Missouri Assessment Program

Science Achievement Level Descriptors

In July 1998, a five-step scale of achievement levels was established to classify students' performance in the area of Science. The levels were **"Step 1"** (lowest), **"Progressing," "Nearing Proficiency," "Proficient,"** and **"Advanced."** Each level, beginning with Step 1, identifies a progression of students' skills, knowledge, and abilities; that is, each level is inclusive of the skills identified in the preceding level(s). Associated with each level is a specific range of numerical scores that determines students' rankings. These five levels have been approved by the State Board of Education.

The Missouri Assessment Program (MAP) was designed to measure students' progress in meeting the Show-Me Standards, a set of academic goals adopted by the State Board of Education in January 1996, as part of the board's goal to raise the bar for academic achievement and student performance in Missouri's public schools. Throughout the process of developing the Show-Me Standards and the MAP, teachers, business leaders, and parents have strongly supported the need for high academic standards and assessments in which students are able to apply their knowledge and skills.

Teachers, parents, legislators, and business leaders across the state met to determine what students should be expected to know and be able to do, at grade levels 3, 7, 10, and 11, in order to be considered "proficient" in Science. The "proficient" category, which is the cornerstone of the Science achievement levels, reflects this emphasis. Although rigorous levels were established, educators and citizens believe proficiency can be achieved through hard work by teachers, students, and parents.

The achievement levels represent what teachers, parents, and employers should expect students to know and be able to do at each grade level and subject area. Perhaps most importantly, the levels represent what Missouri teachers and citizens think should be demanded from students today. Missouri teachers, parents, legislators, and business leaders carefully drafted descriptors for the Science achievement levels to help educators understand what each level represents and what additional skills are required by students to improve their levels of performance. The descriptors should be studied carefully because they illustrate the connection of the Missouri Show-Me Standards to the MAP by specifying the skills, knowledge, and abilities that students should have at each achievement level.

MISSOURI SCIENCE ACHIEVEMENT LEVEL DESCRIPTORS
GRADE 3

STEP 1:
Examples of mastery at this level:
- compare physical characteristics of objects;
- read simple charts and graphs;
- describe an object's position relative to another;
- identify Earth's physical properties;
- identify simple patterns; describe the difference between living and non-living things;
- identify characteristics of organisms that allow it to survive;
- recognize simple cause-and-effect events.

PROGRESSING:
Examples of mastery at this level:
- recognize causes of pollution;
- identify characteristics of mammals;
- record simple observations;
- demonstrate magnetic force;
- list the physical properties of the moon;
- apply information from life experiences;
- identify effects of erosion; identify types of forces;
- identify the effects of the rotation of Earth.

NEARING PROFICIENCY:
Examples of mastery at this level:
- position objects relative to others;
- describe a 4-step food chain;
- complete a bar graph;
- identify naturally occurring resources;
- describe simple solutions to posed problems;
- list basic survival techniques of small animals;
- illustrate changes in states of water;
- describe the life cycle of plants.

PROFICIENT:
Examples of mastery at this level:
- explain the water cycle;
- identify causes of physical changes in Earth's crust;
- connect science to everyday life;
- explain the difference between stars and planets;
- interpret the moon and sun rotation/revolving cycles;
- describe electrostatic force;
- interpret data and draw conclusions;
- describe the life cycle of animals.

ADVANCED:
Examples of mastery at this level:
- interpret Earth, moon, and sun rotation and revolving cycles;
- describe the characteristics of sound;
- analyze simple real-world problems;
- describe weather-related phenomena;
- identify producer/consumer relationships;
- use words, pictures, models, and numbers to effectively communicate science concepts;
- interpret charts; describe the effects of heat on matter;
- name the types of forces and how they affect objects.

MISSOURI SCIENCE ACHIEVEMENT LEVEL DESCRIPTORS
GRADE 7

STEP 1:
Examples of mastery at this level:
- interpret the food pyramid and a food web;
- apply knowledge from life experiences;
- describe how plants reproduce; record information in simple charts;
- explain producer/consumer/decomposer relationship; name forms of energy; explain about animal niches; illustrate how living things adapt to environment.

