FIRST EDUCATION

Common Core

English Language Arts

Reading: Informational Text

7-12

Legend

X The standard is clearly addressed by program activities.

- This standard potentially could be addressed as part the program either by actions that the coach or teacher takes when working with the students or by conditions established by the program.

Grade	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
7th Grade- *ELA Reading Informational Text*	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.	X	X	X
	RI.7.2	Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text.	X	X	X
	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).	-	-	X
	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.	-	-	X
	RI.7.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to the development of the ideas	-	-	-
	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.	-	-	-
	RI.7.7	Compare and contrast a text to an audio, video, or multimedia version of the text, analyzing each medium's portrayal of the subject (e.g., how the delivery of a speech affects the impact of the words).	-	-	X
	RI.7.8	Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.	-	-	X
	RI.7.9	Analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts	-	-	X
	RI.7.10	By the end of the year, read and comprehend literary nonfiction in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	X	X	X
8th Grade	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.	X	X	X
	RI.8.2	Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.	X	X	X
	RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events.	-	-	X
	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.	-	-	X
	RI.8.5	Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	-	-	X

	RI.8.6	Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.	-	-	-
	RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.	-	-	X
	RI.8.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.	-	-	X
	RI.8.10	By the end of the year, read and comprehend literary nonfiction at the high end of the grades 6–8 text complexity band independently and proficiently.	X	X	X
9th -10th Grade- *ELA Reading Informational Text*	RI.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	X	X	X
	RI.9-10.2	Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	X	-	X
	RI.9-10.3	Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.			X
	RI.9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).	-	-	-
	RI.9-10.5	Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).	-	-	-
	RI.9-10.6	Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.	-		X
	RI.9-10.7	Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.	-		X
	RI.9-10.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.	-	X	X
	RI.9-10.9	Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail"), including how they address related themes and concepts.			
	RI.9-10.10	By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9–10 text complexity band independently and proficiently.	X	X	X
	RI.11-12.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.	X	X	X
	RI.11-12.2	Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.	X	-	X

Grade 11-12- *ELA Reading Informational Text*	RI.11-12.3	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.	X	X	X
	RI.11-12.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).	-	-	X
	RI.11-12.5	Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.	X	X	X
	RI.11-12.6	Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.	X	X	X
	RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.	X	X	X
	RI.11-12.8	Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S.Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).			
	RI.11-12.9	Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance for their themes, purposes, and rhetorical features.			
	RI.11-12.10	By the end of grade 11, read and comprehend literary nonfiction in the grades 11-CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11-CCR text complexity band independently and proficiently.	X	X	X

FIRST EDUCATION

Common Core
English Language Arts
Writing
7-12

Legend
X The standard is clearly addressed by program activities.
- This standard potentially could be addressed as part the program either by actions that the coach or teacher takes when working with the students or by conditions established by the program.

Grade	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
Grade 7- *ELA Writing*	W.7.1	Write arguments to support claims with clear reasons and relevant evidence.	X	X	X
		a. Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.	X	X	X
		b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.	X	X	X
		c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.	X	X	X
		d. Establish and maintain a formal style.	X	X	X
		e. Provide a concluding statement or section that follows from and supports the argument presented.	X	X	X
	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.	X	X	X
		a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., readings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.	X	X	X
		b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.	X	X	X
		c. Use appropriate transitions to create cohesion and clarify the relationships among ideas and concepts.	X	-	X
		d. Use precise language and domain-specific vocabulary to inform about or explain the topic.	X	X	X
		e. Establish and maintain a formal style.	X	X	X
		f. Provide a concluding statement or section that follows from and supports the information or explanation presented.	X	X	X
	W.7.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.	-	-	-
		a. Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters; organize an event sequence that unfolds naturally and logically.	-	-	-
		b. Use narrative techniques, such as dialogue, pacing, and description, to develop experiences, events, and/or characters.	-	-	-
		c. Use a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another.	-	-	-
		d. Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.	-	-	-
		e. Provide a conclusion that follows from and reflects on the narrated experiences or events.	-	-	-
	W.7.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	X	X	X
	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.	X	-	X

Grade 7 - *ELA Writing*	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.	X	-	X
	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.	X	X	X
	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.	X	X	X
	W.7.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.	X	X	X
		a. Apply grade 7 Reading standards to literature.	-	-	-
		b. Apply grade 7 Reading standards to literary nonfiction.	-	-	-
Grade 8- *ELA Writing*	W.8.1	Write arguments to support claims with clear reasons and relevant evidence.	X	X	X
		a. Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.	X	X	X
		b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.	X	X	X
		c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.	X	X	X
		d. Establish and maintain a formal style.	X	X	X
		e. Provide a concluding statement or section that follows from and supports the argument presented.	X	X	X
	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.	X	X	X
		a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.	X	X	X
		b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.	-	-	X
		c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.	-	-	X
		d. Use precise language and domain-specific vocabulary to inform about or explain the topic.	X	X	X
		e. Establish and maintain a formal style.	X	X	X
		f. Provide a concluding statement or section that follows from and supports the information or explanation presented.	X	X	X
	W.8.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.	X	X	X
		a. Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters; organize an event sequence that unfolds naturally and logically.	-	-	X
		b. Use narrative techniques, such as dialogue, pacing, description, and reflection, to develop experiences, events, and/or characters.	-	-	X
		c. Use a variety of transition words, phrases, and clauses to convey sequence, signal shifts from one time frame or setting to another, and show the relationships among experiences and events.	-	-	X
		d. Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.	-	-	X
		e. Provide a conclusion that follows from and reflects on the narrated experiences or events.	-	-	X

Grade 8- *ELA Writing*	W.8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	X	-	X
	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.	-	-	X
	W.8.6	Use technology, including the Internet, to produce and publish writing and present the relation-ships between information and ideas efficiently as well as to interact and collaborate with others.	-	-	X
	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.	-	X	X
	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.	X	X	X
	W.8.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.	X	X	X
		a. Apply grade 8 Reading standards to literature.	-	-	-
		b. Apply grade 8 Reading standards to literary nonfiction.	-	-	X
Grade 9- *ELA Writing*	W.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	X	-	X
		a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.	X	-	X
		b. Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.	X	-	X
		c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.	X	-	X
		d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	X	X	X
		e. Provide a concluding statement or section that follows from and supports the argument presented.	X	X	X
	W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	X	X	X
		a. Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.	X	-	X
		b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	X	X	X
		c. Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	X	-	X
		d. Use precise language and domain-specific vocabulary to manage the complexity of the topic.	X	X	X
		e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	X	-	X
		f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).	X	-	X
	W.9-10.3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.	-	-	X

Grade 9- *ELA Writing*		a. Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.	-	-	X
		b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.	-	-	X
		c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.	-	-	X
		d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.	-	-	X
		e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	-	-	X
	W.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	X	-	X
	W.9-10.5	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.	X	-	X
	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.	X	X	X
	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.	X	X	X
	W.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.	X	X	X
	W.9-10.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.	-	-	-
		a. Apply grades 9–10 Reading standards to literature.			
		b. Apply grades 9–10 Reading standards to literary nonfiction.	-	-	X
	W.9-10.10	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 tasks, purposes, and audiences.	X	X	X
Grade 11-12 - *ELA Writing*	W.11-12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	X	X	X
		a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.	X	X	X
		b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.	X	X	X
		c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.	X	-	X
		d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	X	X	X
		e. Provide a concluding statement or section that follows from and supports the argument presented.	X	X	X
	W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	X	-	X
		a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole;	X	-	X

		include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.			
Grade 11-12- *ELA Writing*		b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	X	-	X
		c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	X	-	X
		d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.	X	-	X
		e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	X	-	X
		f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).	X	-	X
	W.11-12.3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.	-	-	X
		a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.	-	-	X
		b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.	-	-	X
		c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).	-	-	X
		d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.	-	-	X
		e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	-	-	X
	W.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	X	-	X
	W.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.	X	-	X
	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.	X	-	X
	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.	X	-	X
	W.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 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.	X	-	X
	W.11-12.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.	-	-	X
		a. Apply grades 11–12 Reading standards to literature.			
		b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]").			-
	W.11-12.10	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 tasks, purposes, and audiences.	X	X	X

FIRST EDUCATION

Common Core

English Language Arts

Reading: Informational Text

7-12

Legend

X The standard is clearly addressed by program activities.

- This standard potentially could be addressed as part the program either by actions that the coach or teacher takes when working with the students or by conditions established by the program.

Grade	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
7th Grade- *ELA Reading Informational Text*	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.	X	X	X
	RI.7.2	Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text.	X	X	X
	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).	-	-	X
	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.	-	-	X
	RI.7.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to the development of the ideas	-	-	-
	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.	-	-	-
	RI.7.7	Compare and contrast a text to an audio, video, or multimedia version of the text, analyzing each medium's portrayal of the subject (e.g., how the delivery of a speech affects the impact of the words).	-	-	X
	RI.7.8	Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.	-	-	X
	RI.7.9	Analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts	-	-	X
	RI.7.10	By the end of the year, read and comprehend literary nonfiction in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	X	X	X
8th Grade	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.	X	X	X
	RI.8.2	Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.	X	X	X
	RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events.	-	-	X
	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.	-	-	X
	RI.8.5	Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	-	-	X

FIRST EDUCATION

Common Core

English Language Arts

Speaking and Listening

7-12

Legend

X The standard is clearly addressed by program activities.

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Grade	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
7th Grade- *ELA Speaking and Listening*	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.	X	X	X
		A. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.	X	x	X
		B. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.	X	X	x
		C. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.	X	x	X
		D. Acknowledge new information expressed by others and, when warranted, modify their own views.	X	X	x
	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.	X	x	X
	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.	X	X	x
	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.	x	x	X
	SL.7.5	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.	x	x	X
	SL.7.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 here for specific expectations.)	x	x	X
	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.	x	x	X
8th Grade-		A. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.	X	x	x

		B. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.	x	x	X
		C. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.	X	x	x
		D. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.	x	x	X
	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.	x	X	x
	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.	x	x	X
	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.	X	x	x
	SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.	x	x	X
	SL.8.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.	X	x	x
9th-10th Grade- *ELA Speaking and Listening*	SL.9-10.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.	x	x	X
		A. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.	X	x	x
		B. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.	x	x	x
		C. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.	X	x	x
9th-10th Grade- *ELA Speaking and Listening*		D. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented	x	x	X
	SL.9-10.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.	X	x	x
	SL.9-10.3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.	x	x	X
	SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of	x	x	x

