

Next Generation Science Standards (NGSS) Grades Kindergarten–5 and Middle School mapped to Cambridge Primary (Stages 1–6) and Cambridge Secondary 1 (Stages 7–9)




Cambridge International Examinations has mapped the Next Generation Science Standards (NGSS) for Grades K to 5 and Middle School to the Cambridge Primary Science framework (Stages 1–6) and Secondary 1 Science framework (Stages 7–9).

The **Cambridge Primary and Secondary 1 frameworks** provide a comprehensive set of progressive learning objectives for Science. The objectives detail what the learner should know or what they should be able to do in Science in Stages 1–9 (the equivalent of the US Grades Kindergarten to 5 and Middle School). They provide a structure for teaching and learning and a reference against which learners' ability and understanding can be checked. Each learning objective has a unique curriculum framework code, e.g. **1Pf1**. These codes appear in the Cambridge Teacher Guide, schemes of work and other published resources.

Summary of main differences

- There is significant overlap between NGSS and Cambridge Primary and Secondary 1 frameworks, but also significant parts of both that do not overlap.
- Earth science, engineering technology and meteorology feature heavily on NGSS but not in Cambridge.
- Traditional chemistry and anatomical biology feature heavily in Cambridge but not NGSS.
- Cambridge is a much more practical and enquiry based curriculum whereas NGSS is more theoretical.

Key

	Cambridge Primary
	Cambridge Secondary 1
	Areas that map across different age groups/stages

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NGSS Kindergarten	Cambridge Primary Stage 1		
K -PS2 Motion and Stability: Forces and Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>K-PS2-1 - Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]</p>	<p>1Pf1 - Recognise that when things speed up, slow down or change direction there is a cause.</p> <p>1Pf2 - Recognise that both pushes and pulls are forces.</p> <p>1Pf3 - Recognise that when things speed up, slow down or change direction there is a cause.</p>	<p>1Eo1 - Explore and observe in order to collect evidence (measurements and observations) to answer questions.</p>	
<p>K-PS2-2 - Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.* [Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.] [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]</p>	<p>1Pf3 - Recognise that when things speed up, slow down or change direction there is a cause.</p>	<p>1Ep1 - Try to answer questions by collecting evidence through observation.</p> <p>1Ep4 - Decide what to do to try to answer a science question.</p> <p>1Eo4 - Make comparisons.</p> <p>1Eo5 - Compare what happened with predictions.</p>	
K-PS3 Energy	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>K-PS3-1 - Make observations to determine the effect of sunlight on Earth's surface. [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water] [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]</p>	<p>2Cc2 - Explore and describe the way some everyday materials change when they are heated or cooled.</p>	<p>1Ep1 - Try to answer questions by collecting evidence through observation.</p> <p>1Eo1 - Explore and observe in order to collect evidence (measurements and observations) to answer questions.</p>	<p>2Cc2 is a weak link. There is nothing about heating or cooling in terms of thermal energy in Cambridge Primary.</p>
<p>K-PS3-2 - Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.*[Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]</p>	<p>2Cc2 - Explore and describe the way some everyday materials change when they are heated or cooled.</p>	<p>1Ep1 - Try to answer questions by collecting evidence through observation.</p> <p>1Ep2 - Ask questions and contribute to discussions about how to seek answers.</p> <p>1Ep3 - Make predictions.</p> <p>1Ep4 - Decide what to do to try to answer a science question.</p> <p>1Eo1 - Explore and observe in order to collect evidence (measurements and observations) to answer questions.</p> <p>1Eo5 - Compare what happened with predictions.</p> <p>1Eo6 - Model and communicate ideas in order to share, explain and develop them.</p>	<p>2Cc2 is a weak link. There is nothing about heating or cooling in terms of thermal energy in Cambridge Primary.</p>

NGSS Kindergarten	Cambridge Primary Stage 1		
K-LS1 From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
K-LS1-1 - Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]	1Bp1 - Know that plants are living things. 1Bp5 - Know that plants need light and water to grow. 1Bh3 - Know about the need for a healthy diet, including the right types of food and water.	1Ep1, 1Eo6 - Model and communicate ideas in order to share, explain and develop them.	
K-ESS2 Earth's Systems	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
K-ESS2-1 - Use and share observations of local weather conditions to describe patterns over time. [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.]	2Be3 - Observe and talk about their observation of the weather, recording reports of weather data.	1Ep1 - Try to answer questions by collecting evidence through observation. 1Eo1 - Explore and observe in order to collect evidence (measurements and observations) to answer questions. 1Eo4 - Make comparisons. 1Eo6 - Model and communicate ideas in order to share, explain and develop them.	Weather observation appears in Stage 2.
K-ESS2-2 - Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]	1Bp3 - Explore ways that different animals and plants inhabit local environments.	1Eo6 - Model and communicate ideas in order to share, explain and develop them.	The emphasis in the Cambridge Curriculum is how organisms are adapted to their environment rather than how they change it.
K-ESS3 Earth and Human Activity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
K-ESS3-1 - Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]	1Bp3 - Explore ways that different animals and plants inhabit local environments.	1Eo6 - Model and communicate ideas in order to share, explain and develop them.	
K-ESS3-2 - Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.* [Clarification Statement: Emphasis is on local forms of severe weather.]		1Ep2 - Ask questions and contribute to discussions about how to seek answers. 1Ep3 - Make predictions.	There is no direct link to the Cambridge Curriculum on this topic.
K-ESS3-3 - Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]	4Be3 - Recognise ways that human activity affects the environment e.g. river pollution, recycling waste.	1Eo6 - Model and communicate ideas in order to share, explain and develop them.	There is nothing about human impact on the environment in the Cambridge Curriculum until Stage 4.

NGSS Grade 1	Cambridge Primary Stage 2		
1-PS4 Waves and their Applications in Technologies for Information Transfer	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>1-PS4-1 - Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>	<p>1Ps1 - Identify many sources of sound.</p> <p>4Ps1 - Explore how sounds are made when objects, materials or air vibrate and learn to measure the volume of sound in decibels with a sound level meter.</p>	<p>2Ep1 - Collect evidence by making observations when trying to answer a science question.</p> <p>2Ep2 - Use first-hand experience, e.g. observe melting ice.</p> <p>2Eo3 - Make and record observations.</p>	<p>There is no link to sound in Stage 2; only in Stages 1 and 4.</p>
<p>1-PS4-2 - Make observations to construct an evidence-based account that objects can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]</p>	<p>2PI1 - Identify different light sources including the sun.</p> <p>2PI2 - Know that darkness is the absence of light.</p> <p>5PI7 - Know that beams/rays of light can be reflected by surfaces including mirrors, and when reflected light enters our eyes we see the object.</p>	<p>2Ep1 - Collect evidence by making observations when trying to answer a science question.</p> <p>2Ep2 - Use first-hand experience, e.g. observe melting ice.</p> <p>2Eo3 - Make and record observations.</p>	<p>Stage 2 covers light, dark and sources of light. The fact that objects can only be seen when illuminated is Stage 5.</p>
<p>1-PS4-3 - Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]</p>	<p>2PI3 - Be able to identify shadows.</p> <p>5PI5 - Explore how opaque materials do not let light through and transparent materials let a lot of light through.</p>		<p>Partly maps to Stage 2, but the remainder to Stage 5.</p>
<p>1-PS4-4 - Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]</p>	<p>1Ps1 - Identify many sources of sound.</p>	<p>2Ep4 - Ask questions and suggest ways to answer them.</p> <p>2Ep3 - Predict what will happen before deciding what to do.</p>	
1-LS1 From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>1-LS1-1 - Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]</p>	<p>2Be1 - Identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants that are found there.</p>	<p>2Ep4 - Ask questions and suggest ways to answer them.</p> <p>2Ep3 - Predict what will happen before deciding what to do.</p>	
<p>1-LS1-2 - Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]</p>	<p>1Bh5 - Know that humans and animals produce offspring which grow into adults.</p>	<p>2Eo1 - Make suggestions for collecting evidence.</p>	<p>Maps to Stage 1</p>

