Standard ID	Standard Text	Edgenuity Lesson Name
EALR 2.9-12 INQ	Inquiry	
2.9-12 INQ	Inquiry In prior grades students learned to revise questions so they can be answered scientifically. In grades 9-12 students extend and refine their understanding of the nature of inquiry and their ability to formulate questions, propose hypotheses, and design, conduct, and report on investigations. Refinement includes an increased understanding of the kinds of questions that scientists ask and how the results reflect the research methods and the criteria that scientific arguments are judged by. Increased abilities include competence in using mathematics, a closer connection between student-planned investigations and existing knowledge, improvements in communication and collaboration, and participation in a community of learners.	
2.9-12 INQA	Scientists generate and evaluate questions to investigate the natural world.	
2.9-12 INQA.1	Generate and evaluate a question that can be answered through a scientific investigation. Critique questions generated by others and explain whether or not the questions are scientific.	Formulating Scientific Questions
2.9-12 INQB	Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying the data.	
2.9-12 INQB.1	Plan and conduct a scientific investigation, choosing a method appropriate to the question being asked.	Analyzing Data and Drawing Conclusions Collecting and Organizing Data Designing Scientific Investigations Hypotheses, Theories, and Laws Laboratory Safety Scientific Inquiry
2.9-12 INQB.2	Collect, analyze, and display data using calculators, computers, or other technical devices when available.	Analyzing Data and Drawing Conclusions Collecting and Organizing Data
2.9-12 INQC	Conclusions must be logical, based on evidence, and consistent with prior established knowledge.	
2.9-12 INQC.1	Draw conclusions supported by evidence from the investigation and consistent with established scientific knowledge.	Analyzing Data and Drawing Conclusions
2.9-12 INQC.2	Analyze alternative explanations and decide which best fits the data and evidence.	Analyzing Evidence Assessing Claims and Evidence

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2.9-12 INQD	The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.	
2.9-12 INQD.1	Write a detailed laboratory report that includes: the question that motivated the study, a justification for the kind of investigation chosen, hypotheses (if any), a description of what was done, a summary of data in tables and graphs, and a conclusion, based on the evidence, that responds to the question.	Science-Based Communication
2.9-12 INQE	The essence of scientific investigation involves the development of a theory or conceptual model that can generate testable predictions.	
2.9-12 INQE.1	Formulate one or more hypotheses based on a model or theory of a causal relationship. Demonstrate creativity and critical thinking to formulate and evaluate the hypotheses.	Creativity and Science Hypotheses, Theories, and Laws
2.9-12 INQF	Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.	
2.9-12 INQF.1	Evaluate an investigation to determine if it was a valid means of answering the question, and whether or not the results were reliable.	Evaluating Scientific Design
2.9-12 INQF.2	Describe the development of a scientific theory that illustrates logical reasoning, creativity, testing, revision, and replacement of prior ideas in light of new evidence.	Hypotheses, Theories, and Laws
2.9-12 INQG	Public communication among scientists is an essential aspect of research. Scientists evaluate the validity of one another's investigations, check the reliability of results, and explain inconsistencies in findings.	
2.9-12 INQG.1	Participate in a scientific discussion about one's own investigations and those performed by others.	
2.9-12 INQG.2	Respond to questions and criticisms, and if appropriate, revise explanations based on these discussions.	
2.9-12 INQH	Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.	
2.9-12 INQH.1	Provide appropriate citations for all ideas, findings, and information used in any and all written reports.	
2.9-12 INQH.2	Explain the consequences for failure to provide appropriate citations.	

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EALR 3.9-12 APP	Application	
3.9-12 APP	Application In prior grades students learn to work with other members of a team to apply the full process of technological design and relevant science concepts to solve problems. In grades 9-12 students apply what they have learned to address societal issues and cultural differences. Students learn that science and technology are interdependent, that science and technology influence society, and that society influences science and technology. Students continue to increase their abilities to work with other students and to use mathematics and information technologies (when available) to solve problems. They transfer insights from those increased abilities when considering local, regional, and global issues. These insights and capabilities will help prepare students to solve societal and personal problems in future years.	
3.9-12 APPA	Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study and by deciding what research will be funded.	
3.9-12 APPA.1	Describe ways that scientific ideas have influenced society or the development of differing cultures.	Science and Society
3.9-12 APPA.2	List questions that scientists investigate that are stimulated by the needs of society (e.g., medical research, global climate change).	Science and Society
3.9-12 APPD	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.	
3.9-12 APPD.1	Use proportional reasoning, functions, graphing, and estimation to solve problems.	Analyzing Data and Drawing Conclusions Collecting and Organizing Data Lab: Measurement
3.9-12 APPD.2	Use computers, probes, and software when available to collect, display, and analyze data.	Analyzing Data and Drawing Conclusions Collecting and Organizing Data
3.9-12 APPE	Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended, others not.	
3.9-12 APPE.1	Analyze a societal issue that may be addressed through science and/or technology. Compare alternative solutions by considering trade-offs and unintended consequences (e.g., removing dams to increase salmon spawning).	Science and Society
3.9-12 APPF	It is important for all citizens to apply science and technology to critical issues that influence society.	
3.9-12 APPF.1	Critically analyze scientific information in current events to make personal choices or to understand public-policy decisions.	Human Impact on the Environment Science and Society

