SCIENCE

Substantive and Procedural Knowledge

YEAR 3

Rocks

Lesson 1: What Are Rocks?

Substantive Knowledge
Rocks are natural materials that make up the Earth's surface.
There are different types of rocks such as igneous, sedimentary, and metamorphic.
Procedural Knowledge
Observe and describe different rock samples.
Sort rocks based on simple properties like colour, texture, and hardness.
Vocabulary
rock, natural, igneous, sedimentary, metamorphic, texture, hard, soft, rough, smooth
Greater Depth
Explain the formation process of each rock type in simple terms.
Compare and contrast different rock types with examples.

Lesson 2: Properties of Rocks

Substantive Knowledge
Rocks have properties such as hardness, permeability (whether water passes through), and durability.
These properties determine how rocks are used.
Procedural Knowledge
Test rocks for hardness using simple scratch tests.
Observe water absorption to test permeability.
Vocabulary
hardness, permeability, durable, absorb, scratch, test, observe, property, water, rock
Greater Depth
Design an experiment to compare rock properties fairly.
Discuss how properties affect the choice of rock for buildings or tools.

Lesson 3: Uses of Rocks

Substantive Knowledge
Different rocks are used for different purposes based on their properties.
Granite and limestone are common building materials.
Procedural Knowledge
Match rocks to their common uses.
Investigate rocks used in the local environment or buildings.

Vocabulary
use, building, material, granite, limestone, construction, strong, soft, natural, man-made
Greater Depth
Research how rock use has changed over time.
Suggest new uses for rocks based on their properties.

Lesson 4: Fossils and How They Form

Substantive Knowledge
Fossils are the remains or impressions of prehistoric plants and animals preserved in rock.
Fossils provide evidence about life millions of years ago.
Procedural Knowledge
Examine images or models of fossils.
Discuss how fossils form.
Vocabulary
fossil, imprint, remains, prehistoric, evidence, rock, plant, animal, preserve, ancient
Greater Depth
Create a model to demonstrate fossil formation.
Explain how fossils help scientists learn about the past.

Lesson 5: Soil and What It Contains

Substantive Knowledge
Soil is made from broken-down rock and organic matter (dead plants and animals).
Different soils have different textures and uses.
Procedural Knowledge
Observe and compare different soil samples.
Separate soil into components.
Vocabulary
soil, organic, rock, sand, clay, texture, component, compare, observe, sample
Greater Depth
Investigate how soil type affects plant growth.
Explain the importance of soil conservation.

Lesson 6: Investigating Rocks and Soil

Substantive Knowledge
Rocks and soils vary widely and have specific uses and characteristics.
Scientific investigation helps classify and understand them.
Procedural Knowledge
Plan and carry out a practical investigation testing rock or soil properties.
Record and interpret findings.
Vocabulary
investigation, classify, record, test, compare, rock, soil, property, sample, data

Greater Depth
Propose improvements to the investigation.
Present findings clearly using diagrams or written explanations.

🐾 Year 3 – Animals Including Humans

Lesson 1: Skeletons and Muscles

Substantive Knowledge
Animals (including humans) have skeletons that support and protect their bodies.
Muscles help animals move by contracting and relaxing.
Procedural Knowledge
Identify and name major bones and muscles in the human body.
Explore how muscles work by simple experiments (e.g. bending the arm).
Vocabulary
skeleton, muscle, bone, support, protect, movement, joint, contract, relax, tendons
Greater Depth
Explain how muscles and bones work together for movement.
Compare the skeletons of different animals.

Lesson 2: Functions of the Skeleton

Substantive Knowledge
The skeleton provides structure, protects organs, and allows movement.
Different bones have different shapes and functions.
Procedural Knowledge
Investigate the functions of the skeleton through models or diagrams.
Identify bones that protect vital organs.
Vocabulary
structure, protect, organ, movement, skull, ribs, spine, function, support, joint
Greater Depth
Describe how injuries to different bones affect movement.
Research skeletons of animals with different functions (e.g. birds, fish).

Lesson 3: Types of Joints

Substantive Knowledge
There are different types of joints: hinge, ball-and-socket, pivot.
Joints allow movement in different ways.
Procedural Knowledge
Identify different joints on the human body.
Compare joint movement by practical activities.
Vocabulary
joint, hinge, ball-and-socket, pivot, movement, bend, rotate, flexibility, connect, bone
Greater Depth
Explain why some joints allow more movement than others.
Investigate joint injuries and how they affect mobility.

