



Henry Ford Museum* ■ Greenfield Village* ■ IMAX® Theatre ■ Ford Rouge Factory Tour ■ Benson Ford Research Center*

Science & Technology Curriculum Connections

The following Michigan Grade Level and High School Content Expectations and national standards are met by The Henry Ford's resources on the theme Science & Technology:

Michigan Science Grade Level & High School Content Expectations

Kindergarten:

- S.IP.00.11** Make purposeful observation of the natural world using the appropriate senses.
- S.IP.00.12** Generate questions based on observations.
- S.IP.00.13** Plan and conduct simple investigations.
- S.IP.00.14** Manipulate simple tools (for example: hand lens, pencils, balances, non-standard objects for measurement) that aid observation and data collection.
- P.FM.00.31** Demonstrate pushes and pulls on objects that can move.
- P.FM.00.32** Observe that objects initially at rest will move in the direction of the push or pull.
- P.FM.00.33** Observe how pushes and pulls can change the speed or direction of moving objects.

Grade 1

- S.IP.01.11** Make purposeful observation of the natural world using the appropriate senses.
- S.IP.01.12** Generate questions based on observations.
- S.IP.01.13** Plan and conduct simple investigations.
- S.IP.01.14** Manipulate simple tools (for example: hand lens, pencils, rulers, thermometers, rain gauges, balances, non-standard objects for measurement) that aid observation and data collection.
- E.ES.01.11** Identify the sun as the most important source of heat which warms the land, air, and water of the Earth.

Grade 2

- S.IP.02.11** Make purposeful observation of the natural world using the appropriate senses.
- S.IP.02.12** Generate questions based on observations.
- S.IP.02.13** Plan and conduct simple investigations.
- S.IP.02.14** Manipulate simple tools (ruler, meter stick, measuring cups, hand lens, thermometer, balance) that aid observation and data collection.
- S.RS.02.16** Identify technology used in everyday life.
- L.OL.02.14** Identify the needs of plants.
- E.FE.02.21** Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.

Grade 3

- S.IP.03.11** Make purposeful observation of the natural world using the appropriate senses.
- S.IP.03.12** Generate questions based on observations.
- S.IP.03.13** Plan and conduct simple and fair investigations.
- S.IP.03.14** Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer).
- S.RS.03.16** Identify technology used in everyday life.
- S.RS.03.17** Identify current problems that may be solved through the use of technology.
- S.RS.03.18** Describe the effect humans and other organisms have on the balance of the natural world.
- S.RS.03.19** Describe how people have contributed to science throughout history and across cultures.
- P.FM.03.35** Describe how a push or a pull is a force.
- P.FM.03.36** Relate a change in motion of an object to the force that caused the change of motion.
- P.FM.03.37** Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.
- P.FM.03.38** Demonstrate when an object does not move in response to a force, it is because another force is acting on it.
- P.FM.03.41** Compare and contrast the motion of objects in terms of direction.
- P.FM.03.42** Identify changes in motion.
- P.FM.03.43** Calculate the speed of an object based on the distance it travels divided by the amount of time it took to travel that distance.
- L.OL.03.32** Identify and compare structures in animals used for controlling body temperature, support, movement, food-getting, and protection (for example: fur, wings, teeth, scales).
- L.EV.03.12** Relate characteristics and functions of observable body parts to the ability of animals to live in their environment (sharp teeth, claws, color, body coverings).
- L.OL.03.41** Classify plants on the basis of observable physical characteristics (roots, leaves, stems, and flowers).
- E.FE.02.21** Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.
- E.FE.02.22** Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams).
- E.ES.03.41** Identify natural resources (metals, fuels, fresh water, fertile soil, and forests).
- E.ES.03.42** Classify renewable (fresh water, fertile soil, forests) and non-renewable (fuels, metals) resources.
- E.ES.03.43** Describe ways humans are protecting, extending, and restoring resources (recycle, reuse, reduce, renewal).
- E.ES.03.51** Describe ways humans are dependent on the natural environment (forests, water, clean air, Earth materials) and constructed environments (homes, neighborhoods, shopping malls, factories, and industry).
- E.ES.03.52** Describe helpful or harmful effects of humans on the environment (garbage, habitat destruction, land management, renewable, and non-renewable resources).
- Grade 4**
- S.IP.04.11** Make purposeful observation of the natural world using the appropriate senses.

S.IP.04.12	Generate questions based on observations.
S.IP.04.13	Plan and conduct simple and fair investigations.
S.IP.04.14	Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).
S.IA.04.12	Share ideas about science through purposeful conversation in collaborative groups.
S.IA.04.13	Communicate and present findings of observations and investigations.
S.IA.04.14	Develop research strategies and skills for information gathering and problem solving.
S.IA.04.15	Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.
S.IA.04.15	Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.
S.IP.04.16	Construct simple charts and graphs from data and observations.
S.RS.04.11	Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
S.RS.04.16	Identify technology used in everyday life.
S.RS.04.17	Identify current problems that may be solved through the use of technology.
S.RS.04.18	Describe the effect humans and other organisms have on the balance of the natural world.
S.RS.04.19	Describe how people have contributed to science throughout history and across cultures.
P.PM.04.53	Identify objects that are good conductors or poor conductors of heat and electricity.
P.CM.04.11	Explain how matter can change from one state (liquid, solid, gas) to another by heating and cooling.
L.EV.04.21	Identify individual differences (color, leg length, size, wing size, leaf shape) in organisms of the same kind.
L.EV.04.22	Identify how variations in physical characteristics of individual organisms give them an advantage for survival and reproduction.
L.OL.04.15	Determine that plants require air, water, light, and a source of energy and building material for growth and repair.
L.OL.04.16	Determine that animals require air, water, and a source of energy and building material for growth and repair.
L.EC.04.11	Identify organisms as part of a food chain or food web.
L.EC.04.21	Explain how environmental changes can produce a change in the food web.
E.ST.04.31	Explain how fossils provide evidence of the history of the Earth.
Grade 5	
S.IP.05.11	Generate scientific questions based on observations, investigations, and research.
S.IP.05.12	Design and conduct scientific investigations.
S.IP.05.13	Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens) appropriate to scientific investigations.
S.IP.05.15	Construct charts and graphs from data and observations.
S.IP.05.16	Identify patterns in data.
S.IA.05.11	Analyze information from data tables and graphs to answer scientific questions.
S.IA.05.12	Evaluate data, claims, and personal knowledge through collaborative science discourse.

