Randolph Township Schools
Randolph Middle School
Food Science Curriculum

"Everything in food is science. The only subjective part is when you eat it."
-Alton Brown

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Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Affirmative Action Statement
Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

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EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

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Introduction

Food science is a marking period course offered to eighth grade students interested in science, technology, engineering, and math, through the lens of food. In this class students will study how food products are developed and use the engineering design process to create a new food product. Students will explore the impact of biotechnology on the food supply and engage in ethical discussions about human needs and wants. A culminating independent research project gives students a deeper connection and perspective about a topic of interest and provides an opportunity to share their knowledge and findings with others. This course will be guided by the current New Jersey Learning Standards in Computer Science and Design Thinking, Career Readiness, Life Literacies, and Key Skills, Science, Mathematics, and English.

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Curriculum Pacing Chart

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
3 weeks	**I**	**Engineering Design with Food**
3 weeks	**II**	**Biotechnology**
3 weeks	**III**	**Independent Research Project**

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Unit I: Engineering Design with Food

<table>
<tr><td colspan="3">TRANSFER: Students will be able to independently engage in the engineering design process to plan, design, collaborate, and develop solutions to real-world problems.</td></tr>
<tr><td rowspan="8">STANDARDS / GOALS:

NJ 2020 SLS: Computer Science and Design Thinking
8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.

8.2.8.ED.5: Explain the need for optimization in a design process.

8.2.8.ED.6: Analyze how trade-offs can impact the design of a product.

8.2.8.NT.4: Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.

NJ 2020 SLS: Career Readiness, Life Literacies, and Key Skills
9.4.8.CI.2: Repurpose an existing resource in an innovative way.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>The ability to understand and have a procedural method that will help one solve a problem is a valuable life skill.</td><td>• What is the best way to solve a problem?</td></tr>
<tr><td>The engineering design process allows engineers to move from finding “a” solution to finding “the best” solution to a problem.</td><td>• What makes a solution the best?</td></tr>
<tr><td><u>KNOWLEDGE</u>
Students will know:</td><td><u>SKILLS</u>
Students will be able to:</td></tr>
<tr><td>The engineering design process is a series of steps that engineers follow to come up with the best solutions to a problem.

Ingredients in food can be manipulated like variables to develop variations on a product.</td><td>Identify the different steps of the engineering design process and explain why they are important.

Identify different variables in the creation of a food product.

Design and conduct an experiment to create a variation of an existing product.</td></tr>
</table>

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Unit I: Engineering Design with Food

9.4.8.CI.4: Explore the role of creativity and innovation in career pathways and industries. 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping. 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem. 9.4.8.TL.3: Select appropriate tools to organize and present information digitally. **NJ 2020 SLS: Science** MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	Requirements for a design are made up of the criteria for success and the constraints. Designing often involves making trade-offs between competing requirements and desired design features. Reflection and modification allow engineers to improve designs and products. Using a design process allows food scientists to develop new food products that target emerging markets and global trends. Natural factors (drought, flood, contamination, etc.) and economic factors (economic recession, transportation infrastructure, etc.) can place constraints on the availability of ingredients and food products.	Identify the criteria and constraints of the solution for a design problem by considering scientific principles and potential impacts on the environment. Judge the importance of a design feature compared to other competing requirements and features. Optimize a product through reflection and modification. Research and identify relevant food trends. Develop a food product that addresses a specific market or trend. Investigate how natural and economic factors can be mitigated in the production of food.

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Unit I: Engineering Design with Food

MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. **NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects** NJSLSA.R1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	**VOCABULARY:** design, procedures, analysis, researching, brainstorming, developing, testing, reflection, criteria, constraints, engineering, reaction **KEY TERMS:** food supply, casein, polymer, enzyme, coagulation	Compose a digital product to organize data collected.

RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. WHST.6-8.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. WHST.6-8.6: Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. **NJ 2020 SLS: Science – Crosscutting Concepts 6-8** • Cause and effect • Structure and function • Patterns		

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Unit I: Engineering Design with Food

NJ 2020 SLS: Science – Science and Engineering Practices 6-8 • Asking questions and defining problems • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Constructing explanations and designing solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information **NJ 2020 SLS: Science – Disciplinary Core Ideas 6-8** ETS1.A: Defining and Delimiting Engineering Problems ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution LS1.B: Growth and Development of Organisms LS4.B: Natural Selection **NJ 2016 SLS: Mathematical Practices** MP1: Make sense of problems and persevere in solving them.		

