



North Carolina Department of Public Instruction

## **INSTRUCTIONAL SUPPORT TOOLS**

FOR ACHIEVING NEW STANDARDS

This document is designed to assist North Carolina educators in effective instruction of the new Common Core State and/or North Carolina Essential Standards (Standard Course of Study) in order to increase student achievement. NCDPI staff are continually updating and improving instructional tools to better serve teachers.

### *North Carolina Essential Standards Assessment Examples* ***Biology***

#### **What is the purpose of this tool?**

Assessment is a vital component of the teaching and learning process. These assessment examples are aligned to new content standards and reinforce teaching the standards to their intended level of deep mastery. The purpose of providing examples is to illustrate ways in which the standards or part(s) of the standards might be assessed in the classroom.

#### **How do I send Feedback?**

We intend the examples in this document to be helpful and specific. That said, we believe that as this document is used, educators will find ways in which the tool can be improved and made even more useful. Please send feedback to us at [feedback@dpi.nc.gov](mailto:feedback@dpi.nc.gov) and we will use your input to refine our instructional tool. Thank You!

#### **Where are the new Common Core State and North Carolina Essential Standards?**

All standards are located at <http://www.ncpublicschools.org/acre/>

## **Essential Standards • Biology**

### **Structure and Functions of Living Organisms**

**Bio.1.1** Understand the relationship between the structures and functions of cells and their organelles.

**Bio.1.2** Analyze the cell as a living system.

### **Ecosystems**

**Bio.2.1** Analyze the interdependence of living organisms within their environments.

**Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).

### **Evolution & Genetics**

**Bio.3.1** Explain how traits are determined by the structure and function of DNA.

**Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.

**Bio.3.3** Understand the application of DNA technology.

**Bio.3.4** Explain the theory of evolution by natural selection as a mechanism for how species change over time.

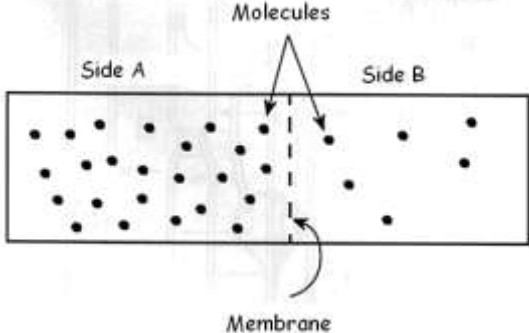
**Bio.3.5** Analyze how classification systems are developed based upon speciation.

### **Molecular Biology**

**Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

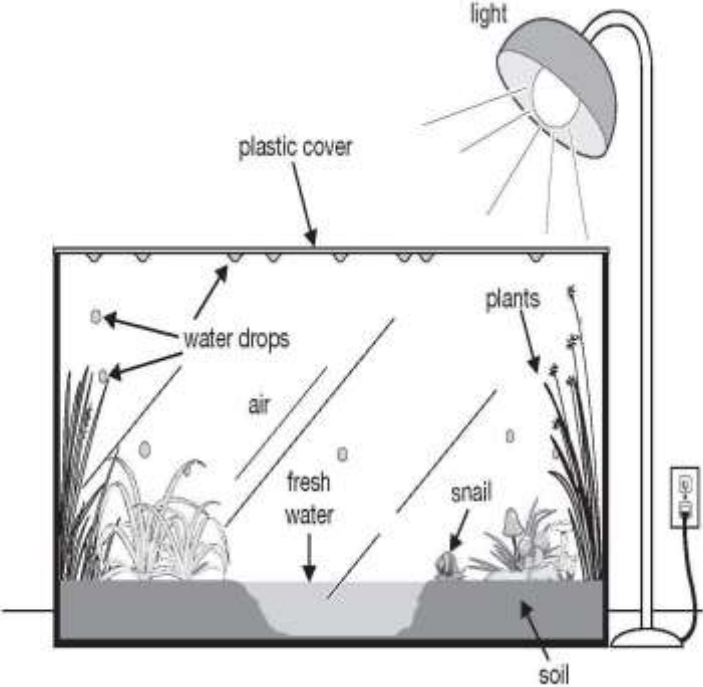
**Bio.4.2** Analyze the relationships between biochemical processes and energy use in the cell.

