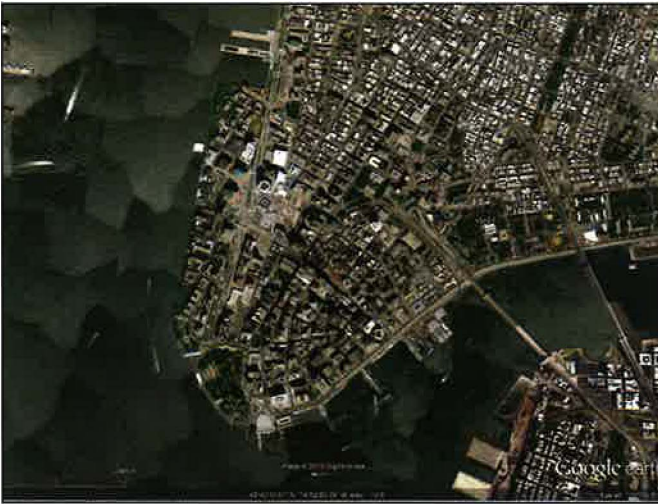Essential Element: The World in Spatial Terms

GEOGRAPHY STANDARD 3: How to analyze the spatial organization of people, places, and environments on Earth's surface

A satellite image of lower Manhattan captures the human and physical processes that give character to this place. Streets, highways, bridges, tunnels, ferries, and rivers are all part of the spatial pattern of transportation in New York City. Data source: ©Google Earth, ©DigitalGlobe.

Images credit: University of North Alabama/Lisa Keys-Mathews
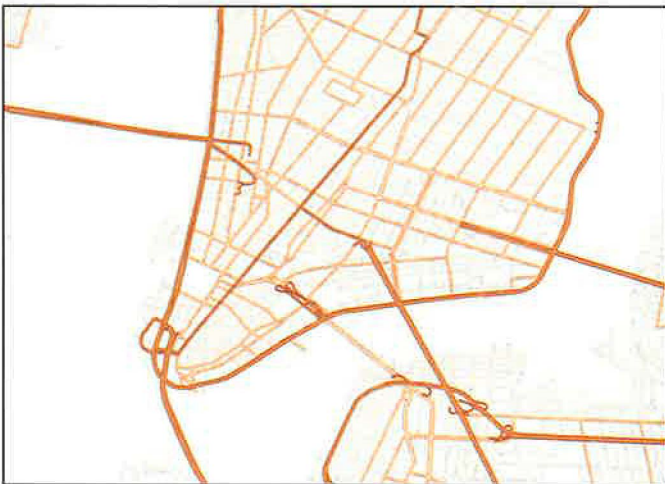
This street map is a simplified model of the actual human and physical landscape from the above satellite image that helps visualize transportation patterns in and out of lower Manhattan. Note that a map can show some features, like tunnel routes into the city, that a satellite image cannot. Data source: 2005 TeleAtlas and Esri Streets.

The geographically informed person

must understand that physical and human phenomena are distributed across Earth's surface and see meaning in their arrangements across space. Geography usually starts with questions such as, "Where?" "What is it like here?" and "Why is this located there and not here?" When considering "where" questions, geographers seek regularities—that is, patterns as well as relationships among phenomena (the features of Earth and activities that take place on Earth). They describe and explain patterns in terms of distance, direction, density, and distribution. They use spatial concepts, processes, and models as powerful tools for explaining the world at all scales, local to global.

Therefore, Standard 3 contains these themes: Spatial Concepts, Spatial Patterns and Processes, and Spatial Models.

Spatial concepts provide a language for describing the arrangement of people, places, and environments. Arrangements can be characterized in terms of proximity, distance, scale, clustering, distribution, etc.

Once students start to identify spatial patterns and use maps and remotely sensed images to discover patterns, then they can begin to explore why the patterns and relationships among phenomena exist as they do, that is, what processes produce the patterns. Processes are the driving forces and underlying causes of observable patterns.

Students must understand the mechanisms underlying processes, from the physical activities that shape the environment to the human processes of economic development, urbanization, migration, and cultural change. Models are idealized and simplified representations based on assumptions about reality, and they can help students analyze spatial organization by demonstrating properties of physical and human features, by simplifying the complexity of reality, and by serving as a source of working hypotheses in research. Models can be organized along a continuum from concrete reality (a globe or a diorama) to higher degrees of abstraction and generalization (models of urban structures, spatial interactions, and physical processes).

Understanding these themes and related concepts enables students to explore the patterns of human and physical phenomena and the processes that influence these patterns. Students use models to convey knowledge and generalizations related to Earth's spatial organization. The use of spatial thinking brings a deeper understanding and appreciation of the complexity and interconnectedness of the physical and human world.

