Green Township School District

Grade 4 Science Curriculum Unit 1

Revised July 2017

Unit 1: Energy

Lesson 1.1	***Next Jersey Student Learning Science Standards:*** ● This Science unit is foundational and based on crucial mathematic standards to be used throughout the rest of the year. ● **See Grade 4 Math Curriculum for alignment** ***NJ Student Learning Math Standards:*** ● 4.MD.A. **Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** ● 1. Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. ***Record measurement equivalents in a two column table.*** For example, know that 1 ft is 12 times as long as 1 in. ***Express the length of a 4 ft snake as 48 in.*** Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ... ● 2. Use the four operations to ***solve word problems involving distances***, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. ***Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale*** ***The concepts covered in this lesson are foundational for future science units. Activities can be taught in conjunction with corresponding math lessons.**	**Concept(s)**: ● Review of distance, motion, and time **Students will be able to**: ● Explain that distance is the separation between two objects ● Measure the distance between two objects ● Identify an object's initial and final positions ● Measure the distance an object travels in two dimensions ● Measure in seconds how long it takes an object to travel a specified distance ● Explain that the faster an object moves over a specified distance, the less time it takes

Lesson 1.2	***Next Jersey Student Learning Science Standards:*** ● **4-PS3-1**. Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.] ● **4-PS3-3**. Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]	**Concept(s)**: ● Energy and motion **Students will be able to**: ● Explain that energy can be transferred from one object to another ● Argue from evidence that the more massive an object, the more energy required to move it
Lesson 1.3	***Next Jersey Student Learning Science Standards:*** ● **4-PS3-1**. Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]	**Concept(s)**: ● Energy and forces **Students will be able to**: ● Construct an argument, using evidence, to show that when forces are balanced, energy is store ● Construct an argument, using evidence, to show that when forces are unbalanced, energy is transformed into motion
Lesson 1.4	***Next Jersey Student Learning Science Standards:*** ● **4-PS3-2**. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.] ● **4-PS3-4**. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into	**Concept(s)**: ● Producing electrical energy **Students will be able to**: ● Explain how mechanical energy is converted into electrical energy ● Explain that electricity is our most prominent form of energy because it can be stored and transferred easily and over long distances ● Construct projects related to the production or use of electrical energy ● Collect information on one of six types of energy sources ● Collaborate to create an oral presentation on one of six types of energy sources

	motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.] ● **4-ESS3-1**. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]	

Other Interdisciplinary Connections	
NGSS Appendix for Alignment	***English-Language Arts:*** ***RI.4.1****. Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.* ***RI.4.2****. Determine the main idea of a text and explain how it is supported by key details; summarize the text.* ***RI.4.3****. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.* ***RI.4.4****. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.* ***RI.4.7****. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.* ***W.4.2.*** *Write informative/explanatory texts to examine a topic and convey ideas and information clearly.* *A. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.* *B. Develop the topic with facts, definitions, concrete details, text evidence , or other information and examples related to the topic. C. Link ideas within paragraphs and sections of information using words and phrases (e.g., another, for example, also, because). D. Use precise language and domain-specific vocabulary to inform about or explain the topic. E. Provide a*

	conclusion related to the information or explanation presented. ***W.4.4****. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.4.5****. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.* ***W.4.7****. Conduct short research projects that build knowledge through investigation of different aspects of a topic.* ***W.4.8.*** *Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.* ***SL.4.1****. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.* *A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.* *B. Follow agreed-upon rules for discussions and carry out assigned roles.* *C. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.* *D. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.* ***SL.4.2****. Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g.,visually, quantitatively, and orally).* ***SL.4.3****. Identify the reasons and evidence a speaker provides to support particular points.* ***SL.4.6****. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**

Green Township School District

Grade 4 Science Curriculum Unit 1

Revised July 2017

2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:
District/School Primary and Supplementary Resources	
Primary Resource: ***Knowing Science: Fourth Grade*** www.knowingscience.com 2016 Knowing Science, LLC	**BrainPOP** **Pebble Go**
Materials	
Materials for each session activity and lesson are listed in the Knowing Science Teacher's Manual.	
School/ Formative Assessment Plan	**School/District Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Self-assessment by students with guidance from teacher.	• Teacher created assessments and projects • Teacher/District created benchmark assessments

Differentiation/Accommodations/Modifications
Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
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Green Township School District

