

SCIENCE AND TECHNOLOGY K-6



Outcomes
and Indicators

Every effort has been made to contact all copyright owners. The Board of Studies NSW apologises if it has inadvertently used material in which copyright resides. For acknowledgement in future editions please contact the Copyright Officer at the Board of Studies NSW.

The Board of Studies owns the copyright on all printed materials. Schools may reproduce this material in part or in full for bona fide study or classroom purposes only.

Acknowledgement of the Board of Studies copyright must be included on any reproductions. Students may copy reasonable portions of this material for the purpose of research or study. Any other use of this syllabus must be referred to the Copyright Officer.

© Board of Studies NSW 2006

Published by
Board of Studies NSW
GPO Box 5300
Sydney NSW 2001
Australia

Tel: (02) 9367 8111
Fax: (02) 9367 8484

**This document is available on the Board of Studies Internet site.
Internet address: www.boardofstudies.nsw.edu.au**

ISBN 1 7414 7399 3

First published 1999
Reprinted with Foundation Statements April 2006

CONTENTS

Background to the Outcomes for Science and Technology K–6.....	5
Aim and Objectives.....	6
Explanation of Terms.....	7
Foundation Statements.....	11
Outcomes.....	15
Outcomes by Content Strands.....	19
Outcomes by Learning Processes.....	33
Outcomes by Stage.....	41
Glossary.....	51

Background to the Outcomes for Science and Technology K–6

This document should be read in conjunction with the *Science and Technology K–6 Syllabus*, which is located in the first 31 pages of the *Science and Technology K–6 Syllabus and Support Document*.

The outcomes presented in this document replace the learning outcomes on pages 9 to 17 of the *Science and Technology K–6 Syllabus and Support Document (1991)*. All other sections of the *Science and Technology K–6 Syllabus and Support Document (1991)* remain current.

These outcomes are consistent with the aim, objectives and content of the syllabus but have been redeveloped in a form that is similar to that used in other K–6 syllabuses, including Mathematics, English, Human Society and Its Environment and Personal Development, Health and Physical Education.

The number of staged outcomes for Science and Technology K–6 has been reduced from 158 to 36 in order to improve manageability. The reduction is not, however, an indication of any lessening of the importance of Science and Technology in the primary curriculum.

Science and Technology K–6 provides the foundation for further learning in the Science Stages 4–5 course and Design and Technology Stages 4–5 course. To examine the outcomes for Stage 4 that build on Science and Technology K–6 visit the Board of Studies website at <http://www.boardofstudies.nsw.edu.au>

Aim and Objectives

Aim of the Science and Technology K–6 Syllabus

The aim of this syllabus is to develop students' competence, confidence and responsibility in their interactions with science and technology leading to:

- an enriched view of themselves, society, the environment and the future;
- an enthusiasm for further learning in science and technology.

Objectives

Knowledge and understanding

Students will develop their knowledge and understanding of:

- Built Environments
- Information and Communication
- Living Things
- Physical Phenomena
- Products and Services
- Earth and its Surroundings
- the process of investigation that people use in order to develop reliable understanding of the natural and made environments
- the process of designing and making that people use in order to satisfy their wants and needs
- the technologies people select and use, and how these technologies affect other people, the environment and the future.

Skills

Students will be able to:

- investigate natural phenomena and made environments
- design and make products, systems and environments to meet specific needs
- assess, select and use a range of technologies.

Values and attitudes

Students will engage in learning experiences that will enable them to develop positive and informed values and attitudes:

- towards themselves
- towards others
- towards science and technology.

Science and Technology K–6 Syllabus (1991) p 7

Explanation of Terms

Foundation Statements

Foundation Statements set out a clear picture of the knowledge, skills and understanding that each student should develop at each stage of primary school.

Stage Outcomes

To improve the manageability of the stage outcomes, the term 'Knowledge and Understanding: Content Strands' has been simplified to the term 'Content Strands'. 'The Knowledge and Understanding: Learning Processes' and 'Skills' sections have been collapsed into one section to be known as 'Learning Processes', as shown below:

Content strands

- Built Environments
- Information and Communication
- Living Things
- Physical Phenomena
- Products and Services
- Earth and its Surroundings

Learning processes

- Investigating
- Designing and Making
- Using Technology

All stage outcomes are of equal importance. The presentation of the outcomes does not imply a sequence of teaching and learning activities.

Outcomes are clear statements of the knowledge, skills and understanding expected to be achieved by most students by the end of a given stage.

Outcomes provide signposts of students' progress and they provide a basis for summative reporting.

Outcomes by Content Strands and Learning Processes

The outcomes by content strands (pp 19–31) and learning processes (pp 33–39) with associated indicators, are provided as examples of progress in a sequence from Early Stage 1 to Stage 3. They serve to show development from Kindergarten to Year 6 and are designed to assist teachers in identifying a student's current achievement and in planning future learning experiences. They show not only development across stages, but different ways in which students might demonstrate progress.

Outcomes by Stage

The outcomes in this section (pp 41–49) have been organised to give teachers an overall view of the outcomes and indicators across a particular stage. This enables teachers not only to look at outcomes with a set of associated indicators, but also to see how the outcomes can work together in both teaching and learning in Science and Technology K–6. The purpose of outcomes by stage is also to show teachers examples of how students can engage with the content strands and learning processes of science and technology in an integral way.

Interpreting Syllabus Outcomes and Indicators

Each stage outcome is a specific statement which is the result of the syllabus' intention in relation to a content strand or learning process.

Taken collectively, the indicators for each outcome exemplify a range of typical behaviours that could be observed in students who have achieved the specific outcome.

Indicators are limited in their capacity to describe a standard expected of students. To appreciate the expected standard fully, it is necessary to interpret the outcome in relation to:

- the scope of learning suggested by the related set of indicators
- the standard of student performance evident in the work samples
- the syllabus content.

Indicators

An indicator is an example of the behaviour that students may display as they work towards the achievement of syllabus outcomes. Indicators reflect and describe aspects of skills development as well as knowledge and understanding.

The indicators can be read as possible examples of one outcome as presented in the outcomes by content strands or outcomes by learning processes sections. The indicators can also be viewed as relating to two outcomes, both a content strand and a learning processes outcome as presented in the outcomes by stages section.

An indicator may illustrate either part or all aspects of an outcome.

Indicators in this document are examples only. They describe a range of observable behaviours that contribute to the achievement of syllabus outcomes. They also assist teachers to monitor student progress within a stage, and provide a basis for on-balance judgements about the achievement of outcomes at the end of a stage.

Teachers will need to develop or adapt their own indicators to suit the needs of their students and a particular unit of work being undertaken.

Values and Attitudes Outcomes

Values and attitudes are an integral part of learning. The values and attitudes outcomes are different in nature from the stage outcomes. The values and attitudes outcomes are described separately on page 18 of this document.

Coding the Outcomes

A code has been applied to each of the outcomes. This does not indicate any intention to sequence or establish a hierarchy of the outcomes. Rather, it is a classification system to facilitate ease of reference. The following codes are used:

- BE** Built Environments
- IC** Information and Communication
- LT** Living Things
- PP** Physical Phenomena
- PS** Products and Services
- ES** Earth and its Surroundings

- INV** Investigating
- DM** Designing and making
- UT** Using technology

- VA** Values and Attitudes

For example, the following outcome:

- DM S1.8** Develops and implements own design ideas in response to an investigation of needs and wants.

refers to the Designing and Making outcome in Stage 1, the last number indicates that this outcome belongs to the eighth set of outcomes.

Glossary

A glossary at the end of the document includes some terms considered to have special significance in science and technology.

FOUNDATION STATEMENTS

Foundation Statements: the statewide common curriculum requirements

Foundation Statements:

- set out a clear picture of the knowledge, skills and understanding that each student should develop at each stage of primary school. They encompass, at a level broader than syllabus outcomes, the nature (key concepts and content) and scope (breadth, depth and rigour) of learning in Kindergarten to Year 6. They do not add new content or concepts to the K–6 curriculum
- provide an answer to the question ‘What must be taught?’ in all schools. Using them you can be confident that you are delivering the most important learning for students. They place an emphasis on the fundamental skills needed to succeed at and beyond school, particularly in the areas of literacy and numeracy
- give you the freedom to focus on the diverse learning needs of your students. Describing what must be taught in this way will ensure that important concepts and content such as Australian history and democracy, scientific investigation, cultural diversity, Aboriginal history and culture, and safe and healthy lifestyle are included in teaching and learning programs. By focusing on the statements you can be sure that you are meeting the common curriculum requirements in each key learning area
- guide you in planning to meet the needs of students with varying ability levels and learning needs. You can select and use the syllabus outcomes and content that best suit the learning needs of your students and adjust teaching strategies and what it is that you ask students to produce
- provide a basis for assessing, reporting and discussing student progress.

Science and Technology

Early Stage 1

Foundation Statement

Investigating Scientifically ■ Designing and Making ■ The Natural Environment ■ The Made Environment

Students explore their immediate environment by using the senses, questioning, sharing ideas and identifying simple cause-and-effect relationships. They identify and safely use some equipment to explore.

Students explore ideas, manipulate materials and trial designs through play to develop products and built environments. They identify and safely use some equipment and computer-based technology to model and make things.

Students identify and group living and non-living things and recognise the different needs of living things. They recognise different forms of energy and identify its use in daily life. Students identify ways in which the environment influences daily life. They explore the properties of both natural and made materials.

Students identify ways in which familiar products, including information products, services and built environments meet the needs of people. They recognise the different ways that information is sent and received and how these influence communication. Students identify the characteristics of a range of materials used to make commonly available products and built environments.

Stage 1

Foundation Statement

Investigating Scientifically ■ Designing and Making ■ The Natural Environment ■ The Made Environment

Students conduct guided investigations by following a series of steps that include questioning, making and testing predictions, collecting and recording data, observing patterns and suggesting possible explanations. They select and safely use a range of equipment, computer-based technology and other resources to investigate and explore.

Students follow a guided design process to create products, including information products, services and built environments. They draw and model design ideas using accepted methods and practices. They select and safely use a range of equipment, computer-based technology and other resources when designing and making.

Students identify and describe ways in which living things grow and change. They identify a variety of energy forms and describe their use in the community. Students describe ways in which living things depend on the Earth and its environment. They identify how the properties of natural and made materials relate to their use.

Students identify the difference between natural and built environments and model built environments designed to suit the needs of users. They communicate messages using a variety of media and technologies. Students describe and apply production processes using a range of materials and techniques to grow, make or process products.

Stage 2

Foundation Statement

Investigating Scientifically ■ Designing and Making ■ The Natural Environment ■ The Made Environment

Students independently implement aspects of a scientific investigation, such as observing, questioning, predicting, testing, recording accurate results, analysing data and drawing conclusions. They demonstrate an understanding of a fair test and identify variables. Students select and safely use equipment, computer-based technology and other resources throughout the processes of investigation.

Students develop and evaluate design ideas recognising the needs of users or audiences. They implement the design process and evaluate solutions using functional and aesthetic criteria. Students select and safely use equipment, computer-based technology and other resources throughout the processes of design and production.

Students identify and describe structures and functions in living things and how they interact with each other and their environment. They identify various forms and sources of energy and identify ways in which energy causes change. Students identify features of the solar system and describe interactions that affect conditions on Earth. They describe how the properties of materials affect their use.

