Selected State and National Academic Standards

Grade Level	*Washington State Science Standards*
4-5	• EALR 2: Inquiry A - Scientific investigations involve asking and answering questions and comparing the answers with evidence from the real world. • EALR 4: Life Science 3B – Plants and animals inherit many characteristics from their parents. Some inherited characteristics allow organisms to better survive and reproduce in a given ecosystem.
6-8	• EALR 2: Inquiry A - Scientific inquiry involves asking and answering questions and comparing the answer with what scientists already know about the world. • EALR 4: Life Science 1A – All organisms are composed of cells, which carry on the many functions needed to sustain life. • EALR 4: Life Science 3B - Every organism contains a set of genetic information (instructions) to specify its traits. This information is contained within genes in the chromosomes in the nucleus of each cell.

Grade Level	*Washington State Health and Fitness Standards*
4-8	• EALR 2: Component 2.2: Understands stages of growth and development. Understands hereditary factors that affect growth, development, and health.

Grade Level	*National Science Education Standards*
4	**Science Standard A (Science as Inquiry)** All students should develop abilities necessary to do scientific inquiry and understanding about scientific inquiry *Fundamental concept*: Ask a question about objects, organisms, and events in the environment. **Standard C (LIfe Science)** All students should develop an understanding of the characteristics of organisms. *Fundamental concept*: Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's interactions with the environment. **Standard G (History and Nature of Science)** All students should develop an understanding of science as a human endeavor. Fundamental concept: Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.
5-8	**Science Standard A (Science as Inquiry)** All students should develop abilities necessary to do scientific inquiry and understanding about scientific inquiry *Fundamental concept*: Identify questions that can be answered through scientific investigations. **Standard C (Life Science)** All students should develop an understanding of reproduction and heredity. *Fundatmental concept*: Hereditary information is contained in genes, located in the chromosomes of each cell. **Science Standard F (Science in Personal and Social Perspectives)** All students should develop an understanding of science and technology in society. *Fundamental concept:* Science influences society through its knowledge and world view.

Module: **Where is your DNA? DNA Isolation Curriculum**

Topics: **Cellular structure, DNA isolation, molecular biology, biochemistry.**

Seattle Children's SCIENCE ADVENTURE LAB

Overview: This lesson is designed to take place onboard the Seattle Children's Science Adventure Lab, a mobile science laboratory. In this module, students collect their own cheek cells and then isolate DNA from the cells. Students learn the general steps used to isolate DNA, which include lysis, separation and precipitation. By completing this module, students learn about the properties and function of DNA and that isolating DNA is the first step in advanced biotechnology applications such as cloning, DNA sequencing and DNA fingerprinting. Throughout the lesson, as part of the 5E Instructional Model, Science Adventure Lab instructors and classroom teachers serve as "facilitators" and "coaches," guiding students through the inquiry process.

Grade Levels: This module is appropriate for students in Grade 4-8.

Time Required: Minimum time required to complete this module is 60 minutes.

Lab Equipment Used: Micropipettes, heat blocks, reagents for DNA isolation.

Health Issue: DNA is found in nearly every type of cell in the human body. Our DNA affects our growth, development and health. Scientists have identified about 4,000 diseases caused by genetic mutations. Mutations in DNA can be harmless and undetectable or they may cause genetic diseases such as hemophilia, muscular dystrophy and cancer. A greater understanding of specific disease genes may lead to improved care and genetic cures of the future.

Objectives:

- To isolate DNA from cheek epithelial cells.
- To develop the laboratory skills and knowledge required to conduct an experiment and test hypotheses.
- To expose students to authentic equipment and tools used by scientists.
- To empower students with the confidence that they can be successful in science and encourage them to pursue careers in science and healthcare.