



REEL ENGINEERS: SIR ISAAC NEWTON GOES FISHING

6th-8th Grade Discussion Guide

Developed by: Dan Bertalan and Phyllis McKenzie

SCIENCE CATEGORIES

Physical Science, Life Science, Engineering, Technology

TIMEFRAME

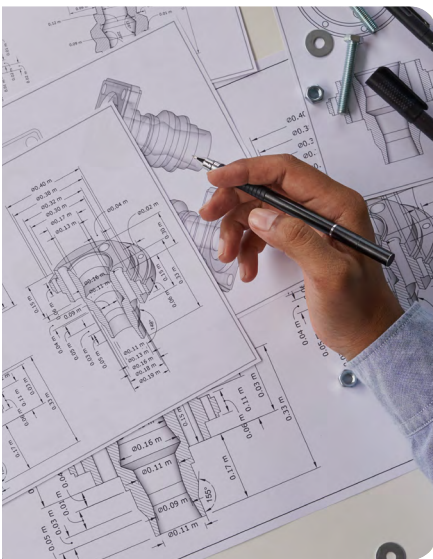
Three, 45-minute Sessions

MATERIALS

Access to computers and the internet, Pre-lesson Worksheet, "Sir Isaac's Perfect Kid's Reel" Worksheet

TOPICS

Physics, engineering, energy transfer, Newton's 3 Laws of Motion



LEARNING OBJECTIVES

Students will be able to:

- Understand the different considerations in designing a device within the reality of Newton's Laws of Motion. They will also understand that engineering designs can be adapted to fulfill the specialized need of kids in certain outdoor activities.
- Define the reasons for designing a fishing reel and identify the laws of motion that influence their reel designs.
- Use video, online research and classroom discussion in developing and supporting their understanding of Newton's Laws of Motion.
- Work in small and large groups to process new information and use various physical science evidence to develop and come to conclusions.

ACTIVITY SUMMARY

Students will work in "design teams" to research, conceptualize, and create an innovative design for a special "kid's fishing reel". Their design will consider factual information, logic, and Newton's three laws of physics to create a fishing reel while helping their class learn about the laws of motion involved in fishing.

BACKGROUND INFORMATION

OVERVIEW (Teacher reads this first section to the students; it is also included in the various Student Group Worksheets)

Alert to Students: This story contains historical fiction – key parts are fact with the fictional slant that Newton was an angler)

After returning from a fishing trip in the year 1685, Sir Isaac Newton kept recalling the excitement of catching a pike while losing an even bigger one when his fishing line snapped from a sudden surge of power from the big fish. Still lost in thought over his fishing adventure, he haphazardly placed his fishing rod and makeshift reel up on a shelf. But as he turned to leave, the rod and reel fell off the shelf and knocked Sir Isaac in the head. As the reel struck him, so did a new



concept of physics that explained why he was able to land the smaller pike yet the big one with more “power in motion in opposite directions” broke his fishing line. Suddenly, Sir Isaac had an idea for designing an innovative fishing reel that would only allow a fish to pull out line from the reel with a certain amount of force to keep it from breaking while also tiring the fish so he could eventually land it! And the rest is fishing and physics history (unlike this historical fiction story).

But in 1687, Newton really did publish his Classical Three Laws of Motion which state:

- Law 1. A body remains at rest, or in motion at a constant speed in a straight line, unless acted upon by a force.
- Law 2. When a body is acted upon by a force, the time rate of change of its momentum equals the force.
- Law 3. If two bodies exert forces on each other, these forces have the same magnitude but opposite directions.

Using Newton’s Three Laws of Motion, you will work with your “reel engineer” team to design a special fishing reel for kids. Your design will use a combination of features from a modern spincasting reel with Newton’s laws to help kids fight and land big fish (without their line snapping like poor Sir Isaac. Your team will then present your design to the class. What fun!

(For Teacher only) By taking part in this lesson, students will develop an understanding of the concepts of physics in designing outdoor equipment while using critical thinking in a peer-driven activity where students ask critical questions, perform research, and present their innovative fishing reel designs to the rest of the class.