		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.	x	x	X
	SL.9-10.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9-10 Language standards 1 and 3 here for specific expectations.)	x	x	X
	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.	x	x	X
		A. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.	x	x	X
		B. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.	x	x	X
		C. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.	x	x	X
		D. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.	x	x	X
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.	x	x	X
	SL.11-12.3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.	x	x	X
	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 perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.	x	x	X
	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.	x	x	X
	SL.11-12.6	Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11-12 Language standards 1 and 3 here for specific expectations.)	X	x	x

Legend
X The standard is clearly addressed by program activities.
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Concept	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
Engineering Design *Grades 6-8*	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.	x	X	X
	MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	X	X	x
	MS-ETS1-3	Analyze data from test to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	x	X	X
	MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	X	X	x
Engineering Design *Grade 9-12*	HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	-	-	X
	HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	X	x	X
	HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural and environmental impacts.	x	x	X
	HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	X	x	x
Forces and Interactions *Grades 6-8*	MS-PS2-1	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	-	x	X
	MS-PS2-2	Plan an investigation to provide evidence that the change in an object's motion depends on the sum of forces on the object and the mass of the object.	-	x	x
	MS-PS2-3	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.			
	MS-PS2-4	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	-	x	X
	MS-PS2-5	Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.			

Forces and Interactions *Grades 9-12*	HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among net force on a macroscopic object, its mass, and its acceleration.	-	x	x
	HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	-	-	X
	HS-PS2-3	Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision,	-	-	x
	HS-PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. [			
	HS-PS2-5	Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.			
Waves and Electromagnetic Radiation *Grades 6-8*	MS-PS4-1	. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.			
	MS-PS4-2.	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.			
	MS-PS4-3	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.			
Waves and Electromagnetic Radiation *Grades 9-12*	MS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.			
	MS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.			
	HS-PS4-3	Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.			
	HS-PS4-4.	Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter			
	HS-PS4-5	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy			
Energy *Grades 6-8*	MS-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.			
	MS-PS3-2	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.			
	MS-PS3-3	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.			
	MS-PS3-4	Plan an investigation to determine the relationships among the energy transferred,			

		the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample			
	MS-PS3-5.	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object			
Energy *Grades 9-12*	HS-PS3-1.	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.			
	HS-PS3-2.	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).			
	HS-PS3-3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*			
	HS-PS3-4	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).			
	HS-PS3-5	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.			

Legend
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Concept	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
Standards for Mathematical Practice	MP 1	Make sense of problems and persevere in solving them	X	X	X
	MP 2	Reason abstractly and quantitatively.	X	X	X
	MP 3	Construct viable arguments and critique the reasoning of others.	X	X	X
	MP 4	Model with mathematics.	X	X	X
	MP 5	Use appropriate tools strategically.	X	X	X
	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
Ratios and Proportional Relationships	7.RPA.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	X	X	X
	7.RP.A.2	Recognize and represent proportional relationships between quantities.			
		A. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	-	-	X
		B. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	-	-	X
		C. Represent proportional relationships by equations	-	-	X
		D. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	-	-	X
	7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.	X	X	X
The Number System	7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.			
		A. Describe situations in which opposite quantities combine to make 0.	-	-	
		B. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative.	-	-	X
		C. Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q).	-	-	-
		D. Apply properties of operations as strategies to add and subtract rational numbers.	-	-	-
	7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	-	-	-
		A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed	-	-	-

		numbers. Interpret products of rational numbers by describing real-world contexts.			
		B. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number.	-	-	-
		C. Apply properties of operations as strategies to multiply and divide rational numbers.	-	-	-
		D. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	-	-	-
	7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.1	X	X	X
Expressions and Equations *Grade 7 Common Core Math*	7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	X	X	X
	7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.	X	X	-
	7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically.	X	X	X
	7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities.			
		A. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	-	-	X
		B. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.	X	X	X
Geometry *Grade 7 Common Core Math*	7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	X	X	X
	7.G.A.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	X	X	X
	7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	X	X	X
	7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	-	X	X
	7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	X	X	X
	7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	-	-	-
	7.SP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends	X	X	X

		to produce representative samples and support valid inferences.			
Statistics and Probability *Grade 7 Common Core Math*	7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	-	-	-
	7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	-	-	-
	7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	-	-	-
	7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	X	X	X
	7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	X	X	X
	7.SP.C.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	-	X	X
		A. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	-	-	-
		B. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	-	X	X
	7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	-	-	X
		A. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	-	-	-
		B. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	-	-	X
		Design and use a simulation to generate frequencies for compound events.	-	-	X

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Standards for Mathematical Practice	MP 1	Make sense of problems and persevere in solving them	X	X	X
	MP 2	Reason abstractly and quantitatively.	X	X	X
	MP 3	Construct viable arguments and critique the reasoning of others.	X	X	X
	MP 4	Model with mathematics.	X	X	X
	MP 5	Use appropriate tools strategically.	X	X	X
	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
The Number System *Grade 8 Common Core Math*	8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	-	-	-
	8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2).	-	-	x
Expressions and Equations *Grade 8 Common Core Math*	8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.	-	-	-
	8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	-	-	-
	8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.	-	-	-
	8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology	-	-	x
	8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.	-	-	X
	8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	-	-	x
	8.EE.C.7	Solve linear equations in one variable.			
		A. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler	-	-	X

		forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).			
Expressions and Equations *Grade 8Common Core Math*		B. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	-	-	x
	8.EE.C.8	Analyze and solve pairs of simultaneous linear equations.			
		A. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	-	-	X
		B. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.	-	-	x
		C. Solve real-world and mathematical problems leading to two linear equations in two variables	x	x	X
Functions *Grade 8 Common Core Math*	8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	-	-	x
	8.F.A.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	x	x	X
	8.F.A.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.	-	-	X
	8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	-	-	x
	8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear).	-	-	X
Geometry *Grade 8 Common Core Math*	8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:			
		A. Lines are taken to lines, and line segments to line segments of the same length.	-	-	-
		B. Angles are taken to angles of the same measure.	-	-	-
		C. Parallel lines are taken to parallel lines.	-	-	-
	8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	x	x	X
	8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	-	-	-
	8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	-	-	-
	8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a	-	-	-

		transversal, and the angle-angle criterion for similarity of triangles.			
	8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.	-	-	-
	8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	-	-	-
	8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	-	-	-
	8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	x	x	X
Statistics and Probability *Grade 8 Common Core Math*	8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	-	-	-
	8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	-	-	x
	8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	-	-	X
	8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	-	-	x

Legend

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	MP 4	Model with mathematics.	X	X	X
	MP 5	Use appropriate tools strategically.	X	X	X
	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
The Real Number System *High School Number & Quantity*	HSN.RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.	-	-	-
	HSN.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	-	-	-
	HSN.RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	-	-	-
Quantities *High School Number & Quantity*	HSN.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	X	x	x
	HSN.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.	x	x	x
	HSN.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	X	x	x
The Complex Number System *High School Number & Quantity*	HSN.CN.A.1	Know there is a complex number i such that i2 = -1, and every complex number has the form a + bi with a and b real.	-	-	-
	HSN.CN.A.2	Use the relation i2 = -1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	-	-	-
	HSN.CN.A.3	(+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	-	-	-
	HSN.CN.B.4	(+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar	-	-	-

		forms of a given complex number represent the same number.			
The Complex Number System *High School Number & Quantity*	HSN.CN.B.5	(+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.	-	-	-
	HSN.CN.B.6	(+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	-	-	x
	HSN.CN.C.7	Solve quadratic equations with real coefficients that have complex solutions.	-	-	X
	HSN.CN.C.8	(+) Extend polynomial identities to the complex numbers.	-	-	-
	HSN.CN.C.9	(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	-	-	X
Vector and Matrix Quantities *High School Number & Quantity*	HSN.VM.A.1	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).	-	-	x
	HSN.VM.A.2	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	-	-	X
	HSN.VM.A.3	Solve problems involving velocity and other quantities that can be represented by vectors.	-	-	x
	HSN.VM.B.4	Add and subtract vectors.	-	-	X
		A. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	-	-	x
		B. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	-	-	x
		C. Understand vector subtraction v - w as v + (-w), where -w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	-	-	X
	HSN.VM.B.5	Multiply a vector by a scalar.			
		A. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as c(vx, vy) = (cvx, cvy).	-	-	x
		B. Compute the magnitude of a scalar multiple cv using ||cv|| = |c|v. Compute the direction of cv knowing that when |c|v ≠ 0, the direction of cv is either along v (for c > 0) or against v (for c < 0).	-	-	X
	HSN.VM.C.6	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	-	-	-
	HSN.VM.C.7	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	-	-	-
	HSN.VM.C.8	Add, subtract, and multiply matrices of appropriate dimensions.	-	-	-
	HSN.VM.C.9	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	-	-	-
	HSN.VM.C.10	Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.			
	HSN.VM.C.11	Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.			

	HSN.VM.C.12	Work with 2 × 2 matrices as a transformations of the plane, and interpret the absolute value of the determinant in terms of area.			

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	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
Seeing Structure in Expressions *High School Algebra*	HSA.SSE.A.1	Interpret expressions that represent a quantity in terms of its context.			
		A. Interpret parts of an expression, such as terms, factors, and coefficients.	-	x	X
		B. Interpret complicated expressions by viewing one or more of their parts as a single entity.	-	x	x
	HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see x4 - y4 as (x2)2 - (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 - y2)(x2 + y2).	-	-	X
	HSA.SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.			
		A. Factor a quadratic expression to reveal the zeros of the function it defines.	-	-	-
		B. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	-	-	-
		C. Use the properties of exponents to transform expressions for exponential functions.	-	-	-
	HSA.SSE.B.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.	x	x	x
Arithmetic with Polynomials and Rational Expressions *High School Algebra*	HSA.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	-	-	x
	HSA.APR.B.2	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x - a is p(a), so p(a) = 0 if and only if (x - a) is a factor of p(x).	-	-	-
	HSA.APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	-	-	-

Arithmetic with Polynomials and Rational Expressions *High School Algebra*	HSA.APR.C.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2)2 = (x2 - y2)2 + (2xy)2 can be used to generate Pythagorean triples.	-	-	x
	HSA.APR.C.5	Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.1	-	-	-
	HSA.APR.D.6	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.	-	-	x
	HSA.APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	x	x	X
Creating Equations *High School Algebra*	HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems.	-	-	X
	HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	-	-	X
	HAS.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.	-	-	x
	HSA.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	-	-	X
Reasoning with Equations and Inequalities *High School Algebra*	HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	-	-	x
	HSA.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	-	-	X
	HSA.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	-	-	x
	HSA.REI.B.4	Solve quadratic equations in one variable			
		A. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)2 = q that has the same solutions. Derive the quadratic formula from this form.	-	-	X
		B. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.	-	-	X
	HSA.REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	-	-	x
	HSA.REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	-	-	X
	HSA.REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = -3x and the circle x2 + y2 = 3.	-	-	x

