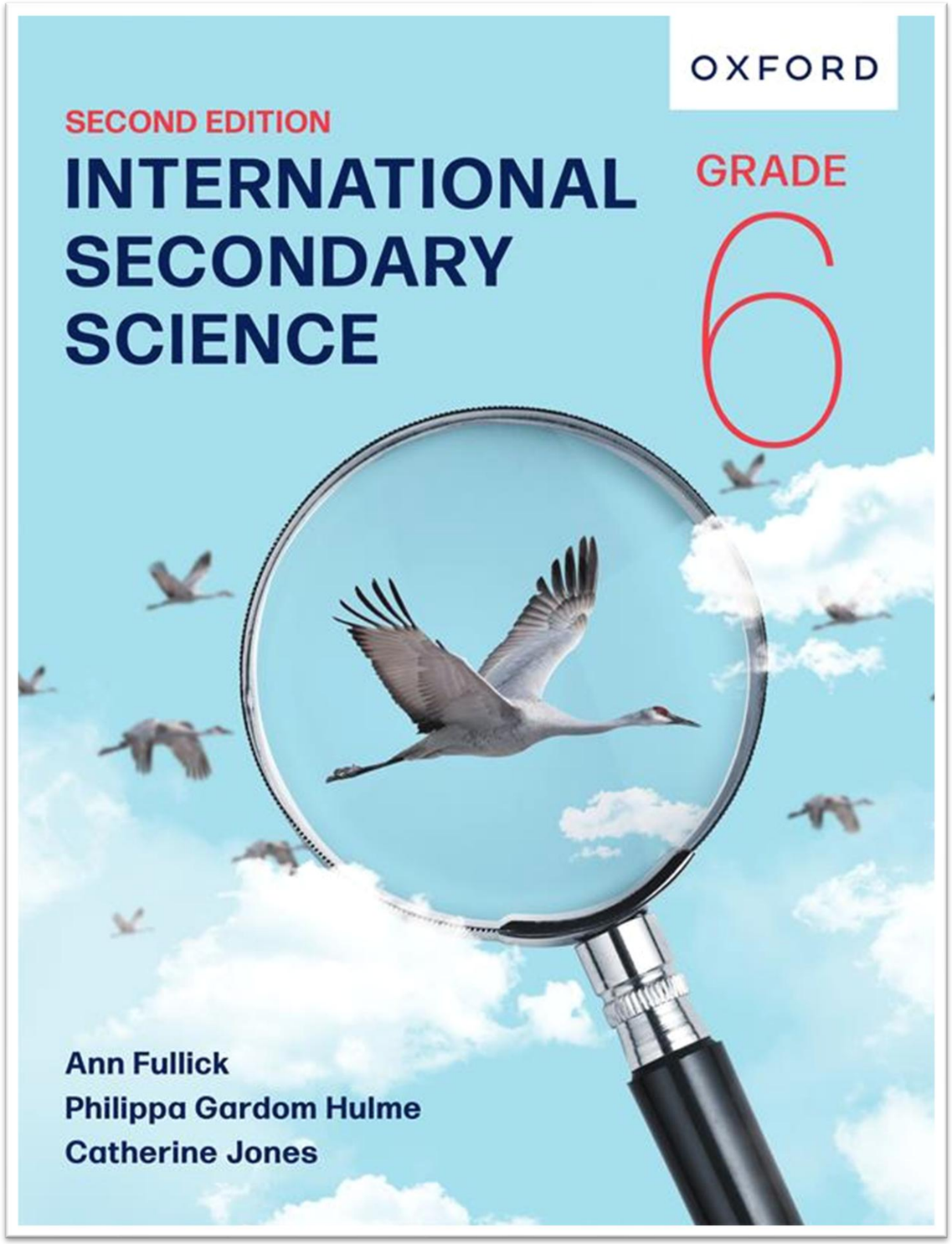

INTERNATIONAL SECONDARY SCIENCE 6 CURRICULUM MAPPING

Please find below the curriculum mapping for International Secondary Science 6 aligned with the National Curriculum of Pakistan 2022 for General Science, along with the key SLOs from the Cambridge Science Framework, ensuring relevance to age-appropriate Cambridge key stages. The mapping also includes value-added SLOs, which enrich conceptual understanding and strengthen scientific process skills.

International Secondary Science 6

Spread number	Student Learning Outcomes in Book	National Curriculum Pakistan 2022	Student Learning Outcomes in Cambridge Curriculum	Value added Student Learning Outcomes
		1. Cellular Organization		
1.1	Recognize cells as the basic unit of life that are organized into tissues, organs, systems and organisms.	✓	**7Bs.01 -** Understand that all organisms are made of cells and microorganisms are typically single celled. **7Bs.05** - Understand that cells can be grouped together to form tissues, organs and organ systems.	
1.1	Arrange and rank different levels of cellular organizations – cells to tissues, organs and organisms.	✓		
1.2	Discuss how scientific knowledge develops over time		**1SIC.01** — Talk about how some of the scientific knowledge and thinking now was different in the past.	✓
1.3	Identify the structures present in an animal cell and plant cell as seen under a simple microscope and relate them to their functions (only cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria and sap vacuole).	✓	**7Bs.02** - Identify and describe the functions of cell structures (limited to cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria and sap vacuole).	
1.3	Describe the similarities and differences between the structures of plant and animal cells. Sketch the animal and plant cells and label key organelles in each.	✓	**7Bs.04** - Describe the similarities and differences between the structures of plant and animal cells.	
1.4	Sort organisms through observation		**1TWSc.01** — Sort and group objects, materials and living things based on observations of the similarities and differences between them.	✓
1.4	Collect and record observations in an appropriate form.		**1TWSc.05** — Collect and record observations and/or measurements by annotating images and completing simple tables.	✓
1.5	Compare and contrast an animal cell and plant cell by preparing slides using onion peels and cheek cells.	✓		
1.6 1.7	Relate the structures of some common cells (nerve, muscle, epithelium and blood cells) to their functions.	✓	**7Bs.03** - Explain how the structures of some specialised cells are related to their functions (including red blood cells, neurones, ciliated cells, root hair cells and palisade cells).	
1.8	Describe strengths and limitations of a model of a cell.			✓

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2. Reproduction in plants				
2.1	Describe the different types of reproduction of plants	✓	**5Bp.02 -** Know the stages in the life cycle of a flowering plant.	
2.2	Distinguish between artificial and natural asexual reproduction in plants. (Budding, grafting, Bulbs, Tuber, Runners, cutting, and layering.)	✓		
2.2	Describe the different types of reproduction of plants	✓		
2.3	Compare and contrast types of reproduction (sexual and asexual) in plants.	✓		
2.3	Describe the different types of reproduction of plants	✓		
2.4	Describe the different types of reproduction of plants	✓		
2.4	Distinguish between artificial and natural asexual reproduction in plants. (Budding, grafting, Bulbs, Tuber, Runners, cutting, and layering.)	✓		
2.5	Inquire how artificial propagation can lead to better quality yield in agriculture.	✓		
3. Human Digestive System				
3.1	a. TWS apply mathematical concepts to analyze data		**3TWSa.04** — Present and interpret results using tables and bar charts.	✓
3.1	State the importance of digestion in the human body and describe physical and chemical digestion.	✓	**3TWSa.04** — Present and interpret results using tables and bar charts.	
3.2	Sequence the main regions of Alimentary Canal, its associated organs and describe the functions of different parts of the Alimentary Canal.	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	
3.2	Briefly describe the role of enzymes in digestion.	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	
3.3	Conclude that blood transports the products of digestion to other parts of the body and the undigested products get egested/defecated.	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	

Spread number	Student Learning Outcomes in Book	National Curriculum Pakistan 2022	Student Learning Outcomes in Cambridge Curriculum	Value added Student Learning Outcomes
3.4	Sequence the main regions of Alimentary Canal, its associated organs and describe the functions of different parts of the Alimentary Canal.	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	
3.4	Describe the functions of different parts of the ailmentary canal.	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	
3.4	Conclude the blood transports the products of digestion to other parts of the body	✓	**5Bs.04** - Describe the human digestive system, including the functions of the organs involved (limited to mouth, esophagus, stomach, small intestine, large intestine and anus), and know that many vertebrates have a similar digestive system.	
3.4	Describe the strengths and limitations of a model.		**4TWSm.01** — Know that models are not fully representative of a real world situation and/or scientific idea.	✓
4. Balanced Diet				
4.1	Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.	✓	**8Bp.01** - Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.	
4.1	Identify the essential nutrients, their chemical composition, and food sources.	✓	**8Bp.01** - Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.	
4.2	Identify carbohydrates and fats as constituents of a balanced diet and describe their functions in the body			✓
4.3	Plan a range of scientific investigations		**6TWSp.04** - Plan fair test investigations, identifying the independent, dependent and control variables.	✓
4.3	Decide what equipment is required to carry out an investigation		**6TWSc.03** - Choose equipment to carry out an investigation and use it appropriately.	✓
4.3	Use symbols and formulae to represent scientific ideas		**7TWSm.02** - Use symbols and formulae to represent scientific ideas.	✓
4.3	Apply mathematical concepts to analyze data			✓
4.4/ 4.5	Recognize that a healthy diet contains a balance of foodstuffs.	✓	**5Bp.01** - Know that animals, including humans, need an adequate, balanced diet in order to be healthy.	
4.5	Identify and describe essential nutrients' deficiency disorders.	✓	**8Bp.01** - Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.	

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4.5/4.6	Correlate diet and fitness.	✓	**8Bp.03** - Discuss how human growth, development and health can be affected by lifestyle, including diet and smoking.	
4.7	Investigate issues which involve and/or require scientific understanding			✓
4.8	Briefly describe some major digestive disorders.	✓		
5. Matter as Particles				
5.1	Explain the Particle Theory of Matter.	✓	**5Cm.01** - Use the particle model to describe solid, liquids (including solutions) and gases.	
5.2	Use particle model of matter to investigate the movement and arrangement of particles in three states.	✓	**7Cm.06** - Describe the three states of matter as solid, liquid and gas in terms of the arrangement, separation and motion of particles.	
5.2	Explain the Particle Theory of Matter.	✓	**5Cm.01** - Use the particle model to describe solid, liquids (including solutions) and gases.	
5.3	Explain why gases and liquids take the shape of their containers but solids do not, in terms of the Particle Theory of Matter	✓	**5Cm.01 -** Use the particle model to describe solid, liquids (including solutions) and gases.	
5.3	Discuss, using the particle theory of matter, why liquids and gases can flow easily but solids cannot.	✓	**5Cm.01** - Use the particle model to describe solid, liquids (including solutions) and gases.	
5.4	Apply the particle theory of matter to explain diffusion.	✓	**8Pf.07** - Describe the diffusion of gases and liquids as the intermingling of substances by the movement of particles.	
5.5	Interpret the evidence for the existence of the particles in matter by observing daily life examples (adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water).	✓		
5.6	Explain the changes in states: Melting, freezing, evaporation, condensation, and sublimation, using the particle model of matter.	✓	**5Cc.01** - Describe the processes of evaporation and condensation, using the particle model and relating the processes to changes in temperature. **4Cc.01** - Describe solidification/freezing and melting, using the particle model to describe the change of state.	
6. Element and Compounds				
6.1	Describe the structure of matter in terms of particles (i.e., atoms and molecules).	✓	**7Cm.01** - Understand that all matter is made of atoms, with each different type of atom being a different element.	
6.1	Recognize the names and symbols for some common elements (first 10 elements of the Periodic Table) and recognize their physical properties.	✓	**7Cm.02** - Know that the Periodic Table presents the known elements in an order.	
6.2	Categorize elements into metals and non-metals of first 10 elements based on their physical properties.	✓	**7Cm.03** - Know metals and non-metals as the two main groupings of elements.	

Spread number	Student Learning Outcomes in Book	National Curriculum Pakistan 2022	Student Learning Outcomes in Cambridge Curriculum	Value added Student Learning Outcomes
6.3	Recognize the names and symbols for some common elements (first 10 elements of the Periodic Table) and recognize their physical properties.		**7Cm.02** - Know that the Periodic Table presents the known elements in an order.	
6.3	Identify that compounds are substances that contain two or more different types of atoms			✓
6.4	Describe the structure of matter in terms of particles, including atoms		**7Cm.01** - Understand that all matter is made of atoms, with each different type of atom being a different element.	
6.4	Describe the strengths and limitations of a model for atoms			✓
6.4	Explain how the properties of an element are the properties of many atoms of the element, not a single atom of the element			✓
6.5	Describe molecules as a combination of atoms (e.g., H_2O, O_2 & CO_2).	✓	**9Cm.02** - Understand that a molecule is formed when two or more atoms join together chemically, through a covalent bond.	
6.5	Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element.	✓	**7Cm.01** - Understand that all matter is made of atoms, with each different type of atom being a different element.	
6.6	Describe how people developed scientific understanding		**4SIC.01** — Describe how scientific knowledge and understanding changes over time through the use of evidence gained by enquiry.	✓
6.6	Describe some factors that influenced when elements were discovered			✓
6.7	Explain that compounds are formed by different types of elements joining together chemically forming a new substance.	✓	**4Cc.03** - Know that some substances will react with another substance to produce one or more new substances and this is called a chemical reaction.	
6.7	Illustrate the formation of a compound with the help of a word equation.	✓	**9Cc.01** - Use word equations and symbol equations to describe reactions (balancing symbol equations is not required).	
6.7	Distinguish between elements and compounds.	✓	**7Cm.04** - Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture.	
6.8	Write compound names			✓
6.8	Deduce the elements in a compound from the compound name			✓
6.9	Use symbols and formulae to represent scientific ideas		**9TWSm.03** - Use symbols and formulae to represent scientific ideas.	✓
6.9	Write chemical formulae for elements and compounds			✓
6.9	Make deductions from formulae			✓
6.10.	Explore the common elements and compounds in our daily life (Carbon, Nitrogen, Hydrogen, Aluminum, Water, Common salt, Sugar).	✓		
6.11	Explain that compounds are formed by different types of elements joining together chemically forming a new substance (e.g. Burning Magnesium or steel wool in air/oxygen).			✓