Unit I: Engineering Design with Food

MP2: Reason abstractly and quantitatively. MP3: Construct viable arguments and critique the reasoning of others. MP5: Use appropriate tools strategically.		

ASSESSMENT EVIDENCE: Students will show their learning by:

- Reflecting on present and past learning through Do Now and Exit Ticket prompts
- Reporting clear and accurate test outcomes of experiments relating to food production
- Manipulating variables in an experiment to establish relationships and improve a product
- Producing a food product targeting a specific market

KEY LEARNING EVENTS AND INSTRUCTION:

- Students will utilize the engineering design process to determine how certain variables affect a chosen food product
- Students will optimize a selected food product for a target market through the engineering design process

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Unit I: Engineering Design with Food

SUGGESTED TIME ALLOTMENT	**3 Weeks**
SUPPLEMENTAL UNIT RESOURCES	Required Resources: Computers with internet access "Food for Thought: Engineering Ice Cream" Suggested Resources: Newsela "The Fizz Wizard and Jammin' Jelly Reaction Kit" "Enzymes and the Science of Cheesemaking Kit" "Ice Cream Engineering"

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Unit II: Biotechnology

<table>
<tr><td colspan="3">TRANSFER: Students will be able to independently use their learning to apply scientific ideas to address human needs and wants.</td></tr>
<tr><td rowspan="5">STANDARDS / GOALS:

NJ 2020 SLS: Computer Science and Design Thinking
8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues.

8.2.8.ITH.2: Compare how technologies have influenced society over time.

8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies.

8.2.8.ED.6: Analyze how trade-offs can impact the design of a product.

NJ 2020 SLS: Career Readiness, Life Literacies, and Key Skills
9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Technologies have changed the way humans influence the inheritance of desired traits in organisms.</td><td>• Can genetics influence what we like to eat?</td></tr>
<tr><td>Biotechnology can produce changes in organisms that can be helpful or harmful.</td><td>• If we can, does that mean we should?</td></tr>
<tr><td><u>KNOWLEDGE</u>
Students will know:</td><td>SKILLS
Students will be able to:</td></tr>
<tr><td>Biotechnology includes a range of techniques that alter living organisms or parts of organisms to improve agriculture.

Selective breeding is the process by which humans choose favorable characteristics in parent organisms to produce offspring with more desirable traits.</td><td>Examine the role of biotechnology in the advancement and enhancement of agriculture.

Conduct an experiment to demonstrate how desired traits can be inherited.</td></tr>
</table>

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9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.	Requirements for a design are made up of the criteria for success and the constraints.	Identify the criteria and constraints of the solution for their design problem by considering scientific principles and potential impacts on the environment.
9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem.	Designing often involves making trade-offs between competing requirements and desired design features.	Judge the importance of a heritable trait compared to other competing requirements and features in a selectively bred organism.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.	Selective breeding is one of the earliest biotechnologies used to influence the food supply.	Summarize how humans have used selective breeding to improve agriculture and food supply.
NJ 2020 SLS: Science MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	Genetic engineering manipulates an organism's genes by introducing, eliminating, or rearranging specific genes using the methods of modern molecular biology.	Establish relationships between modern molecular biology methods and the development of genetic engineering.
MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		

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MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. **NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects** NJSLSA.R1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.	Gene modification through genetic engineering or more traditional methods like selective breeding produce heritable improvements in plants and animals for specific uses. These organisms are collectively referred to as GMOs. Transgenic organisms are GMOs resulting from the insertion of genetic material from another organism using recombinant DNA techniques. Sometimes people need to make moral judgments based on incomplete or untested information. Perspectives and judgments can change as newer or more reliable information is learned.	Synthesize information about how GMOs have been implemented and how they are used today. Analyze the role of transgenic organisms in local and global food supply. Develop and support a position about the use of transgenic organisms in the food supply. Compose a digital product to organize data collected. Evaluate different perspectives about the use of transgenic organisms in the food supply.

