Solomon Islands

Primary Science

TEACHER'S GUIDE Year 6

ALWAYS LEARNING

PEARSON

Solomon Islands

Primary Science

TEACHER'S GUIDE Year 6

Solomon Islands Curriculum Development Division
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Introduction to the Teacher's Guide

This Teacher's Guide supports the *Solomon Islands Primary Science Learner's Book Year 6*. It is meant to give you ideas, not tell you exactly how to teach. The exact methods and timing you use will vary according to your own circumstances.

The chapters of this Teacher's Guide correspond to the chapters in the Learner's Book. Each chapter is presented in three sections. The first section contains the sub-strand statement and the learning outcomes and indicators for the Learner's Book chapter. The bracketed letters after the outcomes indicate the type of domain covered by the general learning outcomes. There are four domains: understanding (U), knowledge (K), Values (V) and skills (S). The information in this section is taken from the Primary Science syllabus.

The second section of each chapter provides support information for the teacher about each of the activities in the Learner's Book. It is presented in table format.

- Column 1 lists important Science processes and skills being developed by each activity.
- Column 2 lists any resources that are needed for the activity and also refers to *Explore Science* (Pearson).
- Column 3 provides information for teachers about conducting the activity.
- Column 4 gives the reference to the relevant pages in the Learner's Book.

The third section of each chapter lists the answers to the activities and assessment activities in the Learner's Book.

At the beginning of this Teacher's Guide you will find information on:

- outcomes-based education and the learner-centred approach
- the approach of the Learner's Book
- the Learner's Book and the syllabus
- teaching methods
- assessment—recording, monitoring and reporting
- resources required for Science
- the links between Primary Science and other subjects.

At the end of the Teacher's Guide are copies of forms to be used for recording, monitoring and reporting individual and class achievement.

Outcomes-based education and the learner-centred approach

This Teacher's Guide is written for a Learner's Book and syllabus that follow the outcomes-based approach to learning. This approach has been adopted by the Ministry of Education and Human Resources Development and the Curriculum Development Division as part of the new curriculum for Basic Education from Years 1 to 9.

The basis of this approach is that learners should acquire knowledge, understanding, skills, values and attitudes that will be useful to them later in life. The approach is based on the needs of the learners rather than the needs of the subject. The emphasis is not on the traditional content of the subject, but on choosing those elements of the subject that will be useful and valuable to learners. The curriculum is learner-centred rather than subject-centred.

This learner-centred approach contrasts with the teacher-centred approach that has been common in the past. The emphasis is on learners learning for themselves with the guidance of the teacher rather than being taught by the teacher. This means active learning in which learners do things that help them to find out for themselves, think about and draw on their own knowledge and experience, make observations, do experiments and carry out practical tasks. This can be called "learning by doing".

Syllabuses, textbooks and teacher's guides refer to "learners", which suggests active participation in the process, rather than "students", which suggests passive reception of knowledge. One way to understand the learner-centred approach is to think of the more traditional approach of our schools as "banking education". In banking education, the teacher regards the learners as empty vessels that need be filled with knowledge. The learners are then tested by being asked to reproduce the knowledge the teacher has given them. This method relies a lot on the learner listening to the teacher, copying notes from the board, learning the notes and reproducing them later. Learners can often do this successfully without understanding fully what they are writing and reading.

The present outcome-based and learner-centred approach can be called "problem-posing education". This assumes that the learners already have their own ideas, knowledge and skills based on previous experience in school or elsewhere. The job of the teacher is to build on this by posing problems to the learners that make them think about their own ideas and experiences, as well as adding new knowledge and skills to it. Learners are also exposed to experiences by being asked to observe reality outside the classroom, look at pictures or diagrams, examine statistics and read passages, and so gain knowledge and develop ideas for themselves. They are then expected to express these in their own words, not those of the teacher, to prove that they have really understood what they have learnt. Learners are encouraged to be responsible for their own learning, to think for themselves and to form their own ideas and opinions. They are encouraged to become critical thinkers and to be able to face new challenges and situations for themselves. Learning becomes a cooperative effort between the learner and the teacher. This approach also emphasizes the use of multiple intelligences. In addition, education is seen not just as a way of passing on knowledge and skills but a way of forming the kinds of values and attitudes that will make people good and responsible citizens in the future.

The approach of the Learner's Book

The Learner's Book, therefore, is based on these principles. It is not just a summary of the factual knowledge and concepts of the subject. In addition to the content, there are activities for the learners to do and these activities form an essential part of the learning process. It is no longer good enough to simply read the book. Learners must also do the activities in the book.

In the past, activities were often included only at the end of chapters, and learners and teachers often ignored these and moved on to the next "content" section. In these books, the activities are part of the text and must be completed in order to fully learn from the book. Some sections or chapters start with an activity to encourage learners to find out information, think about their own experiences and knowledge, or practise skills for themselves.

There are also many activities based on discussions that encourage learners to form their own ideas. This is to help in the development of desirable values and attitudes.

Many of the activities are to be done in groups. This is to encourage interaction among the learners, as they can often learn as much from each other as they can from the Learner's Book or the teacher.

The Learner's Book and the syllabus

The Learner's Book is structured according to the strands and sub-strands of the syllabus. Each chapter is based on one or more sub-strands, and the order of the chapters follows the order of the sub-strands of the syllabus.

Within the individual chapters, however, the order of the outcomes in the sub-strand of the syllabus is not necessarily followed. Each sub-strand of the syllabus outlines the knowledge, understanding, skills and attitudes—that is, the outcomes—we want learners to achieve. The Learner's Book gives guidance about how the learners might best achieve these outcomes. The best way to do this is not always to follow the exact order of the outcomes in the syllabus. In teaching, therefore, you should usually follow the order of presentation in the Learner's Book rather than following the order of outcomes in the syllabus. As long as the outcomes are achieved, you have reached your goal.

The Learner's Book contains many illustrations: photos, pictures, maps, diagrams and statistics. These are not just included for decoration—they are often just as important as the words.

Timing of the syllabus

The time available for Year 6 Science is five periods of 40 minutes per week. While some teachers may find they do not have time to complete all the activities in the Learner's Book, others may complete them all with time to spare. If you do not have time, leave out some sections and move on to the next topic. Do not spend so long on one topic that you miss other topics altogether. Try to teach at least some of every strand of the syllabus. If you have very quick learners, make up extra exercises that challenge them to think about the topic in greater depth.

Some chapters of the Learner's Book cover one sub-strand of the syllabus. Other chapters cover two or more sub-strands that are related to each other and best taught together. The sub-strands of the syllabus covered by a chapter are indicated at the beginning of each chapter.

As explained earlier, the order of topics in the chapters do not always follow the order of the outcomes in the syllabus. As a teacher, therefore,

you should follow the Learner's Book rather than the syllabus, and use the syllabus as a guide to what the learners should finally achieve.

Yearly program planner

The yearly program planner shows the Year 6 learning program for the Primary Science course and the suggested teaching times based on eight teaching weeks per term and 32 teaching weeks per year.

	Term 1										Term 2									
Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Year 6		**Food chains** LL, 20 periods, 4 weeks				**Variation in living things** LL, 20 periods, 4 weeks						**Electricity** EC, 20 periods, 4 weeks				**Forces** EC, 20 periods, 4 weeks				
		Herbivores, carnivores, and omnivores Food chains Observing animals as they feed Predator and prey Energy in food chains Food webs Decomposers				Similarities and differences What do plants need to survive? Adaptations Animal behaviour Parents and babies Extinction						Static electricity Electric circuit Electromagnets				What is a force? Forces in motion Balanced or unbalanced forces Gravity Friction Work and simple machines				

	Term 3										Term 4									
Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Year 6		**Physical and chemical changes and properties of materials** NPM, 30 periods, 6 weeks						**Selling garden produce** F, 10 periods, 2 weeks				**Selling garden produce** F, 15 periods, 3 weeks			**The solar system and the structure of the Earth** EB, 20 periods, 4 weeks					REVISION
		Changes everywhere Physical change Chemical change Properties and uses of materials						Importance of producing food crops Preparing food for market				Money management Keeping records Selling at the right price Where to sell your produce			The Milky Way The solar system The Sun Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune More about planets and moons Inside the Earth					

LL Living and Learning
EC Energy and Change
NPM Natural and Processed Materials
F Farming
EB Earth and Beyond

Teaching methods

The following are some teaching methods or approaches you can use to facilitate effective learning in your classrooms. Planning and good preparation are important for effective application of these methods.

Fieldwork and excursions

Fieldwork is any work outside the classroom. Fieldwork helps learners to link classroom learning to real-world experience outside the classroom. Here learners are instructed to apply the skills of observation, investigation, interviewing etc. as a means of collecting information about the topic of study for themselves, thus achieving the outcomes of the syllabus in more practical and realistic ways. This is very important in science for teaching learners about the real world around them.

Fieldwork is particularly important in the outcomes approach, which aims to link learning to the real needs of the learners. Fieldwork, therefore, is an essential part of teaching, not an optional extra.

To ensure an effective and successful outcome, you must consider important aspects of fieldwork, such as good classroom preparation and planning, an effective process of carrying out actual work in the field and follow-up work in the classroom.

This means you must go and look at the area you plan to do fieldwork in before you do it, and decide exactly what you want learners to observe and do when they go there. The best way is often to provide a questionnaire to the learners before they go. A lot of the work can then be done by learners working in groups to answer the questions, without too much help from you. The activities in the Learner's Book will often provide the basis for a questionnaire.

Fieldwork takes time and may have to be fitted in after the normal teaching time—in an afternoon or even a weekend. Learners can often fill in questionnaires during their own time by looking at their own area—either after school or, in boarding schools, during the holidays.

Fieldwork is difficult in town schools but should not be ignored. You may have to rely on questionnaires to help learners to do the fieldwork

in their own time, as described above. For instance, learners can be encouraged to go out at weekends and look at a river or stream, the sea and coastline, or a farming area. Assignments can also be given for learners to do in their home areas during holidays—this helps them to realize that what they are learning applies to their home area.

Report writing

The report-writing process involves researching an issue thoroughly, often through fieldwork, collecting the information through one or more of the techniques explained in this section, and organizing the information in a logical and clear manner. In Year 6 you should not place too much emphasis on the formal writing of reports. It is usually enough for learners to answer a series of questions in a questionnaire.

Many of the units in the Year 4 and 5 English course teach learners about research and report writing, so you should know what learners are doing—you could even share an exercise to write up fieldwork or other information as part of their English course.

Group work

Learners take a more active role and talk naturally when they are allowed to work in small groups. In this way they can express their ideas rather than listening passively to the teacher, as is often the case in the whole class. Group work encourages learners to talk or do things for themselves as part of the learning process. Learners discuss, share views and interact in their learning in small groups and present their collective work to the class. To ensure effective learning during group work, preparation and class management are important for teachers.

Group work must be properly organized and supervised. You must not use it as an excuse to sit back and let learners get on with it. However, learners will often not talk freely if they know the teacher is listening, so you must leave groups to talk on their own. Sometimes it is even effective to walk out of the classroom for a while to give groups a chance to get going without you listening.

The role of the teacher in group work is as follows.

- **Choose the topic.** Groups can only discuss topics that they know something about, and that allow a range of points of view or opinions. You cannot discuss a topic such as "How are volcanoes formed?" because there is only one answer to the question and answers are right or wrong. You can discuss "How can people who live near volcanoes prepare for what to do if the volcano erupts?" There are many different answers and each learner can have different ideas.
- **Set the objective.** Make sure groups know exactly what to discuss and have a set of clear questions to answer. It is not enough just to say "discuss this topic".
- **Organize the groups.** Groups should be small enough for everyone to be able to talk. They should usually be mixed—different island groups, not all wantoks. It is good to mix girls and boys but do not do this if it leads to girls being too shy to talk. All-girl groups may sometimes be better.
- **Organize the seating.** Good discussion will take place only if learners face each other in a circle. You cannot have a discussion with someone's back! If possible, classrooms may be arranged by grouping desks in circles facing each other so group work is easy and no movement is necessary. In crowded classrooms you may allow some groups to have their discussion outside.
- **Circulate and listen to progress.** It is best to do this only after giving time for discussion to start. Try to make sure that everyone is given a chance to speak. If you see certain people dominating groups, intervene and ask others their ideas. If groups are having difficulty, give guidance by explaining the topic, give some extra questions or ask individuals their ideas. If groups are doing well on their own, do not interfere.
- **Decide on the language to be used.** In Year 6, most learners will want to use Pijin. It is best to let them do so or they may say nothing. There is nothing wrong with a local language if all in the group speak it, but try to get each group to report back their ideas at the end in English, either verbally or in writing.
- **Report back.** It is often a good idea to appoint a 'chair', who will report back to the whole class at the end, but this is not always

necessary. Each member may write their own ideas, or groups may just learn from the process of discussion.

