

To facilitate lesson plan development, the Center for Educational and Training Technology (C.E.T.T.) at Mississippi State University has created a quick lesson planning resource by including MDE's Performance Level Descriptors (PLD's) in the 2010 Mississippi Science Framework. <http://cett.msstate.edu>

Eighth Grade

CONTENT STRANDS:

Inquiry
Physical Science

Life Science
Earth and Space Science

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Draw conclusions from scientific investigations including controlled experiments. **Blueprint: 8 OBJ/7 ITEMS**

Advanced – 1a. Evaluate the design of an investigation, including the design's use of experimental controls and the design's effect on the conclusion.

Proficient – 1a. Design, conduct, and analyze conclusions from an investigation that includes using experimental controls.

- a. Design, conduct, and analyze conclusions from an investigation that includes using experimental controls. (DOK 3)

Proficient – 1b. Distinguish between qualitative and quantitative observations and make inferences based on observations.

Basic – 1b. Identify an inference as being based on qualitative observations or quantitative observations.

- b. Distinguish between qualitative and quantitative observations and make inferences based on observations. (DOK 3)

Advanced – 1c. Predict the effect of summarized data.

Proficient – 1c. Summarize data to show the cause and effect relationship between qualitative and quantitative observations.

- c. Summarize data to show the cause and effect relationship between qualitative and quantitative observations (using standard, metric, and non-standard units of measurement). (DOK 3)
 - Tools (e.g., English rulers [to the nearest one-sixteenth of an inch], metric rulers [to the nearest millimeter], thermometers, scales, hand lenses, microscopes, balances, clocks, calculators, anemometers, rain

gauges, barometers, hygrometers, telescopes, compasses, spring scales, pH indicators, stopwatches, graduated cylinders, medicine droppers)

- Types of data (e.g., linear measures, mass, volume, temperature, area, perimeter)
- Resources (e.g., Internet, electronic encyclopedias, journals, community resources, etc.)

Proficient – 1d. Analyze evidence that is used to form explanations and draw conclusions.

Basic – 1d. Identify evidence that supports an explanation or conclusion.

- d. Analyze evidence that is used to form explanations and draw conclusions. (DOK 3)

Advanced – 1e. Justify whether an argument defending a conclusion is logical.

Proficient – 1e. Develop a logical argument defending conclusions of an experimental method.

- e. Develop a logical argument defending conclusions of an experimental method. (DOK 3)

Proficient – 1f. Develop a logical argument to explain why perfectly designed solutions do not exist.

- f. Develop a logical argument to explain why perfectly designed solutions do not exist. (DOK 3)

Proficient – 1g. Justify a scientist's need to revise conclusions after encountering new experimental evidence that does not match existing explanations.

- g. Justify a scientist's need to revise conclusions after encountering new experimental evidence that does not match existing explanations. (DOK 3)

Advanced – 1h. Evaluate arguments based upon the scientific process for ideas presented as alternative conclusions.

Proficient – 1h. Analyze different ideas and recognize the skepticism of others as part of the scientific process in considering alternative conclusions.

Basic – 1h. Recognize appropriate scientific skepticism when reviewing alternative conclusions.

- h. Analyze different ideas and recognize the skepticism of others as part of the scientific process in considering alternative conclusions. (DOK 3)

PHYSICAL SCIENCE

2. Apply concepts relating to an understanding of chemical and physical changes, interactions involving energy, and forces that affect motion of objects. **Blueprint: 6 OBJ/10 ITEMS**

Advanced – 2a. Balance chemical equations to illustrate the law of conservation of mass.

Proficient – 2a. Identify patterns found in chemical symbols, formulas, reactions, and equations that apply to the law of conservation of mass.

Basic – 2a. Identify the chemical symbols, formulas of common substances, or reactions used in a balanced equation.

- a. Identify patterns found in chemical symbols, formulas, reactions, and equations that apply to the law of conservation of mass. (DOK 1)
 - Chemical symbols and chemical formulas of common substances such as NaCl (table salt), H₂O (water), C₆H₁₂O₆ (sugar), O₂ (oxygen gas), CO₂ (carbon dioxide), and N₂ (nitrogen gas)
 - Mass of reactants before a change and products after a change
 - Balanced chemical equations such as photosynthesis and respiration

Proficient – 2b. Predict the properties and interactions of given elements using the periodic table of the elements.

Basic – 2b. Use the periodic table to identify the properties of an element or a simple compound.

- b. Predict the properties and interactions of given elements using the periodic table of the elements. (DOK 2)
 - Metals and nonmetals
 - Acids and bases
 - Chemical changes in matter (e.g., rusting [slow oxidation], combustion [fast oxidation], food spoilage)

Advanced – 2c. Evaluate the motion of two or more objects to predict the effects of a Collision.

Proficient – 2c. Distinguish the motion of an object by its position, direction of motion, speed, and acceleration and represent resulting data in graphic form in order to make a prediction.

