Science

Science

Years 1–8
PRIMARY SCHOOL CURRICULUM

Ministry of Education, Sports and Culture
Curriculum Materials and Assessment Division

This curriculum statement was prepared by the Science Subject Committee and compiled by Patila Amosa. Simālō Isara was the CMAD Subject Curriculum Officer.

Doris Varghese
Leiataualesā Lino Tagiilima
Li'o Foleni
Ma'ilo Pesamino
Savelio Tasi Ifopō
Tufuga Tovia
Ve'ā Siaunu'ua
Tamasoali'i Savaisē

The external reviewers were:
Dr Suzanne Boniface
Victoria University of Wellington
Wellington
NEW ZEALAND

and

Dr David Salter
The University of Auckland
Auckland
NEW ZEALAND

Funding provided by AusAid, NZAID, ADB under the Education Sector Program II.

Designed, edited and typeset by Mary Egan Limited
+64 9 360 9118
mary@maryegan.co.nz

January 2013

Contents

Introduction: Science education and learning in the Sāmoan context

Science is fundamental to an understanding of our physical and biological world as it affects every aspect of our daily lives. It is a disciplined body of knowledge with a systematic approach to enquiry and problem solving. Science education promotes the use of investigative approaches. It provides opportunities for students to acquire knowledge and understanding by undertaking their own practical investigations and by studying the findings of others.

The Science curriculum at the primary education level allows students to make connections between what they learn in the classroom and their everyday lives. It also stimulates critical thinking and develops students' conceptual understanding and application of Science and technology.

Science and technology have always played an important part in Sāmoan society and culture. However, scientific knowledge is changing and growing rapidly. This is having major effects on individuals and society. Hence, it is increasingly important for students to be equipped with primary knowledge, skills, attitudes and values that will help them make informed judgements about scientific change and how it should be managed. For example, by fostering curiosity about the physical and biological world and developing scientific skills, knowledge and attitudes, Science education can encourage students to help ensure the sustainability and proper maintenance of Sāmoa's limited natural resources.

'Knowledge' refers to an understanding of theories and concepts that comprise Science. 'Skills' refer to the methods of posing questions and carrying out investigations in Science. Although there is no fixed way in which scientists work, all investigations tend to have common processes such as observation, classification, hypothesising, data collection, interpretation and evaluation. 'Attitudes' and 'values' are concerned with the way in which scientific knowledge is applied and appreciated together with an understanding of its limitations.

Science is not an independent discipline; rather, it is closely connected to various learning areas where principles, facts and data are important in reasoning, interpreting and understanding interrelated concepts. Some examples include the mixing of colours in textiles for fabric printing, climate and vegetation in Geography and the Social Sciences, and the growth of crops in Agricultural Science.

Structure of the Science curriculum

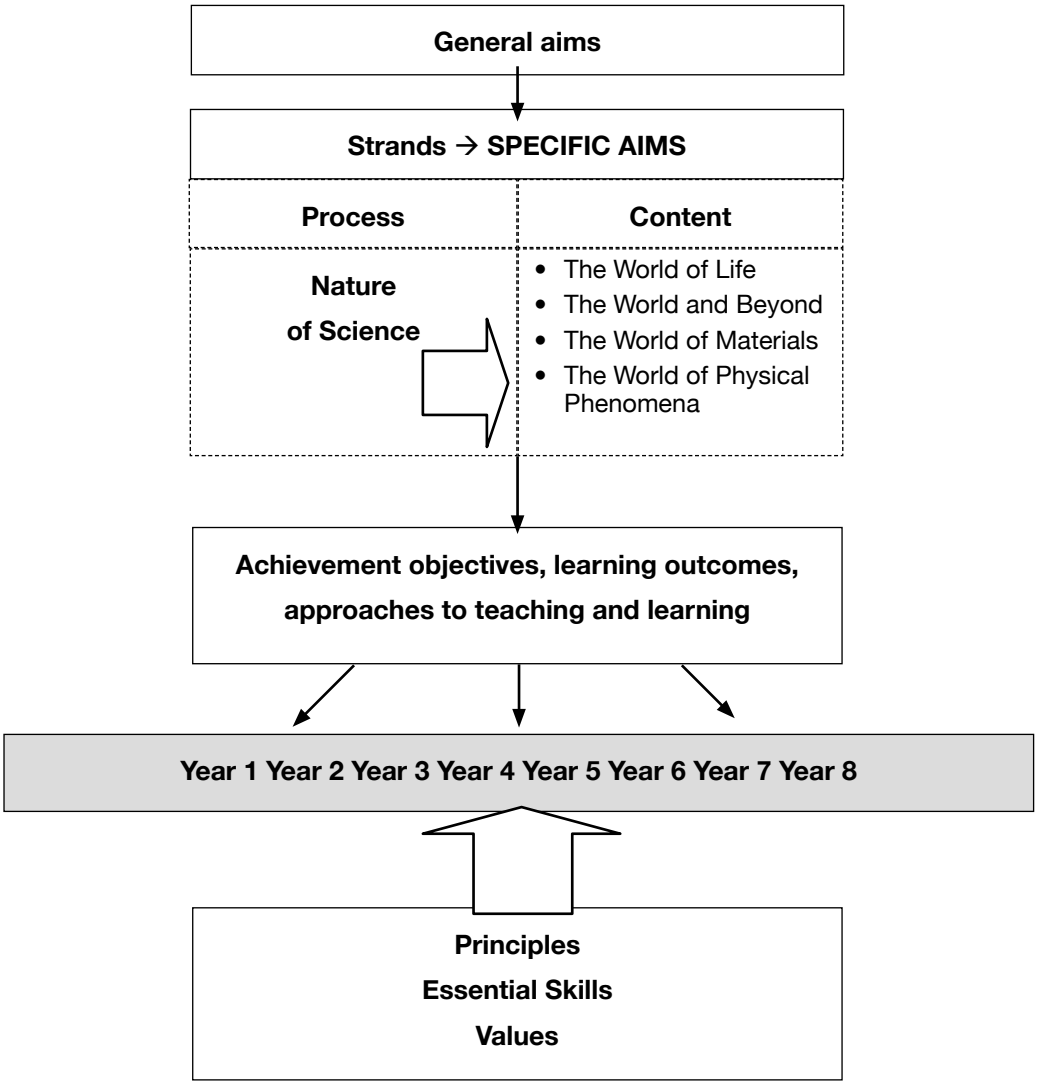
The Science curriculum is organised around the following.

- **General aims:** general statements outlining the purposes of studying Science.
- **Organising strands:** categories used to organise concepts or divide a Science into branches of learning.
- **Specific aims:** statements relating to several key ideas that are foundational concepts for each organising strand that are required for understanding. These aims are developed in greater detail and complexity as students progress in their learning from Year 1 to 8.
- **Achievement objectives ('content standards'):** descriptions of specific outcomes derived from

each *specific aim* that relate to the knowledge or skills that it is expected students will understand or accomplish.

- **Learning outcomes:** statements of the learning that it is intended students will be able to demonstrate as a result of a learning experience.

The structure of the Science curriculum is illustrated in the following diagram.



General aims

Science education helps students to understand themselves and the environment and provides opportunities for them to develop independent, rational thought and responsible action. Understanding of the nature of Science and the procedures of scientific enquiry is crucial so that they can appreciate why scientific ideas are valued and how Science can inform many issues in society.

The general aims of the Sāmoa Primary Science Curriculum are to provide opportunities for students to:

- develop scientific knowledge and skills to enable them to live sustainable and fulfilling lives
- foster their scientific literacy to enable them to participate in Science-related debate and to make wise and logical decisions
- learn about themselves, their environment and how things work through experiences and by engaging in practical investigations
- develop a progressive understanding of Science concepts to build the foundation for Science learning at the secondary level.

Organising strands

The aims of Science education are achieved through learning in five strands are relevant to students' everyday experiences and reflect the major areas of scientific knowledge. These strands include the concepts that are required to be taught at the primary education level and ensure progression to the secondary curriculum.

The Science strands are:

1 Nature of Science
2 The World of Life
3 The World and Beyond
4 The World of Materials
5 The World of Physical Phenomena.

Specific aims

1. Nature of Science

This strand focuses on the 'learning about Science' and 'doing Science' aspects of learning Science. Students will develop their knowledge and understanding of the following concepts and skills.

- **Understanding about Science:** students learn what Science is about and how progress in Science occurs: the features of Science as a knowledge system, its history and development and how scientists over time have interacted with society.
- **Investigating in Science:** students learn that inquiry in Science involves asking a question, planning and completing an investigation, answering the question, then presenting the results to others.
- **Communicating in Science:** students develop the ability to communicate Science ideas to others using the vocabulary, symbol systems and conventions of Science through a variety of media.
- **Participating and contributing:** students link their Science knowledge to actions and decisions in everyday life.

2. The World of Life

This strand focuses on living things, particularly plants and animals and their life processes. Students will develop their knowledge and understanding of:

1 the life processes and characteristics of living organisms
2 the diversity of living things and ways of classifying them into groups
3 the dynamic nature of the environment and the interdependence of its living and non-living components.

3. The World and Beyond

This strand focuses on planet Earth, the solar system and the universe. Students will understand the characteristics of Earth and that Earth is a changing system. They will appreciate the importance of maintaining the features of Earth in order to preserve life. Students will develop their knowledge and understanding of:

1 the dynamic nature of the Earth, solar system and the universe.
2 the different scales of space and time at which events on Earth and in the solar system occur
3 the ways that the resources of the Earth and the Sun provide for the needs of living things.

4. The World of Materials

This strand focuses on the study of matter and the physical and chemical properties that enable materials to react and behave in different ways. Students will develop their knowledge and understanding of:

1 the properties of different substances (materials) that can be explained in terms of the extremely small particles of which the materials are composed
2 the physical and chemical changes that materials can undergo and how these are carried out and can be predicted
3 the relationship between the uses of materials and their properties.

5. The World of Physical Phenomena

This strand focuses on energy and forces and the relationship between them. Students will develop their knowledge and understanding of:

1 the way that forces act on objects and can change their motion and shape
2 the forces of nature that act on objects at a distance.
3 the different forms of energy and the ways they are used in society.

Achievement objectives and learning outcomes

Sāmoa's primary education curriculum is outcomes based. An outcomes-based curriculum clearly identifies the knowledge, skills, attitudes and values that all students should be able to demonstrate at a particular year level, in a particular subject. Teachers are able to teach and students are able to learn more effectively when the outcomes of learning are made explicit and are shared.

Within each of the organising strands of the Science curriculum, achievement objectives and learning outcomes are prescribed for each year level from one to eight. The statements specify the knowledge, skills and understanding that students demonstrate they know and are able to do as a result of engaging with the content through a variety of teaching and learning activities and experiences.

Outcomes-based education shifts away from the traditional focus on the topics teachers teach (content) and for how long, to what students are expected to demonstrate they know and are able to do. Good learning outcomes:

- are observable
- are measurable
- ensure that students can demonstrate the application of their knowledge/skill/attitude
- are highly focused on what students are expected to know and to be able to do with their knowledge and make this explicit to students, teachers, and parents
- ensure that high expectations are held for all students, in the knowledge that all are capable of achievement
- focus on development, which emphasises the likely sequence of conceptual and cognitive growth

- employ a range of teaching contexts, opportunities and means of support to enable students to gain knowledge and demonstrate achievement of outcomes. All students have different learning needs and learning styles and will not always be ready to demonstrate learning outcomes in the same way at the same time, or even at the same year level.

The ultimate test of a good learning outcome is whether the action taken by the participants can be assessed in an authentic way. Learning outcomes enable teachers to closely monitor the progress of students and to report accurately to parents on student progress. It follows that there is a close connection between learning outcomes and the ongoing assessment of students.

Approaches to teaching and learning

The approaches to teaching and learning are designed to support teachers in their implementation of the Science curriculum. Teaching and learning strategies determine the approach that a teacher takes to achieve learning outcomes. The strategies are presented to assist teachers in the design of their own units or when adapting the sample units of work provided in the Science Teachers' Manual. They include information that will be useful when programming and planning class activities. These strategies also provide an explanation of particular terms used in the curriculum.

- Science usually involves empirical observations, investigations and modelling, and is underpinned by a respect for evidence. Scientific progress comes from logical, systematic work as well as creative insight.
- Science contributes to and influences decision-making in all aspects of today's world. Many crucial issues and opportunities faced by society need to be approached from an informed scientific perspective as well as a social and ethical perspective.
- Adoption of a 'Science for all' approach to Science education ensures that all students benefit from participation in school Science and are equipped to use their knowledge of Science concepts in their daily lives, rather than only those who intend to pursue a career in Science. Through this approach, students appreciate Science is not a 'list of facts' but a way of finding out about the world around them.
- In learning Science, meaning for students is developed through active involvement, continued exposure and growing understanding. Students are encouraged to ask questions, explore and investigate the world around them and use their observations and findings to construct reasonable explanations for the questions they pose, communicating their explanations to others.
- Therefore, learning Science becomes a process of inquiry and exploration, as students are engaged in the active construction of ideas, explanations and activities that develop their abilities in doing Science.

In addition to the Science-specific approaches described, there are also general approaches that should be part of everyday learning and teaching. These general approaches include, but are not limited to:

- sharing and talking about learning objectives, learning outcomes and success criteria with students; clarifying progression
- recognising that learning is often demonstrated through oral and written language, and the academic language required to show understanding has to be explicit and part of the sharing of learning objectives and success criteria
- observing and listening to gather intelligence
- questioning and whole-class dialogue to check, probe and develop understanding
- explaining and modelling to clarify progression in key concepts and skills, demonstrate thinking processes and exemplify quality

- giving oral and written feedback to support the evaluation of progress, clarify standards and help identify the next steps in learning
- planning for group talk, peer assessment and self-assessment to help students develop as independent learners
- planning specific activities that give teachers an insight into the progress students are making, the standard they have achieved and obstacles to their progress.

Assessment in Science

Assessment is not separate from the curriculum; rather, it is a cornerstone of outcomes-based learning in all subjects. It is the process of collecting and interpreting evidence in order to determine the student's progress, to make judgements about a student's performance and, above all, to improve each student's learning.

An outcomes-focused approach to assessment involves:

- providing a range of opportunities for students to be aware of and to demonstrate outcomes
- gathering and recording evidence of students' demonstration of outcomes
- making judgements about students' demonstration of outcomes
- guiding the planning of teaching and learning programmes
- reporting achievement to students and parents in an effective way that encourages further learning.

Assessment should be an integral part of teaching and learning as shown in Figure 1; it should not merely test student achievement at the end of a unit of work. For this purpose, teachers' manuals provide assessment guidelines appropriate for each learning outcome. These need to be adapted to suit the circumstance of each classroom situation. For assessment to achieve its full potential, teachers need to ensure that students receive immediate feedback on areas that need improvement.

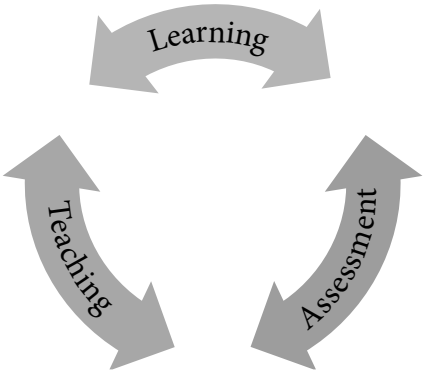


Figure 1: Learning–teaching–assessment cycle

There are three purposes of assessment:

1. assessment *for* learning
2. assessment *as* learning
3. assessment *of* learning.

1. Assessment for learning

Assessment of an individual student's progress is, above all, diagnostic and informative. The purpose of such assessment is to improve teaching and learning by diagnosing learning strengths and weaknesses before teaching and learning commences, then measuring the student's progress against defined learning outcomes and, finally, reviewing the effectiveness of teaching programmes. The information teachers record from these assessments enables clear profiles of individual students' achievement to be built. These profiles are used to inform teachers about each student's learning and development and provide the basis for feedback to students and parents.

