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Energy Pioneers Lesson Plan

Michigan Grade Level Content Expectations and Common Core State Standards

Sixth

SCIENCE

Inquiry Analysis and Communication

- S.IA.06.15- Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, and data.

Reflection and Social Implication

- S.RS.06.18—Describe what science and technology can and cannot reasonably contribute to society.
- S.RS.06.19—Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.

SOCIAL STUDIES

Public Discourse, Decision Making, and Citizens Involvement

P4.2 Citizen Involvement

- 6 – P4.2.3—Participate in projects to help or inform others (e.g., service learning projects).

ENGLISH LANGUAGE ARTS

Reading Standards for Informational Text (RI)

Integration of Knowledge and Ideas

- RI.6.7 Integrate information presented in different media or formats (e.g., visually quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

Writing Standards (W)

Production and Distribution of Writing

- W.6.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Speaking and Listening Standards (SL)

Presentation of Knowledge and Ideas

- SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
- SL.6.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Language Standards (L)

Conventions of Standard English

- L.6.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Seventh

SCIENCE

Inquiry Analysis and Communication

- S.IA.07.15- Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, and data.

Reflection and Social Implication

- S.RS.07.18—Describe what science and technology can and cannot reasonably contribute to society.
  S.RS.07.19—Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.

SOCIAL STUDIES

Public Discourse, Decision Making, and Citizens Involvement

P4.2 Citizen Involvement

- 7 – P4.2.3—Participate in projects to help or inform others (e.g., service learning projects).

HI.2 Historical Inquiry and Analysis

- HI.2.2 Read and comprehend a historical passage to indentify basic factual knowledge and literal meaning by indicating who was involved, what happened, where it happened what events led to the development, and what consequences or outcomes followed.
- HI.2.6 Identify the role of the individual in history and the significance of one person's ideas.

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Production and Distribution of Writing

- W.7.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.

Speaking and Listening Standards (SL)

Presentation of Knowledge and Ideas

- SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
- SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Language Standards (L)

Conventions of Standard English

- L.7.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Eighth

SCIENCE

Inquiry, Reflection, and Social Implication

- 1.2C Develop an understanding of scientific concepts by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
- 1.2I Explain the progression of ideas and explanations that leads to science theories that are part of the current scientific consensus or core knowledge.

SOCIAL STUDIES

Public Discourse, Decision Making, and Citizens Involvement

P4.2 Citizen Involvement

- 8 – P4.2.3—Participate in projects to help or inform others (e.g., service learning projects).

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Production and Distribution of Writing

- W.8.6 Use technology, including the internet, to produce and write and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.

Research to Build and Present Knowledge

- W.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.

Speaking and Listening Standards (SL)

Presentation of Knowledge and Ideas

- SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
- SL.8.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Language Standards (L)

Conventions of Standard English

- L.8.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Ninth & Tenth

SCIENCE

Inquiry, Reflection, and Social Implication

- 1.2C Develop an understanding of scientific concepts by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
- 1.2I Explain the progression of ideas and explanations that leads to science theories that are part of the current scientific consensus or core knowledge.

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Production and Distribution of Writing

- W.9-10.6 Use technology, including the internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Research to Build and Present Knowledge

- W.9-10.7 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.
- W.9-10.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; asses the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

Speaking and Listening Standards (SL)

Presentation of Knowledge and Ideas

- SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
- SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
- SL.9-10.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Language Standards (L)

Conventions of Standard English

- L.9-10.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Eleventh & Twelfth

SCIENCE

Inquiry, Reflection, and Social Implication

- 1.2C Develop an understanding of scientific concepts by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
- 1.2I Explain the progression of ideas and explanations that leads to science theories that are part of the current scientific consensus or core knowledge.

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Production and Distribution of Writing

- W.11-12.6 Use technology, including the internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

- W.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.
- W.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; asses the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Speaking and Listening Standards (SL)

Presentation of Knowledge and Ideas

- SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspective are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
- SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
- SL.11-12.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Language Standards (L)

Conventions of Standard English

- L.11-12.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Grades 6-12 Literacy in History/Social Studies, Science, & Technical Subjects

Grade Bands 6th—8th , 9th—10th, & 11th—12th

Reading Standards for Literacy in Science & Technical Subjects

Integration of Knowledge and Ideas

- RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- RST.9-10.9—Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
- 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.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subject

Research to Build and Present Knowledge

- 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.
- 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.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
- WHST.9-10.7 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.9-10-8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- WHST.9-10.9 Draw evidence from informational texts to support analysis, reflection, and research.
- 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.11-12-8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
- WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection and research.

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Lesson Outcome

The student will research and present information on an important scientist or inventor who has made contributions to energy-related science.

Rationale / Purpose for Lesson

The discoveries of many scientists allow us to enjoy the everyday benefits of energy. This activity is designed to introduce students to many of the scientists and inventors who have contributed to the development of today's modern energy systems. Students may also be exposed to the developments that are being made in the technology of renewable energy.