Lesson 4: Nutrition and the Digestive System

Substantive Knowledge
Humans need nutrients from food to grow and stay healthy.
The digestive system breaks down food into nutrients the body can use.
Procedural Knowledge
Label parts of the digestive system.
Describe the journey of food through the digestive system.
Vocabulary
nutrition, nutrient, digestion, stomach, intestines, mouth, esophagus, absorb, enzyme, food
Greater Depth
Describe the role of enzymes in digestion.
Compare human digestion to that of other animals.

Lesson 5: Teeth and Their Functions

Substantive Knowledge
Humans have different types of teeth: incisors, canines, molars.
Teeth have specific functions like biting, tearing, and grinding.
Procedural Knowledge
Identify different teeth types and their functions.
Investigate how teeth help in eating different foods.
Vocabulary
incisor, canine, molar, tooth, bite, tear, grind, enamel, chew, function
Greater Depth
Explore tooth decay and how to prevent it.
Compare human teeth with those of carnivores and herbivores.

Lesson 6: Keeping Teeth Healthy

Substantive Knowledge
Good dental hygiene is important to keep teeth healthy.
Brushing teeth regularly and avoiding sugary foods helps prevent decay.
Procedural Knowledge
Explore ways to keep teeth healthy.
Plan a routine for dental care.
Vocabulary
hygiene, brush, decay, cavity, sugar, healthy, plaque, prevent, routine, dentist
Greater Depth
Investigate the effects of diet on dental health.
Design a poster promoting good dental hygiene.

Year 3 – Plants

Lesson 1: Functions of Plant Parts

Substantive Knowledge

Plants have roots, stems, leaves, and flowers, each with specific functions.
Roots absorb water and nutrients; stems support the plant and transport fluids; leaves make food through photosynthesis; flowers help reproduction.

Procedural Knowledge

Identify and label plant parts.
Observe and describe the function of each part.

Vocabulary

root, stem, leaf, flower, absorb, support, transport, nutrients, photosynthesis, reproduction

Greater Depth

Explain how roots and stems work together to support growth.
Investigate how leaf structure aids photosynthesis.

Lesson 2: Plant Life Cycle

Substantive Knowledge

Plants go through a life cycle: seed, germination, growth, flowering, pollination, seed dispersal.
Each stage is important for reproduction.

Procedural Knowledge

Sequence the stages of the plant life cycle.
Observe or diagram each stage.

Vocabulary

life cycle, seed, germination, growth, flowering, pollination, seed dispersal, reproduce, stage, cycle

Greater Depth

Compare life cycles of different plants.
Explain the importance of seed dispersal methods.

Lesson 3: Pollination

Substantive Knowledge

Pollination is the transfer of pollen from one flower to another, enabling fertilisation.
Pollinators include bees, butterflies, and wind.

Procedural Knowledge

Identify parts of the flower involved in pollination.
Investigate pollination methods.

Vocabulary

pollination, pollen, fertilisation, stamen, pistil, pollinator, bee, butterfly, wind, flower

Greater Depth

Explore how flower structure attracts pollinators.
Design a flower adapted to a specific pollinator.

Lesson 4: Seed Dispersal

Substantive Knowledge
Seeds are dispersed in different ways: by wind, animals, water, or bursting.
Seed dispersal helps plants spread and survive.
Procedural Knowledge
Identify seed dispersal methods.
Classify seeds by their dispersal type.
Vocabulary
seed dispersal, wind, animal, water, burst, spread, survive, seed, method, classify
Greater Depth
Investigate seeds from local plants.
Explain advantages of each dispersal method.

Lesson 5: Photosynthesis

Substantive Knowledge
Photosynthesis is how plants make food using sunlight, water, and carbon dioxide.
Chlorophyll in leaves absorbs light.
Procedural Knowledge
Explain photosynthesis in simple terms.
Observe leaves and identify parts involved.
Vocabulary
photosynthesis, chlorophyll, sunlight, water, carbon dioxide, food, leaf, energy, process, plant
Greater Depth
Investigate how light intensity affects photosynthesis.
Model the photosynthesis process.

Lesson 6: Plant Adaptations

Substantive Knowledge
Plants adapt to their environment to survive (e.g., cactus spines, water lilies' floating leaves).
Adaptations help plants get water, nutrients, or reproduce.
Procedural Knowledge
Observe and describe plant adaptations.
Compare plants from different habitats.
Vocabulary
adaptation, survive, environment, cactus, spines, water lily, habitat, nutrient, reproduce, feature
Greater Depth
Explain how specific adaptations benefit the plant.
Design a plant adapted to a particular environment.

