

# Southern York County School District Instructional Plan

**Course/Subject: Science in Literature**

**Grade Level: 11 and 12**

**Textbook(s)/Instructional Materials/Novels Used:**

*The Immortal Life of Henrietta Lacks*, ISBN: 978-1400052189, Copyright 2011

*The Martian*, ISBN: 978-0804189354, Copyright 2016

*Copenhagen*, ISBN: 978-0385720793, Copyright 1998

*Silent Spring*, ISBN: 978-0618249060, Copyright 1990

**Dates:** August - September

**Unit Plan:** The Immortal Life of Henrietta Lacks

## Stage 1 – Desired Results

**PA Standards Addressed: Science Standards**

3.3.12B - Describe potential impact of genome research on the biochemistry and physiology of life.

3.3.10B - Identify the specialized structures and regions of the cell and the functions of each.

3.3.12A - Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level.

3.3.12C - Describe genetic engineering techniques, applications and impacts.

3.6.12A - Analyze specific examples where engineering has impacted society in protection, personal health application or physical enhancement.

3.6.12C - Apply advanced information collection and communication techniques to successfully convey solutions to specific construction problems.

3.8.12A - Compare and contrast how scientific and technological knowledge is both shared and protected

3.8.12A - Evaluate technological developments that have changed the way humans do work and discuss their impacts (e.g., genetically engineered crops).

3.8.12B - Use knowledge of human abilities to design or modify technologies that extend and enhance human

3.8.12C - Analyze scientific and technological solutions through the use of risk/benefit analysis.

3.8.12C - Analyze and communicate the positive or negative impacts that a recent technological invention had on society.

**PA Standards Addressed: English Standards**

**CC.1.2.11-12.A**

**Key Ideas and Details – Main Idea**

**Determine and analyze the relationship between two or more central ideas of a text, including the development and interaction of the central ideas; provide an objective summary of the text.**

**CC.1.2.11-12.B**

**Key Ideas and Details**

**Text Analysis**

**Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as inferences and conclusions based on and related to an author’s implicit and explicit assumptions and beliefs.**

**CC.1.2.11-12.C**

**Key Ideas and Details Text Analysis**

**Analyze the interaction and development of a complex set of ideas, sequence of events, or specific individuals over the course of a text.**

**CC.1.2.11-12.D**

**Craft and Structure**

**Point of View**

**Evaluate how an author’s point of view or purpose shapes the context and style of a text.**

**CC.1.2.11-12.E**

**Craft and Structure**

**Text Structure**

Analyze and evaluate the effectiveness of the structure an author uses in his/her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

**CC.1.2.11-12.F**

**Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.2.11-12.G**

**Integration of Knowledge and Ideas**

**Diverse Media**

Integrate and evaluate multiple sources of information presented in different medias or formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

**CC.1.2.11-12.H**

**Integration of Knowledge and Ideas**

**Evaluating Arguments**

Analyze seminal texts based upon reasoning, premises, purposes, and arguments.

**CC.1.2.11-12.I**

**Integration of Knowledge and Ideas**

**Analysis Across Text**

Analyze foundational US and World documents of historical, political, and literary significance for their themes, purposes, and rhetorical features.

**CC.1.2.11-12.J**

**Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college-career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.2.11-12.K**

**Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.A**

**Key Ideas and Details Theme**

Determine and analyze the relationship between two or more themes or central ideas of a text, including the development and interaction of themes; provide an objective summary of the text.

**CC.1.3.11-12.B**

**Key Ideas and Details**

**Text Analysis**

Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as the inferences and conclusions based on and related to an author's implicit and explicit assumptions and beliefs.

**CC.1.3.11-12.C**

**Key Ideas and Details**

**Literary Elements**

Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.

**CC.1.3.11-12.D**

**Craft and Structure**

**Point of View**

Evaluate how an author's point of view or purpose shapes the content and style of a text.

**CC.1.3.11-12.E**

**Craft and Structure**

**Text Structure**

Evaluate the structure of texts including how specific sentences, paragraphs, and larger portions of texts relate to each other and the whole.

**CC.1.3.11-12.F**

**Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.3.11-12.I**

**Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple meaning words and phrases based on grade level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.J**

**Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college – and career –readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.4.11-12.A**

**Informative/ Explanatory**

Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.

**CC.1.4.11-12.B**

**Informative/ Explanatory focus**

Write with sharp, distinct focus identifying topic, task, and audience.

**CC.1.4.11-12.C**

**Informative/ Explanatory Content**

Develop and analyze a topic thoroughly by selecting the most significant and relevant facts, extend the definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic; include graphics and multimedia when useful to aiding comprehension.