Reasoning with Equations and Inequalities *High School Algebra*	HSA.REI.C.8	Represent a system of linear equations as a single matrix equation in a vector variable.	-	-	-
	HSA.REI.C.9	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).	-	-	-
	HAS.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	-	-	X
	HSA.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	-	-	x
	HSA.REI.D.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	-	-	X

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	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
Interpreting Functions *High School Functions*	HSF.IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).	x	x	X
	HSF.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	X	x	x
	HSF.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.	x	x	X
	HSF.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	-	-	x
	HSF.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	-	-	X
	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	-	x	x
	HSF.IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*			
		A. Graph linear and quadratic functions and show intercepts, maxima, and minima.	-	-	X
		B. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	-	-	-
		C. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.			

Interpreting Functions *High School Functions*		D. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.			
		E. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	-	-	X
	HSF.IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.			
		A. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	-	-	-
		B. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.			
	HSF.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	-	x	X
Building Functions *High School Functions*	HSF.BF.A.1	Write a function that describes a relationship between two quantities.*			
		A. Determine an explicit expression, a recursive process, or steps for calculation from a context.	x	x	X
		B. Combine standard function types using arithmetic operations.	X	x	x
		C. Compose functions.	x	x	X
	HSF.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*	-	x	x
	HSF.BF.B.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	-	-	x
	HSF.BF.B.4	Find inverse functions.	X	x	x
		A. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2 x3 or f(x) = (x+1)/(x-1) for $x \neq 1$.			
		B. Verify by composition that one function is the inverse of another.	x	x	X
		C. Read values of an inverse function from a graph or a table, given that the function has an inverse.	-	-	x
		D. Produce an invertible function from a non-invertible function by restricting the domain.	-	-	-
	HSF.BF.B.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.			
	HSF.LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.			
		A. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	-	-	X
		B. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	-	-	x
		C. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	-	-	X

Linear Quadratic & Exponential Models *High School Functions*	HSF.LE.A.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).	-	-	x
	HSF.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	X	x	X
	HSF.LE.A.4	For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.			
	HSF.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.	-	-	X
Trigonometric Functions *High School Functions*	HSF.TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	X	x	x
	HSF.TF.A.2	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	-	-	X
	HSF.TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for x, π + x, and 2π - x in terms of their values for x, where x is any real number.	-	-	X
	HSF.TF.A.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	-	-	X
	HSF.TF.B.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*	-	-	x
	HSF.TF.B.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	-	-	X
	HSF.TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context	-	x	x
	HSF.TF.C.8	Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	-	-	X
	HSF.TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	-	-	X
Modeling Functions *High School Modeling*	HS.M.1	Identifying variables in the situation and selecting those that represent essential features,	x	x	X
	HS.M.2	Formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables,	X	x	x
	HS.M.3	Analyzing and performing operations on these relationships to draw conclusions,	x	x	X
	HS.M.4	Interpreting the results of the mathematics in terms of the original situation	X	x	x
	HS.M.5	Validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable	x	x	x
	HS.M.6	Reporting on the conclusions and the reasoning behind them.	X	x	x

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Congruence *High School Geometry*	HSG.CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	-	X	X
	HSG.CO.A.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	-	-	-
	HSG.CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	-	-	-
	HSG.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	-	-	-
	HSG.CO.A.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	x	x	X
	HSG.CO.B.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	X	x	x
	HSG.CO.B.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	-	-	X
	HSG.CO.B.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	-	-	x

Congruence *High School Geometry*	HSG.CO.C.9	Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	-	-	X
	HSG.CO.C.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.	-	-	-
	HSG.CO.C.11	Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	-	-	-
	HSG.CO.D.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	X	x	x
	HSG.CO.D.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	-	-	
Similarity, Right Triangles & Trigonometry *High School Geometry*	HSG.SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor:			
		A. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	-	-	-
		B. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	-	-	x
	HSG.SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	-	-	-
	HSG.SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	-	-	-
	HSG.SRT.B.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.	-	-	-
	HSG.SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	X	x	x
	HSG.SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	-	-	-
	HSG.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.	-	-	x
	HSG.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*	-	-	-
	HSG.SRT.D.9	Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	-	-	-
	HSG.SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.	-	x	X
	HSG.SRT.D.11	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-	-	x	x

		right triangles (e.g., surveying problems, resultant forces).			
Circles *High School Geometry*	HSG.C.A.1	Prove that all circles are similar.	x	x	X
	HSG.C.A.2	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	-	-	x
	HSG.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	-	-	-
	HSG.C.A.4	Construct a tangent line from a point outside a given circle to the circle.	-	-	x
	HSG.C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	x	x	X
Expressing Geometric Properties with Equations *High School Geometry*	HSG.GPE.A.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	-	x	x
	HSG.GPE.A.2	Derive the equation of a parabola given a focus and directrix.	-	-	-
	HSG.GPE.A.3	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	-	-	-
	HSG.GPE.B.4	Use coordinates to prove simple geometric theorems algebraically.	-	-	X
	HSG.GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	-	-	x
	HSG.GPE.B.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	-	X	X
	.HSG.GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*	-	-	-
Geometric Measurement & Dimension *High School Geometry*	HSG.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	X	x	x
	HSG.GMD.A.2	Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	x	x	X
	HSG.GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*	X	x	X
	HSG.GMD.B.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	x	x	X
Modeling with Geometry *High School Geometry*	HSG.MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	X	x	x
	HSG.MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*	x	x	X
	HSG.MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	X	x	x

Legend

X The standard is clearly addressed by program activities.

