Holyoke Public Schools

Middle School Science

Curriculum Map

Grade 7

Heredity & Evolution

Unit #2

October 2009
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, through the use of the English Language Proficiency Benchmarks and Outcomes (ELPBO) to support instruction for English Language Learners (ELLs). Strategies for teaching ELLs are good teaching practice for all learners. In order to help facilitate this teachers are required to follow curriculum maps.

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.

Resources: Prentice Hall Science Explorer: Cells and Heredity

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, and instructional tools.
Differentiated Instruction

Guided Reading and Study Workbook, Adapted Reading Study Workbook, & Adapted Tests
FIVE ESSENTIAL PRACTICES FOR TEACHING ENGLISH LANGUAGE LEARNERS

The five essential practices for teaching English language learners are practices developed by America's Choice to support the literacy needs of ELL students. These practices are a result of current second language acquisition research, literacy development, and effective classroom practices. *(America's Choice: Teaching English Language Learners: Literacy)*

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<thead>
<tr>
<th>Essential Practice 1</th>
<th>Classroom Applications</th>
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<tr>
<td><strong>Develop Oral Language through Meaningful Conversation and Context.</strong></td>
<td>• Develop oral language through meaningful conversation by planning language experiences and building consistent time to engage conversation.</td>
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<td>Oral language is the foundation of literacy and a main tool for learning and interacting in both academic and social settings. Natural exposure and planned experiences with oral language facilitates increases expression and understanding of the second language. Oral language also supports vocabulary development in context, paving the way for better comprehension and production. Exposure to rich oral and written language environments is vital for developing literacy and language skills.</td>
<td>• Enunciate and rephrase difficult works allow extra time for practice and repetition.</td>
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<td>• Demonstrate and orally explain activities step by step. Rephrase difficult instructions</td>
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<td>• Use think-alouds. Verbally share the comprehension thought process.</td>
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<td>• Provide opportunity for practice: allow extra time for practice and repetition in oral, reading, and writing activities with appropriate feedback.</td>
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<td>• Allow students to respond through Turn and Talk activities, oral, choral reading and re-reading.</td>
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<td>• Use audio recording of a text to provide extended to provide extended literacy opportunities where students listen to the reading of a text independently while developing fluency, accuracy, and language acquisition.</td>
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<td>• Plan daily read-alouds to model literacy strategies and to scaffold fluency, accuracy, and independent reading.</td>
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<td>Essential Practice 2</td>
<td>Classroom Applications</td>
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<tr>
<td>Teach Targeted Skills through Contextualized and Explicit Instruction</td>
<td>Use clues of context to make instruction meaningful. Teach skills and strategies using materials, books or writing that students know and understand.</td>
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<td>Full literacy is a fluid combination of oral, reading, and writing skills. These skills must be taught through explicit and contextualized instruction that scaffolds learning. Contextualized instruction provides students with extra linguistic clues that support understanding not only of the content but also of the language being used in the lesson. Combining contextualized practices with the knowledge of phonemic awareness, phonics skills, language structures and functions, text patterns, and literary devices such as metaphors, analogies, figurative language, and unfamiliar cultural concepts, will aid students in achieving stronger literacy skills. Explicit skills give the students the tools they need to comprehend increasingly complex literacy demands.</td>
<td>Use Big Books or shared reading to teach phonics, vocabulary and language features.</td>
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<td>Use student or teacher writing models to teach craft, spelling, and language use conventions.</td>
<td>Teach phonemic awareness within a context. ELL children must attach meaning and experience to phonemes they may never have heard before. Teach phonemic awareness while explicitly teaching vocabulary, meaning, or within-a-story context.</td>
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<td>Understand the linguistic background native language and address these issues specifically.</td>
<td>Pay special attention to sounds of letters. Languages have different linguistic features. For example, while the vowel sounds in English vary, Spanish vowel sounds are consistent. Students will transfer what they know about one language and automatically, and sometimes incorrectly, apply it to English.</td>
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<td>Pay special attention to sounds of letters. Languages have different linguistic features. For example, while the vowel sounds in English vary, Spanish vowel sounds are consistent. Students will transfer what they know about one language and automatically, and sometimes incorrectly, apply it to English.</td>
<td>Use meaningful activities to teach phonemic awareness, such as language games, Word Walls, word banks, songs, poems, and rhymes that focus on particular sounds or letters.</td>
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<td>Essential Practice 3</td>
<td>Classroom Applications</td>
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<td><strong>Build Vocabulary through Authentic and Meaningful Experiences with Words</strong></td>
<td>• Vocabulary development must be taught intentionally. Since word knowledge correlates with reading comprehension and meaning-making strategies used in decoding, it must be a focus for instruction.</td>
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<td>Developing and deepening a student’s understanding of new words is essential for English language learners. Building vocabulary in the context of literature, experiences, and modeled writing ensures that students will own the new words they encounter. Vocabulary building is a lifelong process and students must learn ways to integrate and approach new and challenging words. Discussing, playing with, and using new words allow students to gain new vocabulary through meaningful, and therefore memorable, experiences.</td>
<td>• Vocabulary development must be taught in context. Connect word knowledge with background knowledge and instructional context. ELL students need both meaning and context to acquire new vocabulary.</td>
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<td>• Facilitate and plan activities that support the three main ways vocabulary is learned: 1. Through meaningful conversations with adults and other students. 2. Listening to adults read at slightly higher levels than the student’s independent level. 3. Read extensively on their own at their reading level.</td>
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<td>• Pre-teach vocabulary words, prefixes/suffix, context clues, and cognates. Build students’ skill box with vocabulary and give them tools to understand and connect new vocabulary.</td>
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<td>• Use content Word Walls or word webs. Support cognitive structuring for ELLs by connecting new vocabulary to themes, ideas, or generalizations.</td>
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<td>• Explicitly focus on and teach academic language. Students need to be consistently exposed to formal or content specific language and vocabulary.</td>
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<td>• Explicitly teach the building blocks of language. Students need to learn the connecting and transition words of the English language (&quot;however,&quot; &quot;in conclusion&quot;, etc.) Teach them in context and teach them explicitly.</td>
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<td>• Focus teaching Tier 2 words, as well as essential Tier 1 words. Although most explicit vocabulary instruction should focus on Tier 2 words (words with a high frequency in the written language, example: examine), ELLs need instruction around Tier 1, or basic spoken words as well...</td>
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<td>Essential Practice 4</td>
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| **Build and Activate Background Knowledge** | • Elicit student’s experience and comments. Connect school, literary and personal events through talking, writing, and reading.  
• Consider the cultural background of students when selecting literacy materials such as books and poems. Support language development of Ell students by giving them new English words for experiences that are close to home. Using materials that represent their cultural background increases motivation and supports participation.  
• Discuss and build language around universal themes. Connect new language to universal experiences.  
• Build content-based word banks and webs. Connect new language to other known words, experiences, and ideas to support cognitive structuring.  
• Use native language and value home culture. View home cultures as a resource, rather than a liability.  
• Use hands-on experience based instruction in all academic areas. Language can be built upon common classroom experiences.  
• Encourage students to make connections before, during and after reading/reading.  
• Find out what students know, and build on their experience. |