**CC.1.4.11-12.D**

**Informative/ Explanatory Organization**

Organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a whole; use appropriate and varied transitions and syntax to length the major sections of the text; provide a concluding statement or section that supports the information presented; include formatting when useful to aiding comprehension.

**CC.1.4.11-12.E**

**Informative/ Explanatory Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain – specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.F**

**Informative/ Explanatory Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.G**

**Opinion/ Argumentative**

Write arguments to support claims in an analysis of substantive topics.

**CC.1.4.11-12.H**

**Opinion/ Argumentative Focus**

Write with a sharp, distinct focus identifying the topic, task, and audience. Introduce the precise, knowledgeable claim.

**CC.1.4.11-12.I**

**Opinion/ Argumentative**

**Content**

Distinguish the claim (s) from alternate or opposing claims; develop claim (s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

**CC.1.4.11-12.J****Opinion /Argumentative Organization**

Create organization that logically sequences claim(s), counterclaims, reasons, and evidence; use words, phrases, and clauses as well as varied syntax to link the major sections of the text to create cohesion and clarify they relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims; provide a concluding statement or section that follows from and supports the argument presented.

**CC.1.4.11-12.K****Opinion/ Argumentative Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.L****Opinion/ Argumentative Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.S****Responses to Literature**

Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.

**CC.1.4.11-12.T****Production and Distribution of Writing / Writing Process**

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.

**CC.1.4.11-12.V****Conducting Research**

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 an understanding of the subject under investigation.

**CC.1.4.11-12.W****Credibility, Reliability, and Validity of Sources**

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 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.

**CC.1.4.11-12.X****Range of Writing**

Write routinely over extended time frames (time for research, 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.

**CC.1.5.11-12.A****Comprehension and Collaboration****Collaboration Discussion**

Initiate and participate effectively in a range of collaborative discussions on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**CC.1.5.11-12.B****Comprehension and Collaboration****Critical Listening**

Evaluate how the speaker’s perspective, reasoning, and use of evidence and rhetoric affect the credibility of an argument through the author’s stance, premises, links among ideas, word choice, points of emphasis, and tone.

**CC.1.5.11-12.C**

**Comprehension and Collaboration**

**Evaluating Information**

Integrate multiple sources of information presented in diverse formats and media (visually, quantitative, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

**CC.1.5.11-12.D**

**Presentation of Knowledge and Ideas**

**Purpose, Audience and Task**

Present information, findings, and supporting evidence, conveying a clear and distinct perspective; organization, development, substance, and style are appropriate to purpose, audience, and task.

**CC.1.5.11-12.E**

**Presentation of Knowledge and Ideas**

**Context**

Adapt speech to a variety of contexts and tasks.

**CC.1.5.11-12.F**

**Integration of Knowledge and Ideas**

**Multimedia**

Make strategic use of digital media in presentations to add interest and enhance understandings of findings, reasoning, and evidence.

**CC.1.5.11-12.G**

**Conventions of Standard English**

Demonstrate the command of the conventions of standard English when speaking based on grades 11-12 level and content.

**Understanding(s):**

*Students will understand . . .*

- HeLa cells harvested from Henrietta Lacks formed the foundation of modern cancer research.
- Greater good vs individual good
- Ethical dilemmas often do not have an “easy” solution.
- Racial tensions of the 1950’s influenced the care and ethical treatment of patients throughout the country.
- How narratives can develop empathy for both humans and their cells.
- The role that eugenics and forced sterilization played in 1930’s America.

**Essential Question(s):**

- How do scientific understanding and storytelling come together to change the way society views the world?
- How can we approach and understand ethical dilemmas?
- How do the different theories of ethics apply to different scientific case studies?
- How are research and narrative writing used in creative nonfiction science writing?

**Learning Objectives:**

*Students will know . . .*

- The process by which cancer develops and grows.
- Ethical dilemmas
- How HeLa cells were instrumental in the development of the polio vaccine.

*Students will be able to:*

- Develop an individual “code of ethics”
- Develop an understanding of how modern science changed as a result of the study of HeLa cells.

