Holyoke Public Schools

Middle School Science

Curriculum Map
Grade 7

4th Quarter

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Holyoke Public Schools

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7th Grade Science Teachers

Overview of Curriculum Maps

Goals:

1. To ensure that students are exposed to a rigorous curriculum in every school and every grade
2. To have consistent instruction and assessment district wide
3. To prepare students for the MCAS test
4. to explain what is expected to be covered in each Science unit of study

Expectations:

The district's expectation is for students to successfully meet the Massachusetts Science and Technology/Engineering Standards, and the English Language Proficiency Benchmarks and Outcomes (ELPBO). In order to help facilitate this teachers are required to follow curriculum maps.

Accountable Talk:

To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the science discipline, and to rigorous thinking.

Feedback to Students:

Feedback needs to happen daily in the classroom. There are many ways to give feedback. Conferencing, observations, questions asked during the workshop, and written responses to students' work and notebook entries.

Formative Assessments are embedded throughout the unit to provide diagnostic information, which teachers can use to inform their decisions about instruction for individual students and for the class. In general Formative Assessment should not be graded. They are intended to help teachers have greater insight into students' thinking.

Summative Assessments are used for evaluation purposes. Summative Assessments are graded. Assessments that are graded should occur at the end of an investigation.

NAEP Science Assessment sample questions
http://nces.ed.gov/nationsreportcard/science/

English Language Proficiency Domains and General Learning Outcomes

S.1 Vocabulary: Students will comprehend and communicate orally, using English vocabulary for personal, social, and academic purposes.
S.3 Academic Interaction: Students will comprehend and communicate orally, using spoken English to participate in academic settings.
S.4 Presentation: Students will present information orally and participate in performances in English that demonstrate appropriate consideration of audience, purpose, and the information to be conveyed.
R.3 Comprehension: Students will read English fluently and identify facts and evidence in order to interpret and analyze text.
R.6 Research: Students will gather information in English from a variety of sources, analyze and evaluate the quality of the information obtained, and use it to answer their own and others' questions.
W.2 Writing: Students will write in English for a variety of purposes with clear focus, coherent organization, and sufficient detail.

Resources: Prentice Hall Science Explorer 2005 edition: *From Bacteria to Plants, Cells and Heredity, and Environmental Science*

Student Text, Student Edition on Audio CD, Teacher's Edition, & Color Transparencies
All-in-One Teaching Resources

- Blackline masters, teaching support, and answer keys are organized by chapter.

TeacherEXPRESS

- (4 CD-ROM Set) contains lesson management software, an Interactive Teacher's Edition, correlates to state and local standards.

Differentiated Instruction

- Guided Reading and Study Workbook, Adapted Reading Study Workbook, & Adapted Tests

PROJECT

Students will conduct a variety of experiments with plants focusing on experimental design (collecting, analyzing and interpreting data).

Resource: Prentice Hall Science Explorer: *From Bacteria to Plants,* Chapter 4: Introduction to Plants, Section 2: Photosynthesis and Light page 114 to 119

LSS # 16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

- Teachers should use released test items to design classroom activities.
- Teachers should use formative assessments to identify misconceptions and track student progress. Use MCAS and /or NAEP released questions that relate to photosynthesis.

Artifacts

Vocabulary: photosynthesis, reflection, absorption, transmission, carbon dioxide, oxygen, light energy, accessory pigments

- *Students may create word rings for new vocabulary. Put the term on the front of an index card along with a representative diagram or drawing. The definition should go on the back, as well as any information which links terms to prior or concurrent knowledge.*

Journal Entries:

- Use MCAS released questions as journal entries. Have students explain why they chose the answer they did, as well as explaining why they did not choose the other answers. Students share their thinking with others.
- What do plants need to live?
- What happens to the green in the sunlight when it reaches a plant's leaves? How do you know? What happens to the red and yellow in sunlight when they reach a plant leaf? How do you know?
- How do animals that eat plants benefit from photosynthesis?
- What things do plants need in order to be green and healthy?
- Explain how each of these conditions could affect photosynthesis in a plant:

a) cloudy weather, b) drought, c) bright sunlight.