Learning is based on establishing neural connections in the brain, drawing on previous experience, background knowledge, and prior and current environments. It is both the teacher's and the student's job to facilitate these connections in order to construct meaning and understand new ideas and concepts while expanding on their own world knowledge. Actively fostering these connections will enable students to more easily interpret their surroundings and assign meaning to new concepts while expanding their own
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| **Teach and Use Meaning-Making Strategies**  
Intentionally teaching meaning-making strategies provides students with a toolbox to approach future learning challenges. Meaning-making strategies vary from helping students comprehend text to various strategies students can use to understand English-dependent lessons. Modeling appropriate behaviors to students gives them the tools to be autonomous learners and supplies them with options they can use to interpret environmental input, both academically and socially. | • Explicitly teach student meaning-making strategies. Model for students how to visualize, make connections, monitor for meaning, determine importance, etc.  
• Provide opportunities for practice. Sustain daily work periods in reading and writing for students to practice these strategies.  
• Systematically assess students and adjust instruction. Monitor progress and use data to adjust the focus of mini-lessons, conferences and small-group instruction.  
• Model activities and thinking for certain skills. Students need to see and experience what is expected of them before they perform a task.  
• Beginning ELLs need more than just phonics and English Language Development instruction. EXPOSE STUDENTS RIGHT AWAY TO COMPREHENSION STRATEGIES. Waiting to address skills in chronological order hinders academic growth and English proficiency.  
• Teach students how to help themselves in English-dependent lessons. Model your thinking and how you approach problems. Build students cognitive toolbox by explicitly teaching the ways to help themselves during difficult language situations. |
**Project: Be a Disease Detective/ Sea un Detective de Enfermedades**

Students write a research paper and make an oral presentation about a genetic disease.

