in terms of power, approach to human rights and the roles of citizens.

7.2.5 Define and compare citizenship and the citizen's role in selected countries of Africa, Asia and the Southwest Pacific.

Standard 3: Geography

Students will explain how atmospheric and oceanic systems affect the seasons and climate. They will understand and use technology and grid systems to identify and locate places geographically. They will identify and categorize the major geographic characteristics and regions of Africa, Asia and the Southwest Pacific. They will also name and locate major physical features, countries and major cities, and use geographic skills and technology to examine geographic relationships within and between these regions and the rest of the world.

- 7.3.4 Identify and describe major physical characteristics of regions in Africa, Asia and the Southwest Pacific.
- 7.3.8 Describe ecosystems of Africa's deserts, Asia's mountain regions, and the coral reefs of Australia.
- 7.3.9 Compare and contrast the distribution of natural resources in Africa, Asia and the Southwest Pacific.
- 7.3.10 Describe the limitations that climate and land forms place on land or people in regions of Africa, Asia and the Southwest Pacific.
- 7.3.14 Use a variety of information resources to identify current issues and developments related to the environment in selected countries in Africa, Asia and the Southwest Pacific.

Standard 4:

Economics

Students will examine the influence of physical and cultural factors upon the economic systems found in countries of Africa, Asia and the Southwest Pacific.

- 7.4.2 Identify economic connections between the local community and the countries of Africa, Asia or the Southwest Pacific.
- 7.4.6 Compare and contrast the standard of living of various countries in Africa, Asia and the Southwest Pacific using Gross Domestic Product (GDP) per capita as an indicator.
- 7.4.7 Describe ways that people can increase individual human capital.
- 7.4.8 Identify ways that societies deal with helpful spillovers (e.g. education) or harmful spillovers (e.g. pollution).

GRADE 8 Core Standards

Standard 2: Civics and Government

Students will explain the major principles, values and institutions of constitutional government and citizenship, which are based on the founding documents of the United States and how three branches of government share and check power within our federal system of government.

- 8.2.2 Identify and explain the relationship between rights and responsibilities of citizenship in the United States.
- 8.2.7 Explain the importance in a democratic republic of responsible participation by citizens in voluntary civil associations/non-governmental organizations that comprise civil society.
- 8.2.9 Explain how citizens can monitor and influence the development and implementation of public policies at local, state and national levels of government.

Standard 3: Geography

Students will identify the major geographic characteristics of the United States and its regions. They will name and locate the major physical features of the United States, as well as each of the states, capitals and major cities, and will use geographic skills and technology to examine the influence of geographic factors on national development.

- 8.3.4 Name and describe processes that build up the land and processes that erode it and identify places these occur.
 - 8.3.11 Identify ways people modified the physical environment as the United States developed and describe the impacts that resulted.
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GRADES 8-12 Core Standards

BIOLOGY Standard 3: Matter Cycles and Energy Transfer

Describe how the sun's energy is captured and used to construct sugar molecules that can be used as a form of energy or serve as building blocks of organic molecules.

Diagram how matter and energy cycle through an ecosystem.

- B.3.1 Describe how some organisms capture the sun's energy through the process of photosynthesis by converting carbon dioxide and water into high-energy compounds and releasing oxygen.
- B.3.2 Describe how most organisms can combine and recombine the elements contained in sugar molecules into a variety of biologically essential compounds by utilizing the energy from cellular respiration.
- B.3.3 Recognize and describe that metabolism consists of all of the biochemical reactions that occur inside cells, which include the production, modification, transport, and exchange of materials that are required for the maintenance of life.
- B.3.4 Describe how matter cycles through an ecosystem by way of food chains and food webs and how organisms convert that matter into a variety of organic molecules to be used in part in their own cellular structures.
- B.3.5 Describe how energy from the sun flows through an ecosystem by way of food chains and food webs and how only a small portion of that energy is used by individual organisms while the majority is lost as heat.

MIDDLE SCHOOL FACS

Standard 1 Life & Careers

Integrate multiple life roles and responsibilities in school, family, career, and community settings.

Standard 4: Interdependence

Describe the relationship between living and nonliving components of ecosystems and describe how that relationship is in flux due to natural changes and human actions.

- B.4.1 Explain that the amount of life environments can support is limited by the available energy, water, oxygen and minerals and by the ability of ecosystems to recycle the remains of dead organisms.
- B.4.2 Describe how human activities and natural phenomena can change the flow and of matter and energy in an ecosystem and how those changes impact other species.
- B.4.4 Describe how climate, the pattern of matter and energy flow, the birth and death of new organisms, and the interaction between those organisms contribute to the long-term stability of an ecosystem.

Standard 8: Evolution

Describe how modern evolutionary theory provides an explanation of the history of life on earth and the similarities among organism that exist today.

- B.8.5 Describe how organisms with beneficial traits are more likely to survive, reproduce, and pass on their genetic information due to genetic variations, environmental forces and reproductive pressures.

GRADE 9-12 Core Standards

Standard 1: Economics

Students will understand that productive resources are limited; therefore, people, institutions and governments cannot have all the goods and services they want. As a result, people, institutions and governments must choose some things and give up others.