Debate and discussion

Group work involves learners in debates and discussions, which are active ways of engaging learners in the learning. Learners are able to conduct and collect information through research to use in debates about a particular topic or share ideas with others in the classroom. They will learn a lot in this process. Discussion can take place in small groups or as a whole class.

Debates are good for encouraging learners to form their own opinions about a topic. Even in Year 6 we should encourage this, using simple topics such as "Do you think girls and boys should be treated equally?". At this level, debates should be informal, without trying to follow the strict parliamentary rules of debating.

Presentations

Role-play is a type of group work in which learners are given a part to play, in either a discussion or a story. Acting out a role-play encourages learners to participate, interact and learn through talking. Learners imagine themselves in the place of other people and try to think, act and talk as those people would act. Role-play is often best used at the end of a teaching topic, when learners have learnt quite a lot about a topic or about people in a different area. This helps them to think about the ideas, emotions and feelings of those people.

Simulation is similar to role-play, but the emphasis is on a situation rather than the people. Learners are given a situation that is similar to a real-life situation and learners can either be themselves acting in that situation or can act a role-play. For instance, learners are given a story about a dispute leading up to a fight in a school hall. They are asked to play the parts of the people in the story and act it out. This helps them to understand other people and how they feel and also to think about what they themselves would do in a similar situation. For a role-play or simulation to be successful, learners need enough time and information about the person and the situation to enable them to act and talk realistically.

Other types of presentations are:

- drama performances
- dance performances
- talks and reports
- poster presentations
- collage presentations
- cartoon presentations.

The outcomes approach is intended to teach attitudes and values as well as knowledge, understanding and skills. Role-play and simulation are particularly important in teaching attitudes and values.

Graphs and statistics

Representing information through graphs and statistics is an important and effective way of teaching and learning about a particular topic. Learners may find some information easier to understand when it is represented in graphical or statistical form. In the Learner's Book, learners are introduced to some simple statistics. You should not use complicated statistics in your teaching, or expect learners to remember statistics. They are there to illustrate a point, not to be learnt.

Research interviews and questions

There are a number of ways of conducting research interviews with people to collect information about a topic, such as:

- organizing informal chats
- preparing questions to ask particular people
- preparing standardized questionnaires that learners can use with small groups, asking the same questions to a large number of people and later converting the answers into statistical form.

Prepared questions are also useful for fieldwork and they can be used alone or with any of the above techniques to collect information.

Guest speakers

Asking people from outside the school with specialized knowledge and skills in particular topics to speak to the learners is one way of varying the normal classroom teaching and learning. Through this process, learners will appreciate the importance of specialized knowledge that other people in the community have.

Visits

If possible, try to visit areas that are relevant to the topic in the Learner's Book. When you visit, make sure learners go with a questionnaire as they would for fieldwork, so they know what to look for and what to find out.

Case studies

A case study is a detailed study of a particular area or topic. A case study helps learners to translate the abstract topic in the syllabus into concrete reality, and so understand it better.

Assessment: recording, monitoring and reporting

Assessment is a continuous planned process of gathering, analyzing and interpreting information about learners' knowledge, understanding, skills and attitudes in the various subjects. Assessment enables teachers to judge whether the learning outcomes have been achieved and the learner progress to be reported.

A good system for learner assessment involves:

- planning for assessment
- using a variety of assessment techniques
- providing opportunities for learners to demonstrate performance using the specific learning outcomes given in the syllabus
- diagnosing, analyzing and providing feedback
- gathering and recording evidence of learners' performance
- observing learners demonstrating a certain skill and assessing their competence
- providing feedback to learners
- making judgements on learners' achievement
- using a meaningful system of grading achievement
- reporting on learners' achievement by referring to the learning outcomes.

Teachers are encouraged to use an effective recording, monitoring and reporting system. This is a requirement and it is important that teachers keep accurate records of all outcomes assessed for both individual students and the entire class. It is important for teachers to keep updated and accurate records of all assessments conducted for formative purposes. This type of assessment is also known as continuous assessment. This is the teacher's record of the learner's performance, progress and achievements.

Purpose of assessment

Assessment is about improving learning for both teachers and learners. It is an important ongoing process in teaching and learning and it should

be used continuously; this means that it should not be done only at the end of a particular topic.

Assessment may be formative or summative. Formative assessment is continuous assessment, which takes place throughout every teaching topic and every chapter of the Learner's Book. The assessment information helps you to continually observe and evaluate learners' achievement, and collect data on areas of improvement and the new skills they acquire.

You should focus on the general and specific learning outcomes stated in the syllabus so that learners are aware of what is being assessed, the assessment techniques being used, and the criteria being used. Learners can then judge for themselves whether they are achieving the general and specific learning outcomes.

To make assessment easier, teachers must develop achievement levels. This is often known as "achievement-based assessment". This type of assessment involves the assessing of knowledge, understanding, attitudes and values. It will also assist teachers to identify the level of achievement or attainment for individual students as well as suggesting remedial work for underachieving learners. You can use the specific learning outcomes to identify what to assess. Teachers must also develop descriptors or specific statements to use as evidence to justify whether a learner has achieved an outcome.

Summative assessment tells you what learners have learnt or can do after a whole section of teaching, for example a unit or chapter test. Tests must include skills as well as knowledge. You should test whether learners can read a thermometer, use a compass or interpret directions using a compass, as well as test the factual knowledge they have learnt.

The other type of assessment is "competency-based assessment". This type of assessment involves the assessing of skills. This type of approach is useful for finding out whether learners have acquired the skill competently or not. Such assessment does not need achievement levels.

The purpose of classroom assessments is to support the learning process and to communicate that learning process with others. Learners need to identify what they already know and what needs to be learnt, and be able to apply what they have learnt. Likewise, parents and guardians need to know how their children perform in the classroom.

This assessment approach is known as "assessment as learning". This process will help learners to do self-assessment and to build a shared language that teachers can use to describe effective learning in the classroom. Learners need to identify their own strengths and weaknesses. They also need to identify their own learning progress and ways that they can improve their learning in the classroom.

Principles of assessment

To ensure that assessment is effective, assessment practices should:

- be based on an understanding of how students learn
- be a component of course design
- be based on clear standards and criteria
- embrace a variety of measures
- be valid, reliable and consistent
- be an integral part of the teaching and learning process
- give feedback which can be used by teachers to assess the achievement of the learning outcomes and to provide reports to parents and guardians.

Assessment techniques

Assessment techniques include the following:

- verbal assessment
  - answering questions
  - making a verbal report
  - interviews
- written assessment
  - doing an activity (from textbooks or self-prepared)
  - doing an assignment
  - writing a report
  - sitting for a test or an examination
- practical assessment
  - carrying out a simple scientific activity, as in many of the activities in the Learner's Book
  - participating in a field trip/excursion and collecting information
  - demonstrating a particular skill
  - undertaking basic library research and collecting information

- group work assessment
  - participating in a group task and discussion
  - participating in a role-play and drama
- observation of what individual learners do
- consultation with individual learners by asking them questions
- focused analysis of learners' work such as a portfolio, or a collection of work they have done, to determine how each individual learner is performing in their learning process.

Recording learners' achievements

It is important to keep accurate records of both individual learners and the whole class. At the end of each assessment event, individual records of achievements must be recorded using the approved recording template. Teachers must indicate whether learners have achieved an outcome, with an A; have partially achieved an outcome, with a PA; or have not achieved an outcome, with an NA. The recommended recording template is shown in Appendix 3.

Up-to-date and accurate records are essential for monitoring and reporting learners' performance, progress and achievements. They are also useful for teachers to show parents, the learner and other key stakeholders.

Sample recording forms are provided for individual learners and the entire class in Appendices 3 and 4. Assessment events should be described in the appropriate columns on the recording forms. Learners achievement should be described as achieved, partially achieved and not achieved.

Teachers must understand the way outcomes are arranged in the syllabus. Section 11 of the syllabus outlines the structure of the syllabus, which differentiates general learning outcomes (shown in column 1) and specific learning outcomes (shown in column 2). Both columns contain learning outcomes that reflect the OBE curriculum approach but are separated to show that the general learning outcomes are open-ended statements while specific learning outcomes are specific statements and are measurable, observable and do-able (can be demonstrated). The coding of the syllabus indicates the specific learning outcomes for each general learning outcome. The achievement of specific learning outcomes will mean that appropriate general outcomes are also achieved.

The focus of the syllabus is the specific learning outcomes because these are the statements that describe the highest level of performances expected of learners to acquire and demonstrate at the end of each learning activity in a term, semester or a year. These are the curriculum requirements or benchmarks of the approved national school curriculum and are often referred to as the Curriculum Standards. A continuous record of achievement using approved forms will act as a report card for an individual learner. It also evaluates the effectiveness of the teaching program. These forms are also integrated in the recording, monitoring and reporting systems in the National Examination and Standards Unit (NESU), Inspectorate Division, Primary and Secondary Divisions and other divisions of the Ministry of Education and Human Resources Development.

Monitoring learners' achievements

With accurate records, you can monitor the learning performance, progress and achievements of individual learners and the whole class. You can monitor individual learners' performance, progress and achievements at the end of each assessment event. As you continue to assess more outcomes, the learning pathway of each learner can be mapped and tracked over a period of time, such as a term or semester, in any one year. This information provides useful data when you need to advise learners, parents and other key stakeholders.

In order to identify strengths and weaknesses of individual learners in the classrooms, you need to keep accurate records of the performances of all learners in the class against the performances of an assessed outcome at the end of an assessment event. In this way you can identify which learners have achieved, partially achieved or not achieved the outcome for a particular assessment event. Using this simple monitoring technique, you can identify those who need enrichment support and those who need remedial support to achieve the outcomes required by the national curriculum. The recommended monitoring template is shown in Appendix 6.

Teachers are also encouraged to build learners' portfolios, or profiles. A portfolio should contain details of knowledge, understanding, skills, attitudes/values and achievements that learners acquire in class. Such information can be obtained from observation of assessment tasks,

products resulting from performances, documentary evidence of completed tasks and written accounts of activities. A learner portfolio must be constructed to keep accurate record of learners' achievements for the purposes of effective monitoring and making accurate reporting.

Reporting learners' achievements

With accurate records and effective monitoring systems, you can make a balanced, accurate and fair report on the learners' performance, progress and achievements in a given assessment period. This type of report, which is recommended by the Ministry of Education, must give a descriptive account of the learners' achievements during a particular term or semester.

This descriptive report does not use marks or grades but instead specifies whether a learner has achieved, partially achieved or not achieved a required outcome. Such statements will be indicated with an A, a PA or an NA in the approved reporting form. At the end of each assessment period, the teacher has to give an overall achievement level for the learner. This is essential for the calculation of the overall award. The overall achievement level is calculated as a gross point average, whereby the values of each of the outcomes assessed are added and divided by the number of outcomes assessed. The value of each overall achievement level is equivalent to an award of attainment for the learner for a specified assessment period. The recommended reporting template is shown in Appendix 8.

Calculation of progressive achievement level for formative assessment

To calculate the progressive achievement level for the learner, you need to add the values of the achievement levels for all outcomes assessed in the formative component of the assessment, and divide by the number of outcomes assessed in this component.

Calculation of progressive achievement level for summative assessment

To calculate the progressive achievement level for the learner, you need to add the values of the achievement levels for all outcomes assessed in the summative component of the assessment, and divide by the number of outcomes assessed in this component.

Calculation of overall achievement level—formative and summative assessment

To calculate the overall achievement level, you need to add progressive achievement levels for formative and summative assessment and divide by 2. An award is issued to the learner in the form of a coloured certificate in recognition of their achievement. The table below shows achievement levels and the corresponding achievement awards.

Achievement levels	Performance descriptors	Achievement awards	Certificate colour code
Level 5	Learner is competent in 95% or more of the outcomes	Achieve with excellence	Gold
Level 4	Learner is competent in 80–94% of the outcomes	Achieve with merit	Green
Level 3	Learner is competent in 50–79% of the outcomes	Achieve	Pink
Level 2	Learner is competent in 20–49% of the outcomes	Achieve below standards	Orange
Level 1	Learner is competent in less than 20% of the outcomes	Achieve far below standards	Purple
Level 0	Learner is not competent. Does not achieve outcomes	Not achieve	Blue

Meetings with parents, learners and other stakeholders

Teachers and the school administration are encouraged to consult parents, learners and other stakeholders to discuss the performance, progress and achievements of learners and suggest ways in which each learner can improve. This is a very important process because it involves giving proper feedback to the learners, parents and other key stakeholders. Meetings can be organized by the school administration with the teacher and the parents, or with the teacher, parents and learner. Teachers should keep accurate records of each learner's performance, progress and achievements and at the same time be able to identify the learning progress for a given period of time during a term, semester or year. These results and data should provide the substance and guidance for the teacher to identify remedial work for each learner and also provide effective feedback to parents, guardians and other stakeholders. The teacher will also need

to provide results after each remedial work has been carried out with the learner. Learners who are unable to achieve the curriculum standard or requirement for a particular specific learning outcome are referred to as "under-achievers".

