Excerpts from:

Connecticut Mastery Test

Fourth Generation

Science Handbook

Connecticut State Board of Education
2008

Position Statement on Science Education

Adopted June 2, 2004

http://www.csde.state.ct.us/public/cedar/assessment/cmt/resources/handbooks/Science_CMT_handbook-posted.pdf

Key segments relating to science choreography and the Genes and Mendel Module are in **RED**

Learning experiences in science should lead all students to:

• Understand and apply basic concepts, principles and theories of biology, chemistry, physics, earth and space sciences and their interrelationships;
• Recognize and participate in scientific endeavors which are evidence based and use inquiry skills that lead to a greater understanding of the world;
• Identify and solve problems through scientific exploration, including the formulation of hypotheses, design of experiments, use of technology, analysis of data and drawing of conclusions;
• Select and use properly appropriate laboratory technology, equipment and material, including measuring and sensing devices;
• Understand and use existing and emerging technologies which have an effect on society and the quality of life, including personal academic and work environments;
• Analyze the possibilities and limits of science and technology in order to make and defend decisions about societal issues; and
• Understand that the way in which scientific knowledge is formulated is crucial to the validity of that knowledge

Teachers play an essential role in ensuring a quality educational program in science by:

• planning units and lessons that contain current, accurate and meaningful content that is aligned with the district curriculum;
• keeping up-to-date with the latest scientific advances in their discipline;
• setting a context for scientific learning that is relevant to students in class;
• engaging students in extended, developmentally appropriate scientific investigations that motivate student effort and interest in scientific learning;
• providing students with a safe environment in which to participate in scientific investigations;
• providing students with resources needed to support their learning;
• assessing student understanding regularly and adjusting instruction to accommodate students with diverse needs, abilities and interests;
• communicating to students and parents the goals and importance of studying science; and

• encouraging students to pursue the study of advanced science and science-related careers.

To assess students' understanding of inquiry and the nature of science, the CMT science assessments include some questions that assess inquiry within the CONTEXT of curriculum embedded performance tasks developed by the State Department of Education. Students are not expected to recall the SPECIFIC DETAILS OR A SINGLE "RIGHT" ANSWER to any performance task. Rather, the test questions will assess students' general abilities to make scientific observations, pose testable questions, design "fair tests," make evidence-based conclusions and judge experimental quality.

Grades 6-8 Core Scientific Inquiry, Literacy and Numeracy *How is scientific knowledge created and communicated?*	
Content Standards	**Expected Performances**
SCIENTIFIC INQUIRY ♦ Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena. ♦ Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation. ♦ Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists. **SCIENTIFIC LITERACY** ♦ Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science. ♦ Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media. **SCIENTIFIC NUMERACY** ♦ Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.	**C INQ.1** Identify questions that can be answered through scientific investigation. **C INQ.2** Read, interpret and examine the credibility of scientific claims in different sources of information. **C INQ.3** Design and conduct appropriate types of scientific investigations to answer different questions. **C INQ.4** Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment. **C INQ.5** Use appropriate tools and techniques to make observations and gather data. **C INQ.6** Use mathematical operations to analyze and interpret data. **C INQ.7** Identify and present relationships between variables in appropriate graphs. **C INQ.8** Draw conclusions and identify sources of error. **C INQ.9** Provide explanations to investigated problems or questions. **C INQ.10** Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

Grade 8 **Core Themes, Content Standards and Expected Performances**	
Content Standards	**Expected Performances**
Heredity and Evolution – What processes are responsible for life's unity and diversity? **8.2 - Reproduction is a characteristic of living systems and it is essential for the continuation of every species.**	**C 25.** Explain the similarities and differences in cell division in somatic and germ cells. **C 26.** Describe the structure and function of the male and female human reproductive systems, including the process of egg and sperm production.

♦ Heredity is the passage of genetic information from one generation to another. ♦ Some of the characteristics of an organism are inherited and some result from interactions with the environment.	**C 27.** Describe how genetic information is organized in genes on chromosomes, and explain sex determination in humans.

PART II
EFFECTIVE INSTRUCTIONAL STRATEGIES

PRACTICAL INSTRUCTIONAL STRATEGIES TO IMPROVE STUDENT ACHIEVEMENT IN SCIENCE

Strategy 2: CHOOSE "MEANINGFUL" LEARNING ACTIVITIES. It is often said that students learn science best when it is a "hands-on" experience. Although students clearly enjoy these opportunities to "do" science, hands-on activities alone do not necessarily lead to "minds-on" understanding of science concepts, what science is, or how scientists work. Meaningful learning activities help students make sense of science ideas and techniques. To prepare students to respond to a range of CMT questions that assess basic factual knowledge, conceptual understanding and application of knowledge, teachers should purposefully select each learning activity based on its potential to help students acquire basic factual knowledge (e.g., identifying structures of plant cells), conceptual understanding (e.g., understanding how the cell membrane regulates materials entering and leaving the cell), or to apply knowledge to solve problems (e.g., how does acid rain affect plant growth). Activities that focus solely on cultivating "process skills" in isolation from science knowledge should be avoided. Instead, use scientific investigation as the vehicle for refining students' abilities to use inquiry science practices to build understanding of a targeted science concept. This approach will prepare students to respond to CMT questions that require students to explain or apply science concepts or inquiry processes.

Strategy 3: MAKE LEARNING RELEVANT AND INTERESTING. In a textbook-driven curriculum, students often ask, "Why do we have to learn this?" When students cannot see a purpose for learning science, knowledge retention can quickly fade after the end-of-chapter test (or even sooner!) Among the best ways to prepare students for cumulative tests like the CMT is through learning experiences that place Framework science concepts in a context of questions, 22 problems and social issues that are interesting and relevant to students' lives. The immediate school or neighborhood surroundings, sports, music, art, national news or family health and nutrition all provide motivating contexts that draw students into their learning. For example, consider the contrast between an ecosystems learning unit in which students read a textbook page that defines terms such as food chain, producer and consumer, compared to a contextualized unit during which students inventory living and nonliving things on the school playground, explore the impact of an invasive weed on the biodiversity of the area over time, and develop strategies to intervene.