

Guide to making judgments — Year 9 Science

Name

Focus: Investigate the sugar content of a soft drink, analyse the effects of sugary drinks and reflect on health implications.

Investigating	Knowledge and understanding	Investigating	Reflecting
Analyses an investigation for fairness of design and implementation. Questions 1–4	Names and describes the functions of parts of the digestive system and demonstrates understanding of how digestion, circulation and respiration work together to provide fuel for the body. Questions 5–6	Analyses experimental evidence, graphical data and information to explain patterns and draw conclusions. Questions 7–14	Reflects on new understandings to suggest ways of minimising risks to health. Reflects on the influence of culture when making health-related choices. Questions 15–17
◀ Makes a valid judgment of the fairness of the investigation based on well-justified decisions about the control of all relevant variables. ◀ Describes two valid, specific reasons for a possible difference between measured and labelled sugar content. ◀ Provides valid explanations for decisions about the control of some variables and partially justifies a judgment of the fairness of the investigation. Makes an accurate comparison of measured and labelled sugar content and provides a valid reason for a possible difference. ◀ Makes a superficial judgment about one of the following: control of a variable, fairness of the investigation, a reason for difference between measured and labelled sugar content.	◀ Fully describes the functions of the specified parts of the digestive system. ◀ Consistently makes correct word choices to describe how the body processes sugar. ◀ Correctly names the specified parts of the digestive system and describes a function of most parts. Makes word choices to correctly describe most aspects of how the body processes sugar. ◀ Either correctly names some parts of the digestive system or makes some correct word choices to describe how the body processes sugar.	◀ Considers all relevant information about glycaemic index and insulin resistance to draw valid conclusions and offer full explanations. ◀ Interprets graphical data to clearly and accurately describe changes to blood glucose levels. Draws a valid conclusion about the effects of abnormal glucose levels. ◀ Determines the duration of exercise required to use the energy in soft drink. Uses graphical data to broadly describe changes to blood glucose levels. Draws a valid conclusion about the effects of excess sugar. ◀ Some success in determining the duration of exercise required to use the energy in soft drink. Either provides a partial description or draws a conclusion.	◀ Considers all relevant understandings in justifying a range of specific recommendations to minimise health risks. ◀ Gives a well-reasoned explanation of cultural influence on a poor health choice. ◀ Considers some new understandings in justifying general recommendations to minimise health risks. ◀ Gives an example of a culturally influenced poor health choice.
			A
			B
			C
			D
			E

Feedback
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Use assessment data to identify strengths and weaknesses in student understanding of core concepts in a learning area

The teacher has used the Guide to Making Judgements (GTMJ) to record and analyse assessment data from the 2010 QCAT class results. The data provide the teacher with evidence of students’ strengths and weaknesses within specific areas of the science curriculum.

**Year 9 Science
Term Overview**

Chemical Sciences			
UNIT 1	Introduction to Chemistry		
	Time Frame	Assessment	Assessment Time
	6 Weeks	Test 1	Week 6 Lesson 2
	Reference	Text Chapter 2	
UNIT 2	Acids and Bases		
	Time Frame	Assessment	Assessment Time
	4 Weeks	Test 2	Week 10 Lesson 3
	Reference	Text Chapter 10	

Plan interventions designed to address specific learning issues identified through the interpretation of assessment data

The teacher uses the identified student strengths and weaknesses to reflect on current teaching practice and plan for the inclusion of opportunities to address identified issues. The next unit of work provides an opportunity to include specific learning experiences to develop student understanding of Science Inquiry Skills.