- c. Distinguish the motion of an object by its position, direction of motion, speed, and acceleration and represent resulting data in graphic form in order to make a prediction. (DOK 2)

Advanced – 2d. Predict the outcome (positive or negative) of altering one component of the power grid system.

Proficient – 2d. Relate how electrical energy transfers through electric circuits, generators, and power grids, including the importance of contributions from Mississippi companies.

- d. Relate how electrical energy transfers through electric circuits, generators, and power grids, including the importance of contributions from Mississippi companies. (DOK 2)
 - The Electrical Power Products Division of Howard Industries, a leading manufacturer of electrical distribution equipment in such locations as Laurel and Ellisville, MS
 - Kuhlman Electric Corporation, located in Crystal Springs, MS

Proficient – 2e. Contrast various components of the electromagnetic spectrum (e.g., infrared, visible light, ultraviolet) and predict their impacts on living things.

Basic – 2e. Identify components of the electromagnetic spectrum.

- e. Contrast various components of the electromagnetic spectrum (e.g., infrared, visible light, ultraviolet) and predict their impacts on living things. (DOK 2)

Proficient – 2f. Recognize Newton’s Three Laws of Motion and identify situations that illustrate each law (e.g., inertia, acceleration, action, reaction forces).

Basic – 2f. Identify Newton’s Three Laws of Motion.

- f. Recognize Newton’s Three Laws of Motion and identify situations that illustrate each law (e.g., inertia, acceleration, action, reaction forces). (DOK 2)

LIFE SCIENCE

3. Compare and contrast the structure and functions of the cell, levels of organization of living things, basis of heredity, and adaptations that explain variations in populations. **Blueprint: 8 OBJ/18 ITEMS**

Proficient – 3a. Analyze how adaptations to a particular environment can increase an organism’s survival and reproduction and relate organisms and their ecological niches to evolutionary change and extinction.

- a. Analyze how adaptations to a particular environment (e.g., desert, aquatic, high altitude) can increase an organism’s survival and reproduction and relate organisms and their ecological niches to evolutionary change and extinction. (DOK 3)

Proficient – 3b. Compare and contrast the major components and functions of different types of cells.

Basic – 3b. Identify different cell types and their structures.

- b. Compare and contrast the major components and functions of different types of cells. (DOK 2)
- Differences in plant and animal cells
 - Structures (nucleus, cytoplasm, cell membrane, cell wall, mitochondrion, and nuclear membrane)
 - Different types of cells and tissues (e.g., epithelial, nerve, bone, blood, muscle)

Proficient – 3c. Describe how viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions.

- c. Describe how viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions. (DOK 1)

Advanced – 3d. Analyze a pedigree diagram to predict the inheritance for a particular trait for a family member.

Proficient – 3d. Describe heredity as the passage of instructions from one generation to another and recognize that hereditary information is contained in genes, located in the chromosomes of each cell.

- d. Describe heredity as the passage of instructions from one generation to another and recognize that hereditary information is contained in genes, located in the chromosomes of each cell. (DOK 2)
- How traits are passed from parents to offspring through pairs of genes
 - Phenotypes and genotypes
 - Hierarchy of DNA, genes, and chromosomes and their relationship to phenotype
 - Punnett square calculations

Advanced – 3e. Analyze the food web of an ecosystem in which the population of an organism has been altered to explain how this change may affect another member of the food web ecosystem.

Proficient – 3e. Explain energy flow in a specified ecosystem.

- e. Explain energy flow in a specified ecosystem. (DOK 2)
- Populations, communities, and habitats
 - Niches, ecosystems and biomes
 - Producers, consumers and decomposers in an ecosystem

Proficient – 3f. Develop a logical argument for or against research conducted in selective breeding and genetic engineering, including research conducted in Mississippi.

Basic – 3f. Identify examples of selective breeding or genetic engineering.

- f. Develop a logical argument for or against research conducted in selective breeding and genetic engineering, including (but not limited to) research conducted in Mississippi. Examples from Mississippi include the following: (DOK 3)
- The Animal Functional Genomics Laboratory at Mississippi State University
 - The Stoneville Pedigreed Seed Company in Stoneville, MS
 - Catfish Genetics Research Unit at the Thad Cochran National Warm Water Aquaculture Center in Stoneville, MS

Proficient – 3g. Research and draw conclusions about the use of single-celled organisms in industry and in the production of food and about their impact on life.

Basic – 3g. Identify examples of single-celled organisms that are used in industry or food production or that impact life.

- g. Research and draw conclusions about the use of single-celled organisms in industry, in the production of food, and impacts on life. (DOK 3)

Advanced – 3h. Explain the process of cellular respiration to the survival of the cell and its components.

Proficient – 3h. Describe how an organism gets energy from oxidizing its food and releasing some of its energy as heat.