In Class Activities:

- Students work in groups to answer the following MCAS question:

  Nathan plants one tomato plant if his garden. He performs an experiment to see whether fertilizer affects the growth of a plant.

  • He treats the soil around his plant with fertilizer and observes that the plant grows several inches.

  • He concludes that the fertilizer increased the growth rate of the plant.

  Are Nathan's experimental design and conclusion correct?

  Explain your answer and note any changes that could be made in his experimental design.

  Students share their answers with the class. Based on the class discussion students go back into their groups and re-design the experiment focusing on good experimental design. Students record their experimental design in their notebooks. Students share and have a class discussion about what is considered "good experimental design".

- The next day, students working on their own are given the following NAEP question, (this will allow teachers to find out if students understand experimental design, this is important before students are asked to design their own plant investigations):

  Pat has two kinds of plant food, "Quickgrow" and "Supergrow"." What would be the best way for Pat to find out which plant food helps a particular type of houseplant grow the most?

  A) Put some Quickgrow on a plant in the living room, put some Supergrow on a plant of the same type in the bedroom, and see which one grows the most.

  B) Find out how much each kind of plant food cost, because the more expensive kind is probably better for growing plants.

  C) Put some Quickgrow on a few plants, put the same amount of Supergrow on a few other plants of the same type, put all the plants in the same place, and see which group of plants grows the most.

  D) Look at the advertisements for Supergrow, and see which one says it helps plants grow the most.

  As a class have students share what answer they choose and why. If

students still have problems with experimental design, then students need more opportunities to help them learn how to design a good experiment.

- Students Write About, Talk About, Draw About, and Read About (WATADA & RA) how plants use the energy from sunlight through a process called photosynthesis.
- Students work in small groups *(collaborative learning)* to complete the Discover Activity: What Colors Make Up Sunlight? On page 114. Students use a prism to learn that white light up of different colors. Students record their observations in their notebooks.
- Students design and carry out experiments using radish seeds. (The experimental questions might include: Do plants grow better in different light?, How do plants grow in different types of water?, How do plants grow with different types of fertilizers?, Can plants grow better by talking to them?, How do plants grow in different types of soil? And/or students could come up with a testable question of their own). This will be going on for weeks. Students will record their experimental design in their notebooks. They will collect data over time about their plants.
- Students Go Online see page 118, and do the Photosynthesis Process Activity. (Teachers may choose to use the Smartboard and do this activity as a class, depending on how many computers are available for students to use). Students record the process of photosynthesis in their notebooks.
- Students answer the following NAEP question in their notebooks:

  A potted plant can survive in a sealed glass container for a long time, but you would not put a mouse in such a sealed container for even a short period of time because it would quickly die. Explain why the plant can survive and the mouse cannot.

  Students share their thinking with others and discuss their explanations.
- Students use microscopes to look at plant cells and make drawings with labels in their notebooks.
- Students are provided with an illustration of photosynthesis, similar to Figure 9 on page 118 in the textbook, including arrows but without labels. Students should fill in the labels so that the illustration shows the complete photosynthesis process. Students add this to their science notebooks.
- Students write a paragraph that summarizes the process of photosynthesis

in their notebooks.

- Students do the Math Activity: Germination and Temperature, on page 163 in the textbook. Students learn that line graphs compare variables over time. Students read a graph, interpret data from the graph, draw conclusions about the relationship between temperature and germination, and make predictions. Students record their findings in their notebooks.
- Students individually answer the experiment questions (#26 and 27): How temperature affects the growth of bean seedlings, on page 91, in the From Bacteria to Plants All-in-One teaching Resources. Students record their responses on a separate sheet of paper. *(These questions provide teachers with feedback about whether or not students understand the experimental design process).*
- Students practice answering multiple choice and open response questions, and then review with peers their answers and discuss the strategies they used to answer the questions. See MCAS Science Project binder or go to http://www.doe.mass.edu/mcas/testitems.html

Student Notes:

- Students read Chapter 4: Introduction to Plants, Section 2: Photosynthesis and Light, pages 114 to 119, and take notes about the important concepts. (*Teachers may choose to read the textbook out loud with students and discuss the text with them to help them with reading comprehension. Teachers may either select to teach students how to take notes using a graphic organizer or they may choose to use some of the graphic organizers provided in the All-in-One Teaching Resources.)*
- Have students work in small groups to study the timeline: Unraveling the Mysteries of Photosynthesis, on pages 116 to 117. Students should record in their notebooks the experimental question that each scientist was investigating.
- Students read: From a Plant to Paper, in the From Bacteria to Plants All-in-One Teaching Resources, on page 294. Students identify the characteristic of a plant that is useful when making paper. Students answer questions in their notebooks.

Resource: Prentice Hall Science Explorer: *Cells and Heredity,* Chapter 2: Cell Processes and Energy, Section 1: Photosynthesis, pages 44 to 48

LSS # 16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

- Teachers should use released test items to design classroom activities.
- Teachers should use formative assessments to identify misconceptions and track student progress. Use MCAS and /or NAEP released questions that relate to photosynthesis.

Artifacts

Vocabulary: photosynthesis, chlorophyll, stomata, autotroph (producers) , heterotroph (consumers), hydroponics

- *Students may create word rings for new vocabulary.*

Journal Entries:

- Why do plants need sunlight?
- An insect eats a leaf. Explain how the insect depends on the sun for energy.
- Would you expect a plant to produce more oxygen on a cloudy day or a sunny day? Explain.

In Class Activities:

- Students complete the Lab Activity: Exhaling Carbon Dioxide, page 123, in the All-in-One Teaching Resources (Cells and Heredity).
- Optional: Students could design an experiment that would test whether plants produced carbon dioxide during photosynthesis. (Use plants that grow in water for this activity).
- **Students continue to collect data about their plant experiments. Students record their observations and data in their notebooks.** (Check that students have a data table to record their observations and measurements).
- Students Write About, Talk About, Draw About, and Read About (WATADA & RA) consumers and producers.

- Students create a flowchart of the steps in photosynthesis.
- Students complete the Lab Activity: Where Does the Energy Come From? on page 44 in textbook. Students observe that energy from the sun powers the calculator. Students record their observations in their notebooks.
- Students working in small groups make a list of 10 different producers and consumers. Students share their list with one another and make a class list.
- Students complete the Lab Activity: Looking at Pigments, on page 47 in the textbook. Students learn that green plants contain different colored pigments. Students record their observations in the notebooks.
- Students read: Chlorophyll and the Color of Light, on page 115 in the Cells and Heredity All-in-One Teaching Resources. Students answer the questions in their notebooks.
- Students complete the Lab Activity: Observing stomata, see page 47 in the teacher's edition. Students use microscopes to observe stomata on the underside of a lettuce leaf. Students record their observations in their notebooks.
- Students grow plants in water without soil. Students learn about hydroponics. Students record their observation in their notebooks.
- Students write about how life on Earth depends on the sun.
- Students practice answering multiple choice and open response questions, and then review with peers their answers and discuss the strategies they used to answer the questions. See MCAS Science Project binder or go to http://www.doe.mass.edu/mcas/testitems.html

Student Notes:

- Students read Chapter 2, Section 1: Photosynthesis, pages 44 to 48, and take notes about the important concepts. *(Teachers may choose to read the textbook out loud with students and discuss the text with them to help them with reading comprehension. Teachers may either select to teach students how to take notes using a graphic organizer or they may choose to use some of the graphic organizers provided in the All-in-One Teaching Resources.)*

Resource: Prentice Hall Science Explorer: *From Bacteria to Plants,* Chapter 3 Protist and Fungi, Section 3: Fungi, pages 88 to 95

LSS # 14. Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

LSS # 2. Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.

LSS #9. Compare sexual reproduction (offspring inherit half of their genes from each parent) with asexual reproduction (offspring is an identical copy of the parent's cell).

LSS #1. Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.

LSS #15. Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.

- Teachers should use released test items to design classroom activities.
- Teachers should use formative assessments to identify misconceptions and track student progress. Use MCAS and /or NAEP released questions that relate to fungi.
- Teachers need to grow mold ahead of time (see page 88 in textbook).

Artifacts

Vocabulary: fungi, hyphae, fruiting body, budding, lichen, decomposers

- *Students may create word rings for new vocabulary.*

Journal Entries:

- What role do fungi play in nature?
- Suppose all the fungi in a forest disappeared. What do you think the forest would be like without fungi?
- How are fungi recyclers?

In Class Activities:

- **Students continue to collect data about their plant experiments. Students record their observations and data in their notebooks.**
- Students complete the Lab Activity: What's for Lunch? on page 96 and 97 in the textbook. Also on page 186 to 188 in the From Bacteria to Plants All-in-

One Teaching Resources. Students draw conclusions about whether sugar and salt act as food sources for yeast. Students record their observations in the notebooks.

- Read out Loud: A Really Big Fungus on page 185 in the All-in-One Teaching Resources. Students work in small groups and interpret data, about samples of fungus that were collected in Michigan, to answer questions in their notebooks. Some math calculations are involved in this activity.
- Students Write About, Talk About, Draw About, and Read About (WATADA & RA) fungi.
- Students complete the Lab Activity: Do All Molds Look Alike? on page 88 in the textbook. Students observe mold growing on bread and fruit. Students record their observations in their notebooks.
- Lab Activity: Students work in small groups and observe a selection of mushrooms (purchased from the grocery store) using a hand lens, see page 91 in the Teacher's Edition. Students should identify the structures of the mushrooms and record their observation in their notebooks.
- Lab Activity: Students work in small groups and observe mushroom spores under the microscope, see page 91 in the Teacher's Edition. Students should make a drawing of their observations, including the color and shape of the spores and their observations in their notebooks.
- Students working in small groups write an explanation about how fungi reproduce sexually and asexually.
- Students make a class list of the different types of fungi and their affect on humans (harmful or beneficial). This list can be added to over the next several days. Students record this list in their notebooks.
- Math Activity: Fungi and Trees, on page 94 in the textbook. Students read, interpret and draw conclusions from a graph about the Effect of Root-Associated Fungi on Tree Growth. Students record their findings in their notebooks.
- Students work in small groups to answer the following MCAS question:
  A Mushroom is a member of the Kingdom Fungi. Members of Kingdom Fungi are unique because they digest their own food outside their bodies and then absorb the nutrients.

  You may organize your answers for parts a, b, and c in a chart.

a. Name two other Kingdoms of living organisms.

b. Give one example of an organism that is classified into each Kingdom you described in part a.

c. For each Kingdom that you selected, describe two characteristics that are used to classify organisms into that Kingdom.

Students share their answers with the class.

- Optional: Students make a compost pile and observe over time the breakdown of materials, see page 93 in the Teacher's Edition. Students learn how fungi help to produce compost. Students record their observations in their notebooks.
- Students practice answering multiple choice and open response questions, and then review with peers their answers and discuss the strategies they used to answer the questions. See MCAS Science Project binder or go to http://www.doe.mass.edu/mcas/testitems.html

Student Notes:

- Students read Chapter 3: Protist and Fungi, Section 3: Fungi, pages 88 to 95 in the textbook. (*Teachers may choose to read the textbook out loud with students and discuss the text with them to help them with reading comprehension. Teachers may either select to teach students how to take notes using a graphic organizer or they may choose to use some of the graphic organizers provided in the All-in-One Teaching Resources.)*

Resource: Prentice Hall Science Explorer: *From Bacteria to Plants,* Chapter 3: Protists and Fungi, Section 1: Protists, pages 74 to 83.

LSS # 2. Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.

- Teachers should use released test items to design classroom activities.
- Teachers should use formative assessments to identify misconceptions and track student progress. Use MCAS and /or NAEP released questions that relate to fungi.

Artifacts

Vocabulary: protest, protozoan, pseudopod, contractile vacuole, mutualism, algae, pigment, spore

- *Students may create word rings for new vocabulary.*

Journal Entries:

- How can you tell if something is alive?

In Class Activities:

- **Students continue to collect data about their plant experiments. Students record their observations and data in their notebooks.**
- Students work in small groups to complete the Lab Activity: What Lives in a Drop of Pond Water? on page 74 in the textbook. Students should make predictions about what they think they will see before they make observations using a microscope. Students record their observation in their notebooks.
- Students Write About, Talk About, Draw About, and Read About (WATADA & RA) protists.
- Students work in small groups to answer the following NAEP question:

  Using a microscope, Linh observes some paramecium in a drop of pond water on a slide. She notices that the paramecium move faster in the area where the light is brightest than they do in an area where the light is less bright. Linh hypothesizes that the paramecia are trying to get away from the light. Describe what she could do to test her hypothesis.

Have students share their answers. Give students the rubric for scoring their answers. Students should also score released student samples using the rubric. This activity will help students understand how test questions are scored using a rubric, as well as providing them with examples of complete answers.

The rubric and samples of student work are available at the NAEP website http://nces.ed.gov/nationsreportcard/science/

(A hard copy will be provided for teachers).

- Students Go Online to learn about two types of protozoans, the amoeba and the paramecium, on page 76 in the textbook. Students compare and contrast the characteristics of an amoeba and a paramecium and record their observations in their notebooks.

- Students work in small groups to complete the Lab Activity: Comparing Protists, on page 191 to 195 in the From Bacteria to Plants All-in-One Teaching Resources. Students use microscopes to observe common protists (euglenas, amoebas, and paramecia). Students record their observations in their notebooks.

- Students practice answering multiple choice and open response questions, and then review with peers their answers and discuss the strategies they used to answer the questions. See MCAS Science Project binder or go to http://www.doe.mass.edu/mcas/testitems.html

Student Notes:

Students read Chapter 3: Protists and Fungi, Section 1: Protists, pages 74 to 83 in the textbook. *(Teachers may choose to read the textbook out loud with students and discuss the text with them to help them with reading comprehension. Teachers may either select to teach students how to take notes using a graphic organizer or they may choose to use some of the graphic organizers provided in the All-in-One Teaching Resources.)*

Resource: Prentice Hall Science Explorer: ***Environmental Science***, Chapter 1: Populations and Communities, Section 4: Changes in Communities, pages 32 to 35

LSS #17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.

- Teachers should use released test items to design classroom activities.
- Teachers should use formative assessments to identify misconceptions and track student progress. Use MCAS and /or NAEP released questions that relate to changes in ecosystems.

Artifacts

Vocabulary: succession, primary succession, pioneer species, secondary succession

Journal Entries:

- Have you ever observed a vacant lot or untended garden over time? What changes did you see?
- How does secondary succession differ from primary succession?

In Class Activities:

- **Students continue to collect data about their plant experiments. Students record their observations and data in their notebooks.**
- Students work in small groups to complete the Discover Activity: What happened here, on page 32 in textbook. Students look at pictures of the Yellowstone National Park in Wyoming after a fire and a few years later, to learn that plants come back over time. Students record their observation in their notebooks.
- Students compare and contrast primary and secondary succession by completing a table like the one on page 32 in their textbooks. Students put the table in their binders.
- Students Write About, Talk About, Draw About, and Read About (WATADA & RA) how events have changed the landscape over time, for example events might include hurricanes, floods, volcanic eruptions, and/or development (like the Mall in Holyoke).

Student Notes:

Students read Chapter 1: Populations and Communities, Section 4: Changes in

Communities, pages 32 to 35 in the textbook. *(Teachers may choose to read the textbook out loud with students and discuss the text with them to help them with reading comprehension. Teachers may either select to teach students how to take notes using a graphic organizer or they may choose to use some of the graphic organizers provided in the All-in-One Teaching Resources.)*

PROJECT: Students will conduct a variety of experiments with plants focusing on experimental design (collecting, analyzing and interpreting data). Students will do both a written lab report and an oral presentation about their plant experiment.

Students will be assessed on:

- their ability to design an experiment to test the effect of one variable on plant growth
- their completeness and accuracy in doing the experiment, making observations, and recording data
- their ability to draw reasonable conclusions based on experimental results and communicate their procedures, results, and conclusions
- and their group participation if they worked in groups.