Science and technology K-6 sample scope and sequence

## Term-based questions and content

### Stage 3

#### Term 1, odd year – material world (materials and changes in state)

In Term 1 students focus on the properties of a range of materials and the way in which materials can be combined and changed. They investigate the different properties of solids, liquids and gases, and consider combining and separating mixtures. This strand introduces students to fundamental concepts of chemistry and is an introduction to materials technologies.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SMaterial world: ST3-6MW-S | How can the state of materials be changed and manipulated? What is the result of combining materials? | Students will:* investigate and compare the properties of solids, liquids and gases
* explore that when materials are combined the result is either a mixture or a new substance
* identify that mixtures can be separated using different techniques.
 |

#### Term 2, odd year – living world (sustainable management of food and fibre production)

In Term 2 students focus on food and fibre production processes. They investigate how and why food and fibre are produced in sustainable, managed environments that enable people to grow and be healthy. This strand further develops their knowledge and understanding of the environmental and biological sciences. There are opportunities to integrate geography.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Design and production: ST3-2DP-TLiving world: ST3-5LW-T | Why is it important for food and/or fibre to be produced sustainably? | Students will:* explore examples of managed environments used to produce food and fibre
* investigate how and why food and fibre are produced in managed environments
* identify and sequence the process of converting ‘on-farm’ food and fibre products into a product suitable for retail sale
* explore plants and animals, tools and techniques used to prepare food to enable people to grow and be healthy
* plan, design and produce a healthy meal
* explain a sustainable practice used by Aboriginal and/or Torres Strait Islander communities to manage food and fibre resources
* investigate how people in design and technological occupations address considerations, including sustainability, in the design of products, services and environments for current and future use.
 |

#### Term 3, odd year – physical world (electrical energy and energy transformations)

In Term 3 students focus on how energy is transformed from one form to another. They are provided with an opportunity to investigate how electrical energy can control movement in products and systems. They explore how this applies to digital systems. This strand develops their abilities to design, test and evaluate a product or system that demonstrates energy transformation, further developing an understanding of the interrelationship between force and energy.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-2DP-TPhysical world: ST3-8PW-STDigital technologies: ST3-11DI-T | What types of energy transformations can be observed?How can electricity be used in a product or system?How do the components of digital systems connect together to form networks? | Physical worldStudents will: * identify different types of energy transformations.
* investigate how electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources
* describe examples where light, sound, heat and electrical energy transform from one type of energy to another
* investigate how electrical energy can control movement, sound, or light in a product or system
* design, test and evaluate a product or system that involves an energy transformation to meet an identified need using electrical energy.

Digital technologiesStudents will:* explore how the main components of digital systems connect together to form networks that transmit data
* describe how data can be transmitted between two digital components
* identify how whole numbers are used to represent all data (binary) in digital systems.
 |

#### Term 4, odd year – Earth and space (Earth’s place in space)

In Term 4 students focus on Earth’s place in the solar system. They investigate how digital technologies are used to gather and represent data about the solar system and use a visual programming language to develop a digital solution. This strand further develops their understanding of the Earth, its position in the solar system and as a dynamic part of a complex, interrelated system.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-2DP-T, ST3-3DP-TEarth and space: ST3-10ES-SDigital technologies: ST3-11DI-T | How does the Earth compare to other planets in the solar system?How do components of digital systems interact with each other to transmit data?How do we represent decision-making in an algorithm? | Earth and spaceStudents will:* identify that Earth is part of a system of planets orbiting around a star (the Sun)
* investigate the role of light energy in how we observe the Sun, Moon and planets
* compare the key features of the planets of our solar system
* research and communicate how Aboriginal and/or Torres Strait Islander Peoples use observations of the night sky to inform decisions about resources and significant cultural events,
* examine and discuss current developments in astronomy, space and planetary science, particularly related to making observations and gathering data.

