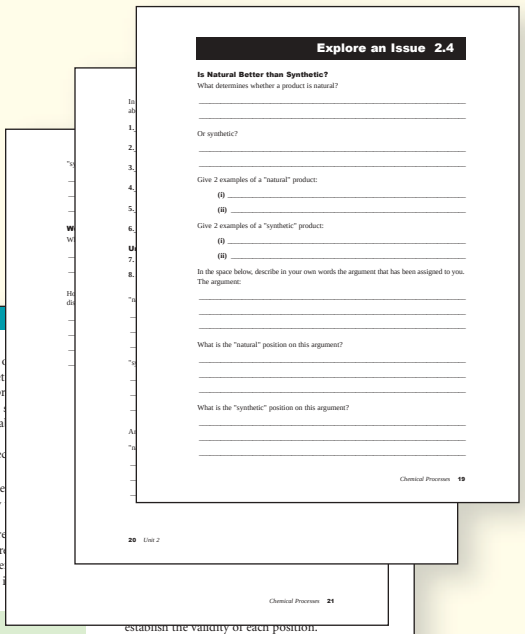
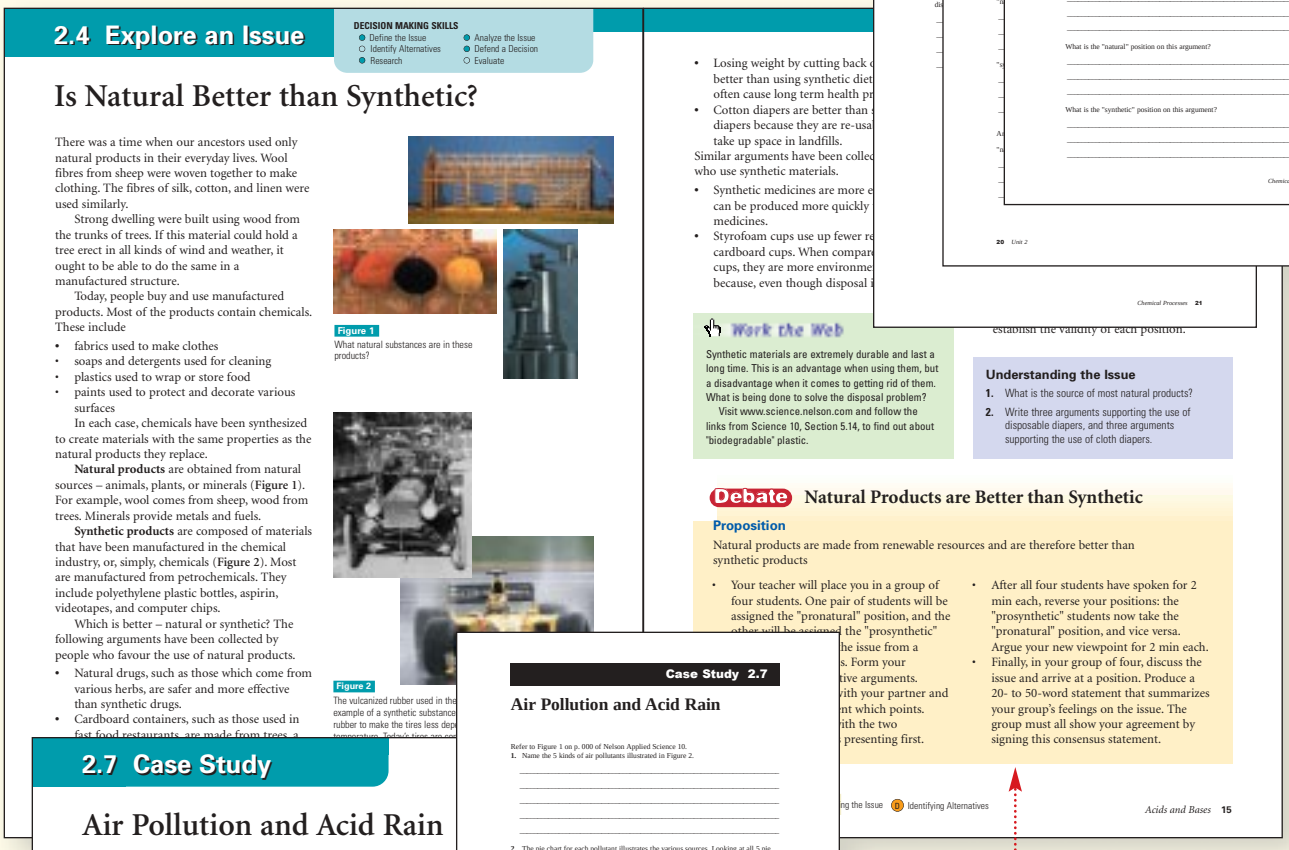
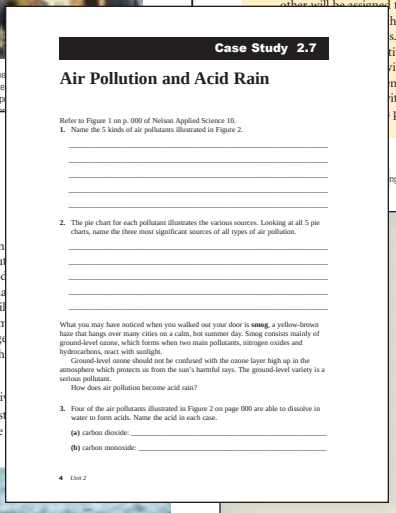
Explore an Issue