These very important meetings make important links with parents and key stakeholders, and give parents and stakeholders the confidence to support their children's education in our schools and to become part of the learning community.

Resources for Primary Science

Following is a list of materials and equipment required for Primary Science. Learners can collect many of these items. The school should use some of its grant money to buy the other items in the shops. They are all available.

Food chains

Bread
Cardboard
Cupboard
Dish
Scissors
Thread or string

Variation in living things

Fruit
Measuring tape or large ruler
Modelling clay or dough
Small plants
Vegetables

Electricity

Balloons
Batteries
Black marker
Blocks of wood
Cardboard
Crayons
Hair comb
Insulated wire
Light globes
Metal clips
Nails or screws
Small pieces of paper
Wire

Forces

Bag of rice
Balls
Basketballs
Box of chalk
Can of drink
Duster
Exercise books
Heavy rock
Large stones
Long rope
Piece of timber
Scissors
Small stones or pebbles
Spring balance
String
Tennis balls
Two large cardboard boxes
Toy truck or car
Packet of biscuits
Sticks
Stapler

Physical and chemical changes and properties of materials

Baking soda
Candle
Clay
4 glass jars with lids
Margarine
Matches
Metal cutlery (knives, spoons and forks)
Metal tin lid or bottle cap
Milk
Nails
Paper
Piece of wood
Plastic cutlery (knives, spoons and forks)
3 small jars
Teaspoon
Salt
Small pieces of paper
Steel wool (without soap)
Sugar
Selection of paper
Selection of plastic bags
Tongs
Vinegar

The solar system and the structure of the Earth

9 balls (all different sizes)
Coloured crayons
Flour
Glue
Knife
Newspapers
Onion
Paper
Paints
Round balloon
Scissors
Seeds
String

Links between Primary Science and other subjects

Many other subjects cover topics or skills that are similar to or related to the topics and skills we teach in science. It is important that you are aware of these and, when you teach a topic or use a skill, you point out to learners that they have also learnt about this or will learn about this in another subject.

Below is a list of some of the topics or skills in other subjects that you should be aware of.

Other subjects: sub-strand and level		Science sub-strand and level
Health Studies	**Year 4** Looking after our water	**Year 4** Solubility
	Year 5 Clean safe water for living Making healthy food choices	**Year 5** Clean drinking water Crops and animals for food
Social Studies	**Year 3** Weather and seasons	**Year 5** The Earth's revolution, rotation and seasons
	Year 4 Transport	**Year 5** Energy sources and energy changes
	Year 6 Using and managing resources	**Year 6** Selling garden produce

Chapter 1 Food chains

Strand: Life and Living

Suggested periods: 20 (4 weeks)

Sub-strand statement:

Energy in living things comes from the Sun. Light energy is absorbed by plants (producers) to make food. This food is stored in plants. Some animals (herbivores) eat the plants and use the energy. In turn, some animals (carnivores) eat other animals and get their share of this energy. This is called a food chain, and energy is passed along the chain from one organism to the next. Some animals that eat both plants and animals and are called omnivores. Animals that hunt and eat other animals are also called predators. There is a special relationship between predators and the animals they eat (prey). If this relationship is not in balance both the predator and the prey may die out.

General learning outcomes

Learners should:

6.1.1 recognize the three consumer levels in a food chain: producers, herbivores, carnivores (K)

6.1.2 know that plants are producers and make their own food (K)

6.1.3 understand that animals get their energy by eating plants or other animals (U)

6.1.4 recognize that some animals, such as humans and pigs, can eat both plants and animals (K)

6.1.5 understand the predator–prey relationship (U)

6.1.6 understand how energy is transferred and obtained by animals at different levels in the food chain. (U)

Specific learning outcomes

Learners should be able to:

6.1.1.1 represent the consumer levels in a food chain in a locality studied

6.1.2.1 explain the important role of the producers in the food chain

6.1.3.1 observe a number of local animals and record what they eat

6.1.4.1 identify two omnivores and explain what this term means

6.1.5.1 give some examples of predator–prey relationships in the local environment

6.1.5.2 explain how the availability of food affects the predator–prey relationship

6.1.6.1 explain why there should be more producers than herbivores or carnivores in the environment.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Classify local animals into different groups.	*Explore Science* (Pearson) page 192	**Activity 1** Learners can work in pairs to group the local animals into herbivores, carnivores and omnivores. Once they have completed their tables they can be asked to explain their classification to the rest of the class.	Page 2
Classify other animals into groups.	*Explore Science* (Pearson) page 192	**Activity 2** Learners can again work in pairs to group animals from places other than the Solomon Islands in the same way as in Activity 1. To help support learners the teacher can provide a list of animals from other places or a set of pictures taken from magazines.	Page 3
Construct a simple food chain.	*Explore Science* (Pearson) page 193	**Activity 3** This activity can be done in pairs and the final food chain should be as follows: Plant ➔ insect ➔ lizard ➔ cat Learners can also make a drawing of this food chain.	Page 4
Observe animal behaviour and record this accurately in drawing and writing.	*Explore Science* (Pearson) pages 192–193	**Activity 4** This activity can be done as homework or during class time in the school grounds. When the learners have completed their drawings and written descriptions they can present them to the class or their work can be displayed around the classroom.	Page 4
Design, make and use skills of manipulation.	*Explore Science* (Pearson) page 193 Card, pencils, crayons, scissors, thread or string	**Activity 5** Learners can work in groups. They should write down a food chain based on some local animals and plants. These can be from the land or from the sea. The teacher should check that the food chain is correct before the groups start to make it. The learners should draw and colour each animal or plant on card and cut it out using scissors. They can then join the organisms using string or thread. Their mobiles can be displayed around the class. They might write a story or poem about their food chain.	Page 5
Classify and describe predators and prey.	*Explore Science* (Pearson) pages 200–201	**Activity 6** Learners can work in pairs. They should write a sentence or two about each animal and possibly make a drawing of a predator chasing its prey.	Page 7

Processes and skills	Resources	Teacher's support notes	Learner's Book
Draw diagrams to share with teachers and class.	*Explore Science* (Pearson) page 194	**Activity 7** Learners should read about the pyramid of numbers in the Learner's Book and examine the diagram carefully. They should then use this information to help them draw a pyramid of numbers for the food chain shown in the activity. When they have completed their pyramids some learners can explain them to the rest of the class.	Page 8
Make connections and draw diagrams to represent these connections.	*Explore Science* (Pearson) page 195	**Activity 8** Learners should be divided into groups. They can brainstorm a list of all the animals that they can find in the school grounds or garden. Then use these lists to draw up a food web. When they have done this for the school grounds, they can repeat the exercise to develop a food web for the sea around Solomon Islands.	Page 9
Make and record observations.	*Explore Science* (Pearson) page 192 Bread, dish	**Activity 9** Learners should work in pairs and set up the activity themselves as set out in the Learner's Book. They should record their observations in drawing and writing. Once the mould (fungus) begins to grow on the bread they should measure the diameter of a patch on each dish and take this measurement every day to see how it changes. The results can be entered into a table and the final set of measurements can be graphed as a bar graph.	Page 11
Design and conduct an investigation.	*Explore Science* (Pearson) page 192 Bread, dish	**Activity 10** Learners should design an investigation or 'fair test' to determine in which conditions mould (fungus) grows, recording their results in a table and writing some conclusions. They can try growing mould on damp and dry bread on dark and light conditions. If a fridge is available they can test growing mould in cold and warm conditions.	Page 12
Write a summary of what has been learnt in the chapter.	*Explore Science* (Pearson) pages 192–203	**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 13
		Revision (assessment) The teacher gives learners time to complete questions 1 to 4 in the revision section of this chapter.	Page 14

Activities and assessment answers

Activity 1

Herbivores	Carnivores	Omnivores
Cow	Gecko	Pig
Horse	Crocodile	
Goat	Shark	
	Cat	

Activity 2

Learners' answers will vary.

Herbivores	Carnivores	Omnivores
Elephant	Lion	Chimpanzee
Zebra	Tiger	Baboon
Giraffe	Wolf	
Rhino	Alligator	
	Fox	

Activity 3

Learners' food chain diagrams will vary.

Activity 4

Learners' responses will depend on the animals they choose to observe and the observations they make. Some learners should be asked to present their observations to the rest of the class.

Activity 5

Learners' food chain models will vary.

Activity 6

Snakes—some snakes have poison and when they strike their prey it dies from the poison. Others hide and grab the prey and they usually wrap their bodies around it to stop it moving before they swallow it.

Owls usually hunt at night. They have very good eyesight and when they see prey they swoop down very quietly and grab it in their claws.

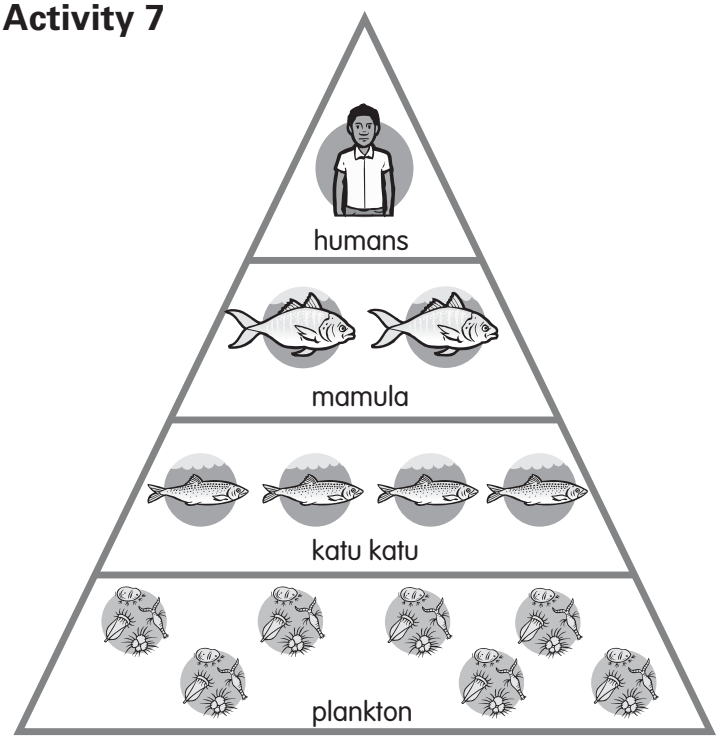
Barracuda can swim very quickly and catch prey in their sharp teeth.

Mice run and hide when they are frightened.

Butterflies are sometimes well camouflaged and can hide among flowers.

Grasshoppers are difficult to see because of their camouflage. They can also jump and fly if they are attacked.

Activity 7



Activity 8

Learners' food webs will vary.

Activity 9

After a few days mould should begin to grow on the bread.

Activity 10

Learners should discover that mould grows fastest in warm, wet and dark conditions.

Revision questions

1 Because plants can use the sunlight to make their own food in a process called photosynthesis.

2 **a** cabbage, slug, frog, snake
b leaf, caterpillar, thrush
c seaweed, crab, seagull
d leaf, caterpillar, ant, lizard

3 We cannot because without plants there would be nothing to produce the first food in all food chains, as plants use the Sun's energy to make their own food, which all the animals (consumers) depend on. Plants also produce oxygen and without this animals could not breathe.

4 Learners' food chain diagrams will vary.

Chapter 2 Variation in living things

Strand: Life and Living
Suggested periods: 20 (4 weeks)

Sub-strand statement:

Survival of organisms depends on how well they are adapted to their environment. To survive, animals must be well adapted to get food, avoid being eaten and find a mate. Changes in the environment by humans or due to natural causes affect organisms. Some organisms can adapt to environmental changes, but not all do. Those that do not may die out (become extinct).