Unit 2 – Acids and Bases, 4 weeks

Week	Lesson	Topic	Annotation
7	1	Common properties of acids and bases Acid Rain Practical : Investigating the effect of Acid rain	Include identification of variables and discuss dependent, independent and controlling variables
	2	Measuring pH <ul style="list-style-type: none"> Acid/Base/Neutral pH Scale (0 -14) pH of Common Products Measuring pH (Indicators) 	Highlight how pH scale provides experimental evidence about the level of acidity of a solution
	3	Practical – Testing common substances with universal indicator	Use pH results from tests to identify patterns in acidity and basicity of common substances and relate to use
8	1	Neutralisation <ul style="list-style-type: none"> General Word Equation Examples of Word Equations Case Study: Antacids Practical - Antacids 	Replace the end of unit test with an investigation on effectiveness of antacids. Investigation will provide information on controlling variables, analysing evidence and drawing conclusions.
	2	Exothermic and endothermic reactions <ul style="list-style-type: none"> Definition Examples of exothermic and endothermic reactions 	
	3	Practical: Exothermic and Endothermic Reactions	Move practical to lesson 2 and use Activities 1 & 2 from RSC resource 'Hand warmers' on fair testing and reliability
9	1	Acid-carbonate reactions <ul style="list-style-type: none"> General Word Equation Examples of Word Equations 	
	2	Acid- metal reactions <ul style="list-style-type: none"> General Word Equation Examples of Word Equations 	
	3	Practical: Reactions of acids	Highlight connections to exothermic reaction and pH scale and revisit patterns
10	1	Revision	Use these three lessons to design, conduct and report on a fair test involving the effectiveness of different brands of antacids
	2	Revision	
	3	Test	

Modify teaching strategies or content decisions as a result of analysis of student assessment data

The teacher has modified the forthcoming unit plan in order to focus on the identified concerns. The lesson plans and teaching strategies have been designed to scaffold student learning within the areas of identified Science Inquiry Skills.

LESSON PLAN

Week 7, Lesson 1 Time: 70 mins	
Objective: To introduce the concepts of acids and bases, review fair testing and apply to acid rain investigation	
Introduction	
Strategies used	Learning experiences
Interactive teaching: Whole class discussion	<ul style="list-style-type: none">Brain storm what students know about acids and basesIdentify common acids and bases in the home (use pictures or samples)Discuss common acids in food, digestion, swimming pools and other relevant point from brain storm
Body of Lesson	
Strategies used	Learning experiences
Direct teaching: Explicit teaching	<ul style="list-style-type: none">Show video clip of consequences of acid rain to the environmentDiscuss consequences highlighted in videoExplain how and why acid rain occurs include word equation
Direct teaching: Explicit teaching	<ul style="list-style-type: none">Introduce acid rain investigation as a way to determine experimentally the effectExplain that in order to make valid judgments about the effect of acid rain the investigation needs to be fairReview requirements of a fair test including controlled, dependent and independent variables
Indirect teaching: Inquiry based learning	<ul style="list-style-type: none">Ask students to read through the experiment in their text book and identify the variablesDiscuss student responses and collaboratively decide which variables are dependent, independent and controlledHave student conduct the experiment and record results
Conclusion	
Strategies used	Learning experiences
Interactive teaching: Whole class discussion	<ul style="list-style-type: none">Ask students to answer the questions from the text related to resultsWhole class discussion comparing different groups resultsHave students collaboratively develop a conclusion

Conducting a Fair Test

Have you ever said... but it's just not FAIR!!! Well we need to be fair in science too.

Once you have written your aim and hypothesis, you can start designing a fair test using "COWS MOO SOFTLY" Change, Measure, keep the Same.

Change a variable

Measure a variable

Keep all other variables the same

Did you know?
vari means to change

Guided Example

Problem: A student wanted to find out which strength of fertilizer made a pea plant grow the tallest.

Change a variable – the strength of the fertilizer will be changed

Measure a variable – the height of the pea plant will be measured

Keep the same – type and size of pot, amount of light, amount and type of soil, amount of water, type of pea plant will be kept the same

Change a variable (Independent variable)	Measure a variable (Dependent variable)	Keep the same (Controlled variables)
Strength of fertiliser	Height of pea plant	Type & size of pot
		Amount of light
		Amount & type of soil
		Amount of water
		Type of pea plant

➤ Complete the following for your experiment...

Independent Variable – the ONE variable that you will change is _____

Dependent Variable – the variable that will measure is _____

Controlled Variables – all of the other variables are kept the s_____

➤ Copy this table into your book and list all of the variables for your experiment

Independent variable (change a variable)	Dependent variable (measure a variable)	Controlled variables (keep the same)
		(you may need more lines)

For further information check out these websites:

[http://www.camden-h.schools.nsw.edu.au/pages/Faculties/Science/Science Project 2.pdf](http://www.camden-h.schools.nsw.edu.au/pages/Faculties/Science/Science%20Project%202.pdf)
http://www.qsa.qld.edu.au/downloads/early_middle/kla_sci_sbm_ss_402.pdf
<http://www1.curriculum.edu.au/sciencepd/readings/invest.htm>

Science Department
Year 9 Extended Investigation – Antacids
TASK SHEET

Chemical Sciences		Unit 2 Acids and Bases	
Student name:		Teacher name:	
Class:		Date given:	
Monitoring date:		Group members:	
Due date:			

Task: Your task is to perform an Extended Investigation on the topic of antacids.