NGSS Grade 1	Cambridge Primary Stage 2		
1-LS3 Heredity: Inheritance and Variation of Traits	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>1-LS3-1 - Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]</p>	<p>1Bh5 - Know that humans and animals produce offspring which grow into adults.</p> <p>1Bp6 - Explore how seeds grow into flowering plants.</p>		<p>Inheritance and variation of traits does not map to Cambridge Primary. Reproduction and life cycles of plants is covered in Stage 5 so could be introduced there (5Bp2, 5Bp7).</p>
1-ESS1 Earth's Place in the Universe	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>1-ESS1-1 - Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]</p>	<p>2Pb1 - Explore how the sun appears to move during the day and how shadows change.</p> <p>2Pb2 - Model how the spin of the Earth leads to day and night, e.g. with different sized balls and a torch.</p>	<p>2Ep2 - Use first-hand experience, e.g. observe melting ice.</p>	
<p>1-ESS1-2 - Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]</p>	<p>5Pb3 - Know that the Earth takes a year to orbit the sun, spinning as it goes.</p>	<p>2Ep2 - Use first-hand experience, e.g. observe melting ice.</p> <p>2Eo1 - Make suggestions for collecting evidence.</p> <p>2Eo3 - Make and record observations.</p> <p>2Eo4 - Take simple measurements.</p>	<p>Seasonal variations do not map to the Cambridge Curriculum, however the Earth's orbit is covered in Stage 5 so could be included there.</p>

NGSS Grade 2	Cambridge Primary Stage 3		
2-PS1 Matter and its Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>2-PS1-1 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]</p>	<p>1Cp1 - Use senses to explore and talk about different materials.</p> <p>1Cp1 - Identify the characteristics of different materials.</p> <p>1Cp4 - Sort objects into groups based on the properties of their materials.</p>	<p>2Ep2 - Use first-hand experience, e.g. observe melting ice.</p> <p>2Ep6 - Recognise that a test or comparison may be unfair.</p> <p>2Eo3 - Make and record observations.</p>	<p>No map to Stage 2, but maps to Stage 1.</p>
<p>2-PS1-2 - Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]</p>	<p>3Cp4 - Discuss why materials are chosen for specific purposes on the basis of their properties.</p>	<p>2Eo1 - Make suggestions for collecting evidence.</p>	<p>Maps to Stage 3.</p>
<p>2-PS1-3 - Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]</p>		<p>2Eo1 - Make suggestions for collecting evidence.</p> <p>2Eo5 - Use a variety of ways to tell others what happened.</p> <p>2Eo8 - Talk about predictions (orally and in text), the outcome and why this happened.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>2-PS1-4 - Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]</p>	<p>2Cc2 - Explore and describe the way some everyday materials change when they are heated or cooled.</p>	<p>2Ep2 - Use first-hand experience, e.g. observe melting ice</p>	
2-LS2 Ecosystems: Interactions, Energy, and Dynamics	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>2-LS2-1 - Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Assessment is limited to testing one variable at a time.]</p>	<p>3Bp2 - Explain observations that plants need water and light to grow.</p>	<p>3Ep3 - With help, think about collecting evidence and planning fair tests.</p>	
<p>2-LS2-2 - Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p>	<p>5Bp5 - Know that insects pollinate some flowers.</p> <p>5Bp7 - Recognise that flowering plants have a life cycle including pollination, fertilisation, seed production, seed dispersal and germination.</p>	<p>3Eo1 - Observe and compare objects, living things and events.</p>	<p>Pollination and seed dispersal do not appear until Stage 5.</p>
2-LS4 Biological Evolution: Unity and Diversity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]</p>	<p>4Be1 - Investigate how different animals are found in different habitats and are suited to the environment in which they are found.</p>	<p>3Eo1 - Observe and compare objects, living things and events.</p>	<p>Adaptations to different habitats is in Stage 4.</p>

NGSS Grade 2	Cambridge Primary Stage 3		
2-ESS1 Earth's Place in the Universe	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>2-ESS1-1 - Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]</p>	<p>2Cp1 - Recognise some types of rocks and the uses of different rocks.</p>	<p>3Ep1 - Collect evidence in a variety of contexts to answer questions or test ideas.</p>	<p>Rocks only appear in the Cambridge Curriculum at Stage 2.</p>
2-ESS2 Earth's Systems	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>2-ESS2-1 - Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*[Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for usingshrubs, grass, and trees to hold back the land.]</p>	<p>4Be3 - Recognise ways that human activity affects the environment e.g. river pollution, recycling waste.</p>	<p>3Ep1 - Collect evidence in a variety of contexts to answer questions or test ideas.</p>	<p>This can be mapped to Stage 4. 4Be3 can be easily adapted to include 2-ESS2 learning objectives.</p>
<p>2-ESS2-2 - Develop a model to represent the shapes and kinds of land and bodies of water in an area. [Assessment Boundary:Assessment does not include quantitative scaling in models.]</p>		<p>3Eo1 - Observe and compare objects, living things and events.</p>	<p>The requirement of water for organisms is present throughout Stage 3, but there is no map to the Cambridge Curriculum on the topic of bodies of water or land.</p>
<p>2-ESS2-3 - Obtain information to identify where water is found on Earth and that it can be solid or liquid.</p>	<p>5Cs4 - Know that the boiling point of water is 100°C and the melting point of ice is 0°C.</p>	<p>3Ep1 - Collect evidence in a variety of contexts to answer questions or test ideas.</p>	
K-2-ETS1 Engineering Design	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p>		<p>3Ep1 - Collect evidence in a variety of contexts to answer questions or test ideas.</p> <p>3Ep2 - Suggest ideas, make predictions and communicate these.</p> <p>3Eo2 - Measure using simple equipment and record observations in a variety of ways.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p>		<p>3Ep1 - Collect evidence in a variety of contexts to answer questions or test ideas.</p> <p>3Ep2 - Suggest ideas, make predictions and communicate these.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>K-2-ETS1-3 - Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.</p>		<p>3Eo4 - Draw conclusions from results and begin to use scientific knowledge to suggest explanations.</p> <p>3Eo5 - Make generalisations and begin to identify simple patterns in results.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>

NGSS Grade 3	Cambridge Primary Stage 4		
3-PS2 Motion and Stability: Forces and Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-PS2-1 - Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]</p>	<p>3Pf2 - Explore how forces can make objects start or stop moving.</p> <p>3Pf4 - Explore how forces, including friction, can make objects move faster or slower or change direction.</p>	<p>4Ep4 - Design a fair test and plan how to collect sufficient evidence.</p> <p>4Ep5 - Choose apparatus and decide what to measure.</p>	<p>Forces appear in the Cambridge Curriculum in Stages 1, 3 and 6; not in Stage 4.</p>
<p>3-PS2-2 - Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.]</p>	<p>3Pf1 - Know that pushes and pulls are examples of forces and that they can be measured with forcemeters.</p>	<p>4Ep1 - Collect evidence in a variety of contexts.</p> <p>4Ep2 - Test an idea or prediction based on scientific knowledge and understanding.</p> <p>4Ep3 - Suggest questions that can be tested and make predictions; communicate these.</p> <p>4Ep4 - Design a fair test and plan how to collect sufficient evidence.</p>	<p>Forces appear in the Cambridge Curriculum in Stages 1, 3 and 6; not in Stage 4.</p>
<p>3-PS2-3 - Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]</p>	<p>4Pm4 - Explore the forces between magnets and know that magnets can attract or repel each other.</p>	<p>4Ep3 - Suggest questions that can be tested and make predictions; communicate these.</p> <p>4Eo5 - Identify simple trends and patterns in results and suggest explanations for some of these.</p>	<p>Electrostatics does not appear in the Primary Cambridge Curriculum.</p>
<p>3-PS2-4 - Define a simple design problem that can be solved by applying scientific ideas about magnets.* [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]</p>	<p>4Pm5 - Know that magnets attract some metals but not others.</p>	<p>4Ep2 - Test an idea or prediction based on scientific knowledge and understanding.</p>	
3-LS1 From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-LS1-1 - Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]</p>	<p>1Bh5 - Know that humans and animals produce offspring which grow into adults.</p> <p>5Bp7 - Recognise that flowering plants have a life cycle including pollination, fertilisation, seed production, seed dispersal and germination.</p>	<p>4Ep1 - Collect evidence in a variety of contexts.</p>	<p>Life cycles appear in Stages 1 and 5; not in Stage 4.</p>
3-LS2 Ecosystems: Interactions, Energy, and Dynamics	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-LS2-1 - Construct an argument that some animals form groups that help members survive.</p>	<p>6Be5 - Understand the terms producer, consumer, predator and prey.</p>		<p>Ecology and food chains appear in Stage 6.</p>

NGSS Grade 3	Cambridge Primary Stage 4		
3-LS3 Heredity: Inheritance and Variation of Traits	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-LS3-1 - Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]</p>		<p>4Ep1 - Collect evidence in a variety of contexts.</p>	<p>Inheritance and variation of traits does not map to Cambridge Primary. Reproduction and life cycles of plants is covered in Stage 5 so could be introduced there (5Bp2, 5Bp7).</p>
<p>3-LS3-2 - Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]</p>	<p>3Bh3 - Explore and research exercise and the adequate, varied diet needed to keep healthy. 3Bh4 - Know that some foods can be damaging to health, e.g. very sweet and fatty foods.</p>	<p>4Ep1 - Collect evidence in a variety of contexts. 4Eo4 - Present results in drawings, bar charts and tables.</p>	<p>Inheritance and variation of traits does not map to Cambridge Primary. Reproduction and life cycles of plants is covered in Stage 5 so could be introduced there (5Bp2, 5Bp7).</p>
3-LS4 Biological Evolution: Unity and Diversity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-LS4-1 - Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]</p>	<p>4Be1 - Investigate how different animals are found in different habitats and are suited to the environment in which they are found.</p>	<p>4Ep1 - Collect evidence in a variety of contexts.</p>	<p>The fossil record does not appear in Cambridge Primary but 4Be1 could be adapted and extended to include organisms from the past.</p>
<p>3-LS4-2 - Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]</p>	<p>4Be1 - Investigate how different animals are found in different habitats and are suited to the environment in which they are found.</p>	<p>4Ep1 - Collect evidence in a variety of contexts. 4Eo6 - Explain what the evidence shows and whether it supports predictions. Communicate this clearly to others.</p>	
<p>3-LS4-3 - Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]</p>	<p>4Be1 - Investigate how different animals are found in different habitats and are suited to the environment in which they are found.</p>	<p>4Ep1 - Collect evidence in a variety of contexts. 4Eo7 - Link evidence to scientific knowledge and understanding in some contexts.</p>	
<p>3-LS4-4 - Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]</p>	<p>4Be3 - Recognise ways that human activity affects the environment e.g. river pollution, recycling waste.</p>	<p>4Eo5 - Identify simple trends and patterns in results and suggest explanations for some of these. 4Eo7 - Link evidence to scientific knowledge and understanding in some context.</p>	

NGSS Grade 3	Cambridge Primary Stage 4		
3-ESS2 Earth's Systems	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-ESS2-1 - Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]</p>		<p>4Eo1 - Make relevant observations and comparisons in a variety of contexts.</p> <p>4Eo4 - Present results in drawings, bar charts and tables.</p> <p>4Eo5 - Identify simple trends and patterns in results and suggest explanations for some of these.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>3-ESS2-2 - Obtain and combine information to describe climates in different regions of the world.</p>		<p>4Ep1 - Collect evidence in a variety of contexts.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
3-ESS3 Earth and Human Activity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-ESS3-1 - Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.* [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]</p>	<p>4Be3 - Recognise ways that human activity affects the environment e.g. river pollution, recycling waste.</p>	<p>4Eo6 - Explain what the evidence shows and whether it supports predictions. Communicate this clearly to others.</p> <p>4Eo7 - Link evidence to scientific knowledge and understanding in some contexts.</p>	

