Nature Science Scope & Sequence

Kindergarten through Grade 3

Science · Technology · Engineering · Nature

Column Guide

Science Concepts Core science knowledge & vocabulary **Technology & Engineering** Hands-on builds, design challenges & tech connections **Nature & Outdoor Science** Outside investigations & nature journaling **Diverse Scientists & Voices** Scientists, inventors & knowledge-keepers from all backgrounds

Curriculum Philosophy

This science curriculum is built on the belief that children are natural scientists — especially when learning happens outdoors, with their hands, and through questions that matter to them. Every unit integrates science concepts with technology and engineering design challenges, so students don't just learn about the world — they practice changing it. Nature journaling and outdoor investigation are not add-ons; they are the foundation. Diverse scientists, inventors, and Indigenous knowledge-keepers are woven throughout every unit, so every child sees themselves in science.

Kindergarten

Exploring Our Natural World — Noticing, Wondering & Discovering

Grade Theme: *Kindergarteners are natural scientists. This year is built around observation, curiosity, and asking questions. Children explore living things, weather, materials, and the sky — all through hands-on investigation and outdoor time. Engineering begins with simple building challenges using natural and everyday materials.*

Unit / Quarter	Science Concepts	Technology & Engineering	Nature & Outdoor Science	Diverse Scien
Q1 **Scientists & Engineers Ask Questions**	• What scientists and engineers do • Asking questions & making observations • Using our five senses as tools • Recording with drawings & symbols • Safety in science exploration	• Introduction to simple tools: magnifying glass, ruler, measuring cup • What is a tool? How does it help us? • Simple building: What makes a structure stand up? • Engineering design intro: Try → Observe → Improve	• Outdoor observation walks — what do we notice? • Keeping a nature journal with drawings • Seasonal changes outdoors • Using senses in nature (sounds, textures, smells)	• Scientists from around the world — diverse role models • Indigenous observation practices & ecological knowledge • African American scientists: Mae Jemison, Charles Drew (intro) • Women scientists: Jane Goodall, Rachel Carson

Q2 **Living Things: Plants & Animals**	• What makes something living vs. nonliving • Basic needs of living things (water, air, food, shelter) • Parts of a plant & their functions • Animals and their habitats • Life cycles: seed → plant, egg → animal	• Design & build a birdhouse or bug hotel from natural materials • Plant a seed — observe, measure, record growth • Engineering challenge: design a habitat for a classroom creature • Simple tools for gardening: what does each tool do?	• Planting a classroom or outdoor garden • Observing insects, birds, worms outdoors • Pressing leaves & identifying local plants • Nature scavenger hunt: find living & nonliving things	• Indigenous plant knowledge & traditional farming (Three Sisters) • African American botanist George Washington Carver • Scientists who study animals: Jane Goodall, Dian Fossey • Traditional ecological knowledge from global cultures
Q3 **Weather, Sky & Seasons**	• Types of weather: sun, rain, wind, snow, clouds • Weather patterns & prediction • The four seasons and how they affect living things • Sun, moon & stars — basic patterns • Day and night cycle	• Build a simple weather station: rain gauge, wind vane, thermometer • Engineering challenge: design an umbrella or rain shelter • Design a piece of clothing for specific weather • Technology: how do meteorologists predict weather?	• Daily weather journaling outdoors • Cloud identification in real time • Shadow play: tracking the sun's position • Seasonal nature walks — documenting change over time	• Indigenous weather knowledge & seasonal calendars • Weather scientists from diverse backgrounds • How different cultures around the world adapt to weather • West African and Indigenous farming tied to seasonal weather patterns
Q4 **Materials & Matter: What Is Everything Made Of?**	• Properties of materials: hard/soft, rough/smooth, heavy/light • Solids, liquids & gases (introductory) • How materials change: heating, cooling, mixing • Choosing materials for a purpose	• Engineering design challenge: build the strongest bridge using blocks, sticks, or cardboard • Test different materials for waterproofing • Design & build a boat that floats — test with different loads • Explore: what happens when we mix materials? (Cooking as chemistry)	• Exploring natural materials: rocks, wood, clay, water, leaves • Making natural dyes or paints from plants • Mud bricks: ancient engineering with natural materials • Outdoor materials scavenger hunt	• Ancient engineering: mud brick homes in Africa & the Middle East • Indigenous use of natural materials for tools, clothing & shelter • African American inventors: Granville Woods, Lewis Howard Latimer • Materials science innovators from around the world