Year 3 – Forces and Magnets

Lesson 1: What Is a Force?

Substantive Knowledge
A force is a push or a pull that can make objects move, stop, or change direction.
Forces can act through contact or at a distance.
Procedural Knowledge
Identify pushes and pulls in everyday life.
Describe effects of forces on motion.
Vocabulary
force, push, pull, movement, contact, distance, change, direction, stop, start
Greater Depth
Explain how forces act in pairs (action and reaction).
Investigate forces in sports or playground activities.

Lesson 2: Magnetic Forces

Substantive Knowledge
Magnets exert a force that can attract or repel certain materials like iron and steel.
Magnetic forces can act without contact.
Procedural Knowledge
Test materials to see if they are magnetic.
Observe attraction and repulsion between magnets.
Vocabulary
magnet, magnetic force, attract, repel, iron, steel, magnetic, material, contact, distance
Greater Depth
Explain magnetic poles and how they interact.
Design experiments to test magnetic strength.

Lesson 3: Magnetic Poles

Substantive Knowledge
Magnets have two poles: north and south.
Opposite poles attract; like poles repel.
Procedural Knowledge
Identify poles on magnets.
Experiment with attraction and repulsion.
Vocabulary
pole, north, south, attract, repel, magnet, force, opposite, like, interaction
Greater Depth
Investigate the strength of attraction at different distances.
Explore Earth's magnetic field basics.

Lesson 4: Magnetic Materials

Substantive Knowledge
Only certain materials (mostly metals) are magnetic.
Non-magnetic materials do not respond to magnets.
Procedural Knowledge
Sort materials into magnetic and non-magnetic groups.
Test household items for magnetism.
Vocabulary
magnetic, non-magnetic, metal, material, test, attract, repel, magnet, iron, steel
Greater Depth
Explain why some metals are magnetic and others aren't.
Investigate alloys and their magnetic properties.

Lesson 5: Friction

Substantive Knowledge
Friction is a force that slows down movement between two surfaces in contact.
Rough surfaces create more friction; smooth surfaces create less.
Procedural Knowledge
Test how different surfaces affect friction.
Observe effects of friction on moving objects.
Vocabulary
friction, force, movement, surface, rough, smooth, slow, contact, resistance, texture
Greater Depth
Explain how friction is useful and when it is a problem.
Design an experiment to measure friction forces.

Lesson 6: Forces in Action

Substantive Knowledge
Forces act in everyday activities like walking, cycling, and driving.
Multiple forces can act on an object simultaneously.
Procedural Knowledge
Observe and describe forces in common scenarios.
Record and explain force effects.
Vocabulary
force, action, reaction, movement, balance, push, pull, stop, start, friction
Greater Depth
Analyse complex force interactions in sports or machines.
Model forces acting on an object and predict outcomes.

💡 Year 3 Science – Light

Lesson 1: What Is Light?

Substantive Knowledge
Light is a form of energy that allows us to see.

Light comes from a source such as the sun or a lamp.
Darkness is the absence of light.
Procedural Knowledge
Identify and group light sources.
Describe situations where light is and isn't present.
Vocabulary
light, source, dark, see, sunlight, energy, torch, lamp, candle, brightness
Greater Depth
Classify objects as sources or reflectors of light.
Explain how we see objects that do not produce light.

Lesson 2: Reflective Materials

Substantive Knowledge
Some materials reflect light better than others.
Smooth, shiny surfaces are good reflectors of light.
Reflection helps us see objects that are not light sources.
Procedural Knowledge
Test and compare how well different materials reflect light.
Record results in a simple table or chart.
Vocabulary
reflect, reflection, shiny, dull, mirror, surface, material, bounce, direction, light
Greater Depth
Predict which materials will be most reflective and justify.
Apply understanding to design a reflective object (e.g. book bag or safety gear).

Lesson 3: Mirrors and Reflections

Substantive Knowledge
Mirrors reflect light to show an image.
Reflected images appear reversed.
Light bounces off a mirror at the same angle it hits it.
Procedural Knowledge
Use mirrors to observe reflections.
Experiment with mirror angles and reflected light paths.
Vocabulary
mirror, reflection, image, reversed, bounce, angle, reflect, light, surface, position
Greater Depth
Create a periscope or mirrored maze and explain how it works.
Explore how reflection is used in everyday life (e.g. rear-view mirrors, sunglasses).

