

THE UNITED STATES ACADEMIC DECATHLON® AND CURRICULUM AND CONTENT STANDARDS

OVERVIEW

The United States Academic Decathlon’s curriculum is an interdisciplinary curriculum in which a selected theme is integrated across six different subject areas: art, economics, literature, music, science, and social science. Students also study mathematics and participate in essay-writing, speech, and interview events. The theme for the 2018–2019 U.S. Academic Decathlon® (USAD) curriculum is *The 1960s: A Transformational Decade*. While in most subjects the majority of the topics relate to the overall curricular theme, some topics that cover fundamentals may also be included to encourage a thorough understanding of the subject area as a whole. The USAD mathematics curriculum is unrelated to the theme and focuses on standard high school mathematics topics.

This document provides a summary of the Common Core Standards for high school Mathematics and Reading that are addressed in USAD’s 2018–2019 curriculum as well as the national content standards met by USAD’s 2018–2019 curriculum.

THE UNITED STATES ACADEMIC DECATHLON’S CURRICULUM AND THE COMMON CORE STANDARDS

Standards Background

The Common Core State Standards Initiative is a state-led effort to establish a common set of educational standards for English language arts and mathematics. The standards aim to ensure that students graduating from high school are prepared to attend college or enter the workforce. The Common Core Standards were developed by states and content experts under the guidance of governors and state education chiefs, and, as of May 2018, they have been adopted by forty-one states, the District of Columbia, four territories, and the Department of Defense Education Activity (DoDEA).

The United States Academic Decathlon® and the Common Core Standards for High School Mathematics

The Common Core High School Mathematics Standards consist of six broad categories, and USAD’s 2018–2019 mathematics curriculum addresses, at least in part, five of these six categories:

- Number and Quantity
- Algebra
- Functions
- Modeling

- Statistics and Probability

The specific standards addressed in the curriculum are:

- N-Q 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.
- A-SSE 1: Interpret expressions that represent a quantity in terms of its context.
- A-SSE 2: Use the structure of an expression to identify ways to rewrite it.
- A-SSE 4: Derive the formula for the sum of a finite geometry series (when the common ratio is not 1) and use the formula to solve problems. For example, calculate mortgage payments.
- A-APR 1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- A-APR 5: Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined, for example, by Pascal's Triangle.
- F-BF 2: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- S-ID 1: Represent data with plots on the real number line (dot plots, histograms, and box plots).
- S-ID 2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more data sets.
- S-ID 3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S-CP 2: Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
- S-CP 3: Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A , and the conditional probability of B given A is the same as the probability of B .

- S-CP 6: Find the conditional probability of A given B as the fraction of B 's outcomes that also belong to A , and interpret the answer in terms of the model.
- S-CP 7: Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
- S-CP 8: Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.
- S-CP 9: Use permutations and combinations to compute probabilities of compound events and solve problems.
- S-MD 2: Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
- S-MD 3: Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
- S-MD 5a: Find the expected payoff for a game of chance.
- S-MD 5b: Evaluate and compare strategies on the basis of expected values.

Mathematical Practice Standards Addressed

In addition to the content standards, the Common Core High School Mathematics standards emphasize eight practice standards. These standards are meant to address the manner in which students approach and reason during their learning of mathematics. USAD's 2018–19 Mathematics Curriculum addresses seven of these eight practice standards:

- *CCSS.Math.Practice.MP1: Make sense of problems and persevere in solving them*
- *CCSS.Math.Practice.MP2: Reason abstractly and quantitatively*
- *CCSS.Math.Practice.MP4: Model with mathematics*
- *CCSS.Math.Practice.MP5: Use appropriate tools strategically*
- *CCSS.Math.Practice.MP6: Attend to precision*
- *CCSS.Math.Practice.MP7: Look for and make use of structure*
- *CCSS.Math.Practice.MP8: Look for and express regularity in repeated reasoning*

The United States Academic Decathlon® and the Common Core Reading Standards for Literature

