Science

Year 7
Above 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 7 SCIENCE

This portfolio provides the following student work samples:

Sample 1 Investigation report: Separating mixtures
Sample 2 Investigation report: Water purification
Sample 3 Presentation: Should we recycle water for drinking?
Sample 4 Video analysis: Forces in sport
Sample 5 Poster: Super suits
Sample 6 Report: The Earth–sun–moon system
Sample 7 Worksheet: Classification
Sample 8 Written test: Living together
Sample 9 Investigation poster: Parachute design

In this portfolio, the student describes a range of techniques to separate a pure substance from a mixture (WS1, WS2) and applies knowledge of the effects of unbalanced forces on motion through sports science and parachute design investigations (WS4, WS5, WS9). The student explores the cycling of water through Earth systems and explains how sustainable use of water is related to understanding of the water cycle (WS2).

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The student explains how the relative positions of the Earth, sun and moon are related to seasons on Earth (WS6). The student demonstrates understanding of the effect of environmental changes on feeding relationships (WS8) and uses classification to group and differentiate organisms (WS7). The student describes how scientific knowledge has been used to address the problems of water conservation (WS2) and athlete performance (WS5) and indicates how the solution might impact various groups in society differently (WS5).

The student poses a question that can be investigated scientifically (WS9) and identifies variables to be changed and measured (WS1, WS9). The student selects equipment to improve measurement accuracy (WS9) and describes improvements to investigation methods that could improve the quality of the data collected (WS1, WS2). The student identifies trends in data (WS1, WS9), summarises data from different sources (WS3, WS9) and uses evidence to support investigation conclusions (WS1, WS2, WS3, WS9). The student communicates ideas, methods and findings using scientific language and a range of appropriate representations (WS1, WS2, WS3, WS4, WS5, WS6, WS7, WS8, WS9).

Investigation report: Separating mixtures

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
>
> *Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations.*