<b>Structure and Functions of Living Organisms</b>		
<b>Essential Standards</b>	<b>Clarifying Objectives</b>	<b>Assessment Examples</b>
<p>Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles.</p>	<p>Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including: the nucleus, plasma membrane, cell wall, mitochondria, vacuoles, chloroplasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell.</p>	<p>1.1.1 A runner is competing in a 10 km track meet and just before completing the race, the runner is nearly out of breath and the energy needed to finish the race. Which cell structure is <i>most</i> affected by this lack of energy?</p> <ul style="list-style-type: none"> <li>a. nucleus</li> <li>b. ribosome</li> <li><b>c. mitochondrion</b></li> <li>d. plasma membrane</li> </ul>
	<p>Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity.</p>	<p>1.1.2 What can be used to distinguish between eukaryotic and prokaryotic cells?</p> <ul style="list-style-type: none"> <li>a. Only eukaryotic cells come from preexisting cells.</li> <li>b. Only prokaryotic cells are the smallest unit of living organisms.</li> <li>c. Only prokaryotic cells contain ribosomes.</li> <li><b>d. Only eukaryotic cells contain membrane-bound organelles.</b></li> </ul>
	<p>Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms.</p>	<p>1.1.3 <b>Constructed Response:</b> Explain how many of the cells in an individual can be very different from one another in terms of structure and function, even though they are descended from a single cell and thus have essentially identical genetic instructions.</p> <p>1.1.3 Nerve cells and bone cells are specialized cells that descend from the same single cell (fertilized egg). Which statement best explains how each type of cell results in a different structure with a specialized function?</p> <ul style="list-style-type: none"> <li>a. Nerve cells and bone cells begin with the same structure; however, bone cells harden over time.</li> <li>b. Nerve cells and bone cells receive different DNA that determines the structure and function that each will perform.</li> <li><b>c. Nerve cells and bone cells receive the same DNA; however, only specific parts of the DNA are activated in each cell.</b></li> <li>d. Nerve cells and bone cells receive the same DNA; however, bone cells receive more to make the protective outer covering.</li> </ul>

<p>Bio.1.2 Analyze the cell as a living system.</p>	<p>Bio.1.2.1 Explain how homeostasis is maintained in a cell and within an organism in various environments (including: temperature and pH).</p>	<p>1.2.1 The diagram below shows the same type of molecule on side A and side B. Over time, what is the likely result?</p>  <p>a. More molecules will be on Side B than Side A.          b. More molecules will be on Side A than Side B.  <b>c. Equal number of molecules will be on Side A &amp; B.</b>          d. All of the molecules will move towards the membrane.</p>
	<p>Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis.</p>	<p>1.2.2 A student observes a typical onion root tip where many of the cells have just successfully completed mitosis. Which statement <i>best</i> explains what must have happened to result in cells that only have half as many chromosomes as all of the other cells in the same section of the tip?</p> <p>a. The parent cell completed mitosis after undergoing interphase.          b. The parent cell completed mitosis after undergoing cytokinesis.          c. The parent cell completed mitosis before undergoing cytokinesis.  <b>d. The parent cell completed mitosis before undergoing interphase.</b></p> <p>1.2.2 Cell cycle checkpoints are proteins that monitor and regulate the progress of the cell cycle in eukaryotic cells. Which statement best describes what would <i>most likely</i> happen if a cell is permitted to progress to mitosis without the preparation stage of interphase?</p> <p>a. The new cells would have all of the organelles except the nucleus.          b. The new cells would have all of the organelles except the mitochondria.          c. The number of chromosomes in the daughter cells would be the same as the number of chromosomes in the parent cell.  <b>d. The number of chromosomes in the daughter cells would be different from the number of chromosomes in the parent cell.</b></p>

