The Third Generation Science Handbook (2007) provides the most recent description of the Connecticut Academic Performance Test (CAPT). Excerpts relating to science choreography are provided below.

In addition, excerpts from the Second Generation Handbook (link) provide a philosophical background particularly relevant to Science Choreography and the Genes and Mendel module.

Excerpts from:

Connecticut State Department of Education

Connecticut Academic Performance Test (CAPT) Third Generation Handbook For

Science

http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890

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

Part I

Core Science Curriculum Framework for Grades 9 and 10

THE STANDARDS FOR SCIENTIFIC INQUIRY, LITERACY AND NUMERACY ARE INTEGRAL PARTS OF THE CONTENT STANDARDS FOR EACH GRADE LEVEL IN THIS CLUSTER.

Grades 9-10 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 the ability to read, write, discuss and present coherent ideas 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.	**D INQ.1** Identify questions that can be answered through scientific investigation. **D INQ.2** Read, interpret and examine the credibility and validity of scientific claims in different sources of information. **D INQ.3** Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment. **D INQ.4** Design and conduct appropriate types of scientific investigations to answer different questions. **D INQ.5** Identify independent and dependent variables, including those that are kept constant and those used as controls. **D INQ.6** Use appropriate tools and techniques to make observations and gather data. **D INQ.7** Assess the reliability of the data that was generated in the investigation. **D INQ.8** Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms. **D INQ.9** Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation. **D INQ.10** Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

Grade 10

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Content Standards	Expected Performances
Structure and Function – How are organisms structured to ensure efficiency and survival? **10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.** ♦ Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions. ♦ The cellular processes of photosynthesis and respiration involve transformation of matter and energy.	**D 1.** Describe significant similarities and differences in the basic structure of plant and animal cells. **D 2.** Describe the general role of DNA and RNA in protein synthesis. **D 3.** Describe the general role of enzymes in metabolic cell processes. **D 4.** Explain the role of the cell membrane in supporting cell functions.
Science and Technology in Society – How do science and technology affect the quality of our lives? **10.2 - Microorganisms have an essential role in life processes and cycles on Earth.** ♦ Understanding the growth and spread patterns of viruses and bacteria enables the development of methods to prevent and treat infectious diseases.	**D 5.** Describe the similarities and differences between bacteria and viruses. **D 6.** Describe how bacterial and viral infectious diseases are transmitted, and explain the roles of sanitation, vaccination and antibiotic medications in the prevention and treatment of infectious diseases. **D 7.** Explain how bacteria and yeasts are used to produce foods for human consumption.
Science and Technology in Society – How do science and technology affect the quality of our lives? **10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.** ♦ The principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.	**D 8.** Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials. **D 9.** Explain the risks and benefits of altering the genetic composition and cell products of existing organisms.

Part II

Instructional Strategies

The Nature of Science

> Over the course of human history, people have developed many interconnected and validated ideas about the physical, biological and social worlds. Those ideas have enabled successive generations to achieve an increasingly comprehensive and reliable understanding of the human species and its environment. The means used to develop these ideas are particular ways of observing, thinking, experimenting and validating. These ways represent a fundamental aspect of the nature of science and reflect how science tends to differ from other modes of knowing. (American Association for the Advancement of Science, *Benchmarks for Scientific Literacy,* Oxford University Press, 1993, p. 3).

When asking science teachers what is it that they teach, it is not uncommon for the response to be a list of content topics such as *electricity, plants* or *weather.* Most teachers know that science instruction is much more than a presentation of topics; that it includes "the ability to inquire, the capacity to use scientific principles to make decisions and the ability to communicate effectively about science"(National Research Council, *National Science Education Standards,* 1996). The CAPT assesses science literacy by asking students to apply their knowledge of science content and scientific principles.

Instructional strategies and student preparation are discussed in this section of the handbook to provide guidelines to science coordinators, district administrators and teachers to assist in the improvement of students' knowledge of science content and principles and to prepare students for the CAPT.

10 Instructional Strategies to Use All Year and to Prepare Students for the CAPT

Strategy 1. Create a Climate for Learning

Every teacher must provide a climate that emphasizes that all children can learn. A climate for learning is one that recognizes and addresses the needs of all learners. Teachers must also ensure the classroom environment is one where all students feel safe physically and emotionally.

A positive classroom environment fosters creative thinking, problem solving, and academic risk-taking. Teachers must promote the formation, exploration and validity of different strategies to solve scientific problems.

Strategy 5. Vary the Way Students Work

Most scientists do not work in isolation; they work in teams or groups. It is important, therefore, to structure the classroom so that students have opportunities to work in groups or teams. This will provide a more authentic scientific experience in the K-12 classroom. Opportunities to work in groups encourage students to share responsibility for learning. Students develop approaches and explanations, exchange information, talk and listen, argue and persuade. They learn to order their thoughts and compare their own thinking processes with those of their peers. Students also become involved in tutoring and encouraging each other. When students work in groups, they all have a chance to be successful and everyone's effort contributes to the group's results.
Individual assignments may serve two purposes: individual accountability and individual feedback. By requiring individual lab write-ups, each student is held accountable for doing his or her own work. It allows each student to incorporate new ideas into his or her own understanding that may not reflect that of the team or group. Individual work allows the teacher to assess the understanding of each student and adjust instruction accordingly. Assignments other than laboratory reports that are the responsibility of the individual allow for choice in the particular area of research and delivery of evidence of student understanding. These assignments may be given under a teacher controlled topic/question or under a broader theme whereby the direction of learning is controlled by the student.