Assessment for learning is based on a variety of student activities, which include: questioning of and by students, class exercises and activities involving individual and group work, products created by students, projects and portfolios, teacher observations of student performance, discussion, student self-assessment and peer assessment.

Activities such as these give teachers the opportunity to give verbal or written feedback to each student. The feedback is constructive and encouraging and aims to build confidence. It is mainly descriptive, emphasising strengths and challenges. The information also gives teachers the opportunity to adjust their own teaching to ensure students' learning is proceeding satisfactorily.

No grades or scores are given.

2. Assessment as learning

A learning-outcomes approach to teaching and learning requires constant classroom assessment of student progress for each clearly defined outcome and constant feedback to students and parents. Assessment should be positive, encouraging and help students understand how to improve. Assessment is only meaningful when there is a clear sense of purpose and anticipated outcome known to both the student and the teacher.

Students have some ownership of, and take responsibility for, their learning because they know in advance what is expected of them – what the learning goals are and how achievement of the goals is going to be measured. Assessment tasks are explicitly linked to the curriculum and classroom programme.

3. Assessment of learning

Assessment of learning is summative. It takes place at the end of a learning unit and is usually accompanied by a grade or score. It tells the student, parents and the teacher how achievement compares with the expected outcome.

In a Science programme, it is important that:

- a range of assessment tasks are used to provide useful information on students' progress against the learning outcomes. These tasks can include:
    - practical activities, tests
    - projects, teacher observations
    - checklists, reflections/journals
    - model making, posters
    - games and quizzes, debates
    - drama/show and tell, learning trails
    - portfolios
- tasks are accessible to all students
- the language used is suitable for all students
- skills that are not able to be assessed on paper, such as practical skills, are assessed through school-based activities
- assessment is ongoing and provides feedback and feed forward to improve learning
- students are involved in the assessment of their own learning.

Good assessment practice is:

- fair – so that no individuals or groups are disadvantaged
- valid – it should assess the knowledge and/or skill it is designed to assess
- open – students should be aware of the methods used and the specific knowledge and/or skills to be assessed
- reliable – given similar circumstances, the same judgements should be made again
- manageable – clear and is part of the learning programme.

Key principles

The National Curriculum Framework lists five key principles that underpin all aspects of Sāmoan education, including the development of the curriculum.

Equity

Equity requires that the system will treat all individuals fairly and justly in the provision of educational opportunity. Policies and practices that advantage some social groups and disadvantage others will be avoided, while those that address existing inequalities in access, treatment and outcome will be promoted.

Quality

Educational quality is exemplified by high standards of academic achievement, cultural understanding and social behaviour and results from a complex interplay of professional and technical factors and social and cultural practices. Policies promoting these will focus on the learning institutions and, specifically, on day-to-day classroom practices including the monitoring, assessment and reporting of student outcomes and teaching effectiveness.

Relevance

Relevance in education implies a system that is meaningful, recognised, applicable and useful to one's life. It should enhance individual and community well-being and, ultimately, national development, including cultural, humanistic and spiritual aspects. Policy decisions will address what is relevant to the individual student, the community and the nation.

Efficiency

Efficiency in education is demonstrated by leadership and management practices that ensure the optimum use of resources – human, financial and material – at all levels, efficient service delivery, effective communication and coordinated and transparent decision-making. Policies will reflect the need to be both efficient and effective.

Sustainability

Sustainability requires the wise use of human, financial and material resources to ensure balanced and continual development in the system. Transparency and accountability are necessary at all levels. The collective values of trust, integrity and a sense of responsibility for the common good in community and national development will be promoted.

Curriculum principles

The National Curriculum Framework outlines the following curriculum principles to give direction and consistency to the development of programmes.

All students can be successful learners

The Sāmoan Curriculum recognises that *all* students can be successful learners when they are provided with sufficient time and support.

Students need to be engaged

The Sāmoan Curriculum recognises that for students to succeed, curriculum experiences must relate to student interests, needs and learning styles in order to engage students in their learning.

Programmes must be planned

The Sāmoan Curriculum recognises that for students to be successful, programmes must be carefully planned and use a range of teaching approaches in order to cater for the various learning styles of students.

Programmes must develop the whole person

To ensure that when students complete their schooling they are well prepared for work and further studies, the Sāmoan Curriculum recognises that programmes must be broad and balanced and provide opportunities for the intellectual, social, spiritual and cultural dispositions of each student to be developed.

Assessment must inform practice

The Sāmoan Curriculum recognises the need for teachers to use monitoring, assessment and reporting practices to help them evaluate the effectiveness of their teaching practices as well as provide an indication of student achievement against established standards.

Teachers make a difference

The Sāmoan Curriculum recognises the centrality of highly effective teaching in ensuring quality outcomes for students.

Community involvement assists learning

The Sāmoan Curriculum recognises that fa'asamoa must be upheld and that the community plays a large role in the education of students.

A sustainable future

The Sāmoan Curriculum emphasises the need to develop environmentally and socially sustainable practices. This applies not only to the physical environment but also in the way society structures itself socially, culturally and economically.

Essential skills

'Essential skills' are the broad skills that are developed throughout the years of schooling. The essential skills are developed as a result of the quality of the experiences provided in all classroom and school activities. They are used by students in all school activities as well as in their social and cultural world outside the school.

Communicating effectively

Communication underpins all learning and includes reading, writing, speaking and listening, visual and graphic representation, non-verbal communication and the use of numbers and data to convey meaning.

In Science, this means students will be required to read, write, collect and extract information from various sources, draw diagrams and concept maps to express ideas, record and present data clearly and concisely.

Solving problems

This involves the use of inquiry and reasoning, gathering data and processing information, posing creative solutions and evaluating outcomes. Mathematical concepts and skills are often used when solving problems.

In Science, this means students will be able to use the general scientific method to suggest hypotheses and conduct investigations. They will be able to: develop and use their numeracy skills to make accurate measurements using a range of appropriate technologies and an appropriate number of trials, record and organise data in tables or diagrams using appropriate units, construct tables and graphs to clearly and succinctly present information; apply mathematical procedures to calculations required in scientific investigations; extract information from column graphs, histograms, divided-bar and sector graphs, line graphs, composite graphs and flow diagrams; express mathematical relationships by using symbols and the appropriate units for physical quantities; and draw valid and justified conclusions from investigations.

Utilising aesthetic judgement

This involves using the visual and performing arts as a means of expression and requires an appreciation of the aesthetic value of objects and experiences.

In Science, this means students will be able to use visual aids or art to demonstrate their understanding of Science concepts. They can also perform songs, dances and plays based on scientific knowledge and experiences to enrich their understanding of people's relationship with nature.

Developing social and cultural skills and attributes

The capacity to operate socially and to work effectively with others is an essential skill. It requires an understanding of context, of the cultural norms and expectations that exist and the ability to negotiate and reach consensus. It also involves developing an ethical framework, including an informed understanding of the issues associated with gender.

In Science, this means students will develop their interpersonal skills by collaborating fairly with others to reach consensus in their information acquisition and analysis. They need to be able to respect and appreciate the importance of the cultural, natural and social environment in their quest for scientific learning.

Managing oneself and developing work and study skills

Students need to be able to manage their time effectively to allow them to pursue personal, spiritual, sporting and academic interests. They need to know how to resolve conflict in constructive ways that allow all involved to feel that they have been treated with fairness and respect. They need to take personal responsibility for their choices and actions and learn from both their mistakes and successes. This includes responsibility for personal health and fitness.

In Science, this means learning activities will be planned to encourage students to be independent learners, yet collaborate effectively with their peers, be self-evaluative yet take others' perceptions into account, be keen learners and commit themselves to a rigorous primary Science education.

Integrating knowledge

While learning areas are used as the organisers of knowledge, the prime purpose of education is for students to understand the world around them and see the links between the various areas. This requires an in-depth understanding of subjects so that the knowledge gained can be linked to experience and complex understandings developed.

In Science, this means students learn effectively and see the relevance in learning Science when they are able to relate their everyday experiences to the science concepts presented in the classroom. Thus, students will be provided with opportunities to develop and formulate their scientific ideas and skills, first in a variety of familiar contexts then later in other challenging situations.

Effectively using technology

Technology involves the development of the skills and knowledge used to make and construct objects and products used in day-to-day living and in the pursuit of special interests. Technology also involves the use of information technology to access information stored electronically. Over time, information technology will become more widely available and be increasingly used in all areas of the curriculum to create, locate and store information.

In Science, students will be exposed to technological skills that are increasingly important for advancement in their education and for leisure. The Science curriculum integrates information and communication technologies into the teaching and learning process and provides students with opportunities to use modern technology to enhance their learning.

Values in the curriculum

'Values' are the internal beliefs and attitudes held by individuals and groups that are used in responding to everyday events. Like the essential skills, they are central to the personal development of each individual and the way the broader society operates. Individuals do not only develop values during schooling but also through the broader community, including the media. The school curriculum will help individuals to develop and clarify their own beliefs and values. The values that underpin the Sāmoan Curriculum include the following.

Fairness, to ensure that decisions and practices are viewed as having respected the opinion of others and where outcomes are accepted as just.

Honesty, to ensure that there is consistency and sincerity in what is said and done.

Excellence, to ensure that high achievement is valued and celebrated.

Responsibility, to ensure that students are responsible for their actions and undertake actions to assist others.

Respect, to ensure that others are treated with consideration and sensitivity, the physical environment is maintained and cultural and spiritual values and societal rules are adopted by all.

Tolerance, to ensure that the differences and diversity within society are respected and accommodated.

Values in Science

Values exert a major influence on the behaviour of an individual and serve as broad guidelines in responding to everyday events. At the primary education level, Science contributes to the student's growing sense of logic, objectivity, analysis, responsibility and appreciation of their natural environment. Schools must therefore provide students with the basis on which they can make judgements in these areas.

Fairness, collaboration, acknowledgement, consultation

Students should be able to consult and collaborate with each other during group investigation, acknowledge others' contributions, base decisions and practices on majority consensus and ensure that everyone's ideas are heard and treated with respect.

Honesty and integrity

Students should be consistent, honest and sincere in what is said and done in relation to their Science investigations, should seek the truth and handle and communicate data and information with moral and ethical principles.

Accuracy and objectivity

Students should be able to seek accurate data and information to validate observations and explanations objectively.

Wisdom, excellence and perseverance

Students should aim to achieve to the best of their ability, learn something worthwhile and useful and investigate a problem until a satisfactory solution is found.

Responsibility

Students should be responsible for their own actions, be able to assist others, resolve disagreement and conflict in non-violent and peaceful ways and show care and concern for their own safety and that of other living things. They should also be aware of their responsibility for the quality and sustainability of the environment.

Honour and respect

Students should be able to treat others with consideration and sensitivity and respect another person's opinions and beliefs.

Open-mindedness

Students should be able to accept all knowledge as tentative and be willing to change their view if the evidence is convincing.

Tolerance and understanding

Students should be aware of and respect academic, cultural, economic and social differences and diversity within their learning environment.

Consideration and inclusion

In their studies, students should be concerned about themselves and others. They should be inclusive of and cooperate with everyone regardless of differences and abilities.

Curiosity

Students need to develop the desire to explore the environment and question what they find.

Inclusive education

The Ministry of Education, Sports and Culture is committed to providing high-quality inclusive education to all Sāmoan students within a school culture based on respect and acceptance. A key component of quality education is the provision of appropriate programmes and support for a diverse range of students, including those with disabilities, those at risk because of social or economic circumstances and those in the gifted range. The principle that '[a]ll students can be successful learners' recognises that all students can succeed when they are provided with sufficient time, support and effective teaching. This ensures that the aims of social justice and equity are seen in practice, as all students, irrespective of race, ethnicity, disability or socio-economic background can achieve quality educational outcomes. It acknowledges the right of all students to be successfully enrolled in schools and experience success through participating in inclusive educational programmes.

The need to cater for all students' individual needs and for them to develop appropriate skills, knowledge and personal attributes through a holistic approach to learning is at the centre of all educational programmes. All students have the right to be included in their local school where they will have the opportunity to access the rich social and cultural setting to best develop the social and cultural skills necessary be included in the broader community.

Supporting the process of inclusive education

'Inclusive education' is a process whereby the school systems, strategic plans and policies adapt and change to include teaching strategies for a wider, more diverse range of students and their families. In inclusive education, the child's learning style is identified and the classroom and teaching strategies are adapted to ensure high-quality learning outcomes for all members of the class. Everyone is important, unique and valued for their contribution to the school.

Students who are gifted in one or more areas also have educational needs. For these students, it is important that programmes are provided that extend their abilities and assist them to develop their intellectual, artistic or other talents to their fullest potential.

Gender

The Sāmoan Curriculum ensures that the learning experiences of girls as well as boys are catered for equally. It is based on the knowledge that:

- a person's sex is genetically determined but gender roles are not and may change over time, from place to place and from individual to individual
- students can play an active role in making meaning from their experiences and in deciding to adopt or reject ways of behaving
- gender stereotypes should be challenged.

'Gender' is what it means to be a female or a male. It refers to those behaviours and attitudes that are culturally accepted, and acceptable, as ways of being a woman and of being a man. Addressing gender issues goes well beyond ensuring that males and females have the same opportunities to receive an education and to fulfil their learning potential. A person's experiences determine the way they understand and make sense of the world. Gender is also culturally determined. In Sāmoa, there is a need for sensitivity to local cultural practices and values, with respect to traditional roles for males and females. The curriculum provides students with subjects, resources and experiences that value the needs of girls and boys.

To be inclusive, teachers need to ensure that all girls and boys are able to participate in activities that enhance their learning equally and provide equal opportunities to pursue a productive and fulfilling life when they complete their schooling. Teaching practices, including classroom organisation and management, should ensure that girls and boys are able and encouraged to participate fully in all learning activities. Teachers must be sensitive to the kinds of classroom practices that discourage girls or boys from succeeding and persevering with their studies.

Materials used in teaching must give students the opportunity to understand how men and women and boys and girls can have a wide range of occupations, tasks and responsibilities. Materials must also use gender-neutral language wherever possible.

School programmes and classroom learning tasks should reflect the diversity of roles available to women and men and girls and boys. Teachers need to ensure that gender is not an obstacle to learning success or individual value. To ensure this, learning programmes must:

- include the interests, perspectives and contributions of both females and males in programmes, content, resources and methods of teaching
- ensure that both males and females have equal access to learning resources, and teachers' time, and take part fully in all forms of learning activity
- ensure that both females and males take active and valued leadership roles in learning activities
- ensure that boys and girls understand and respect the right of each to equal opportunity.

Language learning through Science

The language associated with learning in every subject in the curriculum is often abstract and demanding for any student. Learning becomes even more complex as the medium of instruction in primary education moves from Sāmoan to English.

Science has a language of its own. This is understandable given the abstract nature of Science concepts and the specialised jargon it uses. Since English is the international language of Science and, given the potential use of the Sāmoan language as a learning tool to enhance students' understanding in Science, it is imperative that the English Science terms be retained at all times (or bracketed alongside their Sāmoan equivalents) for clarity, universality and the maintenance of content integrity within the Science curriculum.

The Science curriculum provides opportunities for students to engage in the ongoing development of broad literacy skills as well as more Science-specific literacy. 'Literacy' is the ability to communicate purposefully and appropriately with others in a wide variety of contexts, modes and mediums. Literacy incorporates not only the fundamental skills of speaking, listening, reading and writing but also skills in visual literacy, which are developed through viewing and representing a wide range of texts.

The development of students' literacy skills and understanding is the responsibility of all schoolteachers, as different subjects and learning areas make particular demands on students' literacy. In particular, Science uses words from everyday language that may have different meanings when used within a scientific context. In the curriculum, students are provided with ongoing opportunities to develop their use of the specific language and terminology of Science to communicate their knowledge, understanding and skills to a range of audiences.

The content of the curriculum provides opportunities for students to:

- use the language of Science in both oral and written communication of their knowledge and understanding via a range of media
- extract, summarise, collate and critically evaluate information for a range of purposes and audiences
- debate, discuss and evaluate the impact and applications of Science in a range of contexts.