S.IA.05.13	Communicate and defend findings of observations and investigations using evidence.
S.IA.05.14	Draw conclusions from sets of data from multiple trials of a scientific investigation.
S.RS.05.15	Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
S.RS.05.16	Design solutions to problems using technology.
S.RS.05.17	Describe the effect humans and other organisms have on the balance in the natural world.
S.RS.05.19	Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.
P.FM.05.21	Distinguish between contact forces and non-contact forces.
P.FM.05.22	Demonstrate contact and non-contact forces to change the motion of an object.
P.FM.05.31	Describe what happens when two forces act on an object in the same or opposing directions.
P.FM.05.32	Describe how constant motion is the result of balanced (zero net) forces.
P.FM.05.33	Describe how changes in the motion of objects are caused by a nonzero net (unbalanced) force.
P.FM.05.34	Relate the size of change in motion to the strength of unbalanced forces and the mass of the object.
P.FM.05.41	Explain the motion of an object relative to its point of reference.
P.FM.05.42	Describe the motion of an object in terms of distance, time and direction, as the object moves, and in relationship to other objects.
P.FM.05.43	Illustrate how motion can be represented on a graph.
L.EV.05.11	Explain how behavioral characteristics (adaptation, instinct, learning, habit) of animals help them to survive in their environment.
L.EV.05.12	Describe the physical characteristics (traits) of organisms that help them survive in their environment.
L.EV.05.14	Analyze the relationship of environmental change and catastrophic events (for example: volcanic eruption, floods, asteroid impacts, tsunami) to species extinction.
L.EV.05.21	Relate degree of similarity in anatomical features to the classification of contemporary organisms.
Grade 6	
S.IP.06.11	Generate scientific questions based on observations, investigations, and research.
S.IP.06.12	Design and conduct scientific investigations.
S.IP.06.13	Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes) appropriate to scientific investigations.
S.IP.06.15	Construct charts and graphs from data and observations.
S.IP.06.16	Identify patterns in data.
S.IA.06.11	Analyze information from data tables and graphs to answer scientific questions.
S.IA.06.12	Evaluate data, claims, and personal knowledge through collaborative science discourse.
S.IA.06.13	Communicate and defend findings of observations and investigations using evidence.
S.IA.06.14	Draw conclusions from sets of data from multiple trials of a scientific

- investigation.
- S.IA.06.15** Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.
- S.RS.06.15** Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.06.17** Describe the effect humans and other organisms have on the balance of the natural world.
- S.RS.06.18** Describe what science and technology can and cannot reasonably contribute to society.
- S.RS.06.19** Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.
- P.EN.06.11** Identify kinetic or potential energy in everyday situations (for example: stretched rubber band, objects in motion, ball on a hill, food energy).
- L.OL.06.51** Classify producers, consumers, and decomposers based on their source of food (the source of energy and building materials).
- L.OL.06.52** Distinguish between the ways in which consumers and decomposers obtain energy.
- L.EC.06.11** Identify and describe examples of populations, communities, and ecosystems including the Great Lakes region.
- L.EC.06.21** Describe common patterns of relationships between and among populations (competition, parasitism, symbiosis, predator/prey).
- L.EC.06.22** Explain how two populations of organisms can be mutually beneficial and how that can lead to interdependency.
- L.EC.06.23** Predict how changes in one population might affect other populations based upon their relationships in the food web.
- L.EC.06.31** Identify the living (biotic) and nonliving (abiotic) components of an ecosystem.
- L.EC.06.32** Identify the factors in an ecosystem that influence changes in population size.
- L.EC.06.41** Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.
- L.EC.06.42** Predict possible consequences of overpopulation of organisms, including humans, (for example: species extinction, resource depletion, climate change, pollution).
- E.SE.06.11** Explain how physical and chemical weathering lead to erosion and the formation of soils and sediments.
- E.SE.06.12** Explain how waves, wind, water, and glacier movement, shape and reshape the land surface of the Earth by eroding rock in some areas and depositing sediments in other areas.
- Grade 7**
- S.IP.07.11** Generate scientific questions based on observations, investigations, and research.
- S.IP.07.12** Design and conduct scientific investigations.
- S.IP.07.13** Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes, hot plates, pH meters) appropriate to scientific investigations.
- S.IP.07.15** Construct charts and graphs from data and observations.
- S.IP.07.16** Identify patterns in data.
- S.IA.07.11** Analyze information from data tables and graphs to answer scientific questions.