GEOGRAPHY STANDARD 3: How to analyze the spatial organization of people, places, and environments on Earth's surface

4th GRADE
the student knows and understands:

Spatial Concepts

1. The meaning and use of fundamental spatial concepts such as location, distance, direction, scale, movement, region, and volume

Therefore, the student is able to:

A. Describe and explain the spatial organization of people, places, and environments (where things are in relation to other things) using spatial concepts, as exemplified by being able to

▶ Explain the meaning of the spatial concepts of next to, behind, in front of, left, right, inside, outside, and between (e.g., moving people or desks to new locations, labeling spots in the room).

▶ Describe the meaning of the spatial concepts of distance, direction, and location used in selected literature (e.g., read an account of Paul Revere's ride and describe it in terms of locations [start to end], movement, region of action, distance, direction).

▶ Construct a story built on spatial concepts using directions, locations, distances, and movements in the plot (e.g., cardinal directions, relative and exact locations, real or imaginary locations, statements of distances).

Image credit: Carol and Phil Gersmehl

A model of a classroom can be used to teach spatial concepts such as next to, behind, in front of, left, right, inside, outside, and between.

8th GRADE
the student knows and understands:

Spatial Concepts

1. The meaning and use of spatial concepts, such as accessibility, dispersion, density, and interdependence

Therefore, the student is able to:

A. Describe the spatial organization of people, places, and environments (where things are in relation to other things) using spatial concepts, as exemplified by being able to

▶ Describe spatial concepts, such as population density, transportation networks or linkages, and urban or city growth patterns using paper or digital maps.

▶ Identify and describe related businesses and services needed in the vicinity of a popular vacation destination (e.g., hotels, restaurants, airport, ATM/banking for a theme park, hotels and camping equipment stores near national parks, tourist information centers in large cities, public transit options for stadiums and event centers).

▶ Identify and describe service functions along US interstate highways using a digital globe or street-view maps (e.g., shopping malls, service stations, restaurants, hotels).

12th GRADE
the student knows and understands:

Spatial Concepts

1. The meaning and use of complex spatial concepts, such as connectivity, networks, hierarchies, to analyze and explain the spatial organization of human and physical phenomena

Therefore, the student is able to:

A. Analyze and explain the spatial organization of people, places, and environments (where things are in relation to other things) using spatial concepts, as exemplified by being able to

▶ Construct various forms of geographic representations (hardcopy or digital maps, graphs, tables, or charts) to explain the spatial patterns of physical and human phenomena (e.g., maps that define a major watershed, composed of smaller watersheds and the hierarchies of streams and rivers within; maps that show the transportation networks within and between population centers of varying sizes to show hierarchies of cities, towns, and villages within a region).

▶ Construct data tables and digital maps using US Census data to analyze and explain the variability of population density in relation to the location of transportation nodes and networks.

▶ Construct and use various forms of geographic representations to explain that certain coastal urban centers gained locational, connectivity, and economic prominence (e.g., New Orleans, Calcutta, Rotterdam, Singapore).
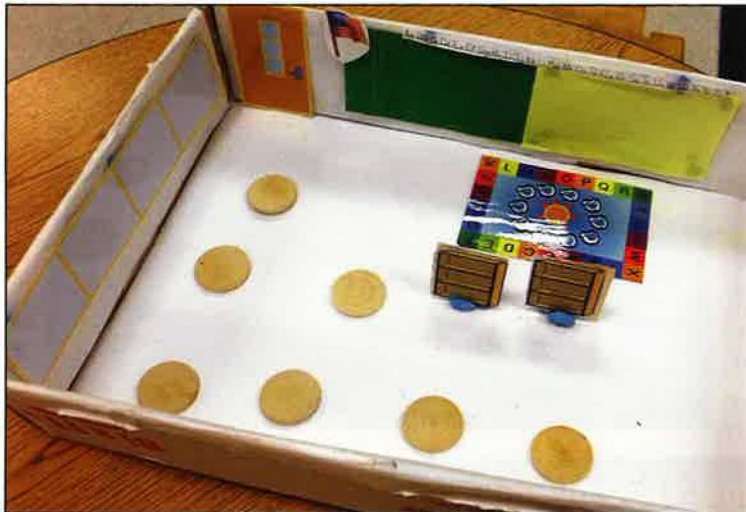
4th GRADE
the student knows and understands:

Spatial Patterns and Processes

2. The distribution of people, places, and environments form spatial patterns across Earth's surface

Therefore, the student is able to:

A. Describe and compare distributions of people, places, and environments to examine spatial patterns, sequences, regularities, and irregularities, as exemplified by being able to

▶ Identify features and patterns on geographic representations or remotely sensed images and describe the differences in the features and patterns (e.g., straight lines of roads forming a grid, curving roads in mountain areas, farmland and pastures versus the patterns of cities and suburbs).

▶ Compare distances and populations of towns and cities along a highway that runs through a state and look for patterns or trends (e.g., regularity of distances between towns of a certain size, the variability in distance from interstate highways between larger cities and smaller cities, sizes of towns closer or farther away from larger cities).