Grade 4 Science Curriculum Unit 2

Revised July 2017

Unit 2: Structure and Function		
Lesson 2.1	***Next Jersey Student Learning Science Standards:*** ● **4-LS1-1**. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.] ● **3-5-ETS1-1**. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● **3-5-ETS1-3**. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Concept(s)**: ● Animal classification **Students will be able to**: ● Compare and review traits of living and nonliving things ● Compare traits of vertebrates and invertebrates ● Explain how animals' physical structures and body coverings may be used to classify them ● Identify and compare observable characteristics of each major vertebrate group
Lesson 2.2	***Next Jersey Student Learning Science Standards:*** ● **4-LS1-1**. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.] ● **3-5-ETS1-1**. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● **3-5-ETS1-2**. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Concept(s)**: ● Animal structure and survival **Students will be able to**: ● Associate the physical structures of animals with basic needs ● Associate animal senses with survival behaviors ● Identify, describe, and associate the physical structures and behaviors of crayfish their basic needs ● Design and construct a 'prosthetic device' to replace a lost crayfish physical structure

Lesson 2.3	***Next Jersey Student Learning Science Standards:*** ● **4-LS1-1**. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.] ● **3-5-ETS1-3**. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Concept(s)**: ● Plant structure and survival **Students will be able to**: ● Associate the physical structure of plants (roots, stems, leaves, flowers, and fruits) with the basic needs of the plants ● Associate the physical structures of plants with their specific functions and explain how these structures work together as s system in the plant ● Observe and compare characteristics of plant structures in a variety of plants ● Comprehend and respond to nonfiction texts
Lesson 2.4	***Next Jersey Student Learning Science Standards:*** ● **4-LS1-1**. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.] ● **4-LS1-2**. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]	**Concept(s)**: ● Plant and animal seasonal responses **Students will be able to**: ● Describe how adaptations of plants allow them to respond to seasonal changes ● Carry out a guided inquiry about the effects of temperature on plants ● Describe how adaptations of animals allow them to respond to seasonal changes ● Compare seasonal behaviors of migration, hibernation, and staying active ● Carry out a guided inquiry about the effects of temperature on animals ● Recognize and understand that conducting science investigations requires safe practices ● Comprehend and respond to nonfiction texts

Other Interdisciplinary Connections

NGSS Appendix for Alignment	***NJ Math Standards:*** ***4.MD.A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.*** *1. Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* *2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.* ***4.MD.B. Represent and interpret data.*** *4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* ***English-Language Arts:*** ***RI.4.1****. Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.* ***RI.4.2****. Determine the main idea of a text and explain how it is supported by key details; summarize the text.* ***RI.4.3****. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.* ***RI.4.4****. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.* ***RI.4.7****. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.* ***W.4.2.*** *Write informative/explanatory texts to examine a topic and convey ideas and information clearly.* *A. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.* *B. Develop the topic with facts, definitions, concrete details, text evidence , or other information and examples related to the topic. C. Link ideas within paragraphs and sections of information using words and phrases (e.g., another, for example, also, because). D. Use precise language and domain-specific vocabulary to inform about or explain the topic. E. Provide a conclusion related to the information or explanation presented.* ***W.4.4****. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.4.5****. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.* ***W.4.7****. Conduct short research projects that build knowledge through investigation of different aspects of a topic.* ***W.4.8.*** *Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.* ***SL.4.1****. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse*

	partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. *A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.* *B. Follow agreed-upon rules for discussions and carry out assigned roles.* *C. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.* *D. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.* ***SL.4.2**. Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g.,visually, quantitatively, and orally).* ***SL.4.3**. Identify the reasons and evidence a speaker provides to support particular points.* ***SL.4.6**. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
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District/School Primary and Supplementary Resources	

Green Township School District

Grade 4 Science Curriculum Unit 2

Revised July 2017

Primary Resource: ***Knowing Science: Fourth Grade*** www.knowingscience.com 2016 Knowing Science, LLC	**BrainPOP** **Pebble Go**

Materials
Materials for each session activity and lesson are listed in the Knowing Science Teacher's Manual.

School/ Formative Assessment Plan	**School/District Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Self-assessment by students with guidance from teacher.	• Teacher created assessments and projects • Teacher/District created benchmark assessments • Design challenge: *How might we fix or prevent crawfish from losing the external extremities that are vital to their survival, growth or behavior?*

Differentiation/Accommodations/Modifications
Gifted and Talented
(content, process, product and learning environment) **Extension Activities** • Conduct research and provide presentation of various topics. • Design surveys to generate and analyze data to be used in discussion. • Debate topics of interest / cultural importance. • Authentic listening and reading sources that provide data and support for speaking and writing prompts. • Exploration of art and/or artists to understand society and history. • Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic). **Anchor Activities**

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
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- Repetition and practice.
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Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
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Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

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- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.

- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
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Modifications for Homework and Assignments

- Extended time to complete assignments.
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- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
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Modifications for Assessments

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- Student may take/complete tests in an alternate setting as needed.
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Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
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- Repetition and practice
- Model skills / techniques to be mastered.
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- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting

- Provide oral reminders and check student work during independent work time
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Modifications for Homework and Assignments

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- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
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Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Green Township School District

Grade 4 Science Curriculum Unit 3

Revised July 2017

Unit 3: Earth's Surface Processes		
Lesson 3.1	***Next Jersey Student Learning Science Standards:*** ● **4-ESS2-2**. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]	**Concept(s)**: ● Earth's internal structure **Students will be able to**: ● Identify Earth's layers and the characteristics of each ● Create models of Earth's internal structure ● Understand how and why geologists use core sampling ● Comprehend and respond to nonfiction texts
Lesson 3.2	***Next Jersey Student Learning Science Standards:*** ● **4-ESS1-1**. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]	**Concept(s)**: ● Using rocks and fossils to learn about Earth's history **Students will be able to**: ● Recognize that fossils provide evidence about organisms that lived long ago ● Explain how fossils provide evidence about the nature of the environment at any time in history ● Create models to better understand plate tectonics and fossil records ● Comprehend and respond to nonfiction texts

Lesson 3.3	***Next Jersey Student Learning Science Standards:*** ● **4-ESS2-2**. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]	**Concept(s)**: ● Soil Structure **Students will be able to**: ● Identify and describe soil layers ● Observe properties of soil samples ● Comprehend and respond to nonfiction texts
Lesson 3.4	***Next Jersey Student Learning Science Standards:*** ● **4-ESS2-1**. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]	**Concept(s)**: ● Weathering and erosion **Students will be able to**: ● Compare the process of weathering and erosion ● Create models to represent and understand various types of weathering and erosion ● Understand the impact of weathering and erosion on humans ● Comprehend and respond to nonfiction texts
Lesson 3.5	***Next Jersey Student Learning Science Standards:*** ● **4-ESS2-2**. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]	**Concept(s)**: ● Maps and patterns in Earth's surface **Students will be able to**: ● Give examples of Earth's continental and oceanic landforms ● Compare types of maps that show Earth's features ● Explain how topographic maps represent contour and elevation ● Comprehend and respond to nonfiction texts

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Grade 4 Science Curriculum Unit 3

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Lesson 3.6	***Next Jersey Student Learning Science Standards:*** ● **4-ESS3-2**. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]	**Concept(s)**: ● Volcanoes, Tsunamis, and Earthquakes, and their effects on humans **Students will be able to**: ● Understand the ways in which tectonic plates move ● Explain how volcanoes, earthquakes, and tsunamis form and describe their relationship to each other ● Give examples of preventive measures humans take to reduce the impacts of these natural hazards ● Comprehend and respond to nonfiction text

Other Interdisciplinary Connections	
NGSS Appendix for Alignment	***NJ Math Standards:*** ***4.MD.A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.*** *1. Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* *2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.* ***4.MD.B. Represent and interpret data.*** *4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* ***English-Language Arts:*** ***RI.4.1****. Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.* ***RI.4.2****. Determine the main idea of a text and explain how it is supported by key details; summarize the text.* ***RI.4.3****. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.* ***RI.4.4****. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.* ***RI.4.7****. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines,*

	animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. ***W.4.2.*** *Write informative/explanatory texts to examine a topic and convey ideas and information clearly.* *A. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.* *B. Develop the topic with facts, definitions, concrete details, text evidence , or other information and examples related to the topic. C. Link ideas within paragraphs and sections of information using words and phrases (e.g., another, for example, also, because). D. Use precise language and domain-specific vocabulary to inform about or explain the topic. E. Provide a conclusion related to the information or explanation presented.* ***W.4.4****. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.4.5****. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.* ***W.4.7****. Conduct short research projects that build knowledge through investigation of different aspects of a topic.* ***W.4.8.*** *Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.* ***SL.4.1****. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.* *A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.* *B. Follow agreed-upon rules for discussions and carry out assigned roles.* *C. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.* *D. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.* ***SL.4.2****. Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g.,visually, quantitatively, and orally).* ***SL.4.3****. Identify the reasons and evidence a speaker provides to support particular points.* ***SL.4.6****. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.**

	CRP12. Work productively in teams while using cultural global competence.
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:
District/School Primary and Supplementary Resources	
Primary Resource: ***Knowing Science: Fourth Grade*** www.knowingscience.com 2016 Knowing Science, LLC	**BrainPOP** **Pebble Go**
Materials	
Materials for each session activity and lesson are listed in the Knowing Science Teacher's Manual.	
School/ Formative Assessment Plan	**School/District Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Self-assessment by students with guidance from teacher.	• Teacher created assessments and projects • Teacher/District created benchmark assessments

