

# Science and Technology

## Statement of What Matters:

Being curious and searching for answers is essential to understanding and predicting phenomena.

### Descriptions of Learning:

#### Progression Step 1

- I can show curiosity and question how things work.
- I can explore the environment, make observations and communicate my ideas.

#### Progression Step 2

- I can ask questions and use my experience to suggest simple methods of inquiry.
- I can recognise patterns from my observations and investigations and can communicate my findings.
- I can use my knowledge and understanding to predict effects as part of my scientific exploration.
- I can recognise that what I do, and the things I use, can have an impact on my environment and on living things.
- I can explore relationships between living things, their habitats and their life cycles.
- I can observe and describe ways in which materials change when they are mixed together.
- I can investigate different forms of energy and how it can be transferred.
- I can explore and communicate the basic properties of light, sound, electricity and magnetism.

- I can identify things in the environment which may be harmful and can act to reduce the risks to myself and others.

### Progression Step 3

- I can identify questions that can be investigated scientifically and suggest suitable methods of inquiry.
- I can suggest conclusions as a result of carrying out my inquiries.
- I can evaluate methods to suggest improvements.
- I can engage with scientific and technological evidence to inform my own opinions.
- I can understand how my actions and the actions of others impact on the environment and living things.
- I can describe the impacts of science and technology, past and present, in my everyday life.

### Progression Step 4

- I can research, devise and use suitable methods of inquiry to investigate my scientific questions.
- I can use my findings to draw valid conclusions.
- I can evaluate and identify ways of improving the reliability of data, taking anomalies into account.
- I can use a range of models to explain and make predictions.
- I can select relevant scientific knowledge from a range of evidence sources to evaluate claims presented as scientific facts.
- I can review my own opinions based on new scientific evidence.
- I can explain how the impact of our actions contribute to the changes in the environment and biodiversity.
- I can describe the impacts of science and technology, past and present, on society.

### Progression Step 5

- I can devise, justify and use systematic methods of inquiry to rigorously investigate my scientific questions and recognise limitations.
- I can link experimental findings and theoretical knowledge to draw valid conclusions.
- I can critically evaluate the quality of data and justify improvements.
- I can apply and make links between a range of models and use them to support or challenge theories.
- I can evaluate the effectiveness of models and refine them to better fit the evidence available.
- I can research and evaluate claims presented as scientific facts by considering the validity of the supporting evidence.
- I can evaluate alternative theories, where the evidence available does not conclusively support one outcome, to form a considered opinion.
- I can evaluate contemporary issues that affect the planet and biodiversity.
- I can evaluate the effectiveness and impact of scientific and technological solutions on a personal, societal and environmental level.

## Statement of What Matters:

Design thinking and engineering offer technical and creative ways to meet society's needs and wants.

### Descriptions of Learning:

#### Progression Step 1

- I can design while I make and communicate about what I am making.

- I can safely use simple tools, materials and equipment to construct and deconstruct.
- I can explore the properties of materials and choose different materials for a particular use.
- I can identify, follow and begin to create sequences and patterns in everyday activities.

## Progression Step 2

- I can produce designs to communicate my ideas in response to particular contexts.
- I can make design decisions, using my knowledge of materials and existing products, and suggest design improvements.
- I can explore how different component parts work together.
- I can safely use a range of tools, materials and equipment to construct for a variety of reasons.
- I have experienced using basic prototyping techniques to improve outcomes.
- I can identify things in the environment which may be harmful and can act to reduce the risks to myself and others.
- I can explore and describe the properties of materials and justify their uses.

## Progression Step 3

- I can draw inspiration to design from historical, cultural and other sources.
- I can creatively respond to the needs and wants of the user, based on the context and on the information collected.
- I can identify and consider factors when developing design proposals.
- I can use design thinking to test and refine my design decisions without fear of failure.

- I can apply my knowledge and skills when making design decisions in order to produce specific outcomes.
- I can consider how my design proposals will solve problems and how this may affect the environment.
- I can use design communication methods to develop and present ideas, and respond to feedback.
- I can combine component parts, materials and processes to achieve functionality and improve the effectiveness of my outcomes.
- I can select and safely use appropriate tools, materials and equipment to construct purposeful outcomes.
- I can use prototyping as a link between my designing and making.
- I can take into account the impact my making may have on the environment.

#### **Progression Step 4**

- I can investigate and draw inspiration from historical, cultural and other sources to design creative solutions.
- I can recognise and act on user needs and wants in increasingly challenging contexts.
- I can identify and prioritise factors which inform my design proposals.
- I can develop my design thinking to test and refine my design decisions by responding to success and failure.
- I can develop my knowledge and skills to support and refine my design decisions in order to produce purposeful outcomes.
- I can adopt an iterative process to improve my design proposals, while minimising their negative impact on the environment and society.
- I can use a variety of design communication methods and techniques to develop and present ideas clearly, and can respond constructively to feedback.