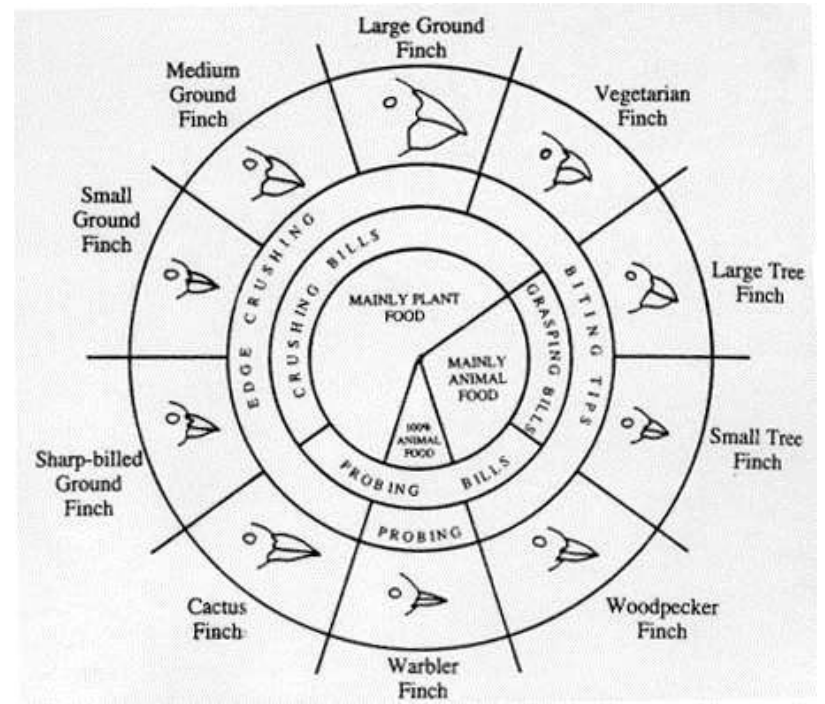
## Biology Assessment Examples

	<p>Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on unicellular organisms).</p>	<p>1.2.3 A single-celled organism is placed in fresh water. The contractile vacuole pumps excess water out of the cell. How does this action help the organism to survive?</p> <ul style="list-style-type: none"><li>a. <b>It helps the organism maintain a stable internal environment.</b></li><li>b. It helps the organism communicate with other cells.</li><li>c. It helps the organism reproduce.</li><li>d. It helps the organism convert energy.</li></ul>
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<b>Ecosystems</b>		
<b>Essential Standards</b>	<b>Clarifying Objectives</b>	<b>Assessment Examples</b>
<p>Bio.2.1 Analyze the interdependence of living organisms within their environments.</p>	<p>Bio.2.1.1 Analyze the flow of energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem.</p>	<p><b>2.1.1 The diagram shows a glass container covered with plastic.</b></p>  <p><b>Bio.2.1.1 Constructed Response</b></p> <p>The diagram shows a thriving ecosystem. Analyze the flow of energy and cycling of matter through the system.</p> <p>1. Use your analysis of the system and briefly tell how carbon is related to the flow of energy and cycling of matter between the environment and the organisms.</p> <p>In your answer include the following information:</p> <ul style="list-style-type: none"> <li>▪ Name the carbon compound that is exchanged between plants and their environment and tell how this is significant to maintaining the health and stability of the ecosystem.</li> <li>▪ Describe how plants use carbon from the atmosphere to create more complex molecules.</li> <li>▪ Describe how animals that eat plants change these molecules and</li> </ul>