'Language functions' refer to the purpose for which language is used. For example, language can be used to give instructions, ask for help or give reasons. Much of this language is common to all subjects in the curriculum. However, in addition to developing their general competence in the functional use of Sāmoan and English, it is necessary for students to understand and use the concepts and language functions that are especially relevant to Science. In Science, the language functions that are especially important for students to learn to use include:

- identifying an object
- describing an effect
- explaining cause and effect
- proposing a hypothesis
- conducting a valid investigation
- measuring, collecting and recording data clearly
- analysing and interpreting information
- discussing findings
- drawing valid conclusions and presenting evidence to support these.

Time allocation

The *Sāmoa National Curriculum Policy Framework 2006* stipulates 2.5 hours per week for Science teaching at all levels. The suggested hours are provided only as a guide. At least one double period (one hour) should be allocated to enable students and teachers to undertake practical work in Science, including hands-on activities and/or accessing Science audiovisual material.

Safety

Safety should permeate all aspects of the teaching of Science. Teachers should be aware of the safety implications of any exploratory or investigatory work. Pupils should be encouraged to observe safe and hygienic ways of working during all practical activities.

Strands: descriptions and conceptual schemes

Note: The conceptual schemes present an overview of the foundational concepts underpinning each Science discipline and are provided so that teachers can obtain a 'big picture' view of the Science they are teaching and how concepts interrelate in each Science discipline. They are not intended to specify all of the content that is to be learned by students.

Strand 1: Nature of Science

This strand focuses on the 'learning about Science' and 'doing Science' aspects of learning Science. 'Learning about Science' promotes students' understanding of the nature of Science, while 'doing Science' develops scientific skills and attributes in students, such as open-mindedness, a respect for evidence, the ability to critically evaluate the merits of an argument and the ability to carry out critical inquiry in ways that provide valid conclusions.

The Nature of Science strand is divided into four areas: (1) understanding about Science, (2) investigating in Science, (3) communicating in Science and (4) participating and contributing.

1. Understanding about Science

Students learn what Science is about and how progress in Science occurs: the features of Science as a knowledge system, its history and development and how scientists over time have interacted with society. By studying the history of Science, students gain an appreciation for the fact that Science reflects its history and is constantly changing, as some ideas are tentative and others are more robust and long-standing, and that Science is an ongoing activity carried out by people. As the achievements of scientists are examined, students appreciate that scientists base their ideas on the scientific theories and models held at the time and work in a systematic and logical manner when interpreting evidence. Students learn that Science incorporates knowledge from many peoples of different cultural and historical backgrounds and that Science ideas may enhance traditional knowledge and assist with sustainable development.

2. Investigating in Science

Students learn that inquiry in Science involves asking a question, which may arise from their observations or research into the natural world, designing and carrying out an investigation to try to answer the question and analysing and evaluating the results before presenting them to others. Further experimentation may be signalled. Students learn to be curious and to use scientific understanding and processes to find answers to their questions. By designing and carrying out Science investigations; generating, validating and critiquing evidence; and analysing and interpreting ideas, students become aware that Science inquiry is an iterative process that can occur in many different ways. Students' investigative and problem-solving skills and attitudes are developed by requiring them to perform investigative projects using a variety of approaches: classifying and identifying, pattern seeking, exploring, investigating models, fair testing, making things or developing systems. Students' questions can arise from previous investigations, planned classroom activities or questions students ask each other. In secondary schools, students are given opportunities for both laboratory-/fieldwork-based inquiry and literature-/media-based projects that in later schooling years are carried out independently.

3. Communicating in Science

Students develop the ability to communicate Science ideas to others using the vocabulary, symbol systems and conventions of Science. Students learn that distinctive ways of communicating and representing ideas occur within the Science community and that these ideas are open to debate and review.

4. Participating and contributing

Students link their Science knowledge to actions and decisions in everyday life. Students study and debate a range of socio-scientific issues that are relevant to them so that they can formulate responses at both the personal and societal levels; for example, the usage and disposal of plastic bags in an atoll environment and the extent of antibiotic usage for remedying minor ailments. This promotes students' ability to research relevant information that enables a well-founded argument. Discussion of the ways that society uses many Science concepts to enhance lifestyles provides students with a rationale for studying Science. This aspect of learning Science gives students a means to understand and act on personal and social issues.

Students in all schooling years and within each strand should have opportunities to use scientific inquiry and develop the ability to think and act in ways consistent with 'doing Science', such as asking questions, planning and conducting investigations, using appropriate tools and techniques to gather evidence, thinking critically and logically about relationships between evidence and explanations, constructing and analysing alternative explanations, and communicating scientific arguments. It is intended that the components of this strand are incorporated into the learning opportunities centred on the four other strands so that students can apply their scientific understanding to finding answers to their questions.

The progression of outcomes for the Nature of Science strand is identified for every two years, providing the flexibility of a two-year period to work towards achieving the identified processes and skills. Progression through the levels of outcomes in the other strands and use of the processes and skills provide opportunities for students to demonstrate their understandings and application of key concepts. The components of the Nature of Science strand need to be considered when planning learning experiences and assessment tasks in the other four strands of the Science curriculum.

Concepts associated with the Nature of Science strand

Understanding about Science

- Scientists ask questions about the world that lead to investigations.
- Science is a way of explaining the world, but there can be more than one way to explain something.
- Science distinguishes itself from other ways of knowing through the use of empirical standards and logical arguments as scientists strive for the best possible explanations about the natural world.
- Scientists assume that the universe is a vast single system in which the primary rules are the same everywhere. The rules may range from very simple to extremely complex, but scientists operate on the belief that the rules can be discovered by careful, systematic study.
- Scientific explanations emphasise evidence, have logically consistent arguments and use scientific principles and theories. The scientific community accepts and uses such explanations until they are displaced by better scientific explanations and Science advances.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.
- Radical changes in Science sometimes result from the appearance of new information and sometimes from the invention of better theories.
- Scientific explanations must meet certain criteria; they must: be consistent with experimental and observational evidence about nature, make accurate predictions about the systems being studied and be logical.
- As all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available.
- The core ideas of Science have been subjected to a wide variety of confirmations and are unlikely to change. In areas where data is incomplete, such as human evolution, new data may lead to changes in thinking.
- All scientific ideas are tentative and subject to change and improvement, in principle; however, for

most major ideas in Science, there is much experimental and observational confirmation and these ideas are not likely to change greatly in the future.
- Scientists change their ideas about the natural world when new experimental evidence does not match their existing explanations.
- Changes in Science usually occur as small modifications to Science knowledge so that Science makes incremental advances.
- Science knowledge changes over time.
- Conceptual principles and knowledge guide scientific inquiries.
- Historical and current scientific knowledge influences the design and interpretation of investigations.
- People have practiced Science for a long time.
- Some scientific knowledge is very old, yet is still applicable today.
- Men and women have made a variety of contributions throughout the history of Science.
- Women and men of all ages, backgrounds and groups engage in a variety of scientific work.
- Many different people in different cultures have made and continue to make contributions to Science.
- Although men and women using Science investigations have learned much about objects, events and phenomena in the natural world, much more remains to be understood. Science will never be finished.
- Tools help scientists make better observations, measurements and equipment for investigations. They help scientists measure, see and do things that they could not otherwise measure, see or do.
- Many people choose Science as a career and devote most of their lives to studying it. Many people get pleasure from doing Science and finding out about things.
- Asking questions, querying other's explanations and suggesting alternative explanations is part of Science.
- Science cannot answer all questions.
- Science is a human endeavour and relies on human qualities such as ordered thinking, openness to new ideas and honesty.
- Scientists have ethical codes that they should work to, such as truthful reporting and making public the results of their work.
- Some scientists work alone, others in groups, but all communicate with others.
- Scientists review and ask questions about the results of other scientists' work.
- Some matters cannot be examined usefully in a scientific way, such as matters of morality. However, Science can be used to inform ethical decisions by identifying the likely consequences of particular actions.
- The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.
- Advances in Science that have been important and made long-lasting effects include: plate tectonics, atomic theory, biological evolution, molecular biology, Newtonian mechanics, geologic time scale and information technology.

Investigating in Science

- Personal explanations of the natural world arise though exploration and asking questions.
- Scientists formulate and test their explanations of nature using observation, experiments and theoretical and mathematical models.
- A scientific investigation involves asking and answering a question and comparing the answer with what scientists already know about the world.
- Scientists use different kinds of investigations depending on the questions they are trying to answer. Different kinds of questions suggest different kinds of scientific investigations.
- Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting).

- Instruments and tools, such as magnifying lenses, provide more information than people obtain from their senses unaided.
- Current scientific knowledge and understandings guide scientific investigations. Different areas of Science use different methods, theories and instruments.
- Scientific investigations sometimes result in new ideas for study and new methods or procedures to improve the collection of data.
- Science investigations generally work the same way in different places.
- When a Science investigation is done the way it was previously, a similar result should occur.
- Sometimes, unexpected differences in results do arise. These may be due to uncertainties in observations or unexpected differences in the things being investigated. Such differences need to be judged to find out whether they are trivial or significant.
- Hypotheses are widely used in Science for choosing which data to pay attention to and additional data to seek and for guiding the interpretation of the data.
- Sometimes, scientists can control conditions to obtain evidence. When that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns.

Communicating in Science

- Scientists communicate their ideas to others using special vocabulary, symbol systems and conventions that belong to Science.
- Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations.
- Clear communication is an essential part of doing Science. It enables scientists to inform others about their work, expose their ideas to the criticism of other scientists and stay informed about scientific discoveries around the world.

Participating and contributing

- Everyone can do Science and invent things and ideas.
- The knowledge and technology that result from Science eventually becomes available to everyone worldwide.
- Science influences society through its knowledge and world view.
- Scientific knowledge and procedures used by scientists influence the way many individuals in society think about themselves, others and the environment.
- The effect of Science on society is neither entirely beneficial nor entirely detrimental.
- Challenges in society often inspire questions for scientific research.
- Safety is an important human need and involves following safety rules at home and school.
- Nutrition is essential to health. Individuals have some responsibility for their own health.
- Different substances can damage the body and its functions; for example, tobacco and alcohol.
- Preventing the abuse and neglect of the environment is important for sustaining quality lifestyles.
- Understanding of the primary concepts of Science should precede active debate about the policies and utilisation of various technologies.
- Humans have a major influence on other species through land use and pollution.
- Science is not separate from society; rather, it is a part of society.

Strand 2: The World of Life

In their study of The World of Life, students should appreciate that there is a great diversity of living and non-living things in the world. The study of the diversity of living things will also allow students to appreciate the importance and necessity of maintaining this. Students will understand that living things share similarities in their structures and functions. They will develop the abilities to compare and identify similarities and differences in the structures and mode of life of living things. Scientists seek to organise the great variety of living things to better understand the world in which we live. Students will understand that there are common threads that connect all living things and unifying factors in the diversity of non-living things that help to categorise them.

Students will understand how all organisms depend on the living and non-living components of their environment for survival. They will investigate the ways plants and animals live in their particular environment to develop an understanding of those structures that enable these organisms to survive in their environments, with a particular focus on Sāmoan environments. By identifying patterns of interactions and interdependence within environments, students will recognise that these interactions contribute to the dynamics of environments. Their understanding about the role of the environment includes ideas about energy flow and nutrition. The concept of the adaptation of living things to a changing environment introduces to students the current environmental problems the world faces today. Students will develop ideas and solutions to mitigate or combat these problems.

A foundational understanding of human and plant biology is developed using the idea of 'structure-function', where organs function together to maintain life. A progression from considering the cellular level of individual organisms to recognising patterns in ecosystems (including the ways that populations interact with each other and with their environment) helps students develop an understanding of the concept of a system as an organised group of related components that form a whole and how this applies to the world of life.

Conceptual scheme of content associated with The World of Life strand

1. LIFE PROCESSES *Comparing the structures, functions and life processes of living things.* **Key concept:** *The structures and functions of an organism are interrelated.*	2. THE DIVERSITY OF LIVING THINGS *Ways of describing and systematically classifying the diversity of living things.* **Key concept:** *Living things can be grouped according to their characteristics.*	3. ECOLOGY AND THE ENVIRONMENT *Identifying the interdependence of living organisms with each other and with their environment.* **Key concept:** *Environments are dynamic and have living and non-living components that interact with each other.*
CHARACTERISTICS OF ORGANISMS **Characteristics of living and non-living things** Living things have certain features not found in non-living things; e.g. they require food, reproduce, breathe, respond to changes in their environment and most move around on their own. **Living things have primary needs** ***Needs of organisms*** Animals need air (oxygen), water, food, warmth (suitable temperature) shelter; plants need air (carbon dioxide, oxygen), water, sunlight, warmth (suitable temperature) and minerals. **Structure is related to function in organisms** Living things have a great variety of different structures that serve different functions in making or obtaining food, growth and reproducing, thus enhancing the chances of survival and further generations. Humans have different structures for walking, seeing, talking, etc. ***Observable features of plants and animals*** • External – body covering, head, sense organs, limbs and other appendages (e.g. wings), external skeleton, leaves, roots, stems, flowers (petal, stigma, anther, pollens, nectar) • Internal – tissues, organs, systems	**DIVERSITY** **Living things can have similar or different characteristics** There are many different living things in the world. Some plants and some animals are alike while others are not. Living things can be grouped in certain ways, including by using Science-based classification keys. • Methods of obtaining nutrition and using air • Plants – flowering/non-flowering • Animals – body coverings, appendages, habitats, vertebrates and invertebrates **LIFE CYCLES** **Changes in an organism over time: life cycles of plants and animals** • Being born • Infant to adult/Metamorphosis/Puberty • Flower to seed to mature plant • Reproducing • Ageing and dying **CHANGE AND ADAPTATIONS** **Adaptations** Adaptations give each type of organism their unique characteristics.	**ORGANISMS AND THEIR ENVIRONMENT** **Living things are suited to their particular surroundings** Different environments in the world support the life of different organisms. ***Types of environments: aquatic/terrestrial*** Organisms can survive only in environments in which their needs are met, e.g. available food, suitable temperature. **Interdependence of living things in an ecosystem** ***Natural relationships*** All animals depend on plants – some eat plants for food; others eat animals that eat plants – food chains, food webs. All organisms, including humans, cause changes to their environment – some are beneficial to them and other living things and others are detrimental. Humans depend on their natural and created environments for survival. **INFLUENCE OF THE SURROUNDINGS ON ORGANISMS** **Environmental factors affect life processes and the survival of organisms** ***Components of environment: biotic (other organisms), abiotic (amount of sunlight, range of temperatures, soil composition, availability of food and living space, etc.)*** ***Features of different environments*** Patterns of behaviour for organisms are related to factors in the environment, such as physical characteristics as well as the kinds and numbers of other organisms present and the availability of food and resources. When an environment changes, some plants and animals survive and reproduce; others die or move to new locations.