Students identify the ways built environments, products and services are constructed or produced. They use a range of techniques, media and information and communication technologies to communicate design ideas to specific audiences. Students explore the properties and uses of both natural and made materials and components.

Stage 3

Foundation Statement

Investigating Scientifically ■ Designing and Making ■ The Natural Environment ■ The Made Environment

Students independently develop questions for scientific investigation, conduct scientific investigations based on fair testing and collect, record and analyse the resulting data. They identify trends in data, evaluate findings and prepare possible explanations. Students use, select and evaluate equipment, computer-based technology and other resources to meet the requirements and constraints of investigations.

Students independently plan, implement and manage the design process and evaluate the results using design criteria. They consider the implications of design and production in relation to environmental, aesthetic, cultural, ethical, safety and functional factors. Students select, safely use and evaluate equipment, computer-based technology and other resources to meet the requirements and constraints of design tasks.

Students identify, describe and evaluate interdependent relationships between living things and the environment within ecosystems. They identify and describe various sources, forms, uses, transfers and changes in forms of energy. Students explore how natural forces and human interaction cause changes to the Earth over time. They recognise that the Earth is the source of most materials, and resources must be managed for sustainability.

Students recognise that built environments are systems created to meet the needs and requirements of people and communities. They identify techniques used to engage audiences and convey meaning when creating information products. Students explain how production processes have changed over time and model systems used to manufacture products and provide services.

OUTCOMES

Outcomes are clear statements of the knowledge, skills and understanding expected to be achieved by most students by the end of a given stage. Outcomes provide signposts of students' progress and they provide a basis for summative reporting.

Overview of Stage Outcomes for Science and Technology K–6

Content Strands

Outcomes	Early Stage 1	Stage 1	Stage 2	Stage 3
Built Environments BE	BE ES1.1 Explores and identifies ways in which built environments suit their users.	BE S1.1 Creates, modifies or models built environments to suit the needs of users.	BE S2.1 Creates, models and evaluates built environments reflecting consideration of functional and aesthetic factors.	BE S3.1 Creates and evaluates built environments demonstrating consideration of sustainability and aesthetic, cultural, safety and functional issues.
Information and Communication IC	IC ES1.2 Recognises and uses various means of communication.	IC S1.2 Creates a range of information products and communicates using a variety of media.	IC S2.2 Creates and evaluates information products demonstrating an understanding of the needs of particular audiences.	IC S3.2 Creates and evaluates information products and processes, demonstrating consideration of the type of media, form, audience and ethical issues.
Living Things LT	LT ES1.3 Identifies ways in which living things are different and have different needs.	LT S1.3 Identifies and describes ways in which living things grow and change.	LT S2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.	LT S3.3 Identifies, describes and evaluates the interactions between living things and their effects on the environment.
Physical Phenomena PP	PP ES1.4 Explores and identifies ways some forms of energy are used in their daily lives.	PP S1.4 Identifies and describes different ways some forms of energy are used in the community.	PP S2.4 Identifies various forms and sources of energy and devises systems that use energy.	PP S3.4 Identifies and applies processes involved in manipulating, using and changing the form of energy.
Products and Services PS	PS ES1.5 Recognises the relationship between everyday products and people's needs.	PS S1.5 Grows, makes or processes some products using a range of techniques and materials.	PS S2.5 Creates and evaluates products and services considering aesthetic and functional factors.	PS S3.5 Creates and evaluates products and services, demonstrating consideration of sustainability, aesthetic, cultural, safety and functional issues.
Earth and its Surroundings ES	ES ES1.6 Explores and identifies ways the environment influences their daily lives.	ES S1.6 Identifies and describes ways in which people and other living things depend upon the Earth and its environments.	ES S2.6 Identifies some of the features of the solar system and describes interactions that affect conditions on Earth.	ES S3.6 Recognises that the Earth is the source of most materials and resources, and describes phenomena and processes, both natural and human, that form and change the Earth over time.

Learning Processes

Outcomes	Early Stage 1	Stage 1	Stage 2	Stage 3
Investigating	INV ES1.7	INV S1.7	INV S2.7	INV S3.7
INV	Investigates their surroundings by observing, questioning, exploring and reporting.	Conducts guided investigations by observing, questioning, predicting, collecting and recording data, and suggesting possible explanations.	Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.	Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.
Designing and Making	DM ES1.8	DM S1.8	DM S2.8	DM S3.8
DM	Generates own ideas and designs through trial and error, play, modelling and making.	Develops and implements own design ideas in response to an investigation of needs and wants.	Develops, implements and evaluates ideas using drawings, models and prototypes at appropriate stages of the design process.	Develops and resolves a design task by planning, implementing managing and evaluating design processes.
Using Technology	UT ES1.9	UT S1.9	UT S2.9	UT S3.9
UT	Identifies and uses a limited range of equipment, computer-based technology, materials and other resources when undertaking exploration and production.	Selects and uses a range of equipment, computer-based technology, materials and other resources to undertake an investigation or design task.	Selects and uses a range of equipment, computer-based technology, materials and other resources with developing skill to enhance investigation and design tasks.	Evaluates, selects and uses a range of equipment, computer-based technology, materials and other resources to meet the requirements and constraints of investigation and design tasks.

Values and Attitudes Outcomes

- VA1** Demonstrates confidence in their own ability and a willingness to make and implement decisions when investigating, designing, making and using technology.
- VA2** Exhibits curiosity and responsiveness to scientific and technological ideas and evidence.
- VA3** Initiates scientific and technological tasks and challenges and perseveres with them to their completion.
- VA4** Gains satisfaction from their efforts to investigate, to design, to make, and to use technology.
- VA5** Works cooperatively with others in groups on scientific and technological tasks and challenges.
- VA6** Shows informed commitment to improving the quality of society and the environment through science and technology activities.
- VA7** Appreciates contributions made by individuals, groups, cultures and communities to scientific and technological understanding.
- VA8** Appreciates the significance of Australian scientific and technological expertise across gender and cultural groups.

OUTCOMES BY CONTENT STRANDS

The outcomes by content strands with associated indicators, are provided as examples of progress in a sequence from Early Stage 1 to Stage 3. They serve to show development from K–6 and are designed to assist teachers in identifying a student's current achievement and in planning future learning experiences. They show not only development across stages, but different ways in which students might demonstrate progress in terms of the content strands.

Built Environments

People create, construct, modify and adapt structures and spaces for a wide range of purposes. The environments they build are an important part of our communities and cultures. See page 19 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

BE ES1.1

Explores and identifies ways in which built environments suit their users.

- describes an immediate environment, eg their own house and records its major features in a drawing
- works collaboratively to build a 'house of bricks' cubby in the classroom after reading *The Three Little Pigs*
- develops a structure that can support itself after experimenting with a variety of materials such as sticks, string and plasticine
- uses building blocks to model part of the school environment and labels its important features
- observes some materials used in their school environment and asks questions about the use of materials, eg *Why is the window made of glass?*
- develops ideas for a garden by modelling with sand, plant clippings, soil and stones
- explores the use of some equipment and materials to join things for a model house, eg masking tape, pva glue, low melt glue gun, string
- visits a market or supermarket and identifies the purpose of different areas, eg parking, check-out, freezer
- selects features in their immediate environment to be recorded in a photo study and justifies choices made, eg the local park because it has swings.

Stage 1

BE S1.1

Creates, modifies or models built environments to suit the needs of users.

- observes, records and classifies vehicles passing the school, eg types of vehicles
- conducts a survey of traffic passing the school and predicts and hypothesizes about traffic flow and explains findings
- selects fabric and uses scissors and staplers safely when creating a display for a transport exhibition
- identifies and collects materials and resources that could be useful for making a model bridge or water tower
- identifies, lists and classifies materials used in nearby buildings and describes their specific use, eg concrete for floors, nails to hold timber together
- draws and explains ideas for reorganising the classroom to make it easier to locate resources and use activity areas
- identifies and describes advantages and disadvantages of a new classroom layout
- chooses appropriate ways of cutting and joining recycled materials for model furniture for the house of an imaginary character
- draws and labels ideas for a cubby or a tree house after reading a fictional text and models their design from recycled materials.

Stage 2**BE S2.1**

Creates, models and evaluates built environments reflecting consideration of functional and aesthetic factors.

- *tests different structures, makes predictions and draws conclusions about the strongest shape for supporting an object or load*
- *interviews students about current playground use and records their responses and proposes ideas for improvements*
- *identifies and describes a variety of ways in which Aboriginal peoples have used or continue to use natural materials to meet their needs, eg mudbricks, fishtraps*
- *generates ideas for improving the use of playground space and prepares labelled plans showing different views for presentation to the school executive*
- *develops and evaluates several ideas for a theme park and models the idea that best meets the design criteria*
- *creates a model theme park using construction kits and recycled materials, considering rides, food, other services and energy sources*
- *uses timber strips, cardboard gussets, bark, sticks, saws and glue guns to construct an authentic-looking model, eg an early settler's hut*
- *selects appropriate materials and resources to model and present ideas for a reading nook to be used by a younger buddy class*
- *uses a range of electronic and print sources, when comparing ways different groups and cultures design buildings to suit climatic conditions.*

Stage 3**BE S3.1**

Creates and evaluates built environments demonstrating consideration of sustainability, aesthetic, cultural, safety and functional issues.

- *evaluates proposed designs for a bridge by modelling structures using timber strips and cardboard gussets and testing them to the point of destruction*
- *uses fair testing when experimenting with mud bricks to determine which ones are the strongest, most weather resistant etc*
- *collects and analyses information about a major transport system in the local area and uses findings to develop suggestions for improvements*
- *selects and safely uses resources, eg coroflute, fabric, glue gun, when planning and constructing a model of a shade structure for the school*
- *creates a model city using simulation software considering funds, energy sources and services etc*
- *prepares a photo study of an area to inform the process of designing a shade structure that is in keeping with existing buildings*
- *uses bookmarked websites to compare the design of buildings in different parts of the world and proposes reasons for differences*
- *devises and implements a survey to determine possible uses for a public building that is to be redeveloped*
- *selects and uses primary and secondary sources to find information about changes to the local environment over time, eg photos and reference material.*

Information and Communication

Information and communications are fundamental to most human activity. They can be used to collect, store and organise data and so assist in solving problems. See page 19 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

IC ES1.2

Recognises and uses various means of communication.

- identifies and draws road signs during a walk through the local area and reports on their meaning
- observes and discusses people's feelings from body language demonstrated through mime
- discusses the purposes of packaging and print-based advertisements, eg pictures of product, price
- works collaboratively on the design and publication of a class book after listening to an Aboriginal oral history
- creates a card for a special person or event, with assistance, using draw/paint software
- contributes ideas for a flyer advertising a class performance
- writes and sends, with assistance, an e-mail or posted letter to a buddy class, then describes what they did
- examines and describes a range of devices used to improve ways in which our senses receive information, eg magnifying glass, microphone, binoculars
- uses a touch sensitive pad or standard keyboard to help develop and publish a group report on a school outing.

Stage 1

IC S1.2

Creates a range of information products and communicates using a variety of media.