Differentiation/Accommodations/Modifications

Gifted and Talented
(content, process, product and learning environment) **Extension Activities** ● Conduct research and provide presentation of various topics. ● Design surveys to generate and analyze data to be used in discussion. ● Debate topics of interest / cultural importance. ● Authentic listening and reading sources that provide data and support for speaking and writing prompts. ● Exploration of art and/or artists to understand society and history. ● Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic). **Anchor Activities** ● Use of Higher Level Questioning Techniques ● Provide assessments at a higher level of thinking
English Language Learners
Modifications for Classroom ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments. ● Repetition and practice. ● Model skills/techniques that need to be mastered. ● Extended time to complete class work ● Visual dictionaries to help build vocabulary ● Provide copy of classnotes ● Pair with a peer for assistance during class **Modifications for Homework/Assignments** ● Modified Assignments ● Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary) ● Extended time for assignment completion as needed ● Highlight key vocabulary ● Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
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Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

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Grade 4 Science Curriculum Unit 4

Revised July 2017

Unit 4: Waves		
Lesson 4.1	***Next Jersey Student Learning Science Standards:*** ● **4-PS4-1**. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.] ● **3-5-ETS1-1**. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost	**Concept(s)**: ● Properties of waves **Students will be able to**: ● Describe waves using scientific vocabulary ● Model waves graphically ● Explain that waves are caused by repetitive motion ● Construct a wave generator
Lesson 4.2	***Next Jersey Student Learning Science Standards:*** ● **4-PS4-2**. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.] ● **3-5-ETS1-1**. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost ● **3-5-ETS1-3**. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Concept(s)**: ● Light and how humans see **Students will be able to**: ● Explain that light travels in a straight line ● Explain that light bends ● Explain that light reflects off objects ● Construct a simple model of the human eye

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Grade 4 Science Curriculum Unit 4

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Lesson 4.3	***Next Jersey Student Learning Science Standards:*** ● **4-PS4-1**. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.] ● **4-PS4-3**. Generate and compare multiple solutions that use patterns to transfer information.* [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.] ● **3-5-ETS1-1**. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● **3-5-ETS1-3**. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Concept(s)**: ● Using waves to transfer information **Students will be able to**: ● Explain what a code is ● Create a code to send information to a recipient ● Decode a coded message from a sender ● Observer the role of waves in transmitting information

Other Interdisciplinary Connections	
NGSS Appendix for Alignment	***NJ Math Standards:*** ***4.MD.A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.*** *1. Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* *2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.* ***4.MD.B. Represent and interpret data.*** *4. Make a line plot to display a data set of measurements in fractions of a unit (1/2,*

	1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. ***English-Language Arts:*** ***RI.4.1****. Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.* ***RI.4.2****. Determine the main idea of a text and explain how it is supported by key details; summarize the text.* ***RI.4.3****. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.* ***RI.4.4****. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.* ***RI.4.7****. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.* ***W.4.2.*** *Write informative/explanatory texts to examine a topic and convey ideas and information clearly.* *A. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.* *B. Develop the topic with facts, definitions, concrete details, text evidence , or other information and examples related to the topic. C. Link ideas within paragraphs and sections of information using words and phrases (e.g., another, for example, also, because). D. Use precise language and domain-specific vocabulary to inform about or explain the topic. E. Provide a conclusion related to the information or explanation presented.* ***W.4.4****. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.4.5****. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.* ***W.4.7****. Conduct short research projects that build knowledge through investigation of different aspects of a topic.* ***W.4.8.*** *Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.* ***SL.4.1****. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.* *A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.* *B. Follow agreed-upon rules for discussions and carry out assigned roles.* *C. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.* *D. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.* ***SL.4.2****. Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g.,visually, quantitatively, and orally).* ***SL.4.3****. Identify the reasons and evidence a speaker provides to support particular points.* ***SL.4.6****. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal*

	discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:
District/School Primary and Supplementary Resources	
Primary Resource: ***Knowing Science: Fourth Grade*** www.knowingscience.com 2016 Knowing Science, LLC	**BrainPOP** **Pebble Go**
Materials	
Materials for each session activity and lesson are listed in the Knowing Science Teacher's Manual.	

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School/ Formative Assessment Plan	School/District Summative Assessment Plan
● Teacher observation of students engaged in group and independent activities. ● Individual and small group conferences/interviews to assess understanding with rubric ● Self-assessment by students with guidance from teacher.	● Teacher created assessments and projects ● Teacher/District created benchmark assessments

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work

- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.

- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
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