- I can investigate, evaluate, select and combine component parts, materials or processes to improve the functionality and effectiveness of my outcomes.
- I can select and safely use specialist tools and techniques in order to develop and construct my outcomes.
- I can use prototyping techniques to test ideas and support my making.
- I can use my making skills and knowledge of materials to produce high-quality and purposeful outcomes.
- I can evaluate and apply responsible habits of working which consider environmental and societal impacts.

### Progression Step 5

- I can investigate, analyse and draw inspiration from historical, cultural and other sources to design new proposals that add value.
- I can tackle challenging problems, independently and collaboratively, to address wider design requirements in increasingly unfamiliar contexts.
- I can prioritise and justify multiple design factors to improve the effectiveness of my design decisions.
- I can fluently use design thinking, including my successes and failures, to test and refine my design decisions.
- I can identify when I need to seek out new knowledge and skills to support and refine my design decisions in order to produce purposeful outcomes.
- I can use an iterative process naturally which considers both potential intended and unintended consequences of my designs, in order to adapt and justify proposals.
- I can independently select and apply appropriate communication methods to develop and present my ideas fluently.

- I can engage with feedback from different audiences and respond constructively to it.
- I can independently select, justify and combine component parts, materials and processes to improve functionality and can evaluate their impact on the effectiveness of my outcomes.
- I can independently select specialist equipment and use it with precision in order to perform complex tasks safely and effectively.
- I can independently select and apply low-fidelity and high-fidelity prototyping to test ideas, materials and structures.
- I can use my making skills and knowledge of materials to produce high-quality and effective outcomes.
- I can apply and justify responsible habits of working which take into account impacts on the environment and society.

## Statement of What Matters:

The world around us is full of living things which depend on each other for survival.

### Descriptions of Learning:

#### Progression Step 1

- I can recognise that plants and animals are living things which grow.
- I can identify, follow and begin to create sequences and patterns in everyday activities.

#### Progression Step 2

- I can recognise patterns from my observations and investigations and can communicate my findings.
- I can use my knowledge and understanding to predict effects as part of my scientific exploration.
- I can recognise that what I do, and the things I use, can have an impact on my environment and on living things.
- I can explore relationships between living things, their habitats and their life cycles.

#### Progression Step 3

- I can describe how living things compete for specific resources and depend on each other for survival.
- I can describe the features of organisms and recognise how they allow them to live, grow and reproduce for survival in their environment.



- I can explain the role of different organs and systems that enable plants and animals to live and grow. I can describe some changes in growth and development caused by hormones.
- I can identify the threats to the development and health of organisms and recognise some natural defences, preventions and treatments.

#### **Progression Step 4**

- I can describe the interdependence of organisms in ecosystems and explain how this affects their chances of survival.
- I can explain how reproduction, mutations and the environment can lead to variation and adaptations within organisms which can affect their chances of survival.
- I can describe the levels of cellular organisation and how cells perform biological processes that ensure the development and survival of organisms.
- I can explain the threats to the development and health of organisms and describe how the effects of these are reduced by natural defences, preventions and treatments.

#### **Progression Step 5**

- I can explain how variation of organisms within a changing environment leads to natural selection which drives evolution.
- I can explain how biological processes and control mechanisms enable organisms to function, develop, reproduce and survive.
- I can evaluate the factors which affect the development and health of organisms.
- I can explain how prevention and treatment can support natural defence systems and enhance the health of organisms.

## Statement of What Matters:

Matter and the way it behaves defines our universe and shapes our lives.

### Descriptions of Learning:

#### Progression Step 1

- I can explore the properties of materials and choose different materials for a particular use.
- I can identify, follow and begin to create sequences and patterns in everyday activities.

#### Progression Step 2

- I can recognise patterns from my observations and investigations and can communicate my findings.
- I can use my knowledge and understanding to predict effects as part of my scientific exploration.
- I can make design decisions, using my knowledge of materials and existing products, and suggest design improvements.
- I can explore and describe the properties of materials and justify their uses.
- I can observe and describe ways in which materials change when they are mixed together.

#### Progression Step 3

- I can recognise that changes in materials affect their properties and uses under different conditions.
- I can recognise that our planet provides natural materials and can explain why they may have been processed to make them useful.

#### Progression Step 4

- I can describe and explain the properties of different types of matter and relate these to how they are used.
- I can describe different types of chemical reactions, explain their uses and identify any effects of the products formed.
- I can use my knowledge of chemical reactions to explain what happens when conditions are changed.
- I can use different methods to analyse materials in order to understand their composition.
- I can describe how various materials need different techniques in order to separate and refine them.

### **Progression Step 5**

- I can use my knowledge of the atomic nature of matter to explain the structure and properties of materials and apply this to their uses.
- I can explain how and why different types of chemical reactions occur and can describe them in atomic or molecular terms, as well as in quantitative terms.
- I can understand how the products and effects of reactions can be managed and controlled.
- I can use my knowledge and understanding of matter to explain how different techniques can be used to extract, refine and analyse materials for a variety of uses.