- S.IA.07.12** Evaluate data, claims, and personal knowledge through collaborative science discourse.
- S.IA.07.13** Communicate and defend findings of observations and investigations.
- S.IA.07.14** Draw conclusions from sets of data from multiple trials of a scientific investigation to draw conclusions.
- S.IA.07.15** Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.
- S.RS.07.15** Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.07.16** Design solutions to problems using technology.
- S.RS.07.17** Describe the effect humans and other organisms have on the balance of the natural world.
- S.RS.07.18** Describe what science and technology can and cannot reasonably contribute to society.
- S.RS.07.19** Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.
- L.OL.07.21** Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).
- P.EN.07.31** Identify examples of waves, including sound waves, seismic waves, and waves on water.
- P.EN.07.32** Describe how waves are produced by vibrations in matter.
- P.EN.07.33** Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).
- P.EN.07.43** Explain how light energy is transferred to chemical energy through the process of photosynthesis.
- P.PM.07.11** Classify substances by their chemical properties (flammability, pH, and reactivity).
- P.CM.07.21** Identify evidence of chemical change through color, gas formation, solid formation, and temperature change.
- E.ES.07.41** Explain how human activities (surface mining, deforestation, overpopulation, construction and urban development, farming, dams, landfills, and restoring natural areas) change the surface of the Earth and affect the survival of organisms.
- E.ES.07.42** Describe the origins of pollution in the atmosphere, geosphere, and hydrosphere, (car exhaust, industrial emissions, acid rain, and natural sources), and how pollution impacts habitats, climatic change, threatens or endangers species.
- E.ES.07.81** Explain the water cycle and describe how evaporation, transpiration, condensation, cloud formation, precipitation, infiltration, surface runoff, ground water, and absorption occur within the cycle.
- E.ES.07.82** Analyze the flow of water between the components of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.

Grades 9-12 – all science disciplines

- B1.2E** Evaluate the future career and occupational prospects of science fields.
- B1.2k** Analyze how science and society interact from a historical, political, economic, or social perspective.

Grades 9-12 - Earth Science

- E1.2k** Analyze how science and society interact from a historical, political, economic, or social perspective.
- E2.3c** Explain how the nitrogen cycle is part of the Earth system.
- E2.3d** Explain how carbon moves through the Earth system (including the geosphere) and how it may benefit (e.g., improve soils for agriculture) or harm (e.g., act as a pollutant) society.
- E2.4A** Describe renewable and nonrenewable sources of energy for human consumption (electricity, fuels), compare their effects on the environment, and include overall costs and benefits.
- E2.4B** Explain how the impact of human activities on the environment (e.g., deforestation, air pollution, coral reef destruction) can be understood through the analysis of interactions between the four Earth systems.
- E3.p3B** Describe the three types of plate boundaries (divergent, convergent, and transform) and geographic features associated with them (e.g., continental rifts and mid-ocean ridges, volcanic and island arcs, deep-sea trenches, transform faults).
- E4.p1A** Describe that the water cycle includes evaporation, transpiration, condensation, precipitation, infiltration, surface runoff, groundwater, and absorption.
- E4.p1B** Analyze the flow of water between the elements of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.
- E4.p1D** Explain the types, process, and beneficial functions of wetlands.
- E4.1C** Explain how water quality in both groundwater and surface systems is impacted by land use decisions.

Grades 9-12 - Biology

- L3.p3A** Identify the factors in an ecosystem that influence fluctuations in population size.
- L3.p3B** Distinguish between the living (biotic) and nonliving (abiotic) components of an ecosystem.
- L3.p3C** Explain how biotic and abiotic factors cycle in an ecosystem (water, carbon, oxygen, and nitrogen).
- L3.p3D** Predict how changes in one population might affect other populations based upon their relationships in a food web.
- L3.p4A** Recognize that, and describe how, human beings are part of Earth's ecosystems. Note that human activities can deliberately or inadvertently alter the equilibrium in ecosystems.
- B3.1A** Describe how organisms acquire energy directly or indirectly from sunlight.
- B3.4A** Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.
- B3.2C** Draw the flow of energy through an ecosystem. Predict changes in the food web when one or more organisms are removed.
- B3.3A** Use a food web to identify and distinguish producers, consumers, and decomposers and explain the transfer of energy through trophic levels.
- B3.3b** Describe environmental processes (e.g., the carbon and nitrogen cycles) and their role in processing matter crucial for sustaining life.
- B3.4C** Examine the negative impact of human activities.
- B3.4d** Describe the greenhouse effect and list possible causes.
- B3.4e** List the possible causes and consequences of global warming.

- B3.5d** Describe different reproductive strategies employed by various organisms and explain their advantages and disadvantages.
- B3.5e** Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems.