Lesson 4: Sun Safety

Substantive Knowledge
The sun is a powerful source of light and heat.
Sunlight can damage eyes and skin.
Protection (e.g. sunglasses, sunscreen) is necessary.

Procedural Knowledge
Identify safe and unsafe sun behaviours.
Create informative posters or presentations about sun safety.
Vocabulary
sun, UV, skin, eye, damage, protection, sunglasses, sunscreen, safety, harmful
Greater Depth
Research UV light and its effects on living things.
Compare sun safety in different countries or environments.

Lesson 5: Shadows
Substantive Knowledge
Shadows form when an object blocks light.
Shadows are always formed on the side away from the light source.
Only opaque objects make clear shadows.
Procedural Knowledge
Observe and draw shadows cast by objects.
Describe how changing light position changes the shadow.
Vocabulary
shadow, block, opaque, translucent, transparent, shape, object, direction, light, cast
Greater Depth
Predict and explain shadow size and shape based on light source position.
Explore how shadows change throughout the day (link to Earth's rotation).

Lesson 6: Changing Shadows
Substantive Knowledge
The size and shape of a shadow depends on the distance and angle of the light source.
Moving the object or light changes the shadow.
Procedural Knowledge
Measure shadow length and record changes.
Investigate what happens when you move the object or light source.
Vocabulary
shadow, size, distance, angle, light source, shape, change, longer, shorter, closer
Greater Depth
Create a scientific explanation linking light, object, and shadow size.
Investigate how shadow length can be used to tell time (e.g. sundials).

🧪 Year 3 – *Scientists and Inventors* (Twinkl PlanIt)

Lesson 1: Marie Curie and Radiation
Substantive Knowledge
Marie Curie discovered radioactive elements and pioneered cancer treatments.
Radiation can be both harmful and helpful in medicine.
Procedural Knowledge
Explore how scientific discoveries can help in real-life contexts.

Discuss safety when handling materials (conceptually—not practically at this age).

Vocabulary

radiation, element, discovery, medicine, cancer, science, research, Nobel Prize, chemist, laboratory

Greater Depth

Create an illustrated timeline of Curie's discoveries.
Reflect: How did Marie Curie show bravery in her work?

Lesson 2: Alexander Fleming and Penicillin

Substantive Knowledge

Alexander Fleming discovered penicillin, the first antibiotic.
Penicillin helps fight bacterial infections.

Procedural Knowledge

Understand what bacteria are and how antibiotics work.
Compare pre- and post-antibiotic medical care.

Vocabulary

penicillin, bacteria, infection, medicine, mould, discovery, antibiotic, health, treatment, scientist

Greater Depth

Write a newspaper article from the time of Fleming's discovery.
Debate: Should people always use antibiotics when they are ill?

Lesson 3: Inge Lehmann and the Earth's Core

Substantive Knowledge

Inge Lehmann discovered that Earth has a solid inner core.
Seismic waves helped scientists learn about Earth's layers.

Procedural Knowledge

Model or draw Earth's layers.
Learn how scientists use clues to understand things they cannot see directly.

Vocabulary

core, mantle, crust, seismic, wave, Earth, solid, layer, earthquake, geologist

Greater Depth

Explain how scientists can make discoveries without seeing something directly.
Create a cross-section of the Earth and label it with facts.

Lesson 4: William Smith and Fossils

Substantive Knowledge

William Smith used fossils to map rocks and geological layers.
Fossils are preserved remains of ancient life and help us understand Earth's history.

Procedural Knowledge

Compare fossils and classify different rock layers.
Use observation and recording to draw fossil impressions.

Vocabulary
fossil, rock, layers, strata, map, history, palaeontology, preserved, sediment, discovery
Greater Depth
Explain how fossils can help date the rocks they are found in.
Design your own fossil and explain what it might tell scientists.

Lesson 5: Garrett Morgan – Traffic Lights and Gas Mask

Substantive Knowledge
Garrett Morgan invented life-saving equipment including the gas mask and traffic light.
His inventions addressed real problems and helped save lives.
Procedural Knowledge
Identify problems and design a solution.
Explore how inventions improve safety in everyday life.
Vocabulary
invention, traffic, light, gas, mask, safety, protect, solution, emergency, improve
Greater Depth
Invent a modern safety device and explain how it works.
Research: How did Morgan's background influence his inventions?