## Statement of What Matters:

Forces and energy provide a foundation for understanding our universe.

### Descriptions of Learning:

#### Progression Step 1

- I can identify, follow and begin to create sequences and patterns in everyday activities.

#### Progression Step 2

- I can recognise patterns from my observations and investigations and can communicate my findings.
- I can use my knowledge and understanding to predict effects as part of my scientific exploration.
- I can investigate different forms of energy and how it can be transferred.
- I can communicate the effect forces have on myself and on objects.
- I can explore and communicate the basic properties of light, sound, electricity and magnetism.

#### Progression Step 3

- I can explore how the motion of objects can be affected by applying specific forces.
- I can use a variety of simple models to describe the forces acting on an object.
- I can explain that energy can be transferred from one place to another and how this can be used to provide the energy we need in our modern lives.
- I can describe the factors that affect electrical circuits and this will enable me to change variables and predict what will happen.

- I can explain how the properties of sound and light will affect how they are experienced.
- By manipulating the properties of sound and light, I can produce a desired effect.
- I can describe how magnetic fields behave and explore a range of practical uses for them.

#### **Progression Step 4**

- I can explain and calculate how multiple forces acting on an object will affect its motion.
- I can understand conservation of energy and can explain that energy is used at differing rates, and that this affects the power and efficiency of a system.
- I can apply my knowledge of energy and forces to new designs and can improve the efficiency of systems.
- I can explain the factors that affect current and describe the way in which it behaves in various circuits.
- I can design and create circuits that will perform a desired function.
- I can predict the behaviour of waves in different circumstances. By applying simple rules, I can use waves in order to learn more about the world around me.
- Through experiment, I can explore magnetic fields to investigate factors that affect their strength.
- I can apply my understanding of the interaction of fields in order to explore uses of magnetism.

#### **Progression Step 5**

- I can quantitatively analyse the movement of objects and understand how applying forces to them can change their motion.

- I can quantify the energy in systems and apply this to system design in order to improve efficiency.
- I can explain and quantitatively model the behaviour of circuits.
- I can independently design and build multiple-component circuits to solve problems.
- I can explain how and why various categories of waves are used for different applications.
- I can apply understanding of waves to ask questions and solve problems.
- I can use models to enable deeper understanding of the links between force, current and magnetic fields.

# Statement of What Matters:

Computation is the foundation for our digital world.

## Descriptions of Learning:

### Progression Step 1

- I can identify, follow and begin to create sequences and patterns in everyday activities.
- I am beginning to follow a sequence of instructions.
- I can experiment with and identify uses of a range of computing technology in the world around me.

### Progression Step 2

- I can safely use a range of tools, materials and equipment to construct for a variety of reasons.
- I can use computational thinking techniques, through unplugged or offline activities.
- I can create simple algorithms and am beginning to explain errors.
- I can follow algorithms to determine their purpose and predict outcomes.
- I am beginning to explain the importance of accurate and reliable data to ensure a desired outcome.
- I can follow instructions to build and control a physical device.

### Progression Step 3

- I can use conditional statements to add control and decision-making to algorithms.
- I can identify repeating patterns and use loops to make my algorithms more concise.
- I can explain and debug algorithms.

- I can use sensors and actuators in systems that gather and process data about the systems' environment.
- I can identify positive and negative design elements that affect user interactions.
- I can explain how digital devices can be interconnected locally and globally.
- I can explain the importance of securing the technology I use and protecting the integrity of my data.
- I can explain how my data is used by services, which can help me make more informed decisions when using technology.
- I can explain how data is stored and processed.
- I can effectively store and manipulate data to produce and give a visual form to useful information.

#### Progression Step 4

- I can decompose given problems and select appropriate constructs to express solutions in a variety of environments.
- I can select and use data structures that efficiently manage data in algorithms.
- I can plan and implement test strategies to identify errors in programs.
- I can select and use multiple sensors and actuators that allow computer systems to interact with the world around them.
- I can apply design principles in order to design a range of efficient user interactions.
- I can explain how systems communicate, in order to design a network.
- I can explain the techniques used to store and transfer data and understand their vulnerabilities.



- I can choose the most appropriate format for the storage and interrogation of data.
- I can make use of mathematical and logical operators in different software tools to investigate a line of inquiry independently.

### **Progression Step 5**

- I can identify, define and decompose problems, choose appropriate constructs and express solutions in a variety of environments.
- I can use file-handling techniques to manipulate data in algorithms.
- I can test, evaluate and improve a solution in software.
- I can design and create physical systems that use appropriate components and logic to complete tasks and achieve goals.
- I can apply design principles in order to design a range of efficient user interactions, and evaluate effectiveness through user studies.
- I can build and test communication systems with the aim of safeguarding my own systems and data.
- I can apply computational techniques to interrogate data sets in order to produce useful insight.