Digital technologiesStudents will: * identify and explain how existing information systems meet the needs of present and future communities
* explore how the main components of digital systems connect together to form networks that transmit data
* design a user interface for a digital system
* define problems, and plan and implement digital solutions, using an appropriate visual programming language involving branching and iteration, and requiring user input.
 |

#### Term 1, even year – material world (properties and uses of materials)

In Term 1 students focus on how the properties of a range of materials and the way in which they are combined, determine their use and inform design solutions. This strand introduces students to fundamental concepts of chemistry and is an introduction to materials technologies.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-2DP-TMaterial world: ST3-7MW-T | Why are the characteristics of materials important when designing and producing? | Students will: * investigate characteristics and properties of a range of materials and evaluate the impact of their use
* identify and evaluate the functional and structural properties of materials
* critique needs or opportunities for designing using sustainable materials
* design a sustainable product, system or environment individually and/or collaboratively considering the properties of materials
* select appropriate materials, components, tools, equipment and techniques and apply safe procedures to produce designed solutions.
 |

#### Term 2, even year – living world (growth, survival and adaptations of living things)

In Term 2 students focus on the growth and survival of living things and how their adaptations over time suit their environment. They investigate the role of digital technologies in gathering and representing data related to the growth and survival of living things and apply this in their own solution. This strand further develops students’ knowledge and understanding of the environmental and biological sciences. There are opportunities for integration with geography.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-2DP-TLiving world: ST3-4LW-SDigital technologies: ST3-11DI-T | How do physical conditions affect the survival of living things?How do the structural and behavioural features of living things support survival?How do components of digital systems interact with each other to transmit data? | Living worldStudents will:* plan and conduct a fair test to show the conditions needed for a particular plant or animal to grow and survive in its environment
* describe how changing physical conditions in the environment affect the growth and survival of living things
* test predictions by gathering data and use evidence to develop explanations of events and phenomena
* understand that scientific and technological knowledge is used to solve problems and inform personal and community decisions
* describe adaptations as existing structures or behaviours that enable living things to survive in their environment
* describe the structural and/or behavioural features of some native Australian animals and plants and why they are considered to be adaptations.

Digital technologiesStudents will: * collect, store and interpret different types of data
* use software to interpret and visualise data.
 |

#### Term 3, even year – physical world (effects of changing the strength of forces)

In Term 3 students focus on the difference between contact and non-contact forces. They investigate the effects of changing the strength of forces and use digital technologies to record and communicate data. This strand develops their abilities to design, test and evaluate a product or system that demonstrates energy transformation, further developing an understanding of the interrelationship between force and energy. There are opportunities for integration with mathematics.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-2DP-TPhysical world: ST3-9PW-STDigital technologies: ST3-11DI-T | How can we make a force stronger or weaker?How do components of digital systems interact with each other to transmit data? | Physical worldStudents will:* explore and describe some common contact or non-contact forces
* perform a scientific investigation to explore the effects of changing the strength of a single contact or non-contact force.

Digital technologiesStudents will: * explore how the main components of digital systems connect together to form networks that transmit data
* collect, store and interpret different types of data.
 |

#### Term 4, even year – Earth and space (changes to the Earth’s surface)

In Term 4 students focus on sudden changes to the Earth’s surface caused by natural disasters. They investigate the effects and explore how the use of data and digital systems can be used to mitigate these effects. This strand further develops their understanding of the Earth as a dynamic part of a complex, interrelated system. There are opportunities for integration with mathematics and geography.

|  |  |  |
| --- | --- | --- |
| Outcomes | Inquiry/focus questions | Content |
| Working scientifically: ST3-1WS-SDesign and production: ST3-3DP-TEarth and space: ST3-10ES-SDigital technologies: ST3-11DI-T | How do sudden geological changes and extreme weather events affect the Earth’s surface?How do components of digital systems interact with each other to transmit data? | Earth and spaceStudents will:* investigate the effects of sudden geological changes and extreme weather events on the Earth’s surface
* investigate ways that advances in science and technology have assisted people to plan for and manage natural disasters to minimise their effect.

Digital technologiesStudents will: * identify and explain how existing information systems meet the needs of present and future communities
* use software to interpret and visualise data
* design, modify and follow algorithms involving branching and iteration.
 |

[Science and Technology K-6 Syllabus (2017)](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales.