

**Course Description: Science 8B** explores the physical and life sciences through topics that explain how energy and matter interact in natural systems. Students begin by investigating electricity, magnetism, and electromagnetic forces. They then explore chemical reactions, including conservation of mass and energy, reaction rates, and acids and bases.

The course continues with an overview of the solar system and the historical development of planetary science. Students also learn how the nervous system and senses work together to respond to the environment. In the final units, students explore wave behavior, sound, and the electromagnetic spectrum, learning how energy travels and how we use waves in communication, medicine, and everyday life.

The course assignments are designed to engage students in applying science and engineering practices (SEPs) to build understanding of disciplinary core ideas (DCIs) through crosscutting concepts (CCs). Capstone assignments encourage students to explain real-world phenomena and design solutions to problems using science and engineering practices.

Module	Lesson Title	Objectives
<b>Module 7: Electricity and Magnetism</b>	7.1: Electric Charge	<ul style="list-style-type: none"><li>Describe the characteristics of electric charge, including how electric charge is transferred.</li><li>Analyze factors that affect the strength and direction of electric forces and fields.</li><li>Describe how electric forces and electric fields affect electric charges.</li></ul>
	7.2: Electric Current	<ul style="list-style-type: none"><li>Describe electric current, including the two types.</li><li>Classify materials as good electrical conductors or good electrical insulators.</li><li>Describe resistance, including the factors that affect it.</li></ul>
	7.3: Electric Circuits	<ul style="list-style-type: none"><li>Describe the characteristics of an electric circuit.</li><li>Differentiate between series and parallel circuits including the benefits and opportunities of each.</li><li>Analyze how the design of electric circuits has evolved and was influenced by the needs of society.</li></ul>
	7.4: Ohm's Law	<ul style="list-style-type: none"><li>Explain how voltage produces electric current.</li><li>Describe Ohm's law, including the appropriate SI units for measuring voltage, current, and resistance.</li><li>Explain the concept of electric power.</li></ul>

Module	Lesson Title	Objectives
	7.5: Magnetic Materials	<ul style="list-style-type: none"> <li>Describe the characteristics of magnetic poles.</li> <li>Describe the characteristics of magnetic materials</li> </ul>
	7.6: Magnetic Fields	<ul style="list-style-type: none"> <li>Describe a magnetic field and its effects.</li> <li>Describe the interaction between two magnetic fields.</li> <li>Describe the characteristics of Earth's magnetic field.</li> </ul>
	7.7: Electromagnetism	<ul style="list-style-type: none"> <li>Define the relationship between electric force and magnetic force in the form of electromagnetic force.</li> <li>Describe how an electric current produces a magnetic force.</li> <li>Explain the concept of solenoids and how to create an electromagnet.</li> </ul>
	7.8: Electromagnetic Induction	<ul style="list-style-type: none"> <li>Explain Faraday's law of electromagnetic induction.</li> <li>Explain how generators and transformers work.</li> </ul>
<b>Module 8: Chemical Reactions</b>	8.1: Chemical Changes	<ul style="list-style-type: none"> <li>Identify chemical properties and distinguish between chemical properties and physical properties.</li> <li>Identify chemical changes and distinguish between physical changes and chemical changes.</li> </ul>
	8.2: Recognizing Chemical Reactions	<ul style="list-style-type: none"> <li>Identify and describe signs of chemical reactions.</li> <li>Identify the reactants and products of chemical reactions.</li> <li>Analyze a scenario to determine whether a chemical reaction has taken place.</li> </ul>
	8.3: Representing Chemical Reactions	<ul style="list-style-type: none"> <li>Identify the parts of a chemical equation.</li> <li>Identify the reactants and products in a chemical equation.</li> <li>Represent chemical reactions with equations.</li> </ul>
	8.4: Types of Chemical Reactions	<ul style="list-style-type: none"> <li>Identify the characteristics of different classes of chemical reactions.</li> <li>Classify chemical reactions as synthesis, decomposition, single replacement, and double replacement.</li> </ul>
	8.5: Mass Conservation in Chemical Reactions	<ul style="list-style-type: none"> <li>Describe how mass is conserved in chemical reactions.</li> <li>Determine whether chemical equations are balanced.</li> <li>Relate balanced chemical equations to conservation of mass.</li> </ul>