- designs and makes signs that indicate different activity areas in a range of languages for the classroom/school
- uses paint, cardboard, glue and natural materials to create masks for different cultural celebrations
- explores objects using a limited number of senses (eg touch and hearing) and describes findings
- identifies, draws and classifies a range of signs, symbols and icons, and labels drawings to show their meaning
- identifies a range of devices that are used to help our senses and classifies these according to the senses used
- gives reasons for different information on packaging when designing and producing a container for Anzac biscuits
- working in groups, designs a poster advertising a play and photocopies the poster for school distribution
- uses an overhead projector to retell a narrative using shadow figures or silhouettes
- with teacher assistance, downloads images from a digital camera for publication, eg on the school website or in print.

Stage 2**IC S2.2**

Creates and evaluates information products demonstrating an understanding of the needs of particular audiences.

- *uses a range of sources to research communication methods and purposes, eg Morse code, short wave radio, message sticks, brochures, TV, and shares findings*
- *identifies how Aboriginal dot paintings can be maps that have special symbols and significance*
- *formulates questions then faxes, posts or e-mails the questions to a buddy class in another school to find out about their favourite television programs*
- *evaluates the effectiveness of school signage and develops and trials ideas for signs before final production*
- *develops ideas for an animation, by planning and drawing a series of pictures for a flip book*
- *plans and produces an animated sequence for young children using video, plasticine figures and signs*
- *reflects on the success of an animation after surveying the targeted audience*
- *selects and explains clay animation techniques (ie plasticine) used to create an animated video about an Australian animal*
- *identifies an appropriate medium, eg video to record a cultural celebration*
- *experiments with a range of desktop publishing features, graphics, font and borders to develop an effective poster.*

Stage 3**IC S3.2**

Creates and evaluates information products and processes, demonstrating consideration of the type of media, form, audience and ethical issues.

- *prepares questions and interviews a communications expert when identifying and analysing future directions in communications*
- *writes and sends an e-mail with an attachment to an expert seeking advice and information for a task*
- *works collaboratively to research, develop a storyboard and a multimedia presentation for communicating about electrical safety*
- *collects information and develops a plan for a seasonal growing calendar for a bush food garden*
- *trials games designed for students who have particular disabilities, evaluates their effectiveness and identifies possible areas for improvement*
- *organises and practises using a microphone, CD player and school PA system when producing a radio show*
- *identifies and explains how and why different social groups are represented in a range of advertisements, eg females, males, different cultural groups*
- *interviews and videos local Aboriginal community members as part of researching the local history using appropriate protocols, eg permission, copyright etc*
- *selects websites and other reference material and checks their accuracy through identifying sources, currency of information, purpose and bias.*

Living Things

Living things interact with each other and affect their environments in complex ways. Understanding of people, other animals and plants is fundamental to a wide range of human activity. See page 20 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

LT ES1.3

Identifies ways in which living things are different and have different needs.

- sorts pictures into groups of living and non-living things
- identifies the different parts of animals that help them to observe, eg eyes, nose
- sorts animal models and/or plant pictures according to differences and similarities, ie in relation to appearance, habitat, movement, food
- observes and reports on the differences between plants grown with and without light
- works collaboratively to plan a model garden and describes how different features cater for a range of living things, eg birds, people
- operates a tape recorder to record, play and identify different bird calls
- suggests ideas for a class aquarium after discussing the needs of goldfish
- designs a habitat for a particular animal, following a visit to the zoo, and explains how it suits the animal's needs
- uses a magnifying glass to identify and then draw different features of animals such as insects, spiders, snails
- contributes to a picture graph showing the frequency of a physical characteristic, eg eye colour across a class group.

Stage 1

LT S1.3

Identifies and describes ways in which living things grow and change.

- identifies changes in themselves over time using family records, interviews with family members and classroom data collection and shares findings
- designs and publishes a timeline that shows how a student has grown and changed since birth
- measures and records, over a four week period, the length of bean plants using informal units
- selects and uses resources for the construction of a pond in the school environment to attract insects and frogs, eg water, plants, rocks
- collaboratively writes, illustrates and publishes a literary recount about the needs of growing animals
- observes tadpoles and frogs in a local waterway and records observation for a class journal
- observes, asks questions and predicts how a plant obtains water and nutrients
- proposes questions for an expert when evaluating plans for an animal environment, eg a bird-friendly garden
- uses a magnifying glass to examine changes in silk worms or 'sea monkeys' during their life cycles and draws the changes.

Stage 2**LT S2.3**

Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.

- *observes and reports on a local environment, describing how plants and animals rely on each other*
- *surveys community groups, eg farmers, Landcare, using e-mail or fax to identify and analyse environmental problems in different parts of NSW*
- *devises and implements a fair test with assistance, to find out the impact of water pollution on plants and reports on findings*
- *draws and labels a plan to refine ideas for making a diorama to show a food chain/web within a particular environment*
- *designs and makes a model of a settlement suited to a particular environment with consideration for the interactions of living things, eg space, underwater*
- *devises a model to demonstrate how a system of the human body functions, eg respiratory system*
- *selects appropriate resources and materials to demonstrate the function of a system that is part of the human body, eg the digestive system*
- *designs, makes and uses a database to record information on selected flora and fauna*
- *chooses a means of publishing a report on the life cycle of an animal, eg silk worm or frog*
- *uses a digital or reflex camera to record stages of an animal's life cycle.*

Stage 3**LT S3.3**

Identifies, describes and evaluates the interactions between living things and their effects on the environment.

- *devises a presentation for younger students on the likely impact of removing one form of life from a food chain*
- *devises and implements a means of comparing physical characteristics (eg eye colour) of a family over three generations and presents findings*
- *predicts outcomes of seed growth tests, undertakes tests, documents findings and shares conclusions*
- *undertakes a detailed observation of an insect colony, develops questions and plans non-destructive tests to collect more data*
- *plans and manages the construction of a bush food/vegetable garden, identifying and resolving the need for funds and expert advice*
- *develops a detailed plan to conserve or improve a local nature reserve/park using a simple scale, symbols and annotations*
- *uses a water testing device to check the water pollution level in a local waterway and discusses findings, eg with an expert*
- *selects the most appropriate medium to record and investigate local plants used by an Aboriginal community*
- *prepares arguments about the potential effects of a new technology on living things after viewing a newsclip, eg the bionic ear.*

Physical Phenomena

Energy can exist in various forms and can be used to meet specific needs. A considerable proportion of human activity depends on understanding of physical phenomena related to energy, space and time. See page 20 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

PP ES1.4

Explores and identifies ways some forms of energy are used in their daily lives.

- examines moving toys and proposes explanations for their movement, eg 'I can roll the ball'
- explores and manipulates moving parts in construction materials, eg gears and wheels, and describes the ways they move
- designs and makes a model farm showing what plants and animals need to live and grow
- observes and describes changes in some materials on heating or cooling, eg jelly, water, chocolate
- designs and makes a simple musical instrument and experiments with the sounds produced
- uses plastic cups or tins and string to make a string telephone and tests with a partner
- represents the function and features of an everyday appliance in a simple model using recycled materials, eg toaster has a cord and uses electricity
- explores and shows others the correct way of placing a battery in toys to make them work
- uses an overhead projector with assistance, to explore how light passes through some materials and not others.

Stage 1

PP S1.4

Identifies and describes different ways some forms of energy are used in the community.

- observes the use of levers of differing lengths to move loads and record the results
- proposes ways of reversing a change of state after observing how some materials are changed by heating or cooling, eg ice–water–water vapour
- develops ideas, plans and makes a reusable container for warm and cold food
- collects different containers used to keep food warm or cold and discusses why they maintain temperature
- discusses the energy provided by different foods, then designs and prepares a meal to eat in preparation for a busy day
- develops a plan with a drawing and some labels for making a moving toy
- experiments with a range of materials and found objects to produce a range of different sounds
- explores and describes how pushes and pulls can make things move, eg pushing a ball or toy car makes it move
- collects toys that move and classifies them according to their type of movement, eg roll, spin, slide, fly
- uses graphics software to draw a design for a household appliance explaining how energy is used, eg a toaster uses electricity to heat bread.

Stage 2**PP S2.4**

Identifies various forms and sources of energy and devises systems that use energy.

- *devises fair tests with assistance to determine which materials are/are not attracted by magnets and presents results in a table*
- *collects and manipulates a range of simple machines and describes how they work, eg egg beater, scissors, can and bottle opener, identifying those with levers*
- *analyses the operation of a variety of lifting devices, eg levers, car jack etc, comparing the ease of lifting with and without the device*
- *selects audio and/or video sources to be used in a presentation on the history of a particular simple machine*
- *uses colour filters when exploring different lighting effects and records the results when adding different colours*
- *explores a range of materials and found objects to produce sounds with varying pitch, proposes ways of classifying sounds and reports on the findings*
- *explores and selects materials to create percussion instruments that produce specific types of sounds*
- *explores the operation and purpose of simple machines to develop ideas for the design of a system, eg a coin sorting system*
- *researches information about musical instruments and applies findings to the design of a musical instrument*
- *designs and constructs a prototype, eg a kite, a windmill, wind speed indicator, after having evaluated a range of ideas for possible shapes and structures*
- *devises a means of testing the performance of a wind powered vehicle, eg a boat or a land yacht.*

Stage 3**PP S3.4**

Identifies and applies processes involved in manipulating, using and changing the form of energy.

- *determines, records and reports on the conditions necessary for an electrical circuit to operate, eg light a bulb*
- *devises a fair test to find out which materials conduct electricity most effectively and shares findings*
- *observes and predicts the effect of different gear ratios used in a range of devices, eg bicycle, clocks*
- *uses a variety of components and materials including gears, pulleys and string to construct an operating model of a crane*
- *develops a plan to a simple scale using measurements and constructs a working model to demonstrate the use of a renewable energy source (sun, wind)*
- *researches and chooses alternative forms of energy to power an energy efficient device or building, eg a cooker, a model holiday cabin*
- *researches the history of early flight and applies findings during the design of a wind-powered vehicle*
- *develops and evaluates a variety of ideas for a wind-powered vehicle and selects a design which will be constructed as a prototype*
- *devises a class mirror maze having investigated how a kaleidoscope produces visual effects*
- *experiments with a range of light sources for a shadow play, eg overhead projector, slide projector, torch.*

Products and Services

People make, distribute, use and consume an enormous quantity and variety of goods and commodities. A considerable proportion of human activity is aimed at providing these products and services. See page 20 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

PS ES1.5

Recognises the relationship between everyday products and people's needs.

- lists and describes their favourite toys and games and explains how they are used
- states how they travel to school giving reasons for this as part of developing a class graph about transport to and from school and identifying which is the most common
- works collaboratively to develop and make a chair for a toy using recycled materials
- works collaboratively to design and publish a menu for a class picnic and lists requirements
- uses scissors correctly and cuts out and assembles images to create collage of healthy foods
- draws a plan of a class garden and shows types of food that could be grown
- uses plastic and masking tape to make a weather-proof outfit for a toy
- participates safely in classroom activities recognising the purpose of common products and equipment, eg turning the computers on, distributing art supplies
- visits a market/supermarket, identifies goods used in their home and explains how they are used.

Stage 1

PS S1.5

Grows, makes or processes some products using a range of techniques and materials.

- follows instructions to test some common materials (eg wood, clay, rubber), records findings in a table and makes some predictions about their properties
- observes and describes changes in materials or ingredients when making bread
- designs and makes a present after sharing ideas with others and consulting books, CD-ROMs and/or bookmarked websites
- draws and labels a finished container, lists materials used and identifies possible improvements
- chooses and prepares materials such as crepe paper, paper cups and plastic straws to construct a present
- collaborates in the development of an exhibition entitled 'Transport: Past, Present and Future'
- uses a digital or reflex camera to record images of products made and used by Aboriginal people, eg textile designs, water/food carriers, didgeridoos and asks questions of an expert
- explains how a piece of equipment works after observing a demonstration of its use, eg a juice squeezer or egg-beater
- participates in and documents the process of preparing food for a cultural celebration, eg Johnny cakes, biscuits or pancakes
- observes and records stages in the growth of alfalfa sprouts and predicts how different conditions might affect growth.

Stage 2**PS S2.5**

Creates and evaluates products and services considering aesthetic and functional factors.

- *devises fair tests with assistance and predicts, tests, and develops conclusions about the properties of different materials, eg strength, elasticity*
- *predicts and tests the efficiency of a range of methods of packaging in relation to the product and the environment and presents findings to peers*
- *collects a range of common materials and identifies those that can be recycled or reused*
- *designs, models and tests a system to collect, sort and store materials for reuse or recycling*
- *devises a system of mass production having constructed a kite from a commercial kit*
- *models ideas for a product and evaluates each design in relation to usefulness and appeal, eg sun protection apparel, sports gear*
- *participates in the planning, implementing and evaluation of a fashion show, eg Carnivale, Skin Cancer Awareness Week*
- *selects and uses equipment and ingredients to prepare a healthy luncheon, eg pizza, Vietnamese roll ups, muffins*
- *interviews an expert to identify traditional Aboriginal technologies used to obtain, prepare and process materials and compare these to other methods*
- *selects desktop publishing software as a way of creating a menu for the school canteen.*

Stage 3**PS S3.5**

Creates and evaluates products and services, demonstrating consideration of sustainability, aesthetic, cultural, safety and functional issues.

- *identifies criteria and uses fair testing when devising a means of evaluating the merits of competing products, eg comparing a range of biscuits, bags, shoes*
- *works collaboratively to evaluate the process used to design and construct a bush food/vegetable garden*
- *designs a system to mass produce recycled paper products and evaluates the system to make it more efficient*
- *identifies criteria to be used when evaluating the design of games, eg audience, skill, cost*
- *uses several methods to produce recycled paper and compares the quality of the end products*
- *selects and experiments with screen printing techniques to produce banners for a cultural festival or other school event*
- *explains to others how to assemble components of a control system, eg a model house alarm or a toilet cistern*
- *selects and uses a range of information sources when researching the contribution of individuals and groups to food preservation technology, eg tinned food, seasonal movements*
- *observes, documents, analyses and reports on some types of food preparation and preservation systems used over time and by different cultures*
- *collects and records information and identifies some of the pros and cons of mining on Aboriginal lands, eg Kakadu, Jabiluka.*

Earth and its Surroundings

The Earth itself is a changing system and is also part of a greater changing system. In order to preserve life on Earth, there is a growing need to develop understanding of the Earth's characteristics and how people interact with their environments. See page 21 of the *Science and Technology K-6 Syllabus* for further information.

Stage 1

ES ES1.6

Explores and identifies ways the environment influences their daily lives.

- *identifies, draws and labels different types of clothing and gives reasons for their use at different times of the year*
- *questions and proposes reasons why different appliances are used at different times of the day and/or year, eg heaters in Winter*
- *observes and recounts changes in the environment over a day and describes activities at different times of the day*
- *generates ideas for symbols to be used on a class weather chart*
- *proposes ideas for improving the use of part of the playground during very hot or wet weather conditions*
- *designs a sun-safe poster to communicate precautions to be taken when outdoors*
- *works with others to devise wet weather gear after testing materials and fabric to find out which type is waterproof*
- *uses a giant class thermometer and temperature strips to measure temperature informally and relate it to descriptors such as warm, cool, hot*
- *chooses pictures representing a particular season and uses scissors to cut these out for a collage*
- *uses a digital or reflex camera with assistance, to record the changes in the playground at different times of the year and relates their observations to others.*

Stage 1

ES S1.6

Identifies and describes ways in which people and other living things depend upon the Earth and its environments.

- *observes and records changes in living things over the seasons, eg deciduous trees changing, reptiles hibernating*
- *tests and records with various materials and forms to observe and report on floating or sinking*
- *describes changes in own body when breathing in and out*
- *observes, asks questions and records what happens to plants when they are deprived of a requirement, eg water, air, sunlight, nutrients*
- *records a farmer's or gardener's response to questions about plants and their needs, using a tape recorder*
- *selects, with guidance, materials and resources to construct a display entitled 'From the earth to the dinner plate'*
- *participates in the designing and making of a terrarium to observe how water changes its form in a closed environment*
- *retells, for video documentation, the procedure followed when designing and making a terrarium*
- *draws ideas and produces pots, bowls or dishes using clay and describes their uses*
- *observes a model of the water cycle and uses graphics software to create a slide show for use in reporting findings.*

Stage 2**ES S2.6**

Identifies some of the features of the solar system and describes interactions that affect conditions on Earth.

- records and graphs daily temperature and length of day over time and compares findings with accepted explanations of planetary movement
- develops questions, researches and presents information about contributions made by Australia and other countries to space exploration
- identifies Aboriginal knowledge of cosmology and examines its cultural significance
- observes and records phases of the moon over time, proposes explanations and uses other sources to verify their ideas
- develops an annotated plan and uses it to construct a model of the solar system
- designs and makes a game about Earth, including questions about orbit, rotation, seasonal changes, the moon and tests it with a target audience
- develops a simple scale plan and makes a device or system that utilises the sun's energy directly or by storing it, eg a solar cooker or fan
- accesses and records information about the sun and planets in the solar system from video, computer software and/or reference books
- uses and reports on a computer adventure/simulation game to inform others about the solar system
- uses a ball and a torch to demonstrate day and night and seasonal change.

Stage 3**ES S3.6**

Recognises that the Earth is the source of most materials and resources, and describes phenomena and processes, both natural and human, that form and change the Earth over time.

- researches information on the causes and effects of catastrophic events such as earthquakes and cyclones
- uses a thermometer, rain gauge, wind gauge to record local weather and compare this with data from another area
- devises an experiment to simulate the effects of significant weather changes on flora and vegetation, eg extreme cold, and reports on conclusions
- devises a fair test to determine the rate of crystal formation in different conditions, using a saturated salt solution and presents findings
- uses a range of magnifying devices to identify, describe and classify different types of rocks and crystals
- works collaboratively to design a storyboard and produce a five-minute sci-fi adventure video based on factual knowledge of a prehistoric period
- uses e-mail to contact a museum when researching techniques used to gain information from fossils
- plans and constructs a model and evaluates a system designed to overcome wind or water erosion
- designs a presentation to demonstrate a sequence of changes to the Earth's surface over time, eg the formation of mountains
- creates a database using relevant information about landforms selected from a range of electronic and printed references.

OUTCOMES BY LEARNING PROCESSES

The outcomes by learning processes with associated indicators are provided as examples of progress in a sequence from Early Stage 1 to Stage 3. They serve to show development from K–6 and are designed to assist teachers in identifying a student’s current achievement and in planning future learning experiences. They show not only development across stages, but different ways in which students might demonstrate progress in terms of the learning processes.

Investigating

All people engage in the activity of investigating. It is an activity that capitalises on, and develops, curiosity. It is a core process whereby students develop understanding about natural and made environments. See page 22 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

INV ES1.7

Investigates their surroundings by observing, questioning, exploring and reporting.

- describes an immediate environment, eg their own house and records its major features in a drawing
- observes some materials used in their school environment and asks questions about the use of materials, eg *Why is the window made of glass?*
- identifies and draws road signs during a walk through the local area and reports on their meaning
- observes and discusses people's feelings from body language demonstrated through mime
- discusses the purposes of packaging and print-based advertisements, eg pictures of product, price
- sorts pictures into groups of living and non-living things
- sorts animal models and/or plant pictures according to differences and similarities, ie in relation to appearance, habitat, movement, food
- identifies the different parts of animals that help them to observe, eg eyes, nose
- observes and reports on the differences between plants grown with and without light
- observes and describes changes in some materials on heating or cooling, eg jelly, water, chocolate
- examines moving toys and proposes explanations for their movement, eg *'I can roll the ball'*
- lists and describes their favourite toys and games and explains how they are used
- explores and manipulates moving parts in construction materials, eg gears and wheels, and describes the ways they move
- visits a market or supermarket and identifies the purpose of different areas, eg parking, check-out, freezer.
- states how they travel to school giving reasons for this as part of developing a class graph about transport to and from school and identifying which is the most common
- visits a market/supermarket, identifies goods used in their home and explains how they are used
- identifies, draws and labels different types of clothing and gives reasons for their use at different times of the year
- questions and proposes reasons why different appliances are used at different times of the day and/or year, eg heaters in Winter
- observes and recounts changes in the environment over a day and describes activities at different times of the day.

Stage 1

INV S1.7

Conducts guided investigations by observing, questioning, predicting, collecting and recording data and suggesting possible explanations.

- observes, records and classifies vehicles passing the school, eg types of vehicles
- conducts a survey of traffic passing the school and predicts and hypothesizes about traffic flow and explains findings
- identifies, lists and classifies materials used in nearby buildings and describes their specific use, eg concrete for floors, nails to hold timber together
- explores objects using a limited number of senses (eg touch and hearing) and describes findings
- identifies, draws and classifies a range of signs, symbols and icons, and labels drawings to show their meaning
- identifies a range of devices that are used to help our senses and classifies these according to the senses used
- identifies changes in themselves over time using family records, interviews with family members and classroom data collection and shares findings
- observes tadpoles and frogs in a local waterway and records observations for a class journal
- observes, asks questions and predicts how a plant obtains water and nutrients
- observes, asks questions and records what happens to plants when they are deprived of a requirement, eg water, air, sunlight, nutrients
- explores and describes how pushes and pulls can make things move, eg pushing a ball or toy car makes it move
- collects toys that move and classifies them according to their type of movement, eg roll, spin, slide, fly
- observes the use of levers of differing lengths to move loads and records the results
- proposes ways of reversing a change of state after observing how some materials are changed by heating or cooling, eg ice-water-water vapour
- follows instructions to test some common materials (eg wood, clay, rubber), records findings in a table and makes some predictions about their properties
- observes and describes changes in materials or ingredients when making bread
- observes and records stages in the growth of alfalfa sprouts and predicts how different conditions might affect growth
- observes and records changes in living things over the seasons, eg deciduous trees changing, reptiles hibernating
- describes changes in own body when breathing in and out
- tests and records with various materials and forms to observe and report on floating or sinking.

Stage 2**INV S2.7**

Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

- tests different structures, makes predictions and draws conclusions about the strongest shape for supporting an object or load
- interviews students about current playground use and records their responses and proposes ideas for improvements
- identifies and describes a variety of ways in which Aboriginal peoples have used or continue to use natural materials to meet their needs, eg mudbricks, fishtraps
- uses a range of sources to research communication methods and purposes, eg Morse code, short wave radio, message sticks, brochures, TV, and shares findings
- identifies how Aboriginal dot paintings can be maps that have special symbols and significance
- formulates questions then faxes, posts or e-mails the questions to a buddy class in another school to find out about their favourite television programs
- observes and reports on a local environment, describing how plants and animals rely on each other
- surveys community groups, eg farmers, Landcare, using e-mail or fax to identify and analyse environmental problems in different parts of NSW
- devises and implements a fair test with assistance, to find out the impact of water pollution on plants and reports on findings
- devises fair tests with assistance to determine which materials are/are not attracted by magnets and presents results in a table
- collects and manipulates a range of simple machines and describes how they work, eg egg beater, scissors, can and bottle opener, identifying those with levers
- uses colour filters when exploring different lighting effects and records the results when adding different colours
- explores a range of materials and found objects to produce sounds with varying pitch, proposes ways of classifying sounds and reports on the findings
- devises fair tests with assistance and predicts, tests, and develops conclusions about the properties of different materials, eg strength, elasticity
- predicts and tests the efficiency of a range of methods of packaging in relation to the product and the environment and presents findings to peers
- collects a range of common materials and identifies those that can be recycled or reused
- records and graphs daily temperature and length of day over time and compares findings with accepted explanations of planetary movement
- develops questions, researches and presents information about contributions made by Australia and other countries to space exploration
- identifies Aboriginal knowledge of cosmology and examines its cultural significance
- observes and records phases of the moon over time, proposes explanations and uses other sources to verify their ideas.

Stage 3**INV S3.7**

Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

- uses fair testing when experimenting with mud bricks to determine which ones are the strongest, most weather resistant etc
- collects and analyses information about a major transport system in the local area and uses findings to develop suggestions for improvements
- devises and implements a survey to determine possible uses for a public building that is to be redeveloped
- prepares questions and interviews a communications expert when identifying and analysing future directions in communications
- selects websites and other reference material and checks their accuracy through identifying sources, currency of information, purpose and bias
- identifies and explains how and why different social groups are represented in a range of advertisements, eg females, males, different cultural groups
- predicts outcomes of seed growth tests, undertakes tests, documents findings and shares conclusions
- undertakes a detailed observation of an insect colony, develops questions and plans non-destructive tests to collect more data
- devises and implements a means of comparing physical characteristics (eg eye colour) of a family over three generations and presents findings
- determines, records and reports on the conditions necessary for an electrical circuit to operate, eg light a bulb
- devises a fair test to find out which materials conduct electricity most effectively and shares findings
- observes and predicts the effect of different gear ratios used in a range of devices, eg bicycle, clocks
- identifies criteria and uses fair testing when devising a means of evaluating the merits of competing products, eg comparing a range of biscuits, bags, shoes
- collects and records information and identifies some of the pros and cons of mining on Aboriginal lands, eg Kakadu, Jabiluka
- observes, documents, analyses and reports on some types of food preparation and preservation systems used over time and by different cultures
- devises an experiment to simulate the effects of significant weather changes on flora and vegetation, eg extreme cold, and reports on conclusions
- researches information on the causes and effects of catastrophic events such as earthquakes and cyclones
- devises a fair test to determine the rate of crystal formation in different conditions, using a saturated salt solution and presents findings.

Designing and Making

Designing is an activity in which all people engage. It is a core process through which students try to identify needs and propose practical means by which these needs can be addressed. See page 23 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

DM ES1.8

Generates own ideas and designs through trial and error, play, modelling and making.

- works collaboratively to build a 'house of bricks' cubby in the classroom after reading *The Three Little Pigs*
- develops a structure that can support itself after experimenting with a variety of materials such as sticks, string and plasticine
- develops ideas for a garden by modelling with sand, plant clippings, soil and stones
- works collaboratively on the design and publication of a class book after listening to an Aboriginal oral history
- creates a card for a special person or event, with assistance, using draw/paint software
- contributes ideas for a flyer advertising a class performance
- works collaboratively to plan a model garden and describes how different features cater for a range of living things, eg birds, people
- draws a plan of a class garden and shows types of food that could be grown
- suggests ideas for a class aquarium after discussing the needs of goldfish
- designs a habitat for a particular animal, following a visit to the zoo, and explains how it suits the animal's needs
- designs and makes a model farm showing what plants and animals need to live and grow
- designs and makes a simple musical instrument and experiments with the sounds produced
- represents the function and features of an everyday appliance in a simple model using recycled materials, eg toaster has a cord and uses electricity
- works collaboratively to develop and make a chair for a toy using recycled materials
- works collaboratively to design and publish a menu for a class picnic and lists requirements
- generates ideas for symbols to be used on a class weather chart
- proposes ideas for improving the use of part of the playground during very hot or wet weather conditions
- designs a sun-safe poster to communicate precautions to be taken when outdoors
- works with others to devise wet weather gear after testing materials and fabric to find out which type is waterproof.

Stage 1

DM S1.8

Develops and implements own design ideas in response to an investigation of needs and wants.

- draws and labels ideas for a cubby or a tree house after reading a fictional text and models their design from recycled materials
- draws and explains ideas for reorganising the classroom to make it easier to locate resources and use activity areas
- identifies and describes advantages and disadvantages of a new classroom layout
- gives reasons for different information on packaging when designing and producing a container for Anzac biscuits
- designs and makes signs that indicate different activity areas in a range of languages for the classroom/school
- working in groups, designs a poster advertising a play and photocopies the poster for school distribution
- designs and publishes a timeline that shows how a student has grown and changed since birth
- collaboratively writes, illustrates and publishes a literary recount about the needs of growing animals
- proposes questions for an expert when evaluating plans for an animal environment, eg a bird-friendly garden
- develops ideas, plans and makes a reusable container for warm and cold food
- discusses the energy provided by different foods, then designs and prepares a meal to eat in preparation for a busy day
- develops a plan with a drawing and some labels for making a moving toy
- designs and makes a present after sharing ideas with others and consulting books, CD-ROMs and/or bookmarked websites
- draws and labels a finished container, lists materials used and identifies possible improvements
- collaborates in the development of an exhibition entitled 'Transport: Past, Present and Future'
- participates in the designing and making of a terrarium to observe how water changes its form in a closed environment
- retells, for video documentation, the procedure followed when designing and making a terrarium
- draws ideas and produces pots, bowls or dishes using clay and describes their uses.

Stage 2**DM S2.8**

Develops, implements and evaluates ideas using drawings, models and prototypes at appropriate stages of the design process.

- generates ideas for improving the use of playground space and prepares labelled plans showing different views for presentation to the school executive
- develops and evaluates several ideas for a theme park and models the idea that best meets the design criteria
- creates a model theme park using construction kits and recycled materials, considering rides, food, other services and energy sources
- develops ideas for an animation, by planning and drawing a series of pictures for a flip book
- plans and produces an animated sequence for young children using video, plasticine figures and signs
- reflects on the success of an animation after surveying the targeted audience
- evaluates the effectiveness of school signage and develops and trials ideas for signs before final production
- draws and labels a plan to refine ideas for making a diorama to show a food chain/web within a particular environment
- designs and makes a model of a settlement suited to a particular environment with consideration for the interactions of living things, eg space, underwater
- devises a model to demonstrate how a system of the human body functions, eg respiratory system
- designs and constructs a prototype, eg a kite, a windmill, wind speed indicator, after having evaluated a range of ideas for possible shapes and structures
- explores the operation and purpose of simple machines to develop ideas for the design of a system, eg a coin sorting system
- researches information about musical instruments and applies findings to the design of a musical instrument
- devises a system of mass production having constructed a kite from a commercial kit
- models ideas for a product and evaluates each design in relation to usefulness and appeal, eg sun protection apparel, sports gear
- participates in the planning, implementing and evaluation of a fashion show, eg Carnivale, Skin Cancer Awareness Week
- designs, models and tests a system to collect, sort and store materials for reuse or recycling
- develops an annotated plan and uses it to construct a model of the solar system
- designs and makes a game about Earth, including questions about orbit, rotation, seasonal changes, the moon and tests it with a target audience
- develops a simple scale plan and makes a device or system that utilises the sun's energy directly or by storing it, eg a solar cooker or fan.

Stage 3**DM S3.8**

Develops and resolves a design task by planning, implementing, managing and evaluating design processes.

- evaluates proposed designs for a bridge by modelling structures using timber strips and cardboard gussets and testing them to the point of destruction
- creates a model city using simulation software considering funds, energy sources and services etc
- prepares a photo study of an area to inform the process of designing a shade structure that is in keeping with existing buildings
- works collaboratively to research, develop a storyboard and a multimedia presentation for communicating about electrical safety
- collects information and develops a plan for a seasonal growing calendar for a bush food garden
- plans and manages the construction of a bush food/vegetable garden, identifying and resolving the need for funds and expert advice
- works collaboratively to evaluate the process used to design and construct a bush food/vegetable garden
- trials games designed for students who have particular disabilities, evaluates their effectiveness and identifies possible areas for improvement
- develops a detailed plan to conserve or improve a local nature reserve/park using a simple scale, symbols and annotations
- devises a presentation for younger students on the likely impact of removing one form of life from a food chain
- develops a plan to a simple scale using measurements and constructs a working model to demonstrate the use of a renewable energy source (sun, wind)
- researches the history of early flight and applies findings during the design of a wind-powered vehicle
- develops and evaluates a variety of ideas for a wind-powered vehicle and selects a design which will be constructed as a prototype
- devises a class mirror maze having investigated how a kaleidoscope produces visual effects
- designs a system to mass produce recycled paper products and evaluates the system to make it more efficient
- identifies criteria to be used when evaluating the design of games, eg audience, skill, cost
- works collaboratively to design a storyboard and produce a five-minute sci-fi adventure video based on factual knowledge of a prehistoric period
- plans and constructs a model and evaluates a system designed to overcome wind or water erosion
- designs a presentation to demonstrate a sequence of changes to the Earth's surface over time, eg the formation of mountains.

Using Technology

A significant proportion of human activity involves the use of technologies. As a result of science and technology education students will learn to use a wide variety of tools, hardware, materials, equipment and software appropriately and safely. See page 24 of the *Science and Technology K-6 Syllabus* for further information.

Early Stage 1

UT ES1.9

Identifies and uses a limited range of equipment, computer-based technology, materials and other resources when undertaking exploration and production.

- uses building blocks to model part of the school environment and labels its important features
- explores the use of some equipment and materials to join things for a model house, eg masking tape, pva glue, low melt glue gun, string
- selects features in their immediate environment to be recorded in a photo study and justifies choices made, eg the local park because it has swings
- writes and sends, with assistance, an e-mail or posted letter to a buddy class, then describes what they did
- examines and describes a range of devices used to improve ways in which our senses receive information, eg magnifying glass, microphone, binoculars
- uses a magnifying glass to identify and then draw different features of animals such as insects, spiders, snails
- uses a touch sensitive pad or standard keyboard to help develop and publish a group report on a school outing
- operates a tape recorder to record, play and identify different bird calls
- contributes to a picture graph showing the frequency of a physical characteristic, eg eye colour, across a class group
- explores and shows others the correct way of placing a battery in toys to make them work
- uses plastic cups or tins and string to make a string telephone and tests with a partner
- uses an overhead projector with assistance, to explore how light passes through some materials and not others
- uses scissors correctly and cuts out and assembles images to create collage of healthy foods
- participates safely in classroom activities recognising the purpose of common products and equipment, eg turning the computers on, distributing art supplies
- uses a giant class thermometer and temperature strips to measure temperature informally and relate it to descriptors such as warm, cool, hot
- uses plastic and masking tape to make a weather-proof outfit for a toy
- chooses pictures representing a particular season and uses scissors to cut these out for a collage
- uses a digital or reflex camera with assistance, to record the changes in the playground at different times of the year and relates their observations to others.

Stage 1

UT S1.9

Selects and uses a range of equipment, computer-based technology, materials and other resources to undertake an investigation or design task.

- chooses appropriate ways of cutting and joining recycled materials for model furniture for the house of an imaginary character
- identifies and collects materials and resources that could be useful for making a model bridge or water tower
- selects fabric and uses scissors or staplers safely when creating a display for a transport exhibition
- uses paint, cardboard, glue and natural materials to create masks for different cultural celebrations
- uses an overhead projector to retell a narrative using shadow figures or silhouettes
- with teacher assistance, downloads images from a digital camera for publication, eg on the school website or in print
- uses a magnifying glass to examine changes in silk worms or 'sea monkeys' during their life cycles and draws the changes
- measures and records, over a four week period the length of bean plants using informal units
- selects and uses resources for the construction of a pond in the school environment to attract insects and frogs, eg water, plants, rocks
- experiments with a range of materials and found objects to produce a range of different sounds
- uses graphics software to draw a design for a household appliance explaining how energy is used, eg a toaster uses electricity to heat bread
- collects different containers used to keep food warm/cold and discusses why they maintain temperature
- chooses and prepares materials such as crepe paper, paper cups and plastic straws to construct a present
- uses a digital or reflex camera to record images of products made and used by Aboriginal people, eg textile designs, food/water carriers, didgeridoos and asks questions of an expert
- explains how a piece of equipment works after observing a demonstration of its use, eg a juice squeezer or egg-beater
- participates in and documents the process of preparing food for a cultural celebration, eg Johnny cakes, biscuits or pancakes
- observes a model of the water cycle and uses graphics software to create a slide show for use in reporting findings
- records a farmer's or gardener's response to questions about plants and their needs, using a tape recorder
- selects, with guidance, materials and resources to construct a display entitled 'From the earth to the dinner plate'.

Stage 2**UT S2.9**

Selects and uses a range of equipment, computer-based technology, materials and other resources with developing skill to enhance investigation and design tasks.

- uses timber strips, cardboard gussets, bark, sticks, saws and glue guns to construct an authentic - looking model, eg an early settler's hut
- selects appropriate materials and resources to model and present ideas for a reading nook to be used by a younger buddy class
- uses a range of electronic and print sources, when comparing ways different groups and cultures design buildings to suit climatic conditions
- identifies an appropriate medium, eg video to record a cultural celebration
- experiments with a range of desktop publishing features, graphics, font and borders to develop an effective poster
- selects and explains clay animation techniques (ie plasticine) used to create an animated video about an Australian animal
- selects appropriate resources and materials to demonstrate the function of a system that is part of the human body, eg the digestive system
- designs, makes and uses a database to record information on selected flora and fauna
- chooses a means of publishing a report on the life cycle of an animal, eg silk worm or frog
- uses a digital or reflex camera to record stages of an animal's life cycle
- explores and selects materials to create percussion instruments that produce specific types of sounds
- analyses the operation of a variety of lifting devices eg, levers, car jack etc, comparing the ease of lifting with and without the device
- selects audio and/or video sources to be used in a presentation on the history of a particular simple machine
- devises a means of testing the performance of a wind powered vehicle, eg a boat or a land yacht
- selects and uses equipment and ingredients to prepare a healthy luncheon, eg pizza, Vietnamese roll ups, muffins
- interviews an expert to identify traditional Aboriginal technologies used to obtain, prepare and process materials and compare these to other methods
- selects desktop publishing software as a way of creating a menu for the school canteen
- accesses and records information about the sun and planets in the solar system from video, computer software and/or reference books
- uses and reports on a computer adventure/ simulation game to inform others about the solar system
- uses a ball and a torch to demonstrate day and night and seasonal change.

Stage 3**UT S3.9**

Evaluates, selects and uses a range of equipment, computer-based technology, materials and other resources to meet the requirements and constraints of investigating and designing tasks.

- uses bookmarked websites to compare the design of buildings in different parts of the world and proposes reasons for differences
- selects and safely uses resources, eg coroflute, fabric, glue gun, when planning and constructing a model of a shade structure for the school
- selects and uses primary and secondary sources to find information about changes to the local environment over time, eg photos, books
- interviews and videos local Aboriginal community members as part of local history research using appropriate protocols, eg permission, copyright etc
- writes and sends an e-mail with an attachment to an expert seeking advice and information for a task
- organises and practises using a microphone, CD player and PA system when producing a radio show
- uses a water testing device to check the water pollution level in a local waterway and discusses findings, eg with an expert
- selects appropriate medium to record/investigate local plants used by an Aboriginal community
- prepares arguments about the potential effects of a new technology on living things after viewing a newsclip, eg the bionic ear
- experiments with a range of light sources for a shadow play, eg overhead/slide projector, torch
- researches and chooses alternative forms of energy to power an energy efficient device or building, eg a cooker, a model holiday cabin
- uses a variety of components and materials including gears, pulleys and string to construct an operating model of a crane
- uses several methods to produce recycled paper and compares the quality of the end products
- selects and experiments with screen printing techniques to produce banners for a cultural festival or other school event
- explains to others how to assemble components of a control system, eg model house alarm, toilet cistern
- selects and uses a range of information sources to research the contribution of individuals/groups to food preservation technology, eg tinned food, seasonal movements
- uses a thermometer, rain gauge, wind gauge to record local weather and compare this with data from another area
- creates a database using information about land-forms selected from electronic/printed references
- uses e-mail to contact a museum when researching techniques to gain information from fossils
- uses a range of magnifying devices to identify, describe and classify different types of rocks and crystals.

OUTCOMES BY STAGE

The outcomes in this section have been organised to give teachers an overall view of the outcomes and indicators across a particular stage. This enables teachers not only to look at outcomes with a set of associated indicators, but also to see how the outcomes can work together in both teaching and learning in Science and Technology. The purpose of outcomes by stage is also to show teachers examples of how students can engage with the content strands and learning processes of Science and Technology K–6 in an integral way.

Early Stage 1

	Early Stage 1 Built Environments	Early Stage 1 Information and Communication	Early Stage 1 Living Things
	<p>Outcome</p> <p>BE ES1.1 Explores and identifies ways in which built environments suit their users.</p> <ul style="list-style-type: none"> describes an immediate environment, eg their own house and records its major features in a drawing observes some materials used in their school environment and asks questions about the use of materials, eg <i>Why is the window made of glass?</i> visits a market or supermarket and identifies the purpose of different areas, eg parking, check-out, freezer. 	<p>Outcome</p> <p>IC ES1.2 Recognises and uses various means of communication.</p> <ul style="list-style-type: none"> identifies and draws road signs during a walk through the local area and reports on their meaning observes and discusses people's feelings from body language demonstrated through mime discusses the purposes of packaging and print-based advertisements, eg pictures of product, price. 	<p>Outcome</p> <p>LT ES1.3 Identifies ways in which living things are different and have different needs.</p> <ul style="list-style-type: none"> sorts pictures into groups of living and non-living things sorts animal models and/or plant pictures according to differences and similarities, ie in relation to appearance, habitat, movement, food observes and reports on the differences between plants grown with and without light identifies the different parts of animals that help them to observe, eg eyes, nose.
<p>Outcomes Investigating* INV ES1.7</p> <p>Investigates their surroundings by observing, questioning, exploring and reporting.</p>			
<p>Designing and Making* DM ES1.8</p> <p>Generates own ideas and designs through trial and error, play, modelling and making.</p>	<ul style="list-style-type: none"> develops ideas for a garden by modelling with sand, plant clippings, soil and stones works collaboratively to build a 'house of bricks' cubby in the classroom after reading <i>The Three Little Pigs</i> develops a structure that can support itself after experimenting with a variety of materials such as sticks, string and plasticine. 	<ul style="list-style-type: none"> works collaboratively on the design and publication of a class book after listening to an Aboriginal oral history creates a card for a special person or event, with assistance, using draw/paint software contributes ideas for a flyer advertising a class performance. 	<ul style="list-style-type: none"> works collaboratively to plan a model garden and describes how different features cater for a range of living things, eg birds, people suggests ideas for a class aquarium after discussing the needs of goldfish designs a habitat for a particular animal, following a visit to the zoo, and explains how it suits the animal's needs.
<p>Using Technology* UT ES1.9</p> <p>Identifies and uses a limited range of equipment, computer-based technology, materials and other resources when undertaking exploration and production.</p>	<ul style="list-style-type: none"> uses building blocks to model part of the school environment and labels its important features explores the use of some equipment and materials to join things for a model house, eg masking tape, pva glue, low melt glue gun, string selects features in their immediate environment to be recorded in a photo study and justifies choices made, eg the local park because it has swings. 	<ul style="list-style-type: none"> writes and sends, with assistance, an e-mail or posted letter to a buddy class, then describes what they did examines and describes a range of devices used to improve ways in which our senses receive information, eg magnifying glass, microphone, binoculars uses a touch sensitive pad or standard keyboard to help develop and publish a group report on a school outing. 	<ul style="list-style-type: none"> uses a magnifying glass to identify and then draw different features of animals such as insects, spiders, snails operates a tape recorder to record, play and identify different bird calls contributes to a picture graph showing the frequency of a physical characteristic, eg eye colour, across a class group.

*The learning process outcomes have equal importance. The ordering of these outcomes is not meant to convey a sequence of learning.

**Early Stage 1
Physical Phenomena**
Outcome
PP ES1.4

Explores and identifies ways some forms of energy are used in their daily lives.

- *observes and describes changes in some materials on heating or cooling, eg jelly, water, chocolate*
- *examines moving toys and proposes explanations for their movement, eg 'I can roll the ball'*
- *explores and manipulates moving parts in construction materials, eg gears and wheels, and describes the ways they move.*
- *designs and makes a model farm showing what plants and animals need to live and grow*
- *designs and makes a simple musical instrument and experiments with the sounds produced*
- *represents the function and features of an everyday appliance in a simple model using recycled materials, eg toaster has a cord and uses electricity.*
- *explores and shows others the correct way of placing a battery in toys to make them work*
- *uses plastic cups or tins and string to make a string telephone and tests with a partner*
- *uses an overhead projector with assistance, to explore how light passes through some materials and not others.*

**Early Stage 1
Products and Services**
Outcome
PS ES1.5

Recognises the relationship between everyday products and people's needs.

- *lists and describes their favourite toys and games and explains how they are used*
- *states how they travel to school giving reasons for this as part of developing a class graph about transport to and from school and identifying which is the most common*
- *visits a market/supermarket, identifies goods used in their home and explains how they are used.*
- *works collaboratively to develop and make a chair for a toy using recycled materials*
- *works collaboratively to design and publish a menu for a class picnic and lists requirements*
- *draws a plan of a class garden and shows types of food that could be grown.*
- *uses scissors correctly and cuts out and assembles images to create collage of healthy foods*
- *uses plastic and masking tape to make a weather-proof outfit for a toy*
- *participates safely in classroom activities recognising the purpose of common products and equipment, eg turning the computers on, distributing art supplies.*

**Early Stage 1
Earth and its Surroundings**
Outcome
ES ES1.6

Explores and identifies ways the environment influences their daily lives.