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EALR 4.9-11 LS	Life Science	
4.9-11 LS1	Structures and Functions of Living Organisms In prior grades students learned that all living systems are composed of cells which make up tissues, organs, and organ systems. In grades 9-11 students learn that cells have complex molecules and structures that enable them to carry out life functions such as photosynthesis and respiration and pass on their characteristics to future generations. Information for producing proteins and reproduction is coded in DNA and organized into genes in chromosomes. This elegant yet complex set of processes explains how life forms replicate themselves with slight changes that make adaptations to changing conditions possible over long periods of time. These processes that occur within living cells help students understand the commonalities among the diverse living forms that populate Earth today.	
4.9-11 LS1A	Carbon-containing compounds are the building blocks of life. Photosynthesis is the process that plant cells use to combine the energy of sunlight with molecules of carbon dioxide and water to produce energy-rich compounds that contain carbon (food) and release oxygen.	
4.9-11 LS1A.1	Explain how plant cells use photosynthesis to produce their own food. Use the following equation to illustrate how plants rearrange atoms during photosynthesis: $6CO_2+6H_2O+$light energy -> $C_6H_{12}O_6+6O_2$.	
		Light Dependent Reactions in Photosynthesis Light Independent Reactions in Photosynthesis The Process of Photosynthesis
4.9-11 LS1A.2	Explain the importance of photosynthesis for both plants and animals, including humans.	
		Photosynthesis and Cellular Respiration
4.9-11 LS1B	The gradual combustion of carbon-containing compounds within cells, called cellular respiration, provides the primary energy source of living organisms; the combustion of carbon by burning of fossil fuels provides the primary energy source for most of modern society.	
4.9-11 LS1B.1	Explain how the process of cellular respiration is similar to the burning of fossil fuels (e.g., both processes involve combustion of carbon-containing compounds to transform chemical energy to a different form of energy).	
		Cellular Respiration
4.9-11 LS1C	Cells contain specialized parts for determining essential functions such as regulation of cellular activities, energy capture and release, formation of proteins, waste disposal, the transfer of information, and movement.	
4.9-11 LS1C.1	Draw, label, and describe the functions of components of essential structures within cells (e.g., cellular membrane, nucleus, chromosome, chloroplast, mitochondrion, ribosome).	
		Animal and Plant Cells Cell Theory Lab: Using a Compound Microscope Prokaryotic and Eukaryotic Cells The Function of Organelles

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4.9-11 LS1D	The cell is surrounded by a membrane that separates the interior of the cell from the outside world and determines which substances may enter and which may leave the cell.	
4.9-11 LS1D.1	Describe the structure of the cell membrane and how the membrane regulates the flow of materials into and out of the cell.	Cell Homeostasis Lab: Diffusion Across a Semi-Permeable Membrane
4.9-11 LS1E	The genetic information responsible for inherited characteristics is encoded in the DNA molecules in chromosomes. DNA is composed of four subunits (A,T,C,G). The sequence of subunits in a gene specifies the amino acids needed to make a protein. Proteins express inherited traits (e.g., eye color, hair texture) and carry out most cell function.	
4.9-11 LS1E.1	Describe how DNA molecules are long chains linking four subunits (smaller molecules) whose sequence encodes genetic information.	Chromosomes DNA and RNA Structure Genetic Code
4.9-11 LS1E.2	Illustrate the process by which gene sequences are copied to produce proteins.	Lab: Building Proteins from RNA Protein Synthesis
4.9-11 LS1F	All of the functions of the cell are based on chemical reactions. Food molecules are broken down to provide the energy and the chemical constituents needed to synthesize other molecules. Breakdown and synthesis are made possible by proteins called enzymes. Some of these enzymes enable the cell to store energy in special chemicals, such as ATP, that are needed to drive the many other chemical reactions in a cell.	
4.9-11 LS1F.1	Explain how cells break down food molecules and use the constituents to synthesize proteins, sugars, fats, DNA and many other molecules that cells require.	Energy in Cells Macromolecules
4.9-11 LS1F.2	Describe the role that enzymes play in the breakdown of food molecules and synthesis of the many different molecules needed for cell structure and function.	Catalysts
4.9-11 LS1F.3	Explain how cells extract and store energy from food molecules.	ATP Energy in Cells
4.9-11 LS1G	Cells use the DNA that forms their genes to encode enzymes and other proteins that allow a cell to grow and divide to produce more cells, and to respond to the environment.	
4.9-11 LS1G.1	Explain that regulation of cell functions can occur by changing the activity of proteins within cells and/or by changing whether and how often particular genes are expressed.	Cell Differentiation and Specialization Lab: Building Proteins from RNA Protein Synthesis