General learning outcomes

Learners should:

6.2.1 understand that within any species there can be lots of variation (U)
6.2.2 know that every organism has some characteristics or adaptations that help it to survive (K)
6.2.3 know that some life forms became extinct a long time ago and others more recently (K)
6.2.4 know that characteristics are passed from one generation to the next. (K)

Specific learning outcomes

Learners should be able to:

6.2.1.1 collect data on the variations in physical characteristics of children in the school and report the findings to the class
6.2.2.1 list some features of two animals and two plants that have helped them to survive
6.2.2.2 design and make a model animal to survive in a given environment
6.2.2.3 observe animals' habits that help them to survive and record these
6.2.3.1 give some examples of forms of life from the local environment that have become extinct and explain why this happened
6.2.4.1 compare the features of baby animals with those of their parents.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Collect data on the characteristics of learners in the class and use these data to draw a number of bar graphs		**Activity 1** Learners are asked to collect information on physical characteristics of children in the class. Learners should first record this information in tables and then use it to draw bar graphs. The teacher should ensure that learners fully understand what to do before they begin this activity. Learners can work in pairs and the teacher can assist them if required. The activity is designed to show learners that although they are all humans and from Solomon Islands, there are still a lot of differences between individuals in the class.	Page 16
Collect data about the height of children in the class and use these data to produce a frequency bar graph.	Measuring tape or ruler	**Activity 2** Learners measure the height of all learners in the class and work out how many learners there are in each height range or category. A class table can be drawn on the blackboard and the learners can use this information to draw a bar graph showing the class heights. The teacher can help individual learners with their graphs if required.	Page 17
Observe the parts of a plant and describe the functions of the various parts.	*Explore Science* (Pearson) pages 116–20	**Activity 3** In the classroom learners make a list of all things that plants need to survive. Learners should each bring a small plant back to the classroom and do a close observation. They should make a table of plant needs and beside each need write the part of the plant that helps with this need. For example, plants need water and the roots are the part of the plant that helps them get water.	Page 17
Draw and label a diagram of a plant.	*Explore Science* (Pearson) pages 116–20	**Activity 4** Learners are asked to draw a picture or diagram of a plant, including its root, and label all the parts of the plant. They should then write what each part does for the plant beside the labels.	Page 18
Observe different bird beaks and match the beak types to what the birds feed on.		**Activity 5** The teacher should prepare a chart of different bird beaks prior to the lesson and then ask learners to carefully observe the bird beaks on the chart. Learners then look at the diagram in the Learner's Book and explain what the different shaped beaks are used for. They then draw each beak and write a sentence about it in their exercise books.	Page 19

Processes and skills	Resources	Teacher's support notes	Learner's Book
Observe different bird feet and match the feet types to what the birds feed on.		**Activity 6** The teacher should prepare a chart of different bird feet prior to the lesson and then ask learners to carefully observe the bird feet on the chart. Learners then look at the diagram in the Learner's Book and explain what the different shaped feet are used for. They then draw each foot and write a sentence about it in their exercise books.	Page 20
Make observations and draw inferences about the features of a bird.	*Explore Science* (Pearson) page 38	**Activity 7** Learners are asked to study the picture of the male peacock in the Learner's Book. They should write a brief description of the bird and why they think the male peacock has beautiful features.	Page 20
Observe and identify features that help grasshoppers to survive.		**Activity 8** Learners study the picture of a grasshopper closely. They should draw a picture of the grasshopper in their exercise books and write a sentence or two about the features that help the grasshopper to survive. If the school is near a grassy area, the learners could look for some live grasshoppers and observe what they do when they go near them. Learners could try catching one and looking at it in real life but teachers should remind them to let it go when they have finished observing it.	Page 21
Make a model animal and describe how it is adapted to survive.	*Explore Science* (Pearson) pages 198–203	**Activity 9** The teacher should prepare materials prior to the lesson for this activity. Learners are asked to make a model animal that can survive in a hot environment. Before making the animal, they should think carefully about the features that would help the animal to survive in this type of environment. For example, it will need to stay cool, be able to find worms and avoid being eaten by other birds. Learners can work in groups for the activity. When they report back ensure that they justify all of the features of their model.	Page 21

Processes and skills	Resources	Teacher's support notes	Learner's Book
Describe the behaviour of a bird.		**Activity 10** Learners should observe the picture of the eagle closely and write down a few sentences about the behaviour shown in the picture. Learners can imagine they are a bird like this and write a short story or poem about diving from a great height and catching fish for dinner.	Page 22
Observe and record how a gecko or other local animals behaves when finding food and avoiding danger.	*Explore Science* (Pearson) pages 200–201	**Activity 11** This activity can be done at school or home. Learners are asked to observe any common animal carefully, for example geckos or lizards, or a mynah bird. Learners should observe the features and the behaviours that allow the animal to catch food and also those that help it to avoid any danger.	Page 22
Observe, identify and list common features seen in parents and their children.	*Explore Science* (Pearson) page 73	**Activity 12** Learners should study the picture of the parent and child in the Learner's Book. In what way is the child the same as her mother? Do they both have the same features, for example, ears, eyes, nose and mouth?	Page 23
Observe, identify and list common features seen in some other animals and their young.	*Explore Science* (Pearson) page 73	**Activity 13** Learners should study the pictures of animals and their young in the Learner's Book. In what way are the young animals the same as their parents?	Page 24
Write a summary of what has been learnt in the chapter.		**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 26
		Revision (assessment) The teacher gives learners time to complete questions 1 to 3 in the revision section of this chapter.	Pages 27–28

Activities and assessment answers

Activity 1

Normally there are more right-handed children in the class.

Activity 2

There will be fewer children in the tall and short groups with most in the middle range of heights. The bar graphs will show this with a peak in the middle of the graph.

Activity 3

Plants need water, sunlight, good soil and air to survive.

The roots of a plant hold it in the soil and allow it to take up water. The stem holds up the leaves and also allows water to pass through it. The leaves capture sunlight and take in air. Some learners may draw flowers. These attract insects and birds and these animals pick up pollen and carry it to other plants. The pollen fertilizes the other plants and enables them to make seeds, which grow into new plants.

Activity 4

The learners should draw a plant and label the roots, stem, leaves and flowers.

Activity 5

A honeyeater has a long fine beak that can reach inside flowers and get the nectar, which is a sweet, sugary liquid that many flowers produce.

A duck has a broad flat beak that it uses to sift through mud and find snails and other small animals.

A heron has a very pointed beak that helps it to spear and catch fish.

A curved sharp beak like that of an eagle is good for catching and holding prey such as mice or rats and then tearing the flesh into small pieces.

Activity 6

An eagle has very sharp claws for grasping and holding its prey such as mice and rats.

A heron has feet with long toes that spread out and allow it to walk over soft mud without sinking in.

A duck has webbed feet that allow it to paddle quickly through the water.

Activity 7

The male peacock has beautiful feathers and a large beautiful tail to help him attract a mate. Female peahens are dull brown and are attracted by the bright features of the male. The male with the best feathers (plumage) finds it easiest to attract females and mate with them. These males tend to have the most young.

Activity 8

Grasshoppers are often eaten by birds. But there are a number of things that help them to avoid being eaten and survive. Firstly, they are difficult to see because they are well camouflaged and blend in with the grass. They are difficult to find for this reason. They have very strong legs and can jump a long way but they can also fly. If a bird or other predator comes near them they can jump and fly away very quickly. That is why we humans find them so difficult to catch.

Activity 9

The animal might have a long pointy beak to push into the ground to find worms. It might also have some spines to protect it form birds that want to eat it and it would probably be a light colour to help reflect some of the heat. But these are just some possible ideas – it might even be shiny to reflect the heat and have strong claws for digging up worms.

Activity 10

The eagle can catch its prey because it has very good eyesight and so is able to see fish from a great height. It can then dive very quickly and use its sharp beak to catch the fish.

Activity 11

The animals that learners choose to observe will vary. If the learners chose to observe geckos they should notice that they generally only come out at night, as they feed on insects. They also often feed near lights, as the insects are attracted to the lights in large numbers and this makes them easier to catch. If the gecko is frightened it runs quickly to its hiding place.

Activity 12

Children have all of the same body structures as their parents: eyes, ears, noses, arms, legs etc. In some cases they also look very like one of their

parents too. However, they cannot be exactly the same, as they get some characteristics from their father and some from their mother.

Activity 13

Like humans, other animals have the same features as their parents. So young dogs have fur, tails and sharp teeth like their parents. These characteristics are passed from one generation to the next in any species.

Revision questions

1 The animal is a fruit bat or flying fox. It has wings that allow it to fly and find fruit to eat and large eyes that help it to see well in the dark because fruit bats only fly at night.

2 The logging removes trees where many animals live. The trees provide them with protection and hiding places and also with food. If the trees are cut down many animals die because they have lost their homes. They also have nowhere to hide from predators, so they are often eaten. Once all the prey animals have gone the predators die out too.

3 Fruit bats, frogs, snakes and lizards, birds and insects—there are many species of all of these as the forests of the Solomon Islands are very rich in animal life.

Chapter 3 Electricity

Strand: Energy and Change

Suggested periods: 20 (4 weeks)

Sub-strand statement:

Electrostatic electricity is a type of electrical charge that is generated by rubbing two materials together, e.g. a plastic ruler and your hair. This type of electricity does not flow. Current electricity is another type of electricity. It is transferred from one point to another in an electric circuit. The flow of electricity in an electric circuit can be varied by including items in the circuit. Simple electric circuits are represented diagrammatically to show the flow of electricity. The flow of electricity can generate a magnetic field. Using domestic electricity requires appropriate safety practices.

General learning outcomes

Learners should:

6.3.1 understand that friction generates electrostatic charge (U)

6.3.2 know that some materials conduct electricity, while others do not (insulators) (K)

6.3.3 know how to construct a simple electric circuit (K)

6.3.4 demonstrate how to record simple circuits using drawings and diagrams (S)

6.3.5 understand that electricity "flows" in a circuit that is complete (U)

6.3.6 understand how to vary this "flow" by including items in a circuit (U)

6.3.7 know that a magnetic field is created by the "flow" of electricity in a wire (K)

6.3.8 know the appropriate safety measures for using domestic electricity. (K)

Specific learning outcomes

Learners should be able to:

6.3.1.1 demonstrate how friction produces electrostatic charge using an inflated balloon

6.3.2.1 identify some conductors and insulators and group a range of materials into conductors and insulators

6.3.3.1 construct a simple electric circuit using a cell or a battery and a bulb

6.3.4.1 draw a diagram of an electric circuit using symbols

6.3.5.1 identify the path of electricity "flow" in a complete circuit

6.3.6.1 identify materials or items that are used to vary the flow of electricity in a circuit using bulbs in series and parallel

6.3.7.1 make an electro-magnet and determine how to change its strength

6.3.8.1 list the essential safety measures for using electrical appliances.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Observe and describe what happens when two different materials are rubbed against each other.	*Explore Science* (Pearson) page 244 Plastic rulers, combs, balloons, paper	**Activity 1** It is best to do this activity on a very dry day. Learners should do this activity in groups. The teacher should ensure that some learners carry out the activity while the others observe what happens when two objects are rubbed against each other. A plastic ruler can be rubbed against clothing; a comb can be run through hair and a balloon rubbed against clothing. These can then be tested for static electricity with small pieces of paper.	Page 30
Observe and describe some further activities with static electricity.	*Explore Science* (Pearson) page 244 Balloons, paper	**Activity 2** This activity can be organized like Activity 1, with some learners carrying out the activity and others watching and recording what happens.	Page 31
Construct a simple circuit.	*Explore Science* (Pearson) page 142 Battery, bulb, wires, switch	**Activity 3** Learners all collect the correct materials: a bulb, leads and a battery. They investigate if they can get the bulb to light by constructing a simple circuit without help from the teacher. If they cannot do this, the teacher needs to make sure they understand that the circuit must be complete for the electricity to flow. If the appropriate equipment is not available, some equipment may be able to be borrowed from the local secondary school.	Page 35
Draw a diagram of a simple electrical circuit using appropriate symbols.	*Explore Science* (Pearson) pages 144–45	**Activity 4** Learners need to be familiar with the main symbols for electrical circuits: bulb, battery, wires and switches. They can work in pairs and draw a diagram of the circuit they made in Activity 3. Once they have done that they should introduce a switch to their circuit and draw circuit diagrams with one switch open and one closed.	Page 36
Design a simple circuit and test conductors and insulators. Devise a rule for conductors and insulators.	*Explore Science* (Pearson) page 146 Different types of materials: metals, wood, rubber, plastic etc.	**Activity 5** Learners design a simple circuit to test whether different types of materials will conduct electricity or not. Once they have completed their circuit they should test a range of materials and group their observations in a table of conductors and insulators. When they have done this they should make up a rule for the types of materials that conduct electricity and those that do not.	Page 37

Processes and skills	Resources	Teacher's support notes	Learner's Book
Observe open and closed circuits and the effect of including extra batteries into a circuit.	*Explore Science* (Pearson) page 142 Batteries, bulb, wires, switch	**Activity 6** In this activity, learners answer questions based on the simple circuit they constructed in Activity 5. The teacher should ensure that materials for the activity are prepared before the lesson.	Page 38
Use simple equipment to construct a circuit with two bulbs.	*Explore Science* (Pearson) pages 143–45 Batteries, bulbs, wires, switch	**Activity 7** Learners construct another circuit with two bulbs. The teacher should ensure they have the correct equipment and check the circuits. The learners should observe what happens to the brightness of two bulbs in series compared to just one bulb in a circuit.	Page 40
Make and compare series and parallel circuits.	*Explore Science* (Pearson) pages 143–45 Batteries, bulbs, wires, switches	**Activity 8** Learners build both parallel and series circuits for two bulbs. The teacher should allow them to use circuit diagrams to help them make these circuits. Once they have done this they can compare the bulb brightness in both types of circuits. The learners may need assistance in making these circuits. If equipment is an issue, this activity can be done as a teacher demonstration. Learners can use the circuit diagrams in their Learner's Books to help them.	Page 41
Make and test an electromagnet.	*Explore Science* (Pearson) pages 166–67 Large nails, wires, batteries, paper clips	**Activity 9** Learners make an electromagnet by coiling a wire around a nail and connecting it to a battery. They can then use this to pick up paper clips. Learners investigate how to make the electromagnet stronger (this can be done with an extra battery or putting more coils around the nail). They can judge the strength of the electromagnet by how many paper clips it can pick up. Electromagnets are used to move large metal objects, particularly scrap metal, because they can be switched on to pick the object up and then switched off to drop the object.	Page 43

Processes and skills	Resources	Teacher's support notes	Learner's Book
Design and explain a safety poster about mains electricity.	*Explore Science* (Pearson) pages 140–46 Chart paper, crayons, markers, pencil	**Activity 10** The teacher should prepare materials for the activity prior to the lesson. Learners work in groups to design a safety poster. The posters should explain the danger of electricity from the mains. When the posters are complete they can be displayed around the classroom and the groups can explain their posters to the rest of the class.	Page 43
Write a summary of what has been learnt in the chapter.		**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 44
		Concept map The teacher reviews the concept map with learners to ensure that they understand the key concepts in this chapter.	Page 45
		Revision (assessment) The teacher gives learners time to complete questions 1 to 6 in the revision section of this chapter.	Page 46

Activities and assessment answers

Activity 1

When the balloon is rubbed against some clothing it gains a charge. This also happens to the comb when you run it through your hair. Once these object have an electrostatic charge they attract and can pick up small objects such as pieces of paper.