- This standard potentially could be addressed as part the program either by actions that the coach or teacher takes when working with the students or by conditions established by the program.

Concept	Indicator	Indicator Statement	FIRST TECH CHALLENGE Team	FIRST ROBOTICS COMPETITION	FIRST TECH CHALLENGE Class Pack
Standards for Mathematical Practice	MP 1	Make sense of problems and persevere in solving them	X	X	X
	MP 2	Reason abstractly and quantitatively.	X	X	X
	MP 3	Construct viable arguments and critique the reasoning of others.	X	X	X
	MP 4	Model with mathematics.	X	X	X
	MP 5	Use appropriate tools strategically.	X	X	X
	MP 6	Attend to Precision	X	X	X
	MP 7	Look for and make use of structure.	X	X	X
	MP 6	Look for and express regularity in repeated reasoning.	X	X	X
Interpreting Categorical & Quantitative Data *High School Statistics and Probability*	HSS.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).	-	-	-
	HSS.ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	-	X	-
	HSS.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	-	X	-
	HSS.ID.A.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	-	X	-
	HSS.ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.		X	
	HSS.ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.			
		A. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	-	-	x
		B. Informally assess the fit of a function by plotting and analyzing residuals.	-	-	X
		C. Fit a linear function for a scatter plot that suggests a linear association.	-	-	x
	HSS.ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	-	-	X
	HSS.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.	-	X	X

	HSS.ID.C.9	Distinguish between correlation and causation.	x	x	X
Making Inferences & Justifying Conclusions *High School Statistics and Probability*	HSS.IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	X	x	-
	HSS.IC.A.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation	x	x	-
	HSS.IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	X	x	-
	HSS.IC.B.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	x	x	-
	HSS.IC.B.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	X	x	x
	HSS.IC.B.6	Evaluate reports based on data.	x	x	X
Conditional Probability & the Rules of Probability *High School Statistics and Probability*	HSS.CP.A.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	X	x	x
	HSS.CP.A.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	x	x	X
	HSS.CP.A.3	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	X	x	x
	HSS.CP.A.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.	-	-	X
	HSS.CP.A.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	X	x	x
	HSS.CP.B.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	x	x	x
	HSS.CP.B.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.	-	-	-
	HSS.CP.B.8	Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.	-	-	-
	HSS.CP.B.9	Use permutations and combinations to compute probabilities of compound events and solve problems.	X	x	-
Use Probability to Make Decisions	HSS.MD.A.1	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	x	x	-
	HSS.MD.A.2	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.	X	x	X
	HSS.MD.A.3	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.	X	x	-
	HSS.MD.A.4	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.	-	x	-

Use Probability to Make Decisions	HSS.MD.B.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.			
		A. Find the expected payoff for a game of chance.	x	x	X
		B. Evaluate and compare strategies on the basis of expected values.	X	x	x
	HSS.MD.B.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	x	x	X
	HSS.MD.B.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	X	x	x

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Algorithms and Programming	3A-AP-13	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.	x	x	X
	3A-AP-14	Demonstrate the use of both linked lists and arrays to simplify solutions, generalizing computational problems instead of repeatedly using simple variables.	-	-	-
	3A-AP-15	Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made.	x	x	x
	3A-AP-16	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions.	X	x	x
	3A-AP-17	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.	x	x	X
	3A-AP-18	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.	X	x	x
	3A-AP-19	Systematically design and develop programs for broad audiences by incorporating feedback from users.	x	x	X
	3A-AP-20	Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries	-	-	X
	3A-AP-21	Evaluate and refine computational artifacts to make them more usable by all and accessible to people with disabilities.	-	-	-
	3A-AP-23	Design and develop computational artifacts working in team roles using collaborative tools.	x	x	X
Computing Systems	3A-CS-01	Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects.	-	-	X
	3A-CS-02	Compare levels of abstraction and interactions between application software, system software, and hardware layers.	-	-	x
	3A-CS-03	Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.	x	x	X
Data and Analysis	3A-DA-09	Translate between different bit representations of real-world phenomena, such as characters, numbers, and images (e.g., convert hexadecimal colors to decimal percentages, ASCII/Unicode representation).	x	x	x

	3A-DA-10	Evaluate the tradeoffs in how data elements are organized and where data is stored.	x	x	X
	3A-DA-11	Create interactive data visualizations or alternative representations using software tools to help others better understand real-world phenomena.	-	x	x
	3A-DA-12	Create computational models that represent the relationships among different elements of data collected from a phenomenon, process, or model.	-	x	X
Impacts of Computing	3A-IC-24	Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices	-	-	x
	3A-IC-25	Test and refine computational artifacts to reduce bias and equity deficits.	-	-	-
	3A-IC-26	Demonstrate ways a given algorithm applies to problems across disciplines	X	x	x
	3A-IC-27	Use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.	-	-	x
	3A-IC-28	Explain the beneficial and harmful effects that intellectual property laws can have on innovation.	-	-	X
	3A-IC-29	Explain the privacy concerns related to the collection and generation of data through automated processes that may not be evident to users.	x	x	X
	3A-IC-30	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics.	-	-	x
Networks and the Internet	3A-NI-04	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	-	-	-
	3A-NI-05	Give examples to illustrate how sensitive data can be affected by malware and other attacks.	-	-	x
	3A-NI-06	Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts.	-	-	-
	3A-NI-07	Compare various security measures, considering tradeoffs between the usability and security of a computing system.	-	-	-
	3A-NO-08	Explain tradeoffs when selecting and implementing cybersecurity recommendations.	-	-	-