LEARNING PROCEDURE

Spincast Fun! classroom video and background information can be found at; intotheoutdoors.org/topics/into-fishing-with-a-spincaster-reel/

SESSION 1

Before watching the Spincasters classroom video, or, reading the website background information, ask students what they know about how a fishing reel works. Also ask students how many have actually been fishing and what type of fishing rods and reels they may have used. Then lead a class discussion about the basic physics of using a fishing reel.

Print and distribute the *Pre-Lesson Student Worksheet* (copy contained in this PDF). Instruct students to fill in the worksheet while watching the *Spincasters* video. Go over the questions with the students before viewing so they know what to look and listen for. After viewing the video, review and discuss the answers to the questions as a class.

Next, print (or e-distribute) and hand out the *“Sir Isaac’s Perfect Kid’s Reel” Worksheet* (copy contained in this PDF). Inform students they will be working together within “engineer team groups” to design a new “kid’s fishing reel”. Explain briefly what they will do in each of the three Sessions. Answer any questions about the assignment.

SESSION 2 - Group Research & Reel Design Development

Divide the class into smaller groups (teams) of three or four students each. Have students review their worksheet assignment within their group, perform online research from the resource links provided on the webpage, plus other sources they discover, then discuss and develop their team’s perfect kid’s fishing reel. The worksheet provides specific instructions for students on what to consider in developing their reel designs. Inform each team that two members of their team will also present their Sir Isaac’s Perfect Kid’s Reel Design to the entire class during Session 3. Their presentations should be supported by research and/or evidence, at least one of Newton’s Laws of Motion, and presented with at least one form of art or media prepared by the group (either video, poster, graphs, charts, images, or art).

SESSION 3 - Student Group Presentations & Class Debate

Using their completed worksheets, have each team present their Sir Isaac’s Perfect Kid’s Reel Design and supporting research... which should include at least one of Newton’s Laws of Motion. Limit each group to five minutes presentation time followed by several minutes of questions and discussion between the groups to compare and contrast their different designs. Encourage discussion about differences on how to possibly combine the best features of different designs.

After the teams each present their Sir Isaac’s Perfect Kid’s Reel Design, lead a class discussion on what key features from the designs could be combined into the perfect reel. Encourage discussion that includes an understanding Newton’s 3 Laws of Motion in the function of a fishing reel.

Conclude Session 3 by listing on the board four or five important design features that the class believes would make the perfect kid’s fishing reel. Then lead a fun discussion (or ad-lib fictional story) on how they might hook, fight and land a huge pike with their new reel design.



ASSESSMENT

Students will be informally assessed based on their participation within their teams and during class presentations and discussions. Teachers could collect the discussion notes students took during the video to check for completion.

Students can be formally assessed using their Sir Isaac's Perfect Kid's Reel Worksheets. Students can be assessed on meeting the formal learning objectives on how thoroughly students completed their respective worksheets.

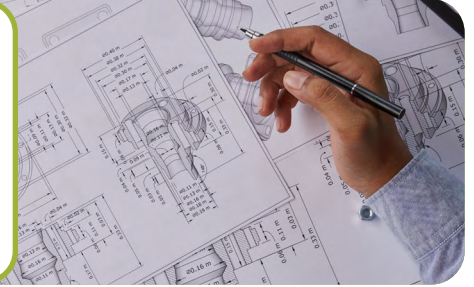
EXTENDING THE LESSON *(Options for extended/additional activities and lessons)*

Students who have access to various fishing reels can bring them into class and give a short presentation on how they function, how they are related to the laws of physics, and how different reels might be better suited for fishing different fishing methods and various fish species. These presentations can be engaging by also telling an actual fishing story!



REEL ENGINEERS PRE-LESSON STUDENT WORKSHEET

Developed by: Dan Bertalan and Phyllis McKenzie



Student Name: _____ Class: _____ Date: _____

Before watching the video or exploring the website, review these questions, look for and write down your answers while watching the video.

1) What are the main functions of a fishing reel?

2) What are some of the forces of motion and physics in catching a fish?

3) What reel design feature might keep the line from breaking when fighting a big fish?

4) What features make a fishing reel easier for beginners to use?

5) What other key components work in conjunction with the reel during fishing... and catching fish?