1. LIFE PROCESSES *Comparing the structures, functions and life processes of living things.* **Key concept:** *The structures and functions of an organism are interrelated.*	2. THE DIVERSITY OF LIVING THINGS *Ways of describing and systematically classifying the diversity of living things.* **Key concept:** *Living things can be grouped according to their characteristics.*	3. ECOLOGY AND THE ENVIRONMENT *Identifying the interdependence of living organisms with each other and with their environment.* **Key concept:** *Environments are dynamic and have living and non-living components that interact with each other.*
STRUCTURE AND FUNCTION IN LIVING SYSTEMS Structure and function are linked at all levels of organisation for living systems – cells, tissues, organs, organ systems, whole organisms, population, community and ecosystems. **Concept of a system** **An organised group of related components that form a whole.Common attributes of living things** Movement, respiration, sensitivity, cell division, growth, reproduction, excretion, nutrition (known by the mnemonic acronym 'MRSCGREN'). **Structural features of living things** ***Functioning of systems of animals: digestive, respiratory, sensitivity*** These systems interact with one another. ***Functioning of systems of plants: photosynthesis, reproduction***	***Adaptations: structural, functional, behavioural*** Organisms must obtain food and reproduce while living in constantly changing environments. Organisms can change over long periods of time as they adapt to their environment to enhance survival and reproductive success.	**POPULATIONS AND ECOSYSTEMS** **Populations** A population consists of all individuals of the same type of plant/animal that occur together at a given place and time. With adequate resources and no disease/predators, populations increase at rapid rates. Lack of resources and other limiting factors, such as unfavourable climate, hinder the growth of populations. Populations of organisms can be classified by the function they serve in an ecosystem. **Ecosystems** Communities of living organisms existing together in a particular area and interacting with each other and with their physical surroundings make up an ecosystem. Organisms both cooperate and compete in ecosystems. • The composition and roles of coastal, land and marine ecosystems: • two main global food webs operate (one marine based and the other land based) that humans are a part of and depend on • roles of organisms – producers, consumers, decomposers food chains and food webs – identify the relationships between producers, consumers, decomposers. **IMPACTS ON ECOSYSTEMS** **Human influence** Humans modify ecosystems as a result of population growth, technology and consumption. Human activities affecting ecosystems include deforestation, land degradation, over-harvesting, habitat destruction, urbanisation and tourism/ ecotourism. **Natural events affect ecosystems** The effects of fire, flood, drought and earthquakes. **AN ENVIRONMENTAL ISSUE** **Local conservation issue: land, water, biodiversity** **Global environmental issue: climate change, acid rain, sea level rise, pollution, waste disposal, natural disasters**

Strand 3: The World and Beyond

In their study of The World and Beyond, students will understand and appreciate that the universe, of which the Earth is a part, has many components. Students explore ideas about the dynamic nature of the Earth, solar system and universe. They develop an understanding that events on Earth, in the solar system and in the universe occur on different scales of time and space.

Students will understand that the Earth is an unusual planet that possesses exactly the right conditions and characteristics to allow life as we know it to exist. They will develop understanding of the characteristic features of Earth and the universe. This will involve students closely exploring objects and materials in their environment to understand how things become the way they are. Students will also examine features of the sky and universe by describing how the position and movement of the Sun, Moon and stars change in a regular and predictable way, such as the phases of the moon and day and night.

Students will develop an understanding that Earth is part of a changing system and is also a changing system itself. They will be aware of and identify changes that can occur primarily on the surface of the Earth where land is exposed to wind, rain and the sea.

Students will understand issues relating to the use of resources and the availability, extraction and processing of resources and disposal of unwanted products. Promoting community awareness of environmental conservation and establishing sustainable resource management are major educational goals of the Sāmoan Curriculum and should be some of the primary focuses of the Science curriculum. Concepts relating to the impact of human activities on the Earth and the pressures they place on natural systems, the limited nature of many of the Earth's resources, natural and human-induced hazards and the influence that humans have on other organisms are all essential components of a Science curriculum.

Conceptual scheme of content associated with The World and Beyond strand

1. THE EARTH, SOLAR SYSTEM AND THE UNIVERSE *The Earth, solar system and universe are dynamic systems that can be explained using ideas from Science.* **Key concept:** *Astronomical cycles are found in the Universe, of which Earth is a component.*	2. CHANGES OVER SPACE AND TIME *Events on Earth, in the solar system and in the universe occur on different scales of time and space.* **Key concept:** *Change happens to many things, including components of the Earth.*	3. THE EARTH'S RESOURCES *Resources meet the needs and wants of a population, but the supply of many resources is limited.* **Key concept:** *Living things use the resources of the Earth and the Sun to meet their needs.*
THE EARTH AS A SYSTEM **Features: rock types, soil, wind, clouds** Clouds are formed by the condensation of water vapour and affect the weather and climate. **Components: layers of the Earth, hydrosphere, lithosphere, atmosphere** The solid Earth is layered with a lithosphere; hot, fluid mantel; and dense metallic core. The atmosphere is a mixture of gases and includes water vapour. **Interactions occur between components: corrosion, erosion, weathering** The sun is an external source of energy for the Earth's systems. **THE SOLAR SYSTEM AS A SYSTEM** **Features: sunrise/sunset, eclipses** **Components: Sun, Earth, Moon, other planets, comets, meteors** The sun provides the energy for phenomena on the Earth's surface, such as winds, ocean currents and the water cycle. Planets are shown to be different from stars by their appearance and their motion. **Interactions: orbits of planets/moons, rotations and revolutions** Most objects in the solar system are in regular and predictable motion. Other planets in our solar system are all orbiting around the sun.	**CHANGES ON EARTH AND BEYOND** Earth cycles shape the structure of Earth over both long and short periods of time. The surface of the Earth changes – sometimes slowly, e.g. erosion, weathering, sometimes rapidly, e.g. earthquakes, landslides, volcanic eruptions. Major geological events, such as earthquakes, volcanic eruptions and mountain building result from movement of plates. **Cyclical: day–night, seasons, tides, phases of the moon** The rotation of Earth on its axis produces the day–night cycle. To people on Earth, this turning of the planet makes it seem as though the Sun, Moon and stars are orbiting the Earth once a day. **Catastrophic: droughts/floods, earthquakes, tsunamis, volcanic eruptions** **Rock cycle, water cycle** Old rocks at the Earth's surface weather, forming sediments that are buried, then compacted, heated and often recrystallised into new rock that is eventually pushed back to the surface of the Earth to continue the rock cycle. Water covers the majority of the Earth's surface and is circulated through the crust, oceans and atmosphere. Water carries dissolved minerals and gases into the oceans. **Weather, climate, seasons** Weather changes daily and over seasons. Weather can be described by measurable quantities, e.g. temperature, wind direction and speed, rainfall. Global patterns of atmospheric movement influence local weather.	Conditions for life are sustained by the interaction of natural cycles and are influenced by human activity. **RESOURCES** 'Resources' are things that living organisms get from the living and non-living environment to meet their needs and wants. Some resources are primary materials, e.g. air, water and soil; some are produced by primary resources, e.g. food, fuels and building materials; some are non-material, such as security, quiet places, safety. The supply of many resources is limited. **Properties of the Earth's materials** The Earth's materials are solid rocks and soils, water and gases in the atmosphere. The main components of soil are rocks, air, water and organic matter from dead plants, animals, fungi and bacteria. Soils have the properties of colour, texture, capacity to retain water, ability to support growth of a range of plants. **USING RESOURCES FROM THE EARTH** The Earth's materials provide many of the resources that humans use. The varied materials have different properties which make them useful in different ways: • minerals • building materials • materials used in commercial products • sources of fuel • growing plants for food.

1. THE EARTH, SOLAR SYSTEM AND THE UNIVERSE *The Earth, solar system and universe are dynamic systems that can be explained using ideas from Science.* **Key concept:** *Astronomical cycles are found in the Universe, of which Earth is a component.*	2. CHANGES OVER SPACE AND TIME *Events on Earth, in the solar system and in the universe occur on different scales of time and space.* **Key concept:** *Change happens to many things, including components of the Earth.*	3. THE EARTH'S RESOURCES *Resources meet the needs and wants of a population, but the supply of many resources is limited.* **Key concept:** *Living things use the resources of the Earth and the Sun to meet their needs.*
Gravity is the force that keeps planets in orbit around the sun. The influence of the Moon's gravity on Earth's oceans causes tidal movement.	**Phases of the moon, day/night** **Position of stars, planets** Objects in the sky have patterns of movement, e.g. Sun, stars, Moon. The patterns of stars stay the same, although they appear to move across the sky. Planets change their position against the background of stars.	**RENEWABLE/NON-RENEWABLE RESOURCES OF THE EARTH** Soil is an important natural, renewable resource, but its composition may be changed by human activities. **Caring for the environment** • Managing human impact on land • The benefits of the Earth's soil resources can be reduced inadvertently by human activity. • Methods of soil conservation to sustain ecosystems. ○ Cleaning up polluted soil or restoring depleted soils can be very difficult and costly.

Strand 4: The World of Materials

Students will explore the material world around them by observing, comparing, describing, sorting and manipulating common objects and materials in their environment. Understanding how materials behave in their natural state and under certain conditions will help them to understand why objects are made of specific materials.

Students will learn about the properties of materials or combinations of materials and how materials are affected by temperature. Investigation of the properties of substances and how they can be changed should occur through experimental work.

Students will use their observations of a range of properties of materials to group them in different ways. They will develop skills of observing, comparing, interpreting and explaining the basis of grouping.

Students will explore the differences between chemical and physical properties of substances by considering whether the process is reversible or whether new substances are made when the change occurs. Explanations for the differences in these changes can be explained by considering the particles of which the substances are made. By the end of their primary years, students should be able to describe changes of state (physical changes) using particle theory.

Typically, the properties of materials determine their use as components in manufactured objects. In carrying out comparative tests on different materials, students develop an understanding of suitability for different purposes. They then begin to develop the skills themselves to choose the best materials for certain tasks. When testing materials for properties, it is important that students begin to use the correct scientific terms.

Issues relating to the use of objects to meet needs in society are also introduced to students and they are also made aware of the relationship between some manufactured materials and current local and global environmental issues. By understanding this relationship between people and their environment, students can better appreciate the consequences of their actions and be responsible for their actions.

Conceptual scheme of content associated with The World of Materials strand

1. PROPERTIES OF MATTER AND STRUCTURE	2. CHANGES TO MATERIALS	3. USES OF MATERIALS
The properties of materials are related to their structure and composition and can be explained using the idea of the particle nature of matter. **Key concept:** *All substances are composed of extremely small particles that determine the properties of a substance.*	*Materials can undergo permanent (chemical) changes or temporary (physical) changes in everyday situations that can be predicted and controlled.* **Key concept:** *Materials can undergo physical changes and chemical changes.*	*Materials can be used to benefit people's lives but may have adverse effects if used inappropriately.* **Key concept:** *The appropriate uses of materials are related to their properties.*

PROPERTIES OF OBJECTS AND MATERIALS
Objects have many observable physical properties and characteristics, such as size, weight, shape, colour, hardness, texture, temperature, flexibility, conduction of heat and electricity, buoyancy, transparency and absorbency. These properties can be measured in some way, e.g. using rulers, balance, thermometers.
Objects are made of one or more materials, such as paper, wood, plastic, rubber, metal.
Objects can be described in terms of the materials they are made of, e.g. clay, paper, cloth.
Objects can also be described by the properties of the materials from which they are made. Some properties, such as size and shape, can be assigned only to the object, while other properties, such as colour and hardness, describe the materials from which objects are made.
Properties can be used to sort, separate and group objects or materials.
 	
Properties of materials
• Colour, lustre, texture, acoustic characteristics
• Porosity
• Transparency, translucency, opacity
• Magnetic, non-magnetic
• Buoyancy: float/sink in water
• Solubility* in cold/hot water
• Hardness, flexibility, viscosity
• Conductivity: heat/electricity
 	
*The amount of a substance that can be dissolved in a certain quantity of solvent depends on temperature.
 	
CHEMICAL SUBSTANCES
Materials are made up of one or more chemical substances.
	PHYSICAL AND CHEMICAL CHANGES
	Things can be done to materials to change some of their physical properties, such as size and shape, but not all materials respond the same way to what is done to them, e.g. squashing, bending, twisting, stretching.
	Heating and cooling cause changes in the properties of materials.
	Many kinds of changes occur faster under hotter conditions.
	Energy, usually as heat, is transferred into or out of a chemical system whenever a change occurs.
	
	Physical change
	Physical (temporary) changes can be reversed fairly easily, as the substance remains the same substance.
	Substances can be changed from one state to another by heating or cooling.
	
	Reversible changes
	The water cycle changes water to various stages through reversible processes like evaporation, condensation, heating, melting, freezing.
	
	Chemical change
	Chemical (permanent) changes are not easy to reverse, as new substances have been formed.
	Substances react chemically with each other in characteristic ways to form new substances with different properties from those found in the original substances.
		OCCURANCE OF SUBSTANCES
		All materials, natural and manufactured, are chemical substances.
		Some objects occur in nature; others have been designed and made by people to solve human problems and enhance quality of life.
		
		Natural materials
		• Organic
		  ○ Plants: wood, fibres
		  ○ Animals: wool, leather, bone
		• Inorganic (non-living)
		  ○ Rocks, minerals
		
		Changes made to properties of materials to meet required uses
		Chemical reactions produce materials that are useful to people, e.g. metals from ores, the creation of new drugs and medicines, the manufacture perfumes and cosmetics, the synthesis of polymers and plastics.
		
		Processed materials
		• Metals: alloys
		• Plastics
		• Synthetic fibres
		• Paper
		• Glass
		• Brick
		• Cement
		• Ceramics
		• Galvanised iron for roofing

1. PROPERTIES OF MATTER AND STRUCTURE *The properties of materials are related to their structure and composition and can be explained using the idea of the particle nature of matter.* **Key concept:** *All substances are composed of extremely small particles that determine the properties of a substance.*	2. CHANGES TO MATERIALS *Materials can undergo permanent (chemical) changes or temporary (physical) changes in everyday situations that can be predicted and controlled.* **Key concept:** *Materials can undergo physical changes and chemical changes.*	3. USES OF MATERIALS *Materials can be used to benefit people's lives but may have adverse effects if used inappropriately.* **Key concept:** *The appropriate uses of materials are related to their properties.*
Chemical substances make up everything that is living and non-living in the world and can be referred to collectively as *matter*. *Matter* is anything that has mass and occupies space and includes all chemical substances. When a new material is made by combining (rather than mixing) two or more materials, it has properties that are different from the original materials. Many different materials can be made from a small number of primary materials. PROPERTIES OF SUBSTANCES Materials and substances can exist in different states with distinct characteristics – solid, liquid and gas. Particles making up materials are perpetually in motion. Solids, liquids and gases differ in the position and movement of the particles making up the substance: in solids, particles vibrate around fixed positions; in liquids, particles move randomly with greater motion and can slide past one another but are close; in gases, particles have still more energy of motion and are mostly far apart, moving almost independently of each other apart from occasional collisions. Materials made up of only one substance are referred to as 'pure', while materials made up of more than one substance are referred to as a 'mixture'. A pure substance has definite characteristic properties that can be observed and/or measured: melting point, boiling point, solubility, density, chemical reactivity. These are all independent of the amount of the sample. Properties of pure substances are used to distinguish and separate one substance from another. Properties of substances are related to their structure, the types of particles of which they are made and the nature of the interactions among those particles. Physical properties can be measured without changing the substance, e.g. melting point, hardness, colour, density.	Chemical reactions occur everywhere in the world and are happening all the time, e.g. cooking, in cars, in our bodies. Some chemical changes (reactions) release large amounts of energy by losing heat and emitting light, e.g. burning fuels such as wood and cooking gas. In chemical reactions, the total mass is conserved (no matter is created or destroyed), regardless of how substances combine or break apart. The total number of atoms present does not change during their rearrangement in a chemical reaction. An important type of chemical change involves the combination of substances with oxygen (e.g. burning/combustion, rusting, corrosion).	USES OF MATERIALS • Building • Tools • Clothing • Food • Cleaning • Medicine • Recreation **Effects of using man-made compounds and materials on the environment** • Pollution; waste disposal; recycling • Greenhouse effect from carbon dioxide accumulation

1. PROPERTIES OF MATTER AND STRUCTURE *The properties of materials are related to their structure and composition and can be explained using the idea of the particle nature of matter.* **Key concept:** *All substances are composed of extremely small particles that determine the properties of a substance.*	2. CHANGES TO MATERIALS *Materials can undergo permanent (chemical) changes or temporary (physical) changes in everyday situations that can be predicted and controlled.* **Key concept:** *Materials can undergo physical changes and chemical changes.*	3. USES OF MATERIALS *Materials can be used to benefit people's lives but may have adverse effects if used inappropriately.* **Key concept:** *The appropriate uses of materials are related to their properties.*
Chemical properties describe the types of reactions a substance can take part in that result in the formation of a new substance, e.g. ability to burn in air, corrode in water. A mixture is made up of a solute and a solvent. A mixture of substances can often be separated into pure substances using differences in one or more of the characteristic physical properties of the substances, such as boiling point, density, solubility. **Techniques for separating mixtures** • Filtration • Decantation • Distillation • Evaporation • Sieving • Chromatography • Magnetic attraction Some substances cannot mix, they form emulsions, e.g. water and oil. **CLASSIFYING SUBSTANCES** Easily observable properties can be used to classify substances into groups, e.g. some materials are soluble while others are insoluble. Pure substances are often placed in categories or groups if they behave similarly and react in similar ways, e.g. metals, non-metals, acids, bases. Metals are elements that are shiny, malleable and ductile and conduct electricity. Non-metal elements are usually gases and are not visible.		