Grades 9-12 - Physics

- P1.1A** Generate new questions that can be investigated in the laboratory or field.
- P1.2D** Evaluate scientific explanations in a peer review process or discussion format.
- P1.1E** Describe a reason for a given conclusion using evidence from an investigation.
- P2.1A** Calculate the average speed of an object using the change of position and elapsed time.
- P2.2A** Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.
- P2.2D** State that uniform circular motion involves acceleration without a change in speed.
- P2.3a** Describe and compare the motion of an object using different reference frames.
- P3.1A** Identify the force(s) acting between objects in “direct contact” or at a distance.
- P3.1c** Provide examples that illustrate the importance of the electric force in everyday life.
- P3.1d** Identify the basic forces in everyday interactions.
- P3.2A** Identify the magnitude and direction of everyday forces.
- P3.2C** Calculate the net force acting on an object.
- P3.3A** Identify the action and reaction force from examples of forces in everyday situations (e.g., book on a table, walking across the floor, pushing open a door).
- P3.3b** Predict how the change in velocity of a small mass compares with the change in velocity of a large mass.
- P3.4A** Predict the change in motion of an object acted upon by several forces.
- P3.4B** Identify forces acting on objects moving with constant velocity (e.g., cars on a highway.)
- P3.4C** Solve problems involving force, mass and acceleration in linear motion.
- P3.4D** Identify forces acting on objects moving with uniform circular motion (e.g., cars on a circular track).
- P3.4f** Calculate the changes in velocity of a thrown or hit object during and after the time it is acted on by the force.
- P3.4g** Explain how the time of impact can affect the net force (e.g., air bags in cars, catching a ball).
- P3.5a** Apply conservation of momentum to solve simple collision problems.
- P4.1c** Explain why work has a more precise scientific meaning than the meaning of work in everyday language.
- P4.1d** Calculate the amount of work done on an object that is moved from one position to another.
- P4.2A** Account for and represent energy transfer and transformation in complex processes (interactions).
- P4.2B** Name devices that transform specific types of energy into other types of energy (e.g., a device that transformed electricity into motion).

- P4.2D** Explain why all the stored energy in gasoline does not transform to mechanical energy of a vehicle.
- P4.3A** Identify the form of energy in given situations (e.g., moving objects, stretched springs, rocks on cliffs, energy in food).
- P4.3C** Explain why all mechanical systems require an external energy source to maintain their motion.
- P4.3d** Rank the amount of kinetic energy from highest to lowest of everyday examples of moving objects.

Michigan Social Studies Grade Level & High School Content Expectations

Grade 1

- H2.0.4** Retell in sequence important ideas and details from stories about families or schools.
- H2.0.5** Use historical records and artifacts (e.g., photos, diaries, oral histories, and videos) to draw possible conclusions about family or school life in the past.
- H2.0.6** Compare life today with life in the past using the criteria of family, school, jobs, or communication.
- G5.0.1** Describe ways in which people modify (e.g., cutting down trees, building roads) and adapt to the environment (e.g., clothing, housing, transportation).

Grade 2

- H2.0.3** Use an example to describe the role of the individual in creating history.
- H2.0.4** Describe changes in the local community over time (e.g., types of businesses, architecture and landscape, jobs, transportation, population).

Grade 3

- G4.0.1** Describe major kinds of economic activity in Michigan today, such as agriculture (e.g., corn, cherries, and dairy), manufacturing (e.g., automobiles, wood products), services and tourism, research and development (e.g., Automation Alley, life sciences corridor, university communities), and explain the factors influencing the location of these economic activities.

Grade 4

- H3.0.1** Use historical inquiry questions to investigate the development of Michigan's major economic activities (agriculture, mining, manufacturing, lumbering, tourism, technology, and research) from statehood to present. (C, E)
- What happened?
 - When did it happen?
 - Who was involved?
 - How and why did it happen?
 - How does it relate to other events or issues in the past, in the present, or in the future?
 - What is its significance?
- H3.0.5** Use visual data and informational text or primary accounts to compare a major Michigan economic activity today with that same or a related activity in the past.
- E1.0.5** Explain how specialization and division of labor increase productivity (e.g., assembly line).

- G4.0.1** Use a case study or story about migration within or to the United States to identify push and pull factors (why they left, why they came) that influenced the migration.
- G5.0.1** Assess the positive and negative effects of human activities on the physical environment of the United States.
- P3.3.1** Compose a brief essay expressing a position on a public policy issue in the United States and justify the position with a reasoned argument.
- P4.2.1** Develop and implement an action plan and know how, when, and where to address or inform others about a public issue.
- Grade 5**
- P4.2.1** Develop and implement an action plan and know how, when, and where to address or inform others about a public issue.
- Grade 6**
- H1.2.2** Read and comprehend a historical passage to identify basic factual knowledge and the literal meaning by indicating who was involved, what happened, where it happened, what events led to the development, and what consequences or outcomes followed.
- H1.2.5** Identify the role of the individual in history and the significance of one person's ideas.
- G1.3.3** Explain the different ways in which places are connected and how those connections demonstrate interdependence and accessibility.
- G3.2.1** Explain how and why ecosystems differ as a consequence of differences in latitude, elevation, and human activities (e.g., South America's location relative to the equator, effects of elevations on temperature and growing season, proximity to bodies of water and the effects on temperature and rainfall, effects of annual flooding on vegetation along river flood plains such as the Amazon).
- G4.2.1** List and describe the advantages and disadvantages of different technologies used to move people, products, and ideas throughout the world (e.g., call centers in the Eastern Hemisphere that service the Western Hemisphere; the United States and Canada as hubs for the Internet; transport of people and perishable products; and the spread of individuals' ideas as voice and image messages on electronic networks such as the Internet).
- G5.1.1** Describe the environmental effects of human action on the atmosphere (air), biosphere (people, animals, and plants), lithosphere (soil), and hydrosphere (water) (e.g., changes in the tropical forest environments in Brazil, Peru, and Costa Rica).
- G5.1.3** Identify the ways in which human-induced changes in the physical environment in one place can cause changes in other places (e.g., cutting forests in one region may result in river basin flooding elsewhere; building a dam floods land upstream and may permit irrigation in another region).
- G5.2.1** Describe the effects that a change in the physical environment could have on human activities and the choices people would have to make in adjusting to the change (e.g., drought in northern Mexico, disappearance of forest vegetation in the Amazon, natural hazards and disasters from volcanic eruptions in Central America and the Caribbean and earthquakes in Mexico City and Colombia).

