Literacy Design Collaborative

Should the United States Say Yes or No to Nuclear Power?

★ TASK ★ LADDER

by Erin Coker

With recent concerns about climate change and rising oil prices, the world is looking for alternative and cleaner energy sources. One possible solution is nuclear power; however, there are advantages and disadvantages to consider.

In this extended writing task (LDC module), students will discuss the scientific and societal advantages and disadvantages of nuclear power. They will read, analyze, and gather/cite relevant information from text(s) and write an argumentative essay arguing whether the U.S. should continue to pursue nuclear energy as a viable energy option, acknowledging competing views. You may also have students discuss current/past examples to illustrate/clarify their position as an optional demand. In addition to the Colorado Academic Standards, this module focuses on the following priority standards from the Common Core State Standards:

• RST.10: Read closely, analyze and evaluate multiple texts pertaining to development and use of nuclear power.

• RST.1: Cite textual evidence to support analysis of science and technical texts. be introducing the first part of standard RST.1. Students will do deeper with this standard in the spring LDC module.)

• SL.6: Acquire and use academic language while speaking, listening, writing and thinking.

• Develop a claim and counterclaim.

• WST.1: Write an evidence-based argumentative essay including competing views with valid reasoning and relevant evidence.

• SL.1: Initiate and engage in a variety of collaborative discussions.

This module explicitly addresses Colorado Academic Standards (CAS): SC09-GR.HS-S.1-GLE.3: Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. As outlined in the district scope and sequence for Chemistry, this module is designed to be implemented following the completion of the second unit, *Fun with the Periodic Table.*

Considerations

• Consider assigning students to two different heterogeneous groups for the duration of this module: a reading group and a writing group. Students should work with their reading group on the first read (or reads) of a text, but should work with their writing group to complete the graphic organizers for each text and then again during the peer editing process.

• Consider where appropriate, assigning part or all of a mini-task (mini-tasks or portions of mini-tasks designed to be completed independently) for homework.

• Within the scoring guide for each mini-task, we have detailed student products that can be monitored; the product suggested for formative assessment has been bolded.

Special Note:

This module's instructional ladder uses several fields in ways not conventional to LDC for the purpose of meeting requirements of Denver Public Schools and its common module approach.

- **Skill and Mini-Task Repetition.** To provide clarity around the sequencing of the teaching of the same skill multiple times in this module, the same skill and/or mini-task sometimes appears multiple times in the Instructional Ladder's "Reading Process."

Mini-Task Prompts. To meet the local mandate of including content/language objectives (CLOs) in every lesson, these mini-task prompts include the sentence starter "students will be able to (SWBAT)." While these are not strictly "student-facing" as required by LDC, each CLO is always communicated to students in this format as a daily goal.

GRADES	DISCIPLINE	COURSE	PACING
11 - 12	**Science**	**Chemistry**	**15hr**

Section 1: What Task?

Teaching Task

Task Template A9 - Argumentation

What are the positive and negative scientific and societal impacts of nuclear power? After reading informational text/s and viewing videos on nuclear power , write an essay in which you discuss the advantages and disadvantages of nuclear power and evaluate whether or not the United States should continue to pursue nuclear power as a domestic energy source. Support your position with evidence from the text/s. Give three example/s from past or current events to illustrate and clarify your position. Be sure to acknowledge competing views.

Standards

Colorado Academic Standards for Science

1.3. **Focus**

Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

RST.11-12.1 **Focus**

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

WHST.11-12.1 **Focus**

Write arguments focused on discipline-specific content.

SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

L.11-12.6

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.

Next Generation Science Standards (NGSS Comprehensive)

PS1.C:1.

Nuclear processes, including fusion, fission, and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process. (HS-PS1-8)

Texts

exploringnuclearenergy.pdf

- **"Nuclear Power Safety Concerns" (reading)**
- **"At U.S. Nuclear Sites, Preparing for the Unlikely" (reading)**
- **"How Nuclear Power Can Stop Global Warming" (reading)**
- **Stewart Brand + Mark Z. Jacobson: Debate: Does the world need nuclear energy? (video)**

Student Work Rubric - Argumentation Task - Grades 9-12

	Emerging	Approaches Expectations	Meets Expectations	Advanced
	1	2	3	4
Controlling Idea	Makes a general claim with an unclear focus.	Establishes a **clear** claim **that addresses the prompt**, with an **uneven focus**.	Establishes **and maintains** a **clear, specific, and credible claim** that addresses **all aspects** of the prompt.	Establishes and maintains a **precise, substantive** claim that addresses all aspects of the prompt. **Acknowledges limitations and/or the complexity of the issue or topic**.
Selection & Citation of Evidence	Includes minimal details from sources. Sources are used without citation.	Includes **details, examples, and/or quotations** from sources that are **relevant to the claim**. **Inconsistently** cites sources.	Includes details, examples, and/or quotations from sources that **support** the claim and **supporting ideas**. **Consistently** cites sources **with minor formatting errors**.	Includes **well-chosen** details, examples, and/or quotations from sources that **fully support** the claim and supporting ideas. Consistently cites sources **using appropriate format**.
Development / Explanation of Sources	Explanation of ideas and source material is irrelevant, incomplete, or inaccurate.	Explains ideas and source material **to support the argument**, with **some incomplete reasoning or explanations**.	**Accurately** explains ideas and source material and **how they support** the argument.	**Thoroughly** and accurately explains ideas and source material, **using logical reasoning to support and develop** the argument.
Organization	Lacks an evident structure. Makes unclear connections among claims, reasons, and/or evidence.	**Groups ideas and uses transitions** to develop the argument, with **some lapses in coherence or organization**.	**Groups and sequences** ideas to **develop a cohesive argument** . Uses transitions **to clarify the relationships among claim(s), reasons, and evidence**.	Groups and sequences ideas **in a logical progression in which ideas build to create a unified whole**. Uses **varied** transitions to clarify the **precise** relationships among claim(s), reasons, and evidence.
Conventions	Major errors in standard English conventions interfere with the clarity of the writing. Language or tone is inappropriate.	Errors in standard English conventions **sometimes interfere** with the clarity of the writing. Uses language and tone that are **sometimes inappropriate** for the audience and purpose.	**Consistently applies** standard English conventions; **minor errors**, while noticeable, **do not interfere** with the clarity of the writing. Uses language and tone **appropriate to the audience and purpose**.	Consistently applies standard English conventions, **with few errors**. Demonstrates **varied syntax** and **precise word choice**. **Consistently** uses language and tone appropriate to the audience and purpose.
Content Understanding (Generic)	Attempts to include disciplinary content in explanation or argument but understanding of content is weak; content is irrelevant, inappropriate, or inaccurate.	Briefly notes disciplinary content relevant to the prompt; shows basic or uneven understanding of content; minor errors in explanation.	Accurately presents disciplinary content relevant to the prompt with sufficient explanations that demonstrate understanding.	Integrates relevant and accurate disciplinary content with thorough explanations that demonstrate in-depth understanding.

