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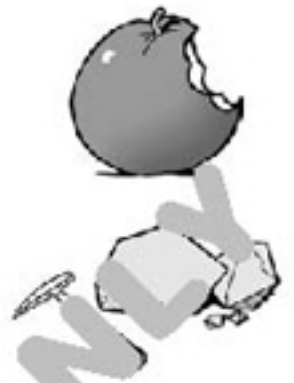
Introduction



The units of work in this book have been developed to meet the needs of students in years 7–9 with learning difficulties and/or low literacy skills, and have been designed to achieve outcomes drawn from the national Statements of Learning for Science (Australian Government Department of Education, Employment and Workplace Relations).

All students have the right to access the curriculum, and to be exposed to important core concepts that will contribute to an understanding of their lives and the world in which they live. This presents a challenging task for teachers who have students with a wide range of abilities in their mainstream classes. While many science demonstrations and lessons can be successfully presented to classes of mixed abilities, some students require adapted learning materials if they are to understand and learn from them. Many science textbooks and curriculum materials use language that is beyond the literacy capabilities of a significant proportion of students, and present concepts that are not easily accessible. Teachers have limited time in which to prepare and teach individualised curriculum material. It is the purpose of this book to present the core concepts of each unit in an accessible manner, and to provide learning activities that are both motivating and challenging for students who need additional support.

These materials have taken into consideration recent research into quality teaching. Through a concentration on the identification and explicit teaching of core concepts, students are more likely to remember this most important material. The low literacy demands increase individual engagement in the text material. Students can move through most tasks in the units of work at their own pace which encourages self-direction and self-regulation. The pair and small group activities also encourage social support for student learning.

It should be remembered that the ideas and resources contained in the units are designed to complement the regular class program. Students should participate in whole class learning experiences where it is appropriate and meaningful for them. Each unit of work can be photocopied and given to students as a record of key information and related activities, many of which can be done independently. It therefore contains both adjusted learning activities, and a convenient summary for revision.

These may be activities that are still too difficult for some students in your class to complete. Further adjustments to these ideas and resources can be made depending on the functioning level of your student/s. In places we suggest that the students undertake simple experiments – for this they will need some equipment readily available in science laboratories, and supervision. For additional ideas regarding how to implement this unit, you may wish to collaborate with your special education or learning support teacher.

How to use this book

Each unit begins with a Unit Organiser that provides an overview of the main concepts to be covered. We suggest that a peer or teaching assistant work through this Organiser with the student(s) to provide a framework of understanding for the learning that will follow. There is considerable evidence that this orienting activity greatly assists struggling students to 'tune into' what is to come. Students should record in dot point form anything they may already know about the topic. This establishes links to existing knowledge – another powerful learning tool.

New vocabulary should be read through in preparation for the glossary and vocabulary tasks that are included as early learning activities in all units. The different learning activities should be briefly discussed – this is particularly important for students on the Autism Spectrum who like to know exactly what is expected of them. There is space to record due dates if required and for the teacher to check off each activity as it is completed. Students often respond well to highlighting each activity as it is completed.

While every effort has been made to provide student-friendly definitions of new terms, the extent to which some scientific terminology can be simplified is limited. Wherever possible, actual items should be used to help reinforce the word and the meaning. Thus, in the first unit *Learning Scientifically*, the laboratory equipment should be seen and preferably handled by the students. Grasping new concepts often depends on an understanding of new vocabulary, so this activity should never be hurried, and certainly not omitted.

In each unit, there is some activity that provides opportunity for students to use the new terms with their definitions, or to look carefully at spelling and construction of the words. Teachers should also take every opportunity to reinforce student use of correct terms, and to discuss their meaning.

Important information is simply presented in each unit, and is followed by different activities designed to reinforce or use that information. Many students will be able to complete these activities independently, but some will require readily available equipment, or a degree of supervision. Various units require the students to access websites for information to help them complete an activity. They may also need assistance with this.

Some units are more challenging than others. The *Elements, Compounds and Mixtures* unit, even though extensively scaffolded, still includes concepts that would be difficult for a number of students. It may be that different units would be suitable for different students – they should be used wherever they are appropriate. You may decide that certain individual activities would be suitable for all the students in your classes.

At the conclusion of each unit there is a task that requires more wholistic understanding of the key concepts of the unit – these could be used as assessment tasks if desired.

