

Biology Module B: Genetics, 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 genetics as well as resources for teachers to utilize in the classroom. This section will focus on the questions:

- 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?

## BIO B GENETICS

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
TITLE	MESSAGE	(CALL TO ACTION		URL		NOTES
Section Overview: Genetics	In Biology Module B, the theme of continuity and unity of life is explored through four big ideas. The big idea of this section, Genetics, focuses on developing an understanding of the patterns of inheritance. Students analyze and predict how genetic information is inherited, altered, and expressed. Processes associated with protein synthesis are analyzed. Scientific thinking, processes, tools, and technologies in the study of genetics are applied as students predict the impacts of genetic engineering on medicine, forensics, and agriculture. Students use models to describe patterns, build explanations and communicate their understanding of the content.					
1. Expression of Genetic Information: Co-dominance and Incomplete Dominance	Students will watch videos on non-Mendelian inheritance and complete practice problems on co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles.					
		WATCH a video on Incomplete and Complete Dominance.		<a href="https://www.youtube.com/watch?v=fQvER3Myl2c">https://www.youtube.com/watch?v=fQvER3Myl2c</a>		
		PRACTICE doing Incomplete and Co dominant Problems.		<a href="https://www.youtube.com/watch?v=fQvER3Myl2c">https://www.youtube.com/watch?v=fQvER3Myl2c</a>		

		COMPLETE the Co dominant and Incomplete dominant problems.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGZkVicjJWUURzRk0">https://drive.google.com/open?id=0B99Um_mvTWdGZkVicjJWUURzRk0</a>	Word - genetics	
Mendelian Genetics	Students will read and watch videos on the Father of Genetics, Gregor Mendel, and discover how the idea of inheritance began. Students will predict observed patterns of Mendelian inheritance (i.e., dominant, recessive). They will complete punnett squares and determine genotypes and phenotypes.					
		READ text on patterns of inheritance Ch. 6 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>		
		READ text on Mendelian Inheritance Ch 6 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 text on human inheritance Ch 8. 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>		
		WATCH and READ the powerpoint on Gregor Mendel and Genetics		<a href="https://docs.google.com/presentation/d/1P-LpqvmnKaeZ8JBpBUL6QewNVrzRvtNHeeR7f0a644/present?slide=id.i0">https://docs.google.com/presentation/d/1P-LpqvmnKaeZ8JBpBUL6QewNVrzRvtNHeeR7f0a644/present?slide=id.i0</a>		

		WATCH video on Gregor Mendel and Punnett Squares.		<a href="https://www.youtube.com/watch?v=ya7h-Y-9l8c">https://www.youtube.com/watch?v=ya7h-Y-9l8c</a>		
		TAKE a quiz on basic genetics.		<a href="http://www.biologycorner.com/quiz/qz_mendel_genetics.html">http://www.biologycorner.com/quiz/qz_mendel_genetics.html</a>		
		WATCH tutorial on solving basic genetic problems.		<a href="https://www.youtube.com/watch?v=Qcmdb25Rnyo">https://www.youtube.com/watch?v=Qcmdb25Rnyo</a>		
		COMPLETE Monohybrid Problems.		<a href="http://www.biologycorner.com/worksheets/genetics_practice.html">http://www.biologycorner.com/worksheets/genetics_practice.html</a>		
		WATCH video on how to do a Dihybrid Cross.		<a href="https://www.youtube.com/watch?v=67rtf4JUDLw">https://www.youtube.com/watch?v=67rtf4JUDLw</a>		
		COMPLETE Dihybrid Problems.		<a href="http://www.biologycorner.com/worksheets/genetics_2traits_bio2.html#.U3tXTIOgc9Y">http://www.biologycorner.com/worksheets/genetics_2traits_bio2.html#.U3tXTIOgc9Y</a>		
Sex-linked, Multiple Alleles and Blood Types	Students will be introduced to non-Mendelian genetic problems. They can watch videos on how to complete them and then demonstrate different types of inheritance.					

