

Biology Module B: Evolution, is one of four sections of Module B of the Biology Keystone Exam. The content and assignments are organized in a manner consistent with the Pennsylvania Keystone Biology blueprint. In Biology Module B, the theme of continuity and unity of life is explored through four big ideas. Students address the big ideas of cell growth and reproduction, genetics, the theory of evolution, and ecology through the exploration of the following essential questions:

- How do organisms live, grow, respond to their environment, and reproduce?
- How are the characteristics of one generation passed to the next?
- How can individuals of the same species and even siblings have different characteristics?
- How can there be so many similarities among organisms yet so many different kinds of plant, animals, and microorganisms?

How and why do organisms interact with their environment and what are the effects of these interactions?

The resources in this Module will enable students to reinforce the concepts within evolution as well as resources for teachers to utilize in the classroom. This section will focus on the question: How can there be so many similarities among organisms yet so many different kinds of plant, animals, and microorganisms?

## BIO B EVOLUTION

Module Title	Message	Assignment / Call to Action	Content Directions	Resource / URL	Info about the URL (published on the "i" button of a resource/url)	Notes
Section Overview: Evolution	In Biology Module B, the theme of continuity and unity of life is explored through four big ideas. The big idea of this section, Evolution, focuses on concepts related to the mechanisms of biological evolution and the application of scientific thinking, processes, tools and technologies in the study of the theory of evolution. Students apply scientific processes to interpret and evaluate sources of evidence that can explain the mechanisms of evolutionary theory. They use evidence to explain processes and use models to communicate explanations of the concepts. Scientific concepts of hypothesis, inference, law, theory, principle, fact, and observation are emphasized.					
Theory of Evolution	In Biology Module B, the theme of continuity and unity of life is explored through four big ideas. The big idea of this section, Evolution, focuses on concepts related to the mechanisms of biological evolution and the application of scientific thinking, processes, tools and technologies in the study of the theory of evolution. Students apply scientific processes to interpret and evaluate sources of evidence that can explain the mechanisms of evolutionary theory. They use evidence to explain processes and use models to communicate explanations of the concepts. Scientific concepts of hypothesis, inference, law, theory, principle, fact, and observation are emphasized.					
		READ text on Darwin and the Theory of Evolution Ch 10 Sec 1.		<a href="https://www.youtube.com/watch?v=fQvER3MyI2c">https://www.youtube.com/watch?v=fQvER3MyI2c</a>		
		WATCH this video about natural selection.		<a href="https://www.youtube.com/watch?v=aTftyFboC_M">https://www.youtube.com/watch?v=aTftyFboC_M</a>		
		WATCH a video on evoluevolutionation.		<a href="https://www.youtube.com/watch?v=dBnZ734vN3E">https://www.youtube.com/watch?v=dBnZ734vN3E</a>		

		SIMULATE natural selection by completing this virtual lab.		<a href="http://www.biologycorner.com/worksheets/pepperedmoth.html">http://www.biologycorner.com/worksheets/pepperedmoth.html</a>		
		ANALYZE the "Survival of the Sneakiest" cartoon.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGVWZYLtU0bXBhRjg">https://drive.google.com/open?id=0B99Um_mvTWdGVWZYLtU0bXBhRjg</a>	PDF - SurvivaloftheSneakiest.doc	
		CREATE a website regarding the theory of evolution.		<a href="http://www.biologycorner.com/projects/evolution/index.html">http://www.biologycorner.com/projects/evolution/index.html</a>		
		COMPLETE Theory of Evolution worksheet in CK-12 pages 424-439		<a href="https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11">https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11</a>		
		CREATE a story about evolution using this app.		<a href="https://itunes.apple.com/us/app/photostory-create-your-own/id551635235?mt=8">https://itunes.apple.com/us/app/photostory-create-your-own/id551635235?mt=8</a>		
		ANSWER free response questions.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGZVJaSVNNQVBpMTg">https://drive.google.com/open?id=0B99Um_mvTWdGZVJaSVNNQVBpMTg</a>	Word - exam_free_response-1	
		PERFORM lab on Natural selection.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGeHJkSVoyNkg0eEE">https://drive.google.com/open?id=0B99Um_mvTWdGeHJkSVoyNkg0eEE</a>	Word - natural_selection_lab-1	

		DISCOVER Darwin and Evolution.		<a href="http://www.pbs.org/wgbh/evolution/educators/lessons/lesson2/index.html">http://www.pbs.org/wgbh/evolution/educators/lessons/lesson2/index.html</a>		
The Mechanisms of Evolution	Students will use data to demonstrate how natural selection can impact allele frequencies of a population. Students will communicate the factors that can contribute to the development of new species and distinguish between isolating mechanisms, genetic drift, founder effect, and migration. Students will construct an explanation of how genetic mutations may result in genotypic and phenotypic variations within a population.					
		READ text on the mechanisms of evolution Ch 10 Sec 3		<a href="https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13">https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13</a>		
		WATCH this video on speciation.		<a href="http://www.hhmi.org/biointeractive/anole-lizards-example-speciation">http://www.hhmi.org/biointeractive/anole-lizards-example-speciation</a>		
		WATCH video on the mechanisms of evolution.		<a href="https://www.youtube.com/watch?v=ALXqMcqH5uE">https://www.youtube.com/watch?v=ALXqMcqH5uE</a>		
		PERFORM an activity to show natural selection.		<a href="http://www.pbs.org/wgbh/evolution/educators/lessons/lesson4/act1.html">http://www.pbs.org/wgbh/evolution/educators/lessons/lesson4/act1.html</a>		
		WATCH video on Genetic Drift and the Founder Effect.		<a href="https://www.youtube.com/watch?v=2y-u9ToDfwl">https://www.youtube.com/watch?v=2y-u9ToDfwl</a>		
		WATCH Genetic drift video by Bozeman.		Video - Genetic Drift - YouTube		