		<p>return carbon to the atmosphere.</p> <ul style="list-style-type: none"> <li>▪ Describe the direction of flow of energy through the ecosystem.</li> </ul> <p>2. If more snails are added to the ecosystem, what effect would that have on the plants in the container?</p>									
	<p>Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations.</p>	<p>2.1.2</p> <p style="text-align: center;"><b>Flower Characteristics</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Characteristics</th> <th style="text-align: center;">Insect-Pollinated Plants</th> <th style="text-align: center;">Wind- or Water-Pollinated Plants</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Appearance</td> <td style="text-align: center;">often colorful</td> <td style="text-align: center;">plain</td> </tr> <tr> <td style="text-align: center;">Reproductive parts</td> <td style="text-align: center;">sometimes hidden</td> <td style="text-align: center;">exposed</td> </tr> </tbody> </table> <p>The differences in the above characteristics of flower species most likely resulted from</p> <ol style="list-style-type: none"> <li>a. <b>adaptations in response to different environmental factors.</b></li> <li>b. parasitism, which did not harm the host species.</li> <li>c. defensive mutations allowing concealment of species.</li> <li>d. mutualism between different plant species.</li> </ol> <p>2.1.2 During extreme conditions like drought or high heat, frogs will dig a hole in the soil and bury themselves. Sometimes frogs will shed a layer of skin, wrap it around themselves for more protection, and wait for rain. How does this adaptation aid frogs?</p> <ol style="list-style-type: none"> <li>a. <b>This adaptation aids in the survival of frogs.</b></li> <li>b. This adaptation attracts other frogs for mating.</li> <li>c. This adaptation helps the frog find food.</li> <li>d. This adaptation aids in the growth of frogs.</li> </ol>	Characteristics	Insect-Pollinated Plants	Wind- or Water-Pollinated Plants	Appearance	often colorful	plain	Reproductive parts	sometimes hidden	exposed
Characteristics	Insect-Pollinated Plants	Wind- or Water-Pollinated Plants									
Appearance	often colorful	plain									
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2.1.2



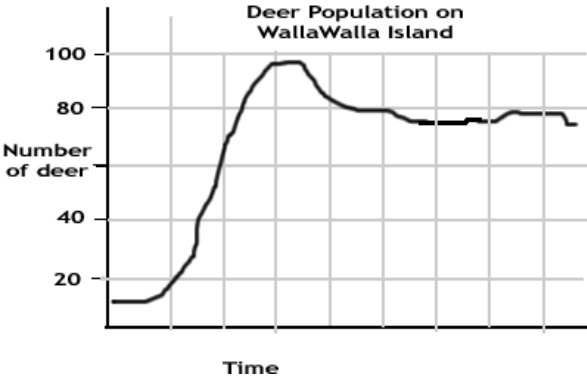
Darwin's studies of finches on the Galapagos Islands suggest that the finches' differences in beak structure were most directly due to

- a. acquired characteristics in the parent finches
- b. mating behaviors of the different finch species
- c. the size of the island where the finches live
- d. adaptations of the finches to different environments**



		<p>2.1.2 Below is a picture of a Viceroy and a Monarch butterfly.</p> <div style="text-align: center;">  <p>Viceroy butterfly (The mimic - palatable species)</p> <p>Monarch butterfly (The model - distasteful species)</p> </div> <p>To birds, the Monarch butterfly looks like the Viceroy butterfly. The Monarch butterfly is distasteful to birds; however, the Viceroy butterfly is not. Once a bird tastes a Monarch butterfly, it will not attempt to eat a Viceroy butterfly. How is this adaptation an advantage to the Viceroy butterfly?</p> <ol style="list-style-type: none"> <li>a. <b>This adaptation aids in the survival of the Viceroy butterfly.</b></li> <li>b. This adaptation attracts other Viceroy butterflies for mating.</li> <li>c. This adaptation helps the Viceroy butterfly find food.</li> <li>d. This adaptation aids in the growth of the Viceroy butterfly.</li> </ol>
	<p>Bio.2.1.3 Explain various ways organisms interact with each other (including predation, competition, parasitism, mutualism) and with their environments resulting in stability within ecosystems.</p>	<p>2.1.3 Classify the relationship between flowering plants and bees, where the plant provides the bee with food and the bee spreads pollen for the plant.</p> <ol style="list-style-type: none"> <li>a. commensalism</li> <li>b. <b>mutualism</b></li> <li>c. parasitism</li> <li>d. predation</li> </ol>

Biology Assessment Examples

	<p>Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease).</p>	<p>2.1.4 The graph below represents the changes in deer population on an island over time.</p>  <p>Identify major areas on the graph that represent population changes and discuss reasons these changes may have occurred.  <i>Source: North Carolina Department of Public Instruction</i></p>
<p>Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next).</p>	<p>Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of non-native species) may impact the environment.</p>	<p>2.2.1 Which of the following has contributed <b>most</b> to the overall warming of the earth's atmosphere?</p> <ol style="list-style-type: none"> <li><b>the burning of fossil fuels</b></li> <li>the depletion of the ozone</li> <li>the occurrence of acid rain</li> <li>the melting of the polar ice caps</li> </ol>
	<p>Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.</p>	<p>2.2.2 <b>Constructed Response:</b> What benefit does recycling provide for the biosphere?</p>