P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness.

P4.2.2 Engage in activities intended to contribute to solving a national or international problem studied.

Grade 7

H1.2.2 Read and comprehend a historical passage to identify basic factual knowledge and the literal meaning by indicating who was involved, what happened, where it happened, what events led to the development, and what consequences or outcomes followed.

H1.2.6 Identify the role of the individual in history and the significance of one person's ideas.

G1.3.3 Explain the different ways in which places are connected and how those connections demonstrate interdependence and accessibility.

G3.2.1 Explain how and why ecosystems differ as a consequence of differences in latitude, elevation, and human activities (e.g., effects of latitude on types of vegetation in Africa, proximity to bodies of water in Europe, and effects of annual river flooding in Southeast Asia and China).

G5.1.1 Describe the environmental effects of human action on the atmosphere (air), biosphere (people, animals, and plants), lithosphere (soil), and hydrosphere (water) (e.g., desertification in the Sahel Region of North Africa, deforestation in the Congo Basin, air pollution in urban center, and chemical spills in European Rivers).

G5.1.2 Describe how variations in technology affect human modifications of the landscape (e.g., clearing of agricultural land in Southeast Asia, fish factories in North Atlantic and Western Pacific Ocean, and damming rivers to meet needs for electricity).

G5.1.3 Identify the ways in which human-induced changes in the physical environment in one place can cause changes in other places (e.g., cutting forests in one region may result in river basin flooding elsewhere as has happened historically in China; building dams floods land upstream and permits irrigation downstream as in Southern Africa, the Aswan Dam flooded the upper Nile Valley and permitted irrigation downstream).

P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness.

P4.2.2 Engage in activities intended to contribute to solving a national or international problem studied.

Grade 8

U4.2.2 The Institution of Slavery – Explain the ideology of the institution of slavery, its policies, and consequences.

U5.1.1 Explain the differences in the lives of free blacks (including those who escaped from slavery) with the lives of free whites and enslaved peoples.

U5.2.5 Construct generalizations about how the war affected combatants, civilians (including the role of women), the physical environment, and the future of warfare, including technological developments.

U5.3.2 Describe the early responses to the end of the Civil War by describing the

- policies of the Freedmen's Bureau

- restrictions placed on the rights and opportunities of freedmen, including racial segregation and Black Codes
- U5.3.3 Describe the new role of African Americans in local, state and federal government in the years after the Civil War and the resistance of Southern whites to this change, including the Ku Klux Klan.
- U6.1.1 America at Century's End – Compare and contrast the United States in 1800 with the United States in 1898 focusing on similarities and differences in
 - territory, including the size of the United States and land use
 - population, including immigration, reactions to immigrants, and the changing demographic structure of rural and urban America
 - systems of transportation (canals and railroads, including the Transcontinental Railroad), and their impact on the economy and society
 - governmental policies promoting economic development (e.g., tariffs, banking, land grants and mineral rights, the Homestead Act)
 - economic change, including industrialization, increased global competition, and their impact on conditions of farmers and industrial workers
 - the treatment of African Americans, including the rise of segregation in the South as endorsed by the Supreme Court's decision in *Plessy v. Ferguson*, and the response of African Americans
- P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness.
- P4.2.2 Engage in activities intended to contribute to solving a national or international problem studied.

Grades 9-12 – all social studies disciplines

- K1.5 Understand the diversity of human beings and human cultures.
- K1.6 Analyze events and circumstances from the vantage point of others.
- K1.7 Understand social problems, social structures, institutions, class, groups, and interaction.
- K1.8 Apply social studies concepts to better understand major current local, national, and world events, issues, and problems.
- P1.2 Analyze point of view, context, and bias to interpret primary and secondary source documents.
- P1.3 Understand that diversity of interpretation arises from frame of reference.
- P1.4 Communicate clearly and coherently in writing, speaking, and visually expressing ideas pertaining to social science topics, acknowledging audience and purpose.
- P1.5 Present a coherent thesis when making an argument, support with evidence, articulate and answer possible objections, and present a concise, clear closing.

Grades 9-12 - World History and Geography

- 7.1.2 Comparative Global Power – Use historical and modern maps and other sources to analyze and explain the changes in the global balance of military, political, and economic power between 1900 and 1945 (including the changing role of the United States and those resisting foreign domination).

- 7.1.4** Global Technology – Describe significant technological innovations and scientific breakthroughs in transportation, communication, medicine, and warfare and analyze how they both benefited and imperiled humanity.