		SYNTHESIZE evolution topics by completing the concept map.		<a href="http://www.biologycorner.com/worksheets/evolution_concept.html">http://www.biologycorner.com/worksheets/evolution_concept.html</a>		
Evidence for Biological Evolution	Students will evaluate evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).					
		READ text on biological evolution Ch 10 Sec 2.		<a href="https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13">https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13</a>		
		READ the following article about evidence for evolution.		<a href="http://anthro.palomar.edu/evolve/evolve_3.htm">http://anthro.palomar.edu/evolve/evolve_3.htm</a>		
		WATCH video on DNA sequencing.		<a href="http://www.bozemanscience.com/comparing-dna-sequences">http://www.bozemanscience.com/comparing-dna-sequences</a>		
		NAVIGATE website to learn about evolution.		<a href="http://evolution.berkeley.edu/evolibrary/home.php">http://evolution.berkeley.edu/evolibrary/home.php</a>		NEEDS TO BE CHANGED IN COURSE!
		COMPLETE this lab activity on the evidence of evolution using cytochrome c analysis.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGT0VpX2dXdKpTR1U">https://drive.google.com/open?id=0B99Um_mvTWdGT0VpX2dXdKpTR1U</a>	PDF - Honors-Evolution- Lab-Amino Acid Comparison	
		ANALYZE fossil evidence for evolution by taking this online quiz.		<a href="http://www.indiana.edu/~ensiweb/lessons/gr.fs.fd.html">http://www.indiana.edu/~ensiweb/lessons/gr.fs.fd.html</a>		

		REVIEW your knowledge of evolution by taking this online quiz.		<a href="http://www.biologycorner.com/quiz/qz_evolution.html">http://www.biologycorner.com/quiz/qz_evolution.html</a>		
		COMPLETE CK-12 worksheets on Evidence of Evolution pages 440-454.		<a href="https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11">https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11</a>		
		COLLECT evidence for Evolution in 2 online activities.		<a href="http://www.pbs.org/wgbh/evolution/educators/lessons/lesson3/index.html">http://www.pbs.org/wgbh/evolution/educators/lessons/lesson3/index.html</a>		
Nature of Science: Scientific Thinking in the Study of the Theory of Evolution	Students will distinguish among the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation. SAS Standards: 3.1.B.A9					
		READ text on scientific thinking Ch 1 Sec 1		<a href="https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13">https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13</a>		
		REVIEW scientific thinking terms.		<a href="http://www.gly.uga.edu/railsback/1122science7.html">http://www.gly.uga.edu/railsback/1122science7.html</a>		
		CLASSIFY statements using scientific thinking terms.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGODhkTUFjbGRYa28">https://drive.google.com/open?id=0B99Um_mvTWdGODhkTUFjbGRYa28</a>	PDF - Scientific Thinking.docx	

		COMPLETE CK-12 workbook activities pages 5-20.		<a href="https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11">https:// itunes.apple.com/ us/book/ck-12- biology-workbook/ id518270997? mt=11</a>		
		DISCOVER the nature of science.		<a href="http://www.pbs.org/wgbh/evolution/educators/lessons/lesson1/index.html">http://www.pbs.org/ wgbh/evolution/ educators/lessons/ lesson1/index.html</a>		
		READ about Evolution Fact and Theory.		<a href="http://www.talkorigins.org/faqs/evolution-fact.html">http:// www.talkorigins.org/ faqs/evolution- fact.html</a>		
		WATCH video on scientific method		<a href="https://www.youtube.com/watch?v=ytX-0nxZUCk">https:// www.youtube.com/ watch? v=ytX-0nxZUCk</a>		
		PRACTICE using the scientific method.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGVGF5dEIQODVxVVU">https:// drive.google.com/ open? id=0B99Um_mvTW dGVGF5dEIQODVx VVU</a>	PDF - BioScientificMethod	
		WATCH podcast on scientific thinking.		Podcast - Blue World: Basking sharks and Lampreys		
		COMPLETE study guide questions while watching podcast.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGOXBNaGFVS2pmbTQ">https:// drive.google.com/ open? id=0B99Um_mvTW dGOXBNaGFVS2p mbTQ</a>	PDF - Study Guide 15	

		INTERPRET lesson plan about scientific thinking.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGN1pqNmFYd1NscDg">https://drive.google.com/open?id=0B99Um_mvTWdGN1pqNmFYd1NscDg</a>	PDF - Lesson_Plan_Webisode15Lamprey	
Review of Evolution	Students will review the different aspects of Biological Evolution.					
		WATCH a podcast reviewing biological evolution.		Podcast - CRSD Videocast 9.appleuniversal		
		COMPLETE review guide while watching podcast.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGZFY1dnJvUHDYemM">https://drive.google.com/open?id=0B99Um_mvTWdGZFY1dnJvUHDYemM</a>	Word - Topic 9 Viewing Guide(1)	
		STUDY review guide on Biological Evolution.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGR1pFUVFzRFpzaVk">https://drive.google.com/open?id=0B99Um_mvTWdGR1pFUVFzRFpzaVk</a>	Word - Topic 9 Quick Facts	
		PLAY this jeopardy game to review evolution concepts.		<a href="http://bio1100.nicerweb.com/jeopardy.html">http://bio1100.nicerweb.com/jeopardy.html</a>		
		QUIZ yourself using this video self-assessment.		<a href="https://www.youtube.com/watch?v=Jvc3S_ZiucU">https://www.youtube.com/watch?v=Jvc3S_ZiucU</a>		
		TAKE a quiz.		<a href="http://www.crsd.org/Page/33093">http://www.crsd.org/Page/33093</a>		