Background for Students

With recent concerns about climate change and rising oil prices, the world is looking for alternative and cleaner energy sources. One possible solution is nuclear power; however, there are advantages and disadvantages to consider.

There are many scientific and societal advantages and disadvantages associated with nuclear power. In this project, you will read about both sides of this debate. In addition to explaining the advantages and disadvantages, you will also take a side on this debate. Your teacher may ask you to strengthen your argument and illustrate and clarify your position by describing at least two examples of past nuclear events.

In this extended writing task, you will read, analyze, and gather/cite relevant information from text(s) and write an argumentative essay.

You will...

- read, analyze and evaluate multiple texts pertaining to development and use of nuclear power.
- cite textual evidence to support analysis of science and technical texts.
- acquire and use academic language while speaking, listening, writing and thinking.
- develop a claim and counterclaim.
- write an evidence-based argumentative essay including competing views with valid reasoning and relevant evidence.
- initiate and engage in a variety of collaborative discussions.

Extension

Using the information you gathered in this module, create a public service announcement/brochure educating the public about nuclear power.

If you decide to have students complete the optional demand make sure to have them also include three example/s from past or current events to illustrate and clarify your position within their brochure.

Optional technology resource

http://www.postermywall.com/

Section 2: What Skills?

Preparing for the Task

TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.

TASK ANALYSIS: Ability to understand and explain the task's prompt.

READING OF THE RUBRIC: Ability to understand, explain and paraphrase the rubric in their own words.

Reading Process

ACTIVE VIEWING> NOTE TAKING: Ability to select important facts and passages for use in one's own writing. Students are able to cite specific textual evidence to support conclusions drawn from the text.

ACTIVE READING> ESSENTIAL VOCABULARY: Ability to understand essential vocabulary as they are used in the text.

BUILDING BACKGROUND KNOWLEDGE>UNDERSTANDING CONSERVATION OF MASS: Ability to understand how matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. (SC09-GR.HS-S.1-GLE.3)

PRE READING>UNDERSTANDING RADIATION EXPOSURE: Ability to recognize the benefits and dangers of radiation, including environmental and health concerns. (SC09-GR.HS-S.1-GLE.3)

ACTIVE READING> CITING TEXTUAL EVIDENCE: Ability to select important facts and passages for use in one's own writing, citing specific textual evidence to support conclusions drawn from the text.

ACTIVE READING> NOTE TAKING: Ability to select important facts and passages for use in one's own writing. Students are able to cite specific textual evidence to support conclusions drawn from the text.

ACTIVE VIEWING>CITING TEXTUAL EVIDENCE: Ability to select important facts and passages for use in one's own writing, citing specific textual evidence to support conclusions drawn from the text.

Transition to Writing

BRIDGING CONVERSATION: Ability to engage in a collaboration conversation with peers using textual evidence to support perspectives.

Writing Process

ESTABLISHING THE CONTROLLING IDEA: Ability to establish a claim and consolidate information relevant to task.

PLANNING THE WRITING: Ability to develop a line of thought and text structure appropriate to an argumentation task.

PEER REVISION AND EDITING: The ability to peer edit and provide feedback on writing.

FINAL DRAFT: Ability to submit final piece that meets expectations.

Section 3: What Instruction?

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
Preparing for the Task				
45 mins	**TASK ENGAGEMENT**: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.	**HOOK! INTRO TO THE CONTROVERSY: CLASS DISCUSSION** SWBAT orally explain the different viewpoints on nuclear power using content vocabulary (advantage, disadvantage, nuclear power, etc.).	Meets Expectations if students: • Brainstorm what they already know about the advantages and disadvantages of nuclear energy. • Write questions that they have about nuclear energy. • **Activity participate in a discussion by sharing and discussing their responses with their classmates. In their discussion students cite specific examples from the video clips.** • Vote yes or no to nuclear power given their initial impressions. (optional)	**Have students watch the two video clips below:** **Link 1: Sustainable Energy Choices for the 21st Century** https://www.youtube.com/watch?v=JZVJ_zQxQl0 **Link 2: Discovery Channel: Japan in Crisis** https://www.youtube.com/watch?v=rlQyEFVymsA Introduce the idea that nuclear power is a highly debatable topic; there are many advantages and disadvantages associated with using nuclear power as a way to generate energy. Tell students that in this module, they will be exploring both the advantages and disadvantages and arguing whether the U.S. should continue to pursue nuclear power as a domestic energy source. Say something like: *• It is very important that we understand both sides of this debate so that we can strengthen our argument.* **Guiding Questions** • What position does each video take? • What evidence can you cite from the video? • Which video makes a better case? Why? Have students complete the *Think and Question* portions of the T-L-Q Chart, focusing on what they know about nuclear energy and its advantages and its disadvantages. The *Learn* portion of the graphic organizer is to be completed at the end of the unit after students finish their final papers. Use the Think/Pair/Share (thinking, communication, information sharing) protocol: 1. Students think to themselves and write on a topic or question. In this case, students are completing the Think and Question portion of the graphic organizer independently. 2. After students finish writing (approximately 5 minutes), they turn to their partners/group members and share their responses, thus allowing time for both rehearsal and immediate feedback on their ideas. 3. Following the group discussion, facilitate a whole class discussion where students share out their own ideas and the ideas they heard from their group members. Through this structure, all students have an opportunity to learn by reflection and by verbalization. 4. Track students' responses on chart paper or type their responses directly in the Google Doc. This document can be revisited throughout the

