

## UNDERSTANDING THE GEOGRAPHY STANDARDS

Geography is about the earth we inhabit and what we do with it. Like all subjects, geography involves a distinctive approach to acquiring knowledge and understanding. That approach stresses the significance of *where* events (people, places, things) occur, how they got there and how they are related to other events elsewhere. When John Snow sought to understand an outbreak of cholera in 19<sup>th</sup> c. London, he looked at where the deaths occurred and discovered they clustered around a local water pump. Removing the pump handle ended the outbreak. After Delaware Route One was completed, debate arose about where the off-ramps had been constructed and whether others in the Townsend area should be added. Because off-ramps bring development, their location is critical to controlling or encouraging growth in southern New Castle County. *Where* matters. Society, businesspeople, parents and students all make location decisions constantly. Where should I shop for a car, what crop should I raise here, where should we draw a school's attendance boundary?

Geography examines the consequences of those decisions. It allows us to understand how human society has arranged itself over the earth's surface, how Amazon forests have been turned into cattle pastures, how superhighways make neighbors of once distant Los Angeles and Phoenix, why Central Americans risk their lives to grow coffee on the slopes of active volcanoes. An enduring theme of geographical understanding is the different ways human cultures have responded to, and changed, the physical environment.

Too often, geography is thought of as a listing of places and products, or at best, the study of how topographic features such as mountains have constrained human actions. The geography standards reject rote memorization and a restricted outlook. Instead, they call for students to use the geographic approach with its key issue of why events occur where they do to help us understand how we have organized our land and life across the earth's surface and what that organization means for our future. Knowledge and insight come from examining events in terms of *where* they occur. The forces composing the natural environment may constrain human behavior but, increasingly, human culture makes significant changes to the natural environment: distinctive places result from this interaction.

### **Goal statements for the Geography Standards:**

- Students will possess a knowledge of geography and an ability to apply a geographical perspective to life situations. All physical phenomena and human activities exist in space as well as time.
- Students will study the relationships of people, places, and environments from the perspective of where they occur, why they are there, and what meaning those locations have for us.
- Students with the knowledge and perspectives of geography will understand the environmental and human processes that shape the Earth's surface, and recognize the culturally distinctive ways people interact with the natural world to produce unique places.

- Students with an appreciation of the nature of their world and their place in it will be better prepared citizens for a physical environment more threatened and a global economy more competitive and interconnected.

**GEOGRAPHY STANDARD ONE: Students will develop a personal geographic framework, or “mental map,” and understand the uses of maps and other geographics [MAPS].**

### **Enduring Understandings**

Students will understand that:

- Mental maps summarize differences and similarities about places. These differences and similarities lead to conflict or cooperation and the exchange of goods and ideas between peoples.
- Mental maps change as the scale moves from local to global; we know more about our home area than more distant places; and these differences affect how we feel and behave towards places that are distant versus those that are close.
- The ways mapped patterns are analyzed and used help solve societal problems.
- Maps can be used to distort or introduce bias into the information they portray.

There are two parts to Standard One. In part one, a **mental map** is a person’s internalized picture of a part of the Earth’s surface. It contains our knowledge of the *relative position* of places as well as knowledge of their physical environments and cultural characteristics. Most people develop several mental maps at different scales and with varying levels of detail: local maps of one’s immediate environment, regional maps of the familiar parts of a country, and national and world maps. The sum total of these mental maps represents a person’s geographical factual knowledge. It allows a person to find their way in the world as well as respond with understanding to political, cultural and environmental events. How concerned should a U.S. citizen be about a Tsunami in the Indian Ocean or a coup in Zimbabwe?

Much of the information in a mental map can be found in a good atlas or by examining a globe, but these should be reinforcing tools, not substitutes. In history, seeing the connections across time comes from a basic familiarity with historical events, not constant recourse to an almanac. Similarly in geography, discovering the relationship of events across earth space requires some understanding of the nature of places and their distances from one another.

Mental maps form slowly and come, not from memorization, but from familiarity. One rarely memorizes a neighborhood’s street names and the orientation of one street to another. Rather, constant movement within the neighborhood brings it into mental focus. Mental maps of more distant world regions are best acquired through analyzing geographic problems. The domestic conflicts over the Vietnam War were in part about the extent to which Vietnam and its neighbors registered on the average American’s mental map. Exploring the place of Vietnam and its proximity to China and the rest of south-east Asia allows at least a more reasoned basis for evaluating the claims of the

“domino effect.” Similarly, the relationship of Kuwait to Iraq and its proximity to Persian Gulf oil routes would help an understanding of the basis for the First Gulf war.

A student’s mental maps from local to global scales could contain an infinite variety of information, but at a minimum, they should reflect an idea of the distance and direction of one place from another. Major places should be noted, along with their general economic activities and cultural characteristics (religion, language, political orientation). Also considered should be their proximity to major landforms (rivers, mountain chains) and the climatic zones in which they fall.

A second part of the standard addresses the **use** of maps and other geo-graphics. A map is a way of selecting and compressing a large amount of data about where events occur on a sheet of paper that represents a part of the earth’s surface. The map uses symbols to represent human actions or physical features, and allows the viewer to gain an overview of an area that would not be possible from the ground. It is like looking down from several thousand feet - or miles - above the earth. Other geo-graphics include globes, and aerial photographs that use either natural or false colors. The latter involve special film sensitive to particular electromagnetic wavelengths. Thus, a river may appear blue on the photograph but streaked with red by polluted water that reflects a wavelength different from fresh water, even though the differences are indistinguishable to the naked eye.

