This module, Biology Module A: Cells and Cell Processes, is one half of a year-long exploration of biology. The content and assignments are organized in a manner consistent with the Pennsylvania Keystone Biology blueprint. In Biology Module A: the theme of Cells and Cell Processes is explored through four big ideas. Students address the big ideas: The Basic Biological Principles, The Chemical Basis of Life, Bioenergetics, Homeostasis and Transport through the exploration of the Essential Questions:

- How do organisms live, grow, respond to their environment, and reproduce?
- How do the structures of organisms enable life's functions?
- How do organisms grow and develop?
- How and why do organisms interact with their environment and what are the effects of these interactions?
- How do organisms obtain and use the matter and energy they need to live and grow?

The resources in this module will enable students to reinforce the concepts within Bioenergetics as well as resources for teachers to utilize in the classroom.

BIO A: BIOENERGETICS

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
BIO A: BIOENERGETICS	Students investigate how sustenance of life requires substantial energy and matter inputs. The complex structural organization of organisms accommodates the capture, transformation, transport, release, and elimination of the matter and energy needed to sustain them. Chemical elements are recombined in different ways to form different products. The result of these chemical reactions is that energy is transferred from one system of interacting molecules to another. In most cases, the energy needed for life is ultimately derived from the sun through photosynthesis.					
Section 1: Cell Structures Involved in Processing Energy	Students will examine the roles of cell organelles in energy transformations. 3.1.B.A2, 3.1.B.A5, 3.1.C.A1					
		READ text on cell organelles (Chapter 3 section 2).		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		WATCH video on Mitochondria		https://www.youtube.com/watch?v=z1kQuwwXmao		
		WATCH video on Structure of Mitochondria		http://www.sophia.org/tutorials/mitochondria--5		

		DRAW Mitochondria and Chloroplast using Educreation App and label their parts.		https://itunes.apple.com/us/app/educreations-interactive-whiteboard/id478617061?mt=8		
		WATCH this video to introduce chloroplasts and photosynthesis.		http://www.youtube.com/watch?v=nwxsJTc8Zt4&edufilter=okMgIJJx4LqGlJwfRqmGyQ&safe=active		
Section 2: Energy Transformations in the Cell	Students compare the basic transformation of energy during photosynthesis and cellular respiration such as the role of ATP in biochemical reactions. SAS Standards 3.1.B.A2, 3.1.B.A5, 3.1.C.A1, 4.1.10.C					
		WACTH video explaining how cells obtain energy		https://www.youtube.com/watch?v=i8c5JcnFaJ0		
		WATCH video showing the purpose of energy transformations		https://www.youtube.com/watch?v=aA8d-tt6dII		
		ANALYZE your knowledge about energy transformations to answer the following questions		https://drive.google.com/open?id=0B99Um_mvTWdGV0ZMTXJ4aF9keWM	WORD DOC - Energy Stored Mechanisms.docx	

		Compare and CONTRAST energy transformations		https://drive.google.com/open?id=0B99Um_mvTWdGaUZ1aVhJMUVRRnc	WORD DOC - Chloroplasts and Mitochondria	
		COMPLETE worksheet on energy transformations.		https://drive.google.com/open?id=0B99Um_mvTWdGVzNiV2czeE9WWWs	WORD DOC - Photosynthesis Worksheet	
Section 3: ATP	Students identify and describe how organisms obtain and transform energy for their life processes which includes the role of ATP in biochemical reactions. SAS Standards 3.1.B.A2, 3.1.C.A1, 3.1.C.A2					
		READ text on energy transformations (Chapter 4, Section 1).		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		WATCH Khan Academy video on ATP.		https://www.khanacademy.org/science/biology/cellular-respiration/v/ATP		
		EXPLORE the APT cycle with this webquest.		https://drive.google.com/open?id=0B99Um_mvTWdGS3l6cnJVeGp3aWc	PDF - APT Webquest	

		ANALYZE information to complete the true/ false quiz about energy (pages 129-131)		https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11		
		SYNTHESIZE information to complete the critical writing activity (page 144).		https://itunes.apple.com/us/book/ck-12-biology-workbook/id518270997?mt=11		
Section 4: Photosynthesis	Students compare the basic transformation of energy during photosynthesis and cellular respiration. SAS Standards 3.1.B.A2, 3.1.B.A5, 3.1.C.A1, 4.1.10.C					
		WATCH this Khan Academy video lecture on Photosynthesis.		https://www.khanacademy.org/science/biology/photosynthesis/v/photosynthesis		
		READ text about the process of photosynthesis (Chapter 4, Section 2).		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		
		INTERPRET diagrams that describe the process of photosynthesis.		http://www.tv411.org/science/tv411-whats-cooking/photosynthesis-science-lesson?gclid=CI_K0__oob0CFQsSMwodwiwAfA		