- *identifies, draws and labels different types of clothing and gives reasons for their use at different times of the year*
- *questions and proposes reasons why different appliances are used at different times of the day and/or year, eg heaters in Winter*
- *observes and recounts changes in the environment over a day and describes activities at different times of the day.*
- *generates ideas for symbols to be used on a class weather chart*
- *proposes ideas for improving the use of part of the playground during very hot or wet weather conditions*
- *designs a sun-safe poster to communicate precautions to be taken when outdoors*
- *works with others to devise wet weather gear after testing materials and fabric to find out which type is waterproof.*
- *uses a giant class thermometer and temperature strips to measure temperature informally and relate it to descriptors such as warm, cool, hot*
- *chooses pictures representing a particular season and uses scissors to cut these out for a collage*
- *uses a digital or reflex camera with assistance, to record the changes in the playground at different times of the year and relates their observations to others.*

Stage 1

	Stage 1 Built Environments	Stage 1 Information and Communication	Stage 1 Living Things
	Outcome	Outcome	Outcome
	BE S1.1 Creates, modifies or models built environments to suit the needs of users.	IC S1.2 Creates a range of information products and communicates using a variety of media.	LT S1.3 Identifies and describes ways living things grow and change.
Outcomes Investigating* INV S1.7	<ul style="list-style-type: none"> observes, records and classifies vehicles passing the school, eg types of vehicles conducts a survey of traffic passing the school and predicts and hypothesizes about traffic flow and explains findings identifies, lists and classifies materials used in nearby buildings and describes their specific use eg concrete for floors, nails to hold timber together. 	<ul style="list-style-type: none"> explores objects using a limited number of senses (eg touch and hearing) and describes findings identifies, draws and classifies a range of signs symbols and icons, and labels drawings to show their meaning identifies a range of devices that are used to help our senses and classifies these according to the senses used. 	<ul style="list-style-type: none"> identifies changes in themselves over time using family records, interviews with family members and classroom data collection and shares findings observes tadpoles and frogs in a local waterway and records observation for a class journal observes, asks questions and predicts how a plant obtains water and nutrients.
Designing and Making* DM S1.8	<ul style="list-style-type: none"> draws and labels ideas for a cubby or a tree house after reading a fictional text and models their design from recycled materials draws and explains ideas for reorganising the classroom to make it easier to locate resources and use activity areas identifies and describes advantages and disadvantages of a new classroom layout. 	<ul style="list-style-type: none"> gives reasons for different information on packaging when designing and producing a container for Anzac biscuits designs and makes signs that indicate different activity areas in a range of languages for the classroom/school working in groups, designs a poster advertising a play and photocopies the poster for school distribution. 	<ul style="list-style-type: none"> designs and publishes a timeline that shows how a student has grown and changed since birth collaboratively writes, illustrates and publishes a literary recount about the needs of growing animals proposes questions for an expert when evaluating plans for an animal environment, eg a bird-friendly garden.
Using Technology* UT S1.9	<ul style="list-style-type: none"> chooses appropriate ways of cutting and joining recycled materials for model furniture for the house of an imaginary character identifies and collects materials and resources that could be useful for making a model bridge or water tower selects fabric and uses scissors and staplers safely when creating a display for a transport exhibition. 	<ul style="list-style-type: none"> uses paint, cardboard, glue and natural materials to create masks for different cultural celebrations uses an overhead projector to retell a narrative using shadow figures or silhouettes with teacher assistance, downloads images from a digital camera for publication, eg on the school website or in print. 	<ul style="list-style-type: none"> uses a magnifying glass to examine changes in silk worms or 'sea monkeys' during their life cycles and draws the changes measures and records, over a four week period, the length of bean plants using informal units selects and uses resources for the construction of a pond in the school environment to attract insects and frogs, eg water, plants, rocks.
Conducts guided investigations by observing, questioning, predicting, collecting and recording data and suggesting possible explanations.			
Develops and implements their own design ideas in response to an investigation of needs and wants.			
Selects and uses a range of equipment, computer-based technology, materials and other resources to undertake an investigation or design task.			

*The learning process outcomes have equal importance. The ordering of these outcomes is not meant to convey a sequence of learning.

**Stage 1
Physical Phenomena**
Outcome
PP S1.4

Identifies and describes different ways some forms of energy are used in the community.

- explores and describes how pushes and pulls can make things move, eg pushing a ball or toy car makes it move
 - collects toys that move and classifies them according to their type of movement, eg, roll, spin, slide, fly
 - observes the use of levers of differing lengths to move loads and record the results
 - proposes ways of reversing a change of state after observing how some materials are changed by heating or cooling, eg ice-water-water vapour.
-
- develops ideas, plans and makes a reusable container for warm and cold food
 - discusses the energy provided by different foods, then designs and prepares a meal to eat in preparation for a busy day
 - develops a plan with a drawing and some labels for making a moving toy.
-
- experiments with a range of materials and found objects to produce a range of different sounds
 - uses graphics software to draw a design for a household appliance explaining how energy is used, eg a toaster uses electricity to heat bread
 - collects different containers used to keep food warm or cold and discusses why they maintain temperature.

**Stage 1
Products and Services**
Outcome
PS S1.5

Grows, makes or processes some products using a range of techniques and materials.

- follows instructions to test some common materials (eg wood, clay, rubber), records findings in a table and makes some predictions about their properties
 - observes and describes changes in materials or ingredients when making bread
 - observes and records stages in the growth of alfalfa sprouts and predicts how different conditions might affect growth.
-
- designs and makes a present after sharing ideas with others and consulting books, CD-ROMs and/or bookmarked websites
 - draws and labels a finished container, lists materials used and identifies possible improvements
 - collaborates in the development of an exhibition entitled 'Transport: Past, Present and Future'
-
- chooses and prepares materials such as crepe paper, paper cups and plastic straws to construct a present
 - uses a digital/reflex camera to record images of products, eg textile designs, food/ water carriers, didgeridoos, made and used by Aboriginal people and asks questions of an expert
 - explains how a piece of equipment works after observing a demonstration of its use, eg a juice squeezer or egg-beater
 - participates in and documents the process of preparing food for a cultural celebration, eg Johnny cakes, biscuits or pancakes.

**Stage 1
Earth and its Surroundings**
Outcome
ES S1.6

Identifies and describes ways people and other living things depend upon the Earth and its environments.

- observes and records changes in living things over the seasons, eg deciduous trees changing, reptiles hibernating
 - describes changes in own body when breathing in and out
 - observes, asks questions and records what happens to plants when they are deprived of a requirement, eg water, air, sunlight, nutrients
 - tests and records with various materials and forms to observe and report on floating or sinking.
-
- participates in the designing and making of a terrarium to observe how water changes its form in a closed environment
 - retells, for video documentation, the procedure followed when designing and making a terrarium
 - draws ideas and produces pots, bowls or dishes using clay and describes their uses.
-
- observes a model of the water cycle and uses graphics software to create a slide show for use in reporting findings
 - records a farmer's or gardener's response to questions about plants and their needs, using a tape recorder
 - selects, with guidance, materials and resources to construct a display entitled 'From the earth to the dinner plate'.

Stage 2

	Stage 2 Built Environments	Stage 2 Information and Communication	Stage 2 Living Things
	<p>Outcome</p> <p>BE S2.1 Creates, models and evaluates built environments reflecting consideration of functional and aesthetic factors.</p>	<p>Outcome</p> <p>IC S2.2 Creates and evaluates information products, demonstrating an understanding of the needs of particular audiences.</p>	<p>Outcome</p> <p>LT S2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.</p>
<p>Outcomes Investigating * INV S2.7</p> <p>Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.</p>	<ul style="list-style-type: none"> tests different structures, makes predictions and draws conclusions about the strongest shape for supporting an object or load interviews students about current playground use and records their responses and proposes ideas for improvements identifies and describes a variety of ways in which Aboriginal peoples have used or continue to use natural materials to meet their needs, eg mudbricks, fishtraps. 	<ul style="list-style-type: none"> uses a range of sources to research communication methods and purposes, eg Morse code, short wave radio, message sticks, brochures, TV, and shares findings identifies how Aboriginal dot paintings can be maps that have special symbols and significance formulates questions then faxes, posts or e-mails the questions to a buddy class in another school to find out about their favourite television programs. 	<ul style="list-style-type: none"> observes and reports on a local environment, describing how plants and animals rely on each other surveys community groups, eg farmers, Landcare, using e-mail or fax to identify and analyse environmental problems in different parts of NSW devises and implements a fair test with assistance, to find out the impact of water pollution on plants and reports on findings.
<p>Designing and Making* DM S2.8</p> <p>Develops, implements and evaluates ideas using drawings, models and prototypes at appropriate stages of the design process.</p>	<ul style="list-style-type: none"> generates ideas for improving the use of playground space and prepares labelled plans showing different views for presentation to the school executive develops and evaluates several ideas for a theme park and models the idea that best meets the design criteria creates a model theme park using construction kits and recycled materials, considering rides, food, other services and energy sources. 	<ul style="list-style-type: none"> evaluates the effectiveness of school signage and develops and trials ideas for signs before final production develops ideas for an animation, by planning and drawing a series of pictures for a flip book plans and produces an animated sequence for young children using video, plasticine figures and signs reflects on the success of an animation after surveying the targeted audience. 	<ul style="list-style-type: none"> draws and labels a plan to refine ideas for making a diorama to show a food chain/web within a particular environment designs and makes a model of a settlement suited to a particular environment with consideration for the interactions of living things, eg space, underwater devises a model to demonstrate how a system of the human body functions, eg respiratory system.
<p>Using Technology* UT S2.9</p> <p>Selects and uses a range of equipment, computer-based technology, materials and other resources with developing skill to enhance investigation and design tasks.</p>	<ul style="list-style-type: none"> uses timber strips, cardboard gussets, bark, sticks, saws and glue guns to construct an authentic-looking model, eg an early settler's hut selects appropriate materials and resources to model and present ideas for a reading nook to be used by a younger buddy class uses a range of electronic and print sources, when comparing ways different groups and cultures design buildings to suit climatic conditions. 	<ul style="list-style-type: none"> identifies an appropriate medium, eg video to record a cultural celebration experiments with a range of desktop publishing features, graphics, font and borders to develop an effective poster selects and explains clay animation techniques (ie plasticine) used to create an animated video about an Australian animal. 	<ul style="list-style-type: none"> selects appropriate resources and materials to demonstrate the function of a system that is part of the human body, eg the digestive system designs, makes and uses a database to record information on selected flora and fauna chooses a means of publishing a report on the life cycle of an animal, eg silk worm or frog uses a digital or reflex camera to record stages of an animal's life cycle.

**Stage 2
Physical Phenomena**
Outcome
PP S2.4

Identifies various types and sources of energy and devises systems that use energy.

- *devises fair tests with assistance to determine which materials are/are not attracted by magnets and presents results in a table*
- *collects and manipulates a range of simple machines and describes how they work, eg egg beater, scissors, can and bottle opener, identifying those with levers*
- *uses colour filters when exploring different lighting effects and records the results when adding different colours*
- *explores a range of materials and found objects to produce sounds with varying pitch, proposes ways of classifying sounds and reports on the findings.*

- *designs and constructs a prototype, eg a kite, a windmill, wind speed indicator after having evaluated a range of ideas for possible shapes and structures*
- *explores the operation and purpose of simple machines to develop ideas for the design of a system, eg a coin sorting system*
- *researches information about musical instruments and applies findings to the design of a musical instrument.*

- *explores and selects materials to create percussion instruments that produce specific types of sounds*
- *analyses the operation of a variety of lifting devices, eg levers, car jack etc, comparing the ease of lifting with and without the device*
- *selects audio and/or video sources to be used in a presentation on the history of a particular simple machine*
- *devises a means of testing the performance of a wind powered vehicle, eg a boat or a land yacht.*

**Stage 2
Products and Services**
Outcome
PS S2.5

Creates and evaluates products and services considering aesthetic and functional factors.

