



The Green Drone AZ Middle School Program allows students to explore topics of conservation, natural resource management, and technology such as Geographic Information Systems (GIS) and Unmanned Aerial Vehicles (UAV) or drones. Concepts are first introduced to students at a broad level and then focused through the lens of a real-world conservation project located just outside of Mesa, AZ on the Lower Salt River, Tonto National Forest.

Students explore the basics of GIS and drone technology and then learn how this technology is used in this project to collect and analyze data, perform resource monitoring, and improve project management. With this knowledge and access to online GIS technology and resources, students can engage in scientific exploration using new tools to improve the quality of their research and analysis.

September 2021

Module 1: What is Green Drone AZ?

Lesson 1

Students will explore topics related to natural resources, conservation, public lands and how technology can be used to improve natural resource management.

Lesson 1 Quiz

Students will complete a short quiz related to the lesson presentation and vocabulary related to module topics.

Lesson 1 In-Class Activity

Restoration Chalk Talk: This activity leads students with guided questions to express their thoughts regarding topics of conservation, human impact on the natural world, and technology.

Lesson 2

Students will be introduced to the Green Drone AZ project and learn how it is related to an ongoing riparian restoration project on the Tonto National Forest. Topics include the importance and status of riparian ecosystems in the arid southwest.

Lesson 2 Quiz

Students will complete a short quiz related to the lesson presentation and vocabulary related to module topics.



Inter-Module Activity

Students will review National Geographic resources and complete an exercise.

October 2021

Module 2: Let's Talk about Drones

Lesson 1

Students will learn about different types of drones and their applications in varying professional fields.

Lesson 1 Quiz

Students will complete a short quiz related to the lesson presentation and vocabulary related to module topics.

Lesson 1 In-Class Activity

Students will complete an activity that relates to drones.

Lesson 2

Students will learn about how drones can be used in conservation and how drone technology is utilized in the Green Drone AZ project.

Lesson 2 Quiz

Students will complete a short quiz related to the lesson presentation and vocabulary related to module topics.

Inter-Module Activity

Students will review National Geographic resources and complete an exercise.

November 2021

Module 3: What is GIS?

Lesson 1

Students will be introduced to GIS technology and learn about its wide array of applications in virtually every industry today.

Lesson 1 Quiz

Students will complete a short quiz related to the lesson presentation and vocabulary related to module topics.



Lesson 1 In-Class Activity

Students will complete an ArcGIS Online (AGO) exercise.

Lesson 2

Students will explore how Green Drone AZ utilizes GIS technology to improve management of the Lower Salt River Restoration Project.

Lesson 2 In-Class Activity

Students will complete an AGO exercise.

Inter-Module Activity

Students will review project data and work within AGO to construct a map.

December 2021

Module 4: How to get involved?

Lesson 1

Students will have the option to attend a field trip to LSRRP site. Students will meet with conservation professionals and explore management concepts related to this ongoing riparian restoration project.

Lesson 1 Quiz

Students will complete a short quiz related to the field trip.

Lesson 1 In-Class Activity

Students will complete an ArcGIS Online (AGO) exercise.

Lesson 2

Students will learn about possible careers in fields of conservation, GIS and drone technology and explore available options for volunteer events, training, and classes.

Final Activity

Students will break up into five groups within their classroom. Groups will give a short presentation to their classmates on their assigned topic. Topics for discussion will be:

- Drone Technology
- GIS Technology
- The intersection of conservation and technology
- Invasive Plant Species
- Importance of Riparian Ecosystems in the Arid Southwest



AZ Educational Standards Addressed

Computer Science:

- **6th Grade**

- **6.CS.HS.1** - Explain how hardware and software can be used to collect and exchange data. Collecting and exchanging data involves input, output, storage, and processing. For example, students can describe how components of a device are used to collect data. Such components might include accelerometer, Global Position System (GPS), microphone, fingerprint sensor, etc.
- **6.DA.CVT.1** - Compare different computational tools used to collect, analyze, and present data that is meaningful and useful. As students continue to explore ways to gather, organize and present data visually to support a claim, they will need to understand when and how to transform data for this purpose. Examples of these computational tools could include Microsoft Excel and Google Sheets.
- **6.DA.S.1** - Identify multiple encoding schemes used to represent data, including binary and ASCII. Students should explore the same data in multiple ways. For example, students could compare representations of the same color using binary, RGB values, hex codes (low-level representations), or forms understandable by people, including words, symbols, and digital displays of the color (high-level representations)
- **6.DA.IM.1** - Discuss the validity of a computational model based on the reliability of the data. A model may be a programmed simulation of events or a representation of how various data is related. In order to refine a model, students need to consider which data points are relevant, how data points relate to each other, and if the data is accurate. For example, students can discuss how valid a poll (political, social media, student poll) is based on how reliable the data is. Students will discuss if predictions can be made based on the poll.
- **6.AP.V.1** - Identify variables that represent different data types and perform operations on their values. A variable is like a container with a name, in which the contents may change, but the name (identifier) does not. When planning and developing programs, students should decide when and how to declare and name new variables. Students should use naming conventions to improve program readability. For example, possible operations include adding points to the score, combining user input with words to make a sentence, changing the size of a picture, or adding a name to a list of people.
- **6.AP.M.1** - Decompose problems into parts to facilitate the design, implementation, and review of programs. In order to understand how programs



are designed and used, problems should be broken down into smaller pieces that are easier to work with.

- **6.AP.PD.1** - Seek and incorporate feedback from team members and users to refine a solution that meets user needs. Development teams that employ user-centered design create solutions (e.g., programs and devices) that can have a large societal impact, such as an app that allows people with speech difficulties to translate hard-to-understand pronunciation into understandable language. Students should seek diverse perspectives throughout the design process to improve their computational artifacts. For example, considerations of the end-user may include usability, accessibility, age-appropriate content, respectful language, user perspective, pronoun use, color contrast, and ease of use.
 - **6.AP.PD.3** - Test programs using a range of inputs and identify expected outputs. At this level, testing should become a deliberate process that is more iterative, systematic, and proactive. For example, having students enter data into Microsoft Excel or Google Sheets to see what outputs are produced.
 - **6.IC.C.1** - Identify some of the tradeoffs associated with computing technologies that can affect people's everyday activities and career options. Advancements in computer technology are neither wholly positive nor negative. However, the ways that people use computing technologies have tradeoffs. Students should consider current events related to broad ideas, including privacy, communication, and automation. For example, driverless cars can increase convenience and reduce accidents, but they are also susceptible to hacking. The emerging industry will reduce the number of taxi and shared-ride drivers, but will create more software engineering and cybersecurity jobs.
 - **6.IC.SI.1** - Identify the advantages of creating a computational product by collaborating with others using digital technologies. Different digital technologies can be used to gather services, ideas, or content from a large group of people, especially from the online community. It can be done at the local level (e.g., classroom or school) or global level (e.g., age-appropriate online communities). For example, a group of students could combine animations to produce a digital community creation. They could also solicit feedback from many people through use of online communities and electronic surveys.
- **7th Grade**
 - **7.CS.HS.1** - Design projects that combine hardware and software to collect and exchange data. Collecting and exchanging data involves input, output, storage, and processing. When possible, students should select the hardware and software components for their project designs by considering factors such as functionality, cost, size, speed, accessibility, and aesthetics. For example, components for a



mobile app could include accelerometer, Global Position System (GPS), microphone, fingerprint sensor, etc.