PROGRESSING:
Examples of mastery at this level:
- interpret the action-reaction law;
- create tables to record data;
- connect science concepts to everyday life;
- read simple charts, graphs, and tables; describe simple relationships;
- relate properties of Earth that sustain life;
- utilize basic properties of light;
- explain the use of insulators and conductors;
- identify the basic patterns of movement of the Solar System.

NEARING PROFICIENCY:
Examples of mastery at this level:
- describe the transmission and prevention of diseases;
- compare renewable vs. non-renewable resources;
- create simple charts and tables;
- describe the effects of earthquakes on Earth's crust;
- design simple investigations;
- describe natural processes in written form;
- draw inferences from data;
- compare asexual vs. sexual reproduction;
- compare scientific theories vs. laws.

PROFICIENT:
Examples of mastery at this level:
- explain how substances expand and contract;
- interpret complex diagrams and abstract models;
- identify causes of the greenhouse effect; use technical terms to describe scientific relationships;
- identify the cause of acid rain and describe its effects;
- design a repeatable experiment to produce reliable data;
- identify and control variables in an experiment;
- list some natural resources of Missouri;
- describe effects of UV light;
- identify survival characteristics of mammals.

ADVANCED:
Examples of mastery at this level:
- explain the moon phases;
- use science concepts to infer, predict, and draw conclusions;
- compare distance relationships in the Solar System;
- use patterns in data to extrapolate information;
- survey the electrical resistance of common objects;
- describe pressure/temperature relationships;
- control multiple variables in experiments;
- analyze impact of technology and human activity on the environment.

MISSOURI SCIENCE ACHIEVEMENT LEVEL DESCRIPTORS
GRADE 10

STEP 1:
Examples of mastery at this level:
- contrast the life-cycles of gymnosperms and angiosperms;
- read simple tables and diagrams;
- identify the resources of oceans;
- describe causes of population decreases;
- apply the properties of light;
- recognize effects of science and technology on society;
- identify components of experiments;
- cite advantages and disadvantages of proposed solutions;
- provide support for conclusions drawn from a set of data.

PROGRESSING:
Examples of mastery at this level:
- describe the effects of population increases on water supplies;
- describe the uses of energy transfer;
- interpret tables, graphs, and diagrams;
- cite some benefits of the space program;
- summarize data charts; identify landfill contamination;
- apply basic science concepts to everyday life;
- utilize the properties of solutions;
- investigate models of genetic frequencies.

NEARING PROFICIECY:
Examples of mastery at this level:
- illustrate seismic waves of earthquakes;
- design repeatable investigations;
- formulate conclusions supported by data;
- explain how vaccines work; use the inquiry method of investigation;
- explain the relationship between velocity and acceleration;
- describe the role of red blood cells;
- identify flaws in experimental design;
- define tectonic plate movement;
- compare meiosis and mitosis;
- propose and evaluate solutions to real-world problems;
- utilize the properties of sound.

PROFICIENT:
Examples of mastery at this level:
- define the half-life of radioactive elements;
- illustrate the transfer of heat energy;
- demonstrate a working knowledge of science concepts and abstract models;
- weigh advantages vs. disadvantages in making decisions;
- organize and analyze data; explain the conservation of momentum;
- make use of mechanical energy/work;
- communicate the reasoning and data used to justify conclusions;
- explain how energy flows through trophic levels;
- relate the development of the plate tectonic theory.

ADVANCED:

Examples of mastery at this level:

- explain how transfer of heat takes place on the molecular level;
- derive chemical formulas for compounds using the Periodic Table;
- demonstrate the relationship between air pressure and density;
- effectively organize and communicate knowledge through detailed explanations;
- calculate the efficiency of simple machines;
- describe the life cycle of a star; propose, evaluate, and defend solutions to solve real-world problems;
- demonstrate the Doppler Effect;
- compare the relationship of force and mass to acceleration;
- explain concept of rotational motion.