Grades 9-12 - United States History & Geography

- 6.1.1** Factors in the American Industrial Revolution – Analyze the factors that enabled the United States to become a major industrial power, including
- technological advances
- 6.3.1** Social Issues – Describe at least three significant problems or issues created by America’s industrial and urban transformation between 1895 and 1930 (e.g., urban and rural poverty and blight, child labor, immigration, political corruption, public health, poor working conditions, and monopolies).
- 6.3.2** Causes and Consequences of Progressive Reform – Analyze the causes, consequences, and limitations of Progressive reform in the following areas
- major changes in the Constitution, including 16th, 17th, 18th, and 19th Amendments
 - new regulatory legislation (e.g., Pure Food and Drug Act, Sherman and Clayton Anti-Trust Acts)
 - the Supreme Court’s role in supporting or slowing reform
 - role of reform organizations, movements and individuals in promoting change (e.g., Women’s Christian Temperance Union, settlement house movement, conservation movement, and the National Association for the Advancement of Colored People, Jane Addams, Carrie Chapman Catt, Eugene Debs, W.E.B. DuBois, Upton Sinclair, Ida Tarbell)
 - efforts to expand and restrict the practices of democracy as reflected in post-Civil War struggles of African Americans and immigrants
- 7.2.3** Impact of WWII on American Life – Analyze the changes in American life brought about by U.S. participation in World War II including
- role of women and minorities in the war effort
 - role of the home front in supporting the war effort (e.g., rationing, work hours, taxes)
- 9.1.1** Economic Changes – Using the changing nature of the American automobile industry as a case study, evaluate the changes in the American economy created by new markets, natural resources, technologies, corporate structures, international competition, new sources and methods of production, energy issues, and mass communication.

9-12 - Economics

- 1.2.3** Investment, Productivity and Growth – Analyze the role investments in physical (e.g., technology) and human capital (e.g., education) play in increasing productivity and how these influence the market.

Michigan English Language Arts Grade Level & High School Content Expectations

Grade 1

- R.CM.01.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- W.GN.01.03** Write an informational piece that addresses a focus question (e.g., What is a family?) using descriptive, enumerative, or sequence patterns that may

- include headings, titles, labels, photographs, or illustrations to enhance the understanding of central ideas.
- S.DS.01.03** Respond to multiple text types by reflecting, making meaning, and making connections.
- L.RP.01.01** Listen to or view knowledgeably and discuss a variety of genre.
- L.RP.01.03** Respond to multiple text types listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to reflect, make meaning, and make connections.
- Grade 2**
- R.CM.02.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- W.GN.02.03** Write an informational piece including a magazine feature article using an organizational pattern such as description, enumeration, sequence, or compare/contrast that may include graphs, diagrams, or charts to enhance the understanding of central and key ideas.
- W.GN.02.04** Use the writing process to produce and present a research project; develop two research questions related to a teacher-selected topic; gather electronic or print resources and organize the information using key ideas with teacher assistance.
- S.DS.02.03** Respond to multiple text types by reflecting, making connections, taking a position, and/or showing understanding.
- L.RP.02.01** Listen to or view knowledgeably and discuss a variety of genre.
- L.RP.02.03** Respond to multiple text types listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to reflect, make connections, take a position, and/or show understanding.
- Grade 3**
- R.CM.03.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- R.MT.03.02** plan, monitor, regulate, evaluate skills, strategies, and processes to construct and convey meaning, (e.g., decoding unknown words), and use graphic organizers to deepen understanding of problem/solution and organizational patterns.
- W.GN.03.01** write a cohesive narrative piece such as a fable, folktale, or realistic fiction using personification, setting, actions and thoughts that reveal important character traits.
- W.GN.03.02** write poetry based on reading a wide variety of grade-appropriate poetry.
- W.GN.03.03** write an informational piece including a report that demonstrates the understanding of central ideas and supporting details using an effective organizational pattern (e.g., compare/contrast, cause/effect, problem/solution) with a title, heading, subheading, and a table of contents.
- W.GN.03.04** use the writing process to produce and present a research project; initiate research questions from content area text from a teacher-selected topic; and use a variety of resources to gather and organize information.
- S.DS.03.01** engage in interactive, extended discourse to socially construct meaning in book clubs, literature circles, partnerships, or other conversation protocols.
- S.DS.03.03** Respond to multiple text types by reflecting, making connections, taking a position, and/or showing understanding.

- S.DS.03.04** Plan and deliver presentations using an effective informational organizational pattern (e.g., descriptive, problem/solution, cause/effect); supportive facts and details reflecting a variety of resources; and varying the pace for effect.
- L.CN.03.01** ask substantive questions of the speaker that will provide additional elaboration and details.
- L.CN.03.02** listen to or view knowledgeably while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, supportive) in small and large group settings.
- L.RP.03.01** Listen to or view knowledgeably and discuss a variety of genre and compare their responses to those of their peers.
- L.RP.03.03** Respond to multiple text types listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to reflect, make connections, take a position, and/or show understanding.
- L.RP.03.05** respond to and retell what a speaker said, paraphrasing and explaining the main idea, and then extend their response by connecting and relating it to personal experiences.

Grade 4

- R.CM.04.04** apply significant knowledge from grade-level science, social studies, and mathematics texts.
- R.MT.04.02** plan, monitor, regulate, and evaluate skills, strategies, and processes to construct and convey meaning (e.g., decoding unknown words) and use graphic organizers to deepen their understanding of compare/contrast, and sequential organizational patterns.
- W.GN.04.01** write a cohesive narrative piece such as a myth, legend, fantasy, or adventure creating relationships among setting, characters, theme, and plot.
- W.GN.04.02** write poetry based on reading a wide variety of grade-appropriate poetry.
- W.GN.04.03** write an informational comparative piece that demonstrates understanding of central and supporting ideas using an effective organizational pattern (e.g., compare/contrast) and informational text features.
- W.GN.04.04** use the writing process to produce and present a research project using a teacher-approved topic; find and narrow research questions; use a variety of resources; take notes; and organize relevant information to draw conclusions.
- S.CN.04.03** Speak effectively using facial expressions, hand gestures, and body language in narrative and informational presentations.
- S.DS.04.01** engage in interactive, extended discourse to socially construct meaning in book clubs, literature circles, partnerships, or other conversation protocols.
- S.DS.04.03** Respond to multiple text types by reflecting, making connections, taking a position, and/or showing deep understanding.
- S.DS.04.04** Plan and deliver presentations focusing on a key question using an informational organizational pattern (e.g., descriptive, problem/solution, cause/effect); supportive facts and details reflecting and emphasizing facial expressions, hand gestures, and body language.
- L.CN.04.01** ask substantive questions of the speaker that will provide additional elaboration and details.
- L.CN.04.02** listen to or view critically while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, supportive) in small and large group settings.
- L.RP.04.01** Listen to or view knowledgeably and discuss a variety of genre and compare their responses to those of their peers.