Lesson 6: Invention Challenge

Substantive Knowledge
Scientific and engineering thinking helps solve everyday problems.
Inventions often go through a design–test–improve process.
Procedural Knowledge
Generate a design idea to solve a real-world problem.
Plan, test, and present a working model or concept.
Vocabulary
design, invent, test, improve, problem, solution, create, build, model, present
Greater Depth
Document the invention journey from problem to solution.
Reflect: What would you improve next if you had more time or materials?

SCIENCE

Substantive and Procedural Knowledge

YEAR 4

Electricity

Lesson 1: What Is Electricity?

Substantive Knowledge
Electricity is a form of energy that powers many devices.
It can flow through conductors and cannot flow through insulators.
Procedural Knowledge
Identify appliances that use electricity.
Distinguish between electrical conductors and insulators.
Vocabulary
electricity, energy, conductor, insulator, power, flow, circuit, appliance, battery, switch
Greater Depth
Explain the flow of electricity in a circuit using simple terms.
Explore how conductors and insulators are used in everyday objects.

Lesson 2: Circuits and Their Components

Substantive Knowledge
An electrical circuit is a complete path for electricity to flow.
Circuits have components like batteries, bulbs, switches, and wires.
Procedural Knowledge
Identify and label parts of a circuit.
Assemble simple circuits using batteries and bulbs.
Vocabulary
circuit, battery, bulb, wire, switch, component, connect, flow, electricity, complete
Greater Depth
Construct circuits with multiple components (e.g., two bulbs).
Predict what happens if a component is removed or added.

Lesson 3: What Makes a Circuit Work?

Substantive Knowledge
For a circuit to work, it must be complete (closed).
An open circuit breaks the flow of electricity.
Procedural Knowledge
Test circuits to see if they are complete or incomplete.
Use switches to open and close circuits.

Vocabulary
complete, closed, open, circuit, switch, electricity, flow, power, break, connect
Greater Depth
Investigate different ways to open or close a circuit.
Explain the role of switches in controlling circuits.

Lesson 4: Conductors and Insulators

Substantive Knowledge
Materials can be conductors (allow electricity) or insulators (block electricity).
Metals are usually good conductors; plastic and rubber are insulators.
Procedural Knowledge
Test a range of materials for conductivity.
Classify materials as conductors or insulators.
Vocabulary
conductor, insulator, electricity, metal, plastic, rubber, test, material, flow, block
Greater Depth
Explain why metals conduct electricity and others do not.
Explore practical uses of insulators in electrical safety.

Lesson 5: Creating Simple Circuits

Substantive Knowledge
Simple circuits can be created using batteries, bulbs, wires, and switches.
Correct connections are necessary for the circuit to work.
Procedural Knowledge
Build a simple circuit to light a bulb.
Troubleshoot circuits that don't work.
Vocabulary
build, circuit, battery, bulb, wire, switch, connect, electricity, flow, troubleshoot
Greater Depth
Experiment with adding components to circuits (e.g., more bulbs).
Explain why some circuit configurations work and others don't.

Lesson 6: Safety with Electricity

Substantive Knowledge
Electricity can be dangerous if not handled properly.
Safety rules include not touching wires and using appliances correctly.
Procedural Knowledge
Discuss and list electricity safety rules.
Identify safe and unsafe electrical situations.
Vocabulary
safety, electricity, dangerous, wire, appliance, rule, touch, protect, risk, handle
Greater Depth
Explain the purpose of safety devices like fuses and circuit breakers.
Investigate how electricity safety is maintained in homes.

States of Matter

Lesson 1: Solids, Liquids, and Gases

Substantive Knowledge
Matter exists in three main states: solid, liquid, and gas.
Solids keep their shape, liquids take the shape of their container, gases spread out.
Procedural Knowledge
Identify examples of solids, liquids, and gases.
Describe properties of each state.
Vocabulary
solid, liquid, gas, shape, volume, matter, container, spread, particle, state
Greater Depth
Explain how particles behave differently in each state.
Compare states of matter in different materials.

Lesson 2: Changing States

Substantive Knowledge
Matter can change state through heating or cooling.
Changes include melting, freezing, evaporating, condensing, and sublimation.
Procedural Knowledge
Observe and describe changes in states of matter.
Record temperatures when changes happen.
Vocabulary
melting, freezing, evaporating, condensing, sublimation, temperature, heat, cool, change, state
Greater Depth
Explain energy transfer during state changes.
Investigate real-life examples of state changes.