1st Grade

Forces, Light, Sound & the Living World

Grade Theme: *First graders begin to explore cause and effect — what makes things move, what makes sound, how light behaves, and how living things grow and change. Engineering challenges become more structured as students learn the design process. Outdoor science and nature connections are woven throughout every unit.*

Unit / Quarter	Science Concepts	Technology & Engineering	Nature & Outdoor Science	Diverse

Q1 **Forces & Motion: Pushes, Pulls & How Things Move**	• Pushes and pulls change motion • Speed, direction & distance • Gravity: why things fall • Friction: surfaces affect motion • Simple machines: ramps, levers, wheels & axles	• Build a ramp: test how angle affects speed & distance • Design a marble run or ball track • Engineering challenge: design a vehicle that travels the farthest • Explore: simple machines found in everyday tools • Technology: how do engineers use forces to design cars, bridges & playgrounds?	• Observe forces in nature: wind, water, gravity (leaves falling, rivers flowing) • Roll objects down hills outdoors • Water flow experiments in a stream or with a hose • Examine how animals use force (birds pushing off branches, dogs digging)	• Indigenous engineering: canoes, tools & structures using natural forces • Ancient African engineering: pyramids, aqueducts, bridges • Modern engineers from diverse backgrounds • Aerospace engineer Mae Jemison — forces that get rockets to space
Q2 **Light & Shadow**	• Light sources: natural (sun) & artificial (bulbs) • Light travels in straight lines • Opaque, transparent & translucent materials • Shadows: how they form and change • Reflection & refraction basics	• Shadow puppet engineering: design & build a shadow puppet theater • Engineer a periscope from mirrors & cardboard • Test materials: which let light through? (Transparency testing) • Design a sundial • Technology: how do cameras, eyeglasses & telescopes use light?	• Shadow tracking: measure & record shadows at different times of day • Explore light in nature: how plants grow toward light (phototropism) • Create nature sun prints (cyanotype paper) • Observe light through leaves, water, prisms outdoors	• Shadow puppet traditions from Asia, Africa & Indonesia • Ancient Egyptian sundials & astronomy • Ibn al-Haytham: Arab scientist who first explained how eyes & light work • Indigenous uses of sunlight for timekeeping & agriculture
Q3 **Sound & Vibration**	• Sound is made by vibration • Sound travels through different materials • Pitch: high & low sounds • Volume: loud & soft • How ears detect sound • Animals & sound communication	• Build a string telephone — explore how sound travels • Design & build a musical instrument from recycled materials • Engineering challenge: design a sound barrier or echo chamber • Technology: how do speakers, microphones & hearing aids work? • Explore: how is digital sound recorded & played back?	• Listen walk: identify & record outdoor sounds • Animal sound observation — birds, insects, frogs • Make nature instruments: rain sticks, drums from gourds • Sound in water: explore how fish & whales communicate	• African drumming traditions & the science of rhythm • Indigenous flutes, drums & instruments — materials & construction • Evelyn Glennie: deaf percussionist who feels sound (disability & science) • Sound science in global musical traditions (gamelan, steel drums, djembe)

Q4 **Life Cycles & Habitats**	• Life cycles: butterfly, frog, plant, bird • What is a habitat? How do animals survive in theirs? • Food chains: producers, consumers, decomposers • Adaptations: how living things fit their environment • Seasons & animal behavior (migration, hibernation)	• Design & build a model habitat for a specific animal • Engineering challenge: create a terrarium or worm farm • Technology: how do scientists track animal migration? (GPS, radio tags) • Design a bird feeder and observe visitor data over time	• Raise butterflies or mealworms — observe full life cycle • Build & install a classroom bird feeder outdoors • Habitat walk: identify local plants & animals in their habitats • Seasonal observation journal: document changes over the year	• Indigenous knowledge of local animal habitats & seasonal patterns • African wildlife and ecosystem science • African American marine biologist Eugenie Clark • Wangari Maathai: reforestation & habitat restoration in Kenya

2nd Grade

Earth Science, Ecosystems & Properties of Matter

Grade Theme: *Second graders zoom out to study Earth — its rocks and soil, water cycle, and ecosystems. They explore matter more deeply, examining properties and how materials interact. Engineering design challenges increase in complexity, requiring students to plan, test, and redesign. Nature journaling and outdoor investigation remain central.*