Maps are used to undertake geographic analysis. Mapped information can be viewed as patterns of data, just as John Snow uncovered patterns of dots. The patterns convey meaning. For instance, a map of U.S. teenage birth rates showed that almost all the states across the South had higher than average rates while northern states had lower than normal rates. Such a contrasting pattern provokes a wide variety of explanations as well as an incentive for further investigation. Today, much geographic information (events, where they occur) can be digitized in a Geographic Information System (GIS). GIS analysis allows two or more maps to be laid on top of each other so that a number of variables can be examined together. A map of public libraries, each with a circle around them representing a reasonable distance for patrons to travel, can be superimposed on a map of urban population. Inevitably, some population areas will be excluded from any of the circles. A GIS allows an instant count of how many people are excluded, permitting policymakers to decide if enough unserved people exist to support a new library and where it might best be placed.

Maps have the same limitations and potential for misuse as statistics. They cannot represent all aspects of that part of the world they encompass. Instead, what is portrayed is selected by the mapmaker and subject to that person’s biases. A map of the U.S. African-American population by county will display one pattern of high and low density areas if *absolute* numbers of African-Americans in each county are used, and a different pattern if the *percentage* of African-Americans in each county is selected. The South Korean government has long lobbied nations to call the sea between it and Japan the “East Sea” rather than the more common “Sea of Japan.” A map reflecting the name change could have serious policy implications for the mapmaker.

**Geography Standard One K-3a: Students will understand the nature and uses of maps, globes, and other geo-graphics.**

**Essential Questions:**

- Why are there different types of maps? How can they be “read” to discover the nature and contents of the real-world?
- To what extent do differences between flat maps and globes affect understanding of places in the world and their relationship to each other?

To “read” a map, one must translate real objects on the ground into symbols (icons) and observe the relative placement of these objects in an area seen from above. This is a developmentally-complex task that is best accomplished by first using air photographs of familiar objects such as a school and its surrounding streets, buildings and open spaces. Navigation from point to point is used with the photograph after which the visible photographic objects can be substituted for map symbols. For navigation using a photo or map, users must possess a sense of direction based on cardinal compass points and an understanding of scaled distance. Once again, moving from air photographs to maps is recommended as a way to advance understanding. Other means of teaching mapping include looking down from high points, building models, diagramming play spaces or mapping the classroom.

Since maps contain only a selection of reality, they are often classified by type. Maps that are used for navigation include topographic maps, highway maps and nautical charts. Maps used for analysis of patterns may display information using a variety of symbols: frequently dots of varying size, lines of different width (displaying the volume of flow, for instance), or shaded areas (called choropleth maps). An embedded concept is that all real-world phenomena can be reduced to one of these three geometric forms – points, lines or areas – and their location portrayed on a map.

Maps are two-dimensional representations of a three-dimensional earth. Projections are used to convert a globe surface into a flat map. An embedded concept is that in making this conversion, either shapes of areas or the size of areas will be distorted. For instance, on the familiar rectangular Mercator projection of the world (a cylindrical projection) the equator and the north and south pole are the same length. Since the pole is a point on the globe, an enormous amount of distortion occurs in the higher latitudes. While Greenland’s shape on the globe is retained, its size on the map is greatly exaggerated. And while a piece of string placed between two points on the globe represents the shortest distance, a straight line between the same points on the Mercator map does not. Students can easily prove this for themselves, and extend the concept by comparing different types of projections (Mercator vs. Peters, for example).

**Geography Standard One 4-5a: Students will demonstrate development of mental maps of Delaware and of the United States which include the relative location and characteristics of major physical features, political divisions, and human settlements.**

**Essential Questions:**

- Why does *where* matter?
- To what extent are mental maps of different scales linked?
- To what extent are human settlements connected?

At this level, the standard calls for initial development of a mental map at the state and national scale. Such maps should not be excessively detailed but should include major settlements, physical features, political divisions and where each feature is situated relative to other features.

At the scale of Delaware, knowledge would be expected of major settlements such as Wilmington, New Castle, Newark, Dover, Lewes, Rehoboth and Seaford. Delaware should be recognized as inhabiting mostly the flat coastal plain of the U.S. Eastern seaboard, impinged slightly in northern New Castle County by the Piedmont. A key dividing line between these two different landforms is the Fall Line. Knowledge should also include Delaware's three counties and the state's borders with Maryland, Pennsylvania and New Jersey as well as its position astride the Delmarva Peninsula between the Chesapeake and Delaware bays. Such a basic mental map would help students identify routes across the state and approximate distances needed to travel between major settlements.

At the U.S. national level, the mental map should distinguish between the relatively low Appalachian Mountains and the much higher Rockies, Sierra Nevada and Cascade ranges. Principal rivers draining the continent also divide the nation: the Columbia, the Colorado, the Mississippi-Missouri and the Great Lakes-St. Lawrence. Climatic divisions would recognize the humid Eastern Seaboard with temperatures grading from south to north, the more extreme seasonal swings of the temperature found in the Mid-West and Great Plains between the Appalachians and the Rockies, with rainfall grading from east to west (the 100<sup>th</sup> meridian is the critical dividing line here), and south to north. West of the Rockies, lack of moisture predominates with temperatures accentuating desert-like conditions from the north to the south-west. Finally, the West Coast has distinctive climates grading from cool and damp in the Pacific northwest to hot and dry in southern California. Within these divisions one finds major cities: New York, Philadelphia, Washington, D.C., Atlanta, Miami, Dallas, Houston, St. Louis, Chicago, Denver, Salt Lake City, Phoenix, Los Angeles, San Francisco and Seattle.

With this knowledge base, students should be able to understand the context of historical and contemporary settlement of the country. Experience of the different parts that make up the country will enrich comprehension of history and literature.