				module as questions are answered and at the end of the module when students reflect on their learning. 5. If there is something that remains in dispute from the discussion, do not correct the misconception yourself but make note of it by adding it to the question portion of the graphic organizer. Let students know as they move though this module they should be looking for supporting evidence for their ideas and answers to their questions. Center the discussion on: Should the U.S. say yes or no to nuclear power? What are your initial thoughts? Record the number of votes for yes and no at the beginning and the end of the module to see how the numbers shift. You can also create a Google form and you can compare the results before, during and after the module. Optional: Share this map of U.S. nuclear reactors.
	Standards: **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy			
	Additional Attachments: **Example Google Form** **Optional Graphic 2 (Power Consumption)** **Optional Graphic (World Power Consumption)** **Nuclear Power Map** **T-L-Q Chart** **Sustainable Energy Choices for the 21st Century** **Discovery Channel: Japan in Crisis**			
30 mins	**TASK ANALYSIS**: Ability to understand and explain the task's prompt.	**ANNOTATED TEACHING TASK** SWBAT analyze the content of the teaching task using question words (who, what, where, when , why, how, etc.).	Meets Expectations if students: • Identify important words and phrases in the teaching task. • Circle unknown words and phrases in the teaching task. • Write questions they have around the teaching task. • Work collaboratively to properly answer their questions and accurately define all unknown vocabulary. • **Reflect on their understanding of the task and expectations.**	Ask students to annotate the teaching task by... • underlining what they think are the most important words and phrases • circling the words they do not know • writing questions about the task Ask students to trade with a partner and try to... • define all the key words/phrases identified • answer all questions posed **I DO** Model your thinking aloud for students using the essential question from the task: • What are the positive and negative scientific and societal impacts of nuclear power? **WE DO** Ask students to: • Identify words/phrases that they think are most important. • Identify words/phrases that they do not know. • Pose questions they might want answers to

				about this question.(If students don't generate adequate responses, teacher can model for them.) ● Ask students to provide definitions/explanations of the key words/phrases identified (optionally use dictionaries/ online resources-computes/phones). ● Ask students to provide answers to the questions posed. (Teacher can model definitions/answers for students). **YOU DO** Have students complete the handout, working individually to identify words and pose questions, then working with a partner to come up with definitions and answers. Students should record their thinking directly on their handout. Ask students to use a different color pen to highlight their collaborative work. Circulate while students work to help them with this process. **Wrap up** Highlight common student responses for important words/phrases and questions. Ask students to share out their findings, defined words and answers to questions. Ask students to share any words/phrases they could not define or questions that are unanswered. Ask the rest of class to fill in those definitions/answers. Capture this thinking on chart paper or a Google Doc so you can refer back to the task throughout the module. Ask students to reflect on their understanding of the teaching task and circle on their paper one of the thumbs (up, sideways or down) pictures. Meet with students who need additional support.
	Standards: **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **RST.11-12.4** : Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11—12 texts and topics.			
	Additional Attachments: **Annotating the Teaching Task**			
50 mins	**READING OF THE RUBRIC**: Ability to understand, explain and paraphrase the rubric in their own words.	**RUBRIC ANALYSIS: RUBRIC ANALYSIS POSTER** SWBAT paraphrase the rubric in writing using rubric words and phrases (development, organization, understanding, etc.).	Meets Expectations if Students: ● **Students show understanding of the language in the rubric by paraphrasing their assigned section of the rubric.** ● **Students generate a relevant graphic that represents their assigned section of the rubric.** ● Students share their paraphrase and graphic	Display prompt and rubric daily, reminding students of the end goal. Hand out rubric to each student. Put posters around the room titled reading/ research, development, organization, conventions, content understanding. Throughout this process, ask students to identify content that is also going to be learned when applicable on the rubric. **I DO** Use a poster for “focus” and read the rubric and then deconstruct, using kid-friendly language. Share a graphic that you created. **WE DO**

			with the whole class explaining their thinking. • All students participate by listening to presentations, asking clarifying questions, and recording the ideas shared on their handout.	Ask five students to come into a circle with the poster for Controlling Idea. As they read the rubric, guide them to translate it into kid-friendly language, adding a unique graphic to help remember each element of the rubric. **YOU DO** Assign each table group one poster (reading/research, development, organization, conventions, content understanding). Read each one and then hand them out. Have students work on putting the words into kid-friendly language and a graphic. Groups present their paraphrase and graphic to the class. Students take notes on the handout and offer feedback to their classmates after their presentation using stems such as: • One thing that I really like about your paraphrase/graphic is... • One thing that might strengthen your work is...
	Standards: **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **RST.11-12.2** : Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.			
	Additional Attachments: **Rubric Analysis**			
Reading Process				
30 mins	**ACTIVE VIEWING> NOTE TAKING**: Ability to select important facts and passages for use in one's own writing. Students are able to cite specific textual evidence to support conclusions drawn from the text.	**COMPARE AND CONTRAST FISSION & FUSION: GRAPHIC ORGANIZER** SWBAT connect orally and in writing nuclear energy terms using causal words (because, due to the fact, which lead to, etc.).	Meets expectations if students: • Accurately defines academic vocabulary using information found in the text • **Creates a concept definition map that accurately connects ideas from the text** • Offers relevant feedback to peers on their vocabulary concept maps.	Have students partner and read the article “Elements and Isotopes” from the packet Exploring Nuclear Energy. While reading, students should define terms in their own words on the graphic organizer, using Fix-up Strategies and the root word, prefixes, suffixes and cognate lists to decipher unknown words. Once words have been defined in pairs, have students check their answers with another partner group. You can also display the correct definitions for students to check their answers. Students use this word list to create a concept definition map with their partner/group. Be strategic when choosing partners/groups. Group students heterogeneously by their English language-proficiency level or reading level. The center of the concept map should be **nuclear energy**. Concept definition maps are organizers that help students understand the essential attributes, qualities, or characteristics of a word’s meaning. The concept definition map should link words listed in the graphic organizer and show how words are connected by drawing a line. Students must also explain why they have connected two words by offering a short one-sentence explanation. In other words, the students must describe what the word means, make comparisons, tell what it is like, and/or give examples. You may designate a number of