Lesson 3: The Water Cycle

Substantive Knowledge
Water moves through the environment via evaporation, condensation, precipitation, and collection.
The water cycle is continuous.
Procedural Knowledge
Describe stages of the water cycle.
Create diagrams or models of the water cycle.
Vocabulary
water cycle, evaporation, condensation, precipitation, collection, water, cloud, rain, sun, cycle
Greater Depth
Explain the role of the sun in driving the water cycle.
Discuss how the water cycle affects weather.

Lesson 4: Measuring Temperature

Substantive Knowledge
Temperature affects the state of matter.
Thermometers measure temperature in degrees Celsius.
Procedural Knowledge
Use thermometers to measure temperature.
Record and interpret temperature data.
Vocabulary
temperature, thermometer, degrees Celsius, measure, heat, cold, change, record, data, scale
Greater Depth
Compare temperature changes during the day.
Investigate temperature changes in different environments.

Lesson 5: Particle Model of Matter

Substantive Knowledge
Matter is made up of tiny particles that behave differently in solids, liquids, and gases.
Particles in solids are tightly packed; in liquids, they move more freely; in gases, they move fast and spread out.
Procedural Knowledge
Model particle arrangements for each state.
Explain observations using the particle model.
Vocabulary
particle, model, matter, solid, liquid, gas, movement, arrangement, space, behaviour
Greater Depth
Use particle theory to explain diffusion and pressure.
Compare the particle model with real materials.

Lesson 6: Investigating Changes of State

Substantive Knowledge
Heat causes matter to change state by affecting particle movement.
Cooling reverses changes.
Procedural Knowledge
Conduct experiments to observe melting and freezing.
Record times and temperatures for changes.
Vocabulary
heat, cool, melting, freezing, experiment, observe, record, state, change, temperature
Greater Depth
Investigate factors that affect the rate of melting/freezing.
Explain results using particle theory.

Sound

Lesson 1: What Is Sound?

Substantive Knowledge
Sound is produced by vibrations.
Vibrations travel through air to the ear.
Procedural Knowledge
Identify sources of sound.
Observe vibrations causing sound.
Vocabulary
sound, vibration, ear, source, travel, wave, pitch, volume, medium, noise
Greater Depth
Explain how vibrations differ for loud and soft sounds.
Explore sound travel in solids, liquids, and gases.

Lesson 2: How Sound Travels

Substantive Knowledge
Sound travels in waves through air and other materials.
It cannot travel through a vacuum.
Procedural Knowledge
Explore how sound travels through different materials.
Test sound transmission using various substances.
Vocabulary
sound wave, travel, air, material, vacuum, medium, transmit, pitch, volume, echo
Greater Depth
Investigate speed of sound in different media.
Explain why sound cannot travel through space.

Lesson 3: Pitch and Volume

Substantive Knowledge
Pitch is how high or low a sound is.
Volume is how loud or quiet a sound is.
Procedural Knowledge
Investigate sounds with different pitch and volume.
Use instruments or objects to change pitch/volume.
Vocabulary
pitch, volume, high, low, loud, quiet, vibration, frequency, wave, sound
Greater Depth
Explain the relationship between vibration frequency and pitch.
Explore how instruments produce different sounds.

Lesson 4: Investigating Sound

Substantive Knowledge
Different materials and distances affect how sound is heard.

Sound can be absorbed, reflected, or blocked.
Procedural Knowledge
Conduct experiments to test sound absorption and reflection.
Measure how sound changes with distance.
Vocabulary
absorb, reflect, block, distance, soundproof, echo, wave, material, vibration, hearing
Greater Depth
Design experiments to test soundproofing materials.
Explain results using sound wave concepts.

Lesson 5: How We Hear
Substantive Knowledge
The ear detects vibrations and sends signals to the brain.
Different parts of the ear help capture and process sound.
Procedural Knowledge
Label parts of the ear.
Explain the hearing process in simple terms.
Vocabulary
ear, vibration, eardrum, cochlea, auditory nerve, brain, sound, hearing, signal, process
Greater Depth
Describe functions of inner, middle, and outer ear.
Explore hearing impairments and prevention.

Lesson 6: Protecting Our Hearing
Substantive Knowledge
Loud noises can damage hearing.
Protection like earplugs can prevent damage.
Procedural Knowledge
Identify loud sounds that could be harmful.
Discuss ways to protect hearing.
Vocabulary
hearing, damage, loud, noise, protect, earplug, prevention, safe, sound, health
Greater Depth
Investigate the effects of long-term noise exposure.
Promote hearing health through awareness campaigns.