Spread number	Student Learning Outcomes in Book	National Curriculum Pakistan 2022	Student Learning Outcomes in Cambridge Curriculum	Value added Student Learning Outcomes
6.12	When planning a scientific enquiry, use scientific knowledge to: make hypothesis and prediction choose equipment work safely collect and record measurements make a conclusion make improvements			✓
7. Mixtures				
7.1	Demonstrate that mixtures are formed when two or more substances mix with each other without the formation of a new substance.	✓	**3Cm.02** - Understand that a mixture contains two or more materials, where the materials can be physically separated.	
7.1	Identify different types of mixtures.	✓		
7.1	Identify and explain examples of common mixtures from daily life.	✓		
7.2	Describe the difference between elements, compounds, and mixtures.	✓	**7Cm.04** - Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture.	
7.3	a. Define the terms pure substance and purity		**8Cm.04** - Know that purity is a way to describe how much of a specific chemical is in a mixture.	✓
7.3	b. Describe how to show that a substance is pure			✓
7.3	c. Make conclusion from a graph		**5TWSa.05** - Present and interpret results using tables, bar charts, dot plots and line graphs.	✓
7.3	d. Describe one application of science			✓
7.3	Differentiate between pure substances and mixtures on the basis of their formation and composition	✓	**7Cm.04** - Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture. 8Cm.04 Know that purity is a way to describe how much of a specific chemical is in a mixture.	
7.4	e. Define the terms solution, soluble, and insoluble			✓
7.4	f. Explain why a solution is a mixture		**3Cm.02** — Understand that a mixture contains two or more materials, where the materials can be physically separated.	✓
7.4	g. Evaluate a model for a solution			✓
7.4	h. Make a prediction and conclusion			✓
7.4	Demonstrate the process of solution formation (using water as universal solvent).		**3Cc.01** - Know that when a solid dissolves in a liquid the solid is still present, and this is an example of mixing.	
7.5	Compare the physical properties of alloys and the elements in them			✓
7.5	Explain how the uses of alloys depend on their properties			✓
7.5	Describe alloys as mixtures of metals and some other elements.	✓	**7Cm.04** - Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture.	

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7.6	Justify why air is considered as a mixture of gases.	✓	**5ESp.01** - Know that the Earth is surrounded by a layer of air called the atmosphere, which is a mixture of different gases (including nitrogen, carbon dioxide and oxygen).	
7.7	Demonstrate ways of separating different mixtures.		**3Cp.03** - Describe how to separate solid/solid mixtures based on the physical properties of the solids (processes involving dissolving are not required). **3Cp.04** - Describe how to separate a mixture of an insoluble solid and a liquid.	✓
7.8	l. Demonstrate way of separating mixtures by distillation			✓
7.8	m. Explain how to obtain pure water from salty water by distillation			✓
7.8	n. Describe some benefits and problems of desalination			✓
7.8	Demonstrate way of separating mixture by chromatography		**8Cp.02** - Describe how paper chromatography can be used to separate and identify substances in a sample.	✓
7.9	Describe how chromatography separates and identifies substances in mixtures			✓
7.9	q. Describe a useful scientific enquiry	✓		✓
	8. Energy			
8.1	Recognize energy as a physical quantity.	✓	**4Pf.01** - Know that energy is present in all matters and in sound, light and heat.	
8.2	Recognize that there are many ways to find answers to questions in science		**3TWSp.02** — Know that there are five main types of scientific enquiry (research, fair testing, observing over time, identifying and classifying, and pattern seeking).	✓
8.2	Understand how to decide if a question can be answered with a fair test investigation		**4TWSp.04** — Identify variables that need to be considered when doing a fair test.	✓
8.3	Describe different ways in which energy can be stored			✓
8.4	Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram, e.g., gravitational potential energy → kinetic → elastic potential energy + thermal + sound → kinetic → gravitational potential energy, etc.	✓	**4Pf.04** - Know that not all energy is transferred from one object to another, but often some energy during a process can be transferred to the surrounding environment and this can be detected as sound, light or temperature increase.	
8.5	Describe situations that involve energy changes between kinetic energy and gravitational potential energy and energy dissipation.		**4Pf.02** — Know that energy cannot be made, lost, used up or destroyed but it can be transferred. **4Pf.04** — Know that not all energy is transferred from one object to another, but often some energy is transferred to the surroundings. 7Pf.02 Know that energy tends to dissipate and in doing so it becomes less useful.	✓