Resources / Materials Required

- Teacher information guide (below)
- Access to research and reference materials such as encyclopedias, biographies, and the Internet
  - EasyBib http://www.easybib.com/
  - Citation Machine http://www.citationmachine.net/
- Copies of "Student Instruction Sheet" (below)
- Copies of "Oral Presentation Rubric" (below)

Introduction

- Ask students to name 10 or 15 inventions that directly impact their daily life. Review the list to see if any are energy related inventions (such as the light bulb).
- Have the students brainstorm some inventions that have impact on how they are able to use energy (such as having access to energy from electric and gas sources).
- Using the "Teacher Information Guide" and the "Student Instruction Sheet," introduce the research project, which will allow students to learn even more about these important scientific discoveries.

Procedures

- Distribute the "Student Instruction Sheet" and "Oral Presentation Rubric." Review the procedures for the research project and oral presentation.
- Allow students to conduct research and compile presentation information over several days.
- Have students give oral presentations in chronological order, highlighting how one discovery helped lead to later discoveries by other scientists.

Closure

After all of the presentations have been given, ask students what they learned about scientists, energy, or inventions. Ask students what new technology and energy uses scientists may be developing today. Also, discuss as a whole class, using evidence from the presentations, which inventor they feel has had the most impact on our society and why.

Teacher Information Guide

Suggested Scientists/Inventors

- Benjamin Franklin, 1706
- James Watt, 1736
- Alessandro Volta, 1745
- John Dalton, 1766
- Hans Oersted, 1777
- Georg Simon Ohm, 1787
- Machael Faraday, 1791
- James Prescott Joule, 1818
- Edwin Laurentine Drake, 1819
- James Clerk Maxwell, 1831
- Thomas Edison, 1847
- Lewis Latimer, 1848
- Nikola Tesla, 1856
- William Stanley, 1858
- Frederick M. Jones, 1892
- Elizabeth Riddle Graves, 1916
- Nancy Fitzroy, 1927
- Lesley Yellowlees, 1953

- Other:
  - ⇒ Have students select an inventor listed on the "Famous People in Energy" page on the U.S. Energy Information Administration's website or on the "Super Scientist" page from Energy Quest.
  - ⇒ Have students research an inventor of newer technology including scientists and engineers working with alternative energy or energy efficiency.

Suggested Research Websites

- Consumers Energy Kids Energy History
- U.S. Energy Information Administration's Energy Kids
- Energy Quest
- Wolfrom Research Science World
- PBS Edison's Miracle of Light
- EasyBib http://www.easybib.com/
- Citation Machine http://www.citationmachine.net/

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Pioneers of Energy Oral Presentation

Student Instruction Sheet

1. Select a scientist or inventor who has made contributions to the field of energy. Your teacher may provide a list of suggested scientists to you. If you choose a scientist who is not on the list, make sure to have your selected scientist approved by your teacher.

2. Conduct research on the scientist you selected. Look for historical information on the person's life and scientific discoveries. Complete research will include information on:
   - Date and location of birth
   - Pertinent information on upbringing, such as family life or early schooling
   - How the scientist became interested in science or started working in the science field (include jobs held by the scientist)
   - Important scientific discoveries or inventions and their impacts
   - Other information you consider important in understanding the scientist's life or scientific contributions

3. Prepare a 5 to 10 minute oral presentation to present the findings of your research. Your presentation should include visual support such as a computer slideshow, a display board, pictures, brochures, etc. Presentations will be graded using the "Oral Presentation Rubric."

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Oral Presentation Rubric: Pioneers of Energy

Student Name: _____

CATEGORY	4	3	2	1
Conducted Research	All historical information appeared to be accurate and in chronological order.	Almost all-historical information appeared to be accurate and in chronological order.	Most of the historical information was accurate and in chronological order.	Very little of the historical information was accurate and/or in chronological order.
Presentation Content	Shows a full understanding of the topic, including all required historical elements.	Shows a good understanding of the topic, including required historical elements.	Shows a good understanding of parts of the topic, including some of the required historical elements.	Does not seem to understand the topic very well.
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Visual Support	Student uses visuals that show considerable work/creativity and which enhanced the presentation.	Student uses one visual that shows considerable work/creativity and which make the presentation better.	Student uses one visual that makes the presentation better.	The student uses no visuals OR the props chosen take away from the presentation.
Sources	All sources (information and graphics) are accurately cited in the desired format.	All sources (information and graphics) are cited, but one or two are not in the desired format.	All sources (information and graphics) are cited, but the majority are not in the desired format.	All sources are cited, but only one in the desired format.
Listens to Others' Presentations	Listens intently. Does not make distracting noises or movements.	Listens intently but has one distracting noise or movement.	Sometimes does not appear to be listening but is not distracting.	Sometimes does not appear to be listening and has distracting noises or movements.