

Mapping *Carbon TIME* onto Next Generation Science Standards (NGSS)

	PS1 MATTER AND ITS INTERACTIONS	LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	LS2 ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMICS	ESS2: EARTH'S SYSTEMS ESS3 EARTH AND HUMAN ACTIVITY
Systems and Scale	<p>MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.</p> <p>MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p>MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.</p> <p>HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.</p> <p>HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.</p>			
Animals	<p>MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.</p> <p>MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p>MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.</p> <p>HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the</p>	<p>MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are</p>	<p>HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.</p>	

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	changes in total bond energy. HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	formed resulting in a net transfer of energy. HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules		
Plants	MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. Energy. HS-PS3-1. Create a computational model to calculate change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. Matter and Energy in Organism and Ecosystems. MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino	HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. Matter and Energy in Organism and Ecosystems. MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and non-living parts of an ecosystem.	

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		acids and/or other large carbon-based molecules. HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.		
Decomposers	MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. Matter and Energy in Organisms and Ecosystems. MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	Matter and Energy in Organisms and Ecosystems. MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	
Human Energy Systems	HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.		HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and	HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

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			geosphere. HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	Earth and Human Activity. MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
Eco-systems	HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	Matter and Energy in Organisms and Ecosystems. MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy in and out of organisms.	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. MS-LS2-3. Develop a model to	Earth's Systems. MS-ESS2-1. Develop a model to describe the cycling of earth's materials and the flow of energy that drives this process. Human Impacts. MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita

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			<p>describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p>MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</p> <p>Interdependent Relationships in Ecosystems. HS-LS2-1. Use mathematical and or computational representations to support explanations of factors that affect carrying capacity of ecosystems and different scales.</p> <p>Interdependent Relationships in Ecosystems. HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems at different scales.</p> <p>HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.</p> <p>Matter and Energy in Organisms and Ecosystems. HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.</p>	<p>consumption of natural resources impact Earth's systems.</p> <p>HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.</p>