SIR ISAAC'S PERFECT KID'S REEL WORKSHEET

Developed by: Dan Bertalan and Phyllis McKenzie



Student Name: _____ Class: _____ Date: _____

Congratulations on being accepted to Sir Isaac Newton's School of Perfect Kid's Reel Design where you'll learn, as Sir Isaac did, how to design the ideal fishing reel using Newton's Laws of Motion.

Alert and Disclaimer to Students: This story is presented as historical fiction – with some key parts being fact with others being fictional, such as Newton being an angler... which may or may not be true.

After returning from a fishing trip in the year 1685, Sir Isaac Newton kept recalling the excitement of catching a pike while losing an even bigger one when his fishing line snapped from a sudden surge of power from the big fish. Still lost in thought over his fishing adventure, he haphazardly placed his fishing rod and makeshift reel up on a shelf. But as he turned to leave, the rod and reel fell off the shelf and knocked Sir Isaac in the head. As the reel struck him, so did a new concept of physics and motion that explained why he was able to land the smaller pike yet the big one with more "power in motion in opposite directions" broke his fishing line. Suddenly, Sir Isaac had an idea for designing an innovative fishing reel that would only allow a fish to pull out line from the reel with a certain amount of force to keep the line from breaking while also tiring the fish so he could eventually land it! And the rest is fishing and physics history (unlike this historical fiction story).

Nonetheless, in 1687, Newton really did publish his *Classical Three Laws of Motion* which state:

- Law 1. A body remains at rest, or in motion at a constant speed in a straight line, unless acted upon by a force.
- Law 2. When a body is acted upon by a force, the time rate of change of its momentum equals the force.
- Law 3. If two bodies exert forces on each other, these forces have the same magnitude but opposite directions.

Using Newton's Three Laws of Motion, you will work within your "reel engineer" team to design a special fishing reel for kids. Your design will use a combination of features from a modern spincasting reel with Newton's laws to help kids fight and land big fish ... without their line snapping like poor Sir Isaac. Your team will then present your design to the class. What fun!



The goal of your reel design team is to research and create Sir Isaac's Perfect Kid's Reel design that should answer these critical questions:

1. What are the key design features of a modern "spincasting" fishing reel? Be specific...
2. How are each of those features affected by at least one (or more) of Newton's 3 Laws of Motion?
3. How are all three of Newton's Laws of Motion involved in the process of catching a fish? (Internet research *Newton's Laws of Motion*)
4. Using your answers to the first three questions, what features would you design into the perfect kid's fishing reel? Consider differences between kids and adults – as most reels are designed for adults.
5. Using paper, computers, video, or mock parts, design the perfect fishing reel. Consider other technologies or electronics that might make your reel design stand out.
6. Prepare for your Session 3 presentation that should include either video, poster, handouts or acting out catching a big fish using your reel design. So be creative and have fun.

Now go work as a reel design team to create an awesome Sir Isaac's Perfect Kid's Reel design to present in Session 3.



The following National Common Core Standards can be met teaching;

REEL ENGINEERS: SIR ISAAC NEWTON GOES FISHING

6TH GRADE:

CCSS.ELA-LITERACY.RI.6.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
CCSS.ELA-LITERACY.RI.6.2	Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
CCSS.ELA-LITERACY.RI.6.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
CCSS.ELA-LITERACY.RI.6.6	Determine an author's point of view or purpose in a text and explain how it is conveyed in the text.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.W.6.1	Write arguments to support claims with clear reasons and relevant evidence.
CCSS.ELA-LITERACY.W.6.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.6.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
CCSS.ELA-LITERACY.W.6.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS.ELA-LITERACY.W.6.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
CCSS.ELA-LITERACY.W.6.6	Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.
CCSS.ELA-LITERACY.W.6.7	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
CCSS.ELA-LITERACY.W.6.8	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
CCSS.ELA-LITERACY.W.6.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
CCSS.ELA-LITERACY.W.6.10	Write routinely over extended time frames (time for research, reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
CCSS.ELA-LITERACY.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.