The development of these mental maps involves two embedded concepts: the importance of the relative location of the features – where is Atlanta in relation to Dallas, where are the Appalachians in relation to the Rockies, and what is the relative distance between these two sets of points. In other words, critical to a mental map is a sense of dimension, using distance and direction expressed in relative, comparative, rather than absolute,

terms. For instance, a plane flying from Philadelphia to Los Angeles takes a more southwesterly route and takes longer to reach its destination than a flight to Chicago.

A second concept is the ability to link mental maps of different scales. Students need to be able to place Delaware (a large-scale mental map) in the context of North America (a smaller-scale mental map) and see connections between the two. For instance, in considering links with nearby cities, Baltimore and Philadelphia are more likely to influence Delaware (e.g. with their “local” sports teams) than New York and Washington, or Chicago and St. Louis. Understanding connections across maps of different scales makes weather patterns more meaningful, for example, highlighting the association of coal-burning plants in West Virginia and air quality conditions in Delaware.

**Geography Standard One 6-8a: Students will demonstrate mental maps of the world and its sub-regions which include the relative location and characteristics of major physical features, political divisions, and human settlements.**

**Essential Questions:**

- Why does *where* matter?
- To what extent are mental maps of different scales linked?
- To what extent are human settlements connected?

At this grade level, what changes is an expansion of the areas covered by mental maps to sub-regions of the world beyond North America, and finally to the world as a whole. In other respects, there is no difference between the objectives and purposes of the 4-5 and 6-8 benchmarks. Once again, the level of detail of the mental map components for the world’s sub-regions is similar to that of the United States. The South American continent provides an example. A mental map would recognize the long Andes mountain chain that runs across the north and down the west side of the continent, separated in Bolivia by a high plateau containing Lake Titicaca. To the east of the Andes lie the Guiana Highlands and Brazilian highlands, separated by the Orinoco and Amazon river systems. The southern Brazilian highlands are drained by branches of the Parana-Paraguay river system that terminates in the Río de la Plata. Inland from Buenos Aires lies the flat pampas and to the south, the arid plateau of Patagonia. Climatically, most of South America east of the Andes experiences tropical weather: warm temperatures throughout the year with wet and dry seasons. To the west, from northern Peru to Central Chile lies the dry Atacama desert. A major concept embedded in human adaptation to the natural environment is the role of altitude that modifies the tropical climate otherwise expected at low latitudes and allows raising mid-latitude crops in small micro-ecologies found at higher elevations. Argentina, Uruguay and Chile are the only South American areas of temperate, mid-latitude climate. Chile is like the U.S. west coast and Argentina and Uruguay like the eastern U.S. seaboard. South Americans live disproportionately in major cities. A mental map of the sub-region would include at a minimum Caracas, Rio de Janeiro, Sao Paulo, Buenos Aires, Montevideo, Santiago, Lima and Bogotá.

Again, it must be stressed that while mental maps carry factual details, these are best learned in the context of examining issues related to those regions. For instance, the travels of early explorers can be traced and the diversity of findings made understandable. Alternatively, areas most likely to appeal to tourism could be hypothesized.

Familiarity with sub-regions allows speculation about future connections. How might the economies of Africa and South America or Africa and India be better linked? Is there a basis for trade (exchange) between these connections? What are the obstacles to greater economic unity among South American countries? Is the lack of interior rail connections across country borders a factor?

**Geography Standard One 9-12a: Students will identify geographic patterns which emerge when data is mapped, and analyze mapped patterns through the application of such common geographic principles as “hierarchy,” “accessibility,” “diffusion” and “complementarity.”**

**Essential Questions:**

- To what extent is competition or interaction between places influenced by their relative location and accessibility?
- How might the position of a place in a settlement hierarchy affect the life of the people in that place?
- What makes it likely or unlikely that people and/or goods will flow between two points?

At the high school level, the standard returns to the analysis and **use** of mapped information. The first benchmark emphasizes the ability to analyze mapped information and offer explanations for the patterns identified. These explanations make use of common principles that account for the geographical behavior of the phenomena being mapped. Four principles are emphasized in the standards.

**Hierarchy** involves the observation that patterns at one scale are often connected to patterns at a different scale. For instance, a map of U.S. cities portrayed as circles of a size proportionate to their population will show many small circles and only a few large ones. Initially, the map may be seen as a static picture but applying the concept of hierarchy, relationships may be implied between the small and large cities. Generally, small cities depend on specialized services that can only be supported in large cities. One example would be the dissemination of news. Major television and newspaper enterprises are found in large cities. Information flows down the hierarchy of cities from large to small much more rapidly and in a less-edited form than information flowing up the hierarchy. A disease spreads similarly. Research about the spread of AIDS in the U.S. indicates that the disease began in large cities and spread to smaller surrounding communities.

Related to the concept of hierarchy is **accessibility**, a measurement of how easily one place can be reached from all others. Large cities become large because they occupy

locations that make reaching a widespread population much easier than from small cities that occupy less accessible points. For instance, in southern Delaware, given where people are located and the network of roads people use to travel between places, Dover is the most accessible point. Seaford, Lewes, and Milford are examples of towns with medium accessibility while Harrington, Bridgeville, and Felton have relatively low accessibility. Hospitals require access to a large number of people to justify the services they provide, so we should not be surprised that a map of hospitals would show them to be located in Dover and the medium-accessibility towns rather than lower-accessibility communities. The same pattern prevails on a map of Wal-Mart stores in southern Delaware. Making sense of these mapped patterns requires application of the principle of accessibility.