				words that you want students to include in their concept map. **Sharing their work** Once students complete their concept definition map, have them join another group to share it and their rationale with their peers. Use the stay and stray strategy. Also have students ask questions and offer feedback. Provide them with stems for feedback/ questions, such as: • When connecting _____ and _____, what was your thinking? • Why did you choose to connect _____ and _____? • I think it would make more sense to connect _____ and _____ because... • Your explanation for connecting _____ and _____ clearly illustrates the concept because... • What you said about _____ makes me think about _____ differently. **Revisit concept maps (optional)** At the end of each lab, ask students to return to their concept maps and add any new connections/learning from the lab activity. **Optional Technology Tool** Coggle it
	Standards: **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy **RST.11-12.7** : Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **RST.11-12.2** : Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **RST.11-12.1** : Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.			
	Additional Attachments: **Compare and Contrast Graphic Organizer** **Instant Egghead: What's the Difference Between Fission and Fusion?**			
45 mins	**ACTIVE READING> ESSENTIAL VOCABULARY**: Ability to understand essential vocabulary as they are used in the text.	**ELEMENTS AND ISOTOPES: DEFINITION CONCEPT MAP** Students will create a concept map containing important vocabulary necessary to answer the teaching task. Students will use vocabulary fix up strategies to determine the meaning of unknown academic	**Meets Expectations** • Student accurately defines academic vocabulary using information found in the text. • **Student creates a concept definition map that accurately connects ideas from the text.** • Students offers relevant	Have students partner read the article *Elements and Isotopes* found in the attached packet Exploring Nuclear Energy. While reading have students use the Fix Up Strategies below along with the resources attached (root word list, prefixes list, suffixes list and cognate list) to define the words listed on the attached graphic organizer in their own words. Once all words have been defined in pairs have students check their answers with another partner group. You may also choose to display the correct definitions for students to check their answers.

		vocabulary.	feedback to peers on their vocabulary concept maps.	Finally, students will use this word list to create a concept definition map with their partner/group. It is important to be strategic when choosing partners/groups. Group students heterogeneously by their english language proficiency level or reading level. The center of the concept map should be **nuclear energy**. Concept definition maps are organizers that help students understand the essential attributes, qualities, or characteristics of a word's meaning. The concept definition map should link words listed in the graphic organizer and show how words are connected by drawing a line. Students must also explain why they have connected two words by offering a short one sentence explanation. In other words the students must describe what the word means, make comparisons, tell what it is like, and/or give examples. You may choose a number of words that you would like students to include in their concept map. **Sharing their work:** Once students have completed their concept definition map, have the students join another group to share their concept map and rationale with their peers. Use the strategy stay and stray (see attached link) http://www.theteachertoolkit.com/index.php/tool/two-stray-one-stay In addition, have students ask questions and offer feedback. Provide students with stems for feedback/ questions. For example... ● When connecting _____ and _____ what was your thinking? ● Why did you choose to connect _____ and _____? ● I think it would make more sense to connect _____ and _____ because... ● Your explanation for connecting _____ and _____ clearly illustrates the concept because... ● What you said about _____ makes me think about _____ differently. **Fix Up Strategies** ****Clunk= unknown word (meaning breaks down for the student)** Reread the sentence with the clunk and look for key ideas to help you figure out the word. Think about what makes sense. Reread the sentences before and after the sentence with the clunk, looking for clues. Break the word apart and look for word parts (prefixes, suffixes, root words) or smaller words you know. Does the clunk have a cognate that makes sense? Once you have come up with a definition for the word put the definition back into the sentence to make sure that it makes sense.

				Revisit concept maps (optional) At the end of each lab ask students to return to their concept maps and add any new connections/learning from the lab activity. **Optional Technology Tool** Coggle it (see teacher resources)

Standards:

1.2. : Matter has definite structure that determines characteristic physical and chemical properties

L.11-12.6 : 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.

L.11-12.4 : Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11—12 reading and content, choosing flexibly from a range of strategies.

RST.11-12.4 : Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11—12 texts and topics.

Additional Attachments:

- **2014-Fix-Up-Strategies.docx**
- **Stay and Stray**
- **Elements and Isotopes: Fix Up Stratgies**
- **Coggle it**
- **2014-3_Root_Brand.docx**
- **2014-Prefix-list.docx**
- **2014-Spanish-English-Cognate-list.docx**
- **2014-Suffix-list.docx**

1 hr	**BUILDING BACKGROUND KNOWLEDGE>UNDERSTANDING CONSERVATION OF MASS**: Ability to understand how matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. (SC09-GR.HS-S.1-GLE.3)	**RADIOACTIVITY: STABLE AND UNSTABLE ISOTOPES ACTIVITY** SWBAT compare and contrast in writing the location of unstable and stable isotopes relative to the band of stability, using compare and contrast words and phrases (similar to, different from, etc.).	**Meets expectations if students:** • Students accurately graph both stable and unstable isotopes given the information provided. • **Students compare and contrast the location of unstable isotopes relative to the band of stability.**	Pages 44-45 and Periodic Table pg 18 Exploring Nuclear Energy PDF file Make copies of the student activities. As a class, review the topic of radiation and radioactive isotopes with the “What are Radioactive Isotopes?” video and/or the introduction at the top of page 44. Ask students to define “isotope,” share how to determine the number of neutrons, protons and electrons an element has using the periodic table, and define stable and unstable isotopes. Using the Radioactivity: Stable and Unstable Isotopes handout, students will find the missing information and complete the charts. Students should plot the stable isotope points on a graph with the protons along the X-axis and the neutrons along the Y-axis. When the points have been plotted, students should draw a curve through the points. Students should plot the points of the unstable isotopes on the same graph using a different color pencil. **Exit Ticket** Ask students to write a paragraph in which they compare and contrast the location of stable and unstable isotopes relative to the band of stability. Be sure to include evidence from your graph. **Possible Extension/Differentiation**

				Have students search the Table of Isotopes. They can choose which element and isotopes they want to graph. Using Excel or another graphing program, students will be able to more easily graph larger proton-to-neutron ratios.