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8.5	Relate potential energy and kinetic energy.	✓	**4Pf.04** - Know that not all energy is transferred from one object to another, but often some energy during a process can be transferred to the surrounding environment and this can be detected as sound, light or temperature increase.	
8.6	Identify whether a given hypothesis is testable		**8TWSp.01** - Identify whether a given hypothesis is testable.	✓
8.6	Decide how many measurements to take		**4TWSc.04** — Describe how repeated measurements and/or observations can give more reliable data. **5TWSc.04** — Decide when observations and measurements need to be repeated to give more reliable data. **6TWSc.04** — Decide when observations and measurements need to be repeated to give more reliable data	✓
8.6	Present results clearly			✓
8.7	Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram, e.g., gravitational potential energy → kinetic → elastic potential energy + thermal + sound → kinetic → gravitational potential energy, etc.	✓	**4Pf.04** - Know that not all energy is transferred from one object to another, but often some energy during a process can be transferred to the surrounding environment and this can be detected as sound, light or temperature increase.	
8.8	State the Law of Conservation of Energy and explain how the law applies to different situations.	✓	**4Pf.02** - Know that energy cannot be made, lost, used up or destroyed but it can be transferred.	
8.9	Compare the Renewable Energy Sources (wind, water, Sun and plants) and Non -Renewable Sources of energy (coal, natural gas, crude oil).	✓	**8ESp.02** - Identify renewable resources (including wind, tidal and solar power, and bioplastics) and non-renewable resources (including fossil fuels) and describe how humans use them.	
8.9	Identify the advantages of using renewable energy resources.	✓	**8ESp.02** - Identify renewable resources (including wind, tidal and solar power, and bioplastics) and non-renewable resources (including fossil fuels) and describe how humans use them.	
8.10/	Describe how fossil fuels were formed		**3ESp.01** — Know that planet Earth is the source of all the materials we use and that many useful materials, including oil, natural gas and metals, come from or are found in rocks.	
8.10/	Explain how a fossil-fuel power station works			✓
8.10/	Describe uses of fossil fuels		**8ESp.02** - Identify renewable resources (including wind, tidal and solar power, and bioplastics) and non-renewable resources (including fossil fuels) and describe how humans use them.	✓
8.11	Explain how energy from the earth can be used to generate electricity			✓
8.12	Describe how wind, waves, tides and water behind dams can be used to generate electricity			✓
8.13	Describe how we use plants to make fuels			✓