		WATCH video on Sex linked and Multiple alleles.		<a href="http://www.youtube.com/watch?v=YoEgUqHOcbc">http://www.youtube.com/watch?v=YoEgUqHOcbc</a>		
		COMPLETE sex linked problems.		<a href="http://www.biologycorner.com/worksheets/genetics_xlinked.html#.U3tYW1Ogc9Y">http://www.biologycorner.com/worksheets/genetics_xlinked.html#.U3tYW1Ogc9Y</a>		
		COMPLETE Genetics Problems		<a href="http://www.biologycorner.com/worksheets/genetics_advanced_problems.html">http://www.biologycorner.com/worksheets/genetics_advanced_problems.html</a>		
		TAKE a quiz on Complex Genetic Problems.		<a href="http://www.biologycorner.com/quiz/qz_advanced_genetics.html">http://www.biologycorner.com/quiz/qz_advanced_genetics.html</a>		
		WATCH a video on Human Blood Types		<a href="http://anthro.palomar.edu/blood/ABO_system.htm">http://anthro.palomar.edu/blood/ABO_system.htm</a>		
		COMPLETE Blood / Multiple Allele Problems		<a href="http://www.biologycorner.com/worksheets/genetics_multiplealleles.html#.U3tYk1Ogc9Y">http://www.biologycorner.com/worksheets/genetics_multiplealleles.html#.U3tYk1Ogc9Y</a>		
		PERFORM Multiple Allele Problems on Chickens		<a href="http://www.biologycorner.com/worksheets/genetics_chicken.html">http://www.biologycorner.com/worksheets/genetics_chicken.html</a>		

		PRACTICE sex linked problems on Calico Cats.		<a href="http://www.biologycorner.com/worksheets/genetics_calico.html">http://www.biologycorner.com/worksheets/genetics_calico.html</a>		
		PRACTICE problems on multiple alleles with eye color.		<a href="http://www.biologycorner.com/worksheets/virtual_eye_color.html">http://www.biologycorner.com/worksheets/virtual_eye_color.html</a>		
		TEST your colorblindness.		<a href="http://colorvisiontesting.com/">http://colorvisiontesting.com/</a>		
		PERFORM an experiment with fruit flies.		<a href="http://www.phschool.com/science/biology_place/labbench/lab7/intro.html">http://www.phschool.com/science/biology_place/labbench/lab7/intro.html</a>		
		TAKE a quiz after performing lab.		<a href="http://www.phschool.com/science/biology_place/labbench/lab7/quiz.html">http://www.phschool.com/science/biology_place/labbench/lab7/quiz.html</a>		
		WATCH video on pedigree charts		<a href="http://www.youtube.com/watch?v=Wuk0W10EveU">http://www.youtube.com/watch?v=Wuk0W10EveU</a>		
		COMPLETE a Pedigree		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGQVpxb0wzYm05RkU">https://drive.google.com/open?id=0B99Um_mvTWdGQVpxb0wzYm05RkU</a>	Word - pedigrees	

		INTERPRET pedigrees		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGWWRMNGhGT0s3TVk">https://drive.google.com/open?id=0B99Um_mvTWdGWWRMNGhGT0s3TVk</a>	PDF - Pedigree Worksheet	
Protein Synthesis	<p>Students will model the processes of transcription and translation. Students will communicate the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.</p> <p>Protein synthesis consists of the processes of transcription and translation. Transcription is the process of copying a part of the DNA molecule that codes for a specific protein and attaching that copy to the ribosome. Translation is process of finding the correct amino acids and assembling them into a protein.</p>					
		READ text on protein synthesis Ch 7 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>		
		VIEW presentation on DNA, replication, transcription and translation.		<a href="https://docs.google.com/presentation/d/1P9_HKHUUNVSCLtEmnF_jQKVN5LHaSwZstwbZIQahmlk/present?slide=id.i0">https://docs.google.com/presentation/d/1P9_HKHUUNVSCLtEmnF_jQKVN5LHaSwZstwbZIQahmlk/present?slide=id.i0</a>		
		WATCH video on Protein Synthesis.		<a href="https://www.youtube.com/watch?v=K2_uB7ybfYM">https://www.youtube.com/watch?v=K2_uB7ybfYM</a>		