▶ Describe and compare the natural features and human factors using geographic representations that may influence where people live (e.g., access to water, climatic conditions, rivers, and bridges).

8th GRADE
the student knows and understands:

Spatial Patterns and Processes

2. Processes shape the spatial patterns of people, places, and environments over time

Therefore, the student is able to:

A. Describe and compare the processes that influence the distribution of human and physical phenomena, as exemplified by being able to

▶ Describe how changing transportation and communication technologies influence human distribution and settlement patterns using time lines, maps, and graphs (e.g., compare historic routes West, such as the Santa Fe Trail and Route 66 with current modes and routes of travel and discuss how these have influenced settlement, map the flow of emigrants to the United States by ethnic group, date, factors causing emigration, ports of entry, and settlement patterns, comparing early immigration to current immigration).

▶ Describe and compare the changes in environmental systems that cause changes in cultural, political, or economic conditions (e.g., a species becoming endangered leads to protected locations and conservation management, climate change influences emissions control legislation, depletion of a natural resource results in higher costs and effects new technologies).

▶ Describe and compare changes in natural vegetation zones and land uses on the slopes of a mountain (e.g., vertical zonation, tree lines in middle latitudes).

In Morocco's High Atlas Mountains, land use zones are neatly patterned according to distance from the stream. Throughout the dry world, land near sources of fresh water is reserved for agriculture, while the villages where farmers live move out of the way and, in this case, upslope.

12th GRADE
the student knows and understands:

Spatial Patterns and Processes

2. Complex processes change over time and shape patterns in the distribution of human and physical phenomena

Therefore, the student is able to:

A. Analyze and explain changes in spatial patterns as a result of the interactions among human and physical processes through time, as exemplified by being able to

▶ Analyze and explain the human and physical characteristics of regions that have changed over time because of the interaction among processes (e.g., local economic patterns shift as international trade relationships evolve because of global social events, local populations of particular species rise or fall because changes in climate affect the viability of a region for other species).

▶ Analyze vegetation maps for an area over different time periods and explain how changing patterns reflect changes in physical processes and human activities (e.g., desertification, deforestation, natural land cover, agricultural land use).

▶ Explain how changes in the physical environment, political environment, and conflict influence changes in economic activity within a region. (e.g., interruption of economic activities and trade patterns in Africa, migration of people to economic trade zones in China).

Image credit: D.J. Zeigler

Essential Element: The World in Spatial Terms

GEOGRAPHY STANDARD 3: How to analyze the spatial organization of people, places, and environments on Earth's surface

4ᵗʰ GRADE
the student knows and understands:

Spatial Models

3. Models are used to represent features of human and/or physical systems

Therefore, the student is able to:

A. Describe and construct models illustrating the properties of human and/or physical systems, as exemplified by being able to

▶Construct a model of Earth and describe its shape, size, and key features (e.g., equator, poles, prime meridian, oceans, continents).

▶Construct a model of the community and identify the different land uses (e.g., residential, industrial, retail).

▶Construct a model of a watershed linked to a model of the hydrologic cycle and describe its key features and the interconnections to the local water supply (e.g., identify mountains, river systems, lakes, oceans, and groundwater that are a part of the system that supplies water to the local community).

8ᵗʰ GRADE
the student knows and understands:

Spatial Models

3. Models are used to represent spatial processes that shape human and physical systems

Therefore, the student is able to:

A. Describe the processes that shape human and physical systems (e.g., diffusion, migration, and plate tectonics) using models, as exemplified by being able to

▶Describe a model that illustrates the diffusion of cultural characteristics (e.g., music styles, clothing styles, fast-food preferences).

▶Describe how the demographic transition model explains historic changes in population and migration patterns (e.g., industrial revolution in Europe, declining birthrates in South Korea).

▶Describe urban models, such as sector or ring models, using a digital globe or map (e.g., Paris as an example of a sector model, Moscow as an example of a ring model).

12ᵗʰ GRADE
the student knows and understands:

Spatial Models

3. Models are used to represent the structure and dynamics of spatial processes that shape human and physical systems

Therefore, the student is able to:

A. Analyze and explain the spatial features, processes, and organization of people, places, and environments using models of human and/or physical systems (e.g., urban structure, sediment transport, and spatial interaction), as exemplified by being able to

▶Construct a model and explain the influence that spatial processes have on human and physical systems (e.g., urbanization and transportation; housing prices and environmental amenities such as water bodies, parks, or vistas; gardening associated with the growing season).

▶Construct physical or digital models of a river valley and evaluate locations that may be suitable for different purposes (e.g., recreational sites, residential housing, resort hotels, industrial sites).

▶Construct a model that shows how election strategists might determine which areas in the state should receive special attention and additional resources in advance of an election (e.g., political party membership, economic traits, past voter turnout).

Image credit: D.J. Zeigler

In the 1970s, a new highway through the Brenner Pass reduced the time required to travel across the Alps from Austria to Italy. Greater accessibility along the route led to changes in the spatial organization of the region.