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Bio.3.1 Explain how traits are determined by the structure and function of DNA.	Bio.3.1.1 Explain the double-stranded, complementary nature of DNA as related to its function in the cell.	<p>3.1.1 If a strand of DNA is CTGCAT, what is the sequence of nucleotides in the complementary strand?</p> <p>a. <b>GACGTA</b>                      b. CTGCAT                      c. AGTACG                      d. GACGUA</p>																																																																																																																																																
	Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits.	<p>3.1.2 This chart represents amino acids that are coded from different combinations of mRNA codons.</p> <p style="text-align: center;"><b>Codons in mRNA</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>First Base</th> <th colspan="6">Second Base</th> <th>Third Base</th> </tr> <tr> <th></th> <th>U</th> <th>C</th> <th>A</th> <th>G</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td></td> <td>UUU Phenylalanine</td> <td>UCU Serine</td> <td>UAU Tyrosine</td> <td>UGU Cysteine</td> <td>U</td> <td></td> <td></td> </tr> <tr> <td>U</td> <td>UUC Phenylalanine</td> <td>UCC Serine</td> <td>UAC Tyrosine</td> <td>UGC Cysteine</td> <td>C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>UUA Leucine</td> <td>UCA Serine</td> <td>UAA Stop</td> <td>UGA Stop</td> <td>A</td> <td></td> <td></td> </tr> <tr> <td></td> <td>UUG Leucine</td> <td>UCG Serine</td> <td>UAG Stop</td> <td>UGG Tryptophan</td> <td>G</td> <td></td> <td></td> </tr> <tr> <td></td> <td>CUU Leucine</td> <td>CCU Proline</td> <td>CAU Histidine</td> <td>CGU Arginine</td> <td>U</td> <td></td> <td></td> </tr> <tr> <td>C</td> <td>CUC Leucine</td> <td>CCC Proline</td> <td>CAC Histidine</td> <td>CGC Arginine</td> <td>C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>CUA Leucine</td> <td>CCA Proline</td> <td>CAA Glutamine</td> <td>CGA Arginine</td> <td>A</td> <td></td> <td></td> </tr> <tr> <td></td> <td>CUG Leucine</td> <td>CCG Proline</td> <td>CAG Glutamine</td> <td>CGG Arginine</td> <td>G</td> <td></td> <td></td> </tr> <tr> <td></td> <td>AUU Isoleucine</td> <td>ACU Threonine</td> <td>AAU Asparagine</td> <td>AGU Serine</td> <td>U</td> <td></td> <td></td> </tr> <tr> <td>A</td> <td>AUC Isoleucine</td> <td>ACC Threonine</td> <td>AAC Asparagine</td> <td>AGC Serine</td> <td>C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>AUA Isoleucine</td> <td>ACA Threonine</td> <td>AAA Lysine</td> <td>AGA Arginine</td> <td>A</td> <td></td> <td></td> </tr> <tr> <td></td> <td>AUG Methionine or start</td> <td>ACG Threonine</td> <td>AAG Lysine</td> <td>AGG Arginine</td> <td>G</td> <td></td> <td></td> </tr> <tr> <td></td> <td>GUU Valine</td> <td>GCU Alanine</td> <td>GAU Aspartic Acid</td> <td>GGU Glycine</td> <td>U</td> <td></td> <td></td> </tr> <tr> <td>G</td> <td>GUC Valine</td> <td>GCC Alanine</td> <td>GAC Aspartic Acid</td> <td>GGC Glycine</td> <td>C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>GUA Valine</td> <td>GCA Alanine</td> <td>GAA Glutamic Acid</td> <td>GGA Glycine</td> <td>A</td> <td></td> <td></td> </tr> <tr> <td></td> <td>GUG Valine</td> <td>GCG Alanine</td> <td>GAG Glutamic Acid</td> <td>GGG Glycine</td> <td>G</td> <td></td> <td></td> </tr> </tbody> </table> <p>Which amino acid sequence can be coded from the DNA sequence CAG TAG CGA?</p> <p>a. Valine — Isoleucine — Glycine                      b. Valine — Aspartic Acid — Alanine                      c. <b>Valine — Isoleucine — Alanine</b>                      d. Valine — Phenylalanine — Alanine</p> <p><i>Source: NC Department of Public Instruction, North Carolina Test of Biology, Form I RELEASED Fall 2009</i></p>	First Base	Second Base						Third Base		U	C	A	G					UUU Phenylalanine	UCU Serine	UAU Tyrosine	UGU Cysteine	U			U	UUC Phenylalanine	UCC Serine	UAC Tyrosine	UGC Cysteine	C				UUA Leucine	UCA Serine	UAA Stop	UGA Stop	A				UUG Leucine	UCG Serine	UAG Stop	UGG Tryptophan	G				CUU Leucine	CCU Proline	CAU Histidine	CGU Arginine	U			C	CUC Leucine	CCC Proline	CAC Histidine	CGC Arginine	C				CUA Leucine	CCA Proline	CAA Glutamine	CGA Arginine	A				CUG Leucine	CCG Proline	CAG Glutamine	CGG Arginine	G				AUU Isoleucine	ACU Threonine	AAU Asparagine	AGU Serine	U			A	AUC Isoleucine	ACC Threonine	AAC Asparagine	AGC Serine	C				AUA Isoleucine	ACA Threonine	AAA Lysine	AGA Arginine	A				AUG Methionine or start	ACG Threonine	AAG Lysine	AGG Arginine	G				GUU Valine	GCU Alanine	GAU Aspartic Acid	GGU Glycine	U			G	GUC Valine	GCC Alanine	GAC Aspartic Acid	GGC Glycine	C				GUA Valine	GCA Alanine	GAA Glutamic Acid	GGA Glycine	A				GUG Valine	GCG Alanine	GAG Glutamic Acid	GGG Glycine	G		
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## Biology Assessment Examples

