

ENVIRONMENTAL SCIENCE NXG SCIENCE STANDARDS

HIGH SCHOOL

ENVIRONMENTAL SCIENCE CONTENT

S.HS.ENV.1	compare and contrast the rate elements cycle through the ecosphere, describing natural and human influences on reaction rates:				
	• carbon				
	• nitrogen				
	• phosphorus				
	• oxygen				
	• sulfur.				
S.HS.ENV.2	explain how the chemical components of biological and physical processes fit in the overall process of biogeochemical cycling such as photosynthesis, respiration, nitrogen fixation, or decomposition.				
S.HS.ENV.3	analyze and evaluate the use and availability of renewable and nonrenewable energy resources:				
	• coal				
	• solar				
	• biomass				
	• biofuels				
	• hydropower				
	• natural gas				
	• wind				
	• geothermal				
	• nuclear.				
S.HS.ENV.4	evaluate environmental and economic advantages and disadvantages of using nonrenewable and renewable energy.				
S.HS.ENV.5	differentiate various means of generating electricity in terms of the transformation of energy among forms, the relationship of matter and energy, and efficiency/production of heat energy.				
S.HS.ENV.6	explain how technology has influenced the sustainability of natural resources over time:				
	• forestry practices				
	• fossil fuels				
	• farming.				
S.HS.ENV.7	relate logistic, exponential, and irruptive population growth to population dynamics including:				
	• natural selection				
	• predator/prey relationships				
	• reproductive strategies				
	• carrying capacity				
	• limiting factors.				
S.HS.ENV.8	create food web diagrams to explain how adding and/or removing a species from an ecosystem may affect other organisms and the entire ecosystem.				
S.HS.ENV.9	evaluate the leading causes of species decline and premature extinction:				
	• habitat destruction and degradation				
	• invasive species				
	• pollution				
	• human population growth				
	• over exploitation.				
S.HS.ENV.10	analyze biological diversity as it relates to the stability of an ecosystem.				
	relate habitat changes to plant and animal populations and climate influences:				
	• variations in habitat size				

S.HS.EN V.11	<ul style="list-style-type: none"> • fragmentation • fluctuation in conditions of abiotic factors • albedo • surface temperature. 				
S.HS.EN V.12	<p>compare and contrast legislation and international agreements associated with protecting habitats, ecosystems, and species:</p> <ul style="list-style-type: none"> • Superfund • Surface Mining Control and Reclamation Act • Wilderness Act • Endangered Species Act • Marine Mammals Act. 				
S.HS.EN V.13	<p>illustrate how changes in wind patterns or ocean temperatures can affect weather in different parts of the world:</p> <ul style="list-style-type: none"> • El Nino • La Nina • Santa Ana winds. 				
S.HS.EN V.14	identify natural and anthropogenic sources of primary, secondary, and indoor air pollutants and the resulting environmental and health effects.				
S.HS.EN V.15	explain the formation of acid rain and describe the resulting effect on soil, plants, water, statues, etc.				
S.HS.EN V.16	identify causes for the thinning of the ozone layer and evaluate the effectiveness of the Montreal Protocol for reducing ozone depletion.				
S.HS.EN V.17	debate climate change as it relates to natural forces, greenhouse gases, human changes in atmospheric concentrations of greenhouse gases, and relevant laws and treaties.				
S.HS.EN V.18	identify sources, uses, quality, conservation, and global distribution of water.				
S.HS.EN V.19	create models to show surface and groundwater flows in a local drainage and explain how surface and ground water are related.				
S.HS.EN V.20	contrast point source and non-point source water pollutants.				
S.HS.EN V.21	use GIS data to analyze the parameters of a watershed and interpret physical, chemical and biological data as a means of assessing environmental quality.				
S.HS.EN V.22	<p>examine legislation associated with the protection of water:</p> <ul style="list-style-type: none"> • Clean Water Act • London Dumping Convention of 1972. 				
S.HS.EN V.23	describe the processes involved and compare different methods of wastewater treatment.				
S.HS.EN V.24	<p>classify and analyze characteristics of different soil types:</p> <ul style="list-style-type: none"> • texture • pH • nitrogen • phosphorus • potassium. 				
S.HS.EN V.25	<p>analyze best management practices of the agriculture business:</p> <ul style="list-style-type: none"> • fertilizers • integrated pest management • associated water pollution • irrigation practices. 				
S.HS.EN V.26	<p>research and describe how communities have restored or protected ecosystems:</p> <ul style="list-style-type: none"> • remediation • mitigation • rehabilitation 				

	<ul style="list-style-type: none"> reclamation preservation. 				
S.HS.EN V.27	evaluate solid waste management practices:				
	<ul style="list-style-type: none"> recycling incineration sanitary landfills hazardous waste disposal. 				

HIGH SCHOOL ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE

Topic	Engineering Design				
S.HS.ETS.1	analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.				
S.HS.ETS.2	design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.				
S.HS.ETS.3	evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.				
S.HS.ETS.4	use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.				

HIGH SCHOOL SCIENCE LITERACY

Topic	Reading- Key Ideas and Details				
S.11-12.L.1	cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.				
S.11-12.L.2	determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.				
S.11-12.L.3	follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.				
Topic	Reading- Craft and Structure				
S.11-12.L.4	determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.				
S.11-12.L.5	analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.				
S.11-12.L.6	analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.				
Topic	Reading- Integration of Knowledge and Ideas				
S.11-12.L.7	integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.				
S.11-12.L.8	evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.				
S.11-12.L.9	synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.				
Topic	Reading- Range of Reading and Level of Text Complexity				
S.11-12.L.10	by the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.				
Topic	Writing- Text Types and Purposes				
	write arguments focused on <i>discipline-specific content</i> :				
	introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons and evidence.				

S.11-12.L.11	develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values and possible biases.				
	use words, phrases and clauses, as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.				
	establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.				
	provide a concluding statement or section that follows from or supports the argument presented.				
S.11-12.L.12	write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes:				
	<ul style="list-style-type: none"> introduce a topic and organize complex ideas, concepts and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures and tables), and multimedia when useful to aid comprehension. 				
	<ul style="list-style-type: none"> develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. 				
	<ul style="list-style-type: none"> use varied transitions and sentence structures to link the major sections of the text, create cohesion and clarify the relationships among complex ideas and concepts. 				
	<ul style="list-style-type: none"> use precise language, domain-specific vocabulary and techniques such as metaphor, simile and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. 				
	<ul style="list-style-type: none"> provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). 				
Topic	Writing- Production and Distribution of Writing				
S.11-12.L.13	produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.				
S.11-12.L.14	develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.				
S.11-12.L.15	use technology, including the Internet, to produce, publish and update individual or shared writing products in response to ongoing feedback, including new arguments or information.				
Topic	Writing- Research to Build and Present Knowledge				
S.11-12.L.16	conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.				
S.11-12.L.17	gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.				
S.11-12.L.18	draw evidence from informational texts to support analysis, reflection and research.				
Topic	Writing- Range of Writing				
S.11-12.L.19	write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.				