Activity 2

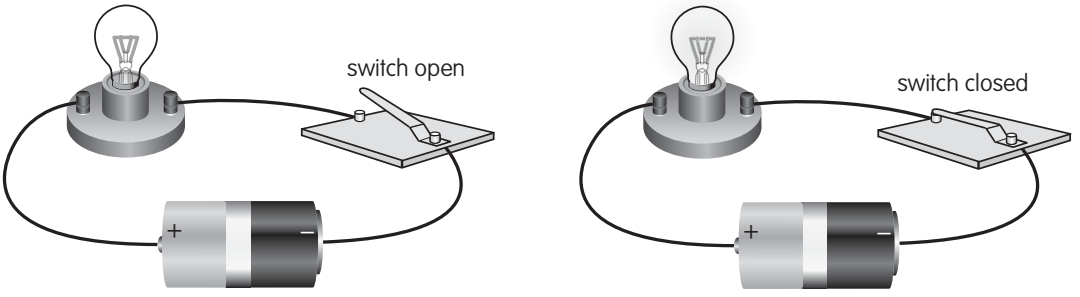
When the balloon is charged it will stick to the wall—but not a metal wall.

Activity 3

Learners will need a battery, two wires and a bulb. The circuit should look like that represented in diagram in Activity 4.

Activity 4

The circuit diagram should look like the one below.



An open circuit

A closed circuit

Activity 5

Some examples are:

Conductors	Coins Fork Knife Spoon Nails Paperclip Keys	**Insulators**	Chalk Plastic ruler Rubber Wooden ruler Crayon Newspaper Glass

Learners should be able to state that metals conduct electricity but non-metals do not. Non-metals are insulators.

Activity 6

1 The bulb will go out.
2 The bulb will become brighter.
3 The two batteries supply extra power to the bulb.

Learners should discover that an open circuit does not conduct electricity, but a closed circuit does. Switches are used to open and close circuits and they can therefore turn appliances on and off.

Activity 7

The bulbs in series become dimmer than the single bulb. This is because two bulbs in series produce more resistance than a single bulb.

Activity 8

If we remove one remove a bulb from the series circuit, the other bulb goes out. But if we remove a bulb from the parallel circuit the other bulb stays on. This is why all buildings are wired in parallel, so that if one bulb 'blows' the other will remain lit.

All buildings have their lights wired in parallel so that if you switch one light off the others stay on.

Activity 9

The more coils of wire or the more batteries, the stronger the magnet. Electromagnets also have the advantage over non-electromagnets that it is possible to change their strength and also switch them on and off.

Activity 10

The posters can show people doing dangerous things such as putting knives into toasters or sockets or climbing electricity pylons – and these should have large 'crosses' beside them to show that they are very dangerous.

Revision questions

1 **a** correct
b incorrect
c incorrect
d incorrect

2 **a** incorrect
b incorrect
c correct
d incorrect

3 **a** battery

4 **a** series
b parallel

5 + stands for positive and – stands for negative

6 Two negatives will repel each other.

Chapter 4 Forces

Strand: Energy and Change

Suggested periods: 20 (4 weeks)

Sub-strand statement:

A force is a push or a pull; forces can be balanced or unbalanced. An object's status (standing or moving) depends on the size and direction of the forces acting on it. Gravity is the force that pulls objects towards the Earth. Weight is the measure of the gravitational pull of the Earth on an object. Friction is an example of a force having an effect on an object's movement.

General learning outcomes

Learners should:

6.4.1 understand that movement of an object depends on the size and direction of the forces acting on the object (U)

6.4.2 understand the effect of balanced and unbalanced forces on an object (U)

6.4.3 appreciate that things fall because of a force pulling from the Earth (V)

6.4.4 appreciate the effect of friction on moving objects (V)

6.4.5 know about some types of simple machines—levers, wheel and axle, pulley, inclined plane (ramp), screw and wedge. (K)

Specific learning outcomes

Learners should be able to:

6.4.1.1 do simple investigations to illustrate the effect of a force on an object's status—stationary or in motion

6.4.2.1 demonstrate balanced and unbalanced forces by pushing and pulling with a partner

6.4.2.2 illustrate the effect of balanced forces on a see-saw

6.4.3.1 design a simple experiment to illustrate a gravitational pull

6.4.4.1 illustrate friction by moving two surfaces against each other and use lubricant to reduce friction

6.4.5.1 identify examples of simple machines in everyday life, e.g. crowbar, inclined plane (ramp), scissors, wheelbarrow and axe

6.4.5.2 demonstrate a pulley in action by improvising with a book, a rope and a wheel.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Demonstrate the forces of pushing and pulling and draw conclusions about the amount of force needed to move a heavier object.	*Explore Science* (Pearson) pages 154–61 2 large cardboard boxes	**Activity 1** Learners form in groups of five for this activity. This activity can be done inside or outside the classroom. The activity requires a large space where everybody can see the boxes. The teacher explains the activity to the learners then selects some learners to sit in the boxes and some to push and pull them. All learners should have a chance to push and pull the boxes with different weights. The learners discuss the result of the activity and later ask them to share it with the whole class.	Page 50
Observe toy cars and trucks being pushed over different surfaces and draw conclusions about the amount of force needed to make them move.	*Explore Science* (Pearson) pages 154–61 Toy cars and trucks	**Activity 2** Learners form groups of five for this activity and the teacher explains the activity clearly. The learners should push the toys over rough and smooth surfaces and up surfaces sloping at different angles. They should observe the amount of force needed to move the toys over different surfaces and up different angles of slope. Learners should record their observations in their exercise books and each group should report its findings and conclusions to the class.	Page 50
Answer revision questions.		**Activity 3** The teacher should check learners' answers in their exercise books. The answers can be used to see if the learners understand the topic of forces so far. If these show any problems, then the topic can be revised.	Page 51
Conduct an activity to demonstrate balanced and unbalanced forces and explain the outcome of these.	*Explore Science* (Pearson) pages 156–60 A strong rope of 4–5 metres in length	**Activity 4** This is an outdoor activity. Learners should find a partner and demonstrate a balanced pushing force, balanced pulling force and unbalanced pushing and pulling forces. When they have done this, they form into two groups ready for tug-of-war. At first the teams should be even. Then all the biggest learners form one team and the smallest form another team. Learners observe what happens when both teams pull the rope. The teacher asks the learners what happens when they have balanced and unbalanced forces.	Page 52

Processes and skills	Resources	Teacher's support notes	Learner's Book
Demonstrate the force of gravity and explain its effect.	*Explore Science* (Pearson) page 162 Tennis ball, basket ball, small and large stones	**Activity 5** This activity should be done outside in a clear place. Four learners demonstrate throwing each object into the air while the others observe the movement of the objects. The whole class takes a big jump and the teacher explains that gravity pulls everything towards the centre of the Earth, which is why objects thrown into the air always fall down to the ground. SAFTEY ISSUE: Care must be taken when throwing objects into the air to avoid hitting any other people or buildings.	Page 53
Conduct another activity about gravity. Make predictions and draw appropriate conclusions based on observations.	*Explore Science* (Pearson) page 162 String, stone, scissors, nail, hammer	**Activity 6** This activity is designed reinforce the concept of gravity. Learners predict what will happen to the stone when the string is cut. They then observe what happens when the string is cut and explain this.	Page 54
Measure and record the weight of various objects using a spring balance.	*Explore Science* (Pearson) page 156 Spring balance, objects of different sizes	**Activity 7** The teacher will need to demonstrate how to use a spring balance to measure weight. Learners should then use a balance to measure the weight of each object provided and record these weights in the table they have copied into their exercise books. The teacher should go around the class and check each group's work and assist them if they need help. Some objects are suggested in the Learner's Book but other objects can be used. If the school does not have any spring balances, they may be able to be borrowed from a local secondary school.	Page 56
Communicate observations about the force of friction.	*Explore Science* (Pearson) page 164	**Activity 8** The teacher can ask learners to make some predictions about what will happen when they rub their hands together and then they can test these by completing the activity.	Page 57

Processes and skills	Resources	Teacher's support notes	Learner's Book
Draw conclusions from different explanations of friction.	*Explore Science* (Pearson) page 164	**Activity 9** Learners should copy the table into their exercise book and complete it by putting a tick in the appropriate box. The teacher will be able to judge from their answers if the learners have gained an understanding of friction.	Page 59
Demonstrate and explain the use of a lever to move a heavy object.	*Explore Science* (Pearson) pages 169–81 Bar/stick, piece of timber, heavy rock	**Activity 10** Learners draw a diagram showing the lever with the pivot close the rock and another with the pivot further from the rock. They should predict if the position of the pivot makes it easier or harder to move the rock. The teacher can set up the lever using a piece of timber as the pivot. The learners then carry out the activity, moving the pivot and testing the lever. They should report their observations to the class and record them in their exercise books.	Page 61
Write a summary of what has been learnt in the chapter.		**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 63
		Concept map The teacher reviews the concept map with learners to ensure that they understand the key concepts in this chapter.	Page 64
		Revision (assessment) The teacher gives learners time to complete questions 1 to 8 in the revision section of this chapter.	Page 64

Activities and assessment answers

Activity 1

The more learners who sit in the box, the more force will be needed to move the box. This is because more learners make the box heavier, and the heavier it is the more force is required to move it.

Activity 2

The surface makes a difference to the force needed to move a toy car. More force is needed to move the toy over a rough surface. This is because rough surfaces produce more friction. It also takes more force to move the toy up a slope than down the same slope. When the learners push the toy up a slope they have to push against the force of gravity pulling it back. When they push it down, the force of gravity is helping them.

Drivers prefer to drive on smooth roads because rough roads produce more friction and cars and lorries have to use more fuel to overcome that force of friction. So it is more expensive to drive on rough roads.

Activity 3

1 A force is a push or a pull.

2 A force can do work such as moving an object from one place to another.

3 **a** A pushing force is used to move a wheelbarrow in the garden.
b A pulling force is used in a game of tug-of-war.
c A pulling force is used when climbing a rope.
d A pulling force is used in chest expander.

Activity 4

When the pairs push or pull each other with equal (balanced) force, then they should stay in the same place. When they repeat this with unequal (unbalanced) force, then they move in the direction the larger force is pulling or pushing

When the sides are equal in a tug-of-war they should stay in the same place. When one side is bigger than the other it can produce more force and pull the other team towards it.

Activity 5

- The objects ended up back on the ground.
- The learners ended up back on the ground.
- Every object is attracted by a force to every other object. The size of the force depends on the size of the object, with large objects having a larger force of attraction. However, the only object around us that is big enough to allow us to feel the force of attraction is the Earth. This force is called the force of gravity, and it is this force that pulls everything back to Earth.

Activity 6

1 The stone hangs downwards because of the force of gravity.
2 The stone falls to the ground when the string is cut because the force of gravity pulls it down to the surface of the Earth.

Activity 7

Learners' findings will vary, depending on the objects they choose to weigh.

Activity 8

When hands are rubbed together they produce a force called friction. Friction is caused by the force of attraction between two surfaces and produces heat. The faster hands are rubbed and the harder they are pressed together during rubbing, the more heat is produced. So when the hands are rubbed together hard, they will feel warmer than when they are rubbed together gently.

Activity 9

Statements	Good friction	Bad friction
Friction allows us to walk and run without slipping over	✓	
Friction slows machines down and uses lots of energy		✓
Friction makes things hot, for example in machines when surfaces rub together		✓
Friction helps us slow down, for example in car or bicycle brakes.	✓	

Activity 10

When the pivot is close to the rock it is easier to move. As the pivot is moved further from the rock, more effort is needed to move the rock.