		COMPLETE worksheet while watching the Protein Synthesis video.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGNGNaUE41ODRwX2s">https://drive.google.com/open?id=0B99Um_mvTWdGNGNaUE41ODRwX2s</a>	PDF - Amoeba Sisters: Video Recap	
		WATCH video on Transcription and Translation.		<a href="http://www.bozemanscience.com/027-part-2-dna-rna">http://www.bozemanscience.com/027-part-2-dna-rna</a>		
		TAKE quiz on protein synthesis.		<a href="http://biologycorner.com/quiz/DNA3_qz.html">http://biologycorner.com/quiz/DNA3_qz.html</a>		
		TAKE bounce quiz on DNA and protein.		<a href="http://www.echalk.co.uk/Science/biology/cells/ProteinAndDNA_BQ/dnaProteinBQ.html">http://www.echalk.co.uk/Science/biology/cells/ProteinAndDNA_BQ/dnaProteinBQ.html</a>		
		READ article on a point mutation associated with hemoglobin and sickle cell anemia.		<a href="http://www.nature.com/scitable/topicpage/genetic-mutation-441">http://www.nature.com/scitable/topicpage/genetic-mutation-441</a>		
		TAKE quiz on Protein Synthesis.		<a href="http://www.sciencegeek.net/Biology/review/U5Protein.htm">http://www.sciencegeek.net/Biology/review/U5Protein.htm</a>		
		DOWNLOAD audio clips on Protein Synthesis.		<a href="https://itunes.apple.com/us/itunes-u/dna-rna-protein-formation/id380230996?mt=10">https://itunes.apple.com/us/itunes-u/dna-rna-protein-formation/id380230996?mt=10</a>	iTunes - DNA, RNA and protein formations - for iPod/iPhone	

Genetic Engineering						
Genetic Engineering	Students will cite multiple examples of how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).					
		READ text on human genetics and biotechnology Ch 8 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 video on Gene Regulation.		<a href="https://www.youtube.com/watch?v=3S3ZOmlAj0">https:// www.youtube.com/ watch? v=3S3ZOmlAj0</a>		
		WATCH a video on genetically modified food.		<a href="https://www.youtube.com/watch?v=8z_CqyB1dQo">https:// www.youtube.com/ watch? v=8z_CqyB1dQo</a>		
		TAKE a quiz on genetic engineering.		<a href="http://www.quia.com/quiz/1847640.html">http:// www.quia.com/quiz/ 1847640.html</a>		
		REVIEW presentation on genetic engineering.		<a href="https://docs.google.com/presentation/d/1zZAW6j0qp3DpQOaSGY0dIT9fKIOpt5iS3gKiTZ6TetE/present?slide=id.i0">https:// docs.google.com/ presentation/d/ 1zZAW6j0qp3DpQ OaSGY0dIT9fKIOpt 5iS3gKiTZ6TetE/ present?slide=id.i0</a>		
		INTERPRET cloning.		<a href="http://www.biologycorner.com/worksheets/cloning.html">http:// www.biologycorner. com/worksheets/ cloning.html</a>		
		VIEW video on Stem Cell.		<a href="http://www.pbs.org/wgbh/nova/body/stem-cells-research.html">http://www.pbs.org/ wgbh/nova/body/ stem-cells- research.html</a>		