A third principle is **diffusion**, embodying the idea that while maps may be static representations of geographic behavior, in reality both the physical and human worlds are constantly changing. People move, freight flows from centers of production to consumption. Precipitation comes and goes, and, at a slower pace, soil is removed by erosion and deposited elsewhere. Diffusion captures the idea of phenomena moving over space in particular directions at variable speeds. The Africanized (“killer”) bee entered the New World in Brazil and slowly spread outwards across northern South America, into Central America and Mexico and then to the United States where climate factors tended to steer it in the direction of the Mid-West and Eastern Seaboard. Eventually, cold Canadian weather will contain its diffusion. The rate and direction of spread can be displayed on a map that uses solid lines with attached dates that join all points where the bees have spread by a particular date. Similar maps can display the diffusion of news in the colonial period when the network of post roads and pattern of settlements influenced the speed and direction of information flow.

There are at least three types of diffusion patterns identified by geographers: *expansion diffusion*, where, for example, the spread of a disease moves from its point of origin by direct contact through a population; *relocation diffusion*, where the diffusion path leapfrogs over intervening points – an example might be the spread of recent refugees from Bosnia to Utica, New York; and *hierarchical diffusion*, where information spreads through a hierarchy of settlements. To use our earlier example of the spread of news, in hierarchical flow news might spread from New York to Philadelphia and then to Wilmington and Trenton. Intervening places closer to New York but lower in the hierarchy, such as New Brunswick, NJ, would take longer to receive the information.

A final principle, **complimentarity**, addresses the likelihood that two places will interact in some way. Generally, the farther away two places are found, the less likely they are to exchange people or goods or influence each other. Complimentarity is a measure of that attraction. For instance, a map of the flow of oil from producing to consuming nations would show a large volume being transported from the Middle East to Japan because, despite the distance involved, the Middle East has a large excess of reserves and Japan, with no oil of its own, is a large consumer of the product. In a different scenario, a map of retail establishments laid on top of a map of population would show fairly high population densities either side of the Delaware/Pennsylvania border, but a much greater

number of service establishments on the Delaware side than in an area 20 miles into Pennsylvania. The reason for the relative absence of stores on the Pennsylvania side is Delaware's lack of a sales tax that increases complementarity levels for Delaware stores with Pennsylvania residents who would rather travel farther and avoid the tax than frequent stores closer to their neighborhoods.

The reciprocal of complementarity is transferability. Without the means to transfer people or goods, no movement will occur. For instance, the natural complementarity between the resources of northern and southern Europe in the early and later Middle Ages led to significant trade levels but the difficulty of land travel across the Alps forced merchants to move their goods by sea through the Strait of Gibraltar. When the Moors occupied Iberia and blocked that route, transferability could not occur and two separate circuits of trade among cities developed, one based on Venice in the Mediterranean and the other (the Hanseatic league) focused on cities around the North Sea and the Baltic.

The standard calls for students to be able to utilize these principles in interpreting mapped patterns; however, it should be recognized that often the principles work together and need not be viewed independently.

**Geography Standard One 9-12b: Students will apply the analysis of mapped patterns to the solution of problems.**

**Essential Question:**

- How might societal problems be posed so that they are open to solution through geographic map analysis?

The second benchmark emphasizes the use of maps to address societal problems. Clearly, it follows from the first benchmark that before using maps to problem-solve, students must have an ability to analyze the forces likely to produce geographic data patterns. In many ways, this benchmark calls for the culmination of geography learning and understanding to be applied in a socially useful manner. Any number of problems might be selected and carrying out the analysis with GIS is recommended. For instance, maps of population distribution could be compared with a map of Delaware recycling centers. An estimate could be made of how far a person would be willing to travel from home to a recycling igloo and the population served by each center could be calculated. Observations of where people are forced to travel greater than optimum distances, or places where the population is served by more than one center, could result in recommendations either to add more centers or move existing ones to more usable locations.

While many problems are susceptible to geographic map analysis, they may not be posed in a manner initially thought of geographically. Since almost all events occur somewhere, part of a student's learning is how to rephrase a problem to allow it to be subject to map analysis. Discussion of the causes of high cancer rates in Delaware often focus on the delay in diagnosis or inadequacy of available treatment. Examining the issue geographically involves identifying the areas where cancer occurrence is high and

then exploring causes for those extremes. Analysis might involve looking at particular environmental conditions associated with places of high incidence, or examining the accessibility pattern of treatment centers.

**GEOGRAPHY STANDARD TWO: Students will develop a knowledge of the ways humans modify and respond to the natural environment [ENVIRONMENT].**

**Enduring Understanding:**

Students will understand that:

- The human response to the characteristics of a physical environment comes with consequences for both the human culture and the physical environment.

The key to Standard Two is the idea that the relationship between the natural environment and human culture is a two-way street. Too often, only one part is asserted: that the form of the natural environment influences (in extreme cases, determines) the human culture of a place. Mountains may prove obstacles to communication, but transport technology overcomes the barriers. Climate may limit the growth of certain crops, but irrigation or greenhouse protection can extend a plant's natural limits. That is not to say that the natural environment does not pose risks: hurricanes, earthquakes, volcanic eruptions, or droughts all pose risks to human settlement. But as human technology expands, people are able to adapt to the constraints once placed by the natural environment. In the early 20<sup>th</sup> century, Arizona's aridity limited farming communities to isolated oases. With irrigation projects from the Colorado River and the invention of air conditioning, major metropolitan populations could be sustained in Phoenix and Tucson.

Besides technological adaptation, human culture has increasingly modified the natural environment, shaping it to its needs. Clearing forests for agriculture, paving surfaces for urban areas, damming rivers, exploiting minerals, polluting air, streams and oceans, are all examples of the permanent changes to the natural world resulting from human culture.

At the center of this standard is the recognition that places are the resolution of the forces of nature and adaptations by human culture. Moreover, as this relationship changes over time, so too do places. For student understanding, knowledge of the forces that shape the natural environment is necessary, and may be gained from both this standard and/or the Science standard, Earth's Dynamic Systems. But what makes geography standard two different from the science standard is the focus on *how* human culture is both influenced by, and adapts to, the natural world.