Strand 5: The World of Physical Phenomena

In their study of The World of Physical Phenomena, students will explore, observe and describe a wide range of physical phenomena that occur in their everyday lives, such as light, sound, heat, electricity, magnetism, and forces and motion. These phenomena are united by the concept of 'energy'.

Students will conduct investigations to develop an understanding of the importance of forces and energy in their daily lives. They will investigate the effects of forces on an objects motion and shape.

Students will investigate how energy affects and is used by both living and non-living things. They will explore the many forms of energy and how one form can be converted to another. Students will learn that energy is conserved when it is transformed from one form to another or when it is transferred to a different system. They will investigate ways of conserving energy so that it is used efficiently and not lost to the surroundings.

With particular reference to Sāmoan environments, students will consider energy sources and methods of harnessing energy and analyse the way energy is used. They will explain the importance of energy conservation and investigate ways of using energy efficiently in a sustainable manner.

Conceptual scheme of content associated with The World of Physical Phenomena strand

1. FORCES AND MOTION *The behaviour of an object can be analysed and described in terms of the forces acting on it.* **Key concept:** *Forces act on objects and influence their motion, shape and energy.*	2. FORCES OF NATURE *Forces of nature include gravitational and electromagnetic forces.* **Key concept:** *Forces of nature act on objects at a distance.*	3. USING ENERGY *Energy transfer and transformation can be put to use to assist everyday life. Energy transfer and transformation is associated with physical events.* **Key concept:** *There are different forms of energy and many ways of using energy.*
ORIGIN OF MOTION **Position and motion of objects** The position of an object can be described by locating it in relation to another object or the background. The location of an object can be described as up, down, in front or behind and can be changed by moving the object. An object's motion can be described by measuring its position over time. Objects can be moved by pushing, pulling, throwing, dropping (due to gravity), sliding and rolling. The speed of an object can be determined as fast, faster or fastest. Something that is moving may move steadily or may change its direction if a force is applied. To change an object's speed, or bend or stretch an object, to heat or cool things, or to push things together or pull things apart all require transfers (and some transformations) of energy. **FORCES** Forces cause motion, as shown by simple objects such as rolling balls and mechanical toys. Change in motion is proportional to the force applied. The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull required (to overcome the friction present).	**GRAVITATIONAL FORCE** Gravity is an attractive force that a mass exerts on any other mass. The strength of the attractive force is related to the sizes of the masses and the distance between them. On Earth, the Moon and other planets, gravity is relative to size. Gravity is everywhere in the universe. Every object exerts gravitational force on every other object. The force depends on how much mass the objects have and on how far apart they are. Gravity becomes appreciable only when a very large mass is present. The Earth's gravity *pulls* an object towards the surface of the Earth without touching it. Objects have weight because of the gravitational force between them and the Earth. The Sun's gravitational pull holds the Earth and other planets in their orbits; Earth's gravity keeps the Moon in orbit around the Earth. Gravity is a weak force compared with electric and magnetic forces. **MAGNETIC FORCE** **Magnetism: attraction and repulsion, North and South poles, magnetic and non-magnetic materials** Magnets can exert a push or a pull. They have two poles, the North and South. Unlike poles attract and like poles repel. Magnets attract magnetic materials.	**ENERGY** Energy is required for different purposes. Humans get energy from food. The Sun warms the land, air and sea. People burn fuels or use electricity to cook food. Energy is needed for doing work or making things 'go'; keeping anything going uses up a resource. Different forms of energy include heat (thermal), light, sound, electrical, gravitational, elastic, nuclear and kinetic energy (the energy associated with movement). The Sun is a major source of energy for changes on the Earth's surface. The Sun loses energy by emitting light. A small amount of that light reaches Earth, transferring energy from the Sun to the Earth. Energy from the Sun (and the wind) is available indefinitely. The energy available from burning fossil fuels comes from the Sun indirectly, as fuels come from plants that grew long ago. Energy can be considered either kinetic (energy of motion) or potential (energy of relative position – elastic, gravitational, chemical, mechanical). **ENERGY TRANSFORMATION** Energy cannot be created or destroyed (under normal conditions), only changed from one form into another. Energy is transferred in many ways and its origin and where it goes next can be traced. Energy transformation can involve several different forms of energy: the motion of objects, heat, light and other radiation, chemical and elastically distorted materials. The total energy of the universe is constant. However, heat is almost always one of the products of an energy transformation and often diffuses away into the cooler surroundings, so that the total amount of energy available for useful transformation is almost always decreasing.

1. FORCES AND MOTION *The behaviour of an object can be analysed and described in terms of the forces acting on it.* **Key concept:** *Forces act on objects and influence their motion, shape and energy.*	2. FORCES OF NATURE *Forces of nature include gravitational and electromagnetic forces.* **Key concept:** *Forces of nature act on objects at a distance.*	3. USING ENERGY *Energy transfer and transformation can be put to use to assist everyday life. Energy transfer and transformation is associated with physical events.* **Key concept:** *There are different forms of energy and many ways of using energy.*
Friction: opposing motion, everyday applications and implications Friction causes all moving objects to slow down and stop (it does *not* cause the force to be used up). A moving object with no friction (or 'retarding force') would continue to move indefinitely (at the same speed without any forces acting on it). Static objects have balancing forces. When one object exerts a force on another, a force equal in magnitude and opposite in direction is exerted on the first object – 'action and reaction'. **Balanced/Unbalanced forces: forces acting in pairs** **Motion** Categories of motion include steady motion, speeding up and slowing down. Some things move too fast for people to see them. Objects change their motion only when a net force is applied: the greater the force is, the greater the change in motion will be; the more massive an object is, the less effect a given force will have (change in motion of an object is proportional to the applied force and inversely proportional to the mass). **Sound** Sound is produced by vibrating objects. There are different types of sounds, vibration, pitch, frequency, volume, echo, travel of sound; e.g. the difference in sound between a lali, pate, drum and bell.	Magnets attract and repel each other and certain kinds of materials without touching. **ELECTRICITY** Many things use electricity. Electricity is the movement of electrically charged particles through a material. Electricity in circuits can produce light, heat, sound and magnetic effects. Electrical circuits require a complete loop though which electricity can pass. Electrical circuits provide the means of transferring electrical energy when heat, light, sound and chemical changes are produced. Electricity is the movement of electrically charged particles. **Electrical current, circuits, circuit symbols and diagrams, conductors, insulators**	**Energy transfers** Those that occur in: • the home – moli ga'o compared with moli karasini, moli eletise; gas versus electricity uses • the community, e.g. ailao afi • transportation, e.g. wind energy in canoes, petrol outboard motors on boats. **HEAT (THERMAL) ENERGY** Heat can be produced in many ways, such as burning or rubbing objects. Heat is produced by mechanical and electrical machines. **Heat energy: transferred by conduction, convection, radiation** Heat can be transferred through materials by collisions of atomic-level particles or across space by radiation. Heat spreads from one place to another by radiation or conduction – from warmer objects to cooler ones until both reach the same temperature. 'Coldness' results from transfer of heat. Some materials conduct heat better than others. Poor conductors can reduce heat loss. 'Temperature' is a measure of the amount of heat in an object or amount of energy required for different activities. Temperature can be measured with a thermometer using the Celsius scale. **SOURCES AND USES OF ENERGY:** **Sources** • Chemical: fossil fuels – coal, oil, gas; wood; coal-fired power stations, diesel electricity generators; the Sun –solar hot water • Wind • Biofuels, e.g. coconut oil • Tidal • Sāmoan: traditional and current sources – the Sun, wind, batteries Some energy sources cost less than others and some cause less pollution than others.

1. FORCES AND MOTION *The behaviour of an object can be analysed and described in terms of the forces acting on it.* **Key concept:** *Forces act on objects and influence their motion, shape and energy.*	2. FORCES OF NATURE *Forces of nature include gravitational and electromagnetic forces.* **Key concept:** *Forces of nature act on objects at a distance.*	3. USING ENERGY *Energy transfer and transformation can be put to use to assist everyday life. Energy transfer and transformation is associated with physical events.* **Key concept:** *There are different forms of energy and many ways of using energy.*
Light It is dark when there is no light. ***Light: reflection, refraction*** Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens or absorbed by an object. Light from the Sun is the main source of light on Earth and this is made up of a mixture of different colours – rainbows.		**Conservation of energy** • Traditional • Design efficiency – e.g. refrigerators, heaters • Social and cultural patterns of energy use People try to conserve energy to slow down the depletion of energy resources and/or to save money. **Consequences of energy use** Short-term effects – pollution Long-term effects – greenhouse effect Renewable/Non-renewable energy sources; long-term sustainability of an energy supply All fuels have advantages and disadvantages. Decisions to slow down the depletion of energy sources through efficient technology can be from personal to national level.

Science achievement objectives and learning outcomes by year level

Note: Achievement objectives are labelled by year, then strand and, lastly, specific aim.

Year 1

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 1.1 show awareness that people ask questions about the world that lead to investigations to seek answers.	NS 1.1.1 ask questions about objects, organisms and events in the environment NS 1.1.2 seek information from reliable sources.
Investigating in Science	NS 1.2 investigate their surroundings by play, exploration and asking questions.	NS 1.2.1 make observations and record simple measurements NS 1.2.2 follow simple oral instructions NS 1.2.3 organise collections of gathered objects NS 1.2.4 use primary tools, such as lenses for magnification NS 1.2.5 create their own designs using available materials, such as sand, shells, used clothing, boxes, wood.
Communicating in Science	NS 1.3 describe the world around them in a variety of ways.	NS 1.3.1 share with others information obtained by observing NS 1.3.2 communicate their observations pictorially and verbally.
Participating and contributing	NS 1.4 explore an issue that links their Science learning to their daily lives.	NS 1.4.1 discuss what happens to plants and animals when water and food is not available to them NS 1.4.2 describe what happens when plastic bags are thrown into the sea.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 1.1 describe observable features of local plants and animals.	WL 1.1.1 use words to correctly describe the colour, shape, size, texture, movement of plants and animals around them, e.g. shiny, hard, smooth, soft, rough, strong, weak, thick, crawl, creeping, running, fast, slow, jump, tall, close to the ground.	WL 1.2.1, 1.2.2 and 1.2.3: Provide a learning opportunity for students to describe observable features of local plants and animals, begin to identify ways in which living and non-living things are different and identify features of the places where local plants and animals are found.
WL 1.2 begin to identify ways in which living and non-living things are different.	WL 1.2.1 identify features of living things from observations (they can move, grow, sense things) WL 1.2.2 list characteristics of non-living things (they cannot move on their own, do not eat, grow, reproduce or sense their surrounding).	
WL 1.3 identify features of the places where they find local plants and animals.	WL 1.3.1 identify the places that familiar plants and animals are located WL 1.3.2 state whether a named plant or animal is found on land, in the soil, in the sea, on the seashore, in a river, etc. WL 1.3.3 describe some features of these places (choosing from a list, e.g. windy, wet, dry, sunny).	

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 1.1 recognise the different features of the Earth and the sky.	WB 1.1.1 describe easily observable features of the Earth and sky, e.g. landforms, clouds, stars, rocks, sand, beaches, hills, mountains WB 1.1.2 compare the brightness of different stars and describe patterns in the sky.	WB 1.1 and 1.2: Provide a learning opportunity for students to recognise the different features of the Earth and the sky and recognise the changes that occur in the sky over the course of a day and the relationship between the presence of the Sun, darkness and light.
WB 1.2 recognise the changes that occur in the sky over the course of a day and the relationship between the presence of the Sun, darkness and light.	WB 1.2.1 trace the apparent motion of the Sun in the sky during the day WB 1.2.2 describe how the presence or absence of the Sun causes day and night.	
WB 1.3 recognise the way that living things use the day and night in different ways.	WB 1.3.1 draw a timeline of their activities for any one day of the week WB 1.3.2 join the timeline into a circle to represent the cyclic pattern of time WB 1.3.3 group their activities as being done when it is light or dark outside.	WB 1.3: Provide a learning opportunity for students to recognise the way that living things use the day and night differently.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 1.1 recognise the observable properties of a range of different everyday materials.	WM 1.1.1 use a variety of language to describe the properties of some common materials.	WM 1.1 and 1.2: Provide a learning opportunity for students to recognise the observable properties of a range of different everyday materials and explore some simple processes that change the shape and form of materials.
WM 1.2 explore some simple processes that change the shape and form of materials.	WM 1.2.1 describe how the shapes of objects can be changed by processes such as squashing, bending, twisting and stretching.	
WM 1.3 recognise the properties of materials used to make familiar objects.	WM 1.3.1 use a variety of language to describe the properties of the materials used to make familiar objects, e.g. clothes are made from fabric, which is soft and smooth.	WM 1.3: Provide a learning opportunity for students to recognise the properties of materials used to make familiar objects.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 1.1 recognise the changing motion of different objects.	WP 1.1.1 describe the changing motion of objects (speeding up, slowing down, going fast, going slow, stopping) WP 1.1.2 identify and describe ways that they can change the motion of objects.	WP 1.1: Provide a learning opportunity for students to recognise the changing motion of different objects.
WP 1.2 recognise the uses and sources of heat in their daily lives.	WP 1.2.1 identify ways heat is used in their daily lives, e.g. fire cooks food, sun heats water WP 1.2.2 identify the sources of heat used in daily life, e.g. gas is used to make the fire that cooks the food.	WP 1.2: Provide a learning opportunity for students to recognise the uses and sources of heat in their daily lives.

Year 2

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 2.1 show awareness that people ask questions about the world that lead to investigations to seek answers.	NS 2.1.1 ask questions about objects, organisms and events in the environment NS 2.1.2 seek information from reliable sources.
Investigating in Science	NS 2.2 investigate their surroundings by play, exploration and asking questions.	NS 2.2.1 make observations and record simple measurements NS 2.2.2 follow simple oral instructions NS 2.2.3 organise collections of gathered objects NS 2.2.4 use primary tools, such as lenses for magnification NS 2.2.5 create their own designs using available materials, such as sand, shells, used clothing, boxes, wood.
Communicating in Science	NS 2.3 describe the world around them in a variety of ways.	NS 2.3.1 share with others information obtained by observing NS 2.3.2 communicate their observations pictorially and verbally.
Participating and contributing	NS 2.4 explore an issue that links their Science learning to their daily lives.	NS 2.4.1 discuss what happens to plants and animals when water and food is not available to them NS 2.4.2 describe what happens when plastic bags are thrown into the sea.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 2.1 identify the requirements of familiar plants and animals for survival.	WL 2.1.1 describe plants' and animals' needs for survival (food, water, light, shelter, air, etc.) and relate these to their life processes (growth, reproduction, movement).	WL 2.1: Provide a learning opportunity for students to identify the requirements of familiar plants and animals for survival.
WL 2.2 use identified characteristics to group living and non-living things.	WL 2.2.1 sort familiar living and non-living things into groups based on observable features.	WL 2.2 and 2.3: Provide a learning opportunity for students to use identified characteristics to group living and non-living things and recognise how the needs of familiar plants and animals are met in their environment.
WL 2.3 recognise how the needs of familiar plants and animals are met in their environment.	WL 2.3.1 identify the sources of food, water and shelter for some familiar plants and animals in the local environment.	