<ul style="list-style-type: none"> <li>▪ How the harvesting of HeLa cells has altered the way modern medicine is practiced.</li> <li>▪ The changing views of cell biology as a result of investigations and research throughout history.</li> <li>▪ The process by which genetic information is transferred.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Develop an understanding of how the Lacks family changed as a result of the study of HeLa cells.</li> </ul>
---	--

**Dates:** September - October

**Unit Plan:** The Martian

**Stage 1 – Desired Results**

**PA Standards Addressed: Science Standards**

- 3.4.12A - Classify and describe, in equation form, types of chemical and nuclear reactions.
- 3.4.12A - Explain how radioactive isotopes that are subject to decay can be used to estimate the age of materials.
- 3.4.12A - Apply the conservation of energy concept to fields as diverse as mechanics, nuclear particles and studies of the origin of the universe.
- 3.4.12C - Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.
- 3.4.12C - Describe inertia, motion, equilibrium, and action/reaction concepts through words, models and mathematical symbols.
- 3.6.12A - Analyze specific examples where engineering has impacted society in protection, personal health application or physical enhancement.
- 3.6.12C - Apply advanced information collection and communication techniques to successfully convey solutions to specific construction problems.
- 3.8.12A - Compare and contrast how scientific and technological knowledge is both shared and protected
- 3.8.12A - Evaluate technological developments that have changed the way humans do work and discuss their impacts (e.g., genetically engineered crops).
- 3.8.12B - Use knowledge of human abilities to design or modify technologies that extend and enhance human
- 3.8.12C - Analyze scientific and technological solutions through the use of risk/benefit analysis.
- 3.8.12C - Analyze and communicate the positive or negative impacts that a recent technological invention had on society.

**PA Standards Addressed: English Standards**

**CC.1.2.11-12.A**

**Key Ideas and Details – Main Idea**

**Determine and analyze the relationship between two or more central ideas of a text, including the development and interaction of the central ideas; provide an objective summary of the text.**

**CC.1.2.11-12.B**

**Key Ideas and Details**

**Text Analysis**

**Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as inferences and conclusions based on and related to an author’s implicit and explicit assumptions and beliefs.**

**CC.1.2.11-12.C**

**Key Ideas and Details Text Analysis**

**Analyze the interaction and development of a complex set of ideas, sequence of events, or specific individuals over the course of a text.**

**CC.1.2.11-12.D**

**Craft and Structure**

**Point of View**

**Evaluate how an author’s point of view or purpose shapes the context and style of a text.**

**CC.1.2.11-12.E**

**Craft and Structure**

**Text Structure**

Analyze and evaluate the effectiveness of the structure an author uses in his/her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

**CC.1.2.11-12.F**

**Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.2.11-12.G**

**Integration of Knowledge and Ideas**

**Diverse Media**

Integrate and evaluate multiple sources of information presented in different medias or formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

**CC.1.2.11-12.H**

**Integration of Knowledge and Ideas**

**Evaluating Arguments**

Analyze seminal texts based upon reasoning, premises, purposes, and arguments.

**CC.1.2.11-12.I**

**Integration of Knowledge and Ideas**

**Analysis Across Text**

Analyze foundational US and World documents of historical, political, and literary significance for their themes, purposes, and rhetorical features.

**CC.1.2.11-12.J**

**Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college-career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.2.11-12.K**

**Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.A**

**Key Ideas and Details Theme**

Determine and analyze the relationship between two or more themes or central ideas of a text, including the development and interaction of themes; provide an objective summary of the text.

**CC.1.3.11-12.B**

**Key Ideas and Details**

**Text Analysis**

Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as the inferences and conclusions based on and related to an author's implicit and explicit assumptions and beliefs.

**CC.1.3.11-12.C**

**Key Ideas and Details**

**Literary Elements**

Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.

**CC.1.3.11-12.D**

**Craft and Structure**

**Point of View**

Evaluate how an author's point of view or purpose shapes the content and style of a text.

**CC.1.3.11-12.E**

## **Craft and Structure**

### **Text Structure**

Evaluate the structure of texts including how specific sentences, paragraphs, and larger portions of texts relate to each other and the whole.

#### **CC.1.3.11-12.F**

##### **Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

#### **CC.1.3.11-12.I**

##### **Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple meaning words and phrases based on grade level reading and content, choosing flexibility from a range of strategies and tools.

#### **CC.1.3.11-12.J**

##### **Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college – and career –readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

#### **CC.1.4.11-12.A**

##### **Informative/ Explanatory**

Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.

#### **CC.1.4.11-12.B**

##### **Informative/ Explanatory focus**

Write with sharp, distinct focus identifying topic, task, and audience.

#### **CC.1.4.11-12.C**

##### **Informative/ Explanatory Content**

Develop and analyze a topic thoroughly by selecting the most significant and relevant facts, extend the definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic; include graphics and multimedia when useful to aiding comprehension.

#### **CC.1.4.11-12.D**

##### **Informative/ Explanatory Organization**

Organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a whole; use appropriate and varied transitions and syntax to length the major sections of the text; provide a concluding statement or section that supports the information presented; include formatting when useful to aiding comprehension.