Strategy 6. Use Warm Up Activities

Use a warm up question or problem everyday to allow students an opportunity to demonstrate their understanding of a particular content or inquiry standard. The problem may be posted for students to do as they come into class. These problems may serve as an ongoing review and reinforcement of scientific content, inquiry and communication skills. For example a graph may be displayed for students to analyze or a table of data may be displayed for students to graph and draw a conclusion.

Strategy 7. Create and Embed Science, Technology and Society (STS) Activities

Science, Technology and Society (STS) learning activities are designed to engage students in the applications of science through the use of their critical thinking skills and content knowledge. They afford students the opportunity to examine ideas and data related to historical, technological and/or social aspects of science concepts and content. In an STS activity the student has a chance to analyze, evaluate and draw conclusions about scientific research or information gathered by sources outside of their classroom. A strong STS activity demonstrates the valuable role science plays in everyday life. Use authentic sources of information including media clips, newspapers, magazines and advertisements as vehicles to practice reading and writing, assess prior knowledge or as a springboard for students to generate questions about the text and the corresponding content. A contemporary issue without one obvious correct answer often provides a wonderful context for an STS activity. The use of contemporary issues in science may also provide daily embedded learning opportunities that allow for continuing growth in reading, writing, listening and presenting.

Strategy 8. Strengthen Comprehension for Content Area Text

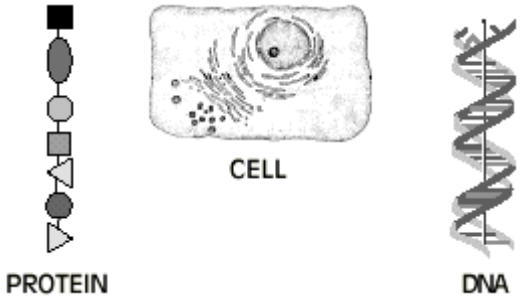
Students must use appropriate self-selected strategies to assist with their understanding of content area text. Prior to engaging with a text, students must examine headings, subheadings, bold/italic embedded words, captions, graphs, charts, and pictures that may accompany the text in an effort to activate prior knowledge, generate predictions, and establish connections and purposes for reading the text. During reading, students must question and be able to answer their questions (e.g. What is my understanding about my reading? How does the new information I am learning relate to what I already know? Why is the author including these specific words? Is there an underlying message the author is trying to communicate? From what perspective is the author coming? How is the information relevant to the authors' purpose? What is the most important aspect of what I am learning and why is it important? What additional questions do I have about what I am reading?). During reading, students may use varied strategies to assist them with understanding difficult text (e.g. re-reading portions; re-examining the accompanying charts, graphs, and pictures; re-examining vocabulary; asking another for clarification; using Post-it Notes with their questioning and answering). After reading, students must be asked to respond to the text in varied ways appropriate to the task (e.g. open-ended verbal and written questions posed by the teacher, other students, and themselves). Students must support all responses, verbal and written, with specific evidence from the text. Teachers must sustain the habit of requiring students to look back in the text for specific evidence. The goal is to move students toward independence about how to learn regardless of the content area. Teachers must support the process by which students use appropriate self-selected strategies to assist with their understanding of content area text.

Generally, to help students learn better, teachers are encouraged to enlist:

- parents to regularly monitor and discuss their youngsters' school work;
- colleagues to develop significant interdisciplinary experiences for students; and
- colleagues to examine student work as evidence of the teaching-learning cycle with a focus on improving instruction.

Part IV
Released Sample Items

10.1 – Fundamental life processes depend on the physical structure and the chemical activities of the cell.



What is the relationship between the three structures in the diagram above?

a. DNA is produced by protein which is produced in the cell.
b. Protein is composed of DNA which is produced in the cell.
c. DNA controls the production of protein in the cell.
d. A cell is composed only of DNA and protein.

A chromosome is best described as a

a. gene that has more than one form.
b. green cell found in many plants.
c. strand of DNA containing genetic information.
d. reproductive cell found in certain kinds of bacteria.

10.2 – Microorganisms have an essential role in life processes and cycles of Earth.

The patient needed a vaccination. Vaccinations prevent disease by _____.

a. preventing viral DNA from entering the body
b. destroying toxins produced by bacteria
c. stimulating the production of antibodies
d. increasing red blood cell production

10.3 – Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

(No examples provided)

10.4 – In sexually reproducing organism, each offspring contain a mix of characteristics inherited from both parents.

In fruit flies, gray body color (G) is dominant over black body color (g). What kind of offspring would you expect from parents who are both heterozygous for body color (Gg x Gg)?

	G	**g**
G		
g		

a. 0% gray, 100% black
b. 25% gray, 75% black
c. 75% gray, 25% black
d. 100% gray, 0% black

Which statement about DNA is correct?

a. A child's DNA will be unrelated to the mother's or father's DNA.
b. A child's DNA will show similarities to both the mother's and father's DNA.
c. A female child's DNA will exactly match the mother's DNA.
d. A male child's DNA will exactly match the father's DNA.

If an intestinal cell in a butterfly contains 24 chromosomes, a butterfly egg cell would contain

a. 3 chromosomes.
b. 6 chromosomes.
c. 12 chromosomes.
d. 24 chromosomes.