**Big Idea:** Genetic information is transferred from one generation to another/ La información genética se transmite de una generación a otra.

**Massachusetts Science and Technology/Engineering Standards**

LSS #7 Recognize that every organism requires a set of instructions that specifies its traits. These instructions are stored in the organism’s chromosomes. Heredity is the passage of these instructions from one generation to another.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Recognize dominant and recessive traits (alleles) are carried on chromosomes
- ✓ Know that genetic instruction is carried on chromosomes
- ✓ Know that chromosomes are stored in the nucleus of a cell

LSS #8 Recognize that hereditary information is contained in genes located in the chromosomes of each cell. A human cell contains about 30,000 different genes on 23 different chromosomes.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Know that Humans have 23 pairs of chromosomes
- ✓ Know that genes are located on chromosomes

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).

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Recognize that sexual reproduction involves genetic material contributed by two parent cells
- ✓ Know that some organisms can make exact copies of themselves by a process called asexual reproduction
- ✓ Know that when an egg and a sperm combine the result is offspring that differ from the parents

**Genetics/ Genética**

**Vocabulary:** chromosome/ cromosoma, heredity/ la herencia, trait/ rasgo, genetic/ genética, gene/ gen, allele/ alelo, dominant/ dominante, recessive/ recesivo, sexual reproduction/ la reproducción sexual, asexual reproduction/ la reproducción asexual, parent/ los padres, offspring/ hijos, genotype/ genotipo, phenotype/ fenotipo, homologous/ homóloga, heterozygous/ heterocigotos, probability/ la probabilidad, Punnett Square/ la Plaza de Punnett
Engage:

- Have students look at the picture, p 74-75 in the Prentice Hall Science Explorer: Cells and Heredity textbook, and ask them: How are these puppies similar to one another and to their mother? How are they different? Discuss with students: Why people often look very similar to other family members, but also different?

Explore:

- **An Inventory of My Traits Activity**: Students take an inventory of their own easily-observable genetic traits. Working in small groups, they observe how their trait inventories differ from those of others. Students record their observations in a data table and make a bar graph to show the most and least common traits in the group. Students share observations, interpret data, draw conclusions, record findings in writing and drawing, and communicate findings to others. (See the following website and the appendix) [http://www.nclark.net/traitsinventory.pdf](http://www.nclark.net/traitsinventory.pdf)

- **Optional**: **Pipe Cleaner Babies Activity**. In this activity students will play the role of a parent, their lab partner will play the role of the other parent. Students will use chromosome and gene models to create four offspring and determine their genotypes and phenotypes. Then mathematically, students will determine the probability of having offspring with different traits. (See the following website and the appendix) [http://biologycorner.com/worksheets/pipecleaner.html](http://biologycorner.com/worksheets/pipecleaner.html)

Explain:

- Read about and discuss: "The Cell and Inheritance" pages 92 to 96, in Cells and Heredity textbook. Students learn that chromosomes are made up of genes and that humans have 23 pairs of chromosomes.

- **Formative Assessment**: What is the relationship between genes and chromosomes?

Explore:

- **Optional activity**: How to extract DNA from anything living. (See the following website and the appendix) [http://learn.genetics.utah.edu/content/labs/extraction/howto/DNA_Extraction.pdf](http://learn.genetics.utah.edu/content/labs/extraction/howto/DNA_Extraction.pdf)

- **GENETICS WITH A SMILE Activity**. See the following website and the appendix [http://sciencespot.net/Media/gen_smilewkst1.pdf](http://sciencespot.net/Media/gen_smilewkst1.pdf)

Part A: Smiley Face Traits

1. Obtain two coins from your teacher. Mark one coin with an “F” and the other with an “M” to represent each of the parents. The parents are heterozygous for all the Smiley Face traits.
2. Flip the coins for parent for each trait. If the coin lands with heads up, it represents...
a dominant allele. A coin that lands tails up indicates a recessive allele. Record the result for each person by circling the correct letter. Use the results and the Smiley Face Traits page to determine the genotype and phenotype for each trait.

Part B: Is it a boy or girl?
To determine the sex of your smiley face, flip the coin for the male parent. Heads would represent X, while tails would be Y.

Part C: Create Your Smiley Face!
Use the Smiley Face Traits chart and your results from Part A to create a sketch of your smiley face.

Explain:

- **Formative Assessment:** Have students compare and contrast dominant and recessive alleles.

Explore:

- **DRAGON GENETICS Activity:** Students will work in pairs in the lab to produce a dragon from the random mixing of genetic traits. Each student will be a surrogate dragon parent. They will pick up a complete set of dragon chromosomes. Surrogate dragon parent partners must be of the opposite sex, therefore one parent must pick up the double X chromosomes while the other must pick up the X/Y chromosomes. The homologous chromosomes will be separated according to Mendel’s law of Independent Assortment. The surrogate parents must then decode the genes inherited by their bundle of joy to determine the phenotype traits of their baby. Using the pictures at the end of the handout, they will cut out these traits and paste them together to have a picture of their baby. See the following website and the appendix  

- **BEANS AND GENES Activity:** Students will a) distinguish between expected and observed genetic ratios, b) demonstrate that in genetic crosses, as the number of offspring increases, the difference between observed and expected results decreases, and c) demonstrate the practical applications of genetic probabilities. See the following website and the appendix  
  [http://www.iit.edu/~smile/bi8602.html](http://www.iit.edu/~smile/bi8602.html)

- **On-line Activity:** In this web lab, students experiment with garden pea plants as did Austrian monk Gregor Mendel (1822-1884). Students write a summary of Mendel’s experiments and his conclusions about the inheritance of traits.  

- **Punnett Square Activity:** Students complete a Punnett square for three generations of guinea pigs. Students observe how traits (long-haired and short-haired) are passed down over several generations. Students learn that dominant and recessive genes pass along traits to future generations. See appendix for worksheet and information.
Explain:

- **Formative Assessment** (used to check for understanding): Ask students to use a Punnett Square to identify how blue eyes (recessive trait) and brown eyes (dominant trait) are passed along through generations.

Explore:

- **Punnett Square Activity**: Students work in small groups to complete the Activity: Punnett Squares (see appendix). Students learn about how the laws of probability apply to genetics. Students should be able to describe the laws of probability.

Explain:

- Students **read about and discuss** probability and heredity, page 84 to 89, in the *Cells and Heredity* textbook.
- **Formative Assessment**: Students complete the worksheet: Simple Genetics Problems (see the following website and the appendix)
  

Explore:

- **Penny Genetics**: How Well Does a Punnett Square Predict the Actual Ratios? In this lab students will make predictions using Punnett Squares, students will use pennies (or chips) to simulate the crosses. Then compare the actual ratios with the predicted ratios. (see the following website and the appendix)
  

Extend:

- **On-line Activity**: Using Punnett squares students work out the probabilities that children of parents in each example will have particular phenotypes and genotypes.
  

Explain:

- **Formative Assessment**: In pea plants (which Gregor Mendel studied), tall pea plants are dominant over short pea plants. Using a Punnett Square, students should predict the genotypes and phenotypes of the offspring of a cross between a homozygous (purebred) tall pea plant and a homozygous (purebred) short pea plant.
- **Math Activity**: Students work in pairs to complete the activity: What are the Genotypes? p 88 in the *Cells and Heredity* textbook. Students interpret a graph about one of Mendel’s crosses. Students should construct Punnett Squares with the possible genotypes of the parents.
Extend:

- DNA Extraction Virtual Lab [http://learn.genetics.utah.edu/content/labs/extraction/](http://learn.genetics.utah.edu/content/labs/extraction/)
- Monohybrid Cross Problem Set [http://www.biology.arizona.edu/mendelian_genetics/problem_sets/monohybrid_cross/01q.html](http://www.biology.arizona.edu/mendelian_genetics/problem_sets/monohybrid_cross/01q.html)
- Human Genome Project [http://www.ornl.gov/sci/techresources/Human_Genome/project/about.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/project/about.shtml)
- This exercise is a simulation of human karyotyping using digital images of chromosomes from actual human genetic studies. You will be arranging chromosomes into a completed karyotype, and interpreting your findings just as if you were working in a genetic analysis program at a hospital or clinic. [http://www.biology.arizona.edu/human_bio/activities/karyotyping/karyotyping.html](http://www.biology.arizona.edu/human_bio/activities/karyotyping/karyotyping.html)

Evaluate: MCAS released questions

Q. Which of the following best describes the purpose of the chromosomes in the nucleus of a cell? (LSS #7)
   A. to store the genetic instructions needed to specify traits
   B. to release energy by breaking down food molecules
   C. to transport nutrients into and out of the cell
   D. to protect the cell from microorganisms

Q. Which of the following best describes the number of chromosomes in a normal human liver cell? (LSS #8)
   A. 23 pairs of chromosomes
   B. 46 different types of chromosomes
   C. 46 male chromosomes and 46 female chromosomes
   D. 23 original chromosomes and 23 duplicate chromosomes

Q. The diagram below shows the chromosomes from a cell after they were photographed
Which of the following questions may best be answered by studying an organism's chromosomes? (LS #8)

A. What sex is the organism?
B. Is the organism endangered?
C. Where is the organism's ecosystem?
D. How does the organism obtain its food?

Q. Spirogyra are green algae that can reproduce sexually. Which of the following features identifies reproduction in Spirogyra as sexual reproduction? (LSS #9)

A. The cells of parent algae have nuclei.
B. Each offspring contains chloroplasts.
C. Several offspring may be produced at once.
D. Genetic material is contributed by two parent cells.

Q. Single-celled organisms can reproduce and create cells exactly like themselves without combining genes from two different parent cells. When they do this, they use a type of (LSS #9)

A. asexual reproduction
B. gamete formation
C. Natural selection
D. Sexual reproduction

http://nces.ed.gov/nationsreportcard/itmrlsx/
Q. In the picture of a cell below, which label indicates the part of the cell that contains most of the cell’s genetic material?

A. 1  
B. 2  
C. 3  
D. 4
Big Idea: The diversity of species developed gradually over many generations. La diversidad de especies desarrollado gradualmente.

Massachusetts Science and Technology/Engineering Standards

LSS #10 Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Know that environmental factors have impacted the survival of species
- ✓ Understand that sexual reproduction produces greater genetic variety of offspring than asexual reproduction

LSS #11 Recognize that evidence drawn from geology, fossils, and comparative anatomy provides the basis of the theory of evolution.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Understand that similar bone structures in different types of animals suggest they evolved from a common ancestor
- ✓ Understand that similar looking embryos from different types of animals suggest they evolved from a common ancestor

LSS #12 Relate the extinction of species to a mismatch of adaptation and the environment.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Recognize that over hunting by humans may cause extinction of a species

LSS #18 Recognize that biological evolution accounts for the diversity of species developed through gradual processes over many generations.

**MCAS item analysis (what do students need to be able to do?)**
- ✓ Recognize that the fossil record has shown that animals have gradually changed over time
- ✓ Recognize that all living things have evolved from common ancestors

Evolution

**Vocabulary:** survival/la supervivencia, species/las especies, environmental/el medio ambiente, geology/geología, fossil record/registro fósil, common ancestors/los antepasados comunes, evolution/la evolución, scientific theory/teoría científica, natural selection/la selección natural, variation/variación, homologous structures/las estructuras homólogas, branching tree/ramas de árbol

**Engage:**
- Ask students to state some of the human-induced causes of species extinction, and list their responses on the board. Have students, either individually or in groups of two or three, use the Internet or print materials to research basic information about
endangered species, such as: giant pandas, tigers, polar bears, endangered whales and dolphins, rhinos, elephants, marine turtles and great apes. Students record the factors that are impacting the survival of different species.
http://www.worldwildlife.org/species/index.html


Explore:
- Darwin’s Finches Activity: Students will understand the process of natural selection through a hands-on experiment. (See the following website and the appendix) http://beam.berkeley.edu/files/spring09/evolution%20lesson%20plan.pdf

Explain:
- Read about and discuss “Darwin’s Theory”, pages 138 to 145, in Cells and Heredity textbook.
- Students look at Figure 3: Galapagos Finches, on page 141 in the Cells and Heredity textbook, and identify some specific differences in the finches’ beaks.
- Students work in small groups to complete the Activity: Nature at Work, p 146-147, p 300-302 in the All-in-One Teaching Resources. Students predict how changing environmental conditions will affect natural selection in the model, and make a dynamic model of natural selection in mice. Students record their observations and conclusions in their notebooks.
- Read and discuss “Evidence of Evolution” pages 148 to 153, in Cells and Heredity textbook. Students state the evidence that supports the theory of evolution.
- On-line Activity: Students examine x-rays of animal hands to compare homologous structures. http://www.simplescience.org/Lessons/Biology/AH/Lesson0.htm
- Use overhead transparencies: C41: Identifying Supporting Evidence, and C42: Branching Tree, to help students learn new vocabulary.
- Students work in small groups to complete the Activity: Change Through Time (A Branching Tree), p 308 in the All-in-One Teaching Resources. Students learn how to interpret a branching tree to determine how different groups of organisms are related. Students record their observations and conclusions in their notebooks.
Evaluate: NAEP released question
Q. Which of the following is most consistent with the modern theory of evolution? (LS #11)
A. Life on this planet came from another planet far out in space.
B. Living organisms have not changed for hundreds of millions of years.
C. Parents pass their physical traits to their offspring; those offspring with traits that help them survive in the environment are able to reproduce.
D. Parents change their physical traits in order to survive in the environment, and then those parental traits are passed to their offspring.

Evaluate: MCAS released questions
Q. Which of the following is the primary advantage of sexual reproduction when compared to asexual reproduction? (LS # 10)
A. There is a greater number of offspring.
B. There is more food available to offspring.
C. There is greater genetic variety in offspring.
D. There is a longer development time for offspring.

Q. About 300 million years ago, the land of Earth was in a single mass known as Pangaea, as shown in Figure A. About 150 million years ago, Pangaea broke up into the land masses shown in Figure B. (LS #10)

Based on the diagrams, which of the following were more likely to survive on continent X after the breakup of Pangaea than before it broke apart?
A. organisms that lived in fresh water
B. organisms that required warm conditions
C. organisms that hibernated for long periods
D. organisms that traveled great distances during migrations
Q. Comparing the skeletons of which of the following fish would **best** show the evolution of a fish species? (LS #11)

A. a male fish and a female fish that could produce offspring  
B. the same fish just before it received a cut and after it healed  
C. a fish that lived recently and a fish that lived a long time ago  
D. the same fish just after it hatched and when it was full-grown

Q. The drawings below show a turtle embryo and a chicken embryo. (LS #11)

Which of the following statements is supported by the similarities between these embryos?

A. The turtle is more advanced than the chicken.  
B. The chicken has more offspring than the turtle.  
C. The turtle and the chicken are similar as adults.  
D. The chicken and the turtle share a common ancestor.
Q. The bones of a whale flipper are similar to the bones of a bat wing as shown in the illustration below. (LS #11)

What does this similarity in bone structure suggest about the whale and the bat?

A. They use the same methods to travel.
B. They evolved from a common ancestor.
C. They can migrate to the same locations.
D. They can manipulate objects in the same way.

Q. The heath hen, an extinct small wild fowl, was a relative of the prairie chicken. Which of the following most likely caused extinction of the heath hen? (LS #12)

A. over hunting
B. stable climate
C. plentiful food supply
D. abundant nesting sites
Q. The diagram below shows the evolutionary relationship of several primates. (LS # 18)

Q. Based on the diagram, which of the following statements is true?

A. Lemurs were the most recent to evolve.
B. Gorillas evolved directly from chimpanzees.
C. Spider monkeys and lemurs evolved at the same time.
D. Gorillas and baboons evolved from a common

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D. Gorillas and baboons evolved from a common
Q. The diagram below represents part of the horse fossil record from three time periods. It includes illustrations of the hooves and teeth of horses from each time period. (LS # 18)

Which of the following statements is best supported by the horse fossil record?

A. The horse has been a carnivore.
B. The horse has changed over time.
C. The horse has many common ancestors.
D. The horse has lived in the same ecosystem.
Project: Students write a research paper about a genetic disease. Possible genetic diseases for students to research include the following: Cystic fibrosis, Tay-Sachs disease, Hemophilia, Sickle-cell anemia, Multiple sclerosis, Parkinson's Disease, Tourette's Syndrome, and Down's Syndrome

- Project presentations should include both an oral and a written report.

Students research reports should include:

- A title page
- A bibliography with at least two or three sources of information. Students may use books, magazine articles, and Internet sites to gather information.
- Students should read reference materials and take notes about what they learned. Students should not copy exact sentences from resources. Student work must be written in their own words.
- Index cards should be used, on one side students should take notes, and on the other side they should record the source of information.
- Students work should be neat and attractive, well written, and accurate.
- The following information should be included:
  - What is the cause of the disease?
  - What are the symptoms?
  - Is there any treatment?
  - Is there any prevention?
  - Is the disease still found in the US? The World?
  - How many people are affected by this disease in the United States?
  - The most interesting thing I learned was...
  - How does this information affect your life or the life of others?

Students will have 3 to 5 minutes to present their projects to the class. In those 3 to 5 minutes students should answer these questions:
- What were you trying to learn about?
- What materials or references did you use?
- What did you learn from this project?