- **7.DA.CVT.1** - Collect and analyze data using computational tools to create models that are meaningful and useful. As students continue to build on their ability to organize and present data visually to support a claim, they will need to understand when and how to transform data for this purpose. For example, students use computational tools such as Microsoft Excel or Google Sheets to solve a problem that is relevant and meaningful.
- **7.DA.S.1** - Use multiple encoding schemes to represent data, including binary and ASCII. Students should represent the same data in multiple ways. For example, students could represent the same color using binary, RGB values, hex codes (low-level representations), as well as forms understandable by people, including words, symbols, and digital displays of the color (high-level representations).
- **7.DA.IM.1** - Use computational models and determine the reliability and validity of data they generate. A model may be a programmed simulation of events or a representation of how various data are related. To refine a model, students need to consider which data points are relevant, how data points relate to each other, and if the data are accurate. For example, students may make a prediction about how far a ball will travel based on a table of data related to the height and angle of a track.
- **7.AP.V.1** - Compare and contrast variables that represent different data types and perform operations on their values. A variable is like a container with a name, in which the contents may change, but the name (identifier) does not. When planning and developing programs, students should decide when and how to declare and name new variables. Students should use naming conventions to improve program readability. For example, possible operations include adding points to the score, combining user input with words to make a sentence, changing the size of a picture, or adding a name to a list of people.
- **7.AP.M.1** - Decompose problems into parts to facilitate the design, implementation, and review of programs. In order to design, implement and evaluate programs students will break down problems into smaller parts. For example, students might code one part of a game at a time (sprites, motion, interaction, backgrounds, etc).
- **7.AP.PD.1** - Seek and incorporate feedback from team members and users to refine a solution that meets user needs. Development teams that employ user-centered design create solutions (e.g., programs and devices) that can have a large societal impact, such as an app that allows people with speech difficulties to translate hard-to-understand pronunciation into understandable language.



Students should begin to seek diverse perspectives throughout the design process to improve their computational artifacts. Considerations of the end-user may include usability, accessibility, age-appropriate content, respectful language, user perspective, pronoun use, color contrast, and ease of use.

- **7.AP.PD.3** - Systematically test and refine programs using a range of possible inputs. At this level, testing should become a deliberate process that is more iterative, systematic, and proactive students should begin to test programs by considering potential errors, such as what will happen if a user enters invalid input (e.g., negative numbers and 0 instead of positive numbers).
- **7.IC.C.1** - Explain how some of the tradeoffs associated with computing technologies can affect people's everyday activities and career options. Advancements in computer technology are neither wholly positive nor negative. However, the ways that people use computing technologies have tradeoffs. Students should consider current events related to broad ideas, including privacy, communication, and automation. For example, driverless cars can increase convenience and reduce accidents, but they are also susceptible to hacking. The emerging industry will reduce the number of taxi and shared-ride drivers but will create more software engineering and cybersecurity jobs.
- **7.IC.SI.1** - Describe the process for creating a computational product by collaborating with others using digital technologies. Crowdsourcing can be used as a platform to gather services, ideas, or content from a large group of people, especially from the online community. It can be done at the local level (e.g., classroom or school) or global level (e.g., age-appropriate online communities). For example, a group of students could combine animations to produce a digital community creation. They could also solicit feedback from many people through use of online communities and electronic surveys.
- **8th Grade**
 - **8.CS.HS.1** - Design and evaluate projects that combine hardware and software components to collect and exchange data. Collecting and exchanging data involves input, output, storage, and processing. When possible, students should select the hardware and software components for their project designs by considering factors such as functionality, cost, size, speed, accessibility, and aesthetics. For example, components for a mobile app could include accelerometer, GPS, and speech recognition. The choice of a device that connects wirelessly through a Bluetooth connection versus a physical USB connection involves a tradeoff between mobility and the need for an additional power source for the wireless device.