USAD’s 2018–19 literature curriculum in concert with other Academic Decathlon® subject areas addresses aspects of all ten of the Common Core College and Career Readiness Anchor Standards for Reading for students in grades K–12:

Key Ideas and Details

- *CCSS.ELA-LITERACY.CCRA.R.1: Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.*
- *CCSS.ELA-LITERACY.CCRA.R.2: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.*
- *CCSS.ELA-LITERACY.CCRA.R.3: Analyze how and why individuals, events, or ideas develop and interact over the course of a text.*

Craft and Structure

- *CCSS.ELA-LITERACY.CCRA.R.4: Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.*
- *CCSS.ELA-LITERACY.CCRA.R.5: Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.*
- *CCSS.ELA-LITERACY.CCRA.R.6: Assess how point of view or purpose shapes the content and style of a text.*

Integration of Knowledge and Ideas

- *CCSS.ELA-LITERACY.CCRA.R.7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.*
- *CCSS.ELA-LITERACY.CCRA.R.8: Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.*
- *CCSS.ELA-LITERACY.CCRA.R.9: Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.*

Range of Reading and Level of Text Complexity

- *CCSS.ELA-LITERACY.CCRA.R.10: Read and comprehend complex literary and informational texts independently and proficiently.*

USAD’s 2018–19 literature curriculum in concert with other Academic Decathlon® subject areas addresses aspects of all ten Common Core Reading Standards for Literature for students in grades 9–10.

Key Ideas and Details

- *CCSS.ELA-LITERACY.RL.9-10.1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.*
- *CCSS.ELA-LITERACY.RL.9-10.2: Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.*
- *CCSS.ELA-LITERACY.RL.9-10.3: Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.*

Craft and Structure

- *CCSS.ELA-LITERACY.RL.9-10.4: Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).*
- *CCSS.ELA-LITERACY.RL.9-10.5: Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.*
- *CCSS.ELA-LITERACY.RL.9-10.6: Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.*

Integration of Knowledge and Ideas

- *CCSS.ELA-LITERACY.RL.9-10.7: Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment.*
- *CCSS.ELA-LITERACY.RL.9-10.8 is not applicable to literature.*
- *CCSS.ELA-LITERACY.RL.9-10.9: Analyze how an author draws on and transforms source material in a specific work.*

Range of Reading and Level of Text Complexity

- *CCSS.ELA-LITERACY.RL.9-10.10: By the end of grade 9, read and comprehend literature, including stories, dramas, and poems, in the grades 9-10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 9-10 text complexity band independently and proficiently. By the end of grade 10, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 9-10 text complexity band independently and proficiently.*

USAD’s 2018–19 literature curriculum in concert with other Academic Decathlon® subject areas addresses aspects of seven Common Core Reading Standards for Literature for students in grades 11–12.

Key Ideas and Details

- *CCSS.ELA-LITERACY.RL.11-12.1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.*
- *CCSS.ELA-LITERACY.RL.11-12.2: Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.*
- *CCSS.ELA-LITERACY.RL.11-12.3: Analyze the impact of the author’s choices regarding how to develop and relate elements of a story or drama.*

Craft and Structure

- *CCSS.ELA-LITERACY.RL.11-12.4: Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful.*
- *CCSS.ELA-LITERACY.RL.11-12.5: Analyze how an author’s choices concerning how to structure specific parts of a text contribute to its overall structure and meaning as well as its aesthetic impact.*
- *CCSS.ELA-LITERACY.RL.11-12.6: Analyze a case in which grasping a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).*

Range of Reading and Level of Text Complexity

- *CCSS.ELA-LITERACY.RL.11-12.10: By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11-CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11-CCR text complexity band independently and proficiently. By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11-CCR text complexity band independently and proficiently.*

THE UNITED STATES ACADEMIC DECATHLON® CURRICULUM AND NATIONAL CONTENT STANDARDS

USAD’s 2018–2019 curriculum addresses aspects of the following:

- *All twenty of the Voluntary National Content Standards in Economics*
- *Eleven of the twelve Curriculum and Content Area Standards for English Language Arts*
- *Four of five content areas of the high school mathematics curriculum delineated by the National Council of Teachers of Mathematics (NCTM) and provides students with opportunities to utilize all four reasoning habits delineated by the NCTM*
- *Four National Core Arts Standards for Music*
- *Four National Core Arts Standards for Visual Arts*
- *Ten of twelve physical science Disciplinary Core Ideas for Grades 9–12 and six of seven Crosscutting Concepts as outlined by the Next Generation Science Standards*
- *Eight overarching curricular themes outlined by the National Council for Social Studies (NCSS), three historical eras of focus delineated by the National Content Standards for U.S. History and two historical eras of focus delineated by the National Content Standards for World History*

Economics

Standards Background

The Council for Economic Education (CEE) has outlined a set of curriculum standards based on the essential principles of economics. This document, titled Voluntary National Content Standards in Economics, includes twenty content standards, each of which were developed by a committee of economists and economic educators.

United States Academic Decathlon® and the Voluntary National Content Standards in Economics

USAD’s 2018–2019 economics curriculum addresses all twenty of the CEE’s Voluntary National Content Standards in Economics:

- STANDARD 1: Scarcity*
- STANDARD 2: Decision Making*
- STANDARD 3: Allocation*
- STANDARD 4: Incentives*
- STANDARD 5: Trade*
- STANDARD 6: Specialization*
- STANDARD 7: Markets and Prices*
- STANDARD 8: Role of Prices*
- STANDARD 9: Competition and Market Structure*
- STANDARD 10: Institutions*
- STANDARD 11: Money and Inflation*
- STANDARD 12: Interest Rates*
- STANDARD 13: Income*
- STANDARD 14: Entrepreneurship*
- STANDARD 15: Economic Growth*
- STANDARD 16: Role of Government and Market Failure*
- STANDARD 17: Government Failure*
- STANDARD 18: Economic Fluctuations*
- STANDARD 19: Unemployment and Inflation*
- STANDARD 20: Fiscal and Monetary Policy*

English Language Arts

Standards Background

The Standards for English Language Arts were developed by the International Reading Association (IRA) and the National Council of Teachers of English (NCTE). The book of standards published by the IRA and NCTE, *Standards for the English Language Arts*, presents a vision of literacy education that encompasses the use of print, oral, and visual language and addresses six interrelated English language arts: reading, writing, speaking, listening, viewing, and visually representing. *Standards for the English Language Arts* presents twelve Curriculum and Content Area Standards for English Language Arts.

United States Academic Decathlon® and the Standards for the English Language Arts

USAD’s literature curriculum in concert with USAD’s essay, speech, and interview events meets eleven of the twelve Curriculum and Content Area Standards for English Language Arts. The only standard not directly met (*STANDARD 10: students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum*) can easily be incorporated as a part of the USAD curriculum by having students use their first language as needed while preparing for the Academic Decathlon®.

USAD’s 2018–2019 literature curriculum as well as USAD’s essay, speech, and interview events address aspects of the following Curriculum and Content Area Standards for English Language Arts:

STANDARD 1: Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.

STANDARD 2: Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, and aesthetic) of human experience.

STANDARD 3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics).

STANDARD 4: Students adjust their use of spoken, written, and visual language (e.g., conventions, style, and vocabulary) to communicate effectively with a variety of audiences and for different purposes.

STANDARD 5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

STANDARD 6: Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and non-print texts.

STANDARD 7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, and people) to communicate their discoveries in ways that suit their purpose and audience.

STANDARD 8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, and video) to gather and synthesize information and to create and communicate knowledge.

STANDARD 9: Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.

STANDARD 11: Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.