Standards:

SL.11-12.1 : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

RST.11-12.3 : Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

1.3. : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy

Additional Attachments:

Radioactivity: Stable and Unstable Isotopes

What are Radioactive isotopes

The Berkeley Laboratory Isotopes Project's

40 mins	**BUILDING BACKGROUND KNOWLEDGE>UNDERSTANDING CONSERVATION OF MASS**: Ability to understand how matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. (SC09-GR.HS-S.1-GLE.3)	**CANDY CHEMISTRY ACTIVITY: DECAY CURVE GRAPH** SWBAT explain in writing how the rate of decay is connected to an advantage/disadvantage of nuclear power using causal words (because, due to the fact, as a result, which led to, etc.).	**Meets expectations if students:** • Follow the step by step procedure recording the number of decayed candies in the data table below until all candies have decayed. • Accurately graph their data on graph paper. • Can construct an exponential function that best fits their data. • Compare their graph to their partners graph and discuss the results. • **Discuss how the rate of decay is connected to an advantage/disadvantage of nuclear power.**	**Radioactive Decay Procedure** Review the concept that unstable (radioactive) elements want to be stable. Radioactive isotopes go through a process of decay to reach a stable state. When an element sample decays so that half of its nuclei remain, this is a half-life. Pass out the Radioactive Decay worksheet and have students complete the activity. When all of the “atoms” have “decayed,” students should graph their data and compare their graph to a neighbor’s. Ask students what they notice and have them discuss the following questions with their partner: • What type of function would you use to model this data (linear, exponential, or quadratic)? Create a function that best fits your data. • How is this activity similar to what happens in the natural world? • Does uranium decay in the same manner? • How is this activity connected to the teaching task? • What are the implications of the rate of decay? Is this an advantage or disadvantage? Wrap up class with a whole group discussion of the above questions. **Exit Ticket** Write a paragraph in which you discuss how the rate of decay is connected to an advantage/disadvantage of nuclear power. Additional question to pose to students around conservation of energy: What happens to the energy lost during the decay?

Standards:

F.LE.2 : Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

	SL.11-12.1 : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy			
	Additional Attachments: **Radio Active Decay: Candy Chemistry**			
35 mins	**BUILDING BACKGROUND KNOWLEDGE>UNDERSTANDING CONSERVATION OF MASS**: Ability to understand how matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. (SC09-GR.HS-S.1-GLE.3)	**EXAMINING NUCLEAR ENERGY: THE DECAY OF URANIUM-234** SWBAT analyze in writing the relationship between the decay of uranium and the conservation of mass and energy using content vocabulary (mass, conserved, decay, uranium, etc.).	**Meets Expectations** • Accurately calculates the masses and balances a nuclear equation for Uranium-235. • Discuss the decomposition of Uranium 235 and 238 and explains how the mass is conserved. • **Analyze the relationship between the decay of uranium and the conservation of mass and energy**	Page 49 Examining Nuclear Energy Have students complete the handout about Uranium 235 on page 49 with a partner or individually. Share the Uranium-238 video or do your own discussion. Have students stand up and put their hand up and then pair up with someone else in the classroom. Once they are with a partner, have students discuss the decomposition of Uranium 235 and 238. Ask students to describe what is happening on both sides of the equation. Where does the energy come from? What happens to the total mass during nuclear fission? How is Uranium 235 different from 238? Uranium is one source that is used to generate nuclear power, how does this connect to the advantages and disadvantages of nuclear power? What is the relationship between the decay of uranium and the conservation of mass and energy? Have students answer the above question as an exit ticket.
	Standards: **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy			
	Additional Attachments: **Decay of Uranium: Examining Nuclear Energy** **Uranium 238 example**			
30 mins	**PRE READING>UNDERSTANDING RADIATION EXPOSURE**: Ability to recognize the benefits and dangers of radiation, including environmental and health concerns. (SC09-GR.HS-S.1-GLE.3)	**RADIATION DOSE CHART** SWBAT orally compare and contrast how different factors contribute to radiation dose using compare and contrast words and phrases (similar to, different from, etc.).	Meets expectations if students: • Accurately determine their radiation exposure. • Compare and contrast class results and discuss factors. • **Make connections to advantages and disadvantages of nuclear power and compare and contrast how different factors contribute to radiation dose through their discussion.**	Distribute the Radiation Dose Chart. Help students determine elevation, if needed. Discuss with students the different sources of radiation and have them determine the yearly amount of radiation to which they are exposed. Give four students in the class "wild cards" that have information for them to follow when filling out the chart. These students will provide a contrast when comparing someone who lives near a nuclear power plant to someone who lives near a coal mine. Ask if students are surprised by the results. Have them line up by their dose of radiation and discuss the sources of radiation that contributed to their dose. Ask: • *How does this connect to advantages and disadvantages?*
	Standards: **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy			

	SL.11-12.1 : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.			
	Additional Attachments: **Radiation Does Chart** **Wild Cards**			
2 hrs and 30 mins	**ACTIVE READING> CITING TEXTUAL EVIDENCE**: Ability to select important facts and passages for use in one's own writing, citing specific textual evidence to support conclusions drawn from the text.	**ANNOLIGHTING- ADVANTAGES & DISADVANTAGES** SWBAT identify the advantages and disadvantages of nuclear power using causal words and phrases (because, due to the fact, as a result of, which lead to, etc.).	Meets expectations if student: • Infers the author's target audience using evidence from the text • Identifies/cites both advantages and disadvantages described in the text(s) • Explains how and why the advantage/disadvantage is relevant.	Use the following strategy for these texts: • At U.S. Nuclear Sites, Preparing for the Unlikely • Nuclear Power Safety Concerns • How Nuclear Power Can Stop Global Warming **First Read** Have students read the texts thinking about who the author's target audience is. Ask students to make notes and cite evidence on the first page of the Advantages and Disadvantages: Annolighting Summary graphic organizer. Have a class discussion comparing the different readings, target audience and evidence. In the task we are asking students to look at both the scientific and societal advantage and disadvantages of nuclear power. Each article represents a different audience. *Scientific American* is a periodical written by scientists for scientists. *The New York Times* is written for the average person. The Council of Foreign Relations is a "think tank" that is composed of different groups that work closely with foreign policy. Ask students to think about the importance of writing to different audiences about the same topic. How would a scientist communicate differently than a foreign policy leader about scientific ideas/concepts? Why is it important for scientists to communicate differently to different audiences? **Second Read** Provide students with the text(s) and two colors of highlighters. Have them use one color to identify the advantages associated with nuclear power and the other for disadvantages. Read through an opening piece of text, modeling the annolighting strategy. Think-aloud: Refer to your colorcoded system when modeling. In the margins next to the portion of text that you have highlighted, write why you have chosen that piece of text and what makes it an advantage/disadvantage. Have students copy what you are doing for these first few examples. Pair up students and have them continue using the process on another piece of text or continue with the text you used to model. You may choose to release students to work on their own when they have demonstrated the skill (this could be after the first or second text). As students finish reading, have them pair up, review, and edit their notes before moving on to another text. Circulate as students move though this piece of text in partners. Monitor and assist students who seem to be struggling. When students have finished this process for all