NGSS Grade 4	Cambridge Primary Stage 5		
4-PS3 Energy	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-PS3-1 - Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]</p>	<p>6Pf3 - Understand the notion of energy in movement.</p>		<p>The concept of energy appears in Cambridge Primary only in Stage 6.</p>
<p>4-PS3-2 - Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]</p>	<p>5Bp1 - Know that plants need energy from light for growth.</p> <p>4Pm3 - Know that electrical current flows and that models can describe this flow, e.g. particles travelling around a circuit.</p> <p>4Ps1 - Explore how sounds are made when objects, materials or air vibrate and learn to measure the volume of sound in decibels with a sound level meter.</p>	<p>5Ep2 - Use observation and measurement to test predictions and make links.</p>	<p>Energy transfers do not appear in Cambridge Primary, but 5Bp1, 4Pm3 and 4Ps1 can be adapted and extended to include this.</p>
<p>4-PS3-3 - Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]</p>	<p>6Pf3 - Understand the notion of energy in movement.</p>	<p>5Ep3 - Make predictions of what will happen based on scientific knowledge and understanding, and suggest and communicate how to test these.</p>	
<p>4-PS3-4 - Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]</p>	<p>4Pm3 - Know that electrical current flows and that models can describe this flow, e.g. particles travelling around a circuit.</p> <p>4Ps1 - Explore how sounds are made when objects, materials or air vibrate and learn to measure the volume of sound in decibels with a sound level meter.</p>	<p>5Ep2 - Use observation and measurement to test predictions and make links.</p> <p>5Ep3 - Make predictions of what will happen based on scientific knowledge and understanding, and suggest and communicate how to test these.</p> <p>5Ep4 - Use knowledge and understanding to plan how to carry out a fair test.</p> <p>5Ep5 - Collect sufficient evidence to test an idea.</p>	<p>Energy transfers do not appear in Cambridge Primary, but 4Pm3 and 4Ps1 can be adapted and extended to include this.</p>

NGSS Grade 4	Cambridge Primary Stage 5		
4-PS4 Waves and their Applications in Technologies for Information Transfer	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-PS4-1 - Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]</p>	<p>4Ps2 - Investigate how sound travels through different materials to the ear.</p> <p>4Ps4 - Investigate the way pitch describes how high or low a sound is and that high and low sounds can be loud or soft. Secondary sources can be used.</p>	<p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	<p>Waves, amplitude and wavelength do not appear in Cambridge Primary, but 4Ps2 and 4Ps4 can be extended to include these concepts.</p>
<p>4-PS4-2 - Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.[Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]</p>	<p>5PI6 - Know that we see light sources because light from the source enters our eyes.</p> <p>5PI7- Know that beams/rays of light can be reflected by surfaces including mirrors, and when reflected light enters our eyes we see the object.</p>	<p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	
<p>4-PS4-3 - Generate and compare multiple solutions that use patterns to transfer information.* [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]</p>		<p>5Ep2 - Use observation and measurement to test predictions and make links.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
4-LS1 From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-LS1-1 - Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]</p>	<p>5Bp6 - Observe that plants produce flowers which have male and female organs; seeds are formed when pollen from the male organ fertilises the ovum (female).</p> <p>6Bh3 - Describe the main functions of the major organs of the body.</p> <p>6Bh4 - Explain how the functions of the major organs are essential.</p>	<p>4Eo7 - Link evidence to scientific knowledge and understanding in some contexts.</p>	<p>Human organs do not appear until Stage 6.</p>
<p>4-LS1-2 - Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]</p>	<p>3Bh5 - Explore human senses and the ways we use them to learn about our world.</p> <p>6Bh3 - Describe the main functions of the major organs of the body.</p>	<p>5Eo1 - Make relevant observations.</p>	<p>Senses appear in Stages 1 and 3 of Cambridge Primary but can be linked to organs and extended to match 4-LS1-2.</p>
4-ESS1 Earth's Place in the Universe	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-ESS1-1 - Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]</p>	<p>2Cp1 - Recognise some types of rocks and the uses of different rocks.</p>	<p>5Eo5 - Decide whether results support predictions.</p> <p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	<p>Rocks only appear in the Cambridge Curriculum at Stage 2.</p>

NGSS Grade 4	Cambridge Primary Stage 5		
4-ESS2 Earth's Systems	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-ESS2-1 - Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]</p>	<p>2Cp1 - Recognise some types of rocks and the uses of different rocks.</p>	<p>5Eo1 - Make relevant observations.</p> <p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	<p>Rocks only appear in the Cambridge Curriculum at Stage 2.</p>
<p>4-ESS2-2 - Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]</p>		<p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
4-ESS3 Earth and Human Activity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>4-ESS3-1 - Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]</p>	<p>6Be1 - Explore how humans have positive and negative effects on the environment, e.g. loss of species, protection of habitats.</p>	<p>5Ep5 - Collect sufficient evidence to test an idea.</p>	<p>Energy and natural resources do not appear in Cambridge Primary but link to 6Be1.</p>
<p>4-ESS3-2 - Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]</p>	<p>6Be2 - Explore a number of ways of caring for the environment, e.g. recycling, reducing waste, reducing energy consumption, not littering, encouraging others to care for the environment.</p>	<p>5Ep3 - Make predictions of what will happen based on scientific knowledge and understanding, and suggest and communicate how to test these.</p>	<p>This topic appears at Stage 6.</p>

NGSS Grade 5	Cambridge Primary Stage 6		
5-PS1 Matter and Its Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-PS1-1 - Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]</p>	<p>4Cs1 - Know that matter can be solid, liquid or gas.</p> <p>5Cs1 - Know that evaporation occurs when a liquid turns into a gas.</p> <p>5Cs2 - Know that condensation occurs when a gas turns into a liquid and that it is the reverse of evaporation.</p> <p>6Cs3 - Observe, describe, record and begin to explain changes that occur when some solids are added to water.</p>	<p>5Eo7 - Recognise and make predictions from patterns in data and suggest explanations using scientific knowledge and understanding.</p>	<p>Particle theory of matter does not appear in Cambridge Primary but can be included in 4Cs1, 5Cs1, 5Cs2 and 6Cs3.</p>
<p>5-PS1-2 - Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]</p>	<p>6Cc1 - Distinguish between reversible and irreversible changes.</p> <p>4Cs2 - Investigate how materials change when they are heated and cooled.</p>	<p>5Eo1 - Make relevant observations.</p> <p>5Eo4 - Present results in bar charts and line graphs.</p>	<p>Conservation of mass does not appear in Cambridge Primary but can be included in 6Cc1 and 4Cs2.</p>
<p>5-PS1-3 - Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]</p>	<p>1Cp4 - Sort objects into groups based on the properties of their materials.</p> <p>3Cp1 - Know that every material has specific properties, e.g. hard, soft, shiny.</p> <p>3Cp2 - Sort materials according to their properties.</p>	<p>5Ep5 - Collect sufficient evidence to test an idea.</p> <p>5Eo1 - Make relevant observations.</p>	<p>Materials and their properties appear in Stages 1 and 3.</p>
<p>5-PS1-4 - Conduct an investigation to determine whether the mixing of two or more substances results in new substances.</p>	<p>6Cc1 - Distinguish between reversible and irreversible changes.</p>	<p>5Ep2 - Use observation and measurement to test predictions and make links.</p> <p>5Ep4 - Use knowledge and understanding to plan how to carry out a fair test.</p>	<p>Reversible and irreversible change appears in Stage 6.</p>