#### **CC.1.4.11-12.E**

##### **Informative/ Explanatory Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain – specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

#### **CC.1.4.11-12.F**

##### **Informative/ Explanatory Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

#### **CC.1.4.11-12.G**

##### **Opinion/ Argumentative**

Write arguments to support claims in an analysis of substantive topics.

#### **CC.1.4.11-12.H**

##### **Opinion/ Argumentative Focus**

Write with a sharp, distinct focus identifying the topic, task, and audience. Introduce the precise, knowledgeable claim.



**CC.1.4.11-12.I**

**Opinion/ Argumentative  
Content**

Distinguish the claim (s) from alternate or opposing claims; develop claim (s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

**CC.1.4.11-12.J**

**Opinion /Argumentative Organization**

Create organization that logically sequences claim(s), counterclaims, reasons, and evidence; use words, phrases, and clauses as well as varied syntax to link the major sections of the text to create cohesion and clarify they relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims; provide a concluding statement or section that follows from and supports the argument presented.

**CC.1.4.11-12.K**

**Opinion/ Argumentative Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.L**

**Opinion/ Argumentative Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.S**

**Responses to Literature**

Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.

**CC.1.4.11-12.T**

**Production and Distribution of Writing / Writing Process**

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.

**CC.1.4.11-12.V**

**Conducting Research**

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 an understanding of the subject under investigation.

**CC.1.4.11-12.W**

**Credibility, Reliability, and Validity of Sources**

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 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.

**CC.1.4.11-12.X**

**Range of Writing**

Write routinely over extended time frames (time for research, 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.

**CC.1.5.11-12.A**

**Comprehension and Collaboration**

**Collaboration Discussion**

Initiate and participate effectively in a range of collaborative discussions on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**CC.1.5.11-12.B**

**Comprehension and Collaboration**

**Critical Listening**

Evaluate how the speaker's perspective, reasoning, and use of evidence and rhetoric affect the credibility of an argument through the author's stance, premises, links among ideas, word choice, points of emphasis, and tone.

**CC.1.5.11-12.C**

**Comprehension and Collaboration**

**Evaluating Information**

Integrate multiple sources of information presented in diverse formats and media (visually, quantitative, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

**CC.1.5.11-12.D**

**Presentation of Knowledge and Ideas**

**Purpose, Audience and Task**

Present information, findings, and supporting evidence, conveying a clear and distinct perspective; organization, development, substance, and style are appropriate to purpose, audience, and task.

**CC.1.5.11-12.E**

**Presentation of Knowledge and Ideas**

**Context**

Adapt speech to a variety of contexts and tasks.

**CC.1.5.11-12.F**

**Integration of Knowledge and Ideas**

**Multimedia**

Make strategic use of digital media in presentations to add interest and enhance understandings of findings, reasoning, and evidence.

**CC.1.5.11-12.G**

**Conventions of Standard English**

Demonstrate the command of the conventions of standard English when speaking based on grades 11-12 level and content.

**Understanding(s):**

*Students will understand . . .*

- As humans, our greatest antagonist is often the world that surrounds us.
- How knowledge of STEM fields is applicable beyond the classroom.
- The difficulties, intricacies, and limitations of manned space travel.
- The importance of socialization to mental health and well being.
- The importance of focused, precise diction in formal and informal communications.
- The various chemical reactions that play an important role in space exploration and colonization.

**Essential Question(s):**

- How do scientific understanding and storytelling come together to change the way society views the world?
- How can STEM knowledge lend authenticity to fictional texts?
- How can realistic science fiction help us to better understand our current world?
- How can social isolation alter the personality of an individual?
- How can an author's use of tone and diction help to craft authentic fictional characters?
- How are conservation of momentum and mechanical energy applicable to space flight?

**Learning Objectives:**

*Students will know . . .*

- The barriers facing manned space travel
- How to write using a technical style of writing.
- The importance of taking accurate, detailed notes

*Students will be able to:*

- Use STEM knowledge to better understand the barriers facing manned space travel.
- Convey complex ideas and instructions using a focused, detailed style.

- The importance of STEM education in manned space flight
- Use science and rhetoric to make logical, compelling arguments.
- Use textual evidence to explore the physics of space travel
- Use textual evidence to explore the chemistry of space evidence
- Use textual evidence to explore the biology of space colonization
- Use textual evidence to explore the engineering of space flight
- Develop an argument in a simulated court case using scientific language and civil discourse.