	<p>Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype.</p>	<p>3.1.3 Which of the following changes in DNA is likely to have the greatest effect on the resulting peptide?</p> <ol style="list-style-type: none"> <li>in a strand of DNA, one C is changed to a T</li> <li><b>a “G” is inserted at the beginning of a gene</b></li> <li>a “G” is inserted at the end of a gene</li> <li>in a strand of DNA, one T is changed to a C</li> </ol>
<p>Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.</p>	<p>Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation.</p>	<p>3.2.1 Why is the process of meiosis important to sexual reproduction?</p> <ol style="list-style-type: none"> <li><b>It provides genetic variation in offspring.</b></li> <li>It doubles the number of chromosomes in offspring.</li> <li>It reduces the number of alleles from parent to offspring.</li> <li>It produces a hybrid of all genetic traits in offspring.</li> </ol>
	<p>Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including: dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits).</p>	<p>3.2.1 A parent with Type A blood and a parent with Type O blood have a child. Which of the following is a possible genotype of their offspring?</p> <ol style="list-style-type: none"> <li><math>I^A I^A</math></li> <li><math>I^A I^B</math></li> <li><math>I^B i</math></li> <li><b>ii</b></li> </ol>
	<p>Bio.3.2.3 Explain how the environment can influence the expression of genetic traits.</p>	<p>3.2.3 Why do identical twins become less alike as they grow older?</p> <ol style="list-style-type: none"> <li><b>Because the environment plays a role in influencing individuals</b></li> <li>Because the genetic makeup of the individuals changes</li> <li>Because the individuals’ cells undergo mitosis</li> <li>Because the number of recessive alleles exceeds the number of dominant alleles</li> </ol>

3.2.3 Himalayan rabbits carry the C gene, which is required for the development of pigments in the fur, skin, and eyes. Specifically, the C gene is maximally active from 15°C to 25°C (Figure 1) and inactive above 35°C (Figure 2). This gene expression produces rabbits with a distinctive coat coloring.

Below is a picture of two Himalayan rabbits.