- **8.DA.CVT.1** - Collect data using computational tools and transform the data to make it more meaningful and useful. As students continue to build on their ability to organize and present data visually to support a claim, they will need to understand when and how to transform data for this purpose. Students should transform data to remove errors, highlight or expose relationships, and/or make it easier for computers to process. Data cleaning is an important transformation for ensuring consistent format and reducing noise and errors (e.g., removing irrelevant responses in a survey). An example of a transformation that highlights a relationship is representing males and females as percentages of a whole instead of as individual counts.
- **8.DA.S.1** - Represent data using multiple encoding schemes including binary and ASCII. Data representations occur at multiple levels of abstraction, from the physical storage of bits to the arrangement of information into organized formats (e.g., tables). Students should represent the same data in multiple ways. For example, students could represent the same color using binary, RGB values, hex codes (low-level representations), as well as forms understandable by people, including words, symbols, and digital displays of the color (high-level representations).
- **8.DA.IM.1** - Design computational models and evaluate them based on the reliability and validity of the data they generate. A model may be a programmed simulation of events or a representation of how various data is related. To refine a model, students need to consider which data points are relevant, how data points relate to each other, and if the data is accurate. For example, students may make a prediction about how far a ball will travel based on a table of data they designed related to the height and angle of a track. The students could then test and refine their model by comparing predicted versus actual results and considering whether other factors are relevant (e.g., size and mass of the ball). Additionally, students could refine game mechanics based on tests to make the game more balanced or fair.
- **8.AP.V.1** - Create named variables that represent different data types and perform operations on their values. A variable is like a container with a name, in which the contents may change, but the name (identifier) does not. When planning and developing programs, students should decide when and how to declare and name new variables. Students should use naming conventions to improve program readability. Examples of operations include adding points to the score, combining user input with words to make a sentence, changing the size of a picture, or adding a name to a list of people.



- **8.AP.M.1** - Decompose problems into parts to facilitate the design, implementation, and review of programs. In order to design, implement and evaluate programs, students will break down problems into smaller parts. For example, students might code one part of a game at a time (sprites, motion, interaction, backgrounds, etc).
- **8.AP.PD.1** - Seek and incorporate feedback from team members and users to refine a solution that meets user needs. Development teams that employ user-centered design create solutions (e.g., programs and devices) that can have a large societal impact, such as an app that allows people with speech difficulties to translate hard-to-understand pronunciation into understandable language. Students should begin to seek diverse perspectives throughout the design process to improve their computational artifacts. Considerations of the end-user may include usability, accessibility, age-appropriate content, respectful language, user perspective, pronoun use, color contrast, and ease of use.
- **8.AP.PD.3** - Systematically test and refine programs using a range of possible inputs. At this level, testing should become a deliberate process that is more iterative, systematic, and proactive. Students should begin to test programs by considering potential errors, such as what will happen if a user enters invalid input (e.g., negative numbers and 0 instead of positive numbers).
- **8.IC.C.1** - Compare and contrast tradeoffs associated with computing technologies that affect people's everyday activities and career options. Advancements in computer technology are neither wholly positive nor negative. However, the ways that people use computing technologies have tradeoffs. Students should consider current events related to broad ideas, including privacy, communication, and automation. For example, driverless cars can increase convenience and reduce accidents, but they are also susceptible to hacking. The emerging industry will reduce the number of taxi and shared-ride drivers, but will create more software engineering and cybersecurity jobs.
- **8.IC.SI.1** - Collaborate with contributors by using digital technologies when creating a computational product. Crowdsourcing can be used as a platform to gather services, ideas, or content from a large group of people, especially from the online community. It can be done at the local level (e.g., classroom or school) or global level (e.g., age-appropriate online communities). For example, a group of students could combine animations to produce a digital community creation. They could also solicit feedback from many people through use of online communities and electronic surveys.



English Language Arts:

● 6th Grade

- **6.RL.1** - Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- **6.RL.4** - Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone.
- **6.RI.1** - Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- **6.RI.2** - Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
- **6.RI.4** - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
- **6.RI.7** - Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- **6.W.1** - Write arguments to support claims with clear reasons and relevant evidence.
 - a. Introduce claim(s) and organize the reasons and evidence clearly.
 - b. Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
 - c. Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.
 - d. Establish and maintain a formal style.
 - e. Provide a concluding statement or section that follows from the argument presented.
- **6.W.2** - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
 - a. Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
 - b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
 - c. Use appropriate transitions to clarify the relationships among ideas and concepts.