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Empowered Learner	6-8.EL.A.1	Articulate personal learning goals, select and manage appropriate technologies to achieve them, and reflect on their successes and areas of improvement in working toward their goals.	x	x	X
	6-8.EL.B.1	Identify and develop online networks within school policy, and customize their learning environments in ways that support their learning, in collaboration with an educator.	-	-	X
	6-8.EL.C.1	Actively seek performance feedback from people, including teachers, and from functionalities embedded in digital tools to improve their learning process, and they select technology to demonstrate their learning in a variety of ways.	X	x	x
	6-8.EL.D.1	Navigate a variety of technologies and transfer their knowledge and skills to learn how to use new technologies.	x	x	X
Digital Citizen	6-8.DC.A.1	Describe how to manage digital identities and reputations within school policy, including demonstrating an understanding of how digital actions may have positive or negative implications for their future.	-	-	x
	6-8.DC.B.1	Demonstrate and advocate for positive, safe, legal, and ethical habits when using technology and when interacting with others online.	X	X	X
	6-8.DC.B.2	Demonstrate an awareness of potential dangers while online (e.g., cyberbullying, child predators, phishing) and understand how to get help.	-	-	X
	6-8.DC.C.1	Advocate and demonstrate a respect for intellectual property with both print and digital media—including copyright, permission and fair use—by creating a variety of media products that include appropriate citation and attribution elements.	x	x	X
	6-8.DC.D.1	Demonstrate an understanding of what personal data is and how to keep it private and secure, including the awareness of terms such as encryption, HTTPS, password strength, cookies, phishing, and computer viruses; understand the limitations of data management and how data-collection technologies work	-	-	X
Knowledge Constructor	6-8.KC.A.1	Demonstrate and practice the ability to effectively utilize research strategies to locate appropriate digital resources in support of their learning.	X	x	x
	6-8.KC.B.1	Practice and demonstrate the ability to evaluate resources for accuracy, perspective, credibility, and relevance.	x	x	X

	6-8.KC.C.1	Locate and collect resources from a variety of sources and organize assets into collections for a wide range of projects and purposes.	x	x	X
	6-8.KC.D.1	Explore real-world issues and problems through inquiry and analysis, develop ideas, actively create solutions for them, and evaluate and revise through the use of digital tools.	X	x	x
Innovative Designer	6-8.ID.A.1	Engage in a design process and employ it to inquire and analyze, generate ideas, create innovative products or solve authentic problems, and evaluate the process to revise if needed.	x	x	X
	6-8.ID.B.1	Select and use digital tools to support a design process and expand their understanding to identify constraints, trade-offs, and to weigh risks.	X	x	x
	6-8.ID.C.1	Engage in a design process to inquire and analyze, develop ideas, test and revise prototypes, embracing the cyclical process of trial and error, and understanding problems or setbacks as potential opportunities for improvement.	x	x	X
	6-8.ID.D.1	Demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.	X	x	x
Computational Thinker	6-8.CT.A.1	Practice defining problems to solve by computing for data analysis, modeling, or algorithmic thinking.	x	x	X
	6-8.CT.B.1	Find or organize data and use technology to analyze and represent the data to solve problems and make decisions.	X	x	x
	6-8.CT.C.1	Break problems into component parts, identify key pieces, and use that information to problem solve.	x	x	x
	6-8.CT.D.1	Demonstrate an understanding of how automation works and use algorithmic thinking to design and automate solutions.	X	x	x
Creative Communicator	6-8.CC.A.1	Select appropriate platforms and tools to create, share, and communicate their work effectively.	x	x	X
	6-8.CC.A.2	Understand and demonstrate how to construct an email to the appropriate audience, including replying to individual, groups, BCC, and CC.	-	-	-
	6-8.CC.B.1	Create original works and apply strategies for responsibly remixing or repurposing to create new artifacts.	x	x	X
	6-8.CC.C.1	Communicate complex ideas clearly using various digital tools to convey the concepts textually, visually, graphically, etc.	X	x	x
	6-8.CC.D.1	Publish or present content designed for specific audiences and select platforms that will effectively convey their ideas to those audiences.	x	x	x

Global Collaborator	6-8.GC.A.1	Use digital tools to interact with others to develop a richer understanding of different perspectives and cultures.	X	x	x
	6-8.GC.B.1	Use collaborative technologies to connect with others, including peers, experts, and community members, to learn about issues and problems or to gain broader perspectives.	x	x	X
	6-8.GC.C.1	Determine their role on a team to meet goals, based on their knowledge of technology and content, as well as personal preference.	X	x	x
	6-8.GC.D.1	Select collaborative technologies and use them to work with others to investigate and develop solutions related to local and global issues.	x	x	

