

High School Science Power Standards and Priorities

Biology

EALR 1		EALR 2		EALR 3	
SYSTEMS		INQUIRY		APPLICATION	
Predictability and Feedback		Conducting Analyses and Thinking Logically		Science, Technology, and Society	
Power Standards		Power Standards		Power Standards	
Create realistic models with feedback, and recognize that all models are limited in their predictive power.		Expand and refine skill and abilities of inquiry to gain a deeper understanding of natural phenomena.		Transfer and apply abilities in science and technological design to develop solutions to societal issues.	
9-12 SYS A	Feedback is a process in which the <u>output</u> of a <u>system</u> provides information used to regulate the operation of the <u>system</u> . <u>Positive feedback</u> increases the disturbance to a <u>system</u> . <u>Negative feedback</u> reduces the disturbance to a <u>system</u> .	9-12 INQ A	Scientists <u>generate</u> and <u>evaluate</u> <u>questions</u> to <u>investigate</u> the <u>natural world</u> .	9-12 APP A	Science affects society and cultures by influencing the way many people think about themselves, others, and the <u>environment</u> . Society also affects <u>science</u> by its prevailing views about what is important to study and by deciding what research will be funded.
9-12 SYS B	Systems thinking can be especially useful in analyzing complex situations. To be useful, a <u>system</u> needs to be specified as clearly as possible.	9-12 INQ B	Scientific progress requires the use of various methods appropriate for answering different kinds of research <u>questions</u> , a thoughtful plan for gathering data needed to answer the <u>question</u> , and care in collecting, analyzing, and displaying the data.	9-12 APP B	The <u>technological design process</u> begins by defining a problem in terms of <u>criteria</u> and <u>constraints</u> , conducting research, and generating several different solutions.
9-12 SYS C	In complex <u>systems</u> , entirely new and unpredictable <u>properties</u> may emerge. Consequently, modeling a complex <u>system</u> in sufficient detail to make <u>reliable</u> predictions may not be possible.	9-12 INQ C	Conclusions must be logical, based on <u>evidence</u> , and consistent with prior <u>established</u> knowledge.	9-12 APP C	Choosing the best <u>solution</u> involves comparing alternatives with respect to <u>criteria</u> and <u>constraints</u> , then building and testing a <u>model</u> or other representation of the final design.
9-12 SYS D	Systems can be changing or in <u>equilibrium</u> .	9-12 INQ D	The methods and procedures that scientists use to obtain <u>evidence</u> must be clearly reported to enhance opportunities for further investigation.	9-12 APP D	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
		9-12 INQ E	The essence of scientific investigation involves the development of a <u>theory</u> or conceptual <u>model</u> that can <u>generate</u> testable predictions.	9-12 APP E	Perfect <u>solutions</u> do not exist. All technological <u>solutions</u> involve <u>trade-offs</u> in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended, others not.
		9-12 INQ F	Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new <u>evidence</u> comes to light.	9-12 APP F	It is important for all citizens to <u>apply</u> <u>science</u> and <u>technology</u> to critical issues that influence society.
		9-12 INQ G	Public <u>communication</u> among scientists is an essential aspect of research. Scientists <u>evaluate</u> the <u>validity</u> of one another's investigations, check the <u>reliability</u> of results, and <u>explain</u> inconsistencies in findings.		
		9-12 INQ H	Scientists carefully <u>evaluate</u> sources of information for <u>reliability</u> before using that information. When referring to the <u>ideas</u> or findings of others, they cite their sources of information.		