- d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
- e. Establish and maintain a formal style.
- f. Provide a concluding statement or section that follows from the information or explanation presented.
- **6.W.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
- **6.W.6** - Use technology, including the internet, to type and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to complete a writing task in a single sitting.
- **6.W.7** - Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
- **6.W.8** - Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
- **6.W.9** - Draw evidence from literary or informational texts to support analysis, reflection, and research.
 - a. Apply grade 6 Reading standards to literature.
 - b. Apply grade 6 Reading standards to informational text and nonfiction.
- **6.SL.1** - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
 - a. Come to discussions prepared having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
 - b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
 - c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
 - d. Review the key ideas expressed, draw conclusions, and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
- **6.SL.4** - Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.



- **6.SL.5** - Include multimedia components (e.g., graphics, images, music, and sound) and visual displays in presentations to clarify information.
- **7th Grade**
 - **7.RL.1** - Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
 - **7.RL.4** - Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including rhymes and other repetitions of sounds (e.g., alliteration) on a specific verse or stanza of a poem or section of a story or drama.
 - **7.RI.1** - Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
 - **7.RI.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.
 - **7.RI.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.
 - **7.RI.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).
 - **7.W.1** - Write arguments to support claims with clear reasons and relevant evidence.
 - a. Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.
 - b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
 - c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.
 - d. Establish and maintain a formal style.
 - e. Provide a concluding statement or section that follows from and supports the argument presented.
 - **7.W.2** - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
 - 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., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

- b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
 - c. Use appropriate transitions to create cohesion and clarify the relationships among ideas and concepts.
 - d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
 - e. Establish and maintain a formal style.
 - f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
- **7.W.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above).
 - **7.W.6** - Use technology, including the internet, to produce and publish writing as well as to interact and collaborate with others.
 - **7.W.7** - Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.
 - **7.W.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.
 - **7.W.9** - Draw evidence from literary or informational texts to support analysis, reflection, and research.
 - a. Apply grade 7 Reading standards to literature.
 - b. Apply grade 7 Reading standards to informational text and nonfiction.
 - **7.SL.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.
 - 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.
 - b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.



- 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.
 - d. Acknowledge new information expressed by others and, when warranted, modify their own views.
 - **7.SL.4** - Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, appropriate vocabulary, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
 - **7.SL.5** - Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
- **8th Grade**
 - **8.RL.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.
 - **8.RL.4** - Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
 - **8.RI.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.
 - **8.RI.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.
 - **8.RI.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.
 - **8.RI.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.
 - **8.W.1** - Write arguments to support claims with clear reasons and relevant evidence.
 - a. Introduce claim(s), acknowledge, and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
 - b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
 - c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.



- d. Establish and maintain a formal style.
- e. Provide a concluding statement or section that follows from and supports the argument presented.
- **8.W.2** - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
 - 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.
 - b. Develop the topic with well-chosen, relevant facts, definitions, concrete details, quotations, or other information and examples.
 - c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
 - d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
 - e. Establish and maintain a formal style.
 - f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
- **8.W.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
- **8.W.6** - Use technology, including the internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.
- **8.W.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.
- **8.W.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.
- **8.W.9** - Draw evidence from literary or informational texts to support analysis, reflection, and research.
 - a. Apply grade 8 Reading standards to literature.
 - b. Apply grade 8 Reading standards to informational text and nonfiction.