**Dates:** November - December

**Unit Plan:** Copenhagen

### Stage 1 – Desired Results

**PA Standards Addressed: Science Standards**

- 3.4.12A - Classify and describe, in equation form, types of chemical and nuclear reactions.
- 3.4.12A - Apply the predictability of nuclear decay to estimate the age of materials that contain radioactive isotopes.
- 3.6.12A - Analyze specific examples where engineering has impacted society in protection, personal health application or physical enhancement.
- 3.6.12C - Apply advanced information collection and communication techniques to successfully convey solutions to specific construction problems.
- 3.8.10A - Compare technologies that are applied and accepted differently in various cultures
- 3.8.10A - Describe and evaluate social change as a result of technological developments.
- 3.8.10C - Compare and contrast potential solutions to technological, social, economic and environmental problems
- 3.8.10C - Analyze the impacts on society of accepting or rejecting scientific and technological advances.
- 3.8.12A - Compare and contrast how scientific and technological knowledge is both shared and protected
- 3.8.12A - Evaluate technological developments that have changed the way humans do work and discuss their impacts (e.g., genetically engineered crops).
- 3.8.12B - Use knowledge of human abilities to design or modify technologies that extend and enhance human
- 3.8.12C - Analyze scientific and technological solutions through the use of risk/benefit analysis.
- 3.8.12C - Analyze and communicate the positive or negative impacts that a recent technological invention had on society.

**PA Standards Addressed: English Standards**

**CC.1.2.11-12.A**

**Key Ideas and Details – Main Idea**

**Determine and analyze the relationship between two or more central ideas of a text, including the development and interaction of the central ideas; provide an objective summary of the text.**

**CC.1.2.11-12.B**

**Key Ideas and Details**

**Text Analysis**

**Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as inferences and conclusions based on and related to an author’s implicit and explicit assumptions and beliefs.**

**CC.1.2.11-12.C**

**Key Ideas and Details Text Analysis**

**Analyze the interaction and development of a complex set of ideas, sequence of events, or specific individuals over the course of a text.**

**CC.1.2.11-12.D**

**Craft and Structure**

**Point of View**

**Evaluate how an author's point of view or purpose shapes the context and style of a text.**

**CC.1.2.11-12.E**

**Craft and Structure**

**Text Structure**

**Analyze and evaluate the effectiveness of the structure an author uses in his/her exposition or argument, including whether the structure makes points clear, convincing, and engaging.**

**CC.1.2.11-12.F**

**Craft and Structure Vocabulary**

**Evaluate how words and phrases shape meaning and tone in texts.**

**CC.1.2.11-12.G**

**Integration of Knowledge and Ideas**

**Diverse Media**

**Integrate and evaluate multiple sources of information presented in different medias or formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.**

**CC.1.2.11-12.H**

**Integration of Knowledge and Ideas**

**Evaluating Arguments**

**Analyze seminal texts based upon reasoning, premises, purposes, and arguments.**

**CC.1.2.11-12.I**

**Integration of Knowledge and Ideas**

**Analysis Across Text**

**Analyze foundational US and World documents of historical, political, and literary significance for their themes, purposes, and rhetorical features.**

**CC.1.2.11-12.J**

**Vocabulary Acquisition and Use**

**Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college-career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.**

**CC.1.2.11-12.K**

**Vocabulary Acquisition and Use**

**Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibility from a range of strategies and tools.**

**CC.1.3.11-12.A**

**Key Ideas and Details Theme**

**Determine and analyze the relationship between two or more themes or central ideas of a text, including the development and interaction of themes; provide an objective summary of the text.**

**CC.1.3.11-12.B**

**Key Ideas and Details**

**Text Analysis**

**Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as the inferences and conclusions based on and related to an author's implicit and explicit assumptions and beliefs.**

**CC.1.3.11-12.C**

**Key Ideas and Details**

**Literary Elements**

**Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.**

**CC.1.3.11-12.D**

**Craft and Structure**

**Point of View**

Evaluate how an author's point of view or purpose shapes the content and style of a text.

**CC.1.3.11-12.E**

**Craft and Structure**

**Text Structure**

Evaluate the structure of texts including how specific sentences, paragraphs, and larger portions of texts relate to each other and the whole.

**CC.1.3.11-12.F**

**Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.3.11-12.I**

**Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple meaning words and phrases based on grade level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.J**

**Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college – and career –readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.4.11-12.A**

**Informative/ Explanatory**

Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.

**CC.1.4.11-12.B**

**Informative/ Explanatory focus**

Write with sharp, distinct focus identifying topic, task, and audience.