NGSS Grade 5	Cambridge Primary Stage 6		
5-PS2 Motion and Stability: Forces and Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-PS2-1 - Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: Down” is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]</p>	<p>3Pf1 - Know that pushes and pulls are examples of forces and that they can be measured with forcemeters.</p> <p>6Pf1 - Distinguish between mass measured in kilograms (kg) and weight measured in Newtons, noting that kilograms are used in everyday life.</p> <p>6Pf2 - Recognise and use units of force, mass and weight and identify the direction in which forces act.</p>	<p>6Ep1 - Consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.</p>	<p>Gravitation does not appear in Cambridge Primary, but can be included when distinguishing between weight and mass.</p>
5-PS3 Energy	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-PS3-1 - Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]</p>	<p>6Be4 - Know that food chains begin with a plant (the producer), which uses energy from the sun.</p>	<p>6Ep1 - Consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.</p>	
5-LS1 From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-LS1-1 - Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]</p>	<p>3Bp2 - Explain observations that plants need water and light to grow.</p> <p>5Bp1 - Know that plants need energy from light for growth.</p>	<p>6Ep2 - Collect evidence and data to test ideas including predictions.</p>	<p>Requirements for plant growth appear in Stages 3 and 5.</p>
5-LS2 Ecosystems: Interactions, Energy, and Dynamics	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-LS2-1 - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]</p>	<p>6Be3 - Know how food chains can be used to represent feeding relationships in a habitat and present these in text and diagrams.</p>	<p>6Ep1 - Consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.</p>	<p>6Be3 can be extended to include decomposition and nutrient cycling.</p>

NGSS Grade 5	Cambridge Primary Stage 6		
5-ESS1 Earth's Place in the Universe	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-ESS1-1 - Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]</p>	<p>5Pb4 - Research the lives and discoveries of scientists who explored the solar system and stars.</p>	<p>6Ep1 - Consider how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.</p>	
<p>5-ESS1-2 - Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]</p>	<p>5Pb1- Explore, through modeling that the sun does not move; its apparent movement is caused by the Earth spinning on its axis.</p> <p>5Pb2- Know that the Earth spins on its axis once in every 24 hours.</p> <p>5Pb3 - Know that the Earth takes a year to orbit the sun, spinning as it goes.</p>		<p>This topic maps to Stage 5.</p>
5-ESS2 Earth's Systems	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-ESS2-1 - Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]</p>		<p>6Eo8 - Suggest and evaluate explanations for predictions using scientific knowledge and understanding and communicate these clearly to others.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>5-ESS2-2 - Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]</p>		<p>6Eo3 - Use tables, bar charts and line graphs to present results.</p> <p>6Eo8 - Suggest and evaluate explanations for predictions using scientific knowledge and understanding and communicate these clearly to others.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
5-ESS3 Earth and Human Activity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>5-ESS3-1 - Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.</p>	<p>6Be2 - Explore a number of ways of caring for the environment, e.g. recycling, reducing waste, reducing energy consumption, not littering, encouraging others to care for the environment.</p>	<p>6Eo3 - Use tables, bar charts and line graphs to present results.</p> <p>6Eo8 - Suggest and evaluate explanations for predictions using scientific knowledge and understanding and communicate these clearly to others.</p>	

NGSS Grade 5	Cambridge Primary Stage 6		
3-5-ETS1 Engineering Design	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>3-5-ETS1-1 - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p>			<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>3-5-ETS1-2 - Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p>			<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>3-5-ETS1-3 - Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p>5Ep4 - Use knowledge and understanding to plan how to carry out a fair test.</p>	<p>5Ep4 - Use knowledge and understanding to plan how to carry out a fair test.</p>	<p>The concept of fair testing appears throughout Cambridge Primary in the Scientific Enquiry Strand, but not explicitly in Stage 6.</p>
	<p>These learning objectives from Cambridge Primary (Stages 1–6) have no full or direct map to any learning objectives in NGSS.</p>		
	<p>1Ps3 - Recognise that as sound travels from a source it becomes fainter.</p>		
	<p>2Pm1 - Recognise the components of simple circuits involving cells (batteries). 2Pm2 - Know how a switch can be used to break a circuit.</p>		
	<p>3Bh3 - Explore and research exercise and the adequate, varied diet needed to keep healthy. 3Bh6 - Sort living things into groups, using simple features and describe rationale for groupings.</p>		
	<p>6Cc2 - Explore how solids can be mixed and how it is often possible to separate them again. 6Cc4 - Explore how, when solids do not dissolve or react with water, they can be separated by filtering, which is similar to sieving. 6Pm1 - Investigate how some materials are better conductors of electricity than others. 6Pm2 - Investigate how some metals are good conductors of electricity while most other materials are not. 6Pm3 - Know why metals are used for cables and wires and why plastics are used to cover wires and as covers for plugs and switches. 6Pm4 - Predict and test the effects of making changes to circuits, including length or thickness of wire and the number and type of components. 6Pm5 - Represent series circuits with drawings and conventional symbols.</p>		
	<p>Throughout the Scientific Enquiry strand from Stage 4 onward, Cambridge Primary includes the learning objective of considering the need for repeated measurements, leading to the concept of reliability at Stage 6.</p>		

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-PS1 Matter and Its Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-PS1-1 - Develop models to describe the atomic composition of simple molecules and extended structures. [Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.] [Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete depiction of all individual atoms in a complex molecule or extended structure.]</p>	<p>8Cs1 - Show how the use particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.</p> <p>8Cp3 - Understand that elements are made of atoms.</p> <p>8Cp4 - Explain the idea of compounds.</p>	<p>8Ec6 - Discuss explanations for results using scientific knowledge and understanding. Communicate these clearly to others.</p>	<p>The term molecule does not appear in Cambridge Secondary 1 but 8Cp3 and 8Cp4 can be extended to cover this.</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. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]</p>	<p>8Cc1 - Use a word equation to describe a reaction.</p> <p>9Cc2 - Describe the reactivity of metals with oxygen, water and dilute acids.</p>	<p>9Eo2 - Use a range of materials and equipment and control risks.</p> <p>9Ec1 - Describe patterns seen in results.</p>	
<p>MS-PS1-3 - Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. [Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [Assessment Boundary: Assessment is limited to qualitative information.]</p>		<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic, but the chemical reactions covered in Stage 9 can be extended to cover this.</p>
<p>MS-PS1-4 - Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. [Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]</p>	<p>7Cs1 - Show in outline how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state.</p> <p>8Cs1 - Show how the use particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.</p>	<p>7Ep2 - Make predictions and review them against evidence.</p> <p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</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. [Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]</p>		<p>9Ep2 - Test explanations by using them to make predictions and then evaluate these against evidence.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic, but the chemical reactions covered in Stage 9 can be extended to cover this.</p>
<p>MS-PS1-6 - Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.* [Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.] [Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.]</p>	<p>9Cc1 - Explore and explain the idea of endothermic processes and exothermic reactions.</p>	<p>9Eo3 - Make observations and measurements.</p> <p>9Ec1 - Describe patterns (correlations) seen in results.</p>	