Module	Lesson Title	Objectives
	8.6: Energy Conservation in Chemical Reactions	<ul style="list-style-type: none"> <li>Explain the energy changes that take place during chemical reactions.</li> <li>Compare endothermic and exothermic reactions.</li> <li>Explain how energy is conserved in chemical reactions.</li> </ul>
	8.7: Chemical Reaction Rates	<ul style="list-style-type: none"> <li>Explain what a reaction rate is.</li> <li>Explain collision theory and how it relates to reaction rates.</li> <li>Identify and explain the factors that affect the rates of chemical reactions.</li> </ul>
	8.8: Acids and Bases	<ul style="list-style-type: none"> <li>Identify general properties of acids and bases.</li> <li>Define pH in terms of hydronium ion concentration in a solution.</li> <li>Classify solutions as acidic, basic, or neutral.</li> </ul>
<b>Module 9: The Solar System</b>	9.1: The Sun	<ul style="list-style-type: none"> <li>Understand that the Sun has different parts.</li> <li>Understand the source of the Sun's fuel.</li> <li>Know the types of phenomena that occur in the sun.</li> </ul>
	9.2: Terrestrial Planets	<ul style="list-style-type: none"> <li>Identify the four inner planets by their characteristics.</li> </ul>
	9.3: Gas Giants	<ul style="list-style-type: none"> <li>Identify the characteristics of the gas giants.</li> </ul>
	9.4: Discovery of Planetary Orbits	<ul style="list-style-type: none"> <li>Describe how our understanding of planetary orbits has changed over time.</li> <li>Identify the scientists responsible for advancing our understanding of orbits.</li> </ul>
	9.5: Orbits of Planets	<ul style="list-style-type: none"> <li>Describe a planet's elliptical orbit, including identifying aphelion and perihelion.</li> <li>Define escape velocity, and describe what happens when an orbital body escapes an orbit.</li> </ul>
	9.6: Dwarf Planets	<ul style="list-style-type: none"> <li>Distinguish between dwarf planets and planets.</li> <li>Distinguish between dwarf planets and small solar system bodies.</li> </ul>
	9.7: Asteroids	<ul style="list-style-type: none"> <li>Describe the characteristics of asteroids.</li> <li>Identify where asteroids are found in our solar system.</li> </ul>
	9.8: Meteors	<ul style="list-style-type: none"> <li>Identify the composition of meteoroids.</li> <li>Distinguish between meteors, meteoroids, and meteorites.</li> </ul>

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	9.9: Comets	<ul style="list-style-type: none"> <li>Identify the characteristics of comets.</li> </ul>
<b>Module 10: Nervous System and Senses</b>	10.1: The Nervous System	<ul style="list-style-type: none"> <li>Identify and describe the structure and function of the human nervous system.</li> <li>Explain the difference between voluntary and involuntary movement.</li> </ul>
	10.2: Spinal Column	<ul style="list-style-type: none"> <li>Distinguish between the central and peripheral nervous system.</li> <li>Identify and describe the function of each area of the spinal column.</li> <li>Explain the main types of spinal cord injuries.</li> </ul>
	10.3: Brain	<ul style="list-style-type: none"> <li>Describe how messages are sent and received throughout the body.</li> <li>Identify the three main areas of the brain and their functions.</li> </ul>
	10.4: Sight	<ul style="list-style-type: none"> <li>Identify and explain the function of the parts of the eye.</li> <li>Describe the four most common vision problems.</li> </ul>
	10.5: Hearing	<ul style="list-style-type: none"> <li>Identify the parts of the ear.</li> <li>Explain the function of each part of the ear.</li> <li>Explain how humans hear sounds.</li> </ul>
	10.6: Smell	<ul style="list-style-type: none"> <li>Explain how the sense of smell works.</li> <li>Identify and explain the function of the different parts of the nose.</li> </ul>
	10.7: Taste	<ul style="list-style-type: none"> <li>Describe how the body perceives taste.</li> <li>Identify and distinguish between the 5 different tastes humans recognize.</li> <li>Describe how smell and taste work together to recognize flavor.</li> </ul>
	10.8: Touch	<ul style="list-style-type: none"> <li>Identify the functions of the largest sensory organ--the skin.</li> <li>Differentiate between different types of sense receptors.</li> </ul>
	11.1: Describing Waves	<ul style="list-style-type: none"> <li>Relate mechanical waves to energy.</li> <li>Describe the characteristics of transverse, longitudinal, and surface waves.</li> <li>Identify examples of mechanical waves.</li> </ul>