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4.9-11 LS1H	Genes are carried on chromosomes. Animal cells contain two copies of each chromosome with genetic information that regulate body structure and functions. Most cells divide by a process called mitosis, in which the genetic information is copied so that each new cell contains exact copies of the original chromosomes.	
4.9-11 LS1H.1	Describe and model the process of mitosis, in which one cell divides, producing two cells, each with copies of both chromosomes from each pair in the original cell.	Asexual and Sexual Reproduction Cell Cycle Mitosis
4.9-11 LS1I	Egg and sperm cells are formed by a process called meiosis in which each resulting cell contains only one representative chromosome from each pair found in the original cell. Recombination of genetic information during meiosis scrambles the genetic information, allowing for new genetic combinations and characteristics in the offspring. Fertilization restores the original number of chromosome pairs and reshuffles the genetic information, allowing for variation among offspring.	
4.9-11 LS1I.1	Describe and model the process of meiosis in which egg and sperm cells are formed with only one set of chromosomes from each parent.	Asexual and Sexual Reproduction Meiosis
4.9-11 LS1I.2	Model and explain the process of genetic recombination that may occur during meiosis and how this then results in differing characteristics in offspring.	Asexual and Sexual Reproduction Introduction to Genetics Laws of Inheritance Meiosis
4.9-11 LS1I.3	Describe the process of fertilization that restores the original chromosome number while reshuffling the genetic information, allowing for variation among offspring.	The Reproductive Process
4.9-11 LS1I.4	Predict the outcome of specific genetic crosses involving two characteristics.	Acquired and Inherited Traits Lab: Mouse Genetics (One Trait) Lab: Mouse Genetics (Two Traits) Non-Mendelian Inheritance Probability of Inheritance Sex-Linked Inheritance

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4.9-11 LS2	Ecosystems In prior grades students learned to apply key concepts about ecosystems to understand the interactions among organisms and the nonliving environment. In grades 9-11 students learn about the factors that foster or limit growth of populations within ecosystems and that help to maintain the health of the ecosystem overall. Organisms participate in the cycles of matter and flow of energy to survive and reproduce. Given abundant resources, populations can increase at rapid rates. But living and nonliving factors limit growth, resulting in ecosystems that can remain stable for long periods of time. Understanding the factors that affect populations is important for many societal issues, from decisions about protecting endangered species to questions about how to meet the resource needs of civilization while maintaining the health and sustainability of Earth's ecosystems.	
4.9-11 LS2A	Matter cycles and energy flows through living and nonliving components in ecosystems. The transfer of matter and energy is important for maintaining the health and sustainability of an ecosystem.	
4.9-11 LS2A.1	Explain how plants and animals cycle carbon and nitrogen within an ecosystem.	The Cycles of Matter The Importance of Carbon
4.9-11 LS2A.2	Explain how matter cycles and energy flows in ecosystems, resulting in the formation of differing chemical compounds and heat.	Cellular Respiration Light Dependent Reactions in Photosynthesis Light Independent Reactions in Photosynthesis The Cycles of Matter
4.9-11 LS2B	Living organisms have the capacity to produce very large populations. Population density is the number of individuals of a particular population living in a given amount of space.	
4.9-11 LS2B.1	Evaluate the conditions necessary for rapid population growth (e.g., given adequate living and nonliving resources and no disease or predators, populations of an organism increase at rapid rates).	Population Growth
4.9-11 LS2B.2	Given ecosystem data, calculate the population density of an organism.	Population Size and Structure
4.9-11 LS2C	Population growth is limited by the availability of matter and energy found in resources, the size of the environment, and the presence of competing and/or predatory organisms.	
4.9-11 LS2C.1	Explain factors, including matter and energy, in the environment that limit the growth of plant and animal populations in natural ecosystems.	Energy Flow in Ecosystems Lab: Interdependence of Organisms Succession and Extinction The Cycles of Matter