- L.RP.04.03** Respond to multiple text types listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to clarify meaning, make connections, take a position, and/or show deep understanding.
- L.RP.04.05** respond to and summarize the major ideas and evidence presented in spoken messages and formal presentations.
- Grade 5**
- R.CM.05.04** apply significant knowledge from grade-level science, social studies, and mathematics texts.
- R.MT.05.02** plan, monitor, regulate, and evaluate skills, strategies, and processes to construct and convey meaning (e.g., decoding unfamiliar words); select an appropriate text type from known genre for particular writing purposes; and use theory/evidence, cause/effect, and persuasive organizational patterns.
- W.GN.05.01** write a cohesive narrative piece such as a mystery, tall tale, or historical fiction using time period and setting to enhance the plot; demonstrating roles and functions of heroes, anti-heroes, and narrator; and depicting conflicts and resolutions.
- W.GN.05.02** write poetry based on reading a wide variety of grade-appropriate poetry.
- W.GN.05.03** write a position piece that demonstrates understanding of central ideas and supporting details (e.g., position/evidence organizational pattern) using multiple headings and subheadings.
- W.GN.05.04** use the writing process to produce and present a research project; use a variety of resources to gather and organize relevant information into central ideas and supporting details for a teacher-approved narrowed focus question and hypothesis.
- S.DS.05.01** engage in interactive, extended discourse to socially construct meaning in book clubs, literature circles, partnerships, or other conversation protocols.
- S.DS.05.03** Respond to multiple text types by analyzing content, interpreting the message, and evaluating the purpose.
- S.DS.05.04** Plan and deliver persuasive presentations or reports using an informational organizational pattern for a specific purpose (e.g., to persuade, describe, inform) that conveys and supports the point they want to make, while varying voice modulation, volume, and pace of speech to emphasize meaning.
- S.CN.05.02** Adjust their use of language to communicate effectively with a variety of audiences and for different purposes including research, explanation, and persuasion.
- S.CN.05.03** Speak effectively using varying modulation, volume, and pace of speech to indicate emotions, create excitement, and emphasize meaning in narrative and informational presentations.
- L.CN.05.01** ask substantive questions based on the argument(s) presented by a speaker when listening to or viewing a variety of presentations.
- L.CN.05.02** listen to or view critically while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, supportive) in small and large group settings.
- L.RP.05.01** Listen to or view knowledgeably and discuss a variety of genre and compare their responses to those of their peers.
- L.RP.05.03** Respond to multiple text types listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to clarify meaning, make connections, take a position, and/or show deep understanding without major misconceptions.

Grade 6

- R.CM.06.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- W.GN.06.01** write a cohesive narrative piece such as a personal narrative, adventure, tall tale, folktale, fantasy, or poetry that includes appropriate conventions to the genre, employing elements of characterization for major and minor characters; internal and/or external conflict; and issues of plot, theme, and imagery.
- W.GN.06.02** write a personal, persuasive, or comparative essay that includes organizational patterns supporting key ideas.
- W.GN.06.03** Formulate research questions using multiple resources and perspectives that allow them to organize, analyze, and explore problems and pose solutions that culminate in a final presented project using the writing process.
- S.DS.06.02** Respond to multiple text types in order to compare/contrast ideas, form, and style; to evaluate quality; take a stand and support an issue; and to identify personally with a universal theme.
- S.DS.06.04** Plan a focused and coherent informational presentation using an informational organizational pattern (e.g., problem/solution, sequence); select a focus question to address and organize the message to ensure that it matches the intent and the audience to which it will be delivered.
- L.CN.06.02** Listen to or view critically while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, supportive); critically examine the verbal and non-verbal strategies during speeches and presentations.
- L.RP.06.01** Listen to or view knowledgeably a variety of genre to summarize, take notes on key points, and ask clarifying questions.
- L.RP.06.05** Respond to multiple text types when listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to compare/contrast similarities and differences in idea, form, and style to evaluate quality and to identify personal and universal themes.

Grade 7

- R.CM.07.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- W.GN.07.01** write a cohesive narrative piece such as a memoir, drama, legend, mystery, poetry, or myth that includes appropriate conventions to the genre employing literary and plot devices (e.g., internal and/or external conflicts, antagonists/protagonists, personification).
- W.GN.07.02** Write a research report using a wide variety of resources that includes appropriate organizational patterns (e.g., position statement/supporting evidence, problem statement/solution, or compare/contrast), descriptive language, and informational text features.
- S.CN.07.01** Adjust their use of language to communicate effectively with a variety of audiences and for different purposes by using specialized language related to a topic and selecting words carefully to achieve precise meaning when presenting.
- S.DS.07.02** Respond to multiple text types in order to anticipate and answer questions, offer opinions and solutions, and to identify personally with a universal theme.
- S.DS.07.04** Plan and deliver a focused, coherent informational presentation using an informational organizational pattern (e.g., theory/evidence, persuasion,

sequence) that incorporates persuasive, non-verbal techniques, and provides explanations and descriptions supportive of the presentation's focus and the backgrounds and interests of the audience.