Living Things and Their Habitats
Lesson 1: Classifying Living Things
Substantive Knowledge
Living things can be classified into groups such as plants, animals, fungi, bacteria.
Classification helps organise and understand biodiversity.
Procedural Knowledge
Use classification keys to group living things.

Identify features used for classification.
Vocabulary
classify, living thing, plant, animal, fungi, bacteria, group, feature, biodiversity, kingdom
Greater Depth
Create own classification keys.
Discuss challenges of classification.

Lesson 2: Habitats and Microhabitats
Substantive Knowledge
A habitat is where an organism lives.
Microhabitats are small, specific environments within habitats.
Procedural Knowledge
Identify habitats and microhabitats in local areas.
Describe conditions in different habitats.
Vocabulary
habitat, microhabitat, environment, organism, shelter, food, water, soil, community, ecosystem
Greater Depth
Investigate microhabitats in school grounds.
Discuss how organisms adapt to habitats.

Lesson 3: Food Chains and Webs
Substantive Knowledge
Food chains show how energy flows from one organism to another.
Producers, consumers, and predators play different roles.
Procedural Knowledge
Construct simple food chains.
Identify producers and consumers.
Vocabulary
food chain, producer, consumer, predator, prey, energy, herbivore, carnivore, omnivore, ecosystem
Greater Depth
Explore food webs showing complex feeding relationships.
Investigate effects of removing an organism.

Lesson 4: Adaptations
Substantive Knowledge
Living things have adaptations that help them survive in their habitats.
Adaptations can be structural, behavioural, or functional.
Procedural Knowledge
Observe and describe adaptations in local species.
Classify types of adaptations.

Vocabulary
adaptation, survive, structural, behavioural, functional, habitat, environment, feature, characteristic, change
Greater Depth
Research extreme adaptations in animals/plants.
Discuss evolution and natural selection basics.

Lesson 5: Investigating Habitats
Substantive Knowledge
Different habitats support different communities of organisms.
Environmental factors affect habitats.
Procedural Knowledge
Carry out fieldwork to explore local habitats.
Record and analyse findings.
Vocabulary
habitat, community, environment, fieldwork, record, analyse, survey, soil, water, light
Greater Depth
Compare habitats from different regions.
Suggest ways to protect habitats.

Lesson 6: Human Impact on Habitats
Substantive Knowledge
Human activities can damage or protect habitats.
Conservation helps maintain biodiversity.
Procedural Knowledge
Identify positive and negative human impacts.
Discuss conservation methods.
Vocabulary
impact, conservation, pollution, habitat loss, biodiversity, protect, damage, human, environment, change
Greater Depth
Research local conservation projects.
Propose actions to improve local habitats.

🧠 Year 4 Science – Animals Including Humans

Lesson 1: The Digestive System
Substantive Knowledge
The digestive system breaks down food so the body can absorb nutrients.
Key organs include the mouth, oesophagus, stomach, intestines.
Procedural Knowledge
Label the parts of the digestive system.
Sequence the journey of food through the body.

Vocabulary
digest, digestion, oesophagus, stomach, intestine, nutrients, organ, system, mouth, waste
Greater Depth
Explain what happens to food at each stage of digestion.
Compare the human digestive system to that of another animal.

Lesson 2: Functions of the Digestive System

Substantive Knowledge
Each part of the digestive system has a specific function (e.g., the stomach breaks food down with acid).
Nutrients are absorbed in the small intestine.
Procedural Knowledge
Match organs to their functions.
Use diagrams to show processes.
Vocabulary
function, breakdown, absorption, acid, small intestine, large intestine, faeces, saliva, enzymes, waste
Greater Depth
Describe how different organs work together.
Predict what would happen if one organ didn't function properly.

Lesson 3: Different Types of Teeth

Substantive Knowledge
Humans have different types of teeth: incisors, canines, premolars, and molars.
Each tooth type has a specific role in eating.
Procedural Knowledge
Identify and name different types of teeth.
Compare tooth shapes and match them to functions.
Vocabulary
tooth, teeth, incisor, canine, molar, chew, bite, grind, tear, function
Greater Depth
Compare human teeth to those of herbivores, carnivores, and omnivores.
Explain how diet affects tooth structure.