**Geography Standard Two K-3a: Students will distinguish different types of climate and landforms and explain why they occur.**

**Essential Question:**

- To what extent do differences in climate and landforms across the earth affect how and where people live?

In the earliest grades, students should be able to recognize that climate is not the same in all parts of the world. They should be able to distinguish (using precipitation and temperature variations) differences between tropical, temperate (mid-latitude) and high-latitude cold climates, and between areas with moisture deficits (deserts) and areas with moisture surpluses (where precipitation exceeds evaporation). A detailed understanding of climatic causation is not expected but students should be able to grasp the general concept that the sun heats the earth more in the equatorial regions and less towards the poles, and different climates are the result of the redistribution of energy. Furthermore, students should understand why the earth passes through periods of day and night and be aware of seasonal differences.

For landforms, students should recognize contrasts between continents and oceans. They need to be aware that mountains are formed by energy from the earth's core and that running water (from precipitation) as well as ice produce rivers that carve valleys in the mountains and move eroded material down to coastal plains in an effort to smooth out the earth's land surface.

**Geography Standard Two 4-5a: Students will apply a knowledge of topography, climate, soils and vegetation of Delaware and the United States to understand how human society alters, and is affected by, the physical environment.**

**Essential Questions:**

- What will happen to the earth because people live on it? What will happen to people as a result of what happens to the earth?

An encyclopedic knowledge of topography, climate, soils and vegetation is not called for in this standard. Rather, students should understand how those physical characteristics can be changed by human actions. They should be presented with examples that aid this understanding. For example: At the Delaware scale they can be introduced to the idea that cities produce energy that makes temperatures higher than in the surrounding suburbs or rural areas; or they can learn that extensive woodlands once covered much of the coastal plain and Piedmont, but when trees are removed, soils on steeper slopes are more easily eroded, clogging streams and increasing flooding in lower areas. At the United States scale, they may learn that damming rivers like the Colorado allows irrigation systems to turn desert areas like Phoenix and Tucson into major metropolitan and agricultural areas.

Students should also understand how different types of physical environments constrain human activities or put people at risk. At the Delaware scale, the rougher Piedmont topography means an often thinner soil cover and less productive farming; the dense settlement along the coast exposes the population to flooding and destruction by nor'easters and hurricanes. At the United States scale, cooler temperatures to the north and lower rainfall in the west restrict certain crops, such as cotton, to the humid south-east; active earthquake zones along the San Andreas Fault put major populations in San Francisco and Los Angeles at risk.

Whether considering the impact of humans on the environment or the environment on human culture, the heart of this standard is the need for students to be able to anticipate the consequences likely to occur, based on their knowledge of the ways humans and the physical environment interact. They should know, for instance, what happens when trees are cleared; when climate is altered; how soil can be lost through over-grazing; what consequences follow from building on steep slopes; how rivers annually cover floodplains; how altitude modifies temperatures; and how humans respond to environmental hazards and risks.

**Geography Standard Two 6-8a: Students will apply a knowledge of the major processes shaping natural environments to understand how different peoples have changed, and been affected by, physical environments in the world's sub-regions.**

**Essential Question:**

- Under what conditions should human cultures attempt to change the processes that shape the natural environment?

This standard differs from the 4-5 level in two ways. While the 4-5 level sought student awareness of the likely consequences of environment-culture interaction, this standard requires students answer those questions by applying an understanding of the *processes* that shape climate and landforms, and vegetation and soils. For instance, the behavior of rivers results in more erosion at higher elevations because gravity causes faster stream flow. At lower altitudes, stream flow decreases, the ability of water to move larger material lessens, the river meanders more and deposits rather than erodes material. Such knowledge of the way rivers behave helps to explain flood plain vulnerability to human settlement and often the need to build levees. Similarly, knowledge of the way rising air cools less when precipitation occurs and warms faster when descending helps explain the need for irrigation systems in rainshadows found on the leeward slopes of mountain chains such as the Andes.

Knowledge of the way environmental processes can affect human culture is only part of this standard. Equally important is the effect human culture can have on those processes. Familiar examples might be the widespread clearing of tropical forests that reduce carbon dioxide uptake and thereby contribute to higher levels of CO<sup>2</sup> in the atmosphere, a major cause of global warming. Similarly, the Three Gorges Dam on the Yangtze River will reduce downstream flooding, decreasing the amount of silt deposits that annually fertilize the soils.

A second difference between this standard and the 4-5 level is expanding the geographic area to other parts of the world beyond Delaware and the United States. Again, this development does not assume rote learning but rather the ability of students to apply their understanding of process. Thus, for instance, while knowledge of river systems may have come from studying the Mississippi, application to the behavior of major rivers such as the Nile should allow students to understand why 90% of Egypt's population relies on productive soils in the river flood plain, and why the Aswan high dam was built to protect farmers from flooding but in doing so reduced soil productivity.

**Geography Standard Two 9-12a: Students will understand the Earth’s physical environment as a set of interconnected systems (ecosystems) and the ways humans have perceived, reacted to, and changed environments at local to global scales.**

**Essential Questions:**

- To what extent can people predict the consequences from human alterations to the physical environment?
- Why might focusing on how people perceive the risks and resources of the natural environment help to explain human behavior in different parts of the world?

At the 9-12 level, knowledge of the processes shaping climate, landforms, vegetation and soils is placed in the context of systems. A system is a set of interconnected parts that are logically (functionally) connected. Most environmental systems are closed; for instance, the hydrologic cycle, the carbon cycle, or the nitrogen cycle. The climate system is also ultimately in balance: energy incoming from the sun is balanced by energy lost to space. However, the amount of energy in various states can change, which explains why global warming of the lower atmosphere via the greenhouse effect can occur if more greenhouse gasses are introduced.