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Empowered Learner	9-12.EL.A.1	Actively assimilate and revise personal and career goals, select and manage current and emerging technologies to achieve them, and reflect on their successes and areas of improvement in working toward their goals.	-	x	X
	9-12.EL.B.1	Consistently engage in online social networks as a means to access and promote lifelong learning in collaboration with global peers.	X	x	-
	9-12.EL.C.1	Regularly revise their work habits and attitudes based on feedback from others and from functionalities embedded in digital tools to improve their learning process, and they select or creatively use technologies to share their learning in ways that are useful to others.	x	x	X
	9-12.EL.D.1	Successfully use a variety of existing technologies to develop criteria and identify new digital tools and resources from emerging technologies to accomplish a defined task with fluency and ease.	X	x	x
Digital Citizen	9-12.DC.A.1	Analyze their digital identities and reputations within school policy to consider social media's impact on society, including demonstrating an understanding of how digital actions may have positive or negative implications for their future.	-	-	-
	9-12.DC.B.1	Demonstrate and advocate for positive, safe, legal, and ethical habits when using technology and when interacting with others online.	X	x	x
	9-12.DC.B.2	Distinguish potential dangers while online (e.g., malicious actors, phishing, impersonation) to prevent, detect, and combat cybersecurity threats while practicing safe and secure techniques, tactics, and practices recognizing cybersecurity is everyone's responsibility.	-	-	X
	9-12.DC.C.1	Advocate and demonstrate a respect for intellectual property with both print and digital media—including copyright, permission and fair use—by creating a variety of media products that include appropriate citation and attribution elements.	X	x	x
	9-12.DC.D.1	Demonstrate an understanding of what personal data is and how to keep it private and secure, including the awareness of terms such as encryption, HTTPS, password strength, cookies, phishing, and computer viruses; understand the limitations of data management and how data-collection technologies work.	-	-	-
Knowledge Constructor	9-12.KC.A.1	Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.	X	x	x

	9-12.KC.B.1	Evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources in the school and career setting.	-	-	-
	9-12.KC.C.1	Curate information from digital resources, including online databases and catalogs, for research using a variety of tools and methods to create collections of artifacts that support their learning and career goals.	X	x	x
	9-12.KC.D.1	Explore real-world issues and problems through inquiry and analysis, develop ideas, actively create solutions for them, and evaluate and revise through the use of digital tools.	x	x	X
Innovative Designer	9-12.ID.A.1	Engage in a design process and employ it to inquire and analyze, generate ideas, create innovative products or solve authentic problems, and evaluate the process to revise if needed.	X	x	x
	9-12.ID.B.1	Creatively use digital tools to support a design process and expand their understanding to identify constraints, trade-offs, and to weigh risks.	x	x	X
	9-12.ID.C.1	Engage in a cyclical design process to inquire and analyze, develop ideas, test, and revise prototypes, presenting finished products and best practices learned during the development.	X	x	x
	9-12.ID.D.1	Demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.	x	x	X
Computational Thinker	9-12.CT.A.1	Define complex issues, create a plan, and select appropriate technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.	X	x	x
	9-12.CT.B.1	Evaluate created or given data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	x	x	X
	9-12.CT.B.2	Evaluate and justify the formats for reporting results to a variety of audiences.	X	x	x
	9-12.CT.C.1	Collaborate to break problems into component parts, identify key pieces, and use that information to problem-solve.	x	x	X
	9-12.CT.C.2	Use 3D design tools to create prototypes, models, and simulations to demonstrate solutions and ideas.	X	x	x
	9-12.CT.D.1	Collaborate to develop an automated process by using algorithmic thinking to develop a sequence of steps to create and test automated solutions.	x	x	X
Creative Communicator	9-12.CC.A.1	Use digital learning tools and resources to identify communication needs considering goals, audience, content, access to tools or devices, and timing of communication, to involve teams in diverse locales for effective communication.	X	x	x
	9-12.CC.B.1	Create an original work using multiple digital tools, including planning, research, editing, and production.	x	x	X

	9-12.CC.C.1	Create digital graphic visualizations, data driven models, and simulations to succinctly communicate complex ideas and problems; justify methods and tools used.	X	x	x
	9-12.CC.D.1	Publish or present content designed for specific audiences using online meeting tools to asynchronous and synchronous audiences.	x	x	X
	9-12.GC.A.1	Use digital tools to interact with others to develop a richer understanding of different perspectives and cultures; publish electronic artifacts that communicate to a culturally diverse and global community.	X	x	x
Global Collaborator	9-12.GC.B.1	Use collaborative technologies (live and recorded) to connect with global stakeholders including peers, not excluding other languages, experts, and community members, to learn about issues and problems or to gain a broader perspective; develop multiple viewpoints that may be electronically published and accessible to all audiences.	x	x	X
	9-12.GC.C.1	Learn project management roles on a team to meet goals, based on their knowledge of technology and content, as well as personal preference; goals in project, timelines and milestones, will be monitored with tools and shared globally.	X	x	x
	9-12.GC.D.1	Select and justify the effective collaborative technologies (live video conference, online forums, social media and other emerging communication methods) to investigate, develop, and publish solutions related to local and global issues.	x	x	x
	9-12.GC.D.2	Understand that digital tools such as blogs and social media can be used to crowd source, crowd fund, and mobilize a community toward a goal.	X	x	x