**CC.1.4.11-12.C**

**Informative/ Explanatory Content**

Develop and analyze a topic thoroughly by selecting the most significant and relevant facts, extend the definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic; include graphics and multimedia when useful to aiding comprehension.

**CC.1.4.11-12.D**

**Informative/ Explanatory Organization**

Organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a whole; use appropriate and varied transitions and syntax to length the major sections of the text; provide a concluding statement or section that supports the information presented; include formatting when useful to aiding comprehension.

**CC.1.4.11-12.E**

**Informative/ Explanatory Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain – specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.F**

**Informative/ Explanatory Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.G**

**Opinion/ Argumentative**

**Write arguments to support claims in an analysis of substantive topics.**

**CC.1.4.11-12.H**

**Opinion/ Argumentative Focus**

Write with a sharp, distinct focus identifying the topic, task, and audience. Introduce the precise, knowledgeable claim.

**CC.1.4.11-12.I**

**Opinion/ Argumentative Content**

Distinguish the claim (s) from alternate or opposing claims; develop claim (s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

**CC.1.4.11-12.J**

**Opinion /Argumentative Organization**

Create organization that logically sequences claim(s), counterclaims, reasons, and evidence; use words, phrases, and clauses as well as varied syntax to link the major sections of the text to create cohesion and clarify they relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims; provide a concluding statement or section that follows from and supports the argument presented.

**CC.1.4.11-12.K**

**Opinion/ Argumentative Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.L**

**Opinion/ Argumentative Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.S**

**Responses to Literature**

Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.

**CC.1.4.11-12.T**

**Production and Distribution of Writing / Writing Process**

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.

**CC.1.4.11-12.V**

**Conducting Research**

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 an understanding of the subject under investigation.

**CC.1.4.11-12.W**

**Credibility, Reliability, and Validity of Sources**

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 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.

**CC.1.4.11-12.X**

**Range of Writing**

Write routinely over extended time frames (time for research, 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.

**CC.1.5.11-12.A**

**Comprehension and Collaboration**

**Collaboration Discussion**

Initiate and participate effectively in a range of collaborative discussions on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**CC.1.5.11-12.B**

**Comprehension and Collaboration**

**Critical Listening**

Evaluate how the speaker's perspective, reasoning, and use of evidence and rhetoric affect the credibility of an argument through the author's stance, premises, links among ideas, word choice, points of emphasis, and tone.

**CC.1.5.11-12.C**

**Comprehension and Collaboration**

**Evaluating Information**

Integrate multiple sources of information presented in diverse formats and media (visually, quantitative, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

**CC.1.5.11-12.D**

**Presentation of Knowledge and Ideas**

**Purpose, Audience and Task**

Present information, findings, and supporting evidence, conveying a clear and distinct perspective; organization, development, substance, and style are appropriate to purpose, audience, and task.

**CC.1.5.11-12.E**

**Presentation of Knowledge and Ideas**

**Context**

Adapt speech to a variety of contexts and tasks.

**CC.1.5.11-12.F**

**Integration of Knowledge and Ideas**

**Multimedia**

Make strategic use of digital media in presentations to add interest and enhance understandings of findings, reasoning, and evidence.

**CC.1.5.11-12.G**

**Conventions of Standard English**

Demonstrate the command of the conventions of standard English when speaking based on grades 11-12 level and content.

**Understanding(s):**

*Students will understand . . .*

- The importance of using drama as a means of conveying important historical developments.
- The roles that Niels Bohr and Werner Heisenberg played in global history and scientific advancement.
- The ethical dilemma centered on the exploitation of atomic energy.
- The role of the protagonists in the development of both modern atomic theory and atomic weapons.

**Essential Question(s):**

- How do scientific understanding and storytelling come together to change the way society views the world?
- How can the use of drama help people to learn more about science and history?
- How can we use primary documents to help us determine the objective truth about historical events?
- How can we approach and understand ethical dilemmas?
- How are research and narrative writing used in historical fiction writing?

**Learning Objectives:**

**Students will know . . .**

- The main components of a nuclear reactor.
- The significance of geography (Heligoland, Tisvilde, Prinz-Albrecht-Strasse, Elsinore) as it pertains to the themes of the play
- The importance of setting and stage directions for establishing the mood of a play.
- The importance of “uncertainty” in quantum theory and in the lives of the protagonists.

**Students will be able to:**

- Articulate their thoughts and research in both written and oral formats.
- Discuss and put in context the various thought experiments discussed in the play (Schrodinger’s Cat, Quantum Theory, Uncertainty, etc.)
- Understand the role that chain reactions play in both a nuclear reaction and in the lives of the protagonists of the play.