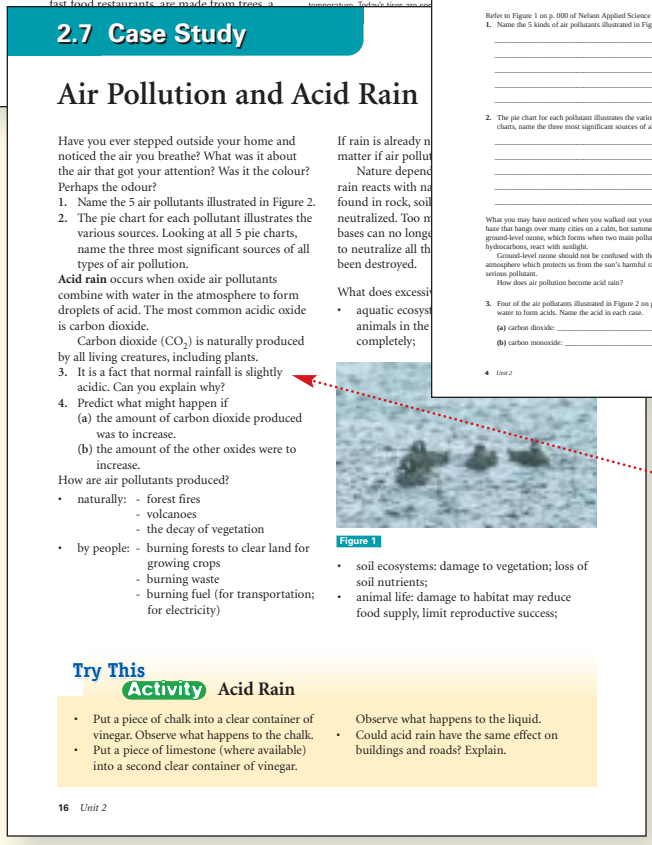
Each unit includes an *Explore an Issue,* which encourages students to examine various points of view on a "real-world" issue before making a personal decision.

Student Record of Learning
corresponding pages.









Role Play or Debate
Role play or debate situations provide students with an opportunity to analyse and evaluate issues. Both formats encourage the presentation (communication) and defence of personal decisions.

Questions
Questions attached to the narrative help students focus on and develop key ideas and information.

Case Study

Case Studies introduce students to concepts that, for reasons such as time, safety, or expense, they would not be able to investigate themselves. Each concept is presented in a familiar context.

Inquiry Investigations

Each unit presents several investigations to engage students in observing and experimenting. During these investigations, students will have the opportunity to develop inquiry skills: **Questioning, Hypothesizing, Planning, Conducting, Recording, Analysing, Concluding**, and **Communicating**.