Module	Lesson Title	Objectives
<b>Module 11: Waves and Sound</b>	11.2: Properties of Waves	<ul style="list-style-type: none"> <li>Identify the parts of a wave.</li> <li>Describe the characteristics of wavelength, frequency, and period, including their appropriate SI units.</li> <li>Describe how to measure amplitude and relate it to the energy of a wave.</li> </ul>
	11.3: Wave Speed	<ul style="list-style-type: none"> <li>Describe the mathematical relationship between frequency, wavelength, and wave speed.</li> <li>Identify the appropriate SI unit for measuring wave speed.</li> <li>Describe how the properties of the medium affect the speed of a wave.</li> </ul>
	11.4: Behavior of Waves	<ul style="list-style-type: none"> <li>Describe how reflection, refraction, and diffraction affect waves.</li> <li>Identify factors that affect the amount of wave refraction or diffraction.</li> </ul>
	11.5: Interactions of Waves	<ul style="list-style-type: none"> <li>Describe how interference affects waves.</li> <li>Distinguish between constructive and destructive interference.</li> <li>Explain how standing waves form.</li> </ul>
	11.6: Properties of Sound Waves	<ul style="list-style-type: none"> <li>Identify the components of sound.</li> <li>Describe the intensity (loudness) of a sound and relate it to the amplitude of sound waves.</li> <li>Describe the pitch of a sound and relate it to the frequency of sound waves.</li> </ul>
	11.7: Behavior of Sound Waves	<ul style="list-style-type: none"> <li>Distinguish between transmission and absorption of sound waves.</li> <li>Describe echolocation, ultrasound imaging, and sonar as examples of sound wave reflection.</li> </ul>
	11.8: Sound and Music	<ul style="list-style-type: none"> <li>Explain the difference between music and noise.</li> <li>Explain why resonance occurs.</li> <li>Describe how interference of sound applies to musical beats and harmonics in different types of instruments.</li> </ul>
	12.1: Describing Electromagnetic Waves	<ul style="list-style-type: none"> <li>Differentiate between electromagnetic waves and mechanical waves in terms of how they are produced and how they travel.</li> <li>Analyze the speed at which sound and light move through different materials.</li> <li>Describe the evidence for the dual nature of electromagnetic radiation.</li> </ul>

Module	Lesson Title	Objectives
<b>Module 12: The Electromagnetic Spectrum</b>	12.2: The Electromagnetic Spectrum	<ul style="list-style-type: none"><li>• Describe the characteristics of the electromagnetic spectrum.</li><li>• List the waves in the electromagnetic spectrum from longest to shortest wavelength.</li><li>• Differentiate between ionizing and nonionizing radiation.</li></ul>
	12.3: Low-Frequency Radiation	<ul style="list-style-type: none"><li>• Compare radio waves, microwaves, and infrared waves.</li><li>• Distinguish between amplitude modulation and frequency modulation.</li><li>• Identify everyday uses for radio waves and infrared waves.</li></ul>
	12.4: High-Frequency Radiation	<ul style="list-style-type: none"><li>• Compare ultraviolet rays, X-rays, and gamma rays.</li><li>• Compare the three types of ultraviolet radiation that travel to Earth from the Sun.</li><li>• Identify applications of ultraviolet rays, X-rays, and gamma rays.</li></ul>
	12.5: Visible Light	<ul style="list-style-type: none"><li>• Rank and classify colors of visible light based on their frequencies and wavelengths.</li><li>• Explain how a prism disperses white light into different colors.</li><li>• Analyze factors that determine the color of an object.</li></ul>
	12.6: Behavior of Light Waves	<ul style="list-style-type: none"><li>• Describe regular and diffuse reflection of light.</li><li>• Describe what happens when transmitted light is scattered, refracted, or polarized.</li><li>• Classify materials as transparent, translucent, or opaque to visible light.</li></ul>
	12.7: Colors of Light and Pigments	<ul style="list-style-type: none"><li>• Explain color addition of light and color subtraction of pigments.</li><li>• Distinguish among primary, secondary, and complementary colors of light and pigments.</li><li>• Explain how humans see colors.</li></ul>
	12.8: Sources of Light	<ul style="list-style-type: none"><li>• Explain how light is produced by common light sources.</li><li>• Identify uses of different light sources.</li></ul>