**Dates:** January/February/March/April/May**Unit Plan:** Silent Spring**Stage 1 – Desired Results****PA Standards Addressed: Science Standards**

3.6.12A - Analyze specific examples where engineering has impacted society in protection, personal health application or physical enhancement.

3.6.12C - Apply advanced information collection and communication techniques to successfully convey solutions to specific construction problems.

3.8.10A - Identify past and current tradeoffs between increased production, environmental harm and social values

3.8.10A - Compare technologies that are applied and accepted differently in various cultures

3.8.10A - Describe and evaluate social change as a result of technological developments.

3.8.10A - Assess the social impacts of a specific international environmental problem by designing a solution that applies the appropriate technologies and resources.

3.8.10C - Compare and contrast potential solutions to technological, social, economic and environmental problems

3.8.10C - Analyze the impacts on society of accepting or rejecting scientific and technological advances.

3.8.12A - Compare and contrast how scientific and technological knowledge is both shared and protected

3.8.12A - Evaluate technological developments that have changed the way humans do work and discuss their impacts (e.g., genetically engineered crops).

3.8.12B - Use knowledge of human abilities to design or modify technologies that extend and enhance human

3.8.12C - Analyze scientific and technological solutions through the use of risk/benefit analysis.

3.8.12C - Analyze and communicate the positive or negative impacts that a recent technological invention had on society.

**PA Standards Addressed: English Standards****CC.1.2.11-12.A****Key Ideas and Details – Main Idea**

**Determine and analyze the relationship between two or more central ideas of a text, including the development and interaction of the central ideas; provide an objective summary of the text.**

**CC.1.2.11-12.B****Key Ideas and Details****Text Analysis**

**Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as inferences and conclusions based on and related to an author’s implicit and explicit assumptions and beliefs.**

**CC.1.2.11-12.C****Key Ideas and Details Text Analysis**

**Analyze the interaction and development of a complex set of ideas, sequence of events, or specific individuals over the course of a text.**



**CC.1.2.11-12.D**

**Craft and Structure**

**Point of View**

Evaluate how an author's point of view or purpose shapes the context and style of a text.

**CC.1.2.11-12.E**

**Craft and Structure**

**Text Structure**

Analyze and evaluate the effectiveness of the structure an author uses in his/her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

**CC.1.2.11-12.F**

**Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.2.11-12.G**

**Integration of Knowledge and Ideas**

**Diverse Media**

Integrate and evaluate multiple sources of information presented in different medias or formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

**CC.1.2.11-12.H**

**Integration of Knowledge and Ideas**

**Evaluating Arguments**

Analyze seminal texts based upon reasoning, premises, purposes, and arguments.

**CC.1.2.11-12.I**

**Integration of Knowledge and Ideas**

**Analysis Across Text**

Analyze foundational US and World documents of historical, political, and literary significance for their themes, purposes, and rhetorical features.

**CC.1.2.11-12.J**

**Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college-career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.2.11-12.K**

**Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.A**

**Key Ideas and Details Theme**

Determine and analyze the relationship between two or more themes or central ideas of a text, including the development and interaction of themes; provide an objective summary of the text.

**CC.1.3.11-12.B**

**Key Ideas and Details**

**Text Analysis**

Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as the inferences and conclusions based on and related to an author's implicit and explicit assumptions and beliefs.

**CC.1.3.11-12.D**

**Craft and Structure**

**Point of View**

Evaluate how an author's point of view or purpose shapes the content and style of a text.

**CC.1.3.11-12.E**

**Craft and Structure**

**Text Structure**

Evaluate the structure of texts including how specific sentences, paragraphs, and larger portions of texts relate to each other and the whole.

**CC.1.3.11-12.F****Craft and Structure Vocabulary**

Evaluate how words and phrases shape meaning and tone in texts.

**CC.1.3.11-12.I****Vocabulary Acquisition and Use**

Determine or clarify the meaning of unknown and multiple meaning words and phrases based on grade level reading and content, choosing flexibility from a range of strategies and tools.

**CC.1.3.11-12.J****Vocabulary Acquisition and Use**

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college – and career –readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

**CC.1.4.11-12.A****Informative/ Explanatory**

Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.

**CC.1.4.11-12.B****Informative/ Explanatory focus**

Write with sharp, distinct focus identifying topic, task, and audience.

**CC.1.4.11-12.C****Informative/ Explanatory Content**

Develop and analyze a topic thoroughly by selecting the most significant and relevant facts, extend the definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic; include graphics and multimedia when useful to aiding comprehension.