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8.14	Assemble and demonstrate a solar panel to operate a small fan. (STEAM)	✓		
8.14	Design and make a solar water heater. (STEAM)			✓
		9. Electricity		
9.1	Explain the phenomena of static electricity in everyday life.	✓		
9.2	Describe how electricity can be dangerous		**2Pe.01** — Identify how we use electricity and describe how to be safe with it.	✓
9.2	Explain how the risk of damage or injury from electricity can be reduced		**2Pe.01** — Identify how we use electricity and describe how to be safe with it.	✓
9.3	Describe a simple circuit as a path for flow of charges.	✓		
9.3	Differentiate between open and closed circuits.	✓	**4Pe.02** - Describe how a simple switch is used to open and close a circuit	
9.3	Draw and interpret simple circuit diagrams (using symbols).	✓	**6Pe.01** - Use diagrams and conventional symbols to represent, make and compare circuits that include cells, switches, lamps and buzzers.	
9.4	Recognize electric current as a flow of charges	✓	**7Pe.01** - Use a simple model to describe electricity as a flow of electrons around a circuit.	
9.4	Describe the characteristics of series and parallel circuits.	✓	**6Pe.02** - Make simple circuits and compare the brightness of lamps in series and parallel circuits.	
9.4	Draw and construct a series and parallel circuits.	✓	**6Pe.02** - Make simple circuits and compare the brightness of lamps in series and parallel circuits.	
9.5	Describe the difference between a series and a parallel circuit			✓
9.5	Describe what happens to current in a parallel circuit		**6Pe.02** — Make simple circuits and compare the brightness of lamps in series and parallel circuits.	✓
9.5	Describe how to measure current in a series and parallel circuit			✓
9.5	Describe the effect on the current of adding cells and lamps in series and parallel circuit		**4Pe.03** — Describe how changing the number or type of components in a series circuit can make a lamp brighter or dimmer.	✓
9.5	Identify the use of series and parallel electric circuits in daily life.	✓		
9.6	Describe a model of an electric circuit			✓
9.6	Describe strengths and limitations of the model			✓
9.7	Investigate the factors that affect the brightness of bulbs or speed of motors • Number of batteries • Number of Bulbs • Type of wire • Length of wire • Thickness of wire	✓	**7Pe.04** - Describe how adding components into a series circuit can affect the current (limited to addition of cells and lamps).	
9.7	Assemble and operate a trip wire security alarm system using simple items. (STEAM)	✓		

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	10. Magnetism			
10.1	Describe how to magnetize a magnetic material. Describe how to demagnetize a magnet.	✓		
10.1	Describe the properties of magnets			✓
10.1	Know which materials are magnetic			✓
10.1	Use a model to explain the behaviour of magnetic materials		**3Pe.02** - Describe how magnets interact when near each other, using the terms repel and attract.	✓
10.2	Recognize that electric current has a magnetic field around it using a magnetic compass.	✓		FALSE
10.2	Recognize that a freely-moving magnet comes to rest pointing in a North-South direction.	✓		
10.2	Draw magnetic field of a bar magnet using iron filings.	✓		
10.2	Recognise that there is a space around the magnet where effect of magnetic force can be observed	✓	**8Pe.01** - Describe a magnetic field, and understand that it surrounds a magnet and exerts a force on other magnetic fields.	
10.3	Recognize Earth's magnetic field which attracts a freely pivoted magnet to line up with it.	✓	**8ESp.01** - Know that the reason the Earth has a magnetic field is that the core acts as a magnet.	
10.4	Construct an electromagnet and identify its application in daily life.	✓	**8Pe.02** - Describe how to make an electromagnet and know that electromagnets have many applications.	
10.4	Compare different types of magnets (permanent, temporary and electromagnets).	✓		
10.5	Describe some uses of electromagnets			✓
10.5	Explain why electromagnets are used instead of permanent magnets			✓
	11. Technology in Everyday Life			
11.1	Design a solar oven to convert solar energy into heat energy.	✓		
11.2	Assemble a circuit to demonstrate the working of an electric bell.	✓		
11.2	Suggest improvements to the design.			✓
11.3	Grow seasonal plants and vegetables in earthen pots and demonstrate the effect of use of fertilizers on the growth of plants	✓		
11.4	Prepare yogurt and cheese from milk to demonstrate the beneficial microorganisms.	✓	**7Be.01** - Know and describe the ecological role some microorganisms have as decomposers.	
	12. Solar System			
12.1	Differentiate between the characteristics of different planets.	✓	**4ESs.02** - Name the planets in the Solar System.	
12.1	Differentiate between planets and dwarf planets.	✓		

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12.2	Describe the characteristics of asteroids, meteorites and comets.	✓	**8ESc.03** - Describe asteroids as rocks, smaller than planets, and describe their formation from rocks left over from the formation of a planetary system. 4ESs.04 Know that planetary systems can contain stars, planets, asteroids and comets	
12.3	Investigate how artificial satellites have improved our knowledge about space and are used for space research	✓		
12.2	Inquire into the sighting of Halley's Comet; describe what they would feel if they saw it.	✓		
12.3	Describe the uses of various satellites in space i.e., geostationary, weather, communication and Global Positioning System (GPS).	✓	**5ESs.03** - Know that a satellite is an object in space that orbits a larger object and a moon is a natural satellite that orbits a planet.	