The key element in all the natural systems is considering energy as the common denominator. For instance, the tropical rainforest is an almost closed energy system that comes close to supporting itself with no energy assistance from the underlying, often infertile, soil. Human adaptation involves redirecting some of that energy to human uses via burning patches of forest as the basis for a temporary influx of energy to the soil that permits crops of value to people to be grown. One developmental feature of the standard is for students to treat a human change to the environment as a diversion of energy to human society from the path it follows in the natural system.

A second development feature introduces complexity to the human-environment equation. Rather than simply comparing the nature of the physical environment with what people do with it, human perception is introduced. Thus, an environment may be considered hazardous by an objective observer, but explaining human adaptation involves knowing how the environment is *perceived* by those who use it. People might not be expected to settle on the sides of active volcanoes, as in Central America, or build on the shores of hurricane-prone coasts – that they do requires understanding how they perceive the environment and deal with the risk.

**GEOGRAPHY STANDARD THREE: Students will develop an understanding of the diversity of human culture and the unique nature of places [PLACES].**

**Enduring Understandings**

Students will understand that:

- Places are unique associations of natural environments and human cultural modifications.

- Concepts of site and situation can explain the uniqueness of places. As site or situation change, so also does the character of a place.

The enduring goals of geography - to apply analysis of the importance of “where” events occur and the way in which human-environmental relations shape the nature of the earth’s surface - are embodied in the first two geography standards. In Standard Three, they are both brought to bear on one of geography’s central, enduring subjects, the nature of places. Places may be defined as locations with character. A place occupies a given location on the earth’s surface – what may be called its *site*. That site contains a unique combination of physical environmental conditions: climate, landforms, soils and vegetation. It also contains people with distinct cultural attributes who modify the environment to create a distinctive place. Places, however, reflect one additional attribute, their location relative to all other places, or their *situation*. Places close together can expect to have more interaction – trade, information flow, human migration – than places farther apart and thus be more subject to change over time. Isolated places change little. Evaluating a location’s site and situation allows identification of those distinctive characteristics that make it a unique place. New York City, originally located on Manhattan Island, has a poor site, bounded by the Hudson and East Rivers that require numerous tunnels and bridges for connection. But its situation is superior, located at the confluence of the Atlantic Ocean and the Hudson River and (later) Erie Canal that gave the city an ability to reach growing 19<sup>th</sup> century settlements west of the Appalachians in the Ohio river valley. Far surpassing the situation of its rival urban centers, Philadelphia, Boston and Baltimore, it acquired status as the country’s largest city which it has never relinquished.

**Geography Standard Three K-3a: Students will be able to identify types of human settlement, connections between settlements, and the types of activities found in each.**

**Essential Questions:**

- To what extent are places different in culture and activity?
- How might connections between places affect their size and complexity?

At this level, students should be aware that places differ by size and the functions that occur within them: cities are larger and more complex, with greater levels of specialized services than towns. Towns, in turn exceed the size and complexity of villages, which are often agricultural in character. Some places are distinguished by specialized functions: religious centers like the Vatican, resorts like Vail, Colorado, political capitals like Washington, D.C. Places also vary by culture: house design, dress, food, or language may also distinguish one place from another.

There is also a need to understand that places do not exist in isolation but are influenced by connections with other places. Migration can change a place, such as the growth of the Guatemalan community in Georgetown. Improved roads can alter a town’s character, such as upgrading Delaware State Highway One, which helped the growth of Lewes and Rehoboth as tourist destinations. The type of transportation connection between places

can affect the amount of interaction. Places with rail connections will most likely exchange freight; airline connections and port connections allow contacts with foreign places; one-lane highways are much less likely to support place-to-place communication than interstates.

**Geography Standard Three 4-5a: Students will understand the reasons for the locations of human activities and settlements and the routes connecting them in Delaware and the United States.**

**Essential Question:**

- Why is a place founded where it is? Why might those reasons change?

In both Delaware and the United States, places are of different size and contain different levels of economic activity, based on how well they are connected to other places. Students need to apply this observation by examining sample places of different size to become comfortable with the idea. For instance, Christiana Mall in New Castle County, located at the junction of Route One and I-95, is closer and can more easily reach the large population living in the suburbs of the county than can Wilmington, which accounts for the Mall containing four major department stores while the city of Wilmington has none. Similarly, the New York metropolitan area is the largest in the country because, although it is located in the north-east corner of the country, it has better road, rail, and air connections to the rest of the U.S. population than any other place.

Students need to learn to apply the ideas of site and situation to explain the nature of particular places. Site choices at different time periods help explain the distribution of places in Delaware. The earliest European settlements such as Lewes, New Castle, Dover, Odessa and Seaford were at the head of navigable rivers and streams that flowed into the Delaware River or Chesapeake Bay. Soils were fertile (site) and locations gave easy transport access to markets (situation). Inland locations were not populated. In the 19<sup>th</sup> century, the railroad offered better access to markets from the center of the Delmarva Peninsula, and a new string of towns such as Middletown, Harrington and Camden-Wyoming developed (situation).

**Geography Standard Three 6-8a: Students will identify and explain the major cultural patterns of human activity in the world's sub-regions.**

**Essential Question:**

- What makes a place culturally unique?
- Under what conditions do cultures spread?