Lesson 4: Tooth Decay

Substantive Knowledge
Tooth decay is caused by sugar and poor dental hygiene.
Acid from plaque damages teeth over time.
Procedural Knowledge
Plan a fair test to observe how different drinks affect egg shells (to simulate teeth).
Record and explain results.
Vocabulary
decay, sugar, plaque, enamel, acid, cavity, bacteria, healthy, test, fair

Greater Depth
Suggest ways to reduce tooth decay based on test results.
Explain why enamel is important and how to protect it.

Lesson 5: Food Chains
Substantive Knowledge
A food chain shows how energy moves through living things.
Producers (plants) start food chains, followed by consumers (herbivores, carnivores).
Procedural Knowledge
Create simple food chains using arrows to show energy transfer.
Identify producers, consumers, and predators.
Vocabulary
food chain, producer, consumer, predator, prey, energy, herbivore, carnivore, omnivore, source
Greater Depth
Explain the impact of removing one part of a food chain.
Create more complex food webs and explain interconnections.

Lesson 6: Human Teeth Investigation & Recap
Substantive Knowledge
Humans have a full set of teeth by around age 12.
Teeth must be cared for to stay healthy and functional.
Procedural Knowledge
Carry out and record an investigation into sugar and dental health (e.g., egg shell experiment).
Recap key learning and apply to real-life scenarios.
Vocabulary
investigation, plan, results, conclusion, recap, observe, measure, damage, tooth, sugar
Greater Depth
Reflect on the investigation process and suggest improvements.
Make links between diet, digestion, and overall health.

Year 4 – *Scientists and Inventors* (Twinkl PlanIt)

Lesson 1: Ibn al-Haytham – Light and Vision
Substantive Knowledge
Ibn al-Haytham was a pioneering scientist who studied light and how we see.
He discovered that light travels in straight lines and reflects off objects into our eyes.
Procedural Knowledge
Investigate how light travels.
Model reflection using mirrors.
Vocabulary
light, reflection, straight, travel, mirror, see, eye, scientist, vision, discovery

Greater Depth
Design an investigation to prove that light travels in straight lines.
Explain how Ibn al-Haytham's ideas changed our understanding of sight.

Lesson 2: Thomas Edison – Electric Lightbulb

Substantive Knowledge
Thomas Edison improved and popularised the electric lightbulb.
His work led to the widespread use of electric light in homes and cities.
Procedural Knowledge
Identify components needed to make a bulb light up.
Build a simple circuit.
Vocabulary
bulb, circuit, electricity, wire, switch, filament, energy, invent, glow, power
Greater Depth
Create a poster comparing life before and after the electric bulb.
Design a new invention that uses light to solve a problem.

Lesson 3: Garrett Morgan – Safety Inventions

Substantive Knowledge
Garrett Morgan invented the gas mask and the three-way traffic signal.
His inventions aimed to improve public safety.
Procedural Knowledge
Discuss how inventions solve problems.
Create a labelled diagram of a safety device.
Vocabulary
invention, safety, traffic, mask, gas, protect, danger, idea, signal, emergency
Greater Depth
Invent a safety device for school and explain how it works.
Write a persuasive letter to a mayor about why your invention should be used.

Lesson 4: Eva Crane – Bees and Beekeeping

Substantive Knowledge
Eva Crane studied bees and promoted sustainable beekeeping.
Bees play a vital role in pollination and ecosystems.
Procedural Knowledge
Identify how bees contribute to plant reproduction.
Observe bee-friendly plants or habitats.
Vocabulary
bees, pollination, hive, nectar, flower, honey, insect, environment, study, keep
Greater Depth
Design a bee-friendly garden with explanations.
Research: What would happen if bees disappeared?

Lesson 5: Alexander Graham Bell – Telephone

Substantive Knowledge

Alexander Graham Bell invented the telephone, which transmits sound over distances.
His invention changed how humans communicate.

Procedural Knowledge

Explore how sound travels through vibrations.
Make a simple string telephone and test how sound moves.

Vocabulary

sound, vibration, communicate, phone, invention, voice, string, distance, hear, call

Greater Depth

Compare modern phones to Bell's telephone—how have they evolved?
Design a futuristic way to communicate and explain how it might work.

Lesson 6: Invention Challenge

Substantive Knowledge

Scientists and inventors solve problems creatively.
Designs often need testing and revising.

Procedural Knowledge

Plan, test, and improve a model invention.
Present your idea to an audience.

Vocabulary

design, invent, test, improve, model, present, build, create, idea, explain

Greater Depth

Document the invention process in a design journal.
Reflect: What real-world need does your invention address?