- *devises fair tests with assistance and predicts, tests, and develops conclusions about the properties of different materials, eg strength, elasticity*
- *predicts and tests the efficiency of a range of methods of packaging in relation to the product and the environment and presents findings to peers*
- *collects a range of common materials and identifies those that can be recycled or reused.*

- *devises a system of mass production having constructed a kite from a commercial kit*
- *models ideas for a product and evaluates each design in relation to usefulness and appeal, eg sun protection apparel, sports gear*
- *participates in the planning, implementing and evaluation of a fashion show, eg Carnival, Skin Cancer Awareness Week*
- *designs, models and tests a system to collect, sort and store materials for reuse or recycling.*

- *selects and uses equipment and ingredients to prepare a healthy luncheon, eg pizza, Vietnamese roll ups, muffins*
- *interviews an expert to identify traditional Aboriginal technologies used to obtain, prepare and process materials and compare these to other methods*
- *selects desktop publishing software as a way of creating a menu for the school canteen.*

**Stage 2
Earth and its Surroundings**
Outcome
ES S2.6

Identifies some of the features of the solar system and describes interactions that affect conditions on Earth.

- *records and graphs daily temperature and length of day over time and compares findings with accepted explanations of planetary movement*
- *develops questions, researches and presents information about contributions made by Australia and other countries to space exploration*
- *identifies Aboriginal knowledge of cosmology and examines its cultural significance*
- *observes and records phases of the moon over time, proposes explanations and uses other sources to verify their ideas.*

- *develops an annotated plan and uses it to construct a model of the solar system*
- *designs and makes a game about Earth, including questions about orbit, rotation, seasonal changes, the moon and tests with a target audience*
- *produces a plan to a simple scale and makes a device or system that utilises the sun's energy directly or by storing it, eg a solar cooker or fan.*

- *accesses and records information about the sun and planets in the solar system from video, computer software and/or reference books*
- *uses and reports on a computer adventure/ simulation game to inform others about the solar system*
- *uses a ball and a torch to demonstrate day and night and seasonal change.*

*The learning process outcomes have equal importance. The ordering of these outcomes is not meant to convey a sequence of learning.

Stage 3

Outcomes Investigating* INV S3.7

Conducts their own investigations and makes judgements based on the results of observing, questioning, planning, predicting, testing, collecting, recording and analysing data, and drawing conclusions.

Designing and Making* DM S3.8

Develops and resolves a design task by planning, implementing, managing and evaluating design processes.

Using Technology* UT S3.9

Evaluates, selects and uses a range of equipment, computer-based technology, materials and other resources to meet the requirements and constraints of investigation and design tasks.

Stage 3 Built Environments

Outcome

BE S3.1
Creates and evaluates built environments demonstrating consideration of sustainability and aesthetic, cultural, safety and functional issues.

- uses fair testing when experimenting with mud bricks to determine which ones are the strongest, most weather resistant etc
- collects and analyses information about a major transport system in the local area and uses findings to develop suggestions for improvements
- devises and implements a survey to determine possible uses for a public building that is to be redeveloped.
- evaluates proposed designs for a bridge by modelling structures using timber strips and cardboard gussets and testing them to the point of destruction
- creates a model city using simulation software considering funds, energy sources and services etc
- prepares a photo study of an area to inform the process of designing a shade structure that is in keeping with existing buildings.
- uses bookmarked websites to compare the design of buildings in different parts of the world and proposes reasons for differences
- selects and safely uses resources, eg coroflute, fabric, glue gun, when planning and constructing a model of a shade structure for the school
- selects and uses primary and secondary sources to find information about changes to the local environment over time, eg photos and reference material.

Stage 3 Information and Communication

Outcome

IC S3.2
Creates and evaluates information products and processes, demonstrating consideration of type of media, form, audience and ethical issues.

- prepares questions and interviews a communications expert when identifying and analysing future directions in communications
- selects websites and other reference material and checks their accuracy through identifying sources, currency of information, purpose and bias
- identifies and explains how and why different social groups are represented in a range of advertisements, eg females, males, different cultural groups.
- works collaboratively to research, develop a storyboard and a multimedia presentation for communicating about electrical safety
- collects information and develops a plan for a seasonal growing calendar for a bush food garden
- trials games designed for students who have particular disabilities, evaluates their effectiveness and identifies possible areas for improvement.
- writes and sends an e-mail with an attachment to an expert seeking advice and information for a task
- organises and practises using a microphone, CD player and school PA system when producing a radio show
- interviews and videos local Aboriginal community members as part of researching the local history using appropriate protocols, eg permission, copyright etc.

Stage 3 Living Things

Outcome

LT S3.3
Identifies, describes and evaluates the interactions between living things and their effects on the environment.

- predicts outcomes of seed growth tests, undertakes tests, documents findings and shares conclusions
- undertakes a detailed observation of an insect colony, develops questions and plans non-destructive tests to collect more data
- devises and implements a means of comparing physical characteristics (eg eye colour) of a family over three generations and presents findings.
- plans and manages the construction of a bush food/vegetable garden, identifying and resolving the need for funds and expert advice
- develops a detailed plan to conserve or improve a local nature reserve/park using a simple scale, symbols and annotations
- devises a presentation for younger students on the likely impact of removing one form of life from a food chain.
- uses a water testing device to check the water pollution level in a local waterway and discusses findings, eg with an expert
- selects the most appropriate medium to record and investigate local plants used by an Aboriginal community
- prepares arguments about the potential effects of a new technology on living things after viewing a newsclip, eg the bionic ear.

*The learning process outcomes have equal importance. The ordering of these outcomes is not meant to convey a sequence of learning.

**Stage 3
Physical Phenomena**
Outcome
PP S3.4

Identifies and applies processes involved in manipulating, using and changing the form of energy.

- determines, records and reports on the conditions necessary for an electrical circuit to operate, eg light a bulb
- devises a fair test to find out which materials conduct electricity most effectively and shares findings
- observes and predicts the effect of different gear ratios used in a range of devices, eg bicycle, clocks.

- develops a plan to a simple scale using measurements and constructs a working model to demonstrate the use of a renewable energy source (sun, wind)
- researches the history of early flight and applies findings during the design of a wind-powered vehicle
- develops and evaluates a variety of ideas for a wind-powered vehicle and selects a design which will be constructed as a prototype
- devises a class mirror maze having investigated how a kaleidoscope produces visual effects.

- experiments with a range of light sources for a shadow play, eg overhead projector, slide projector, torch
- researches and chooses alternative forms of energy to power an energy efficient device or building, eg a cooker, a model holiday cabin
- uses a variety of components and materials including gears, pulleys and string to construct an operating model of a crane.

**Stage 3
Products and Services**
Outcome
PS S3.5

Creates and evaluates products and services, demonstrating consideration of sustainability, aesthetic, cultural, safety and functional issues.

- identifies criteria and uses fair testing when devising a means of evaluating the merits of competing products, eg comparing a range of biscuits, bags, shoes
- collects and records information and identifies some of the pros and cons of mining on Aboriginal lands, eg Kakadu, Jabiluka
- observes, documents, analyses and reports on some types of food preparation and preservation systems used over time and by different cultures.

- works collaboratively to evaluate the process used to design and construct a bush food/vegetable garden
- designs a system to mass produce recycled paper products and evaluates the system to make it more efficient
- identifies criteria to be used when evaluating the design of games, eg audience, skill, cost.

- uses several methods to produce recycled paper and compares the quality of the end products
- selects and experiments with screen printing techniques to produce banners for a cultural festival or other school event
- explains to others how to assemble components of a control system, eg a model house alarm or a toilet cistern
- selects and uses a range of information sources when researching the contribution of individuals and groups to food preservation technology, eg tinned food, seasonal movement.

**Stage 3
Earth and its Surroundings**
Outcome
ES S3.6

Recognises that the Earth is the source of most materials and resources, and describes phenomena and processes, both natural and human, that form and change the Earth over time.

- devises an experiment to simulate the effects of significant weather changes on flora and vegetation, eg extreme cold, and reports on conclusions
- researches information on the causes and effects of catastrophic events such as earthquakes and cyclones
- devises a fair test to determine the rate of crystal formation in different conditions, using a saturated salt solution, and presents findings.

- works collaboratively to design a storyboard and produce a five-minute sci-fi adventure video based on factual knowledge of a prehistoric period
- plans and constructs a model and evaluates a system designed to overcome wind or water erosion
- designs a presentation to demonstrate a sequence of changes to the Earth's surface over time, eg the formation of mountains.

- uses a thermometer, rain gauge, wind gauge to record local weather and compare this with data from another area
- creates a database using relevant information about landforms selected from a range of electronic and printed references
- uses e-mail to contact a museum when researching techniques used to gain information from fossils
- uses a range of magnifying devices to identify, describe and classify different types of rocks and crystals.

Glossary

bookmarked websites	a feature of Internet browser that allows the user to save the location of a website for revisiting at another time
computer-based technology	computer hardware and software that makes the hardware work, including printers, MIDI (musical instrument digital interface), scanners, modems, digital cameras
control technology	a system which is constructed and programmed to fulfil a specific purpose, eg activate traffic lights, touch sensitive sensors, toilet cistern
coroflute	corrugated plastic sheeting suitable for model or product construction
fair tests	tests structured to ensure constant conditions in order to obtain a fair or accurate result for further information, see <i>Science and Technology K–6 Syllabus and Support Document</i> , Teaching Strategies, page 166
gusset	a triangular brace for reinforcing the corner or angle of a structure
information products	a media type used to sort, store, retrieve, transform and communicate information such as an audio program, a documentary on video, a series of posters, a multimedia presentation
low melt glue guns	a lightweight, low melt glue gun designed for students in the first years of primary schooling. Glue guns should always be used with teacher supervision and the use of cotton gloves is recommended. Prior to using this equipment, teachers should carry out a risk assessment for the use of low melt glue guns in their classroom
multimedia	a range of files or formats used to integrate a presentation, which could include text, sound, video
prototype	a working model on which others are based
salt-based crystals	formed by the evaporation of a salt solution, fast evaporation results in smaller crystals, slow evaporation in bigger crystals
slideshow	a sequence of linked computer screens
sustainability	the pattern of activities that meets the needs of the current generation without prejudicing the ability of future generations to meet their needs
systems	combinations of elements that work together to achieve specified outcomes. Televisions, sewing machines, work schedules or rosters, catalogues, computers and recipes are all examples of systems
touch-sensitive pad	a board that connects to a computer and can be used with or instead of a conventional keyboard. Operated by touching the surface of the board, causing the computer to respond in a preset way by using an overlay
working model	an example or model showing how a device, product or environment functions

A list of useful resources to support Science and Technology K–6 are available on the Board of Studies website at <http://www.boardofstudies.nsw.edu.au>