- **8.SL.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.
 - 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.
 - b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
 - c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
 - d. Acknowledge new information expressed by others, and, when warranted, qualify, or justify their own views based on the evidence presented.
- **8.SL.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.
- **8.SL.5** - Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

History and Social Science:

- **6th Grade**

- **6.SP1.4** - Evaluate the significance of past events and their effect on students' lives and society.
- **6.C4.1** - Explain challenges and opportunities people and groups face when solving local, regional, and/or global problems.
- **6.G1.1** - Use and construct maps, graphs, and other representations to explain relationships between locations of places and regions.
 - Key concepts include major landforms and water bodies, countries, cities, ecosystems, climate, languages, religion, economic systems, governmental systems, population patterns, disease, trade routes, and settlement patterns.
- **6.G3.2** - Analyze the influence of location, use of natural resources, catastrophic environmental events, and technological developments on human settlement and migration.
 - Key concepts include but are not limited to development of early river civilization, pastoral societies, rise of cities, innovations in transportation, and collapse of empires.



- **7th Grade**
 - **7.SP1.3** - Evaluate the significance of past events and their effect on students' lives and global society.
 - **7.G1.1** - Use and construct maps and other geographic representations to explain the spatial patterns of cultural and environmental characteristics.
 - Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology
 - **7.G1.2** - Analyze various geographic representations and use geographic tools to explain relationships between the location of places and their environments.
 - **7.G3.2** - Analyze how relationships between humans and environments extend or contract patterns of settlement and movement
 - **7.G4.4** - Explain an issue in terms of its scale (local, regional, state, national, or global)
- **8th Grade**
 - **8.SP1.3** - Evaluate the significance of past events and their effect on students' lives and society.
 - **8.G1.1** - Use geographic tools and representations to analyze historical and modern political and economic issues and events.
 - Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology
 - **8.G2.1** - Examine impact of and responses to environmental issues such as air, water, and land pollution, deforestation, urban sprawl, and changes to climate.
 - **8.G4.1** - Take an active stance on a geographic issue reflecting its scale (local, regional, state, national, or global)

Science:

- **6th Grade**
 - **6.P4U2.5** - Analyze how humans use technology to store (potential) and/or use (kinetic) energy.
 - **6.L2U3.11** - Use evidence to construct an argument regarding the impact of human activities on the environment and how they positively and negatively affect the competition for energy and resources in ecosystems.
 - **6.L2U3.12** - Engage in argument from evidence to support a claim about the factors that cause species to change and how humans can impact those factors.
- **7th Grade**
 - **7.P3U1.4** - Use non-algebraic mathematics and computational thinking to explain Newton's laws of motion.
 - **7.L2U1.12** - Construct an explanation for how some plant cells convert light energy into food energy.



- **8th Grade**
 - **8.P1U1.2** - Obtain and evaluate information regarding how scientists identify substances based on unique physical and chemical properties.
 - **8.E1U3.8** - Construct and support an argument about how human consumption of limited resources impacts the biosphere.

Technology:

- **6th Grade**
 - **Strand 1**
 - **Concept 1**
 - **PO 1.** Analyze information to generate new ideas and products.
 - **Concept 2**
 - **PO 2.** Explore and experiment with system variables using models or simulations.
 - **PO 3.** Compare and contrast two systems using a digital model or simulation.
 - **Concept 3**
 - **PO 1.** Identify patterns and trends to draw conclusions and forecast possibilities.
 - **Concept 4**
 - **PO 1.** Analyze information using digital creativity tools to create original works and express ideas.
 - **PO 2.** Use digital collaborative tools to analyze information to produce original works and express ideas.
 - **Strand 2**
 - **Concept 1**
 - **PO 1.** Communicate digitally with others by selecting and using a variety of appropriate communication tools.
 - **Concept 2**
 - **PO 1.** Communicate and collaborate for the purpose of producing original works or solving problems.
 - **Strand 3**
 - **Concept 1**
 - **PO 1.** Predict and use key words and phrases that narrow or broaden information searches.
 - **PO 2.** Predict which information sources will provide the desired data.
 - **Concept 2**
 - **PO 1.** Locate and synthesize information to revise search strategies.