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 2.1 recognise the variety of natural features of their local environment.	WB 2.1.1 compare some of the natural features of the local environment using both words and pictures or diagrams.	WB 2.1: Provide a learning opportunity for students to recognise the variety of natural features of their local environment.
WB 2.2 recognise that the local environment has changed over time.	WB 2.2.1 compare different aspects of the local environment as it appears today with what it was like in the past (using photos or stories from local people to portray the environment of the past) WB 2.2.2 suggest events that might have caused the changes to occur.	WB 2.2 and 2.3: Provide a learning opportunity for students to recognise that the local environment has changed over time and that different landforms are used by people in different ways.
WB 2.3 recognise that different landforms are used by people in different ways.	WB 2.3.1 describe in words and pictures the ways that landforms and natural features are used in their environment by people in their daily lives WB 2.3.2 match a local feature to a suitable activity, e.g. coastal area for shipping or swimming, mountain for hiking, river for fishing.	

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 2.1 recognise the similarities and differences in the observable properties of a range of different everyday materials.	WM 2.1.1 use an extended variety of language to describe the properties of some common materials WM 2.1.2 sort materials based on observable properties, e.g. hard, soft, shiny, fluffy, green.	WM 2.1, 2.2 and 2.3: Provide a learning opportunity for students to recognise the similarities and differences in the observable properties of a range of different everyday materials, and the types of materials that are needed for particular uses.
WM 2.2 recognise that it is easy to change the shape of some materials but not others.	WM 2.2.1 compare the actions needed to change the shape of different materials and sort materials according to their ability to be changed in different ways.	
WM 2.3 recognise the types of materials that are needed for particular uses.	WM 2.3.1 select an appropriate material for making a particular everyday object WM 2.3.2 explain their choice based on the observable properties of the materials.	

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 2.1 recognise how pushes and pulls change the motion or shape of an object.	WP 2.1.1 classify actions as pushes or pulls, e.g. stretching (pull), squeezing (push) WP 2.1.2 describe in words or pictures how an object changes when a push or a pull is applied WP 2.1.3 predict what will happen to an object when it is pushed or pulled WP 2.1.4 describe examples of activities they do which involve pulling and pushing, e.g. tosogamaea.	WP 2.1: Provide a learning opportunity for students to recognise how pushes and pulls change the motion or shape of an object.
WP 2.2 recognise that some forces act when objects are not touching.	WP 2.2.1 describe what happens to some metal objects when they are near a magnet WP 2.2.2 describe the effect of putting different ends of magnets together WP 2.2.3 sort objects into groups according to their attraction to a magnet.	WP 2.2 and 2.3: Provide a learning opportunity for students to recognise that some forces act when objects are not touching and recognise that light comes from definite sources and travels in straight lines.

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 2.3 recognise that we need light to see objects and that light travels in straight lines	WP 2.3.1 describe a range of different light sources, e.g. the Sun, light bulbs, candles WP 2.3.2 compare the amount they can see in the daytime with what they can see in the night-time and relate this to the presence or absence of the Sun WP 2.3.3 describe methods that are used to make it easier to see objects WP 2.3.4 describe the path light from a source (e.g. a torch) must travel in order for them to see it.	

Year 3

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 3.1 show awareness that there may be more than one explanation for an event or phenomenon by examining their own and others' knowledge.	NS 3.1.1 share ideas about how the different parts work in a toy NS 3.1.2 discuss what happens to a seed when it is placed in the ground and what it looks like when it starts to grow NS 3.1.3 check their explanations against the scientific knowledge, experiences and observations of others NS 3.1.4 critique and analyse their work and the work of others.
Investigating in Science	NS 3.2 extend their experiences and personal explanations of the natural world through observing, exploring and generating ideas to answer their own questions.	NS 3.2.1 identify a simple problem as a specific task NS 3.2.2 plan and conduct a simple investigation based on systematic observations NS 3.2.3 design and conduct simple experiments to answer questions NS 3.2.4 employ simple equipment and tools to gather data and extend the senses, e.g. measure with rulers, thermometers, watches; use magnifying lenses; use calculators and computers NS 3.2.5 use data provided to construct a reasonable explanation NS 3.2.6 make proposals to build something or get something to work better NS 3.2.7 work individually and collaboratively to use suitable tools and instruments to make measurements.
Communicating in Science	NS 3.3 build their language and develop their understanding of the ways that the natural world can be represented.	NS 3.3.1 share with others information obtained by observing NS 3.3.2 explain a problem and a solution related to the problem in their own words NS 3.3.3 describe their designs to others NS 3.3.4 collect and record data in simple forms, such as in tables, pictorial diagrams NS 3.3.5 write simple statements that record the results of their investigations.
Participating and contributing	NS 3.4 act on an issue that links their Science learning to their daily lives.	NS 3.4.1 describe the ways they recycle materials at home NS 3.4.2 discuss the ways they may care for a sick animal.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 3.1 recognise similarities and differences in the observable properties of some groups of plants and animals.	WL 3.1.1 describe similarities and differences between members of an animal or plant family, e.g. all birds have two legs, feathers and a beak, but different birds have different shapes, sizes, colours, beaks and feet.	WL 3.1: Provide a learning opportunity for students to recognise similarities and differences in the observable properties of some groups of plants and animals.
WL 3.2 recognise that living things can be grouped according to their observable properties.	WL 3.2.1 use simple classification keys for plants or animals based on observable properties.	WL 3.2: Provide a learning opportunity for students to recognise that living things can be grouped according to their observable properties.
WL 3.3 relate some of the observable features of plants and animals to their habitats.	WL 3.3.1 describe features of plants and animals and explain how these enable them to live in their habitats, e.g. how fins of fish enable them to swim in water or how the limbs of geckos enable them to stick to and move on ceilings.	WL 3.3: Provide a learning opportunity for students to relate some of the observable features of plants and animals to their habitats.

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 3.1 recognise some properties of stars.	WB 3.1.1 describe their observations of the patterns in the night sky by drawing pictures of some constellations WB 3.1.2 map the position of some constellations on different nights WB 3.1.3 explain why the Sun looks bigger than other stars and feels hotter than other stars in relation to the distance of the stars from the Earth.	WB 3.1: Provide a learning opportunity for students to recognise some properties of stars.
WB 3.2 recognise the relationship between the Sun and daylight, the differences between day and night and that a day–night cycle takes 24 hours.	WB 3.2.1 explain how the day–night cycle is related to the way the Sun is shining on different parts of the Earth WB 3.2.2 describe changes that occur in the sky between sunrise and sunset WB 3.2.3 measure the changes in temperature on the Earth's surface between sunrise and sunset WB 3.2.4 relate the temperature changes to the position of the Sun.	WB 3.2 and WB 3.3: Provide a learning opportunity for students to recognise the relationship between the Sun and daylight, the differences between day and night, that a day–night cycle takes 24 hours and the importance of the Sun in enabling life to exist on Earth.
WB 3.3 recognise the importance of the Sun in enabling life to exist on Earth.	WB 3.3.1 explain the importance of the Sun to people and plants, e.g. it provides warmth and light, which are needed for survival WB 3.3.2 describe some of the ways that energy from the Sun is used in their community.	

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 3.1 recognise that groups of similar materials have similar properties.	WM 3.1.1 compare the properties of a group of similar materials, e.g. metals have some similar observable properties (e.g. shiny, hard, can be bent or hammered, conduct heat) but only some metals can be magnetised.	WM 3.1: Provide a learning opportunity for students to recognise that groups of similar materials have similar properties.
WM 3.2 recognise that some materials change when they are left in the air and/or water.	WM 3.2.1 compare the properties of a group of similar materials in different environmental conditions, e.g. different metals investigated in different environmental conditions, such as wet, dry, salty, above the ground, below the ground WM 3.2.2 sort familiar materials according to their solubility.	WM 3.2 and WB 3.3: Provide a learning opportunity for students to recognise that some materials change when they are left in the air and/or water and find out about the uses of a group of similar materials.
WM 3.3 explore the uses of a group of similar materials.	WM 3.3.1 describe a range of uses for a group of similar materials and relate these uses to the observable properties, e.g. metals WM 3.3.2 identify different metals that are used for different purposes.	

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 3.1 recognise how pushes and pulls affect the motion of an object.	WP 3.1.1 relate the speed of an object to the strength of the push or pull WP 3.1.2 describe how the movement of an object can be changed by either pushing or pulling WP 3.1.3 explain places in the home or community where pushes and pulls are used to change the motion of an object.	WP 3.1: Provide a learning opportunity for students to recognise how pushes and pulls affect the motion of an object.
WP 3.2 recognise the conditions under which an object floats in water.	WP 3.2.1 compare the ability of a variety of different objects to float in water WP 3.2.2 change the nature of objects to change their ability to float or sink WP 3.2.3 predict whether objects will float or sink WP 3.2.4 predict the amount of water that will be displaced when an object is put into water.	WP 3.2 and 3.3: Provide a learning opportunity for students to recognise the conditions under which an object floats in water and recognise the different ways of making and changing sounds.
WP 3.3 recognise the different ways of making and changing sounds.	WP 3.3.1 describe different ways of making sound – plucking, striking, blowing, scraping WP 3.3.2 describe ways of making sound louder or softer, higher or lower WP 3.3.3 design an instrument to produce a prescribed sound.	

Year 4

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 4.1 show awareness that there may be more than one explanation for an event or phenomenon by examining their own and others' knowledge.	NS 4.1.1 share ideas about how the different parts work in a toy NS 4.1.2 discuss what happens to a seed when it is placed in the ground and what it looks like when it starts to grow NS 4.1.3 check their explanations against the scientific knowledge, experiences and observations of others NS 4.1.4 critique and analyse their work and the work of others.
Investigating in Science	NS 4.2 extend their experiences and personal explanations of the natural world through observing, exploring and generating ideas to answer their own questions.	NS 4.2.1 identify a simple problem as a specific task NS 4.2.2 plan and conduct a simple investigation based on systematic observations NS 4.2.3 design and conduct simple experiments to answer questions NS 4.2.4 employ simple equipment and tools to gather data and extend the senses, e.g. measure with rulers, thermometers, watches; use magnifying lenses; use calculators and computers NS 4.2.5 use data provided to construct a reasonable explanation NS 4.2.6 make proposals to build something or get something to work better NS 4.2.7 work individually and collaboratively to use suitable tools and instruments to make measurements.
Communicating in Science	NS 4.3 build their language and develop their understandings of the ways that the natural world can be represented.	NS 4.3.1 share with others information obtained by observing NS 4.3.2 explain a problem and a solution related to the problem in their own words NS 4.3.3 describe their designs to others NS 4.3.4 collect and record data in simple forms, such as tables, pictorial diagrams NS 4.3.5 write simple statements that record the results of their investigations.
Participating and contributing	NS 4.4 act on an issue that links their Science learning to their daily lives.	NS 4.4.1 describe the ways they recycle materials at home NS 4.4.2 discuss the ways they may care for a sick animal.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 4.1 recognise the key structures found in plants and relate these to their functions in carrying out life processes.	WL 4.1.1 label the key parts of a plant and identify the functions of the structures in terms of the plant's life processes.	WL 4.1: Provide a learning opportunity for students to recognise the key structures found in plants and relate these to their functions in carrying out life processes.
WL 4.2 group different types of plants according to their observable properties.	WL 4.2.1 describe the differences between plants and animals and begin to group plants according to their similar properties (flowering and non-flowering, etc.) WL 4.2.2 list the observable similarities and differences of the plants in a local bush community.	WL 4.2: Provide a learning opportunity for students to group different types of plants according to their observable properties.
WL 4.3 recognise the ways in which living things are important to each other and their environment.	WL 4.3.1 describe the living things found in a local biological community (e.g. beach or bush) and identify how the community provides food and shelter for the plants and animals.	WL 4.3: Provide a learning opportunity for students to recognise the ways in which living things are important to each other and their environment.

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 4.1 recognise the different forces that shape the land, including natural events and human actions.	WB 4.1.1 describe some local features that have changed over time, e.g. the coastline, the river bank WB 4.1.2 make a model to show the action of water on different surroundings, e.g. a model of a river valley, stream or beach WB 4.1.3 explain the action of moving water on its surroundings, e.g. the action of waves on the coast, the action of flowing river water on a river bank WB 4.1.4 describe how people can change the course of a river or stream, e.g. by building dams.	WB 4.1: Provide a learning opportunity for students to recognise the different forces that shape the land including natural events and human actions.
WB 4.2 recognise the different time scales for changes that have formed the Earth as we know it today.	WB 4.2.1 compare fast and slow changes that occur in the natural environment, e.g. changes brought about by human activity are fast but many natural processes are so slow that it is not possible to see them happening WB 4.2.2 predict the consequences of some slow and some quick changes in the local or global environment, e.g. heavy rain falling in the mountains, a tsunami, an oil spill, the erosion of a hillside.	WB 4.2: Provide a learning opportunity for students to recognise the different time scales for the changes that have formed the Earth as we know it today.

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 4.3 recognise that people use the Earth's resources to stay alive but that some of these resources will run out of they are not used carefully.	WB 4.3.3 describe some of the resources living organisms obtain from the Earth, e.g. food, shelter, oxygen, carbon dioxide, water WB 4.3.3 explain why we are running out of some of these resources, e.g. because they are non-renewable or renewable but not being replaced fast enough, water resources are being polluted by overuse or lack of care, overcrowding causing local resources to be used up WB 4.3.3 suggest ways that local communities could care for their resources.	WB 4.3: Provide a learning opportunity for students to recognise that people use the Earth's resources to stay alive but that some of these resources will run out of they are not used carefully.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 4.1 measure the properties of some common fabrics.	WM 4.1.1 carry out an investigation to compare the properties of different fabrics, e.g. ability to absorb or repel water, strength, ease of creasing, ability to keep something warm/cold.	WM 4.1: Provide a learning opportunity for students to measure the properties of some common fabrics.
WM 4.2 recognise that some changes brought about by heating and cooling are reversible and others are permanent.	WM 4.2.1 compare the effects of heating and cooling on everyday materials, e.g. how water/ice, chocolate, bread and butter change when they are heated or cooled. WM 4.2.2 determine whether changes are permanent or temporary and explain their answers.	WM 4.2: Provide a learning opportunity for students to recognise that some changes brought about by heating and cooling are reversible and others are permanent.
WM 4.3 explore the uses of common materials and relate these to their observed properties.	WM 4.3.1 compare the properties of different fabrics and relate this to the uses that people make of them WM 4.3.2 identify suitable fabrics for given purposes WM 4.3.3 discuss the ways that some fabrics are made out of fibres WM 4.3.4 describe the processes used to make some fabrics.	WM 4.3: Provide a learning opportunity for students to find out about the uses of common materials and relate these to their observed properties.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 4.1 recognise the effect of friction on the motion of objects.	WP 4.1.1 describe what happens when they rub their hands together and relate this to the concept of friction WP 4.1.2 describe the texture of different surfaces and compare the motion of small objects on different types of surfaces WP 4.1.3 predict how the motion of an object will be affected by different surfaces over which it may travel.	WP 4.1: Provide a learning opportunity for students to recognise the effect of friction on the motion of objects.
WP 4.2 recognise the effects of static electricity.	WP 4.2.1 describe how static electricity can be generated WP 4.2.2 describe the effect of static electricity on various objects WP 4.2.3 explain places where static electricity is experienced in everyday life.	WP 4.2: Provide a learning opportunity for students to recognise the effects of static electricity.
WP 4.3 recognise the different ways that animals keep warm (or cool).	WP 4.3.1 explain the difference between warm-blooded and cold-blooded animals WP 4.3.2 describe some of the ways that animals stop heat from leaving their bodies, e.g. cold-blooded animals hibernate or slow down their life processes; warm-blooded animals use material to keep their living spaces warm WP 4.3.3 compare the ability of different materials to stop heat loss WP 4.3.4 discuss their observations about the ability of different materials to remove heat, e.g. metals feel cold to touch WP 4.3.5 describe the movement of heat between different environments.	WP 4.3: Provide a learning opportunity for students to recognise the different ways that animals keep warm (or cool).