Revision questions

1 Push and pull.

2 Friction is useful for slowing cars down when the brakes are on. Friction is a problem when it causes machines to heat up and use a lot of energy.

3 On wet roads there is less friction and cars can skid or slide easily.

4 We reduce friction in machines by applying oil to the moving parts to lubricate them.

5 A lever or a pulley.

6 Yes.

7 A pulley.

Chapter 5 Physical and chemical changes and properties of materials

Strand: Natural and Processed Materials

Suggested periods: 30 (6 weeks)

Sub-strand statement:

The properties and uses of materials are related to their structure. The properties of materials, e.g. hardness, flexibility, solubility and strength, determine the uses to which they are put. Differences in properties explain the behaviour of materials, e.g. why liquid water flows, rubber bands stretch, pottery pieces break, balloons full of air float in water, etc. Some materials can have their properties changed by heating.

General learning outcomes

Learners should:

6.5.1 understand that different materials have a number of properties, e.g. hardness of stone, softness of flour, texture of fabrics (U)

6.5.2 understand that different materials are chosen to make things because of their properties (U)

6.5.3 know that heat can cause permanent changes in materials (K)

6.5.4 know that natural causes bring about changes in materials (K)

6.5.5 know that everyday processes such as mixing concretes, heating clay, burning fuel, and cooking involve chemical changes that cannot be reversed (K)

6.5.6 know that physical changes can be reversed but chemical changes cannot. (K)

Specific learning outcomes

Learners should be able to:

6.5.1.1 list the properties of a number of man-made and natural materials found locally

6.5.2.1 identify the materials used to make a number of different things and explain why those materials were chosen

6.5.3.1 conduct an activity that causes permanent change to a material using heat, e.g. burning wood

6.5.4.1 identify rusting iron sheets as an example of chemical change

6.5.5.1 give an example of a local material changing its properties, e.g. potting clay becoming hard when heated

6.5.5.2 identify a range of chemical and physical changes and explain how they are different.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Identify physical and chemical changes.	*Explore Science* (Pearson) pages 40–49 and 84–93	**Activity 1** The class brainstorms a list of changes and the teacher writes learners' suggestions on the blackboard, explaining that some changes can be easily reversed (that is, physical changes) and others cannot (that is, chemical changes). Learners examine the picture in the Learner's Book and identify the different types of changes taking place. The teacher asks learners to divide the changes in the picture into physical changes and chemical changes.	Page 66
Observe and explain some physical changes.	*Explore Science* (Pearson) page 89 Candle, margarine and modelling clay	**Activity 2** The teacher should demonstrate the melting of wax, the softening or melting of margarine and the changing shapes of clay. Learners discuss why each change is a physical change and explain their answers.	Page 68
Identify the changes that water goes through and draw a diagram of the water cycle.	*Explore Science* (Pearson) page 93	**Activity 3** The teacher should help the class to brainstorm a list of the changes that water can go though. The brainstorm can be listed on the blackboard to help the learners draw a diagram of the water cycle.	Page 69
Observe some changes and identify them as physical or chemical.	Firewood, matches, paper	**Activity 4** This activity should be done outdoors. Before the learners begin this activity, they must be reminded that playing with fire is extremely dangerous. The teacher should recap on the previous activity about physical changes, making sure learners know that these can be reversed, then carry out the burning demonstrations. They should decide if these are physical or chemical changes and why. SAFETY NOTE: the teacher should check that the ashes of the paper and wood are cool before the learners touch them.	Page 71
Carry out an experiment, record data and draw conclusions.	Small jars, vinegar, baking soda, milk, teaspoon, paper, matches	**Activity 5** The teacher explains the activity to learners and introduces the materials they will use. There are three changes. The teacher should burn the paper for safety reason but the learners can add vinegar to milk and baking soda, as these activities are quite safe. The learners should copy the table into their books, write their observations and explain why each change is chemical.	Page 73

Processes and skills	Resources	Teacher's support notes	Learner's Book
Communicate scientific information by summarising physical and chemical change.		**Activity 6** Learners should write a few lines about physical and chemical change, explaining the difference between them, and provide some examples of each. This is a good chance for the teacher to find out if the learners have understood this topic and revise any areas that they do not understand.	Page 74
Conduct an experiment to observe, record and describe results to make conclusions.	Metal tin lid or bottle cap, tongs, sugar, jars	**Activity 7** Learners should dissolve some sugar in a glass jar of water and decide if this is a physical or chemical change. For safety reasons the teacher should melt the sugar over a candle flame using the tongs and bottle cap. The sugar melts first but then begins to burn and becomes black. Again, the learners should decide if this is a physical or chemical change. They should record their observations and conclusions in their exercise books.	Page 74
Observe, record and draw conclusions about chemical changes.	Glass jars with lids, steel wool, nails, water, salt	**Activity 8** Learners set up the 4 jars with the nails or steel wool. Rusting can be quite slow but should begin in some of the jars after a few days. Learners should check the jars every day and record their observations and decide in which jar rusting takes place fastest. They should use this information to write down some conclusions about rusting.	Page 76
Make comparisons based on observations.	*Explore Science* (Pearson) pages 40–49 Paper bags, plastic bags	**Activity 9** Learners test the strength of the two types of bags by putting large stones into them when they are dry and when they are wet, and observing which bag breaks or tears more easily. The teacher should remind learners that they should never throw plastic bags into rivers, the sea or any other part of the environment as they do not break down and can damage animals and plants.	Page 77

Processes and skills	Resources	Teacher's support notes	Learner's Book
Conduct a field trip to identify, observe and compare traditional and modern materials.	*Explore Science* (Pearson) pages 40–49	**Activity 10** The teacher should take learners for a walk around their local area to see the roofs of houses made of different materials. If the school is in town, they can visit a settlement to see some locally made roofs of houses. Learners observe the materials used and think about their properties. The teacher can ask learners why they think people often prefer modern roofing such as corrugated iron to traditional materials such as pandanus.	Page 78
Identify the properties of materials and link these to their uses.	*Explore Science* (Pearson) pages 40–49	**Activity 11** The teacher takes learners on a walk around the school compound and encourages learners to identify the different materials used in the school buildings. Back in the classroom, learners discuss what they have observed. The teacher lists the various materials used in the buildings on the blackboard and asks why each material is used. Learners should also observe their own classroom and note the materials used in desks, tables, chairs, cupboards, shelves and other furniture. Again, they should record why these materials are used.	Page 79
Identify the properties of materials and link these to their uses.	Explore Science (Pearson) 40-49 Metal and plastic knives, forks, spoon	**Activity 12** Give out some metal and plastic cutlery and ask learners to compare these. Which do they prefer and why?	Page 80
Identify the properties of materials and link these to their uses.	*Explore Science* (Pearson) pages 40–49	**Activity 13** If possible, let learners examine different types of wood and also look at some carvings. Carvers use kerosene wood and mahogany because they look very nice and the do not rot easily, so they last for a very long time.	Page 80
Construct sentences describing materials according to their properties.	*Explore Science* (Pearson) pages 40–49	**Activity 14** This activity is designed to revise properties. It is also very good for developing language skills.	Page 80

Processes and skills	Resources	Teacher's support notes	Learner's Book
Write a summary of what has been learnt in the chapter.	*Explore Science* (Pearson) pages 40–49	**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 81
		Concept map The teacher reviews the concept map with learners to ensure that they understand the key concepts in this chapter.	Page 81
		Revision (assessment) The teacher gives learners time to complete questions 1 to 7 in the revision section of this chapter.	Page 82

Activities and assessment answers

Activity 1

Some changes are:

1 water boiling when it changes from being cold to hot and some is converted to steam
2 roasted meat when it changed from raw to cooked meat
3 melting ice when it changes from solid to liquid.

Activity 2

All of the changes are physical. In each case there is no new substance and the change can be easily reversed. Liquid wax becomes solid when it cools. Margarine becomes hard if you put it in the fridge and we can easily change the shape of the clay back to its original.

Activity 3

Water evaporates when it is heated by the Sun and condenses when it rises into the sky and cools again. Then it falls back to Earth as rain. Refer to page 93 of *Explore Science* (Pearson) for a diagram of the water cycle.

Activity 4

The learners observed some materials—wood and paper—being burnt. Burning wood or paper causes a chemical change because a new substance is formed and the process cannot be reversed.

Activity 5

	Description of substance I started with	Observation: What I saw during the chemical change	Description of substances I finished with
a	Piece of paper	Paper burning	Ashes
b	Vinegar and milk	Milk becomes lumpy	Curdled milk
c	Vinegar and baking soda	Bubbles	Clear water

Activity 6

In a physical change, the substances remain the same, and no new substance is produced. Physical change is also reversible. Chemical change produce new substances and it is not easy to reverse it. Melting wax in a candle is a physical change, while burning paper or wood is a chemical change. Most cooking involves chemical change.

Activity 7

Sugar dissolving in water is a physical change as no new substance is produced and we can get the sugar back by evaporating the water.

When we heat sugar it melts, which is a physical change, but once it starts to burn and go black, a new substance is produced and the process cannot be reversed, which is a chemical change.

Activity 8

The steel wool in the salt water will begin to rust fastest. Water causes steel to rust but salt water makes it rust much more quickly. Much of the steel in Solomon Islands is near sea water, so it tends to rust. The steel wool in the dry, sealed jar should not rust.

Activity 9

Paper bags and plastic bags are both strong but plastic bags do not change when they get wet, while paper bags become soft and tear easily. Plastic bags are also waterproof. Paper bags are not.

Activity 10

Corrugated iron roofs are becoming popular because they last longer than pandanus roofs, although they do rust over time.

Activity 11

Structure	Material	Reason
Window	Glass	We can see through it
Roof	Corrugated iron	Strong
Chair	Wood	Strong and easy to carve
Gutter pipe	Plastic	Lightweight and does not rust

Activity 12

Metal cutlery is stronger and generally looks better and is heavier than plastic cutlery, but it is also more expensive. Generally people prefer metal cutlery because of how it looks and feels and because it is stronger. It should be interesting to find out if the learners also prefer the metal cutlery and if so why.

Activity 13

Kerosene wood and mahogany are used by carvers because they look very nice and they do not rot easily, so they last for a very long time.

Activity 14

Some possible responses are:

- A new pot is shiny but after using it for some time, it becomes dull.
- The wax feels hard but after it is heated, it becomes soft.
- The rough wood becomes smooth after it is carved.

Revision questions

1 Melting ice, melting wax, dissolving sugar.

2 Burning paper, cooking egg, rusting iron or steel.

3 In a physical change, the substances remain the same, and no new substance is produced. Physical change is also reversible. Chemical change produces new substances and it is not easy to reverse it. Melting wax in a candle is a physical change while burning paper or wood is a chemical change. Most cooking involves chemical change.

4 **a** Rubber for tyres: Rubber is very strong and grips the road very well to stop cars from skidding.

b Corrugated iron (zinc) for roofs: Corrugated iron is strong and quite light and lasts for a long time.

c Glass for windows: Glass is clear so it lets light in and we can see through it.

d Plastic for bags: Plastic is strong and does not tear when it gets wet. It is also waterproof.

5 Reactions.

6 Rusting is a chemical change.

7 Steel is very strong and it can be bent into different shapes. It is also quite cheap compared to other metals.

Chapter 6 Selling garden produce

Strand: Farming

Suggested periods: 25 (5 weeks)

Sub-strand statement:

There are many reasons for growing crops and raising farm animals. Some farms grow crops and raise animals entirely for money, while others do it only for their families to use (subsistence farming). Some subsistence farms produce more than the family needs and they sell the extra crops and animals (surplus). Whatever the reason, proper farm management and accurate and up-to-date records must be kept.

General learning outcomes

Learners should:

6.6.1 know the importance of generating income and managing it (K)

6.6.2 understand the benefits of record-keeping for income generation (U)

6.6.3 recognize the benefits derived from farming (K)

6.6.4 appreciate the importance of selling farm produce for cash. (V)

Specific learning outcomes

Learners should be able to:

6.6.1.1 explain the benefits of gardening

6.6.2.1 prepare garden produce to sell

6.6.3.1 keep records of income, expenses and profit

6.6.4.1 determine market price of garden produce

6.6.5.1 identify market outlets for garden produce.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Record information on various food products for different purposes in a simple table.		**Activity 1** This lesson should be done individually. Learners should devise a simple table in which they list crops that people in the area produce for food and for other purposes, for example to sell.	Page 84
Record data about various food crops produced for sale.		**Activity 2** This is another individual activity. The teacher should ensure that learners list all the possible food crops that they see people in their local area growing to sell at the market or school, or for their own homes.	Page 86
Make calculations based on data provided.		**Activity 3** Learners use information about revenue and expenses to calculate income, expenses and profit.	Page 89
Manipulate data and make calculations.		**Activity 4** Learners make a table in their exercise book to keep proper records. They then use the figures to calculate income, expenses and profit for each day for a month and the totals for the month.	Page 90
Make observations at a local market.		**Activity 5** Learners visit a nearby local market and talk to some people who are selling their produce. Learners should ask them about the cost of transport expenses, the market fees and how they finally decided on their selling price. This could be done at a weekend as homework or as a class trip organized and led by the teacher.	Page 91
Make observations at a local restaurant or hotel.		**Activity 6** Learners visit places such as local hotels, schools, stores or restaurants and find out where they buy their fruits and vegetables and eggs. Do they use local suppliers? If not, why not? Learners list the reasons in their exercise books.	Page 92

Processes and skills	Resources	Teacher's support notes	Learner's Book
Write a summary of what has been learnt in the chapter.		**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Page 94
		Concept map The teacher reviews the concept map with learners to ensure that they understand the key concepts in this chapter.	Page 93
		Revision (assessment) The teacher gives learners time to complete questions 1 to 5 in the revision section of this chapter.	Page 94

Activities and assessment answers

Activity 1

The answers to this activity will vary according to the area in which learners live.