CCSS.ELA-LITERACY.SL.6.3	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.SL.6.5	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
CCSS.ELA-LITERACY.SL.6.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
CCSS.ELA-LITERACY.L.6.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
CCSS.ELA-LITERACY.L.6.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
CCSS.ELA-LITERACY.L.6.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
CCSS.ELA-LITERACY.L.6.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.
CCSS.ELA-LITERACY.L.6.5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
CCSS.ELA-LITERACY.L.6.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

7TH GRADE:

CCSS.ELA-LITERACY.RI.7.1	Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
CCSS.ELA-LITERACY.RI.7.3	Analyze the interactions between individuals, events, and ideas in a text e.g., how ideas influence individuals or events, or how individuals influence ideas or events).
CCSS.ELA-LITERACY.RI.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.
CCSS.ELA-LITERACY.RI.7.6	Determine an author's point of view or purpose in a text and analyze how the author distinguishes his or her position from that of others.
CCSS.ELA-LITERACY.W.7.1	Write arguments to support claims with clear reasons and relevant evidence.
CCSS.ELA-LITERACY.W.7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.7.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
CCSS.ELA-LITERACY.W.7.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.



CCSS.ELA-LITERACY.W.7.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
CCSS.ELA-LITERACY.W.7.6	Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.W.7.8	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.
CCSS.ELA-LITERACY.W.7.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
CCSS.ELA-LITERACY.W.7.10	Write routinely over extended time frames (time for research, reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
CCSS.ELA-LITERACY.SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.7.2	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
CCSS.ELA-LITERACY.SL.7.3	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.SL.7.5	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
CCSS.ELA-LITERACY.SL.7.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
CCSS.ELA-LITERACY.L.7.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
CCSS.ELA-LITERACY.L.7.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
CCSS.ELA-LITERACY.L.7.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
CCSS.ELA-LITERACY.L.7.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.
CCSS.ELA-LITERACY.L.7.5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
CCSS.ELA-LITERACY.L.7.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.



8TH GRADE:

CCSS.ELA-LITERACY.RI.8.1	Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
CCSS.ELA-LITERACY.RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events.
CCSS.ELA-LITERACY.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
CCSS.ELA-LITERACY.RI.8.6	Determine an author's point of view or purpose in a text and analyze how the author distinguishes acknowledged and responds to conflicting evidence or viewpoints.
CCSS.ELA-LITERACY.RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multi-media) to present a particular topic or idea.
CCSS.ELA-LITERACY.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
CCSS.ELA-LITERACY.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.8.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
CCSS.ELA-LITERACY.W.8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS.ELA-LITERACY.W.8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
CCSS.ELA-LITERACY.W.8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.W.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.
CCSS.ELA-LITERACY.W.8.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
CCSS.ELA-LITERACY.W.8.10	Write routinely over extended time frames (time for research, reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
CCSS.ELA-LITERACY.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.SL.8.2	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
CCSS.ELA-LITERACY.SL.8.3	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.



CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
CCSS.ELA-LITERACY.SL.8.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
CCSS.ELA-LITERACY.L.8.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
CCSS.ELA-LITERACY.L.8.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
CCSS.ELA-LITERACY.L.8.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
CCSS.ELA-LITERACY.L.8.4	Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.
CCSS.ELA-LITERACY.L.8.5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
CCSS.ELA-LITERACY.L.8.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

6TH - 8TH GRADE:

CCSS.ELA-LITERACY.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
CCSS.ELA-LITERACY.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
CCSS.ELA-LITERACY.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).
CCSS.ELA-LITERACY.RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
CCSS.ELA-LITERACY.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.
CCSS.ELA-LITERACY.WHST.6-8.1	Write arguments focused on discipline-specific content.
CCSS.ELA-LITERACY.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
CCSS.ELA-LITERACY.WHST.6-8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.



- CCSS.ELA-LITERACY.WHST.6-8.5** With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
- CCSS.ELA-LITERACY.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.
- CCSS.ELA-LITERACY.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.
- CCSS.ELA-LITERACY.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
- CCSS.ELA-LITERACY.WHST.6-8.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.
- CCSS.ELA-LITERACY.WHST.6-8.10** Write routinely over extended time frames (time for research, reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

NEXT GENERATION SCIENCE STANDARDS:

- MS-PS2-1.** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.
- MS-PS2-2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces of the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.
- 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.