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RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. WHST.6-8.1: Write arguments focused on discipline-specific content. WHST.6-8.6: Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. WHST.6-8.9: Draw evidence from informational texts to support analysis, reflection, and research. **NJ 2020 SLS: Science – Crosscutting Concepts 6-8** • Cause and effect • Patterns **NJ 2020 SLS: Science – Science and Engineering Practices 6-8** • Asking questions and defining problems	Scientific discussions are crucial in the problem-solving process in order to assess issues from various viewpoints and gather knowledge through collaboration. **VOCABULARY:** procedures, analysis, researching, brainstorming, reflection, engineering, perspective, judgment, problem solving, position **KEY TERMS:** biotechnology, selective breeding, genetic engineering, genes, GMO, transgenic organism	Successfully collaborate with peers in scientific discussions.

• Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Constructing explanations and designing solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information **NJ 2020 SLS: Science – Disciplinary Core Ideas 6-8** ETS1.A: Defining and Delimiting Engineering Problems LS1.B: Growth and Development of Organisms LS4.B: Natural Selection **NJ 2016 SLS: Mathematical Practices** MP1: Make sense of problems and persevere in solving them. MP2: Reason abstractly and quantitatively. MP3: Construct viable arguments and critique the reasoning of others. MP5: Use appropriate tools strategically.		

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ASSESSMENT EVIDENCE: Students will show their learning by:

- Reflecting on present and past learning through Do Now and Exit Ticket prompts
- Reporting clear and accurate test outcomes for experiments relating to selective breeding
- Engaging in discourse about biotechnology
- Preparing a claim supported by evidence

KEY LEARNING EVENTS AND INSTRUCTION:

- Students will select desired genetic traits in an organism with the purpose of maximizing the offspring's effectiveness in agriculture
- Students will participate in a Socratic seminar to thoughtfully discuss issues regarding transgenic organisms

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Unit II: Biotechnology

SUGGESTED TIME ALLOTMENT	**3 Weeks**
SUPPLEMENTAL UNIT RESOURCES	Required Resources: https://www.usda.gov/topics/biotechnology Computers with internet access Suggested Resources: Newsela "A Recipe for Genetics: Selective Breeding and Transgenics" "GMO: Friend or Foe? Socratic Seminar"

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Unit III: Independent Research Project

<table>
<tr><td colspan="3">TRANSFER: Students will be able to independently evaluate sources and effectively communicate information based on purpose and audience using appropriate media.</td></tr>
<tr><td rowspan="5">STANDARDS / GOALS:

NJ 2020 SLS: Computer Science and Design Thinking
8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.

8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues.

NJ 2020 SLS: Career Readiness, Life Literacies, and Key Skills
9.4.8.DC.1: Analyze the resource citations in online materials for proper use.

9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Research is a means of collecting facts and data in order to inform an audience.</td><td>• How can you best provide informative communication?</td></tr>
<tr><td>Researchers must examine sources for credibility, validity, purpose, and reliability.</td><td>• How do you know when research is valid and valuable?</td></tr>
<tr><td><u>KNOWLEDGE</u>
Students will know:</td><td>SKILLS
Students will be able to:</td></tr>
<tr><td>Food Science encompasses an array of topics like microorganisms, food supply, and food health & safety, which can have both negative and positive effects on our food.</td><td>Examine and select an independent research project topic about food science.</td></tr>
</table>

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Unit III: Independent Research Project

9.4.8.IML.1: Critically curate multiple resources to assess the credibility of sources when searching for information. 9.4.8.IML.7: Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose. 9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem. 9.4.8.TL.3: Select appropriate tools to organize and present information digitally. 9.4.8.TL.4: Synthesize and publish information about a local or global issue or event.	Sources used for research are crucial in supporting claims as they provide factual evidence to strengthen scientific arguments. Conducting an independent research project on a high-interest topic encourages exploration and enhances understanding. When preparing a formal presentation, the presenter uses various media and visual displays to communicate information. Writing a narrative to convey technical information or ideas provides authentic engagement for the intended audience. Visual representation of technical information reinforces important concepts and clarifies relationships.	Establish the credibility of at least 3 sources pertaining to the independent research topic. Explore multiple text and multimedia sources to gather relevant information about the independent research topic. Generate additional research questions related to the independent research topic. Synthesize independent research into a cohesive presentation. Compose a storyline to deliver key information about the independent research topic. Construct a visual to support key facts about the independent research topic.