While most investigations will be "directed", each unit provides at least one opportunity for an "open-ended" investigation, which requires students to choose their own questions and to plan and conduct an inquiry to answer those questions.

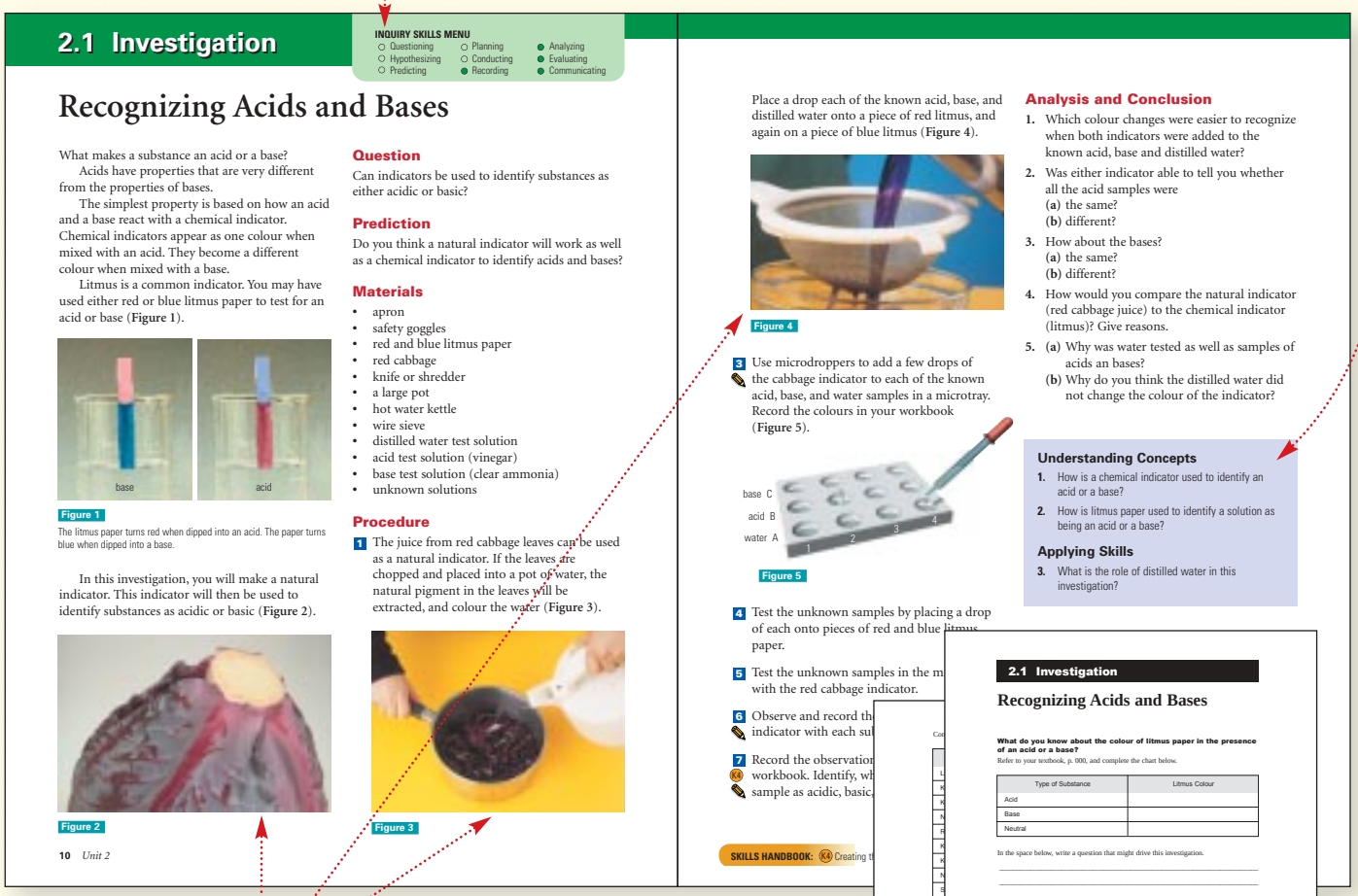
Questions

Questions relating to the expectations are provided, where applicable, and categorized as *Understanding Concepts, Making Connections,* and for investigations, *Applying Skills*.