STANDARD 12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Mathematics

Standards Background

In 2009, the National Council of Teachers of Mathematics (NCTM) published *Focus in High School Mathematics: Reasoning and Sense Making*, a document which proposes curricular emphases that make reasoning and sense-making foundational to high school mathematics content and teaching. *Focus in High School Mathematics: Reasoning and Sense Making* organizes reasoning habits into four broad categories:

- *Analyzing a problem*
- *Implementing a strategy*
- *Seeking and using connections*
- *Reflecting on a solution*

USAD’s 2018–2019 mathematics curriculum provides students with ample opportunities to apply all of these four reasoning habits.

In addition, *Focus in High School Mathematics* highlights reasoning opportunities in five specific content areas, and USAD’s 2018–2019 mathematics curriculum provides students with reasoning opportunities in the following four of these five content areas:

- *Reasoning with Numbers and Measurements*
- *Reasoning with Algebraic Symbols*
- *Reasoning with Functions*
- *Reasoning with Statistics and Probability*

Music and Art

Standards Background

The National Core Arts Standards were launched by the National Coalition for Core Arts Standards (NCCAS) in 2014. These standards, developed by arts educators across various fields of arts education, are organized into five disciplines: Dance, Media Arts, Music, Theatre, and Visual Arts. The standards aim to “guide the delivery of arts education in the classroom with new ways of thinking, learning, and creating. The standards also inform policy-makers about implementation of arts programs for the traditional and emerging models and structures of education.”¹

United States Academic Decathlon® and the National Core Arts Standards

The National Core Arts Standards are comprised of eleven standards, which are organized into four groupings: creating; performing/presenting/producing; responding; and connecting. USAD’s art curriculum focuses on the study of art history, art appreciation, and the analysis of artworks and is not performance based. Likewise, USAD’s music curriculum is centered on musicology (as opposed to composition or performance) and is designed to be accessible to all students, including those who cannot read musical notation and those who have no formal training in musical performance. Therefore, USAD’s curriculum addresses those standards grouped under “responding” and “connecting.” The standards not directly met by USAD’s curriculum can be incorporated as a part of USAD’s curriculum by having students create their own works of art and create and/or perform musical works in addition to studying the works of others.

USAD’s 2018–19 art and music curriculum addresses aspects of the following four National Core Arts Standards for Visual Arts and Music:

STANDARD 7: Perceive and Analyze Artistic Work

STANDARD 8: Interpret Intent and Meaning in Artistic Work

STANDARD 9: Apply Criteria to Evaluate Artistic Work

STANDARD 11: Relate Artistic Ideas and Works with Societal, Cultural, and Historical Context to Deepen Understanding

Science

Standards Background

The *Next Generation Science Standards* were developed by the National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve (an independent, bipartisan, non-profit education reform organization) and were released for adoption in the spring of 2013. Each of the Next Generation Science Standards is comprised of three dimensions: Practices, Crosscutting Concepts, and Disciplinary Core Ideas.

The focus of this document will be on the dimensions of Disciplinary Core Ideas and Crosscutting Concepts. Rather than cover a broad spectrum of topics and scientific fields of study, USAD’s science curriculum explores a specific topic in greater depth than is typical for a high school-level curriculum. As a result, the number of the *Next Generation Science Standards* that are addressed each year by USAD’s science curriculum may be limited; however, when viewed over the course of multiple years, USAD’s science curricula have met many of the standards.

United States Academic Decathlon® and the Next Generation Science Standards

The Next Generation Science Standards delineate four main domains for Disciplinary Core Ideas: earth and space science; life science; physical sciences; and engineering, technology, and applications of science. USAD’s 2018–2019 science curriculum addresses aspects of ten of twelve physical science Disciplinary Core Ideas for Grades 9–12:

- *PS1.A: Structure and Properties of Matter*
- *PS1.B: Chemical Reactions*
- *PS1.C: Nuclear Processes*
- *PS2.B: Types of Interactions*
- *PS3.A: Definitions of Energy*
- *PS3.B: Conservation of Energy and Energy Transfer*
- *PS3.D: Energy in Chemical Processes*
- *PS4.A: Wave Properties*
- *PS4.B: Electromagnetic Radiation*
- *PS4.C: Information Technologies and Instrumentation*