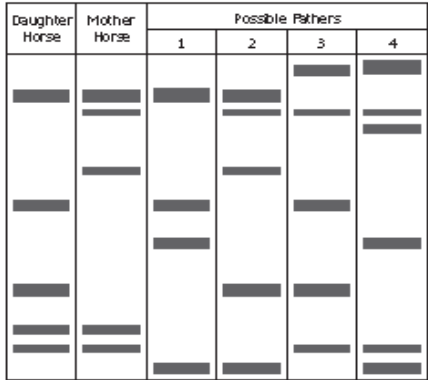
**Figure 1**



**Figure 2**

Why do these Himalayan rabbits exhibit different colors of fur?

- a. **The environment determines whether the gene for fur pigmentation is expressed.**
- b. The genetic makeup of the rabbits change.
- c. The rabbit's color changed in order to attract a mate.
- d. The rabbit's cells undergo mitosis.

<p>Bio.3.3 Understand the application of DNA technology.</p>	<p>Bio.3.3.1 Interpret how DNA is used for the comparison and identification of organisms.</p>	<p style="text-align: center;"><b>DNA Fingerprinting Experiment</b></p>  <p>3.3.1 The diagram shows DNA fingerprints from a daughter horse, the mother horse, and four possible fathers. Which horse is <i>most likely</i> the father?</p> <ol style="list-style-type: none"> <li>Horse 1</li> <li>Horse 2</li> <li><b>Horse 3</b></li> <li>Horse 4</li> </ol> <p><i>Source: Virginia Standards of Learning, Biology Exam 2008</i></p>
	<p>Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society.</p>	<p>3.3.2 How is the process of gene therapy used to treat cystic fibrosis?</p> <ol style="list-style-type: none"> <li><b>by replacing the abnormal gene with a copy of the normal gene</b></li> <li>by removing a portion of the abnormal gene</li> <li>by adding a nitrogen base to the beginning of the DNA sequence</li> <li>by inducing a mutation</li> </ol>
	<p>Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including: cloning, genetically modified organisms, stem cell research, and Human Genome Project).</p>	<p>3.3.3 <b>Constructed Response:</b> Should there be laws to regulate stem cell research? Justify your answer.</p>
<p>Bio.3.4 Explain the theory of evolution by natural selection as a mechanism for how species change over time.</p>	<p>Bio.3.4.1 Explain how fossil, biochemical, and anatomical evidence support the theory of evolution.</p>	<p>3.4.1 Species A and B share similarities in DNA sequences. What would this suggest about their evolutionary relationship?</p> <ol style="list-style-type: none"> <li>Species A developed before species B.</li> <li><b>Species A and B share a recent common ancestor.</b></li> <li>Species A and B are unrelated.</li> <li>Species B developed before Species A.</li> </ol>

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	<p>Bio.3.4.2 Explain how natural selection influences the changes in species over time.</p>	<p>3.4.2 During the Industrial Revolution, there were two variations of English Peppered Moths, those with light color and those with dark color. The soot from the factories covered the trees. Data was collected to measure the percentage of each type of moth in the area. It was noted that the percentage of dark-colored moths increased over time, while the percentage of light-colored moths decreased. What is the likely explanation for this change?</p> <ol style="list-style-type: none"> <li>The presence of a mutation changed the color of the English Peppered Moths.</li> <li><b>The presence of the dark-colored variation increased the likelihood for survival of the English Peppered Moths.</b></li> <li>The presence of the light-colored variation increased the likelihood for survival of the English Peppered Moths.</li> <li>The presence of an acquired trait changed the color of the English Peppered Moths.</li> <li></li> </ol>
	<p>Bio.3.4.3 Explain how various disease agents (bacteria, viruses, chemicals) can influence natural selection.</p>	<p>3.4.3 <b>Constructed Response:</b> Why are incidences of sickle cell anemia more common in areas known for high occurrence of malaria?</p> <p>3.4.3 A researcher sprays a new pesticide on thousands of insects of the same species that live in a large field. A few of the insects survive. What can be concluded by the researcher?</p> <ol style="list-style-type: none"> <li><b>The species of insects will likely become resistant to the pesticide.</b></li> <li>The ideal interval between the first and second applications of the pesticide should be increased.</li> <li>The pesticide has no effect on the species.</li> <li>The concentration of the pesticide was too weak.</li> </ol>
<p>Bio.3.5 Analyze how classification systems are developed based upon speciation.</p>	<p>Bio.3.5.1 Explain the historical development and changing nature of classification systems.</p>	<p>3.5.1 <b>Constructed Response:</b> How did organisms like euglena, which are heterotrophic and autotrophic, change the classification system?</p>

Bio.3.5.2 Analyze the classification of organisms according to their evolutionary relationships (including: dichotomous keys and phylogenetic trees).