Year 5

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 5.1 show awareness that Science knowledge provides one way of explaining the world and can change over time.	NS 5.1.1 compare ideas about what causes day and night NS 5.1.2 identify a range of ideas about shadows NS 5.1.3 recognise several alternative explanations for a natural phenomenon presented in a demonstration by the teacher NS 5.1.4 understand that background knowledge and theories guide the design of investigations, the types of observations made and the interpretations of data.
Investigating in Science	NS 5.2 conduct guided investigations by observing, questioning, predicting, collecting and recording data, and suggesting possible explanations.	NS 5.2.1 formulate an answer to an original question NS 5.2.2 interpret observations based on their prior knowledge NS 5.2.3 develop, implement and evaluate ideas using drawings and models NS 5.2.4 conduct investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions NS 5.2.5 contribute simple ideas about variables and procedures when given a focus question and familiar situation, collect and make limited records of data and say whether what happened was expected NS 5.2.6 identify the constraints in designing a solution to a problem, e.g. materials, time, cost, etc NS 5.2.7 evaluate a product or design by considering how well it meets the challenge of solving a problem and suggest modifications NS 5.2.8 recognise the relationship between explanation and evidence.
Communicating in Science	NS 5.3 communicate in ways that incorporate vocabulary and symbols that belong to Science.	NS 5.3.1 communicate their observations, experiences and thinking in a number of ways, e.g. verbally, pictorially, diagrammatically NS 5.3.2 access information from computer resources, such as simple picture dictionaries, encyclopaedias and information sites NS 5.3.3 communicate scientific ideas through drawings and simple verbal or written statements.
Participating and contributing	NS 5.4 describe ways in which developments in Science have ultimately led to improved lifestyles for people in their community.	NS 5.4.1 relate how medicine has improved the health of someone they know NS 5.4.2 discuss the benefits of synthetic fabrics NS 5.4.3 describe the how people use telephones to assist with communication NS 5.4.4 discuss different ways that people cook food, e.g. using fires, microwave ovens.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 5.1 recognise the stages in the life cycle of animals and the importance of the reproductive processes	WL 5.1.1 describe the life cycles of different types of animals, e.g. insects, mammals, reptiles WL 5.1.2 explain the purpose of the different stages in the life cycle	WL 5.1: Provide a learning opportunity for students to recognise the stages in the life cycle of animals and the importance of the reproductive processes
WL 5.2 group different types of animals according to their observable properties	WL 5.2.1 group animals according to their similar properties (e.g. insects, fish, amphibians, reptiles, birds, mammals) WL 5.2.2 describe the features which distinguish one animal group and recognise the diversity within the group, e.g. features common to all mammals and similarities and differences of a subgroups such as sea mammals	WL 5.2: Provide a learning opportunity for students to group different types of animals according to their observable properties
WL 5.3 recognise how environmental factors affect life processes	WL 5.3.1 describe how the amount of sunlight, range of temperatures, soil composition, space, and availability of food/nutrients affect the rate of growth of different types of living organisms, e.g. seeds	WL 5.3: Provide a learning opportunity for students to Recognise how environmental factors affect life processes

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 5.1 recognise that the components of the Earth are air, rocks, soil, water and life forms.	WB 5.1.1 describe layers in the solid Earth and the different sorts of rocks that can be found WB 5.1.2 describe the different components of the atmosphere WB 5.1.3 explain how water is cycled through and around the Earth WB 5.1.4 explain the effects of the water cycle for everyday living.	WB 5.1: Provide a learning opportunity for students to recognise that the components of the Earth are air, rocks, soil, water and life forms.
WB 5.2 recognise the changes that occur over time to shape the features of the solid Earth.	WB 5.2.1 describe the changes to the surface of the Earth that have happened over a long period and resulted in new landforms, e.g. the formation of the continents, formation of Sāmoa and other local landforms such as atolls; soil types, rock types WB 5.2.2 describe the physical processes of weathering and erosion and give examples of where these have taken place in the local environment WB 5.2.3 explain the role of the weathering of rocks in soil formation.	WB 5.2: Provide a learning opportunity for students to recognise the changes that occur over time to shape the features of the solid Earth.

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 5.3 recognise how the actions of people cause changes in the environment and can upset the balance of nature.	WB 5.3.1 describe how plants can help stop erosion with the 'holding power' of their roots WB 5.3.2 describe weathering and erosion that is taking place in the local environment that has been caused by the actions of people, e.g. walking tracks, land being cleared WB 5.3.3 suggest ways of preventing and controlling further erosion.	WB 5.3: Provide a learning opportunity for students to recognise how the actions of people cause changes in the environment and can upset the balance of nature.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 5.1 recognise the three states of matter in the materials that make up the world around them.	WM 5.1.1 describe the differences between the three states of matter WM 5.1.2 identify the different states of matter in materials found at home and school WM 5.1.3 use the correct vocabulary to describe changes in state WM 5.1.4 identify changes of state occurring in their everyday environment.	WM 5.1: Provide a learning opportunity for students to recognise the three states of matter in the materials that make up the world around them.
WM 5.2 recognise that when some compounds are combined a reaction takes place and new substances are formed.	WM 5.2.1 describe observations of chemical reactions involving everyday substances, e.g. carbonates (baking soda, egg shells, chalk) with acids (e.g. vinegar, fruit juice).	WM 5.2: Provide a learning opportunity for students to recognise that when some compounds are combined a reaction takes place a new substance is formed.
WM 5.3 recognise some useful chemical reactions.	WM 5.3.1 investigate and report on the reactions that happen in cooking, e.g. making a cake, making bread, making hokey pokey WM 5.3.2 describe what happens when a candle burns WM 5.3.3 describe how chemical reactions are used to make new materials that are useful for people, e.g. making medicines.	WM 5.3: Provide a learning opportunity for students to recognise some useful chemical reactions.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 5.1 recognise that the movement of objects through the air is the result of the combined forces of gravity and air resistance and that the movement can be affected by the object's shape.	WP 5.1.1 compare the motion of small objects in water and air and the motion of objects of different weights in air WP 5.1.2 describe the action of air pushing against objects, e.g. when travelling in a car or on a bike WP 5.1.3 describe ways of speeding up or slowing down the rate an object falls WP 5.1.4 design a parachute to achieve a desired result (a slow or fast fall) WP 5.1.5 explain the effect that gravity has on an object, e.g. the relationship between gravity and weight.	WP 5.1: Provide a learning opportunity for students to recognise that the movement of objects through the air is the result of the combined forces of gravity and air resistance and that the movement can be affected by the object's shape.
WP 5.2 recognise that light comes from definite sources and can be reflected, absorbed or transmitted from different surfaces.	WP 5.2.1 distinguish between light sources and light reflectors WP 5.2.2 differentiate between transmitted, absorbed and reflected light WP 5.2.3 demonstrate ways of producing coloured light from white light WP 5.2.4 describe what happens when light is filtered by materials of different colours WP 5.2.5 predict the results of seeing through coloured lenses.	WP 5.2: Provide a learning opportunity for students to recognise that light comes from definite sources and can be reflected, absorbed or transmitted from different surfaces.

Year 6

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 6.1 show awareness that Science knowledge provides one way of explaining the world and can change over time.	NS 6.1.1 compare ideas about what causes day and night NS 6.1.2 identify a range of ideas about shadows NS 6.1.3 recognise several alternative explanations for a natural phenomenon presented in a demonstration by the teacher NS 6.1.4 understand that background knowledge and theories guide the design of investigations, the types of observations made and the interpretations of data.
Investigating in Science	NS 6.2 conduct guided investigations by observing, questioning, predicting, collecting and recording data, and suggesting possible explanations.	NS 6.2.1 formulate an answer to an original question NS 6.2.2 interpret observations based on their prior knowledge NS 6.2.3 develop, implement and evaluate ideas using drawings and models NS 6.2.4 conduct investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions NS 6.2.5 contribute simple ideas about variables and procedures when given a focus question and familiar situation, collect and make limited records of data and can say whether what happened was expected NS 6.2.6 identify the constraints in designing a solution to a problem, e.g. materials, time, cost NS 6.2.7 evaluate a product or design by considering how well it meets the challenge of solving a problem and suggest modifications NS 6.2.8 recognise the relationship between explanation and evidence.
Communicating in Science	NS 6.3 communicate in ways that incorporate vocabulary and symbols that belong to Science.	NS 6.3.1 communicate their observations, experiences and thinking in a number of ways, e.g. verbally, pictorially, diagrammatically NS 6.3.2 access information from computer resources, such as simple picture dictionaries, encyclopaedias and information sites NS 6.3.3 communicate scientific ideas through drawings and simple verbal or written statements.
Participating and contributing	NS 6.4 describe ways in which developments in Science have ultimately led to improved lifestyles for people in their community.	NS 6.4.1 relate how medicine has improved the health of someone they know NS 6.4.2 discuss the benefits of synthetic fabrics NS 6.4.3 describe the how people use telephones to assist with communication NS 6.4.4 discuss different ways that people cook food, e.g. using fires, microwave ovens.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 6.1 recognise the stages in the life cycle of a plant and the role of flowers in producing new plants.	WL 6.1.1 describe the different stages in the life cycle of a familiar flowering plant WL 6.1.2 identify the parts of a flower and the role these have in reproduction. WL 6.1.3 identify the different stages in seed germination.	WL 6.1: Provide a learning opportunity for students to recognise the stages in the life cycle of a plant and the role of flowers in producing new plants.
WL 6.2 recognise the different ways that plants have adapted to their environment to ensure pollination and seed dispersal take place.	WL 6.2.1 explain the differences between wind- and animal-pollinated plants WL 6.2.2 explain the different ways seeds are adapted to their environment to ensure wide dispersal, e.g. coconuts.	WL 6.2: Provide a learning opportunity for students to recognise the different ways that plants have adapted to their environment to ensure pollination and seed dispersal take place.
WL 6.3 identify the relationships and interdependencies that occur among living things to enable them to survive in their habitat.	WL 6.3.1 draw and interpret simple food chains WL 6.3.2 describe examples of interdependent relationships between plants and animals, e.g. flowering plants depending on pollinating agents WL 6.3.3 discuss the consequences of upsetting these relationships and ways of protecting them.	WL 6.3: Provide a learning opportunity for students to identify relationships and interdependencies that occur among living things that enable them to survive in their habitat.

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 6.1 recognise the relationship between the Earth, solar system and the universe and the different types of objects seen in the night sky.	WB 6.1.1 describe the components of the solar system and the place of the Earth in relation to the other planets. WB 6.1.1 explain the difference between the Sun and the planets as light sources or reflectors WB 6.1.1 locate distant objects, including the Moon, stars and planets, using a telescope WB 6.1.1 use star charts to identify different constellations in the night sky WB 6.1.1 explain the differences between a comet and a meteor.	WB 6.1: Provide a learning opportunity for students to recognise the relationship between the Earth, Solar system and the universe and the different types of objects seen in the night sky.
WB 6.2 recognise that there are patterns of movement in the night sky.	WB 6.2.2 describe their observations about how the position of a constellation changes over time WB 6.2.2 explain why star charts for countries in different parts of the world are different from those for Sāmoa WB 6.2.2 describe the same constellation viewed from different locations.	WB 6.2: Provide a learning opportunity for students to recognise that there are patterns of movement in the night sky.

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 6.3 recognise that the Earth holds clues about previous life and living conditions on Earth.	WB 6.3.3 describe places where fossils are found WB 6.3.3 make a model to show how fossils are formed WB 6.3.3 explain how fossils can give information about living things that were on Earth a long time ago.	WB 6.3: Provide a learning opportunity for students to recognise that the Earth holds clues about previous life and living conditions on Earth.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 6.1 recognise the similar and different chemical and physical properties of a group of materials.	WM 6.1.1 carry out an investigation to compare the properties of different plastics, e.g. strength, appearance, reaction with water, effect of heating (e.g. in the sun or hot water), effect of burning WM 6.1.2 compare the ways that different plastics change when forces are applied and when they are heated or burned.	WM 6.1: Provide a learning opportunity for students to recognise the similar and different chemical and physical properties of a group of materials.
WM 6.2 recognise the effect of the different solubility of compounds in water and other liquids.	WM 6.2.1 describe observations made when some common materials are added to water, e.g. change of colour, disappearance of one of the substances WM 6.2.2 compare the properties of the components of a solution before and after they are mixed WM 6.2.3 use the terms 'soluble' and 'insoluble' to classify substances WM 6.2.4 compare the dissolving ability of water with some other liquids WM 6.2.5 compare the solubility of different substances, such as how much sugar can dissolve in water or how different amounts of coffee powder dissolve to give different colour intensities.	WM 6.2: Provide a learning opportunity for students to recognise the effect of the different solubility of compounds in water and other liquids.
WM 6.3 recognise that not all plastics are the same and there is a wide range of properties, uses and issues associated with different plastics.	WM 6.3.1 describe the different types of plastics and relate to the 'plastics code' WM 6.3.2 relate the properties of the different types of plastics to the things that are made from them WM 6.3.3 describe different ways of recycling and compare the recycling of plastics with paper and metals WM 6.3.4 investigate an issue associated with the disposal of plastics when they are no longer wanted WM 6.3.5 find new uses for some plastic articles instead of throwing them away.	WM 6.3: Provide a learning opportunity for students to recognise that not all plastics are the same and there is a wide range of properties, uses and issues associated with different plastics.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 6.1 recognise how simple machines are used in various ways to assist in doing work.	WP 6.1.1 describe how some simple machines they use at home make a job easier, e.g. wheelbarrow, spade WP 6.1.2 identify different types of machines and how they work (e.g. by levers and pulleys) WP 6.1.3 select the appropriate machine for a given task WP 6.1.4 describe how changing the pivot difference of a lever makes it easier to lift an object.	WP 6.1: Provide a learning opportunity for students to recognise how simple machines are used in various ways to assist in doing work.
WP 6.2 recognise that magnetism is a force that operates at a distance and the extent of the magnetic field.	WP 6.2.1 describe the effect of magnetic force and the patterns of a magnetic field WP 6.2.2 predict how distance affects the attraction of objects to a magnet WP 6.2.3 describe ways of making temporary magnets and comparing the strength of these magnets.	WP 6.2: Provide a learning opportunity for students to recognise that magnetism is a force that operates at a distance and the extent of the magnetic field.
WP 6.3 recognise the different ways that heat energy can be transferred.	WP 6.3.1 measure the temperature of an object and use this to describe its warmth or coolness WP 6.3.2 describe how heat is transferred from the heat source in a heating process, such as cooking or boiling water WP 6.3.3 compare different materials that can be used to keep something hot and materials that can transfer heat efficiently WP 6.3.4 describe different materials as good or poor conductors WP 6.3.4 choose appropriate materials for the design of an insulating system.	WP 6.3: Provide a learning opportunity for students to recognise the different ways that heat energy can be transferred.