				three readings, have them complete the second page of the graphic organizer summarizing their ideas.

Standards:

RST.11-12.6 : Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

W.11-12.9 : Draw evidence from literary or informational texts to support analysis, reflection, and research.

1.3. : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy

SL.11-12.1 : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

RST.11-12.2 : Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.1 : Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

Additional Attachments:

How Nuclear Power Can Stop Global Warming

At U.S. Nuclear Sites, Preparing for the Unlikely

Nuclear Power Safety Concerns

Advantages and Disadvantages: Annolighting Summary

StratAnnolight.doc

50 mins	**ACTIVE READING> NOTE TAKING**: Ability to select important facts and passages for use in one's own writing. Students are able to cite specific textual evidence to support conclusions drawn from the text.	**CAUSE & EFFECT GRAPHIC ORGANIZER** SWBAT summarize lessons learned from past nuclear accidents using content vocabulary (radiation, earthquake, safety features, generator, etc.).	Meets expectations if students: • Highlight causes and effects in different colors • Make annotations that are thoughtful and demonstrate engagement with the text • **Summarizes and paraphrases the causes and effects for all three examples** • **Shares at least one lesson learned from each nuclear accident**	Students read the article “Nuclear Accidents,” pages 34–35 of Exploring Nuclear Energy. Have them highlight the causes in one color and the effects in another, then summarize the causes and effects on the graphic organizer and list one lesson learned from each nuclear accident. Explain that today students will be "annolighting:" a combination of highlighting and annotation that improves comprehension. Please see the attached teacher resource for more information regarding the strategy "annolighting". Provide students with the selected article and two highlighters of different colors. **I DO** Teacher will do a read-aloud, highlighting causes in one color and effects in another for the first section Three Mile Island. You may choose to do this in two separate reads. Also, the teacher will model the writing of notes in the margins while reading. These notes can be anything from paraphrasing to connecting to questioning. You may choose to use sticky notes if you are concerned about students having enough space for their annotations. **WE DO** Ask students to help you paraphrase the causes and effects for the first section, using the attached graphic organizer. **YOU DO** Students will then follow this same procedure with a partner for the rest of the article. Students will also read the last section, Lessons Learned, and indicate at least one lesson learned

				for each nuclear accident. This activity will culminate with the students discussing the article with another partner group sharing their work. Have student pairs find another student pair and compare their responses.

Standards:

1.3. : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy

SL.11-12.1 : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

W.11-12.9 : Draw evidence from literary or informational texts to support analysis, reflection, and research.

RST.11-12.2 : Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.1 : Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

Additional Attachments:

Nuclear Accidents

Causes & Effects: Nuclear Events

Annolighting A Text

45 mins	**ACTIVE VIEWING>CITING TEXTUAL EVIDENCE**: Ability to select important facts and passages for use in one's own writing, citing specific textual evidence to support conclusions drawn from the text.	**TED TALK & GRAPHIC ORGANIZER** SWBAT synthesize, orally and in writing, evidence about the advantages and disadvantages of nuclear power using content vocabulary (climate change, nuclear waste, electricity demands, sustainability, etc.).	Meets expectations if students: • **Include important information/evidence from the debate pertaining to the teaching task in their graphic organizers.** • Includes student-generated questions that pertain to the teaching task and include information from the debate in their graphic organizers. • Participates in a group discussion using the 3-2-1 protocol.	Distribute the graphic organizer and have students use it to take notes during the video. Tell them that you are looking to see that they are citing specific evidence/information from the video for both advantages and disadvantages. In addition to citing evidence, students should record questions that come up while they are watching the video. You may want to stop the video at certain points to ensure that students have time to record their ideas. Use the 1-3-6 protocol for a group discussion following the video. Students will combine their ideas and write them on chart paper. Two groups will combine and repeat this process of combining their ideas. There are two sides to the graphic organizer: one for individual students and the other to combine their group's ideas as they combine with other groups. Ask students to answer their questions. If there are remaining questions, have a class discussion. **Note:** A transcript in English and Spanish is available for this video. You can also turn on Spanish subtitles. **Optional Technology:** Create a Google Form to show students' opinions before and after watching the debate. NOTE*** Is this activity correctly titled? Revisit the graphic organizer from the TED talk activity.

Standards:

1.3. : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy

RST.11-12.7 : Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

W.11-12.9 : Draw evidence from literary or informational texts to support analysis, reflection, and research.