Have you ever eaten too much and developed a stomach ache? Have ever you been given medication to settle your stomach? If so, you may have had an antacid tablet or liquid.

Antacids are taken to relieve heartburn or indigestion. Antacid is a suitable treatment for healthy people, but severe heartburn requires medical attention.

Part 1 - Designing the investigation

1. Conduct some preliminary research and think of a question to do with antacids. Think about "How?" or "Why?" something happens and whether you can test it experimentally. When you have written your question below, show it to your teacher to get approval before continuing.

Question: _____

2. Copy the table below and list your variables.

Independent variable	Dependent variable	Controlled variables
		(add more lines)

3. Write the aim and hypothesis based on your question.
4. Describe your experimental setup using a labelled diagram.
5. List your materials, equipment and safety issues under separate headings.
6. Write the experimental procedure. Remember that this is written in past tense and third person (ie. like it happened yesterday and no words like "I", "we", "me" and "they").

Part 2 - Conducting the investigation

7. Complete the preliminary trials of your experiment and modify your procedure if necessary.
8. Record any data (a table is good for this).

Part 3 - Analysing data and drawing conclusions

9. Consider what might be the best way to present your data (think about different types of graphs).
10. Analyse your data, looking for patterns, trends or any relationships between the variables.
11. Summarise your results and explain scientifically what happened (be sure to refer to your data and figures).
12. Comment on any difficulties you had and discuss whether your results would be reproducible.
13. Write a conclusion summing up the relationship between the hypothesis and results. It should indicate if the hypothesis was accepted or rejected by the results.

Modify teaching strategies or content decisions as a result of analysis of student assessment data

New student resources and assessment items have been developed to enable students to practice the skills required, demonstrate their ability to plan and conduct experiments, and process and analyse data.

Student name: _____

Year 9 Extended Investigation – Antacids Assessment Criteria

	A	B	C	D	E
Science Understanding Knowledge of chemical reactions	Excellent knowledge of scientific concepts.	Thorough knowledge of scientific concepts.	Sound knowledge of scientific concepts.	Limited knowledge of scientific concepts.	Very limited knowledge of scientific concepts.
Science Inquiry Skills Investigation methods	Excellent ability to: use scientific methodology, hypothesise, develop experimental procedures, identify and control variables	Substantial ability to: use scientific methodology, hypothesise, develop experimental procedures, identify and control variables	Adequate ability to: use scientific methodology, hypothesise, develop experimental procedures, identify and control variables	Little ability to: use scientific methodology, hypothesise, develop experimental procedures, identify and control variables	Experiments are not conducted or totally irrelevant to purpose.
Science Inquiry Skills Data collection and analysis	Data collection and presentation clear, logical and appropriate. Data interpretation is well sequenced and consistent with information collected.	Data collected and recorded in an organised manner. Data interpretation is mainly complete and valid.	Data collected and presented in a suitable manner. Data interpretation shows some validity but some aspects not considered.	Some observations made and most data collected and presented. Data interpretation has been attempted with some relevance.	Some observations made with an attempt to record and present them. Data interpretation has been attempted.
Science Inquiry Skills Evaluating conclusions	The evaluation and conclusion show thorough understanding with well explained reasoning and logical development.	The evaluation and conclusion contain good understanding with well explained reasoning and logical development	The evaluation and conclusion show some understanding with reasonable explanation	The evaluation and conclusion show little or no understanding	No evaluation provided.
Science Inquiry Skills Communication and presentation	Communicates method in clear replicable way technically faultless Clear and visually effective presentation, free from mechanical errors.	Not quite replicable or cumbersome Neat and clear but somewhat lacking in flow or communication.	Lacks some detail and difficult to follow in places. Adequate presentation but somewhat difficult to follow.	Unclear, lacks substantial detail, difficult to follow the structure.	Incomplete or Incomprehensible.