

NEXT GEN SCIENCE STANDARDS (WITH LINKED COMMON CORE)

S/E Practices

- Develop and use models based on evidence to illustrate the relationships between systems or components.
- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade-off considerations.

Core Ideas

- Definitions of Energy
- Conservation of Energy and Energy Transfer
- Relationship Between Energy and Forces
- Defining and Delimiting Engineering Problems
- Electromagnetic Radiation
- Developing Possible Solutions
- Natural Resources
- Human Impacts on Earth Systems
- Optimizing the Design Solution

Crosscutting

- Cause and Effect
- Systems and System Models
- Energy and Matter
- Influence of Science, Engineering, and Technology on Society and the Natural World

HS-PS3-3

Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

HS-PS4-5

Communicate technical information about how some technological devices used the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-ESS3-4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-ETS1-1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints that account for societal needs and wants.

HS-ETS1-2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3

Evaluated 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.

COMMON CORE

- RST.11-12.1
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- WHST.9-12.2
- WHST.9-12.7
- MP.2
- MP.4
- HSN-Q.A.1
- HSN-Q.A.2
- HSN-Q.A.3

COMMON CORE CONNECTIONS DETAILED SUMMARY

ENGLISH LANGUAGE ARTS

RST.11-12.1

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.

RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media in order to address a question or solve a problem.

RST.11-12.8

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 tasks, 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.

RST.11-12.9

Synthesize information from a range of sources into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

WHST.9-12.2

Write informative/explanatory texts, including the narration of historic events, scientific procedures/experiments, or technical processes.

WHST.9-12.7

Conduct short as well as more sustained research projects to answer a 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.

MATH

MP.2

Reason abstractly and quantitatively

MP.4

Model with mathematics

HSN-Q.A.1

Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HSN-Q.A.2;

Define appropriate quantities for the purpose of descriptive modeling.

HSN-Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

PENNSYLVANIA-SPECIFIC STANDARD CONNECTIONS

PA Science Standards

- BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances.
- 3.2.P.B4 Develop qualitative and quantitative understanding of current, voltage, resistance, and the connections among them.
- 3.2.10.B7 Formulate and revise explanations and models using logic and evidence.
- 3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.
- 3.4.10.B1 Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- 3.4.10.B2 Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
- 3.4.10.B3 Compare and contract how a number of different factors contribute to shaping the design and demand for various technologies.
- 3.4.10.C1 Apply the components of the technical design process.
- 3.4.10.C2 Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
- 3.4.10.D1 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.
- 3.4.10.D3 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.
- 3.4.10.E3 Compare and contrast the major forms of energy.
- 3.4.10.E7 Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

PA Core

- CC.3.5.9-10.A Cite specific textural evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- CC.3.5.9-10D 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.
- CC.3.5.9-10G Translated quantitative or technical information expressed in a text into visual form and translated information expressed visually or mathematically into words.
- CC.3.5.9-10H Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- CC.3.5.9-10I Compare and contrast findings presented in a text to those from other sources, noting when the findings support or contradict previous explanations or accounts.
- CC.3.6.9-10A Write arguments focused on discipline-specific content.
- CC.3.6.9-10B Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- CC.3.6.9-10F Conduct short as well as more sustained research projects to answer a question or solve a problem.
- CC.3.6.9-10G Gather relevant information from multiple authoritative sources.
- CC.3.6.9-10H Draw evidence from informational texts to support analysis, reflection, and research.
- CC.2.4.HS.B.5 Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
- CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
- CC.2.MP.1 Make sense of problems and persevere in solving them.
- CC.2.MP.2 Reason abstractly and quantitatively.
- CC.2.MP.3 Construct viable arguments and critique the reasoning of others.
- CC.2.MP.4 Model with mathematics.
- CC.2.MP.5 Use appropriate tools strategically.
- CC.2.MP.6 Attend to precision.

PENNSYLVANIA-SPECIFIC STANDARD CONNECTIONS (CONTINUED)

PA Arts and Humanities

- 9.1.12.A Know and use the elements and principles of each art form to create works.
- 9.1.12.B Recognize, know, use, and demonstrate a variety of appropriate arts elements and principles to produce, review, and revise, original works.
- 9.1.12.C Integrate and apply advanced vocabulary to the arts forms.
- 9.1.12.E Delineate a unifying theme through the production of a work of art that reflects skills in media processes and techniques.
- 9.1.12.F Analyze works or arts influences by experiences or historical and cultural events through production, performance, or exhibition.
- 9.1.12.H Incorporate the effective and safe use of materials, equipment, and tools into the production of works in the arts at work and performance spaces.
- 9.1.12.I Distinguish among a variety of regional arts events and resources and analyze methods of selection and admission.
- 9.1.12.J Analyze and evaluate the use of traditional and contemporary technologies for producing and exhibiting works in the arts or the works of others.
- 9.1.12.K Analyze and evaluate the use of traditional and contemporary technologies in furthering knowledge and understanding in the humanities.
- 9.3.12.A Explain and apply the critical examination process of works in the arts and humanities.
- 9.3.12.B Determine and apply criteria to a person's work.
- 9.3.12.D Analyze and interpret works in the arts and humanities from different societies using culturally specific vocabulary of critical response.
- 9.4.12.B Describe and analyze the effects that works have on individuals, groups, and society.
- 9.4.12.C Compare and contrast the attributes of various audiences' environments as they influence individual aesthetic response.
- 9.4.12.D Analyze and interpret a philosophical position identified in works.

PA Civics and Government

- 5.2.12.B Examine the causes of conflicts in society and evaluate techniques to address those conflicts.
- 5.2.12.D Evaluate and demonstrate what makes competent and responsible citizens.
- 5.3.12.B Compare and contrast policy-making in various contemporary governments.
- 5.3.12.C Evaluate how government agencies create, amend, and enforce regulations.
- 5.3.12.D Evaluate the roles of political parties, interest groups, and mass media in politics and public policy.
- 5.3.12.G Evaluate the impact of interest groups in developing public policy.
- 5.3.12.H Evaluate the role of mass media in setting public agenda and influencing political life.
- 5.3.12.I Evaluate tax policies of various states and countries.
- 5.3.12.J Evaluate critical issues in various contemporary governments.