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-PS2 Motion and Stability: Forces and Interactions	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-PS2-1 - Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.* [Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.] [Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.]</p>		<p>7Eo1 - Make careful observations including measurements.</p>	<p>Colliding objects do not appear in Cambridge Secondary 1, but 7Pf1 - Describe the effects of forces on motion, including friction and air resistance, could be extended to cover this.</p>
<p>MS-PS2-2 - Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton’s First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton’s Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]</p>	<p>8Pf1 - Calculate average speeds, including through the use of timing gates.</p>	<p>8Ep4 - Plan investigations to test ideas. 8Ep5 - Identify important variables; choose which variables to change, control and measure. 8Ep6 - Make predictions using scientific knowledge and understanding.</p>	
<p>MS-PS2-3 - Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. [Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.]</p>	<p>8Pm1 - Describe the properties of magnets. 8Pm3 - Construct and use an electromagnet.</p>	<p>8Eo1 - Take appropriately accurate measurements. 8Eo2 - Use a range of equipment correctly.</p>	
<p>MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. [Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.] [Assessment Boundary: Assessment does not include Newton’s Law of Gravitation or Kepler’s Laws.]</p>	<p>7Pf2 - Describe the effect of gravity on objects.</p>	<p>7Ep7 - Choose appropriate apparatus and use it correctly. 7Eo1 - Make careful observations including measurements. 7Eo2 - Present results in the form of tables, bar charts and line graphs.</p>	
<p>MS-PS2-5 - Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. [Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations.] [Assessment Boundary: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.]</p>	<p>8Pm2 - Recognise and reproduce the magnetic field pattern of a bar magnet.</p>	<p>8Ep3 - Select ideas and turn them into a form that can be tested. 8Ep4 - Plan investigations to test ideas. 8Ec4 - Identify anomalous results and suggest improvements to investigations.</p>	

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-PS3 Energy	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-PS3-1 - Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. [Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball.]</p>	<p>7Pe2 - Recognise different energy types and energy transfers.</p>	<p>7Eo2 - Present results in the form of tables, bar charts and line graphs.</p> <p>7Ec1 - Make conclusions from collected data, including those presented in a graph, chart or spreadsheet.</p>	
<p>MS-PS3-2 - Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. [Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.] [Assessment Boundary: Assessment is limited to two objects and electric, magnetic, and gravitational interactions.]</p>	<p>7Pe2 - Recognise different energy types and energy transfers.</p> <p>8Pm1 - Describe the properties of magnets.</p>	<p>8Eo4 - Present results as appropriate in tables and graphs.</p> <p>8Ec7 - Present conclusions to others in appropriate ways.</p>	
<p>MS-PS3-3 - Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.* [Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.] [Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.]</p>	<p>9Pe2 - Identify and explain the thermal (heat) energy transfer processes of conduction, convection and radiation.</p>	<p>9Ep4 - Select ideas and produce plans for testing based upon previous knowledge, understanding and research.</p> <p>9Ep5 - Suggest and use preliminary work to decide how to carry out an investigation.</p>	
<p>MS-PS3-4 - Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. [Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.] [Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.]</p>	<p>9Pe2 - Identify and explain the thermal (heat) energy transfer processes of conduction, convection and radiation.</p>	<p>9Ep4 - Select ideas and produce plans for testing based upon previous knowledge, understanding and research.</p> <p>9Ep5 - Suggest and use preliminary work to decide how to carry out an investigation.</p> <p>9Ep7 - Decide which measurements and observations are necessary and what equipment to use.</p> <p>9Ep8 - Decide which apparatus to use and assess any hazards in the laboratory, field or workplace.</p>	
<p>MS-PS3-5 - Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. [Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object.] [Assessment Boundary: Assessment does not include calculations of energy.]</p>	<p>7Pe2 - Recognise different energy types and energy transfers.</p>	<p>7Ep1 - Be able to talk about the importance of questions, evidence and explanations.</p> <p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-PS4 Waves and Their Applications in Technologies for Information Transfer	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-PS4-1 - Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.]</p>	<p>8Ps2 - Recognise the link between loudness and amplitude, pitch and frequency, using an oscilloscope.</p>	<p>8Ec1 - Make simple calculations.</p>	
<p>MS-PS4-2 - Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]</p>	<p>8PI1 - Use light travelling in a straight line to explain the formation of shadows and other phenomena. 8PI2 - Describe how non-luminous objects are seen. 8PI3 - Describe reflection at a plane surface and use the law of reflection. 8PI4 - Investigate refraction at the boundary between air and glass or air and water.</p>	<p>8Ep1 - Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.</p>	<p>Waves do not appear in Cambridge Secondary 1 but the topics in 8PI can be extended to include this.</p>
<p>MS-PS4-3 - Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]</p>	<p>8PI4 - Investigate refraction at the boundary between air and glass or air and water.</p>	<p>8Ec5 - Interpret data from secondary sources. 8Ec6 - Discuss explanations for results using scientific knowledge and understanding. Communicate these clearly to others.</p>	<p>The topic of refraction could be extended to include total internal reflection which is the basis for fibre optic technology.</p>
MS-LS1 - From Molecules to Organisms: Structures and Processes	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-LS1-1 - Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]</p>	<p>7Bc5 - Relate the structure of some common cells to their functions. Secondary sources can be used.</p>	<p>7Ep4 - Outline plans to carry out investigations, considering the variables to control, change or observe. 7Ep6 - Identify appropriate evidence to collect and suitable methods of collection. 7Ep7 - Choose appropriate apparatus and use it correctly.</p>	
<p>MS-LS1-2 - Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. [Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]</p>	<p>7Bc3 - Identify the structures present in plant and animal cells as seen with a simple light microscope and/or a computer microscope. 7Bc4 - Compare the structure of plant and animal cells.</p>	<p>7Eo3 - Use information from secondary sources.</p>	
<p>MS-LS1-3 - Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. [Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.] [Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.]</p>	<p>7Bc6 - Understand that cells can be grouped together to form tissues, organs and organisms.</p>	<p>7Ep1 - Be able to talk about the importance of questions, evidence and explanations. 7Ep2 - Make predictions and review them against evidence.</p>	

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
<p>MS-LS1-4 - Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen and hard shells on nuts that squirrels bury.]</p>	<p>8Bh13 - Describe the human reproductive system, including the menstrual cycle, fertilisation and foetal development.</p> <p>9Bp3 - Understand sexual reproduction in flowering plants, including pollination, fertilisation, seed formation and dispersal.</p>	<p>9Ec3 - Look critically at sources of secondary data.</p> <p>9Ec4 - Draw conclusions.</p>	<p>Animal behaviour could be included in 8Bh13 and the adaptations of flowering plants included in 9Bp3.</p>
<p>MS-LS1-5 - Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.]</p>	<p>9Bp2 - Understand the importance of water and mineral salts to plant growth.</p> <p>8Bh7 - Discuss how conception, growth, development, behaviour and health can be affected by diet, drugs and disease.</p>	<p>8Ec6 - Discuss explanations for results using scientific knowledge and understanding. Communicate these clearly to others.</p> <p>8Ec7 - Present conclusions to others in appropriate ways.</p>	<p>9Bp2 and 8Bh7 can be extended to include genetic factors.</p>
<p>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. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]</p>	<p>8Bp1 - Explore how plants need carbon dioxide, water and light for photosynthesis in order to make biomass and oxygen.</p> <p>9Be3 - Explain and model food chains, food webs and energy flow.</p> <p>9Be4 - Explain the role of decomposers.</p>	<p>9Ec8 - Explain results using scientific knowledge and understanding. Communicate this clearly to others.</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. [Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]</p>	<p>8Bh4 - Understand the function of enzymes as biological catalysts in breaking down food to simple chemicals.</p> <p>8Bh9 - Define and describe aerobic respiration, and use the word equation.</p>	<p>8Ec5 - Interpret data from secondary sources.</p> <p>8Ec6 - Discuss explanations for results using scientific knowledge and understanding. Communicate these clearly to others.</p>	
<p>MS-LS1-8 - Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]</p>	<p>7Bh2 - Recognise the positions and know the functions of the major organ systems of the human body. Secondary sources can be used.</p>	<p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	<p>7Bh2 can be extended to cover sensory receptors and the roles of the brain in more detail.</p>