Year 7

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 7.1 explain how different cultures have developed understandings of the natural world.	NS 7.1.1 compare ideas from different cultures about the origins of the land and sea NS 7.1.2 relate stories about the men and women who have made a variety of contributions throughout the history of Science.
Investigating in Science	NS 7.2 ask questions, plan and conduct appropriate investigations that consider the variables, and develop simple explanations.	NS 7.2.1 identify questions that can be answered through scientific investigation NS 7.2.2 show ability to refine and refocus broad and ill-defined questions NS 7.2.3 make predictions that are supported by reasons and relevant to the context NS 7.2.4 follow a sequence of instructions to undertake an investigation NS 7.2.5 use data from investigations to recognise patterns and relationships and reach conclusions NS 7.2.6 identify variables that can be changed in an experiment NS 7.2.7 evaluate the 'fairness' of a given experiment in which a certain variable was changed NS 7.2.8 conduct trials, collect data using repeat experiments or replicates; explain patterns in data or information prepared in different formats; and make general suggestions for improving an investigation NS 7.2.9 take accurate measurements using appropriate tools and techniques NS 7.2.10 use evidence to generate explanations and propose alternative explanations.
Communicating in Science	NS 7.3 identify vocabulary and symbols that belong to Science in both popular and scientific texts.	NS 7.3.1 identify Science vocabulary in their texts and their meaning NS 7.3.2 identify word parts that make up science words, meaning of word parts, and their language origins NS 7.3.3 identify other science words with similar word parts and infer meanings NS 7.3.4 recognise science symbols for common words in their environment, e.g. water, oxygen
Participating and contributing	NS 7.4 describe how knowledge of Science is used by people when making decisions about environmental issues.	NS 7.4.1 share with others information obtained by observing NS 7.4.2 communicate their observations, experiences and thinking in a number of ways, e.g. verbally, pictorially, diagrammatically NS 7.4.3 describe their designs to others NS 7.4.4 organise numerical data and descriptive information using simple tables, diagrams and graphs.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 7.1 recognise the structural features of members of the fungus kingdom and how these enable them to carry out their life processes.	WL 7.1.1 describe the features and life processes of a mould or fungus and its similarities and differences to plants and animals WL 7.1.2 describe the reproduction of a mould or fungus and its asexual life cycle WL 7.1.3 describe the effect of moulds on materials WL 7.1.4 describe how moulds/fungi are useful in the community.	WL 7.1: Provide a learning opportunity for students to recognise the structural features of members of the fungus kingdom and how these enable them to carry out their life processes.
WL 7.2 recognise the similarities and differences in a species and how variability can help some individuals to survive in difficult times.	WL 7.2.1 describe the similarities and differences in individuals of the same species, e.g. variability among members of their class, leaves from a tree. WL 7.2.2 link survival needs to the features of different plants and animals, e.g. running fastest to escape predators, best at being able to survive dry conditions.	WL 7.2: Provide a learning opportunity for students to recognise that living things have changed over long periods and adapted to changes in their environment.
WL 7.3 recognise the interrelationships among living things in an ecosystem and the effect of change.	WL 7.3.1 collect data to describe the population of plants and animals in a local ecosystem, e.g. a local beach WL 7.3.2 describe how the needs of the plants and animals are met in the ecosystem WL 7.3.3 discuss changes that could affect the living things in the ecosystem (natural and human-induced) WL 7.3.4 describe ways that the ecosystem could be protected.	WL 7.3: Provide a learning opportunity for students to recognise the interrelationships among living things in an ecosystem and the effect of change.

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 7.1 recognise the causes and effects of different types of weather and the seasonal variation of weather patterns.	WB 7.1.1 describe the features of the different seasons, e.g. in terms of what the weather is like WB 7.1.2 describe how clouds are formed WB 7.1.3 describe variation in local weather patterns from data they have collected WB 7.1.4 predict changes in weather from local weather maps WB 7.1.5 explain how weather can drastically affect living things, e.g. through storms, flooding, gales, hurricanes WB 7.1.6 describe ways that living things adapt their lives to the different weather conditions, e.g. types of houses built, lifestyles, plumage, fur (e.g. thickness, moulting).	WB 7.1: Provide a learning opportunity for students to recognise the causes and effects of different types of weather and the seasonal variation of weather patterns.
WB 7.2 recognise the causes of the cycles of the Moon and how the Moon affects life on Earth.	WB 7.2.1 describe the relative motion of the Earth, Sun and Moon, e.g. the day–night spin of the Earth's axis, the Earth's yearly orbit around the Sun, the Moon's movement around the Earth WB 7.2.2 describe the changing appearance of the Moon from their observations, e.g. from a night diary WB 7.2.3 explain how the changes in the Moon's appearance relate to the amount of the illuminated surface that can be seen on the Earth WB 7.2.4 describe the pattern of the tides and the difference between high and low tide WB 7.2.5 explain the link between the tides and the Moon's gravitational pull.	WB 7.2: Provide a learning opportunity for students to recognise the causes of the cycles of the Moon and how the Moon affects life on Earth.
WB 7.3 recognise the different resources from the Earth that people use and the need to use them wisely.	WB 7.3.1 describe the places where different materials are obtained, such as building materials, cooking fuels, food, material for clothing, metals WB 7.3.2 describe the processes used to obtain some of these materials and their effects on the environment WB 7.3.3 explain why some resources are running out WB 7.3.4 suggest ways to protect local resources.	WB 7.3: Provide a learning opportunity for students to recognise the different resources from the Earth that people use and the need to use them wisely.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 7.1 recognise the difference between the properties of pure substances and mixtures.	WM 7.1.1 identify some familiar materials as pure substances or mixtures, e.g. table salt; water; milk; metals such as iron, aluminium, copper; coffee and tea WM 7.1.2 compare the properties of a pure substance with a mixture of pure substances, e.g. freezing water compared with freezing water with dissolved salt or sugar.	WM 7.1: Provide a learning opportunity for students to recognise the difference between the properties of pure substances and mixtures.
WM 7.2 recognise that the physical properties of the components of a mixture enable them to be separated.	WM 7.2.1. separate black pen ink into the different colours that combine to give black WM 7.2.2. separate out the components of a mixture using techniques based on a difference in a physical property, e.g. evaporation, filtration, sieving, decanting, chromatography and magnetic attraction.	WM 7.2: Provide a learning opportunity for students to recognise that the physical properties of the components of a mixture enable them to be separated.
WM 7.3 recognise that the properties and usefulness of a mixture depend on the properties of its components.	WM 7.3.1 compare the properties of different mixtures, e.g. the strength of concrete made with many stones versus that made with only sand added, freezing point of water with different amounts of salt added WM 7.3.2 evaluate ways that materials can be changed to make them more useful, e.g. galvanising iron for roofing, painting iron to prevent rusting WM 7.3.3 compare the usefulness of drinking water containing dissolved sugar with saltwater WM 7.3.4 build a model for separating fresh water from saltwater.	WM 7.3: Provide a learning opportunity for students to recognise that the properties and usefulness of a mixture depend on the properties of its components.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 7.1 recognise the role of forces in the movement of objects and friction as a force that makes it harder to move things.	WP 7.1.1 identify the force involved in the motion of an object when it speeds up, slows down or changes direction WP 7.1.2 compare the action of a (bicycle) tyre on different types of surfaces WP 7.1.3 predict how the stopping distance (of the bicycle) will change as the type of tyre is varied WP 7.1.4 describe and demonstrate ways of reducing the force of friction between two surfaces, e.g. using ball bearings, using lubricant.	WP 7.1: Provide a learning opportunity for students to recognise the role of forces in the movement of objects and friction as a force that makes it harder to move things.
WP 7.2 recognise what is needed to make a simple circuit and the relationship between electricity and magnetism.	WP 7.2.1 construct a circuit from wires, a bulb, a battery and clips WP 7.2.2 describe the requirements of a simple circuit that allows the flow of electricity WP 7.2.3 describe how electricity can be used to magnetise a nail and how to increase the effectiveness of the magnetisation.	WP 7.2: Provide a learning opportunity for students to recognise what is needed to make up a simple circuit and the relationship between electricity and magnetism.
WP 7.3 recognise the energy transformations in their everyday lives and the need for energy efficiency in some systems.	WP 7.3.1 describe the different forms of energy used in different places at home and in the community WP 7.3.2 use diagrams to show different energy transformations that occur in daily activities, e.g. when playing sport, cooking food, driving a car WP 7.3.3 compare the useful and non-useful forms of energy that are produced when a car is driven and suggest ways of making energy use more efficient WP 7.3.4 map the energy changes that take place when it is transferred from a power station to operating household appliances WP 7.3.5 compare the efficiency of household appliances by using the information provided on the appliances WP 7.3.6 describe their observations of the electrical consumption of their household using the correct units, e.g. kilowatt hours WP 7.3.7 suggest ways of using electricity more efficiently in their home.	WP 7.3: Provide a learning opportunity for students to recognise the energy transformations in their everyday lives and the need for energy efficiency in some systems.

Year 8

Strand 1: The Nature of Science (NS)

SUBSTRAND	ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*
Understanding about Science	NS 8.1 explain how different cultures have developed understandings of the natural world.	NS 8.1.1 compare ideas from different cultures about the origins of the land and sea NS 8.1.2 relate stories about the men and women who have made a variety of contributions throughout the history of Science.
Investigating in Science	NS 8.2 ask questions, plan and conduct appropriate investigations that consider the variables, and develop simple explanations.	NS 8.2.1 identify questions that can be answered through scientific investigation NS 8.2.2 show ability to refine and refocus broad and ill-defined questions NS 8.2.3 make predictions that are supported by reasons relevant to the context NS 8.2.4 follow a sequence of instructions to undertake an investigation NS 8.2.5 use data from investigations to recognise patterns and relationships and reach conclusions NS 8.2.6 identify variables that can be changed in an experiment NS 8.2.7 evaluate the 'fairness' of a given experiment in which a certain variable was changed NS 8.2.8 conduct trials, collect data using repeat experiments or replicates; explain patterns in data or information prepared in different formats; and make general suggestions for improving an investigation NS 8.2.9 take accurate measurements using appropriate tools and techniques NS 8.2.10 use evidence to generate explanations and propose alternative explanations.
Communicating in Science	NS 8.3 identify vocabulary and symbols that belong to Science in both popular and scientific texts.	NS 8.3.1 identify Science vocabulary in their texts and their meaning NS 8.3.2 identify word parts that make up science words, meaning of word parts, and their language origins NS 8.3.3 identify other science words with similar word parts and infer meanings NS 8.3.4 recognise science symbols for common words in their environment, e.g. water, oxygen.
Participating and contributing	NS 8.4 describe how knowledge of Science is used by people when making decisions about environmental issues.	NS 8.4.1 share with others information obtained by observing NS 8.4.2 communicate their observations, experiences and thinking in a number of ways, e.g. verbally, pictorially, diagrammatically NS 8.4.3 describe their designs to others NS 8.4.4 organise numerical data and descriptive information using simple tables, diagrams and graphs.

Strand 2: The World of Life (WL)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WL 8.1 recognise the structural features of a group of animals and how these features have helped it to survive.	WL 8.1.1 describe the structural features of an animal species, e.g. insects WL 8.1.2 link the structural features to the life processes of insects WL 8.1.3 link the structural features to the survival of insects in different environments.	WL 8.1: Provide a learning opportunity for students to recognise the structural features of a group of animals and how these features have helped it survive.
WL 8.2 recognise the diversity of life in a soil community.	WL 8.2.1 gather data to document the living things in a soil community WL 8.2.2 classify the animals and plants found in the soil community WL 8.2.3 construct a food web to show the interdependence of the animals and plants in the soil community, including the role of decomposers.	WL 8.2: Provide a learning opportunity for students to recognise the diversity of life in a soil community.
WL 8.3 explore the importance of conservation in sustaining life in an ecosystem.	WL 8.3.1 explain the importance of conservation of Sāmoa's natural resources WL 8.3.2 describe conservation issues in Sāmoa (e.g. conservation of water catchment areas, forests, coral reefs, turtles, manumea) and explain the links among these issues (e.g. the links between water conservation and erosion reduction or prevention, reducing sedimentation and preventing the smothering of coral reefs) WL 8.3.3 propose ways of raising conservation awareness in a local community such as a class, school or village.	WL 8.3: Provide a learning opportunity for students to explore the importance of conservation in sustaining life in an ecosystem.

Strand 3: The World and Beyond (WB)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WB 8.1 recognise some characteristic features of the Earth's surface and that some changes to the landscape are determined by processes beneath the surface, such as earthquakes and volcanoes.	WB 8.1.1 describe the plates which make up the Earth's crust and the way they are moved by the mantle WB 8.1.2 describe and model how mountain ranges are built over time by the action of the Earth's plates pushing against each other WB 8.1.3 describe how volcanoes occur when the Earth's crust is thin enough for molten rock to break through WB 8.1.4 describe the appearance of a volcano before, during and after an eruption WB 8.1.5 explain the effect that volcanoes have on weather and the landscape WB8.1.6 describe how the movement of the Earth's crust can lead to earthquakes WB 8.1.7 explain the scales used to measure the severity of earthquakes WB 8.1.8 describe how the land can be changed as a result of earthquakes.	WB 8.1: Provide a learning opportunity for students to recognise some characteristic features of the Earth's surface and that some changes to the landscape are determined by processes beneath the surface, such as earthquakes and volcanoes.
WB 8.2 recognise the difference between renewable and non-renewable sources of energy and the need to use the resources of the Earth wisely.	WB 8.2.1 describe some renewable and some non-renewable sources of energy in the local community WB 8.2.2 explain the need to conserve non-renewable sources WB 8.2.3 suggest ways that more renewable sources of energy could be used in the local community WB 8.2.4 suggest ways that energy could be used more efficiently.	WB 8.2: Provide a learning opportunity for students to recognise the difference between renewable and non-renewable sources of energy and the need to use the resources of the Earth wisely.

Strand 4: The World of Materials (WM)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WM 8.1 recognise the different arrangements and motions of particles in solids, liquids and gases and relate this to the properties of some familiar materials.	WM 8.1.1 describe, using words and pictures, the different arrangements of particles in solids, liquids and gases. WM 8.1.2 explain how heating or cooling a substance changes the arrangement of the particles and can cause a change in the state of a substance WM 8.1.3 discuss the properties of air using the ideas of mixtures and the particle nature of matter (e.g. air can be compressed because the particles can be forced closer together, air can be separated into different gases because it is a mixture and is made up of more than one type of particle).	WM 8.1: Provide a learning opportunity for students to recognise the different arrangements and motion of particles in solids, liquids and gases and relate this the properties of some familiar materials.
WM 8.2 recognise the chemical and physical properties of some of the components of air.	WM 8.2.1 explain the reactions of some of the components of air by describing the differences in the products and reactants and representing the reactions with simple word equations, e.g. burning, rusting.	WM 8.2: Provide a learning opportunity for students to recognise the chemical and physical properties of some of the components of air.
WM 8.3 recognise that changing the components of a mixture can change its properties and this can sometimes cause problems for people and the environment.	WM 8.3.1 describe the ways that the composition of the air can be changed by the activities of people (e.g. burning uses up oxygen and adds carbon dioxide) and plants (use carbon dioxide and add oxygen) WM 8.3.2 explain why the atmosphere is important for the Earth WM 8.3.3 describe some consequences of people's pollution of the atmosphere WM 8.3.4 create a suitable way of promoting awareness of an environmental issue affecting their school community and of a global environmental issue.	WM 8.3: Provide a learning opportunity for students to recognise that changing the components of a mixture can change its properties and this can sometimes cause problems for people and the environment.

Strand 5: The World of Physical Phenomena (WP)

ACHIEVEMENT OBJECTIVES *Students learn to:*	LEARNING OUTCOMES *Students will demonstrate such learning when they can:*	APPROACHES TO TEACHING AND LEARNING
WP 8.1 recognise the combined effect of the forces of gravity and friction on the motion of an object.	WP 8.1.1 design a build a ramp to illustrate the effect of gravity and friction on the motion of a marble WP 8.1.2 predict the results of the motion of the marble on the ramp based on their understanding of friction and gravity WP 8.1.3 change the motion of the marble by making predictable changes to the ramp.	WP 8.1: Provide a learning opportunity for students to recognise the combined effect of the forces of gravity and friction on the motion of an object.
WP 8.2 recognise the importance of energy conservation in homes and in communities.	WP 8.2.1 make a chart listing the sources of available energy and use in a local community WP 8.2.2 classify energy sources as renewable or non-renewable WP 8.2.3 build a model for a device that uses a form of renewable energy and could be used in the home, e.g. a solar water heater WP 8.2.4 explain how the device they built works and the reasons for their choice of materials WP 8.2.5 suggest ways to make devices that use energy more efficient, e.g. how to stop heat energy escaping or ways to keep a house cool without using electricity. WP 8.2.6 suggest ways that non-renewable energy sources could be replaced in their community, e.g. using windmills to generate electricity, replacing diesel with biofuels, using tidal power.	WP 8.2: Provide a learning opportunity for students to recognise the importance of energy conservation in homes and communities.