Science

Year 9
Below satisfactory

WORK SAMPLE PORTFOLIO

Annotated work sample portfolios are provided to support implementation of the Foundation – Year 10 Australian Curriculum.

Each portfolio is an example of evidence of student learning in relation to the achievement standard. Three portfolios are available for each achievement standard, illustrating satisfactory, above satisfactory and below satisfactory student achievement. The set of portfolios assists teachers to make on-balance judgements about the quality of their students' achievement.

Each portfolio comprises a collection of students' work drawn from a range of assessment tasks. There is no pre-determined number of student work samples in a portfolio, nor are they sequenced in any particular order. Each work sample in the portfolio may vary in terms of how much student time was involved in undertaking the task or the degree of support provided by the teacher. The portfolios comprise authentic samples of student work and may contain errors such as spelling mistakes and other inaccuracies. Opinions expressed in student work are those of the student.

The portfolios have been selected, annotated and reviewed by classroom teachers and other curriculum experts. The portfolios will be reviewed over time.

ACARA acknowledges the contribution of Australian teachers in the development of these work sample portfolios.

THIS PORTFOLIO: YEAR 9 SCIENCE

This portfolio provides the following student work samples:

Sample 1	Investigation report: Chemical change
Sample 2	Research report: Chemical change
Sample 3	Investigation report: Solar oven
Sample 4	Investigation report: Refraction of light
Sample 5	Written test: Changing Earth
Sample 6	Worksheet: Ecosystems
Sample 7	Venn diagram: Control and regulation
Sample 8	Research report: Bionic eye

In this portfolio, the student explains chemical processes with reference to atoms and energy transfers (WS1, WS2) and describes examples of photosynthesis and combustion as important chemical reactions (WS2). The student applies the wave model of energy transfer to explain phenomena (WS3, WS4). The student explains some global features in terms of geological processes and timescales (WS5) and provides a simple analysis of how biological systems function and respond to external changes with reference to interdependencies (WS6, WS7). The student explains how technological factors have influenced scientific developments (WS5) and predicts how future applications of technologies might affect people's lives (WS8).

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The student demonstrates the capacity to design questions that could be investigated using a range of inquiry skills and methods, including the control and accurate measurement of variables and systematic collection of data (WS1, WS3). The student analyses trends in data (WS1, WS3, WS4), identifies relationships between variables and reveals inconsistencies in results, suggesting specific improvements to improve the quality of the evidence (WS1, WS3, WS4). The student uses appropriate language and representations to communicate findings and ideas (WS1, WS2, WS3, WS4, WS5, WS6, WS7, WS8) and designs text to communicate to specific audiences (WS1, WS2).

Investigation report: Chemical change

Year 9 Science achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

> *By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.*
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> *Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.*

Summary of task

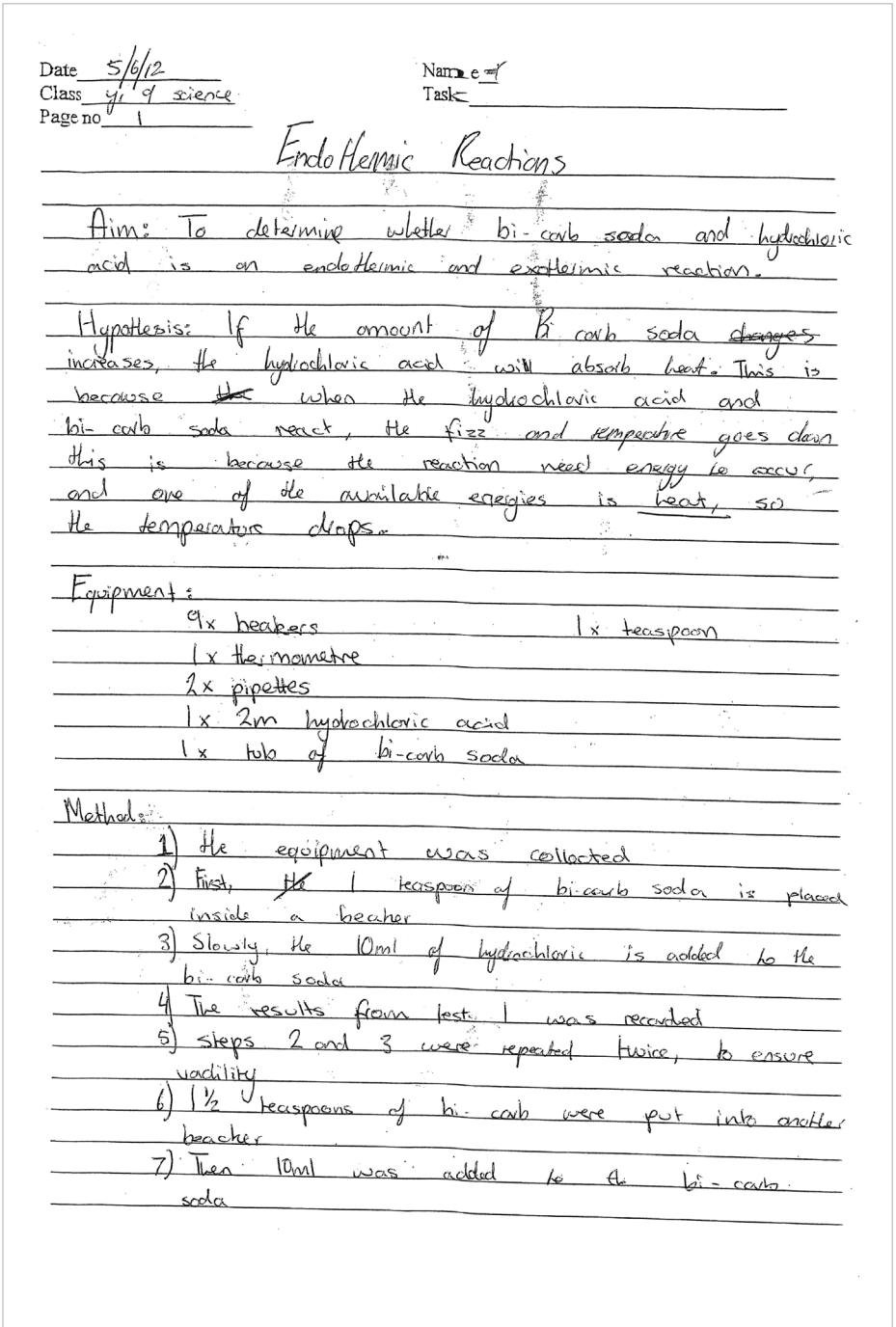
Students had investigated a range of chemical reactions and explored the use of the atomic model to explain and predict chemical processes. Students had been introduced to the classification of endothermic and exothermic reactions and some everyday applications of these.

In this task students were asked to work in groups to investigate the energy changes involved in chemical reactions. A range of chemicals and equipment was provided. Students were required to develop a question, design an appropriate method and select ways to present their data in a scientific report appropriate for an audience of their peers.

Students were advised of the following safety precautions when handling hydrochloric acid: be careful to avoid skin contact as well as clothing contact; wear safety goggles at all times while handling the hydrochloric acid and report any spills immediately.

The practical component of this task was undertaken in three lessons. In the fourth lesson, students completed their written investigation report individually under test conditions. A set of guidelines for writing a practical report was provided.

Investigation report: Chemical change



Date 5/6/12
Class yr 9 science
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Name
Task

Endothermic Reactions

Aim: To determine whether bi-carb soda and hydrochloric acid is an endothermic and exothermic reaction.

Hypothesis: If the amount of bi carb soda ~~changes~~ increases, the hydrochloric acid will absorb heat. This is because ~~the~~ when the hydrochloric acid and bi-carb soda react, the fizz and temperature goes down this is because the reaction need energy to occur, and one of the available energies is heat, so the temperature drops.

Equipment:

- 9x beakers
- 1x teaspoon
- 1x thermometre
- 2x pipettes
- 1x 2m hydrochloric acid
- 1x tub of bi-carb soda

Method:

1) The equipment was collected
2) First, ~~the~~ 1 teaspoon of bi-carb soda is placed inside a beaker
3) Slowly, the 10ml of hydrochloric is added to the bi-carb soda
4) The results from test 1 was recorded
5) steps 2 and 3 were repeated twice, to ensure validity
6) 1½ teaspoons of bi carb were put into another beaker
7) Then 10ml was added to the bi-carb soda

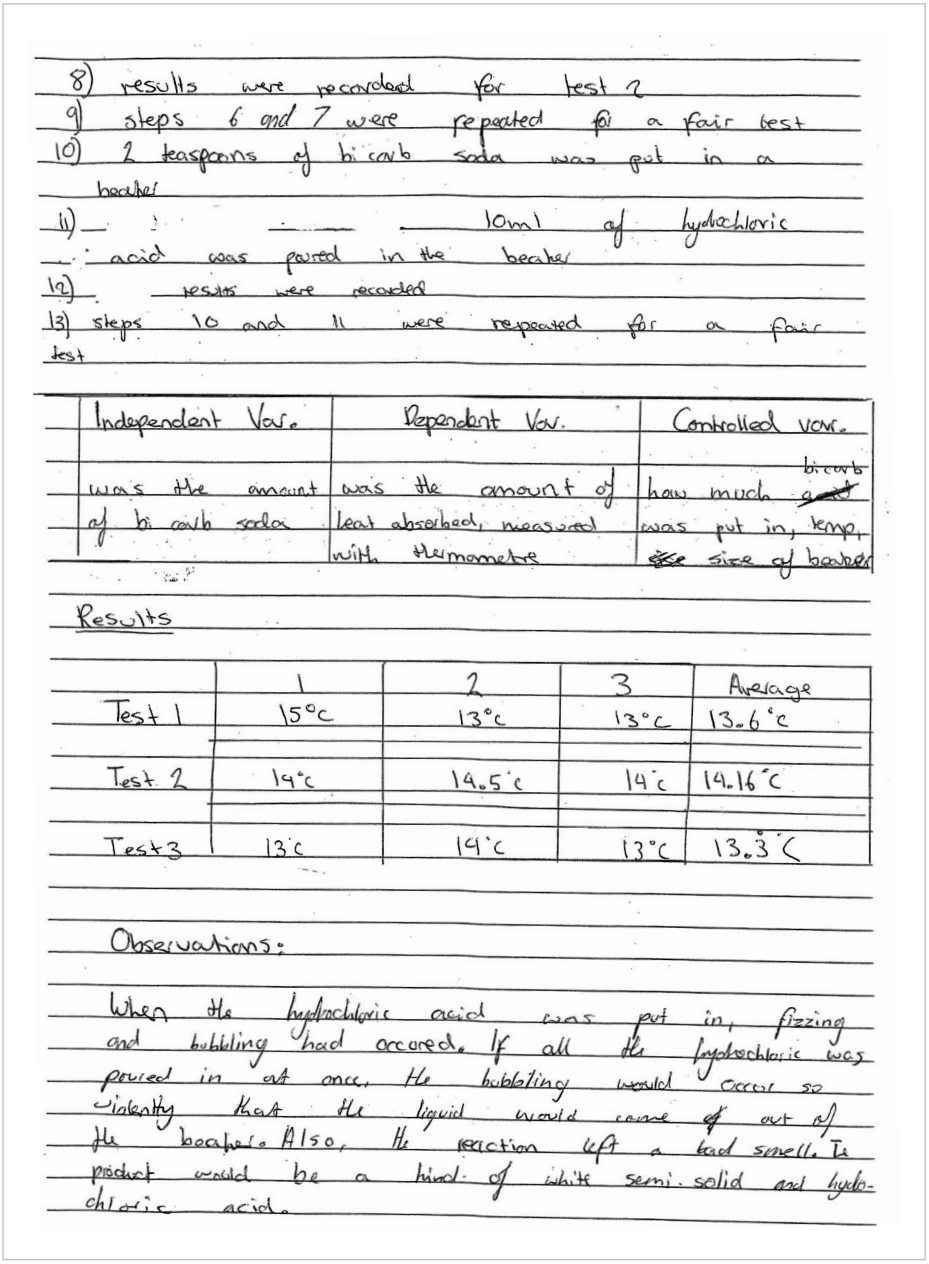
Annotations

Designs an aim that partially reflects a question to be investigated.

Develops a hypothesis and attempts to provide a justification based on energy change in endothermic reactions.

Designs a method, including an indication of how variables were controlled.

Investigation report: Chemical change



8) results were recorded for test 2
9) steps 6 and 7 were repeated for a fair test
10) 2 teaspoons of bi carb soda was put in a beaker
11) 10ml of hydrochloric acid was poured in the beaker
12) results were recorded
13) steps 10 and 11 were repeated for a fair test

Independent Var.	Dependent Var.	Controlled var.
was the amount of bi carb soda	was the amount of heat absorbed, measured with thermometre	how much bicarb was put in, temp, ~~size~~ size of beaker

Results

	1	2	3	Average
Test 1	15°c	13°c	13°c	13.6°c
Test 2	14°c	14.5°c	14°c	14.16°c
Test 3	13°c	14°c	13°c	13.3°c

Observations:

When the hydrochloric acid was put in, fizzing and bubbling had occured. If all the hydrochloric was poured in at once, the bubbling would occur so violently that the liquid would come of out of the beaker. Also, the reaction left a bad smell. The product would be a kind of white semi-solid and hydrochloric acid.

Annotations

Identifies a controlled variable.

Records quantitative data (temperature).

Records qualitative data (reaction observation).

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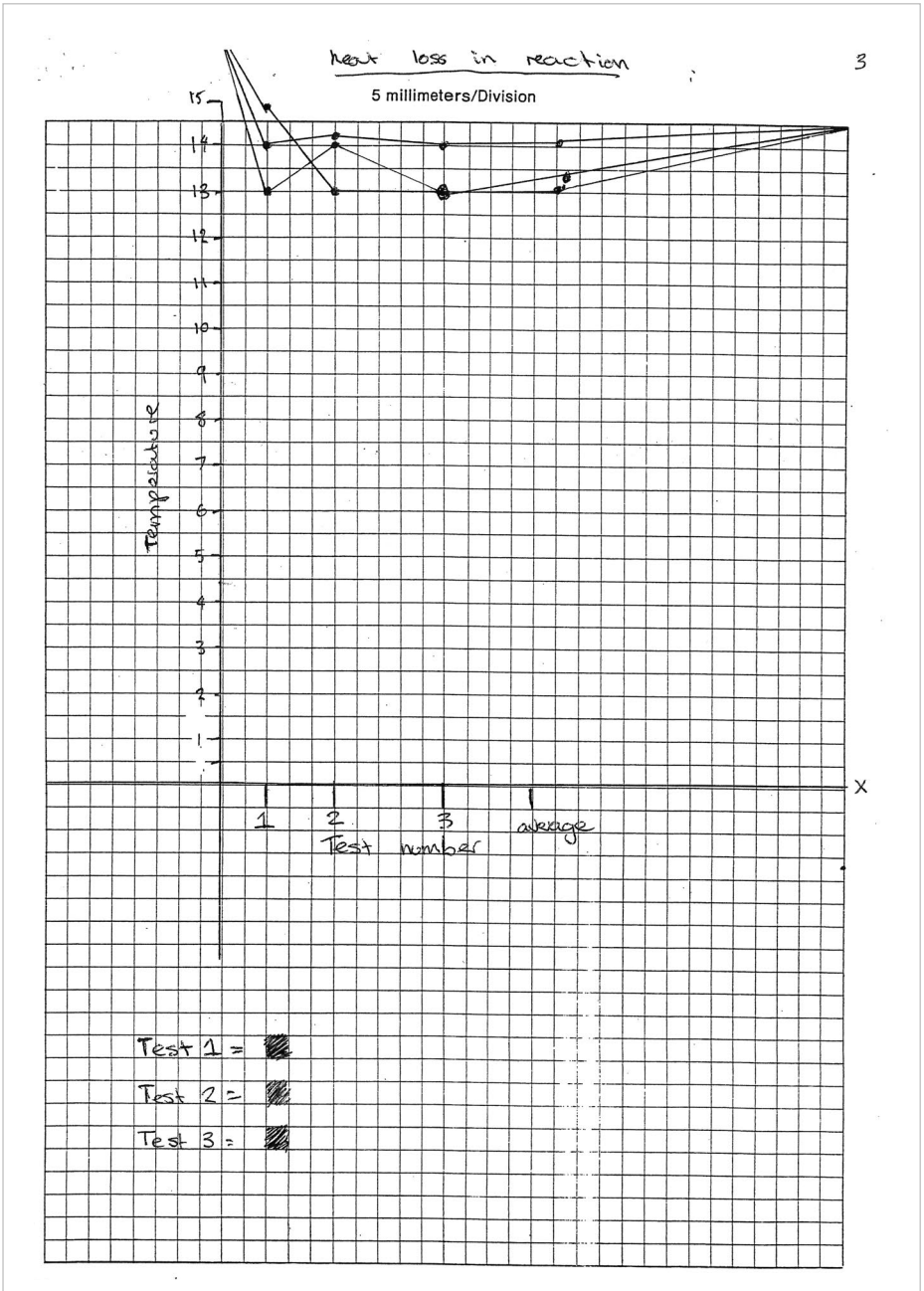
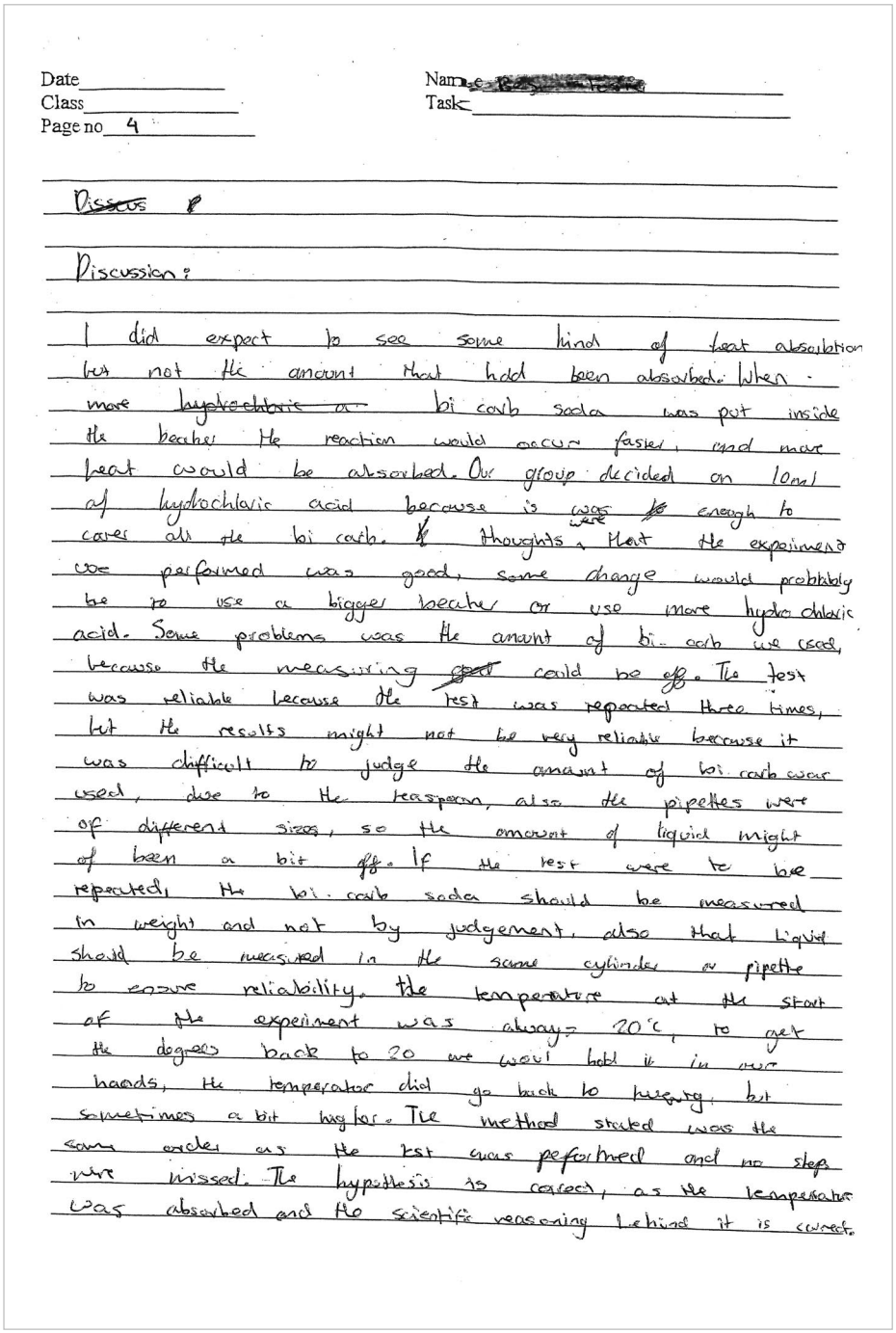
Investigation report: Chemical change



Annotations

Uses some graphing conventions to construct a line graph to represent changes in temperature.

Investigation report: Chemical change



Date_____
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Name [redacted]
Task_____

~~Discuss~~ ß

Discussion:

I did expect to see some kind of heat absorbtion but not the amount that had been absorbed. When more ~~hydrochloric~~ bi carb soda was put inside the beaker the reaction would occur faster, and more heat would be absorbed. Our group decided on 10ml of hydrochloric acid because is was ~~is~~ are enough to cover all the bi carb. ß Thoughts, That the experiment we performed was good, some change would probably be to use a bigger beaker or use more hydrochloric acid. Some problems was the amount of bi carb we used, because the measuring ~~spoon~~ could be off. The test was reliable because the test was repeated three times, but the results might not be very reliable because it was difficult to judge the amount of bi carb were used, due to the teaspoon, also the pipettes were of different sizes, so the amount of liquid might of been a bit off. If the test were to be repeated, the bi carb soda should be measured in weight and not by judgement, also that liquid should be measured in the same cylinder or pipette to ensure reliability. The temperature at the start of the experiment was always 20°C, to get the degrees back to 20 we would hold it in our hands, the temperature did go back to twenty, but sometimes a bit higher. The method stated was the same order as the test was performed and no steps were missed. The hypothesis is correct, as the temperature was absorbed and the scientific reasoning behind it is correct.

Annotations

Attempts to provide an analysis and explanation of data.

Provides an analysis of the method to justify the reliability of the data.

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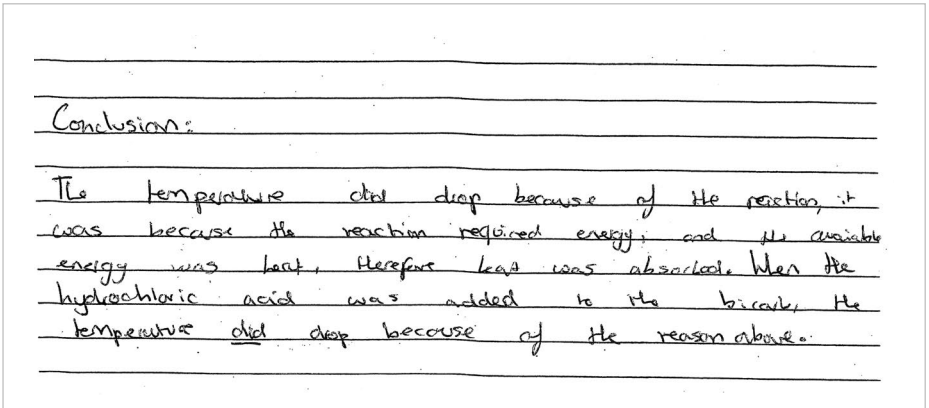
Investigation report: Chemical change



Conclusion:

The temperature did drop because of the reaction, it was because the reaction required energy, and the available energy was heat, Therefore heat was absorbed. When the hydrochloric acid was added to the bicarb, the temperature did drop because of the reason above.

Annotations

Refers to data to justify conclusions.

Annotations (Overview)

The student uses language and representations to communicate science ideas to a specific audience.

Research report: Chemical change

Year 9 Science achievement standard

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Summary of task

Students had been introduced to the atomic model and the ways in which this could be used to explain chemical structures and processes. They had investigated a variety of chemical reactions and classified them as endothermic or exothermic, linking this to energy transfers and transformations.

In this task, students were asked to research how chemical changes impact on society and develop a report suitable for a general public audience. Students were given two weeks to complete the task outside of class time.

Research report: Chemical change

CHEMICAL CHANGES

Physical and chemical change is different because physical change is reversible and chemical change isn't. If you burnt a piece of wood its a chemical change because you can't unburn it. But if you freeze water it's a physical change because you can unfreeze it. A physical change gives the same thing you started with like if you cut a piece of wood it's the same wood that you started with just in smaller pieces. But a chemical change gives something different from what you started with like burning the wood. Some other things that are physical changes are melting chocolate, food going mouldy, cutting down trees, dying your hair. Some other things that are chemical changes are toasting toast, making a cake, rusty old car, explosions.

Chemical changes are used in everyday life like when you have to go somewhere and need to put some petrol in your car it goes in as a liquid but gets turned into a gas while your driving and so that's a chemical change because it can't go back into being a liquid. The gas is carbon dioxide which is really bad for the environment like we all know because of all the global warming and hole in the ozone layer. But if there weren't any cars for people to use this would be worse because how would we get to school and work on time so this would have a bad impact on everyday life.

The chemical change in fireworks happens because of the burning like with the burning wood and you can't unburn them so it has to be a chemical change. Fireworks are a chemical change with good and bad parts to because some people love to watch them so it gives them entertainment. But fireworks are bad for some animals like pet dogs because they get scared and run away and can also make people go deaf if their not careful.

Annotations

Describes chemical changes in comparison to physical changes, using examples.

Identifies implications of a chemical reaction (combustion of petrol) for society.

Identifies the lighting of fireworks as a chemical change, and describes some implications of this application for society.

Annotations (Overview)

The student uses language and representations to communicate findings and ideas to a specific audience.

Investigation report: Solar oven

Year 9 Science achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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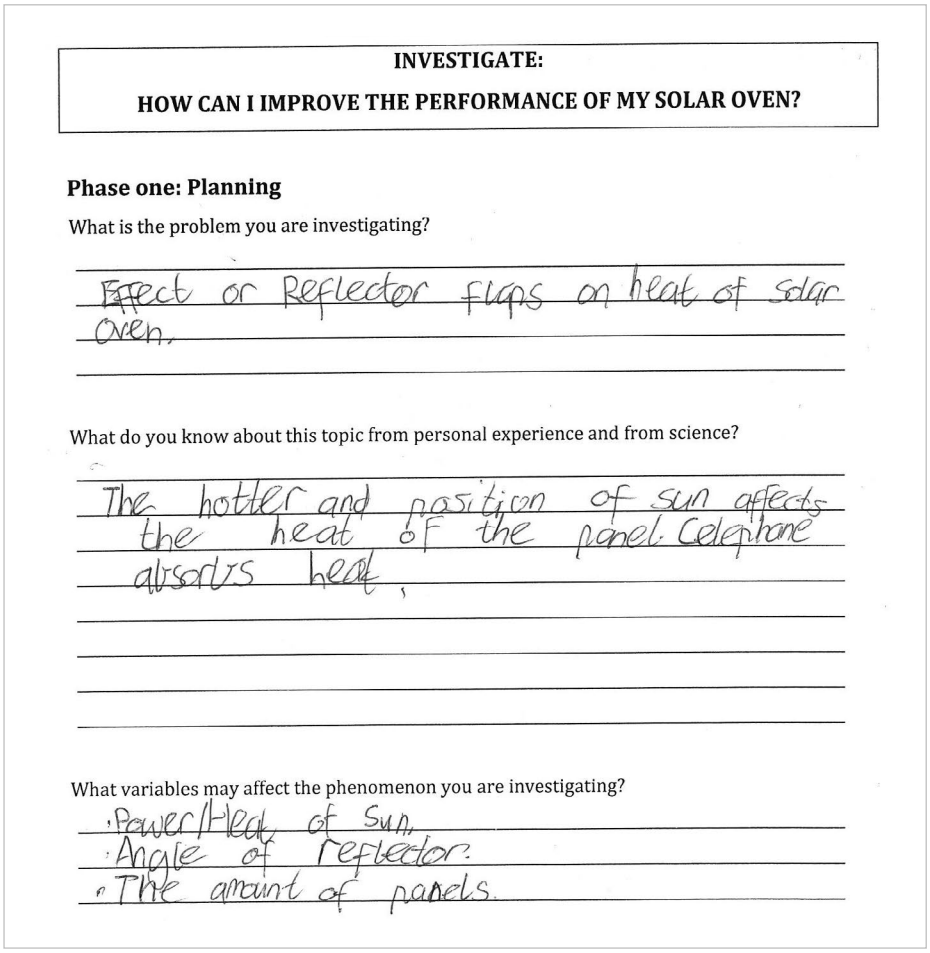
Summary of task

Students had completed a number of tasks to develop their science inquiry skills. They had been exploring sustainable energy use and simple technologies that could be used as alternatives to electric appliances.

Students were asked to research solar ovens and how they work. They were then required to design and build their own solar oven and test its performance. A template was provided which students used to document their procedure and findings. Students were required to explain trends and patterns in their data and to complete an evaluation of their investigation.

Students were warned that handling the solar ovens when hot could cause burns, so protective clothing should be worn. They were provided with welder's gloves to protect their hands when taking temperature measurements.

Investigation report: Solar oven



INVESTIGATE:

HOW CAN I IMPROVE THE PERFORMANCE OF MY SOLAR OVEN?

Phase one: Planning

What is the problem you are investigating?

Effect or Reflector flaps on heat of solar oven.

What do you know about this topic from personal experience and from science?

The hotter and position of sun affects the heat of the panel. Celephane absorbs heat,

What variables may affect the phenomenon you are investigating?

- Power/Heat of Sun.
- Angle of reflector.
- The amount of panels.

Annotations

Investigation report: Solar oven

Which of the variables are you going to investigate as your independent variable (this is the variable you will change to see what effect it has on the dependent variable)?

Our Independent variable is the amount of panels on our Solar oven.

How will the independent variable be changed in the experiment?

We will sticky tape the panel of the solar oven and adjust it's diffrence.

What is the dependent variable (i.e. the variable that responds to changes in the independent variable)?

The dependent variable is if the ~~food~~ thermometer ~~cooks~~ tempreture rises.

How will you measure the dependent variable?

Depending on the ~~if it melts~~ heats or if it ~~doesent~~ does melt we will measure it with a thermometer.

What question are you Investigating?

~~If our food will cook under the heat of our Solar oven.~~ If our Solar oven will produce heat.

OR

What hypothesis are you testing? State your hypothesis as a relationship between the independent and dependent variables.

If the heat of an Solar oven is affected by the number of panels then I believe the more panels the greater heat the Solar oven.

Predict what you think will happen. Explain why.

I believe that the more panels on our box the higher the temperature will become as more light rays will be reflected towards the focus.

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Annotations

Identifies the independent variable.

Identifies how to measure the dependent variable.

Develops a question related to the investigation.

Develops a hypothesis that reflects the variables to be changed.

Investigation report: Solar oven

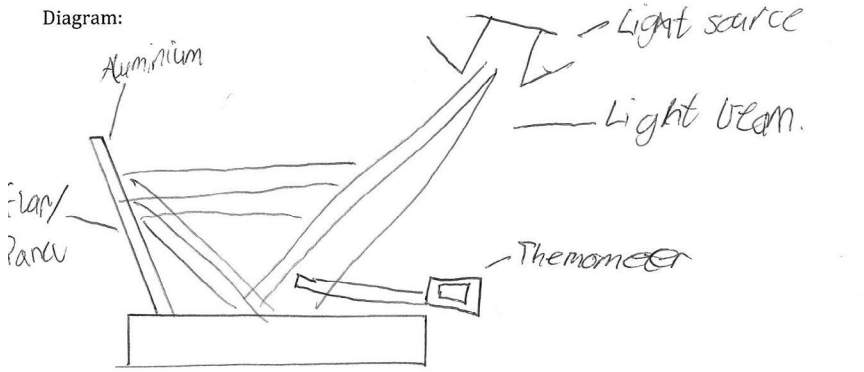
What variables are to be controlled (kept constant) to make it a fair test?

The amount, type of food. The temprature reflecting of oven.

Describe your experimental set-up using a labelled diagram and explain how you will collec your data.

The light source will send light beams at the panel. The light beams will then reflect of the aluminium into the box and generate heat. Witthe will test the heat with a themometer.

Diagram:



Are there any special safety precautions?

No only not to touch the Themometer if hot.

Annotations

Identifies some variables to be controlled in the investigation.

Provides a minimal description of the method.

Refers to a possible safety issue.

Investigation report: Solar oven

Phase two: Experimenting

Carry out some preliminary trials. Were there any problems?

It did not heat up very much as the rays were being deflected outwards.

How did you modify your experiment to fix the problems?

We angled the panel so the light beams were reflected back towards the box

Collect and record the data you need to test your hypothesis. Draw your data table here.

Title of table: Effect of panels on solar oven temperature

	Start	Finish	Difference
Panel 1	18°C	22°C	4°C
Panel 2	18°C	24°C	6°C
Panel 3	18°C	25°	7°
Panel 4	18°C	26°	8°C

How did you make sure your data were accurate?

We made sure the solar oven was always exposed to 5 minutes of light beams & that the panels were always at the same angle.

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Annotations

Identifies an issue with the method and an appropriate improvement.

Collects and records data.

Describes steps taken to control two variables.

Investigation report: Solar oven

Phase three: Data analysis

What is the **best** way to present your data? Is it appropriate to draw a graph? What type of graph is most suitable?

USE EXCEL TO GENERATE A GRAPH

- Remember to plot the *independent variable* on the horizontal axis.
- Remember that the title of the graph should mention both the independent and dependent variables.

PRINT YOUR GRAPH OUT AND ATTACH TO THIS DOCUMENT

Analyse your data. Are there any patterns or trends in your data? What is the relationship between the variables you have investigated? Is the hypothesis supported by the data?

As we attach more panels to the solar oven was a gradual increase in temperature. The Hypothesis stated that the more panels on the solar oven the greater heat the solar oven will reach is correct.

Using science concepts explain the patterns, trends or relationships you have identified in your data. What is your conclusion?

The more solar panels on the solar oven the more ~~light~~ heat is trapped. So the hotter the solar oven becomes.

Annotations

Identifies the relationship between the number of reflectors and the temperature of the solar oven.

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Investigation report: Solar oven

Phase four: Evaluation

What were the main sources of experimental error (sample size and selection, measurement error, poor control of variables)?

The size of the panels was all different.

How confident are you with your conclusions? How much uncertainty/error is associated with your data?

We are really confident because our results show the heat rising.

How could the design of the experiment have been improved to reduce error?

We could have measured the exact size and so all the panels will be the same size.

What have you learned about the topic of your investigation? Was the outcome different from your prediction? Explain.

We have learnt that the more solar panels the greater heat the solar oven will reach. Our prediction was correct as we predicted the more panels the greater heat the oven will reach.

What have you learned about the methods of investigating in science?

We have learnt that you should keep things the same

Annotations

Identifies possible sources of error and suggests an improvement to the method to reduce error.

Annotations (Overview)

The student uses language and representations to communicate findings and ideas.

Investigation report: Refraction of light

Year 9 Science achievement standard

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Summary of task

Students had been introduced to the wave model of light, and investigated reflection, refraction and total internal reflection phenomena, including constructing representations to indicate the transfer of energy.

Students were asked to complete an investigation to collect quantitative data to support the law of refraction. They were required to relate their findings to their knowledge of light waves and energy transfer and connect them to everyday phenomena.

Students were warned that the use of light boxes presented a low risk of electrocution and burns and they were required to follow appropriate procedures to ensure the light boxes were set up away from water sources and not handled when they became hot.

Two 50-minute lessons were allocated to the investigation. Students completed the report independently outside of class time.

Investigation report: Refraction of light

Variables

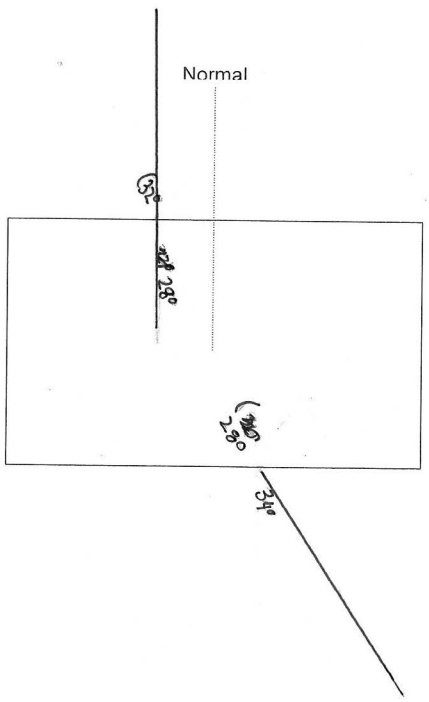
Independent: The angle of incidence

Dependent: The angle of refraction

Controlled to ensure a fair test: To ensure a fair test we need to keep the same time; bulb, power supply, light box, position, light box slits, glass block.

Results

Diagram 1



Annotations

Identifies the independent, dependent and controlled variables in the investigation.

Represents how light enters and leaves a more dense medium.

Investigation report: Refraction of light

Table

Test		Trial 1	Trial 2	Trail 3
Light entering glass from air	Angle of incidence	32°	35°	33°
	Angle of refraction	28°	25°	24°
Light entering air from glass	Angle of incidence	32°	35°	33°
	Angle of refraction	28°	37°	24°

Discussion

Does the light bend towards or away from the normal as it enters the glass block?
As it enters the light bends towards the normal.

Which way does it bend as it leaves?
When it leaves the block it bends away.

Complete the following statement – As light travels from a less dense medium to a more dense medium it bends Towards the normal, as it travels from a more dense medium to a ~~dense~~ Less dense one it bends away from the normal

Did your findings reflect you hypothesis? Explain
Yes, my findings did reflect my hypothesis of the light bending.

What can you determine from your table of results? (What results were similar?)
What I can determine from the results is both ∠Angles are similiar entering and leaving the object. (Judging from diagram 1+3 because they were most accurate.)

Annotations

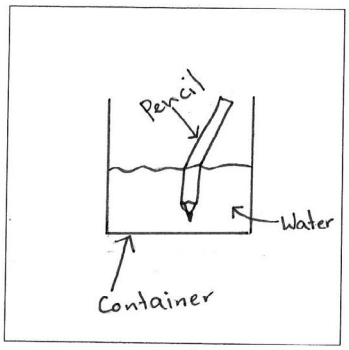
Collates data in a provided table.

Describes the movement of light through a more dense medium with reference to the normal.

Analyses experimental data to identify the relationship between angles at which light enters and exits a glass block.

Investigation report: Refraction of light

Explain in detail the effect refraction has on either spear fishing, the bending of a pencil in water, the twinkling of the stars or the variation in the size of the sun (midday compared to sunrise and sunset).



When the pencil enters the water, the speed of the light is slowed down but your brain think light travels in straight lines makin things seem shallow then it reall is.

What errors occurred and explain how they affected your results.

Maybe the steadiness of my hand would of helped and also if I had a pencil with a thinner lead, parallax and also how I use the protractor

Conclusion

The aim was to investigate how a light beam reacts when going through a transperent block. My hypothesis was supported. The results suggest that the angle of incidence and refraction were the same going in and out.

Annotations

Applies some knowledge of the wave model of light to partially explain the apparent bending of a pencil in water.

Suggests possible sources of inconsistencies in results.

Written test: Changing Earth

Year 9 Science achievement standard

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Summary of task

Students had completed a unit on plate tectonics and changes to Earth's crust. They had investigated the development of the theory of plate tectonics and the evidence that supports the theory. They had analysed a range of landforms and earthquake and volcanic events to identify the contributing plate movements.

Students were required to complete a unit test following completion of the unit. They had 90 minutes to complete the test in closed book test conditions. The work sample includes a selection of the test items.

Written test: Changing Earth

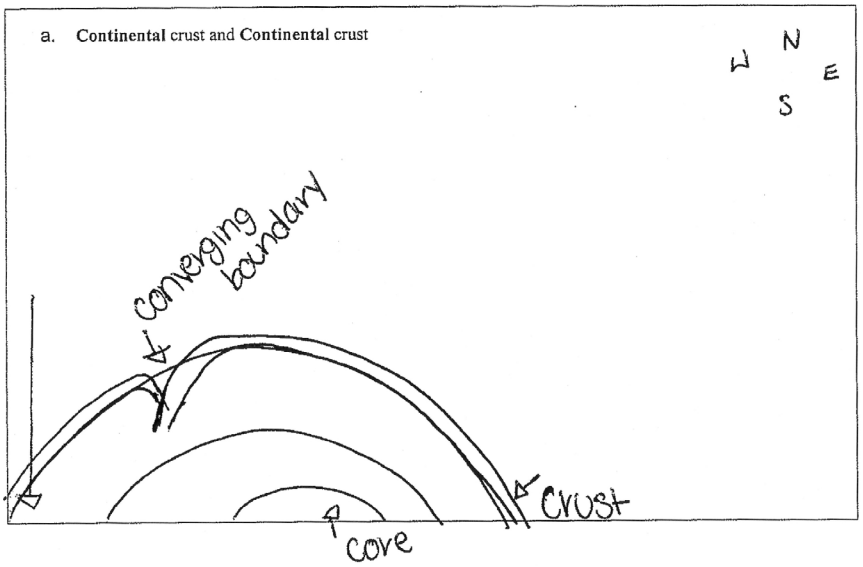
PART 2 – MEDIUM DIFFICULTY QUESTIONS

4. a) In the boxes below **illustrate** a convergent boundary between:

   i) Continental and continental crust. (Box 'A')
   ii) Oceanic and oceanic crust. (Box 'B')

In your illustration, be sure to **identify** the direction that each plate is moving **and** name the landform that each boundary produces.

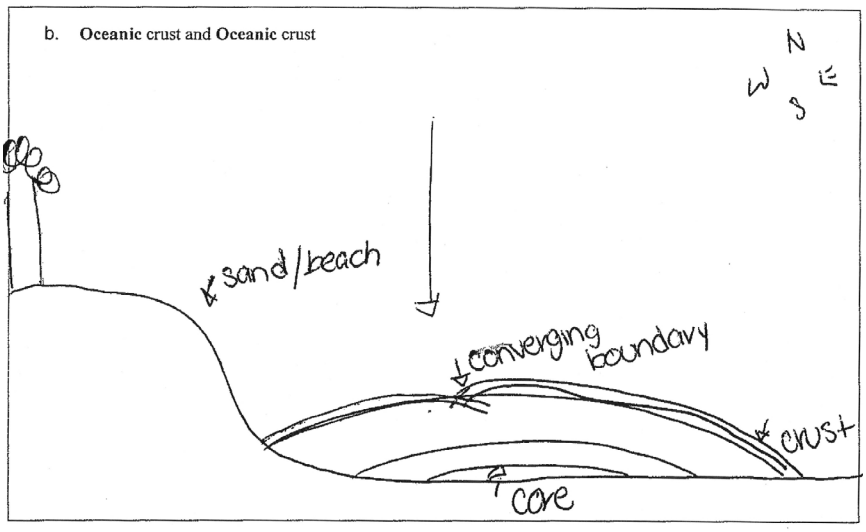
a. **Continental** crust and **Continental** crust



Annotations

Identifies a convergent boundary between two plates.

Written test: Changing Earth



b) **Explain** why a convergent boundary between a continental plate and an oceanic plate always produces a volcanic island and a deep ocean trench.

The convergent boundary always forms between the continental and oceanic plates because the two different plates are not compatable with each other. When they colide, an volcanic island or deep ocean trench forms.

Annotations

Recognises that continental and oceanic plates are distinct from each other.

Science

Year 9

Below satisfactory

Written test: Changing Earth

8. In 1912, a scientist called Alfred Wegener suggested a hypothesis called continental drift. Wegener's continental drift hypothesis states that "*all the continents used to form a single land mass, called Pangea, before breaking apart and 'drifting' into their current positions*". Despite the evidence Wegener had collected, his theory was rejected by the scientific community. However, in light of new evidence the scientific community have revised Wegener's hypothesis and incorporated it into the theory of plate tectonics.

Justify the following statement: "Without modern technology, Wegener's theory of continental drift would never have been accepted by the scientific community". In your justification make sure to:

a) **Identify** one piece of technology that provided new evidence in support of Wegener's theory of continental drift
b) **Explain** one (1) new piece of evidence that has been collected that supports Wegener's theory of continental drift
c) **Explain how** this evidence **supports and extends** Wegener's original theory

Yes, without modern technology such as the weather monoting stations and epicentre tools, he would not have been able to support his theory. If Wegener did not support his theory with the machines and technology that he has, he has no way of proving that he has correct infomation.

Annotations

Identifies that technology plays a role in gathering data to support a theory.

Annotations (Overview)

The student uses language and representations to communicate ideas.

Worksheet: Ecosystems

Year 9 Science achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

> *By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.*
>
> *Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.*

Summary of task

Students had completed a unit on ecosystems, including conducting field work in their local heathland and completing a case study on the Biosphere 2 experiment. They had investigated how matter and energy move through an ecosystem, and the different ways this can be represented.

This task was a revision exercise undertaken at the end of the unit. Students worked individually, with no access to resources, other than the Wetland Food Web diagram. They were given 40 minutes to complete the task. A recommended word count was given for the first question as a guide to the level of depth required by students in their answers.

Worksheet: Ecosystems

1. Explain what the "Wetland Food Web" diagram shows. (50-100 words)

It shows the cycle of food because the arrows show what eats what. It starts with th sun which is a producer. It helps the reeds and water plants to grow and they are eaten by the mosquito, water boatman and freshwater snail. Which are eaten by the turtle, fish and swan. And so on. The pelican, duck, heron and lizard are consumers and the bacteria, yabby and worm are decomposers.

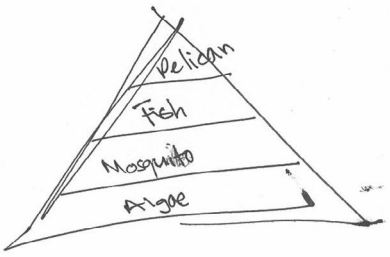
2. A pollution leak into the creek that occurred above this wetland caused the water quality to decrease; all the water boatman died and the mosquitos bred excessively. Predict the possible effects of these changes on the other living things in the wetland.

Some fish would die out and the algae would slow down as well. Some consumers will go hungry too.

3. Explain how oxygen and carbon are cycled in this system.

All of the plants, animals, decomposers take in oxygen and give out carbon.

4. Choose one food chain that contains 3 consumers and draw a biomass pyramid. Briefly explain what the biomass pyramid represents.



Annotations

Describes a food web in terms of feeding relationships.

Describes some effects of pollution on specific populations in a wetland.

Illustrates that a biomass pyramid shows the relative numbers of organisms in a food chain.

Annotations (Overview)

The student uses language and representations to communicate science ideas.

Venn diagram: Control and regulation

Year 9 Science achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

> *By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.*
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> *Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.*

Summary of task

Students had studied the human nervous and endocrine systems, particularly the role of the central nervous system, the peripheral nervous system and hormones. They had not explored any aspects of plant responses to environmental change.

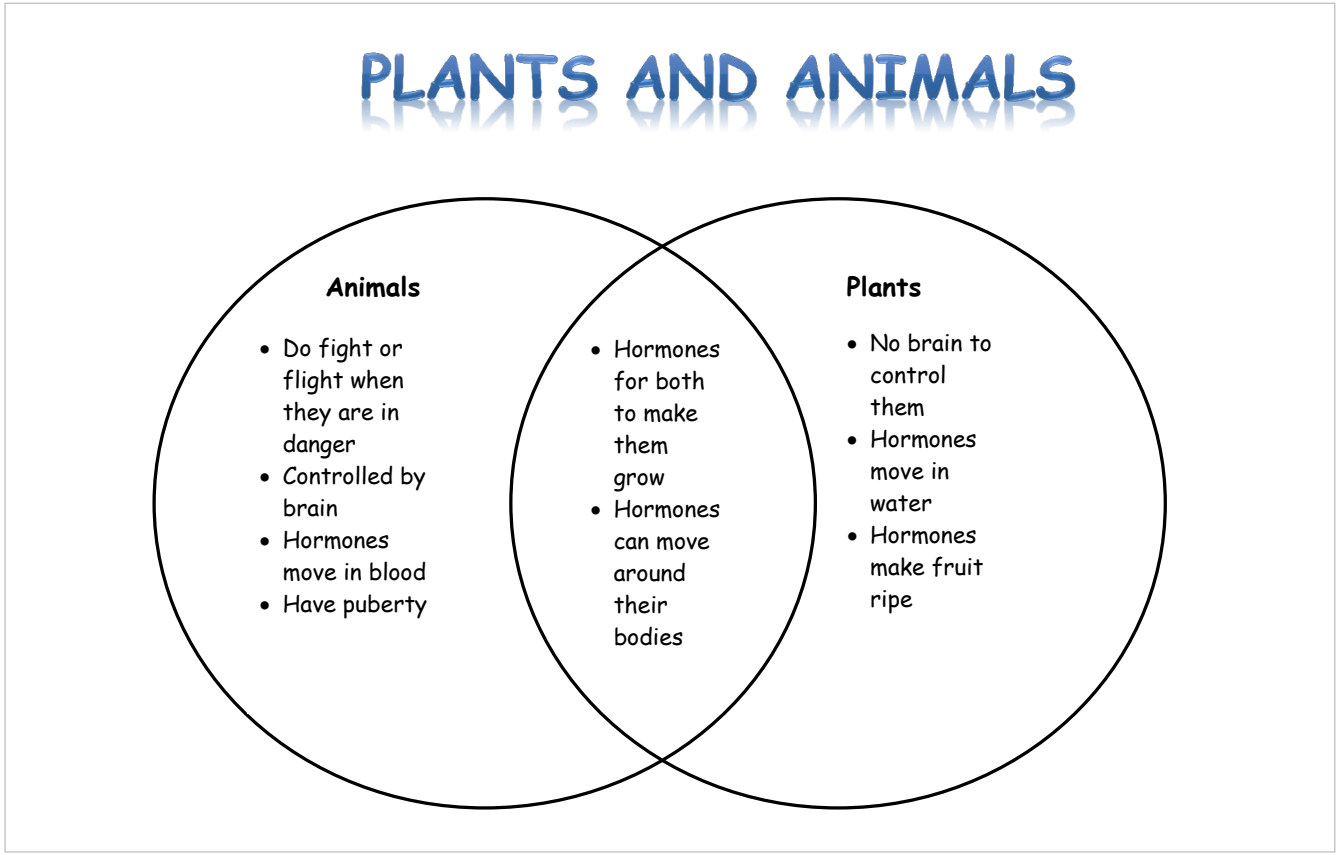
Students were asked to research how plants use hormones to respond to their environment and to construct a Venn diagram to show the similarities and differences between the plant and animal mechanisms for control and regulation of systems. They completed their research in pairs over one class lesson and constructed the Venn diagram summary as a homework task.

Science

Year 9

Below satisfactory

Venn diagram: Control and regulation



Annotations

Identifies similarities and differences in animal and plant mechanisms for control and regulation.

Identifies that both plants and animals rely on hormones for growth and development.

Identifies that control and regulation in animals involves organs (the brain), tissues (blood) and chemicals (hormones).

Annotations (Overview)

The student uses appropriate language and representations to communicate findings and ideas.

Research report: Bionic eye

Year 9 Science achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.

Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

Summary of task

Students had been studying energy transfer in the context of sound, light and electricity. They had considered how the structure of the eye enables light waves to be detected and how eyes work, including how information is passed on to our brains.

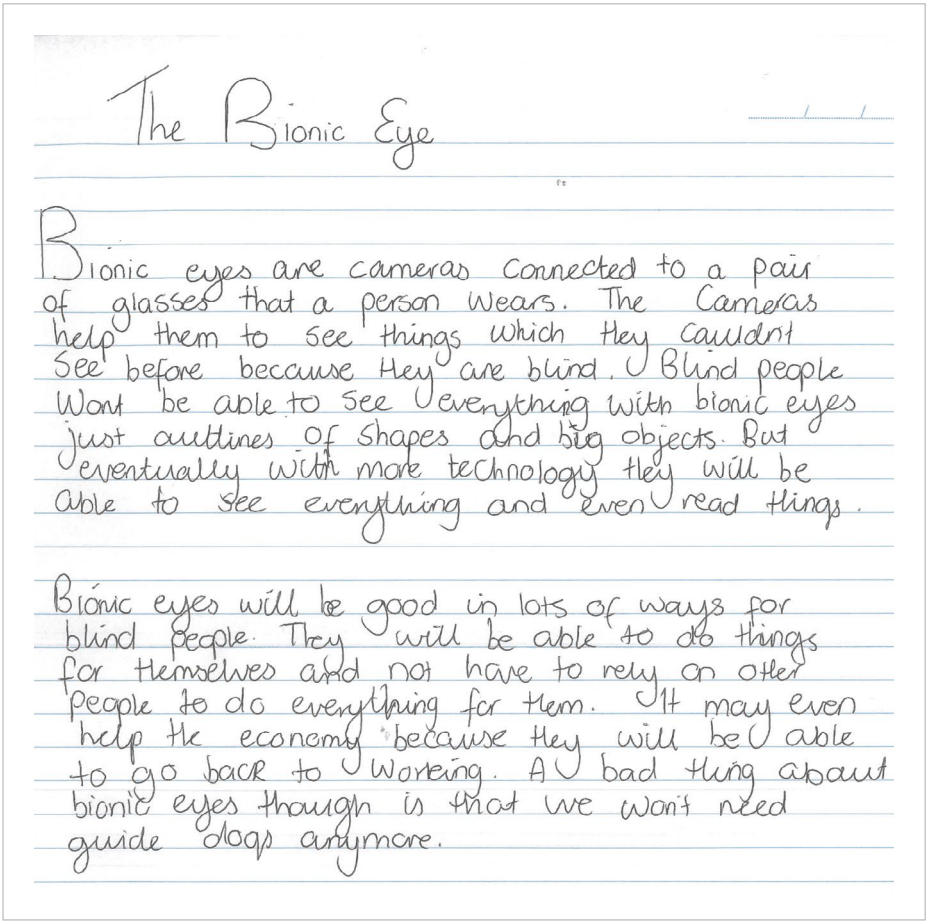
Students were asked to research how bionic eyes have been developed in Australia, provide a brief description of how bionic eyes work, and how they might impact people's lives. They were asked to produce a brief report on their findings. They were provided with one 50-minute lesson to begin their research and were required to complete the task at home.

Science

Year 9

Below satisfactory

Research report: Bionic eye



The Bionic Eye

Bionic eyes are cameras connected to a pair of glasses that a person wears. The Cameras help them to see things which they couldn't See before because they are blind. Blind people Wont be able to see everything with bionic eyes just outlines of shapes and big objects. But eventually with more technology they will be able to see everything and even read things.

Bionic eyes will be good in lots of ways for blind people. They will be able to do things for themselves and not have to rely on other people to do everything for them. It may even help the economy because they will be able to go back to Working. A bad thing about bionic eyes though is that we won't need guide dogs anymore.

Annotations

Identifies an aspect of the function of the bionic eye technology.

Describes how the bionic eye may improve people's vision.

Identifies how people may benefit from the development of the bionic eye.

Annotations (Overview)

The student uses appropriate language and representations to communicate science ideas.