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4.9-11 LS2D	Scientists represent ecosystems in the natural world using mathematical models.	
4.9-11 LS2D.1	Draw a systems diagram to illustrate and explain why introduced (nonnative) species often do poorly and have a tendency to die out, as well as why they sometimes do very well and force out native species.	Populations and the Environment
4.9-11 LS2E	Interrelationships of organisms may generate ecosystems that are stable for hundreds or thousands of years. Biodiversity refers to the different kinds of organisms in specific ecosystems or on the planet as a whole.	
4.9-11 LS2E.1	Compare the biodiversity of organisms in different types of ecosystems (e.g., rain forest, grassland, desert) noting the interdependencies and interrelationships among the organisms in these different ecosystems.	Organizational Hierarchy Populations and the Environment Relationships Among Organisms
4.9-11 LS2F	The concept of sustainable development supports adoption of policies that enable people to obtain the resources they need today without limiting the ability of future generations to meet their own needs. Sustainable processes include substituting renewable for nonrenewable resources, recycling, and using fewer resources.	
4.9-11 LS2F.1	Explain how scientific concepts and findings relate to a resource issue currently under discussion in the state of Washington (e.g., removal of dams to facilitate salmon spawning in rivers; construction of wind farms).	Human Impact on the Environment
4.9-11 LS2F.2	Explain how the concept of sustainable development may be applied to a current resource issue in the state of Washington.	Human Impact on the Environment
4.9-11 LS3	Biological Evolution In prior grades students learned how the traits of organisms are passed on through the transfer of genetic information during reproduction. In grades 9-11 students learn about the factors that underlie biological evolution: variability of offspring, population growth, a finite supply of resources, and natural selection. Both the fossil record and analyses of DNA have made it possible to better understand the causes of variability and to determine how the many species alive today are related. Evolution is the major framework that explains the amazing diversity of life on our planet and guides the work of the life sciences.	
4.9-11 LS3A	Biological evolution is due to: (1) genetic variability of offspring due to mutations and genetic recombination, (2) the potential for a species to increase its numbers, (3) a finite supply of resources, and (4) natural selection by the environment for those offspring better able to survive and produce offspring.	
4.9-11 LS3A.1	Explain biological evolution as the consequence of the interactions of four factors: population growth, inherited variability of offspring, a finite supply of resources, and natural selection by the environment of offspring better able to survive and reproduce.	Darwin's Theory Lab: Natural Selection The History of Evolutionary Theory

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4.9-11 LS3A.2	Predict the effect on a species if one of these factors should change.	Biogeographic Isolation Factors Affecting Biological Diversity Factors Affecting Genetic Variation Lab: Natural Selection
4.9-11 LS3B	Random changes in the genetic makeup of cells and organisms (mutations) can cause changes in their physical characteristics or behaviors. If the genetic mutations occur in eggs or sperm cells, the changes will be inherited by offspring. While many of these changes will be harmful, a small minority may allow the offspring to better survive and reproduce.	
4.9-11 LS3B.1	Describe the molecular process by which organisms pass on physical and behavioral traits to offspring, as well as the environmental and genetic factors that cause minor differences (variations) in offspring or occasional "mistakes" in the copying of genetic material that can be inherited by future generations (mutations).	Chromosomal Changes DNA Mutations Factors Affecting Genetic Variation
4.9-11 LS3B.2	Explain how a genetic mutation may or may not allow a species to survive and reproduce in a given environment.	Factors Affecting Genetic Variation
4.9-11 LS3C	The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled available ecosystem niches on Earth with life forms.	
4.9-11 LS3C.1	Explain how the millions of different species alive today are related by descent from a common ancestor.	Evolutionary Relationships
4.9-11 LS3C.2	Explain that genes in organisms that are very different (e.g., yeast, flies, and mammals) can be very similar because these organisms all share a common ancestor.	Evolutionary Relationships
4.9-11 LS3D	The fossil record and anatomical and molecular similarities observed among diverse species of living organisms provide evidence of biological evolution.	
4.9-11 LS3D.1	Using the fossil record and anatomical and/or molecular (DNA) similarities as evidence, formulate a logical argument for biological evolution as an explanation for the development of a representative species (e.g., birds, horses, elephants, whales).	Biological Evidence and the Fossil Record

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4.9-11 LS3E	Biological classifications are based on how organisms are related, reflecting their evolutionary history. Scientists infer relationships from physiological traits, genetic information, and the ability of two organisms to produce fertile offspring.	
4.9-11 LS3E.1	Classify organisms, using similarities and differences in physical and functional characteristics.	Bacteria Evolutionary Relationships Identifying Unknown Organisms Lab: Using a Dichotomous Key Methods of Classification Protists and Fungi The Kingdoms Types of Plants
4.9-11 LS3E.2	Explain similarities and differences among closely related organisms in terms of biological evolution (e.g., "Darwin's finches" had different beaks due to food sources on the islands where they evolved).	Biological Evidence and the Fossil Record Darwin's Theory Evolutionary Relationships Lab: Natural Selection