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Unit III: Independent Research Project

NJ 2020 SLS: Science MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Being able to read, interpret, and produce scientific and technical text are fundamental practices of science and engineering, as is the ability to communicate clearly and persuasively.	Analyze benefits and drawbacks related to the independent research topic.
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		Evaluate limitations and challenges faced by groups or populations impacted by the independent research topic.
MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.		Develop a solution for a stated drawback, limitation, or challenge related to the independent research topic.
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Peer review allows for learners to gather and respond to feedback on their own work.	Critique peer projects for content and quality.

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NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects NJSLSA.R1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.W2: Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. NJSLSA.W3: Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	**VOCABULARY:** design, procedures, analysis, researching, brainstorming, reflection, research, credibility, validity, reliability, bias, engineering **KEY TERMS:** microorganisms, food supply	

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RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. WHST.6-8.4: Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience. WHST.6-8.6: Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.		

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WHST.6-8.8: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. **NJ 2020 SLS: Science – Crosscutting Concepts 6-8** • Cause and effect • Structure and function • Patterns **NJ 2020 SLS: Science – Science and Engineering Practices 6-8** • Asking questions and defining problems • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Constructing explanations and designing solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information		

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NJ 2020 SLS: Science – Disciplinary Core Ideas 6-8 ETS1.A: Defining and Delimiting Engineering Problems LS1.B: Growth and Development of Organisms LS2.A: Interdependent Relationships in Ecosystems LS4.B: Natural Selection ESS3.C: Human Impacts on Earth Systems **NJ 2016 SLS: Mathematical Practices** MP1**:** Make sense of problems and persevere in solving them. MP2**:** Reason abstractly and quantitatively. MP3: Construct viable arguments and critique the reasoning of others. MP5: Use appropriate tools strategically.		

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Unit III: Independent Research Project

ASSESSMENT EVIDENCE: Students will show their learning by:

- Reflecting on present and past learning through Do Now and Exit Ticket prompts
- Identifying and selecting valid and reliable sources for use in a project about a food science research topic
- Synthesizing information from multiple sources into a single digital product with attention to purpose and audience
- Communicating information about a food science research topic in a clear and engaging format

KEY LEARNING EVENTS AND INSTRUCTION:

- Students will establish the credibility of sources using a points-based checklist
- Students will research and synthesize information about a food science research topic
- Students will create a PSA to disseminate information in a narrative style about a food science research topic

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Unit III: Independent Research Project

SUGGESTED TIME ALLOTMENT	**3 Weeks**
SUPPLEMENTAL UNIT RESOURCES	Required Resources: https://www.youtube.com (exact videos vary per student based on topic) Computers with internet access Suggested Resources: Newsela "Food Science Cartoon PSA Project" https://www.commonsense.org/education/lesson-plans/evaluating-legitimate-sources https://www.cdc.gov https://www.usda.gov https://www.fda.gov/food Microsoft PowerPoint Pixton comic character add-in

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APPENDIX A

Food Science Cartoon PSA Rubric

DESCRIPTION: For this project, you will use PowerPoint and insert web-based comic characters to create a cartoon PSA about your research topic. Use the Defining Questions to help shape the content and storyline of your cartoon. A project that earns a "Meets Expectations" for all 9 Criteria will receive a grade above 90%.