A final word

Students with learning difficulties or special educational needs require, and respond very well to, prompt feedback. It is even more important for these students that their work is marked quickly and that they receive feedback on their progress. They will soon lose interest in completing work that does not pass by their teacher's eye relatively quickly, or in working alone for long periods. Many students with learning difficulties receive very little genuine praise from their busy teachers – we hope these activities provide opportunities for you to deliver generous amounts of acknowledgement for their effort and their learning.

We wish you every success in this important endeavour.

Oesles and Leanne

Glossary: New Vocabulary used in this Unit

analyse	to carry out an in-depth examination
beaker	a container used in scientific experiments to hold liquids
Bunsen burner	gas burner
classification	a system of grouping things that have the same features, for example all birds have feathers
conclusion	the ending; a decision formed after considering all the facts
cylinder	container for holding liquefied gas
experiment	a scientific way of testing an idea fairly
flask	a type of container with a narrow opening used in science experiments to hold liquids
hypothesis	an idea that tries to explain some aspect of scientific knowledge; a possible answer to a question
laboratory	a special room set up with scientific equipment for experiments
observation	looking at something closely
test tube	thin glass tube closed at one end used to hold fluid
variable	the part of an experiment which changes the result; the thing that is different between one test and another

Activity 1: Word Meanings

Find as many words as you can from the letters in the two long words below.
Some examples have been done for you.

Experiment	Hypothesis
net *pet* *in*	*the* *pot* *is*

What is science?

Science is finding out information about our world.

Science has answered questions such as how the heart works, why an aeroplane flies and where to find minerals.

Many inventions such as microscopes, televisions and rockets have been made by scientists. Scientists have also made many discoveries in medicine such as how to cure some diseases and how to do surgery better.

Activity 2:
Types of Scientists

A pronoun is a word that takes the place of nouns in a sentence. Pronouns are used to avoid repetition. The main pronouns are: he, she, they, it, we.

Example:

My uncle is a zoologist. (uncle) **He** studies animals that live in the desert.

Use the pronouns **he** **she** **they** **it** **we** in the second sentence to replace the noun.

1. Mark is a scientist. (Mark) _____ is a chemist who works for a company that makes medicines.
2. Albert Einstein was a famous physicist. (Albert) _____ studied how matter and energy worked together.
3. Sarah is a meteorologist. (Sarah) _____ predicts the weather.
4. The ancient relic was dug up in Egypt. (relic) _____ was studied by an archaeologist.
5. Terry is a geologist. (Terry) _____ works for a mining company looking for gold.
6. Penny and Roy went to study elephants in Africa. (Penny, Roy) _____ are zoologists.
7. Our class studied endangered animals. (class) _____ were just like biologists.
8. The farmers wanted to know which type of wheat to plant. (farmers) _____ asked a botanist for help.

Science Safety Rules

Most school laboratories have safety rules for students to follow.

The rules help protect everyone: teachers, other students and you.

Below is a sample of the rules your school labs might have.

1. Be careful when moving around the laboratory.
2. Wear protective glasses when handling chemicals and other substances which might get in your eyes.
3. Wear covered footwear in the laboratory. Sandals and thongs are not allowed.
4. Do experiments only as directed by your teacher and follow the directions.
5. Report accidents, and broken or damaged equipment to your teacher.
6. Clean and return any equipment used.
7. Do not reach across a lighted Bunsen burner.
8. Always point a test tube away from you if you are heating it up.

The Scientific Method

Science has a way of answering the questions we want to know about the world around us. We call this plan the **scientific method**. This plan has several parts.

1. **Observation**: By observing things around us, we begin to ask questions about what is happening, why it is happening and so on.

   For example, perhaps you noticed that two plants in your house were growing beside a coloured glass window. One part of the window was green and one part was red. You also noticed that one plant was bigger than the other.

2. **Ask a question**: When we know exactly what it is that we want to know, we ask that question.

   For example, will plants grow differently under different coloured lights?

3. **Make a hypothesis**: A hypothesis is a possible answer to the question. It's an educated guess. It is usually stated like this:

   If we _____ (do something) then _____ (will happen).

   For example, if we grow plants under green lights then they will grow better than plants growing under red lights.

4. **Experiment to test the hypothesis**: Design a test that will give us the answer to the question.

   Set up red and green lights. Place the same kind of plant under each light and see what happens to each plant.

5. **Analyse the results**: Record everything that happens during the experiment. This is called data.

   Measure how big each plant is after a few days.

6. **Conclusion**: When the experiment is finished, we must look at the results and the data to see if your hypothesis was correct. It doesn't matter if the hypothesis was wrong because we still learned something.

   If the plant grew better under the green light, then your hypothesis was correct.