RST.11-12.8 : Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

	RST.11-12.1 : Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.			
	Additional Attachments: **TED Talk Nuclear Power Debate Graphic Organizer** **1-3-6 Protocol** **Stewart Brand + Mark Z. Jacobson: Debate: Does the world need nuclear energy?**			
Transition to Writing				
1 hr	**BRIDGING CONVERSATION**: Ability to engage in a collaboration conversation with peers using textual evidence to support perspectives.	**SPEED DATING PARTNER DEBATE - GRAPHIC ORGANIZER** SWBAT orally justify their viewpoint on the advantages and disadvantages of nuclear power using causal words and phrases (because, due to, which led to, etc.).	Meets expectations if students: • Make their viewpoints clear and organized • **Support their arguments with facts and examples** • **Ensure all supporting points and explanations are relevant** • Make all arguments strong and convincing • Speak in a voice that can always be heard • Prepare well with team and complete the graphic organizer.	Students will need all the graphic organizers and the readings for the Speed Dating Team Debate. If possible arrange the room into tables groups of four students in a circular formation. Project Students Norms during the debate for students. Divide the class in half. Explain that one side of the room will be in favor of nuclear power and the other side will be opposed. Remind students that even though they might be debating a point of view that is different from their own, it is important because it will strengthen their own viewpoint and help them understand competing arguments and evidence that they can use in their essay. After the class is divided into a pro/con side, assign students a debate partner. Explain that during the Round Robin Debate, they will be "co-debating" with their partner. Have debate partner teams complete the pre-debate part of their graphic organizer. Explain to students that they must support their opinion about the advantage or disadvantage of nuclear power with at least four pieces of textual evidence from the readings. This provides them a range of textual evidence to use throughout the Speed Dating Debate. Although students will be working as a team during the debate, each partner needs to complete the graphic organizer so they each have evidence to use when it is time to write their essay. Remind students that a debate is different from a discussion. In a debate, they are trying to convince the opposing team of students that their point of view is correct, or attempt to prove the other side is wrong. Remind them of the TED debate that they watched previously. Decide if the pro or con side will rotate during the speed debate portion. At a table of four, have the two opposing sides face each other. Explain to students that they will have one minute per team (two minutes total for both) to explain their argument in support of nuclear power using textual evidence to support it. Teachers can set a timer to make sure the time is adhered to. As teams listen to the opposing viewpoint, they record key points the team made that stood out to them, along with evidence they used to support it. Give teams two minutes to form a rebuttal and one minute to present their rebuttal. Teams then put a

				check on their graphic organizer if the opposing team overall convinced them of their argument. Have teams rotate after the rebuttal phase with one team rotating counterclockwise or clockwise to a new team. Students can repeat the process two or three times so they hear a range of different pieces of evidence and arguments from students. Finally, as a separate exit ticket or on the graphic organizer, students write the names of the two debaters they felt had convincing key points and use of evidence. They submit this anonymously to the educator. You can decide if you want to award a prize of some kind. Even if no prize is given, you can see patterns of what evidence or ideas stood out to students and share that with the class the following day.
	Standards: **WHST.11-12.1** : Write arguments focused on discipline-specific content. **1.3.** : Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.			
	Additional Attachments: **Speed Dating Debate Student Norms** **Student Speed Dating Graphic Organizer**			
Writing Process				
50 mins	**ESTABLISHING THE CONTROLLING IDEA**: Ability to establish a claim and consolidate information relevant to task.	**CLAIM STATEMENT USING TVA** SWBAT develop and strengthen a claim in writing on the advantages and disadvantages of nuclear power using content vocabulary (argument, topic, claim and verb).	Meets expectations if students: • **Create a claim statement that contains all formula elements.**	**I DO** Review T+V+A with sudents: T= topic, what it means V= strong action verb A= argument – the specific debatable points or what s/he wants to say (Ask students for three key points.) Color-code the components for students, e.g., Topic = red, Verb = blue, and Argument = green. Model on a topic that is different from the class topic. When modeling the argument, number the three key points of the argument. For example: “Americans should eliminate (verb) the regular consumption of fast food (topic) because a fast food diet leads to preventable and expensive health issues, such as diabetes, obesity, and heart disease. (argument)” Review the essay prompt. Make sure students have this to refer to as they write their theses. **WE DO** Distribute the graphic organizer and have students work in pairs to color-code the components, e.g., Topic = red, Verb = blue, and Argument = green. Some of the examples are missing components. Ask students to identify what is missing. For the argument, ask students to number the key

				points. You may also ask them to fix/edit the claim statements that are missing components. Review the answers as a whole class. Ask students to circle the claim statement that has all components present. **YOU DO** Each student will create a claim statement on the graphic organizer. Pair up students to review their claim statements by providing feedback on the quality, the effectiveness of addressing the prompt and its ability to meet all criteria. o With the class, highlight strong claim statements on the board or using the document camera. **Exit card** Write your name and claim statement on a notecard. Hand it to the teacher on your way out the door. Teacher will provide feedback to students on their claim statements. **Differentiation** Optional support: Provide students with a list of verbs to choose from. You may choose to have students working in pairs or groups during the WE DO portion of the lesson.
	Standards: **WHST.11-12.5** : 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. **WHST.11-12.4** : Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.			
	Additional Attachments: **Verbs** **T+V+A = Thesis Statement**			
40 mins	**PLANNING THE WRITING**: Ability to develop a line of thought and text structure appropriate to an argumentation task.	**STICKY NOTE ARGUMENT PLAN** SWBAT justify in writing how their evidence supports their claim about nuclear power using causal language (because, due to the fact, which led to, etc.).	Meets expectations if students: • **Have three key points, each of which is supported by two pieces of textual evidence** • **Have one key counterpoint supported by two pieces of textual evidence** • **Elaborate and write a clear explanation (1–2 sentences) of how each piece of textual evidence proves their key point** • Optional planning, current/ past examples.	Students will use their thesis statement to develop three key points for their essays, recording them on sticky notes, which they place on their Argument Plan. Each key point is supported by two pieces of textual evidence and one piece of opposing evidence. For each piece of textual evidence, students record (on a sticky note) an explanation of how the evidence supports or opposes the key point, and place it on the Argument Plan. To model for students, use the scenario of a person who shoplifts something while a group of friends watch. Who is responsible, and how did that responsibility develop? Students work in small, collaborative groups, with each student producing their own plan. Ask them to begin their Argument Plan by going back and looking through their notes and searching for three key points that support their thesis statement. Direct students to use three large sticky notes to establish their three key points. They place these in each of the Key Point boxes on the Argument Plan. Direct students to review all notes from the active

reading portion of the module and also dig back into the texts to find specific pieces of textual evidence that support and oppose each key point. Tell students to write each piece of evidence on smaller sticky notes and place each sticky note in an Evidence or Opposing Evidence box under each Key Point on the Argument Plan.

For each piece of textual evidence, ask the students to write a clear explanation of how the evidence supports or opposes the key point. Use larger sticky notes for this step, since the explanation should be 1-2 sentences. Note: This is not the draft, just "thinking on a sticky note" about what should be in that part of the argument.