- **a Understanding Concepts:** Questions focusing on understanding the basic concepts introduced or developed in the section.
- **b Making Connections:** Questions inviting students to relate their knowledge and skills to other problems and situations.
- **c Applying Skills:** Questions focusing on the inquiry skills, and their related applications.

Inquiry Skills Menu

Indicates which inquiry skills students will develop in investigations.



2.1 Investigation

INQUIRY SKILLS MENU
○ Questioning ○ Planning ● Analyzing
○ Hypothesizing ○ Conducting ● Evaluating
○ Predicting ● Recording ● Communicating

Recognizing Acids and Bases

What makes a substance an acid or a base?

Acids have properties that are very different from the properties of bases.

The simplest property is based on how an acid and a base react with a chemical indicator. Chemical indicators appear as one colour when mixed with an acid. They become a different colour when mixed with a base.

Litmus is a common indicator. You may have used either red or blue litmus paper to test for an acid or base (**Figure 1**).

base acid

Figure 1

The litmus paper turns red when dipped into an acid. The paper turns blue when dipped into a base.

In this investigation, you will make a natural indicator. This indicator will then be used to identify substances as acidic or basic (**Figure 2**).

Figure 2

Question

Can indicators be used to identify substances as either acidic or basic?

Prediction

Do you think a natural indicator will work as well as a chemical indicator to identify acids and bases?

Materials

- apron
- safety goggles
- red and blue litmus paper
- red cabbage
- knife or shredder
- a large pot
- hot water kettle
- wire sieve
- distilled water test solution
- acid test solution (vinegar)
- base test solution (clear ammonia)
- unknown solutions

Procedure

1 The juice from red cabbage leaves can be used as a natural indicator. If the leaves are chopped and placed into a pot of water, the natural pigment in the leaves will be extracted, and colour the water (**Figure 3**).

Figure 3

10 *Unit 2*

Place a drop each of the known acid, base, and distilled water onto a piece of red litmus, and again on a piece of blue litmus (**Figure 4**).

Figure 4

3 Use microdroppers to add a few drops of the cabbage indicator to each of the known acid, base, and water samples in a microtray. Record the colours in your workbook (**Figure 5**).

base C
acid B
water A
1 2 3 4

Figure 5

4 Test the unknown samples by placing a drop of each onto pieces of red and blue litmus paper.

5 Test the unknown samples in the m with the red cabbage indicator.

6 Observe and record th indicator with each su

7 Record the observatio workbook. Identify, wh sample as acidic, basic,

SKILLS HANDBOOK: Creating t

Analysis and Conclusion

1. Which colour changes were easier to recognize when both indicators were added to the known acid, base and distilled water?
2. Was either indicator able to tell you whether all the acid samples were
   (a) the same?
   (b) different?
3. How about the bases?
   (a) the same?
   (b) different?
4. How would you compare the natural indicator (red cabbage juice) to the chemical indicator (litmus)? Give reasons.
5. (a) Why was water tested as well as samples of acids an bases?
   (b) Why do you think the distilled water did not change the colour of the indicator?

Understanding Concepts

1. How is a chemical indicator used to identify an acid or a base?
2. How is litmus paper used to identify a solution as being an acid or a base?

Applying Skills

3. What is the role of distilled water in this investigation?

2.1 Investigation

Recognizing Acids and Bases

What do you know about the colour of litmus paper in the presence of an acid or a base?

Refer to your textbook, p. 000, and complete the chart below.

Type of Substance	Litmus Colour
Acid	
Base	
Neutral	

In the space below, write a question that might drive this investigation.

Do you think natural juices, such as red cabbage juice, can be used to identify acids and bases in the same way that litmus does?

Write your prediction.

16 *Unit 2*

Chemical Processes 17

Procedural Photographs

Where appropriate, written procedural steps are supported visually by a photograph.

Student Record of Learning

corresponding pages.