Places across the world differ in large part because of their exposure to different cultures. The major ancient world's cultures occupied distinct locations called **cultural hearths**: North China Plain (Chinese); Indus and Ganges (Indian/Hindu); Mesopotamia (Egyptian, Indo-European); Greece, Rome, Saudi Arabia (Islam), Inland West Africa; Highland/Lowland Guatemala (Mayan); Valley of Mexico (Aztec); and Peru (Inca). From these cultural hearths, distinctive languages and religions spread out at different

times to encompass communities at various distances away from the center. Students need to understand the geographic origins of the major cultures and the places that came under their influence. They should recognize the patterns of diffusion that were influenced by the presence of trading routes, such as those that spread Islam across the Sahara from North Africa, or barriers to movement such as the Amazon rainforest that kept the Inca culture restricted to the Andes highlands and Pacific lowlands. The concept of *core* (the cultural hearth where the culture has its strongest influence) and *periphery* (the places only lightly touched by the culture) can aid student comprehension in understanding the causes behind the cultural diversity of places.

**Geography Standard Three 9-12a: Students should understand the processes which result in distinctive cultures, economic activity and settlement form in particular locations across the world.**

**Essential Questions:**

- Why are some places more culturally diverse or similar than others?
- To what extent does the culture of a place change over time?

At this level, students should understand that *over time*, as successive waves of diffusion wash over particular places, the nature of culture in those places changes. Moreover, after 1492, with the worldwide spread of European colonialism, some have argued that growing cultural diversity among places is being replaced with a slow movement towards cultural similarity. The loss of distinct languages and the spread of English is associated with a growth in global communication and human migration, all of which may be responsible for the spread of western culture, especially among major world cities. Students should understand the potential for such trends to reduce cultural diversity among places and recognize evidence such as the growth of common building styles, western clothes and Hollywood movies.

In addition to culture, places are distinctive because of the economic activities found there. At the 9-12 level, students need to understand the processes that account for differences in agriculture and industry in different parts of the world. While environmental limits place constraints on the agricultural economy and the location of raw materials influence the location of industrial enterprises, students should understand that there are other influential factors. Distance to market and transport costs and services are a major factor. For instance, when trans-Atlantic transport improved, wheat could be grown more profitably in North America rather than Europe. When refrigerated ships were introduced, Argentina shifted from an economy based on hides to one based on chilled beef shipped to North America and Europe. In general, agriculture is more intensive (yields per acre are higher) closer to the market and extensive (yields per acre are lower) farther away.

Distance also affects the location of industry. Originally, water power sites attracted industry because power could not be moved. When coal became common, power could be moved but coal was so heavy it was cheaper to use it on its site of production so industry gravitated to coal fields. When the amount of coal needed in manufacturing and

the diversity of raw materials in a finished product expanded, industry shifted to major metropolitan centers where the market for products was greatest. Other factors such as available labor, cost of electricity, type of living conditions and tax incentives all play their part in the location of industry. Students need to understand how these factors affect the character of a given place.

Finally, places display particular arrangements of form or built environment (the organization of buildings, streets and open spaces). American cities adopted the grid-iron street plan; European medieval cities reflect no prior planning; Islamic cities display a focus on points (the bazaar, the mosque), buildings are surrounded by high walls that extend to the edge of property lines, and streets are leftover spaces without order or organization. Each of these settlement forms contributes to place distinctiveness.

**GEOGRAPHY STANDARD FOUR: Students will develop an understanding of the character and use of regions and the connections between and among them [REGIONS].**

**Enduring Understandings**

Students will understand that:

- A region is a concept rather than a real object on the ground, used to simplify the diversity of places.
- Regions must have boundaries to exist, yet there advantages and disadvantages associated with any real or abstract feature used to draw a boundary.

Just as all people are unique, so are places. And just as it is impossible to understand every person in the world, so it is with the world's places. With people we develop concepts such as communities, ethnicities, religious observance, speakers of particular languages, and social classes to help us make sense of humanity. Similarly, geography has developed the concept of regions to simplify an understanding of places. Regions, unlike places, do not exist; they are a construct or concept. Regions are defined as an area of the earth's surface enclosing places that have some common characteristic. A climatic region may include the area where we find places experiencing a similar climate, such as the tropics; an agricultural region may be an area within which places engage in a similar type of agriculture, such as the corn belt; a political region might be one in which all places are under the jurisdiction of a particular set of laws, such as the United States; an ethnic region might enclose places that house a common ethnic population, such as Kurdistan. If students examine their language, they will see that it is full of regional terms: the "city;" the "suburbs;" my "neighborhood;" "downtown."

An important feature of regions is that although they are a product of a person's mind, once identified they can take on real and universal meaning. We may not know exactly the location of "the South" in the United States, but being "southern" invokes strong feelings pro and con. In Delaware, being south or north of "the Canal" is an important distinction in the minds of Delawareans, although to an outsider, there is no discernable difference between a place either side of Chesapeake and Delaware Canal waterway.

Regions are only identifiable once they have discrete boundaries around an area of earth space that separates it from other spaces. Drawing boundaries is often difficult and frequently zones rather than discrete lines are used. Methods of drawing boundaries are an important part of the regional concept.

**Geography Standard Four K-3a: Students will be able to use the concepts of place and region to explain simple patterns of connections between and among places across the country and the world.**

**Essential Questions:**

- Why might places differ from regions? How can regions be used to simplify an understanding of place diversity?
- How might differences and similarities among regions result in connections between them?

At this level, students need to understand the difference between a place and a region. The best way to do this is to examine similarities among places over a given area. Once the concept is clear, students can examine their own speech to identify the use of the regional concept in the terms they use. They should then be led to understand that regions are defined by a theme – cultural, ethnic, linguistic, religious, wealthy or poor; any characteristic can serve as the criterion for developing a region. Students should examine the number of regions they live in: state, county, political, school district, parish, rural or urban.