		WATCH this video about the parts of a leaf involved in photosynthesis.		The Fuse School 8-2 Structure of the Leaf		
		REVIEW the parts of a leaf and mechanisms of survival in different climates.		https://drive.google.com/file/d/0B99Um_mvTWdGcXJYR0s5bUFBT2c/view?usp=sharing	PDF - Microsoft Word - Parts of a Leaf and Types of Photosynthesis.docx	
		EXPLORE the basics of Photosynthesis with pbs and "Illuminating Photosynthesis".		https://drive.google.com/open?id=0B99Um_mvTWdGM3BSZDFGbW1Yak0	PDF - Illuminating Photosynthesis REVISED	
		ANALYZE this photosynthesis case study.		https://drive.google.com/open?id=0B99Um_mvTWdGc0dVaVRCZ0JkVWs	PDF - Microsoft Word	
		DESIGN a ThingLink to illustrate key facts about the reactions of photosynthesis.		https://itunes.apple.com/us/app/thinglink/id647304300?mt=8		
		COMPLETE questions on photosynthesis.		https://drive.google.com/open?id=0B99Um_mvTWdGY2hFV0ZRRWVycVE	Word Doc - handout_photosynthesis_worksheet	

		PLAY Millionaire Photosynthesis.		https://drive.google.com/open?id=0B99Um_mvTWdGR1RwMkJaWEZTSVE	PowerPoint - MillionairPhotosynthesis	
		WATCH movie clip on Photosynthesis and producers.		Video - photosynthesis		
		REVIEW photosynthesis in this presentation.		https://drive.google.com/open?id=0B99Um_mvTWdGdGpUSjNoX2p5cjA	PowerPoint - chloroplasts_dia_info_1	
Section 5: Cellular Respiration	No Message					
		WATCH this video to review photosynthesis and introduce cellular respiration.		http://www.bozemanscience.com/013-photosynthesis-and-respiration		
		WATCH this video to describe the main events of cellular respiration.		https://www.youtube.com/watch?v=FHWbjnzfi_U		
		READ text about the process of cellular respiration (Ch. 4, Sec. 3&4)		https://itunes.apple.com/us/book/ck-12-biology-interactive/id574071922?mt=13		

		FORMULATE answers to the cellular respiration review questions.		https://drive.google.com/open?id=0B99Um_mvTWdGdTN3YVJLREwwN1k	PDF - Cellular Respiration Review	
		ANALYZE the process of cellular respiration to complete this writing assignment.		https://drive.google.com/open?id=0B99Um_mvTWdGdkRFckJ1cnJmTTQ	PDF - Cellular Respiration Writing	
Section 6: Review Bioenergetics	No Message					
		WATCH video reviewing Bioenergetics.		Video - CRSD Videocast 5.appleuniversal		
		COMPLETE reviewing guide as you WATCH video.		https://drive.google.com/open?id=0B99Um_mvTWdGQjMyQXg2V2JCaEU	Word - Topic 5 Viewing Guide	
		COMPARE and CONTRAST photosynthesis and cellular respiration.		https://drive.google.com/open?id=0B99Um_mvTWdGSzk5U2swTXROZ0k	PDF - Photosynthesis Versus Cellular Respiration.docx	
		SYNTHESIZE information about bioenergetics to complete the graphic organizer.		https://drive.google.com/open?id=0B99Um_mvTWdGVXU1ZDV4TVQ4Ylk	PDF - Photosynthesis Versus Cellular Respiration.docx	

		COMPARE and CONTRAST bioenergetics in a free response.		https://drive.google.com/open?id=0B99Um_mvTWdGN1h3cWtLd210ajg	Word - energy_exam_free_reponse	
		TAKE a quiz on energy		https://drive.google.com/open?id=0B99Um_mvTWdGUXVBQlhuY3NaY00	Word - energy_biggie_quiz	
		STUDY information on bioenergetics.		https://drive.google.com/open?id=0B99Um_mvTWdGQV9WM1RGeTVKSzg	Word - Topic 5 Quick Facts	
		TAKE a quiz.		http://www.crsd.org/Page/32668		