3.5.2 Using the key provided, drawing III can be identified as which bird?



I) 90cm



II) 69cm



III) 50cm



IV) 31cm



V) 20cm



VI) 7.5cm

**Taxonomic Key to North American Birds**

- 1.a. Larger than 40. cm ..... 2
- 1.b. Not larger than 40. cm ..... 4
  
- 2.a. Hooked beak ..... 3
- 2.b. Beak not hooked ..... *Phasianus colchicus*
  
- 3.a. Feathers over eyes that look like ear ..... *Bubo virginianus*
- 3.b. No Feathers that look like ears ..... *Haliaeetus Leucocephalus*
  
- 4.a. Head one solid color of feathers ..... 5
- 4.b. Head not solid color of feathers ..... *Colinus virginianus*
  
- 5.a. Bill flat..... *Anas platyrhynchos*
- 5.b. Bill pointed ..... *Archilochus colubris*



## Biology Assessment Examples

		<p>a. <i>Bubo virginianus</i> b. <i>Haliaeetus leucocephalus</i> c. <i>Corlinus virginianus</i> d. <i>Anas platyrhynchos</i></p> <p>Source: NC Department of Public Instruction, EOC Biology Sample Items Goal 4, 2004 Curriculum</p> <p>3.5.3 <b>Constructed Response:</b> Based upon the dichotomous key above, which two organisms are more closely related? Explain your reasoning.</p>
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<b>Molecular Biology</b>		
<b>Essential Standards</b>	<b>Clarifying Objectives</b>	<b>Assessment Examples</b>
<b>Bio.4.1 Understand how biological molecules are essential to the survival of living organisms.</b>	Bio.4.1.1 Compare the structures and functions of the major biological molecules (carbohydrates, proteins, lipids, and nucleic acids) as related to the survival of living organisms.	4.1.1 Why would a distance runner consume carbohydrates instead of proteins before a race? a. Carbohydrates provide insulation for heat. b. Carbohydrates provide structure for tissues. c. Carbohydrates provide genetic material for muscle cells. <b>d. Carbohydrates provide energy for endurance.</b>
	Bio.4.1.2 Summarize the relationship among DNA, proteins, and amino acids in carrying out the work of cells and how this is similar in all organisms.	4.1.2 How does the DNA code become a protein? <b>a. DNA → mRNA → tRNA → amino acid → protein</b> a. DNA → tRNA → mRNA → amino acid → protein b. DNA → mRNA → amino acid → tRNA → protein c. DNA → amino acid → mRNA → tRNA → protein
	Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions.	4.1.3 How do enzymes speed up biological chemical reactions? a. Enzymes increase the energy required for a reaction to occur. <b>b. Enzymes decrease the energy required for a reaction to occur.</b> c. Enzymes have no affect on the energy required for a reaction to occur. d. Enzymes maintain the energy needed for a reaction to occur.
<b>Bio 4.2 Analyze the relationships between biochemical processes and energy use.</b>	Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems.	4.2.1 How does the process of photosynthesis in plants provide energy for animals? <b>a. The water and carbon dioxide used in photosynthesis are converted into glucose and ATP for animals.</b> b. The glucose and ATP used in photosynthesis are converted into water and carbon dioxide for animals. c. The glucose and carbon dioxide used in photosynthesis are converted into proteins for animals. d. The oxygen and glucose produced through photosynthesis are converted into lipids for animals.
	Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).	4.2.2 The concentration of a certain molecule is greater inside the cell than outside the cell. If the cell needs more of that molecule, what is the best process to move more of this molecule inside the cell? <b>a. Active transport</b> b. Passive transport c. Diffusion d. Osmosis