**CC.1.4.11-12.D****Informative/ Explanatory Organization**

Organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a whole; use appropriate and varied transitions and syntax to length the major sections of the text; provide a concluding statement or section that supports the information presented; include formatting when useful to aiding comprehension.

**CC.1.4.11-12.E****Informative/ Explanatory Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain – specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.F****Informative/ Explanatory Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.G****Opinion/ Argumentative**

Write arguments to support claims in an analysis of substantive topics.

**CC.1.4.11-12.H****Opinion/ Argumentative Focus**

Write with a sharp, distinct focus identifying the topic, task, and audience. Introduce the precise, knowledgeable claim.

**CC.1.4.11-12.I**

**Opinion/ Argumentative Content**

Distinguish the claim (s) from alternate or opposing claims; develop claim (s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

**CC.1.4.11-12.J**

**Opinion /Argumentative Organization**

Create organization that logically sequences claim(s), counterclaims, reasons, and evidence; use words, phrases, and clauses as well as varied syntax to link the major sections of the text to create cohesion and clarify they relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims; provide a concluding statement or section that follows from and supports the argument presented.

**CC.1.4.11-12.K**

**Opinion/ Argumentative Style**

Write with an awareness of the stylistic aspects of composition. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.

**CC.1.4.11-12.L**

**Opinion/ Argumentative Conventions of Language**

Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

**CC.1.4.11-12.S**

**Responses to Literature**

Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.

**CC.1.4.11-12.T**

**Production and Distribution of Writing / Writing Process**

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.

**CC.1.4.11-12.V**

**Conducting Research**

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 an understanding of the subject under investigation.

**CC.1.4.11-12.W**

**Credibility, Reliability, and Validity of Sources**

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 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.

**CC.1.4.11-12.X**

**Range of Writing**

Write routinely over extended time frames (time for research, 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.

**CC.1.5.11-12.A**

**Comprehension and Collaboration**

**Collaboration Discussion**

Initiate and participate effectively in a range of collaborative discussions on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**CC.1.5.11-12.B**

**Comprehension and Collaboration**

**Critical Listening**

Evaluate how the speaker's perspective, reasoning, and use of evidence and rhetoric affect the credibility of an argument through the author's stance, premises, links among ideas, word choice, points of emphasis, and tone.

**CC.1.5.11-12.C**

**Comprehension and Collaboration**

**Evaluating Information**

Integrate multiple sources of information presented in diverse formats and media (visually, quantitative, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

**CC.1.5.11-12.D**

**Presentation of Knowledge and Ideas**

**Purpose, Audience and Task**

Present information, findings, and supporting evidence, conveying a clear and distinct perspective; organization, development, substance, and style are appropriate to purpose, audience, and task.

**CC.1.5.11-12.E**

**Presentation of Knowledge and Ideas**

**Context**

Adapt speech to a variety of contexts and tasks.

**CC.1.5.11-12.F**

**Integration of Knowledge and Ideas**

**Multimedia**

Make strategic use of digital media in presentations to add interest and enhance understandings of findings, reasoning, and evidence.

**CC.1.5.11-12.G**

**Conventions of Standard English**

Demonstrate the command of the conventions of standard English when speaking based on grades 11-12 level and content.

**Understanding(s):**

*Students will understand . . .*

- The improper use of chemicals can lead to disastrous environmental repercussions.
- That the application of chemicals and pesticides often represents an ethical dilemma.
- That objective data is not always enough to change the way policy is crafted.
- Analysis and publication of scientific data is vital to changing the world.
- The effect that biases and individual backgrounds play in our interpretation of scientific results.

**Essential Question(s):**

- How can precise language help to accurately convey difficult scientific concepts?
- How can objective scientific research be used to better inform the individuals who make policy decisions within our world?
- How can the effective use of rhetoric help to change the way people think?
- How can a skillful blend of science and literature help to change the world?
- How does Science Writing and Bias Alter our Perspective of the World?

**Learning Objectives:**

*Students will know . . .*

- The physical and environmental repercussions of indiscriminate chemical applications.
- How *Silent Spring* played a crucial role in changing the way the United States utilized pesticides and other chemicals.

*Students will be able to:*

- Write using APA style.
- Craft a document that blends accurate science and effective writing and mimics that of Rachel Carson's work.
- Understand the effects of DDT on the environment.

- The role that biases play in our understanding of scientific discoveries and data.
- The causes and effects of diseases spread by mosquitoes and how the use of DDT can control their spread.
- Understand the effects of banning DDT on populations around the world.
- Read NOAA reports and compare how various news sources report on the findings.