Unit / Quarter	Science Concepts	Technology & Engineering	Nature & Outdoor Science	Diverse Scientists & Voices
Q1 **Rocks, Soil & Earth's Materials**	• Types of rocks: igneous, sedimentary, metamorphic (introductory) • Properties of rocks: color, texture, hardness, luster • Soil: what is it made of? Layers & composition • Fossils: evidence of past life • Erosion & weathering: how Earth's surface changes	• Rock & soil testing lab: hardness, absorption, sorting • Engineer a soil filter to clean muddy water • Design a model showing erosion prevention (terracing, roots) • Technology: how do geologists use tools to study rocks? (sonar, drilling) • Build a model landform: mountain, valley, river delta	• Rock collection & classification walk • Dig & examine soil layers outdoors • Make plaster fossil casts from shells or bones • Erosion observation: watch how rain moves soil • Compare soil from different outdoor locations	• Indigenous knowledge of land, soil & sustainable farming • African American geologist Marguerite Thomas Williams (first Black person to earn geology PhD in U.S.) • Ancient agricultural engineering: African terrace farming, Aztec chinampas • Traditional African & Indigenous pottery — clay as earth material

Q2 **The Water Cycle & Weather Systems**	• States of water: solid, liquid, gas • The water cycle: evaporation, condensation, precipitation • Types of clouds & what they tell us • How weather systems form • Water conservation & scarcity as a global issue	• Build a water cycle in a bag (sealed terrarium model) • Design a rain catchment system • Engineering challenge: build a water filter using sand, gravel & charcoal • Technology: how do satellites & weather radar work? • Design a drought-resistant garden plan	• Water cycle observation: puddle evaporation tracking • Cloud journaling: identify & sketch clouds daily • Stream or pond visit: observe water moving through landscape • Rain gauge data collection & graphing over weeks	• Indigenous water management: Hohokam canals, Aztec aqueducts, African fog catchers • The global water crisis — who is most affected? • Environmental justice: clean water access for all communities • African American environmental engineer: solving water problems (Flint, MI connection)
Q3 **Matter: Properties, Changes & Mixtures**	• Properties of matter: mass, volume, density, texture, color • Physical changes: cutting, folding, dissolving • Chemical changes: burning, cooking, rusting (observable) • Mixtures & solutions • States of matter & temperature effects	• Density tower lab: layering liquids by density • Engineering challenge: design a container that keeps ice from melting longest • Explore polymers: make slime, explore its properties • Technology: how do scientists use matter properties in materials science? • Design & test a package to protect a fragile object (egg drop style)	• Cooking as chemistry: observe physical & chemical changes in food • Explore natural mixtures: soil + water, sand + pebbles • Rust investigation: iron + water + air outdoors • Natural polymers: rubber from trees, silk from silkworms	• African American chemist Percy Julian — changing matter to save lives • Ancient African metallurgy: iron smelting in sub-Saharan Africa (oldest in the world) • Traditional dye-making & chemistry across world cultures • Marie Curie — matter, radioactivity & persistence

Q4 **Ecosystems & Interdependence**	• What is an ecosystem? • Biomes: rainforest, desert, grassland, ocean, tundra, forest • Food webs: complexity beyond food chains • Producers, consumers, decomposers — everyone's role matters • How ecosystems can be disrupted & how they recover	• Build a model ecosystem / biome diorama with research • Design a solution to an ecosystem problem (invasive species, pollution) • Technology: how do scientists use camera traps, drones & satellites to study ecosystems? • Engineering challenge: design a composting system for the classroom	• Local ecosystem walk: identify producers, consumers, decomposers • Build & tend a compost bin — observe decomposition • Biome research: compare local ecosystem to one on another continent • Observe & document a food web in the schoolyard or backyard	• African savanna & rainforest ecosystems — biodiversity hotspots • Indigenous land stewardship as ecosystem science • Wangari Maathai & the Green Belt Movement • Global South scientists studying biodiversity & conservation

3rd Grade

Forces of Nature, Life Science & Engineering Design

Grade Theme: *Third graders tackle more complex scientific concepts — heredity, ecosystems at depth, electricity, magnetism, and Earth's forces. Engineering design becomes a full process: students research, plan, build, test, and present. Connections between science, technology, and society are made explicit. Outdoor and nature-based learning anchors every unit.*

