Science
Chemistry
Unit 7: Food-Matter and Energy for Life

Essential Understandings	▪ The physical world contains basic elements whose structure can be studied. ▪ Matter is transformed in accordance with various chemical laws and principles. ▪ Energy is a fundamental part of physical and chemical changes. ▪ Heat is one of the fundamental forms of energy affecting change and order of matter in our universe.
Essential Questions	▪ How is food energy stored, transferred, and released? ▪ What chemical roles do carbohydrates and fats play in human metabolism? ▪ Why are protein molecules essential to living organisms? ▪ What roles do vitamins, minerals, and additives play in foods we eat?
Essential Knowledge	▪ Integration of personal diet into food groups/food pyramids. ▪ The types and function of carbohydrates and fats in human metabolism. ▪ Proteins and enzymes have varying structures and provide for human body growth and function. ▪ The role of vitamins, minerals, and other food additives in the human body.
Vocabulary	▪ <u>Terms</u>: ○ photosynthesis, carbohydrates, monosaccharides, disaccharides, polysaccharides, fats, triglycerides, fatty acids, saturated vs. unsaturated fats, limiting reactants.
Essential Skills	▪ Personal diets are categorized into food groups and food pyramids. ▪ Multiple types of carbohydrates and fats are utilized in human metabolism and body functions. ▪ Proteins and enzymes have varying structures and provide for human body growth and function. ▪ Vitamins, minerals, and other food additives play minor roles in the human body.

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Related Maine Learning Results	B. The Skills and Traits of Scientific Inquiry and Technological Design B1.The Skills and Traits of Scientific Inquiry Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis. a. Identify questions, concepts, and testable hypotheses that guide scientific investigations. b. Design and safely conduct methodical scientific investigations, including experiments with controls. c. Use statistics to summarize, describe, analyze, and interpret results. d. Formulate and revise scientific investigations using logic and evidence. e. Use a variety of tools and technologies to improve investigations and communications. f. Recognize and analyze alternative explanations and models using scientific criteria. g. Communicate and defend scientific ideas. C. The Scientific and Technological Enterprise C1.Understandings of Inquiry Students describe key aspects of scientific investigations: that they are guided by scientific principles and knowledge, and that they are performed to test ideas, and that they are communicated and defended publicly. a. Describe how hypotheses and past and present knowledge guide and influence scientific investigations. b. Describe how scientists defend their evidence and explanations using logical arguments and verifiable results.

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Related Maine Learning Results	D. The Physical Setting D3.Matter and Energy Students describe the structure, behavior, and interactions of matter at the atomic level and the relationships between matter and energy. a. Describe the structure of atoms in terms of neutrons, protons, and electrons and the role of the atomic structure in determining chemical properties. b. Describe how the number and arrangement of atoms in a molecule determine a molecule's properties, including the types of bonds it makes with other molecules and its mass, and apply this to predictions about chemical reactions. c. Explain the essential roles of carbon and water in life processes. d. Describe how light is emitted and absorbed by atoms' changing energy levels, and how the results can be used to identify a substance. e. Describe factors that affect the rate of chemical reactions (including concentration, pressure, temperature, and the presence of molecules that encourage interaction with other molecules. f. Apply an understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical reactions. g. Describe nuclear reactions, including fusion and fission, and the energy they release. h. Describe the radioactive decay and half-life. i. Explain the relationship between kinetic and potential energy and apply the knowledge to solve problems. j. Describe how in energy transformations the total amount of energy remains the same, but because of inefficiencies (heat, sound, and vibration) useful energy is often lost through radiation or conduction. k. Apply an understanding of energy transformations to solve problems. l. Describe the relationship among heat, temperature, and pressure in terms of the actions of atoms, molecules, and ions.
Sample Lessons And Activities	▪ In Laboratory Experiments: o A.3 Snack – Food Energy o C.5 Enzymes o C.7 Amylase Tests o D.3 Vitamin C ▪ Survey of foods/food additives

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Sample Classroom Assessment Methods	▪ Unit 7 Section A, B, C, D Tests ▪ Pre/post- Lab Quizzes on Snack Food Energy, Enzymes, the Amylase Tests, Vitamin C, and Analyzing Food-Coloring additives.
Sample Resources	▪ Publications: ○ Chemistry in the Community, Chemcom, 5th edition textbook and ancillaries ▪ Videos: ○ World of Chemistry series ○ Planet Earth series