Activity 2

1 The answers to this activity will vary according to the area in which learners live.

2 The main benefits of growing food are that it:

- provides fresh, healthy food to eat
- saves money
- provides income
- provides exercise.

Activity 3

Mary's income	$200
Mary's expenses	$60
Mary's profit	$140

Activity 4

Date	Income	$	Expenses	$
5/06/11	vegetables sold	30.00		
			transport fee	3.00
			market fee	5.00
10/06/11	vegetables sold	40.00		
			transport fee	3.00
			market fee	5.00
15/06/11	vegetables sold	45.00		
			transport fee	3.00
			market fee	5.00
20/06/11	vegetables sold	45.00		
			transport fee	3.00
			market fee	5.00
TOTAL		160.00		32.00

Profit for June = $128.00

Activity 5

Answers to this activity will depend on individual learners' findings.

Activity 6

Answers to this activity will depend on individual learners' findings.

Revision questions

1 The main reasons for growing crops and rearing livestock are to sell and for the family to eat. Selling provides money or income but eating the produce saves money as you buy less from the shops. The food you produce is also healthier and fresher than the food you buy and gardening is good exercise, so keeps people healthy.

2 *a* is the correct answer.

3 Seeds, fertilizer and transport

4 Wash the produce and present it in an attractive way.

5 If we keep good records, we know all of our expenses and income. This helps us plan for the future, particularly in terms of what the best produce is to give us maximum profit.

Chapter 7 The solar system and the structure of the Earth

Strand: Earth and Beyond

Suggested periods: 20 (4 weeks)

Sub-strand statement:

The Sun and other planets and their moons make up the solar system. All planets orbit the Sun and are attracted towards the Sun by a force called gravity. Only some planets have moons and the moons orbit their respective planets. Earth has a unique structure and composition, from the core to the atmosphere.

General learning outcomes

Learners should:

6.7.1 know that the solar system is made up of the Sun, planets and moons (K)

6.7.2 identify the eight planets and their position in the solar system (K)

6.7.3 know that some planets have moons that orbit around them (K)

6.7.4 understand that planets are kept in orbit around the Sun by a force called gravity (U)

6.7.5 know the different layers of the Earth's internal structure. (K)

Specific learning outcomes

Learners should be able to:

6.7.1.1 illustrate the planets' positions and their orbit in relation to the Sun by a simple solar model

6.7.2.1 name in order of closeness to the Sun the eight planets in the solar system

6.7.3.1 identify planets that have moons

6.7.4.1 demonstrate the attraction of planets to the Sun

6.7.5.1 draw or model and label the layers of the Earth's internal structure.

Processes and skills	Resources	Teacher's support notes	Learner's Book
Observe the night sky and describe how it appears.	*Explore Science* (Pearson) pages 94–113	**Activity 1** Learners can complete this activity at night when the weather is fine, with parental assistance. They should observe the night sky and see if they can find the Milky Way. The Milky Way can be seen in the night sky when it is fine and the viewer is well away from street lights. In class, learners can describe what the sky looked like at night and read their descriptions, stories or poems about the night sky and the Milky Way.	Page 96
Produce an accurate diagram of the solar system.	*Explore Science* (Pearson) pages 94–97	**Activity 2** In Year 5, learners studied the solar system. They learnt about the Sun and the eight planets that orbit the Sun. This activity is designed to revise that learning and see what learners remember. The teacher should check the learners' diagrams to ensure that they distinguish between the inner planets and the outer planets.	Page 97
Model the solar system.	*Explore Science* (Pearson) pages 94–97 Various seeds, marbles, tennis balls, beach ball, measuring rope	**Activity 3** This activity is designed to give learners some idea of the size of the different planets in relation to each other and the distances between them. So the model is to scale. The teacher may need to ask the learners to bring in some of the materials, such as tennis balls and marbles. An umbrella can be used instead of a beach ball to represent the Sun. It should be possible to model the inner planets in most schools. Schools near a beach should have enough space to model all the planets.	Page 98
Make and record observations.	*Explore Science* (Pearson) page 98	**Activity 4** This activity gives the learners a chance to observe the planet Venus, the brightest object in the sky after the Sun and moon. It is best seen in the early evening just after sunset or the early morning just around sunrise, away from any lights in learners' homes or the street or village.	Page 99
Answer questions.	*Explore Science* (Pearson) page 98	**Activity 5** Learners should read through the information about the planet Venus in the Learners' Book and then answer the questions in this activity.	Page 100

Processes and skills	Resources	Teacher's support notes	Learner's Book
Use information to identify a planet.	*Explore Science* (Pearson) page 99	**Activity 6** Learners use the information in this activity to identify planet Earth.	Page 102
Design and make a model of the planet Mars.	*Explore Science* (Pearson) page 99 Balloons, scissors, newspapers, glue, paints or crayons, pins, string	**Activity 7** Learners can help by bringing in newspaper and possibly glue and balloons. The activity should be done in groups of 4 or 5. The teacher should make sure each group understands what they are to do. The same activity can be used to make models of other planets for display.	Page 103
Use information to answer questions.	*Explore Science* (Pearson) page 100	**Activity 8** Learners should read the information about the planet Jupiter and use this to answer the questions in the activity box.	Page 104
Design and make a model of the planet Saturn.	*Explore Science* (Pearson) page 100 Balloons, scissors, newspapers, glue, paints or crayons, pins, string	**Activity 9** This activity is the same as Activity 7 but the planet will be larger and the colours different. Learners should make suggestions about how they might make the rings of Saturn on their models.	Page 105
Use information to answer questions.	*Explore Science* (Pearson) page 101	**Activity 10** Learners read the information on Uranus and use this to decide if they could possibly live on this planet. They should realize from the information provided that there would be no possibility of living on Uranus.	Page 106
Use scientific information to write a story.		**Activity 11** Learners make drawings of the moon over a month to show how it changes shape. Learners should use the information about the Moon in the Learner's Book and their own experience of seeing the Moon to write a story. They can use stories from their own province or island if they wish. They can also draw pictures to illustrate their story. The teacher should encourage learners to think about the shapes on the Moon's surface and how it waxes and wanes.	Page 108

Processes and skills	Resources	Teacher's support notes	Learner's Book
Role-play the orbits of the Earth, Moon and Sun.	*Explore Science* (Pearson) page 103	**Activity 12** This is a revision activity, as learners should have studied this in Year 5. Learners should work in groups of three. One stands still, as the Sun. Another moves around the Sun in an orbit, acting as the Earth, while another, the Moon, orbits the Earth.	Page 109
Design an activity to demonstrate the orbit of different planets around the Sun.	*Explore Science* (Pearson) pages 94–97 Three pieces of string of different lengths, a tennis ball	**Activity 13** Learners will have done a similar activity in Year 5 when they modelled the orbit of the Moon around the Earth. They should revise the solar system before they begin. They have to choose the correct length of string to make the orbit for each planet. The teacher should ensure that they select the shortest string for Mercury and the longest for Jupiter.	Page 109
Make a model of the internal layers of the Earth.	*Explore Science* (Pearson) page 99 Flour, water, knife, crayons, glue	**Activity 14** There are two suggested ways of making a model of the internal layers of the Earth: as described in Activity 14 and in Activity 15. Ideally, it would be good to do both but if there is not time, Activity 14 is the best one. Learners make their own model of the Earth, using flour and water to make a ball of dough, which they allow to dry. This represents the Earth. Once it is dry they can cut the ball in two and colour the different layers to show the crust, mantle and core of the Earth.	Page 110
Make a model of the internal layers of the Earth.	*Explore Science* (Pearson) page 99 Onions, small knives	**Activity 15** An alternative and easier way to make a model of the internal layers of the Earth is to cut an onion and compare the layers to the layers in the Earth. The skin of the onion would represent the Earth's crust.	Page 111
Write a summary of what has been learnt in the chapter.		**Chapter review** The teacher goes through the chapter review to revise the work covered in each of the sections, referring to the appropriate pages in the Learner's Book if any review statements are not understood.	Pages 112–13
		Concept map The teacher reviews the concept map with learners to ensure that they understand the key concepts in this chapter.	Page 111
		Revision (assessment) The teacher gives learners time to complete questions 1 to 7 in the revision section of this chapter.	Pages 114–15

Activities and assessment answers

Activity 1

This activity is based on the observations of individual learners. The Milky Way can be seen in the night sky when it is fine and the students are well away from streetlights.

Activity 2

The planets arranged in order from the nearest to the furthest from the Sun are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

Activity 3

The planets should be in the same order as above. It should be possible to model the inner planets in most schools. Schools near a beach should have enough space to model all of the planets.

Activity 4

Make sure the learners know that they should look for the planet Venus around dusk and dawn. It is best if they can get away from any lights in their home or the street or village.

Activity 5

1 You would only survive for a very short time.
2 Conditions on Venus are much too hot for animals or plants to survive, because it is much closer to the Sun than the Earth is.

Activity 6

The planet described is the Earth.

Activity 7

Models can be displayed in the classroom when they have been completed.

Activity 8

1 Outer
2 King of the gods
3 More than 60
4 The Great Red Spot
5 Io
6 Ganymede, Callisto and Europa

Activity 9

Learners should decide how to make the rings of Saturn themselves.

Activity 10

Uranus is the coldest planet. It is not possible to live on Uranus because the temperature is –224°C, the atmosphere is made of the gas methane, and there are winds of 900 kilometres per hour.

Activity 11

1 The learners can draw about 10 small boxes in their exercise books and sketch the shape of the moon every 3 nights into one of the boxes.
2 The stories will depend on the experiences of the individual learners.

Activity 12

Learners should have done a similar activity in Year 5 and it is good to remind them of this before they begin.

Activity 13

Learners should us the shortest string for Mercury as it is nearest to the sun and the longest string for Jupiter.

Activity 14

Making the layers of the Earth from dough of different colours is the best way for learners to experience the structure of the Earth. But if this is not possible the alternative Activity 15 is easier to arrange.

Activity 15

An onion is similar to the Earth because it is made up of layers. The outside layer of the onion represents the crust of the Earth.

Revision questions

1 b: Mercury, Venus, Earth and Mars
2 c: Uranus
3 a: It is also known as the "morning star" or "evening star".
4 d: 1781
5 b: Neil Armstrong
6 a: Crust
7 **a** The *solar system* consists of the Sun and everything that orbits around it.
  b A *planet* is a very round object that moves around the Sun.

c The four planets closest to the Sun are called the *inner* planets.
d The Sun is not a planet but a *star*.
e Mercury is a very *hot* planet because it is the closest to the Sun.
f The third planet from the Sun is our *Earth*.
g It takes 365 *days* for the Earth to go around the Sun.
h Our Earth has only one natural *satellite*, and that is the Moon.
i The Earth is divided into *layers*.
j The Earth's core is made up of iron and *nickel*.

Appendix 1: Glossary of terms

The glossary in the Learner's Book lists important words and concepts for each chapter. Each of these words is printed in bold where it appears in the Learner's Book. You may need to explain other difficult words to learners, or encourage them to use a dictionary.

Learners should be encouraged to use the glossary whenever they come across a word in bold that they do not know or understand clearly, but they do not need to learn the definition. They should make sure they understand the word and then practise using it for themselves. The real test is being able to use the word correctly in a sentence, not being able to repeat the definition.

The glossary from the Learner's Book is repeated on the following pages.