Unit / Quarter	Science Concepts	Technology & Engineering	Nature & Outdoor Science	Diverse Scientists & Voices
Q1 **Electricity & Magnetism**	• Static electricity: how charges build & release • Electric circuits: open, closed, series & parallel • Conductors & insulators • Magnets: poles, attraction, repulsion, magnetic fields • Electromagnetism: how electricity creates magnetism	• Build a simple circuit with battery, wire & bulb • Engineer a flashlight from basic components • Design a circuit with a switch • Build an electromagnet — test its strength with different coils • Technology: how do electric motors, generators & MRI machines work? • Coding intro: program a simple light sequence with a micro:bit or similar	• Static electricity in nature: lightning, fur, amber • Earth's magnetic field & animal navigation (birds, sea turtles) • Magnetite in rocks: natural magnets • Observe how compass needles respond to magnets outdoors	• Lewis Howard Latimer: improved electric light bulb (African American inventor) • Granville Woods: railway telegraph & electrical inventions • Otis Boykin: improved electrical resistor used in pacemakers • Marie Curie & electrical research • Ancient knowledge of magnetism: Chinese compass invention

Q2 **Heredity, Traits & Adaptations**	• Inherited vs. learned traits • Variation within a species • How adaptations help organisms survive • Natural selection basics (intro) • Plant & animal reproduction • How environments drive adaptation over time	• Technology: how do scientists use microscopes to study cells & traits? • Design a creature adapted to a specific imaginary environment (engineering meets life science) • Explore: how has selective breeding changed domestic plants & animals? • Data collection: measure & graph variation in leaf size, bean length, etc.	• Variation observation: collect & compare 20 leaves of the same species — no two alike • Grow plants in different conditions (light, water, soil) — observe variation in outcome • Animal adaptation research walk: how are local animals built for survival? • Bird beak lab: simulate different beak shapes & food types	• Indigenous seed-saving traditions & selective breeding knowledge • George Washington Carver: understanding plant traits & soil science • African biodiversity: Africa has more genetic diversity than any other continent • Women scientists in genetics: Barbara McClintock (corn genetics), Nettie Stevens
Q3 **Earth's Forces: Volcanoes, Earthquakes & Landforms**	• Earth's layers: crust, mantle, outer core, inner core • Tectonic plates & plate movement • Earthquakes: causes, waves & measurement • Volcanoes: types, eruptions & formation • How Earth's surface changes over time (fast vs. slow change)	• Build & erupt a model volcano (baking soda & vinegar — then explore more realistic chemical reactions) • Engineer an earthquake-proof structure: shake table testing • Technology: how do seismographs detect earthquakes? Build a simple model • Design challenge: engineer a building for an earthquake-prone city • Explore: how does technology help predict volcanic eruptions & save lives?	• Topographic map reading: how maps show Earth's landforms • Rock layers & erosion observation outdoors • Local landform study: how was this land shaped? • Earthquake preparedness: real-world application of science	• Ancient African geology: oldest rocks on Earth found in Africa • Indigenous knowledge of volcanic & earthquake activity • Scientist profile: volcanologist Jess Phoenix • How earthquake engineering matters most for vulnerable communities globally • Ring of Fire geography — Pacific nations & earthquake science

Q4 **Engineering Design Deep Dive: Solve a Real Problem**	• Review & integrate: matter, energy, forces, life science, Earth science • Science in society: how does science solve real problems? • Environmental science: pollution, conservation, sustainability • Energy sources: renewable vs. nonrenewable	• Full engineering design challenge: identify a real community or environmental problem → research → design → build → test → present • Explore renewable energy: build a simple solar oven or pinwheel wind turbine • Technology: coding & digital tools to collect & display scientific data • Design challenge options: water filter, solar cooker, earthquake shelter, pollinator garden, composting system • Present engineering solution to an audience (school exhibition style)	• Identify a local environmental problem to solve for the final project • Outdoor data collection in support of design challenge • Pollinator garden planning & planting • Year-end nature journal review: document a year of outdoor science	• Environmental justice: communities of color most impacted by pollution — science as advocacy • African American environmental scientists & activists • Indigenous environmental engineering solutions • Global young innovators: youth scientists solving local problems worldwide • Lonnie Johnson: African American inventor of the Super Soaker & energy innovator

Planning Notes

- Each unit spans approximately 4–6 weeks. Engineering challenges may extend across multiple weeks as students test and redesign.
- Nature journals should be ongoing throughout the year — not limited to the Nature & Outdoor Science column. Bring journals outside every week.
- Technology & Engineering challenges are designed to use low-cost or recycled materials. No specialized lab equipment is required.
- Diverse Scientists are highlighted in every unit — consider digging deeper with biographies, short videos, or read-alouds.
- This sequence pairs naturally with the Social Studies Scope & Sequence — science units can be connected to geographic and cultural regions studied in social studies.
- Assessment is best done through science notebooks, observation records, engineering reflection sheets, and project presentations rather than traditional tests.