		WATCH video on human genome medical applications.		<a href="http://www.pbs.org/wgbh/nova/body/public-genomes.html">http://www.pbs.org/wgbh/nova/body/public-genomes.html</a>		
		VIEW video on extracting DNA.		<a href="https://www.youtube.com/watch?v=jRQGCdE0sso&amp;list=PLBE2770DA8684CD9C&amp;index=6">https://www.youtube.com/watch?v=jRQGCdE0sso&amp;list=PLBE2770DA8684CD9C&amp;index=6</a>		
		READ information on GMO's.		<a href="http://www.eschooltoday.com/gmo/how-is-gmo-done.html">http://www.eschooltoday.com/gmo/how-is-gmo-done.html</a>		
Expression of Genetic Information	Students will construct explanations of how genetic mutations alter the DNA sequence and distinguish among mutations that may or may not affect phenotype (e.g., silent, nonsense, frameshift).					
		READ text on genetic information Ch 7 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>		
		VIEW a video on Mutations.		<a href="https://www.youtube.com/watch?v=efstlgoynlk">https://www.youtube.com/watch?v=efstlgoynlk</a>		
		EXPLORE mutations and their effects.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGdzN3UHhnb2U4Z3M">https://drive.google.com/open?id=0B99Um_mvTWdGdzN3UHhnb2U4Z3M</a>	PDF - mutations by analogy	

		SIMULATE effects of mutations in this activity.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGNGMwC1nOXVlY1k">https://drive.google.com/open?id=0B99Um_mvTWdGNGMwC1nOXVlY1k</a>	PDF - Genetics_pages-4/28/04.qk	
		WATCH a video relating mutations to breast cancer.		<a href="http://www.pbs.org/pov/inthefamily/video_classroom1.php#.VgQX1Y9Vikp">http://www.pbs.org/pov/inthefamily/video_classroom1.php#.VgQX1Y9Vikp</a>		
		INTERPRET effects of mutations.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGZ3JRQzhvbkJUbee">https://drive.google.com/open?id=0B99Um_mvTWdGZ3JRQzhvbkJUbee</a>	Word - Mutation Activity	
		TAKE a quiz on types of mutations.		<a href="http://www.quia.com/quiz/2142636.html?AP_rand=994652092">http://www.quia.com/quiz/2142636.html?AP_rand=994652092</a>		
		DISCOVER human mutations.		<a href="http://bigthink.com/daylight-atheism/evolution-is-still-happening-beneficial-mutations-in-humans">http://bigthink.com/daylight-atheism/evolution-is-still-happening-beneficial-mutations-in-humans</a>		
		TAKE quiz on sex linked and mutations.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGSTFHemJ4c0xnUGM">https://drive.google.com/open?id=0B99Um_mvTWdGSTFHemJ4c0xnUGM</a>	Word - Sex linked QUIZ	

		SIMULATE different mutations in this group activity.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGQXFoQUJ0dkFjbjQ">https://drive.google.com/open?id=0B99Um_mvTWdGQXFoQUJ0dkFjbjQ</a>	Word - Monstrous Mutations-1	
Review of Genetics	Students review concepts related to the topic Genetics.					
		WATCH podcast on Genetics.		Podcast - CRSD Videocast 7.appleuniversal		
		COMPLETE review sheet while watching podcast.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGaGdPbzRXUzh0Mzg">https://drive.google.com/open?id=0B99Um_mvTWdGaGdPbzRXUzh0Mzg</a>	Word - topic_6_viewing_guide	
		STUDY facts on Genetics.		<a href="https://drive.google.com/open?id=0B99Um_mvTWdGSGRBMS1EMkplc2c">https://drive.google.com/open?id=0B99Um_mvTWdGSGRBMS1EMkplc2c</a>	Word - Topic 6 Quick Facts-1	
		TAKE a quiz.		<a href="http://www.crsd.org/Page/33011">http://www.crsd.org/Page/33011</a>		
		REVIEW Genetics.		<a href="http://serendip.brynmawr.edu/sci_edu/waldron/pdf/GeneticsProtocol.pdf">http://serendip.brynmawr.edu/sci_edu/waldron/pdf/GeneticsProtocol.pdf</a>		