- E.1.1 Define each of the productive resources (natural, human, capital) and explain why they are necessary for the production of goods and services. (Geography)
- E.1.2 Explain how consumers and producers confront the condition of scarcity by making choices which involve opportunity costs and tradeoffs.
- E.1.3 Explain the important role of the entrepreneur in taking the risk to combine

productive resources to produce goods and services.

- E. 1.4 Describe how people respond predictably to positive and negative incentives.
- E. 1.5 Explain that voluntary exchange occurs when all participating parties expect to gain.
- E.1.6 Compare and contrast how the various economic systems (traditional, market, command, mixed) answer the questions: What to produce? How to produce it? For whom to produce?
- E.1.9 Diagram and explain a Circular Flow Model of a market economy, showing households and businesses as decision makers, resource and money flows, and the three basic markets—product, productive resources and financial markets.

Standard 5: National Economic Performance

Students will understand the means by which economic performance is measured.

- E.5.9 Recognize that a country’s overall level of income, employment and prices are determined by the individual spending and production decisions of households, firms and government. (Government; Individuals, Society and Culture).
- E.5.11 Compare and contrast solutions for reducing unemployment. (Government).

Earth and Space Science I

Standard 3: The Earth

Recognize and describe that earth sciences address planet wide interacting systems (e.g. the oceans, the air, solid ground, and life on Earth) and interactions with the solar system.

Examine the interrelationships between society and the planet wide interacting systems and understand the basic physical and chemical laws that control these interactions.

ES 3.1 Understand that the Earth system contains fixed amounts of each stable chemical element and that each element moves among reservoirs in the solid earth, oceans, atmosphere and living organisms as part of biogeochemical cycles (i.e. nitrogen, water, carbon, oxygen and phosphorus cycles), which are driven by energy from within the earth and from the sun.

ES 3.2 Demonstrate the possible effects of atmospheric changes brought about by natural and human made processes.

ES 3.3 Identify and differentiate between renewable and nonrenewable resources present within Earth’s systems. Describe the possible long-term consequences that increased human consumption has placed on natural processes that renew some resources.

ES 3.4 Recognize that fundamental physical and chemical laws control past, present and future dynamic interactions between and within Earth systems.

Standard 4: The Atmosphere and Hydrosphere

Understand the structure and circulation of Earth’s atmosphere and hydrosphere and explain how natural and human factors may interact with these processes.

Understand that both weather and climate involve the transfer of matter and energy throughout the atmosphere and hydrosphere, driven by solar energy and gravity.

ES 4.1 Examine the origins, structure, composition, and function of Earth’s atmosphere. Include the role of living organisms in the production and cycling of atmospheric gases.

ES 4.2 Describe the relationships among evaporation, precipitation, ground water, surface water, and glacial systems in the water cycle. Discuss the effect of human interactions with the water cycle.

ES 4.3 Explain the importance of heat transfer between and within the atmosphere, land masses, and bodies of water.

Biology

Standard 3: Matter Cycles and Energy Transfer

Describe how the sun's energy is captured and used to construct sugar molecules that can be used as a form of energy or serve as building blocks of organic molecules.

Diagram how matter and energy cycle through an ecosystem.

- B.3.1 Describe how some organisms capture the sun's energy through the process of photosynthesis by converting carbon dioxide and water into high-energy compounds and releasing oxygen.
- B.3.2 Describe how most organisms can combine and recombine the elements contained in sugar molecules into a variety of biologically essential compounds by utilizing the energy from cellular respiration.
- B.3.3 Recognize and describe that metabolism consists of all of the biochemical reactions that occur inside cells, which include the production, modification, transport, and exchange of materials that are required for the maintenance of life.
- B.3.4 Describe how matter cycles through an ecosystem by way of food chains and food webs and how organisms convert that matter into a variety of organic molecules to be used in part in their own cellular structures.
- B.3.5 Describe how energy from the sun flows through an ecosystem by way of food chains and food webs and how only a small portion of that energy is used by individual organisms while the majority is lost as heat.

Standard 4: Interdependence

Describe the relationship between living and nonliving components of ecosystems and describe how that relationship is in flux due to natural changes and human actions.

- B.4.1 Explain that the amount of life environments can support is limited by the available energy, water, oxygen and minerals and by the ability of ecosystems to recycle the remains of dead organisms.
- B.4.2 Describe how human activities and natural phenomena can change the flow and of matter and energy in an ecosystem and how those changes impact other species.
- B.4.3 Describe the consequences of introducing non-native species into an ecosystem and identify the impact it may have on that ecosystem.
- B.4.4 Describe how climate, the pattern of matter and energy flow, the birth and death of new organisms, and the interaction between those organisms contribute to the long-term stability of an ecosystem.

Standard 8:

Evolution

Describe how organisms with beneficial traits are more likely to survive, reproduce, and pass on their genetic information due to genetic variations, environmental forces and reproductive pressures.

Integrated Chemistry and Physics Standard 8: Society (Energy production, environment, economics)

Understand the impact of energy production and use on society and the environment.

- ICP8.4 Describe how efficient use of renewable and non-renewable energy sources is essential to maintaining an acceptable environment.
- ICP8.5 Describe how the availability of energy resources is essential to the development of an economically viable society.
- ICP 8.6 Contrast the dependence on and use of energy and other natural resources in the economies of industrial nations, of developing nations and of undeveloped nations.