- L.CN.07.02** Listen to or view critically while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, supportive); critically examine the verbal and non-verbal strategies during speeches and presentations.
- L.RP.07.05** Respond to multiple text types when listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to anticipate and answer questions; determine personal and universal themes; and offer opinions or solutions.
- Grade 8**
- R.CM.08.04** Apply significant knowledge from grade-level science, social studies, and mathematics texts.
- W.GN.08.01** write a cohesive narrative piece such as poetry, historical fiction, science fiction, or realistic fiction that includes appropriate conventions to genre employing literary and plot devices (e.g., narrator credibility, rising and falling actions and/or conflict, imagery and transitional language).
- W.GN.08.02** write an historical expository piece such as a journal, biography, or simulated memoir that includes appropriate organization, illustrations, marginal notes and/or annotations.
- S.CN.08.01** Adjust their use of language to communicate effectively with a variety of audiences and for different purposes by using enunciation to emphasize key ideas and concepts when presenting.
- S.CN.08.02** Speak effectively using body language including gestures, posture, facial expressions, tone of voice, and pace of speaking to enhance meaning and influence interpretation in narrative and informational presentations.
- S.DS.08.02** Respond to multiple text types in order to explore problems and pose solutions supported with evidence, take a stand on an issue and support it, and identify personally with a universal theme.
- S.DS.08.04** Plan, outline, and deliver an informational presentation using precise and vivid language in the active voice; organizing logically to convey the message; applying persuasive non-verbal techniques; making use of rhetorical strategies to support the purpose of the presentation and to positively impact the intended audience.
- L.CN.08.02** Listen to or view critically while demonstrating appropriate social skills of audience behaviors (e.g., eye contact, attentive, and supportive); critically examine the verbal and non-verbal strategies during speeches and presentations.
- L.RP.08.05** Respond to multiple text types when listened to or viewed knowledgeably, by discussing, illustrating, and/or writing in order to anticipate and answer questions; determine personal and universal themes; and offer opinions or solutions.

Grades 9-12
CE 1.3.1

Compose written, spoken, and/or multimedia compositions in a range of genres (e.g., personal narrative, biography, poem, fiction, drama, creative nonfiction, summary, literary analysis essay, research report, or work-related text); pieces that serve a variety of purposes (e.g., expressive, informative, creative, and persuasive) and that use a variety of organizational patterns

- (e.g., autobiography, free verse, dialogue, comparison/contrast, definition, or cause and effect).
- CE 1.3.9** Use the formal, stylistic, content, and mechanical conventions of a variety of genres in speaking, writing, and multimedia presentations.
- CE 1.4.3** Develop and refine a position, claim, thesis, or hypothesis that will be explored and supported by analyzing different perspectives, resolving inconsistencies, and writing about those differences in a structure appropriate for the audience (e.g., argumentative essay that avoids inconsistencies in logic and develops a single thesis; exploratory essay that explains differences and similarities and raises additional questions).
- CE 1.5.1** Use writing, speaking, and visual expression to develop powerful, creative and critical messages.
- CE 1.5.2** Prepare spoken and multimedia presentations that effectively address audiences by careful use of voice, pacing, gestures, eye contact, visual aids, audio and video technology.
- CE 2.1.7** Demonstrate understanding of written, spoken, or visual information by restating, paraphrasing, summarizing, critiquing, or composing a personal response; distinguish between a summary and a critique.
- CE 2.3.4** Critically interpret primary and secondary research-related documents (e.g., historical and government documents, newspapers, critical and technical articles, and subject-specific books).

Michigan Career and Employability Skills Standards

Strands

- 2** All students will acquire, organize, interpret, and evaluate information from career awareness and exploration activities, career assessment, and work-based experiences to identify and to pursue their career goals.

National Curriculum Standards for Science

Science as Inquiry
 Physical Science
 Life Science
 Earth Science
 Science and Technology
 Personal & Social Perspectives
 History and Nature of Science

National Curriculum Standards for Social Studies

Strands

- II** Time, Continuity, and Change
VII Production, Distribution, and Consumption
VIII Science, technology, and society

National Curriculum Standards for Geography

Physical Systems
 Environment and Society

National Curriculum Standards for History K-4

Topic 1 Living and Working Together in Families and Communities, Now and Long Ago

Topic 3 The History of the United States: Democratic Principles and Values and the Peoples from Many Cultures Who Contributed to Its Cultural, Economic and Political Heritage

National United States History Content Standards Grades 5-12: Eras

Era 5: Civil War and reconstruction (1850 to 1877)

Era 6: The development of the industrial United States (1870 to 1900)

Era 7: The emergence of modern America (1890 to 1930)

Era 8: The Great Depression and World War II (1929 to 1945)

Era 9: Postwar United States (1945 to early 1970s)

National English Language Arts Content Standards

Strand

- 1** Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.
- 3** Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).
- 4** Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- 5** Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
- 7** Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

National Curriculum Standards for Math

Data Analysis and Probability