Once the concept of region is firmly understood, students should see that each region is distinctive and as such likely to be connected to other regions. Fresh fruit and vegetable regions are close to urban market regions; business regions in the center city are connected to nearby residential regions that are the source of workers; regions in major metropolitan areas are connected to nearby resort and recreational regions.

**Geography Standard Four 4-5a: Students will be able to apply geographic skills to develop a profile of the local community by placing it in the context of physical, cultural and other types of regions.**

**Essential Questions:**

- How might identifying the regional associations of a place create a community profile of the place's distinctiveness?
- How might this place be like others in a larger region?

In this benchmark, students should understand how to develop a local community profile by examining a place's historical growth (through maps) and the factors that make it unique. Students should then take those factors and identify the particular regions in which the community is found at both the Delaware and U.S. scales. For instance, a location in central Delaware such as Dover would be considered part of the mid-latitude temperate climatic region, part of the Coastal Plain landform region, part of the urban region of the North-eastern seaboard; part of the Tidewater South traditional cultural

region; and so on. By identifying the various regional identities of Dover, students can develop a profile of the distinctive features of the place. The key ability is knowing *how* to undertake such a study, what steps to take, what conclusions to draw.

**Geography Standard Four 6-8a: Students will understand the processes affecting the location of economic activities in different world regions.**

**Essential Questions:**

- To what degree are economic regions specialized? What’s “special” about the region and how could it change?

There are at least three different types of regions that students should understand: *formal* (where the defining features of the region extend uniformly from border to border, such as a legal/political region); *functional* (where the defining characteristic of the region is strongest in the center and becomes less evident towards the edges, such as the reception area for a TV station); and *perceptual* (a region that exists only in the mind, such as “the South” or “the Far West” with no agreed-upon boundaries).

Economic activities are usually defined in terms of functional regions where the edges are zones rather than single lines. Students should recognize that economic regions are increasingly based on specialization, such as the Ruhr River valley, defined by its coalfields; the Central Valley of California, known for its Mediterranean agricultural products; or Bangalore, India, recently famous for its concentration of high-technology firms and services.

Moreover, students should recognize that specialized regions can be altered by changes in transport technology or politics. For instance, Australia was once a producer of wool until refrigerated ships allowed meat to be supplied to United Kingdom markets. But when the U.K. joined the European Union, market preference was reduced and Australia has now become part of the Asian region, supplying countries such as Japan with needed minerals such as iron ore and coal.

**Geography Standard Four 6-8b: Students will explain how conflict and cooperation among people contribute to the division of the Earth’s surface into distinctive cultural and political territories.**

**Essential Questions:**

- To what extent is territory also an expression of political or cultural identity? How might this view of territory explain conflicts between nations or ethnic groups over space?
- How might territorial identity and claims on land change over time?

An area of the earth’s surface with which people identify culturally or politically is termed a *territory*. Invariably, a territory is a formal region, defined by specific borders (though not always recognized by neighbors). The space within a territory is often regarded as a part of one’s political or cultural definition. As such, it is exclusive and not

able to be shared with others because to do so would dilute the identity it represents. In a perfect world, the world's political territories would each reflect the sovereignty of the people who occupy them. Unfortunately, cooperation such as that which produces the stable Canadian-U.S. border is not always the norm. Many active and latent conflicts exist in which different people lay claim to the same territory: in Northern Ireland between Protestants and Catholics; in northern Spain between Castilians and Basques, in Israel between Jews and Palestinians. Students should understand that the present-day division of the earth's surface into political and cultural regions is the result of the *current* consequences of conflict and cooperation between states and ethnic groups. Boundaries between groups have not always been stable, and claims over territory based on the discovery of new resources (e.g. oil) or the movement of people (e.g. illegal Salvadoran settlers in sparsely-populated Honduras) can destabilize regional boundaries.

**Geography Standard Four 9-12a: Students will apply knowledge of the types of regions and methods of drawing boundaries to interpret the Earth's changing complexity.**

**Essential Questions:**

- How might regional analysis help to solve societal problems?
- To what extent are regional boundaries permanent? What might cause them to change over time?

This benchmark calls for an understanding of how to use regional analysis. The key to such analysis requires identifying the boundaries of regions, for without boundaries a region cannot exist. Formal regions require precise boundaries and many political units are formal regions. Students should recognize the ways that formal regional boundaries have been drawn, and the advantages and disadvantages of each. For instance, the use of physical features such as rivers or the crests of mountains raises a number of issues. Where does the boundary go between the peaks of a mountain range? Should the boundary use the center of a river and, if so, what happens when the river changes its course? The use of human features can have similar consequences. Many boundaries have followed survey lines such as compass headings or lines of latitude or longitude. While they have the value of precision, they often ignore and cut across the much more complex boundaries of human culture, as in much of Africa.

Functional regions pose equal difficulties. Where a region's influence declines over a zone, placing the boundary is often arbitrary: at what point is the region's influence sufficiently diminished? Students need to recognize the value of simple statistical techniques to solve this problem, such as the use of **Theissen polygons** that place a boundary at the mid-point between two regional centers.

Students should understand how to use regions in solving societal problems. For instance, the location of hospitals relative to the population served often results in some people having better access to services than others. Determining the regional service boundaries of hospitals in the state demonstrates that fact and can point to areas where the population is poorly served.

Students should recognize that regions and their boundaries are not always permanent, since the conditions that created them may have changed over time. For instance, the regional boundaries of Native American tribes prior to European settlement were severely disrupted or obliterated after many Native American groups were forcibly moved from their original lands. On the other hand, in Northern Canada, assertion of Native American rights has produced a new set of regional self-governing territories, such as Nunavut. Similarly, the European Union is actively seeking to create a single region out of what were once 25 independent states.