A

adaptation change in a living thing, over time, that better enables it to survive and multiply

atmosphere the gases surrounding Earth or another planet held in place by gravity

axle supporting rod on which a wheel or a set of wheels turns

B

bacteria very small living things that you cannot see. Some kinds of bacteria cause diseases

baking soda white powder used to raise bread during baking

balanced state of being steady

behaviour typical actions of an animal

burning to be on fire

C

camouflage way of hiding by colouring it so that it looks like its surroundings

carnivore animal that eats the flesh of other animals

characteristic something that makes a living thing different from others

chemical change change in a substance that cannot be reversed

chemical reaction process that leads to the change of one set of substances to another

closed circuit electric circuit without any gaps in it which allows electricity to flow

commercial interest business

conductor anything that carries or allows passage of heat or electricity, usually a metal

consumer animal that eats either plants or other animals

consumption process of eating something

core centre; in this case, referring to the centre of the Earth

corrugated iron iron sheet with lots of folds in it to increase its strength

crater hollow area shaped like the inside of a bowl; the mouth of a volcano is a crater

crust outer layer of Earth

current electricity electricity that moves or flows through wires

D

decomposer	organisms that break down dead or decaying organisms, e.g. bacteria, fungi, worms
device	invention or machine used to perform simple tasks
differences	things that are not the same

E

Earth	the planet on which we live
effort	force needed to move a lever
electrical circuit	continuous series of connected wires that allow electricity to flow
electrocuted	be killed by electricity
energy	power or ability to make something work or be active
expenses	money needed to buy or do something
extinction	when a species ceases to exist

F

feature	a part of the face such as the eyes, nose or chin
filament	fine wire that lights or heats up when electric current is passed through it
food chain	series of living beings in which each serves as food for the next
food web	a number of food chains linked together
force	a push or a pull
friction	rubbing of objects against each other which produces heat
fungi	plant-like living things such as mushrooms, yeasts and moulds. Fungi help decompose dead plants and animals

G

galaxy	system of millions of stars, gas and dust, e.g. the Milky Way
gears	part of a machine that causes another part to move using a connecting toothed wheel
gravity	force by which all objects in the universe are attracted to each other

H

herbivore animal that only feeds on plants

I

income money received for work or selling something

insulator material that does not allow electricity to pass through it, e.g. glass or plastic

J

Jovian belonging to Jupiter

Jupiter biggest planet in the solar system and fifth in distance from the Sun

K

kerosene wood type of tree used for wood carvings

kilogram unit of weight equal to one thousand grams

L

lever simple tool used to lift or move something, e.g. a crowbar

lightning electricity produced in thunderclouds; appears as a bright flash or streak in the sky

load object moved by a lever

lubrication coating of oil or grease to reduce friction between moving objects

M

machine device with a system of parts that work together to perform a task, e.g. a pulley to lift an object

mahogany tree with hard, dark wood which is good for carving

mantle part of the Earth that lies between the crust and the core

Mars seventh largest planet in the solar system and fourth from the Sun

mass amount of a substance or material

materials anything used for building or making something

melt process of change from a solid to a liquid due to heating, e.g. when ice turns to water

Mercury	planet that is nearest to the Sun; the second smallest planet
Milky Way	galaxy that contains the Earth, Sun and the solar system
Moon	Earth's natural satellite, which revolves around the Earth from west to east in about 28 days
motion	movement
mould	fungus that grows on the surface of food, plant and animal matter

N

negative charge	charge given to certain objects when they are rubbed and negative charges are added to their surface
Neptune	fourth largest planet in the solar system and eighth from the Sun
Newton	Isaac Newton was a scientist who worked out the law of gravity

O

omnivore	animal that eats plants and other animals
open circuit	series of wires that have a gap in them (usually produced by a switch) which does not allow electricity to flow
orbit	path a planet takes around the Sun
organism	living thing

P

pandanus	type of plant with very strong leaves that can be dried and used to make roofs or baskets
photosynthesis	process by which green plants use carbon dioxide and water and energy from the sun to make food
physical change	change in a substance that can be reversed, such as boiling water or melting ice
pivot	the point of support on which a lever turns
planet	large body in outer space that moves around the Sun or another star. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune are all planets in our solar system

plankton	very small plants and animals that live in fresh or salt water. Most kinds of plankton are microscopic
pollination	when pollen is moved to another plant in order to fertilize it and produce seed that will grow into new plants
positive charge	charge given to certain objects when they are rubbed and negative charges are removed from their surface
predator	animal that hunts and eats other animals for food
prey	animal being hunted and eaten by another animal
produce	something grown or produced, especially farm goods, fruit and vegetables
producer	things that make something, e.g. when plants make their own food or farmers grow a crop
profit	amount of money made by a person or business after all expenses have been taken away
properties	qualities or characteristics of something, e.g. stone is hard
pull	bring closer using a force
pulley	simple machine that makes lifting objects easier
push	force that moves things away
pyramid of numbers	way to show the numbers of organisms in a food chain

R

reversed	changed back or undone
rusting (corrosion)	process which occurs when a metal such as iron is exposed to air and water and develops an orange coating

S

satellite	anything that orbits a planet, e.g. a moon, or spacecraft sent to send back information
Saturn	sixth planet in the solar system, with a system of rings
shock	feeling caused by electricity passing through the body
similarities	things that are alike between things

solar system	the Sun and its planets
spark	very small bit of hot and glowing material thrown off by burning wood or paper
species	group of living things that are very similar and can mate with one another but not with those of other groups
star	heavenly body visible from Earth as a point of light in the night sky
static electricity	electricity made by rubbing objects. This electricity does not flow
steel	hard, strong metal made from iron when it is mixed with carbon. It is used to make machines, bridges, tools, knives
structure	anything that has been built
Sun	star in the centre of our solar system. The Earth and other planets revolve around it and receive heat and light from it
survival	staying alive
U	
unbalanced	not balanced
Uranus	third largest planet in the solar system and seventh in distance from the Sun
V	
Venus	sixth largest planet in the solar system and second nearest to the sun
vinegar	sour liquid which is also a weak acid, used to flavour or preserve food
voltage	force of an electric current as measured in volts
W	
weight	force of gravity acting on an object

Appendix 2: Lesson plan format

<table>
<tr><td colspan="2">Name of school:</td><td>Class teacher:</td></tr>
<tr><td colspan="2">Lesson title:</td><td>Date:</td></tr>
<tr><td colspan="3">Learning outcomes:
• What are the main things I want learners to learn and be able to do as a result of the lesson? How are lesson outcomes linked to syllabus outcomes?
• What are other things I want learners to learn as well?</td></tr>
<tr><td colspan="3">Lesson content:
• What are the key facts, concepts or procedures that I want learners to understand as a result of this lesson?</td></tr>
<tr><td colspan="3">Introduction:
• How will I get learners motivated, curious and ready to learn?
• This section should be allocated 3–5 minutes.</td></tr>
<tr><td>Teacher activities:
• What am I going to do during the lesson in order for learners to achieve the learning outcome?
• This section should be allocated 8–10 minutes.</td><td colspan="2">Learner activities:
• What are the learners going to do during the lesson in order for them to achieve the learning outcome?
• This section should be allocated 20–25 minutes.</td></tr>
<tr><td colspan="3">Conclusion:
• How will I bring the lesson to a logical and meaningful conclusion?
• This section should be allocated 5–7 minutes.</td></tr>
<tr><td colspan="3">Learner assessment:
• How will I know that learners have achieved what I wanted them to achieve?</td></tr>
<tr><td colspan="3">Lesson evaluation:
• How will I evaluate the success of the lesson?</td></tr>
<tr><td colspan="3">Lesson endorsement: (to be signed by Head of Department/Head Teacher/Principal)
Head of Department:
Head Teacher/Principal:</td></tr>
</table>

Appendix 3: Sample individual record form

Learner name:			**Year:**						**Class:**
Strand:			**Sub-strand:**						
Assessment event	**Specific learning outcome (use appropriate code)**		**Achievement levels (ratings)** 0	1	2	3	4	5	**Specific learning outcomes**: A = achieved, PA = partially achieved, NA = not achieved Key: 0 = NA, 1–4 = PA, 5 = A
1	6.1.2.1	Explain the important role of the producers in the food chain						*	A
2						*			PA
3			*						NA
4							*		PA
Descriptive comments:									
Class teacher:		Signature:							Date:

Appendix 4: Sample class record form

Class:	**Strand:**	**Sub-strand:**	**Year:**

Specific learning outcomes: A = achieved, PA = partially achieved, NA = not achieved															**Individual comments on the learning progress in the class**
Assessment event	1															
Learning outcome assessed (code)	6.1.2.1															
Denis	A															
Ian	A															
Jack	A															
James	A															
John	PA															
Joyce	PA															
Lionel	PA															Steady/satisfactory
Liza	NA															
Luke	NA															
Mary	A															Improved/excellent progress
Michael	PA															
Nancy	NA															
Peter	A															
Tom	NA															
Yates	NA															Not improved/slow progress
Overall comments:																
Class teacher:								Signature:							Date:	

Appendix 5: Sample individual monitoring form

Learner name:						**Class:**	**Year:**
Strand:						**Topic/unit:**	
Sub-strand:							
Assessment event	**Specific learning outcomes: A = achieved, PA = partially achieved, NA = not achieved**					**Remarks: comment on learning progress: improved, steady or not improved**	
	Code	**Outcome assessed**	**A**	**PA**	**NA**		
1	6.1.2.1	Explain the important role of the producers in the food chain	*			Improved from previous assessment event	
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
Class teacher:						Signature:	Date:

Appendix 6: Sample class monitoring form

Class:		**Term/semester:**						**Year:**	
Strand:								**Topic/unit:**	
Sub-strand:								**Remarks: comment on learning progress: improved, steady or not improved**	
Assessment event	**1**	**2**	**3**	**4**					
Specific learning outcome assessed (code)	6.1.2.1	6.1.3.1	6.1.4.1	6.1.5.1					
Mary Kasi	NA	PA	A	A					Improved with excellent progress
John Niga	A								
Liza Joe	NA								
Peter Glen	PA								
James Iro	PA								
Luke Bilo	A								
Class teacher:				Signature:				Date:	

Appendix 7: Sample individual remedial work form

Learner name:			**Class:**			**Term/semester:**		**Year:**
Strand:			**Sub-strand:**					
Assessment event	**Specific learning outcomes (use appropriate code)**		**A**	**PA**	**NA**	**Remedial work required**	**Results after remedial work**	
	Code	**Outcome assessed**						
1	6.1.2.1	Explain the important role of the producers in the food chain		*		Give specific activity to explain the important role of the producers in the food chain	Able to explain the important role of the producers in the food chain. Achieved the requirement.	
Class teacher:						Signature:		Date:

Appendix 8: Sample individual report form

Learner name:		**Class:**	**Term:**	**Year:**
Strand:	**Sub-strand:**		**Specific learning outcomes: Achieved (A), partially achieved (PA) or not achieved (NA)**	

Code	**Specific learning outcome assessed (use appropriate code)**	**A**	**PA**	**NA**
6.1.2.1	Explain the important role of the producers in the food chain		*	

Descriptive remarks:

Strand:	**Sub-strand:**	**Specific learning outcomes: Achieved (A), partially achieved (PA) or not achieved (NA)**

Code	**Specific learning outcomes (use appropriate code)**	**A**	**PA**	**NA**

Descriptive remarks:

Results for summative assessment: The progressive achievement level for summative assessment is:

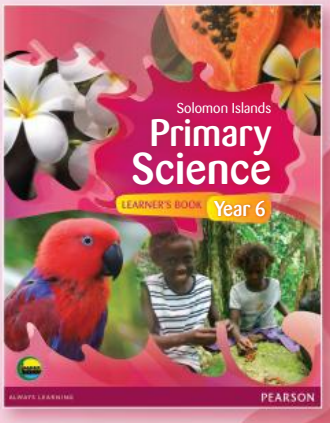
Appendix 8 continued

Strand:	**Combination of sub-strands:**	**Specific learning outcomes: Achieved (A), partially achieved (PA) or not achieved (NA)**		
Code	**Specific learning outcome assessed (use appropriate code)**	**A**	**PA**	**NA**
6.1.2.1		*		
6.1.3.1			*	
6.1.4.1				*
Descriptive remarks from summative assessment:				
Overall achievement level:	Overall achievement award:			
School administration report on learner's behaviour and character				
Class teacher:	Signature:	Date:		
Class teacher comments:				
Head teacher/Principal:	Signature:	Date:		
Head teacher/Principal comments:				

Solomon Islands

Primary Science

TEACHER'S GUIDE Year 6



This *Solomon Islands Primary Science Teacher's Guide, Year 6* is the teacher support material for the *Solomon Islands Primary Science Learner's Book, Year 6*.

The teacher's guide supports the chapters of the learner's book— 'food chains'; 'variation in living things'; 'electricity'; 'forces'; 'physical and chemical changes and properties of materials'; 'selling garden produce'; and 'the solar system and the structure of the Earth'. The support notes for each chapter are presented in a standard format. Each section has:

- processes and skills
- resources
- teacher's support notes
- learner's guide references
- answers to the activities and assessment items.

The Solomon Islands Primary Science Teacher's Guide, Year 6 is part of a new series of materials for Solomon Islands Primary Science for Years 1 to 6. This series was developed as part of the Solomon Islands school curriculum reform during 2005 to 2012. The teacher's guide will help teachers to give learners the opportunity to learn from their environment. It supports teachers in the organization of learners' hands-on investigations of the physical and living world.

Throughout this teacher's guide there are page references to a primary science encyclopedia, *Explore Science*, where teachers can find background information on each chapter of the learner's book. The encyclopedia accompanies this teacher's guide.

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