Students then place these sticky notes on their Argument plan.

Why use sticky notes?

Writing each piece of the argument on an individual sticky note will enable students to lift them off the Argument Plan and arrange them into an order in which they want to write them out. For instance, they might choose to begin with opposing evidence and follow with supporting; or they may choose to begin with an explanation and follow with a piece of evidence. They may even choose to place their Key Point at the end of a string of evidence/explanations. The sticky notes enable them to play with the structure of their argument in a flexible and kinesthetic way.

NOTE: This effect can also be achieved electronically by typing within the boxes of the Argument Plan, and then using copy/paste onto another document to play with the organization of the pieces.

Student Objectives: (What will I know?)

• I will know that I have chosen and placed the best pieces of evidence and opposing evidence for my argument.

• I will also know how to connect my evidence to my thesis statement.

• Why? I will be able to think about the best choices for evidence, and how they connect to my claim (thesis), before I need to think about how to draft them into paragraphs.

Standards:

RST.11-12.9 : Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

RST.11-12.4 : Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11—12 texts and topics.

RST.11-12.1 : Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

Additional Attachments:

Argument Plan Nuclear Power

Lino interactive online stickynotes

1 hr	**PLANNING THE WRITING**: Ability to develop a line of thought and text structure appropriate to an argumentation task.	**INITIAL DRAFT**
		SWBAT argue in writing their response to the task prompt, using transition words and phrases (as a matter of fact, generally speaking, in addition, etc.).
			Meets expectations if students:
			• **Create an initial draft that contains:**
			  ◦ **An introduction with background on nuclear power and a claim**
			  ◦ **Body paragraphs (including counterclaim) with both evidence from the text cited, using parenthetical citations and logical reasoning from the student**
			  ◦ **A conclusion that connects back to the claim and leaves a lasting impression, or a call to action, for the audience.**
				Give students time to revisit the feedback you provided on the argument plan and ask any questions for clarification.
				
				Have students use their argument plan and any other graphic organizers to write out their initial draft. Remind them that the argument plan should help organize their writing, and they should ensure that their topic sentence introduces the whole paragraph.
				
				• Prior to writing the draft, review with students the MEAT paragraph structure. Display this structure for students to see in the classroom.
				• You may also provide students with transition words of phrases.
				
				Encourage students to re-read the prompt partway through writing, to check that they are on track.
				
				Circulate around the room to respond to student questions or provide feedback.

	Standards: **WHST.11-12.4** : Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **WHST.11-12.1** : Write arguments focused on discipline-specific content.			
	Additional Attachments: **Transition Words for Writing** **MEAT**			
1 hr	**PEER REVISION AND EDITING**: The ability to peer edit and provide feedback on writing.	**PEER REVISING ROUND TABLE** SWBAT evaluate in writing their peers initial drafts using scientific argument language (claims, evidence and reasoning, etc.)	Meets expectations if students: • Hone feedback on the sheet to make it focused and targeted, providing clear next steps for the author • Focus feedback during the discussion on both strengths and weaknesses • **Explain why an aspect of the author's essay is missing or needs to be developed** • **Submits the Grade the Feedback sheet with explanations regarding the quality of the oral and written feedback the author received.**	Arrange students into groups of four. Distribute the Guidelines for Peer Round Table Handout to all students and read aloud the handout to the group. Pass out also the Peer Reviser Graphic Organizer. Explain to students that all peer revisers will be using the sheet to provide feedback to the author of the essay. The sheet will also be passed when the essay is passed. Have students revise a paper for between 10 minutes, writing directed and specific responses in the author's graphic organizer. Students pass the paper to the next group member for further revision. When all of the members of the group have read an essay, have them discuss their feedback and general aspects or themes of the essay that they noticed. Tell them to limit this discussion to not longer than five minutes. Encourage them to focus the discussion on both the strengths and weaknesses of the essay. The author will take notes silently on the discussion on their graphic organizer. When the discussion is over, the author asks those who revised his/her paper clarifying questions about any other aspects that did not come up in discussion. Have students complete and then submit the Peer Accountability Sheet. Module Author and School - Jacqueline Goods, Adrian Constant, Marilyn Ménélas, Jennifer Rygalski (Academy of Innovative Technology)

	Standards: **WHST.11-12.7** : Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.11-12.5** : 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. **WHST.11-12.2** : Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. **SL.11-12.1** : Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11—12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.			
	Additional Attachments: **Guidelines for Peer Round Table** **Peer Accountability - Evalaute the Feedback** **Group Peer Revision Graphic Organizer**			
10 mins	**FINAL DRAFT**: Ability to submit final piece that meets expectations.	**FINAL PIECE** SWBAT argue in writing their response to the task prompt using transition words and phrases (as a matter of fact, generally speaking, in addition, etc.)	• **Fits the "Meets Expectations" category in the rubric for the teaching task.**	*None*
	Standards: **WHST.11-12.10** : Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.			

Instructional Resources

No resources specified

Section 4: What Results?

Student Work Samples

Meets Expectations

High Student Work

Approaches Expectations

Medium Student Work

Not Yet

Low Student Work

Teacher Reflection

Not provided

All Attachments

- **exploringnuclearenergy.pdf : https://s.ldc.org/u/8qkmqurh4go4k30w8fak1uwwo**
- **"Nuclear Power Safety Concerns" (reading) : https://s.ldc.org/u/7p5fjm1i5zsigz4oscx45f60t**
- **"At U.S. Nuclear Sites, Preparing for the Unlikely" (reading) : https://s.ldc.org/u/en86rr8vdikvlaqjbj28xyhga**
- **"How Nuclear Power Can Stop Global Warming" (reading) : https://s.ldc.org/u/30hlaerv17aptviu9wjm5530j**
- **Stewart Brand + Mark Z. Jacobson: Debate: Does the world need nuclear energy? (video) : https://s.ldc.org/u/ek7xhyv236z8ekzziz3nagtbh**
- **High Student Work : https://s.ldc.org/u/59mca1eakva9ru937pafe0538**
- **Medium Student Work : https://s.ldc.org/u/csyvr0b1bw6lcneccqvubwfe8**
- **Low Student Work : https://s.ldc.org/u/97fbonp6elqrca2inq2s5abim**