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-LS2 Ecosystems: Interactions, Energy, and Dynamics	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>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. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]</p>	<p>9Be5 - Describe factors affecting the size of populations.</p>	<p>9Ec8 - Explain results using scientific knowledge and understanding. Communicate this clearly to others.</p>	
<p>MS-LS2-2 - Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]</p>	<p>9Be3 - Explain and model food chains, food webs and energy flow. 9Be5 - Describe factors affecting the size of populations.</p>	<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	
<p>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. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]</p>	<p>9Be4 - Explain the role of decomposers.</p>	<p>9Ec8 - Explain results using scientific knowledge and understanding. Communicate this clearly to others.</p>	<p>9Be4 can be extended to cover the carbon and nitrogen cycles.</p>
<p>MS-LS2-4 - Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]</p>	<p>9Be3 - Explain and model food chains, food webs and energy flow. 9Be5 - Describe factors affecting the size of populations.</p>	<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	
<p>MS-LS2-5 - Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]</p>	<p>9Be6 - Describe and investigate some effects of human influences on the environment.</p>	<p>9Ep3 - Discuss the way that scientists work today and how they worked in the past, including reference to experimentation, evidence and creative thought.</p>	
MS-LS3 Heredity: Inheritance and Variation of Traits	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-LS3-1 - Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. [Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.][Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.]</p>	<p>9Bv2 - Understand that organisms inherit characteristics from their parents through genetic material that is carried in cell nuclei.</p>	<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	<p>Mutation does not appear in the Cambridge Secondary 1 curriculum but 9Bv2 can be extended to cover this.</p>
<p>MS-LS3-2 - Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. [Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.]</p>	<p>9Bv2 - Understand that organisms inherit characteristics from their parents through genetic material that is carried in cell nuclei.</p>	<p>9Ep4 - Select ideas and produce plans for testing based on previous knowledge, understanding and research.</p>	

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
MS-LS4 Biological Evolution: Unity and Diversity	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-LS4-1 - Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. [Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.] [Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.]</p>	<p>7Ce3 - Examine fossils and research the fossil record.</p>	<p>7Ep1 - Be able to talk about the importance of questions, evidence and explanations.</p>	
<p>MS-LS4-2 - Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. [Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.]</p>	<p>7Ce3 - Examine fossils and research the fossil record. 9Bv4 - Discuss the work of Darwin in developing the scientific theory of natural selection.</p>	<p>7Ep1 - Be able to talk about the importance of questions, evidence and explanations.</p>	
<p>MS-LS4-3 - Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. [Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.] [Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.]</p>		<p>9Ec3 - Look critically at sources of secondary data.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-LS4-4 - Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. [Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.]</p>	<p>9Be1 - Explain the ways in which living things are adapted to their habitats. Secondary sources can be used.</p>	<p>9Ec3 - Look critically at sources of secondary data. 9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	
<p>MS-LS4-5 - Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. [Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]</p>	<p>9Bv3 - Describe how selective breeding can lead to new varieties.</p>	<p>9Ep3 - Discuss the way that scientists work today and how they worked in the past, including reference to experimentation, evidence and creative thought.</p>	
<p>MS-LS4-6 - Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.] [Assessment Boundary: Assessment does not include Hardy Weinberg calculations.]</p>	<p>9Bv4 - Discuss the work of Darwin in developing the scientific theory of natural selection.</p>	<p>7Ec4 - Present conclusions using different methods. 8Ec1 - Make simple calculations.</p>	
MS-ESS1 Earth's Place in the Universe	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-ESS1-1 - Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. [Clarification Statement: Examples of models can be physical, graphical, or conceptual.]</p>	<p>7Pb1 - Describe how the movement of the Earth causes the apparent daily and annual movement of the sun and the stars.</p>	<p>7Ep5 - Make predictions referring to previous scientific knowledge and understanding.</p>	<p>7Pb1 can be extended to cover lunar phases.</p>
<p>MS-ESS1-2 - Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. [Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state).] [Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]</p>	<p>7Pb2 - Describe the relative position and movement of the planets and the sun in the solar system.</p>	<p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	<p>7Pb2 can be extended to cover motions within galaxies.</p>

NGSS Middle School Physical Sciences	Cambridge Secondary 1 Science (Stages 7–9)		
<p>MS-ESS1-3 - Analyze and interpret data to determine scale properties of objects in the solar system. [Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object’s layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.] [Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.]</p>	<p>7Ce2 Research simple models of the internal structure of the Earth.</p> <p>7Pb2 - Describe the relative position and movement of the planets and the sun in the solar system.</p>	<p>8Ep1 - Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.</p> <p>8Ep2 - Test predictions with reference to evidence gained.</p>	
<p>MS-ESS1-4 - Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history. [Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth’s history. Examples of Earth’s major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] [Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]</p>	<p>7Ce4 - Discuss the fossil record as a guide to estimating the age of the Earth.7Ce5 - Learn about most recent estimates of the age of the Earth.</p>	<p>7Ep2 - Make predictions and review them against evidence.</p> <p>7Ec4 - Present conclusions using different methods.</p>	
<p>MS-ESS2 Earth’s Systems</p>	<p>Biology B, Chemistry C or Physics P</p>	<p>Scientific Enquiry E</p>	<p>Additional notes</p>
<p>MS-ESS2-1 - Develop a model to describe the cycling of Earth’s materials and the flow of energy that drives this process. [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth’s materials.] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]</p>	<p>7Ce1 - Observe and classify different types of rocks and soils.</p>	<p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	<p>7Ce1 can be extended to include the rock cycle.</p>
<p>MS-ESS2-2 - Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales. [Clarification Statement: Emphasis is on how processes change Earth’s surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]</p>		<p>8Ep1 - Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.</p> <p>8Ec5 - Interpret data from secondary sources.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-ESS2-3 - Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. [Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).] [Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.]</p>	<p>7Ce2 - Research simple models of the internal structure of the Earth.</p> <p>7Ce3 - Examine fossils and research the fossil record.</p>	<p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	<p>7Ce2 and 7Ce3 can be extended to cover tectonic plates.</p>
<p>MS-ESS2-4 - Develop a model to describe the cycling of water through Earth’s systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]</p>	<p>7Cs1 - Show in outline how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state.</p>	<p>7Ec3 - Consider explanations for predictions using scientific knowledge and understanding and communicate these.</p>	<p>7Cs1 can be extended to cover the water cycle.</p>

