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.		https://www.youtube.com/watch?v=fQvER3MyI2c		
		PRACTICE doing Incomplete and Co dominant Problems.		https://www.youtube.com/watch?v=fQvER3MyI2c		

		COMPLETE the Co dominant and Incomplete dominant problems.		https://drive.google.com/open?id=0B99Um_mvTWdGZkVicjJWUURzRk0	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.		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		READ text on Mendelian Inheritance Ch 6 Sec 2.		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		READ text on human inheritance Ch 8. Sec. 2.		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		WATCH and READ the powerpoint on Gregor Mendel and Genetics		https://docs.google.com/presentation/d/1P-LpqvmnKaeZ8JBpBUL6QewNVrzRtvtNHeeR7f0a644/present?slide=id.i0		

		WATCH video on Gregor Mendel and Punnett Squares.		https://www.youtube.com/watch?v=ya7h-Y-9l8c		
		TAKE a quiz on basic genetics.		http://www.biologycorner.com/quiz/qz_mendel_genetics.html		
		WATCH tutorial on solving basic genetic problems.		https://www.youtube.com/watch?v=Qcmdb25Rnyo		
		COMPLETE Monohybrid Problems.		http://www.biologycorner.com/worksheets/genetics_practice.html		
		WATCH video on how to do a Dihybrid Cross.		https://www.youtube.com/watch?v=67rtf4JUDLw		
		COMPLETE Dihybrid Problems.		http://www.biologycorner.com/worksheets/genetics_2traits_bio2.html#.U3tXTlOgc9Y		
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.		http://www.youtube.com/watch?v=YoEgUqHOcbc		
		COMPLETE sex linked problems.		http://www.biologycorner.com/worksheets/genetics_xlinked.html#.U3tYW1Ogc9Y		
		COMPLETE Genetics Problems		http://www.biologycorner.com/worksheets/genetics_advanced_problems.html		
		TAKE a quiz on Complex Genetic Problems.		http://www.biologycorner.com/quiz/qz_advanced_genetics.html		
		WATCH a video on Human Blood Types		http://anthro.palomar.edu/blood/ABO_system.htm		
		COMPLETE Blood / Multiple Allele Problems		http://www.biologycorner.com/worksheets/genetics_multiplealleles.html#.U3tYk1Ogc9Y		
		PERFORM Multiple Allele Problems on Chickens		http://www.biologycorner.com/worksheets/genetics_chicken.html		

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

		INTERPRET pedigrees		https://drive.google.com/open?id=0B99Um_mvTWdGWWRMNGhGT0s3TVk	PDF - Pedigree Worksheet	
Protein Synthesis	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. 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.					
		READ text on protein synthesis Ch 7 Sec 2		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		VIEW presentation on DNA, replication, transciption and translation.		https://docs.google.com/presentation/d/1P9_HKHUUNVSCLtEmnF_jQKVN5LHaSwZstwbZIQahml k/present?slide=id.i0		
		WATCH video on Protein Synthesis.		https://www.youtube.com/watch?v=K2_uB7ybfYM		

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

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.		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		WATCH video on Gene Regulation.		https://www.youtube.com/watch?v=3S3ZOmleAj0		
		WATCH a video on genetically modified food.		https://www.youtube.com/watch?v=8z_CqyB1dQo		
		TAKE a quiz on genetic engineering.		http://www.quia.com/quiz/1847640.html		
		REVIEW presentation on genetic engineering.		https://docs.google.com/presentation/d/1zZAW6j0qp3DpQOaSGY0dIT9fKlOpt5iS3gKiTZ6TetE/present?slide=id.i0		
		INTERPRET cloning.		http://www.biologycorner.com/worksheets/cloning.html		
		VIEW video on Stem Cell.		http://www.pbs.org/wgbh/nova/body/stem-cells-research.html		

		WATCH video on human genome medical applications.		http://www.pbs.org/wgbh/nova/body/public-genomes.html		
		VIEW video on extracting DNA.		https://www.youtube.com/watch?v=jRQGCdE0sso&list=PLBE2770DA8684CD9C&index=6		
		READ information on GMO's.		http://www.eschooltoday.com/gmo/how-is-gmo-done.html		
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.		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		VIEW a video on Mutations.		https://www.youtube.com/watch?v=efstlgoynlk		
		EXPLORE mutations and their effects.		https://drive.google.com/open?id=0B99Um_mvTWdGdzN3UHhnb2U4Z3M	PDF - mutations by analogy	

		SIMULATE effects of mutations in this activity.		https://drive.google.com/open?id=0B99Um_mvTWdGNGMwcC1nOXVIY1k	PDF - Genetics_pages-4/28/04.qk	
		WATCH a video relating mutations to breast cancer.		http://www.pbs.org/pov/inthefamily/video_classroom1.php#.VgQX1Y9Vikp		
		INTERPRET effects of mutations.		https://drive.google.com/open?id=0B99Um_mvTWdGZ3JRQzhvbkJUbEE	Word - Mutation Activity	
		TAKE a quiz on types of mutations.		http://www.quia.com/quiz/2142636.html?AP_rand=994652092		
		DISCOVER human mutations.		http://bigthink.com/daylight-atheism/evolution-is-still-happening-beneficial-mutations-in-humans		
		TAKE quiz on sex linked and mutations.		https://drive.google.com/open?id=0B99Um_mvTWdGSTFHemJ4c0xnUGM	Word - Sex linked QUIZ	

		SIMULATE different mutations in this group activity.		https://drive.google.com/open?id=0B99Um_mvTWdGQXFoQUJ0dkFjbjQ	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.		https://drive.google.com/open?id=0B99Um_mvTWdGaGdPbzRXUzh0Mzg	Word - topic_6_viewing_guide	
		STUDY facts on Genetics.		https://drive.google.com/open?id=0B99Um_mvTWdGSGRBMS1EMkplc2c	Word - Topic 6 Quick Facts-1	
		TAKE a quiz.		http://www.crsd.org/Page/33011		
		REVIEW Genetics.		http://serendip.brynmawr.edu/sci_edu/waldron/pdf/GeneticsProtocol.pdf		