- **PO 4.** Use appropriate digital tools to synthesize research information to develop new ideas and/or create new understanding.
- **Strand 4**
 - **Concept 2**
 - **PO 1.** Plan and manage research using credible digital resources to develop solutions to answer a question.
 - **PO 2.** Generate solutions from different perspectives using collected resources and data.
- **Strand 5**
 - **Concept 3**
 - **PO 1.** Research a current technology and describe its potential use to solve an economic, environmental, health, political, scientific, or social problem.
- **Strand 6**
 - **Concept 2**
 - **PO 5.** Create multimedia presentations with multiple pages, audio, images, and transitions for individual assignments.
- **7th Grade**
 - **Strand 1**
 - **Concept 1**
 - **PO 1.** Analyze and evaluate information to generate new ideas, processes, or products.
 - **Concept 2**
 - **PO 1.** Summarize the relationship amongst interdependent elements of a digital model or simulation.
 - **PO 2.** Analyze system processes and outcomes using models or simulations.
 - **PO 3.** Analyze and apply understanding of how one system, digital models, or simulations operates by comparing it to another system of a different type that operates in a similar manner.
 - **Concept 4**
 - **PO 1.** Create innovative products or projects using digital tools to express original ideas.
 - **PO 2.** Use digital collaborative tools to synthesize information, produce original works, and express ideas.
 - **Strand 2**
 - **Concept 1**



- **PO 1.** Collaborate and communicate with peers, experts, or others employing a variety of digital tools to share findings and/or publish.
- **Concept 2**
 - **PO 1.** Communicate and collaborate for the purpose of producing original works or solving problems.
- **Strand 3**
 - **Concept 1**
 - **PO 2.** Determine which information source will provide the desired data.
 - **Concept 2**
 - **PO 1.** Locate and synthesize information utilizing advanced search strategies.
- **Strand 4**
 - **Concept 2**
 - **PO 1.** Plan, conduct and manage research using appropriate digital resources to develop solutions for a question.
- **Strand 5**
 - **Concept 3**
 - **PO 1.** Analyze the potential benefits and hazards of a new technology and the possible short- and long-term consequences of implementing this technology.
- **Strand 6**
 - **Concept 2**
 - **PO 5.** Create and edit visual and audio material to generate a multimedia product.
- **8th Grade**
 - **Strand 1**
 - **Concept 1**
 - **PO 1.** Analyze and evaluate information to generate new ideas, processes, or products.
 - **Concept 2**
 - **PO 1.** Summarize the relationship amongst interdependent elements of a digital model or simulation.
 - **PO 2.** Analyze system processes and outcomes using models or simulations.
 - **PO 3.** Analyze and apply understanding of how one system, digital models or simulations operates by comparing it to another system of a different type that operates in a similar manner.



- **Concept 4**
 - **PO 1.** Create innovative products or projects using digital tools to express original ideas.
 - **PO 2.** Use digital tools to collaborate with a group to communicate original ideas, products, or projects effectively in a creative or innovative style.
- **Strand 2**
 - **Concept 1**
 - **PO 1.** Collaborate and communicate with peers, experts, or others employing a variety of digital tools to share findings and/or publish.
 - **Concept 2**
 - **PO 1.** Communicate and collaborate for the purpose of producing original works or solving problems.
- **Strand 3**
 - **Concept 1**
 - **PO 2.** Determine which information source will provide the desired data.
 - **Concept 2**
 - **PO 1.** Locate and synthesize information utilizing advanced search strategies.
- **Strand 4**
 - **Concept 2**
 - **PO 1.** Plan, conduct and manage research using appropriate digital resources to develop solutions for a question.
- **Strand 5**
 - **Concept 3**
 - **PO 1.** Analyze current economic, environmental, health, political, scientific, or social problems that have technological solutions and propose potential solutions for the problems.
- **Strand 6**
 - **Concept 2**
 - **PO 5.** Create and edit visual and audio material to generate a stand-alone multimedia product.