Criteria	INADEQUATE ATTEMPT	APPROACHES EXPECTATIONS	DEFINING QUESTIONS (NO⇔YES)	MEETS EXPECTATIONS	EXCEEDS EXPECTATIONS
Stating the Facts	• The topic is either unstated and/or the context left unexplained • Purpose, use, and/or means of action is unclear or blatantly biased • Less than 3 accurate facts are stated	• Topic is stated but generic background information provides limited context • Purpose, use, and/or means of action are relevant but exhibit a degree of bias • At least 3 accurate facts are stated	***Are the facts of the topic placed into context and clearly explained in an unbiased manner?*** *"What is it?"* *"What does it do?"* *"What are at least 3 key facts everyone should know about it?"*	• Topic is stated and clarified by providing solid contextual information • Purpose, use, and/or means of action are accurate and unbiased • At least 3 facts are highlighted that enhance the reader's understanding of the topic	• Topic is stated clearly and enhanced by comprehensive contextual information • Purpose, use, and/or means of action are clear and unbiased • Facts chosen are well-curated and provide the reader with a deep understanding of the topic
Benefits & Drawbacks	• Benefits and/or drawbacks are unclear and lack supporting evidence	• Benefits and/or drawbacks are addressed, but the supporting evidence may lack credibility due to an unreliable or biased source	***Does the PSA effectively evaluate the topic for benefits and drawbacks?*** ***Are the benefits and/or drawbacks cited from credible, unbiased sources?***	• Any benefits or drawbacks are explained using credible supporting evidence from unbiased sources	• Benefits and drawbacks are thoroughly discussed with well-reasoned evidence drawn from multiple credible, unbiased sources
Limitations & Challenges	• Limitations or challenges for impacted groups are inadequately addressed	• Addresses limitations or challenges for impacted groups, but explanation/reasoning lacks substance	***Does the PSA effectively raise awareness of limitations and/or challenges faced by the group or population impacted by the topic?***	• Draws attention to limitations/challenges for impacted groups through explanation and reasoning	• Emphasizes impact of limitations/challenges on affected groups through data-driven explanation and reasoning
Proposing a Solution	• Proposed solution does not address problem due to lack of realism, relevance, evidence, or support	• Proposes a solution to a related problem that might be possible with certain conditions, but evidence is weak or unconvincing	***Does the proposal specifically address a stated drawback, limitation, or challenge?*** ***Is the solution backed by evidence of practical real-world results?***	• Proposes a reasonable solution for a defined problem that demonstrates an effective and credible plan based on cited real-life examples	• Proposes a realistic, enduring solution for a defined problem with a detailed method of maintaining support citing successful real-world examples

Criteria	INADEQUATE ATTEMPT	APPROACHES EXPECTATIONS	DEFINING QUESTIONS (NO⇔YES)	MEETS EXPECTATIONS	EXCEEDS EXPECTATIONS
Audience & Purpose	• Shows minimal grasp of audience or purpose, presenting mainly unreliable or biased information	• Shows some grasp of audience and purpose, making an effort to avoid bias but not fully succeeding	***Does the PSA cartoon effectively communicate bias-free awareness of the topic to a middle school student audience?***	• Presents information on-target to audience and purpose, avoiding bias by taking a neutral or balanced approach	• Clearly understands audience and purpose, eliminating bias through argument and counterargument
Delivery & Style	• Delivery techniques make the presentation confusing or difficult to follow	• Delivery techniques make the presentation understandable, but lacks engagement	***Does the PSA cartoon follow a distinct and engaging storyline?*** ***Is the presentation dynamic with the sensible use of PowerPoint Animations?***	• Delivery techniques make the presentation both understandable and interesting	• Delivery techniques allow the reader to gain a clear understanding of the topic and make the presentation compelling
Visual Appeal	• Presentation makes insufficient use of visuals, leaving the reader disengaged with ideas minimally reinforced and credibility questioned • Choices in visuals detract from and diminish the quality of the presentation	• Presentation makes some use of visuals in an attempt to engage the reader and reinforce key ideas while still seeming somewhat credible • Most choices in visuals are appropriate, but may not be cohesive, slightly lowering the presentation quality	***Are the comic characters chosen appropriate, cohesive, and appealing?*** ***Do background setting and prop choices enhance the visual and make sense to the story?*** ***Are the chosen comic characters, props, and background images eye-pleasing and proportional?***	• Presentation makes strategic use of visuals to engage the reader, reinforce key ideas and messages, and establish credibility on the topic • Choices in visuals are purposeful, cohesive, and maintain the quality of the presentation	• Presentation makes professional and strategic use of visuals to captivate the reader, strengthen key ideas, and establish authority on the topic • Each visual enhances the clarity, quality, and appeal of the presentation
Works Cited	• Information used lacks credible sources	• Uses and credits information from at least 3 sources, but credibility may be questionable	***Is a Works Cited slide included at the end of the PSA?*** ***Are the final sources used reliable and unbiased?***	• Uses and credits information from at least 3 distinct reliable and unbiased sources	• Seamlessly integrates information from various reliable, unbiased sources to establish credibility of the presentation
Overall Impact	• Lack of a coherent storyline leaves the reader feeling confused or disinterested	• A storyline is present, but disorganization or lack of cohesion may leave the reader feeling only somewhat better informed than before	***Is the storyline well-organized and cohesive?*** ***Does the PSA cartoon leave a lasting impression while successfully educating the reader?***	• The reader can follow the storyline and understand key points, feeling more educated and interested than before	• A strong storyline enhances the message and leaves the reader feeling well-educated and eager to learn more about the topic