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Life Science		Life Science		Life Science	
PROCESSES WITHIN CELLS		MAINTENANCE AND STABILITY OF POPULATIONS		MECHANISMS OF EVOLUTION	
Power Standards		Power Standards		Power Standards	
Cells contain the mechanisms for life functions, reproduction, and inheritance.		A variety of factors can affect the ability of an ecosystem to maintain current population levels.		The underlying mechanisms of evolution include genetic variability, population growth, resource supply, and environment.	
9-11 LS1 A	Carbon-containing <u>compounds</u> are the building blocks of life. <u>Photosynthesis</u> is the process that plant cells use to combine the energy of sunlight with molecules of carbon dioxide and water to produce energy-rich <u>compounds</u> that contain carbon (<u>food</u>) and release oxygen.	9-11 LS2 A	<u>Matter</u> and <u>energy</u> is <i>transferred</i> and cycled through living and nonliving components in <u>ecosystems</u> . The cycling of <u>matter</u> and <u>energy</u> is important for maintaining the health and sustainability of an <u>ecosystem</u> .	9-11 LS3 A	Biological <u>evolution</u> is due to: (1) <u>genetic variability</u> of offspring due to <u>mutations</u> and <u>genetic recombination</u> , (2) the potential for a <i>species</i> to increase its numbers, (3) a finite supply of resources, and (4) <u>selection</u> by the <u>environment</u> for those offspring better able to survive and produce offspring.
9-11 LS1 B	The gradual combustion of carbon-containing <u>compounds</u> within cells, called <u>cellular respiration</u> , provides the primary energy source of living <u>organisms</u> ; & the combustion of carbon by burning of <u>fossil fuels</u> provides the primary energy source for human society.	9-11 LS2 B	Living <u>organisms</u> have the capacity to produce very large <u>populations</u> . <u>Population density</u> is the number of individuals of a particular <u>population</u> living in a given amount of space.	9-11 LS3 B	Random changes in the <u>genetic</u> makeup of cells and <u>organisms</u> (<u>mutations</u>) can cause changes in their physical <u>characteristics</u> or behaviors. If the <u>genetic mutations</u> 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.
9-11 LS1 C	Cells contain specialized parts for determining its essential <u>functions</u> , such as regulation of cellular activities, energy capture and release, formation of proteins, waste disposal, <u>transfer</u> of information, and movement.	9-11 LS2 C	<u>Population growth</u> is limited by the availability of matter and energy found in resources, the size of the <u>environment</u> , and the presence of competing and/or predatory <u>organisms</u> .	9-11 LS3 C	The great <u>diversity</u> of <u>organisms</u> is the result of more than 3.5 billion years of <u>evolution</u> that has filled available <u>ecosystem niches</u> on Earth with life forms.
9-11 LS1 D	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.	9-11 LS2 D	Scientists represent systems in the natural world, using mathematical models.	9-11 LS3 D	The <u>fossil</u> record and anatomical and molecular similarities observed among diverse <u>species</u> of living <u>organisms</u> provide <u>evidence</u> of biological <u>evolution</u> .
9-11 LS1 E	The <u>genetic information</u> responsible for inherited <u>characteristics</u> is encoded in the DNA molecules in <u>chromosomes</u> . DNA is composed of four subunits (A,T,C,G). The sequence of subunits in a <u>gene</u> specifies the amino acids needed to make a protein. <u>Proteins</u> express inherited traits (e.g., eye color, hair texture) and carry out most cell functions.	9-11 LS2 E	Interrelationships of <u>organisms</u> may <u>generate ecosystems</u> that are stable for hundreds or thousands of years. <u>Biodiversity</u> refers to the different kinds of <u>organisms</u> in specific <u>ecosystems</u> or on the planet as a whole.	9-11 LS3 E	<u>Biological classifications</u> are based on how <u>organisms</u> are related, reflecting their evolutionary history. Scientists <u>infer relationships</u> from physiological traits, <u>genetic information</u> , and the ability of two <u>organisms</u> to produce fertile offspring.

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9-11 LS1 F	All of the <u>functions</u> of the cell are based on <u>chemical reactions</u> . 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 <u>enzymes</u> . Some of these <u>enzymes</u> enable the cell to store energy in special chemicals, such as ATP, that are needed to drive the many other <u>chemical reactions</u> in a cell.	9-11 LS2 F	The <u>concept of sustainable development</u> supports adoption of policies that enable people to obtain the resources they need today, without limiting the ability of future <u>generations</u> to meet their own needs. Sustainable processes include substituting renewable for nonrenewable resources, recycling, and using fewer resources.		
9-11 LS1 G	Cells use the DNA that forms their genes to encode <u>enzymes</u> and other proteins that allow a cell to grow and divide to produce more cells, and respond to the <u>environment</u> .				
9-11 LS1 H	Genes are carried on <u>chromosomes</u> . Animal cells contain two copies of each <u>chromosome</u> with <u>genetic information</u> that regulate body structure and <u>functions</u> . Cells divide by a process called <u>mitosis</u> , in which the <u>genetic information</u> is copied so that each new cell contains exact copies of the original <u>chromosomes</u> .				
9-11 LS1 I	Egg and sperm cells are formed by a process called <u>meiosis</u> in which each resulting cell contains only one representative <u>chromosome</u> from each pair found in the original cell. <u>Recombination of genetic information</u> during <u>meiosis</u> scrambles the <u>genetic information</u> , allowing for new <u>genetic combinations</u> and <u>characteristics</u> in the offspring. Fertilization restores the original number of <u>chromosome</u> pairs and reshuffles the <u>genetic information</u> , allowing for <u>variation</u> among offspring.				