The Next Generation Science Standards identify “seven crosscutting concepts that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering.”ⁱⁱ USAD’s 2018–2019 science curriculum addresses aspects of the following six crosscutting concepts:

- *Patterns*
- *Cause and Effect: Mechanism and Explanation*
- *Systems and System Models*
- *Energy and Matter: Flows, Cycles, Conservation*
- *Structure and Function*
- *Stability and Change*

Social Science

Standards Background

The Curriculum Standards for Social Studies were developed by a Task Force of the National Council for the Social Studies (NCSS) and approved by the NCSS Board of Directors in April 1994 and revised in 2010. The NCSS standards focus on ten overarching themes, and the content standards include aspects of several different fields of study, including civics, geography, U.S. history, and world history.

The United States Academic Decathlon® and the Curriculum Standards for Social Studies

Rather than cover a broad spectrum of topics, time periods, and cultures, USAD’s social science curriculum explores a specific topic in greater depth than is typical for a high school-level curriculum. As a result, the number of the NCSS standards that are addressed each year by USAD’s social science curriculum may be limited; however, when viewed over the course of multiple years, USAD’s social science curricula have met many of the NCSS standards.

USAD’s 2018–2019 curriculum (social science, economics, literature, and science) addresses aspects of eight of the ten NCSS curricular themes:

- *Culture*
- *Time, Continuity, and Change*
- *Individual Development and Identity*
- *Individuals, Groups, and Institutions*
- *Power, Authority, and Governance*
- *Production, Distribution, and Consumption*
- *Science, Technology, and Society*
- *Global Connections*

USAD’s 2018–2019 social science curriculum addresses aspects of the standards within the following eras of focus delineated by the NCSS standards for United States History and World History for Grades 5–12:

- *U.S. HISTORY: NSS-USH.5.12.8 – Era 8: The Great Depression and World War II (1929–1945)*
- *U.S. HISTORY: NSS-USH.5.12.9 – Era 9: Postwar United States (1945 to early 1970s)*
- *U.S. HISTORY: NSS-USH.5.12.10 – Era 10: Contemporary United States (1968 to the present)*
- *WORLD HISTORY: NSS-WH.5-12.8 – Era 8: A Half-Century of Crisis and Achievement, 1900–1945*
- *WORLD HISTORY: NSS-WH.5-12.9 – ERA 9: The Twentieth Century Since 1945: Promises and Paradoxes*

Source List

Common Core State Standards Initiative. 31 May 2018 <<http://www.corestandards.org/>>.

“Focus in High School Mathematics: Reasoning and Sense Making.” National Council of Teachers of Mathematics. 31 May 2018 <<http://www.nctm.org/Standards-and-Positions/Principles-and-Standards/>>.

“K–12 Standards.” National Council on Economic Education. 31 May 2018 <<http://councilforeconed.org/resource/voluntary-national-content-standards-in-economics/>>.

“National Core Arts Standards.” National Coalition for Core Arts Standard. 31 May 2018 <<http://www.nationalartsstandards.org/>>.

“National Curriculum Standards for Social Studies.” National Council for the Social Studies. 31 May 2018 <<https://www.socialstudies.org/standards>>.

“Next Generation Science Standards: For States, By States.” 31 May 2018 <<http://www.nextgenscience.org/>>.

“Standards for the English Language Arts.” The National Council of Teachers of English. 31 May 2018 <<http://www.ncte.org/standards/ncte-ira> >.

ⁱ “National Core Arts Standards: A Conceptual Framework for Arts Learning,” National Coalition for Core Arts Standards, accessed 31 May 2018,

http://www.nationalartsstandards.org/sites/default/files/NCCAS%20%20Conceptual%20Framework_4.pdf.

ⁱⁱ “Appendix G: Crosscutting Concepts,” Next Generation Science Standards, accessed 31 May 2018,

<http://www.nextgenscience.org/sites/default/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf>.