Basic – 3h. Identify the reactants and products involved in cellular respiration.

- h. Describe how an organism gets energy from oxidizing its food and releasing some of its energy as heat. (DOK 1)

EARTH AND SPACE SCIENCE

4. Describe the Earth's System in terms of its position to objects in the universe, structure and composition, climate, and renewable and nonrenewable resources. **Blueprint: 8 OBJ/15 ITEMS**

Advanced – 4a. Explain how the composition of the lithosphere and asthenosphere affects plate movement.

Proficient – 4a. Compare and contrast the lithosphere and the asthenosphere.

Basic – 4a. Identify the composition, physical nature, or location of the lithosphere or the asthenosphere.

- a. Compare and contrast the lithosphere and the asthenosphere. (DOK 1)
- Composition, density, and location of continental crust and oceanic crust
 - Physical nature of the lithosphere (brittle and rigid) with the asthenosphere (plastic and flowing)
 - How the lithosphere responds to tectonic forces (faulting and folding)

Advanced – 4b. Predict geologic phenomena based on the composition and movement of interacting plates.

Proficient – 4b. Describe the cause and effect relationship between the composition of and movement within the Earth's lithosphere.

Basic – 4b. Identify plate boundaries based on lithospheric movement.

- b. Describe the cause and effect relationship between the composition of and movement within the Earth's lithosphere. (DOK 1)
- Seismic wave velocities of earthquakes and volcanoes to lithospheric plate boundaries using seismic data
 - Volcanoes formed at mid-ocean ridges, within intra-plate regions, at island arcs, and along some continental edges
 - Modern distribution of continents to the movement of lithospheric plates since the formation of Pangaea

Advanced – 4c. Predict a change in weather based on differences in pressure, heat, air movement, and humidity.

Proficient – 4c. Examine weather forecasting and describe how meteorologists use atmospheric features and technology to predict the weather.

- c. Examine weather forecasting and describe how meteorologists use atmospheric features and technology to predict the weather. (DOK 2)
- Temperature, precipitation, wind (speed/direction), dew point, relative humidity, and barometric pressure
 - How the thermal energy transferred to the air results in vertical and horizontal movement of air masses, Coriolis effect
 - Global wind patterns (e.g., trade winds, westerlies, jet streams)
 - Satellites and computer modeling

Proficient – 4d. Research the importance of the conservation of renewable and nonrenewable resources, including Mississippi, and justify methods that might be useful in decreasing the human impact on global warming.

Basic – 4d. Identify renewable or nonrenewable resources.

- d. Research the importance of the conservation of renewable and nonrenewable resources, including (but not limited to) Mississippi, and justify methods that might be useful in decreasing the human impact on global warming. (DOK 3)
- Greenhouse gases
 - The effects of the human population
 - Relationships of the cycles of water, carbon, oxygen, and nitrogen

Advanced – 4e. Explain how a change in the angle of Earth's axis affects climate and seasons.

Proficient – 4e. Explain how the tilt of Earth's axis and the position of the Earth in relation to the sun determine climatic zones, season, and length of the days.

Basic – 4e. Identify the effect of Earth's tilt on its axis or the position of Earth in relation to the Sun on seasons and climate.

- e. Explain how the tilt of Earth's axis and the position of the Earth in relation to the sun determine climatic zones, seasons, and length of the days. (DOK 2)

Advanced – 4f. Explain techniques used to determine distances between objects in the universe or used to determine the age of the universe.

Proficient – 4f. Describe the hierarchical structure (stars, clusters, galaxies, galactic clusters) of the universe and examine the expanding universe to include its age and history and the modern techniques used to measure object and distances in the universe.

- f. Describe the hierarchical structure (stars, clusters, galaxies, galactic clusters) of the universe and examine the expanding universe to include its age and history and the modern techniques (e.g., radio, infrared, ultraviolet and X-ray astronomy) used to measure objects and distances in the universe. (DOK 2)

Proficient – 4g. Justify the importance of continued research and use of new technology in the development and commercialization of potentially useful natural products, including, but not limited to research efforts in Mississippi.

- g. Justify the importance of continued research and use of new technology in the development and commercialization of potentially useful natural products, including, but not limited to research efforts in Mississippi. (DOK 3)
- The Thad Cochran National Center for Natural Products Research, housed at the University of Mississippi
 - The Jamie Whitten Delta States Research Center in Stoneville, MS,
 - The Mississippi Polymer Institute, housed at the University of Southern Mississippi

Proficient – 4h. Justify why an imaginary hurricane might or might not hit a particular area, using important technological resources.

- h. Justify why an imaginary hurricane might or might not hit a particular area, using important technological resources including (but not limited to) the following: (DOK 2)
- John C. Stennis Space Center Applied Research and Technology Project Office in Hancock County
 - National Oceanic and Atmospheric Administration (NOAA)
 - The National Weather Service