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<p>MS-ESS2-5 - Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. [Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.]</p>	<p>8Cs1 - Show how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.</p> <p>9Pf3 - Explain pressures in gases and liquids (qualitative only).</p>	<p>8Ep1 - Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.</p>	<p>Meteorology does not appear on the Cambridge Secondary 1 curriculum, but 8Cs1 and 9Pf3 could be extended to cover this.</p>
<p>MS-ESS2-6 - Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] [Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.]</p>	<p>8Cs1 - Show how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.</p> <p>7Pb1 - Describe how the movement of the Earth causes the apparent daily and annual movement of the sun and the stars.</p>	<p>8Ep1 - Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.</p>	<p>8Cs1 and 7Pb1 could be extended to cover atmospheric and oceanic patterns.</p>
<p>MS-ESS3 Earth and Human Activity</p>	<p>Biology B, Chemistry C or Physics P</p>	<p>Scientific Enquiry E</p>	<p>Additional notes</p>
<p>MS-ESS3-1 - Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]</p>	<p>7Ce2 - Research simple models of the internal structure of the Earth.</p> <p>9Be6 - Describe and investigate some effects of human influences on the environment.</p> <p>9Pe1 - Use knowledge of energy sources including fossil fuels and renewable energy resources to consider the world's energy needs, including research from secondary sources.</p>	<p>9Ec3 - Look critically at sources of secondary data.</p> <p>9Ec4 - Draw conclusions.</p>	
<p>MS-ESS3-2 - Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]</p>		<p>9Ep2 - Test explanations by using them to make predictions and then evaluate these against evidence.</p> <p>9Ec1 - Describe patterns (correlations) seen in results.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-ESS3-3 - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]</p>	<p>9Be6 - Describe and investigate some effects of human influences on the environment.</p>	<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p>	

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<p>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. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth’s systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]</p>	<p>9Be6 - Describe and investigate some effects of human influences on the environment.</p> <p>9Pe1 - Use knowledge of energy sources including fossil fuels and renewable energy resources to consider the world’s energy needs, including research from secondary sources.</p>	<p>9Ec1 - Describe patterns (correlations) seen in results.</p> <p>9Ec2 - Interpret results using scientific knowledge and understanding.</p> <p>9Ec3 - Look critically at sources of secondary data.</p> <p>9Ec4 - Draw conclusions.</p>	
<p>MS-ESS3-5 - Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]</p>	<p>9Be6 - Describe and investigate some effects of human influences on the environment.</p>	<p>9Ep1 - Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.</p> <p>9Ep2 - Test explanations by using them to make predictions and then evaluate these against evidence.</p>	
MS-ETS1 Engineering Design	Biology B, Chemistry C or Physics P	Scientific Enquiry E	Additional notes
<p>MS-ETS1-1 - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p>		<p>7Ep3 - Suggest ideas that may be tested.</p> <p>7Ep4 - Outline plans to carry out investigations, considering the variables to control, change or observe.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-ETS1-2 - Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p>		<p>7Ec1 - Make conclusions from collected data, including those presented in a graph, chart or spreadsheet.</p> <p>8Ec7 - Present conclusions to others in appropriate ways.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-ETS1-3 - Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</p>		<p>8Ec4 - Identify anomalous results and suggest improvements to investigations.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>
<p>MS-ETS1-4 - Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>		<p>9Eo1 - Make sufficient observations and measurements to reduce error and make results more reliable.</p> <p>9Eo2 - Use a range of materials and equipment and control risks.</p> <p>9Eo3 - Make observations and measurements.</p>	<p>There is no direct link to the Cambridge Curriculum on this topic.</p>

These learning objectives from Cambridge Secondary 1 (Stages 7–9) have no full or direct map to any learning objectives in NGSS.

7Bc1 - Identify the seven characteristics of living things and relate these to a wide range of organisms in the local and wider environment.
7Bc2 - Know about the role of micro-organisms in the breakdown of organic matter, food production and disease, including the work of Louis Pasteur.
7Bv1 - Understand what is meant by a species.
7Bv3 - Classify animals and plants into major groups, using some locally occurring examples.
7Cp1 - Distinguish between metals and non-metals.
7Cp2 - Describe everyday materials and their physical properties.
7Cc1 - Use a pH scale.
7Cc2 - Understand neutralisation and some of its applications.
7Cc3 - Use indicators to distinguish acid and alkaline solutions.

8Bh1 - Identify the constituents of a balanced diet and the functions of various nutrients. Secondary sources can be used.
8Bh2 - Understand the effects of nutritional deficiencies.
8Bh3 - Recognise the organs of the alimentary canal and know their functions. Secondary sources can be used.
8Bh5 - Recognise and model the basic components of the circulatory system and know their functions.
8Bh6 - Understand the relationship between diet and fitness.
8Bh7 - Discuss how conception, growth, development, behaviour and health can be affected by diet, drugs and disease.
8Bh8 - Recognise the basic components of the respiratory system and know their functions.
8Bh10 Explain gaseous exchange.
8Bh11 - Describe the effects of smoking. Secondary sources can be used.
8Bh12 - Discuss the physical and emotional changes that take place during adolescence.
8Bh13 - Describe the human reproductive system, including the menstrual cycle, fertilisation and foetal development.
8Pf1 - Calculate average speeds, including through the use of timing gates.
8Pf2 - Interpret simple distance/time graphs.
8Ps1 - Explain the properties of sound in terms of movement of air particles.
8PI1 - Use light travelling in a straight line to explain the formation of shadows and other phenomena.
8PI5 - Explain the dispersion of white light.
8PI6 - Explain colour addition and subtraction, and the absorption and reflection of coloured light.

9Cp1 - Describe the structure of an atom and learn about the methods and discoveries of Rutherford.
9Cp2 - Compare the structures of the first twenty elements of the Periodic Table.
9Cp3 - Describe trends in groups and periods.
9Cc3 - Explore and understand the reactivity series.
9Cc4 - Give examples of displacement reactions.
9Cc6 - Give an explanation of the effects of concentration, particle size, temperature and catalysts on the rate of a reaction.
9Pf1 - Explain that pressure is caused by the action of a force on an area.
9Pf4 - Know that forces can cause objects to turn on a pivot and understand the principle of moments.
9Pm2 - Interpret and draw simple parallel circuits.
9Pm3 - Model and explain how common types of components, including cells (batteries), affect current.
9Pm4 - Explain how current divides in parallel circuits.
9Pm5 - Measure current using ammeters and voltage using voltmeters, including digital meters.
9Pe3 - Explain cooling by evaporation.