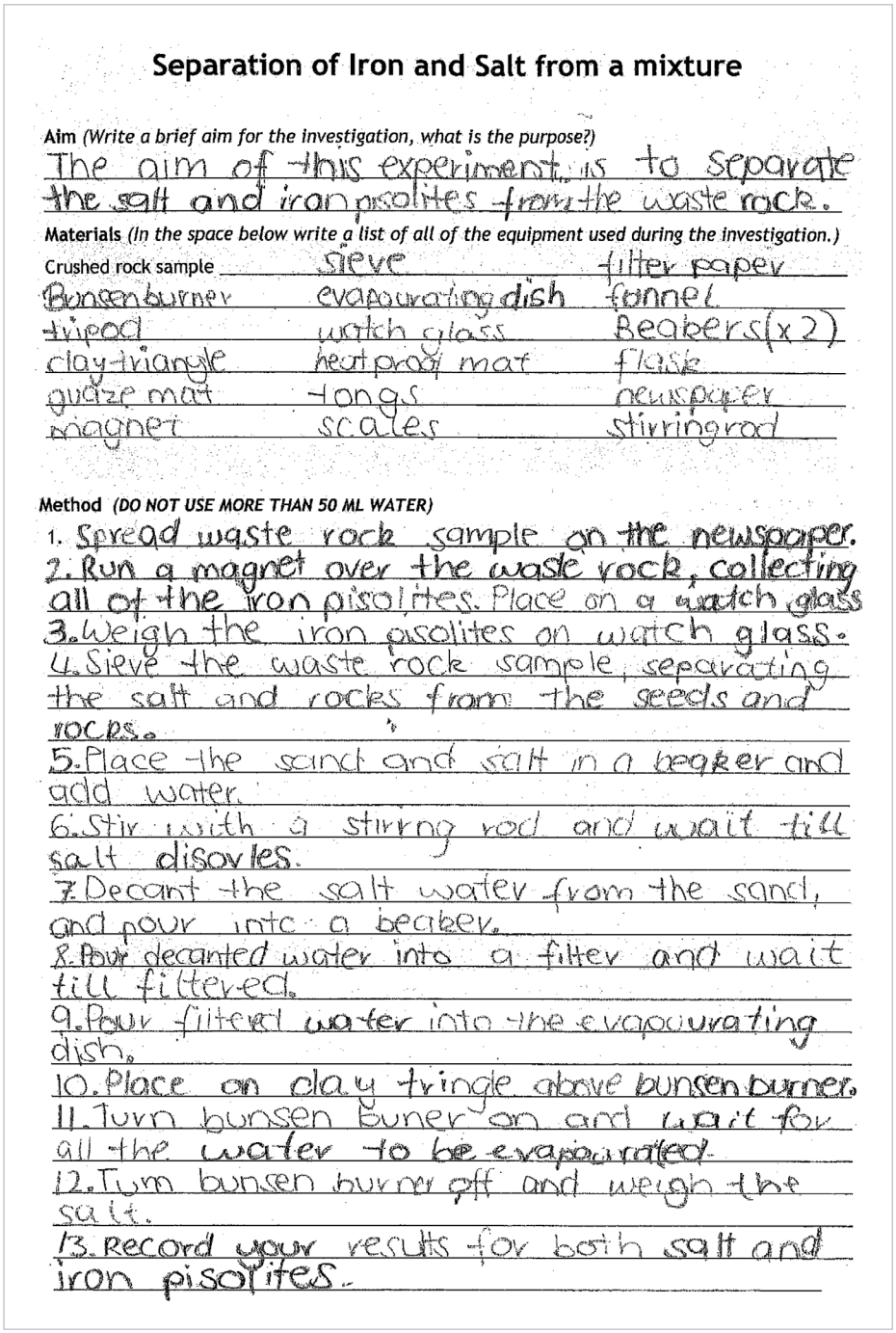
Summary of task

Students had been learning about various techniques that can be used to separate a mixture. They had completed a series of guided practical tasks where each technique was practised and applied to a common mixture. Students had also demonstrated safe working practices in the laboratory and had obtained their 'Bunsen burner licence'.

In this investigation, students were required to separate pistolite (iron ore) and salt from a mixture that also contained sand, birdseed and gravel. Three 100-minute lessons were provided to plan, undertake and complete a report on the investigation. A scaffolded worksheet was provided and students were encouraged to review their previous practical and theory work on the topic.

Students were advised that Bunsen burners present fire hazards. They were required to tie back their hair, ensure the bench space was clear of other materials and ensure they did not leave the open flame unattended. They were reminded that the equipment would be hot and could cause burns if not handled using appropriate techniques.

Investigation report: Separating mixtures



Separation of Iron and Salt from a mixture

Aim *(Write a brief aim for the investigation, what is the purpose?)*

The aim of this experiment is to separate the salt and iron pisolites from the waste rock.

Materials *(In the space below write a list of all of the equipment used during the investigation.)*

Crushed rock sample	sieve	filter paper
Bunsen burner	evapourating dish	funnel
tripod	watch glass	Beakers (x2)
clay triangle	heat proof mat	flask
guaze mat	tongs	newspaper
magnet	scales	stirring rod

Method *(DO NOT USE MORE THAN 50 ML WATER)*

1. Spread waste rock sample on the newspaper.
2. Run a magnet over the waste rock, collecting all of the iron pisolites. Place on a watch glass
3. Weigh the iron pisolites on watch glass.
4. Sieve the waste rock sample, separating the salt and rocks from the seeds and rocks.
5. Place the sand and salt in a beaker and add water.
6. Stir with a stirring rod and wait till salt disovles.
7. Decant the salt water from the sand, and pour into a beaker.
8. Pour decanted water into a filter and wait till filtered.
9. Pour filtered water into the evapourating dish.
10. Place on clay tringle above bunsen burner.
11. Turn bunsen buner on and wait for all the water to be evapourated.
12. Turn bunsen burner off and weigh the salt.
13. Record your results for both salt and iron pisolites.

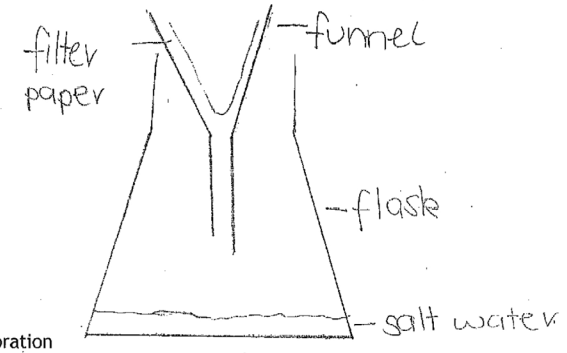
Annotations

Describes a method to separate iron and salt from a mixture.

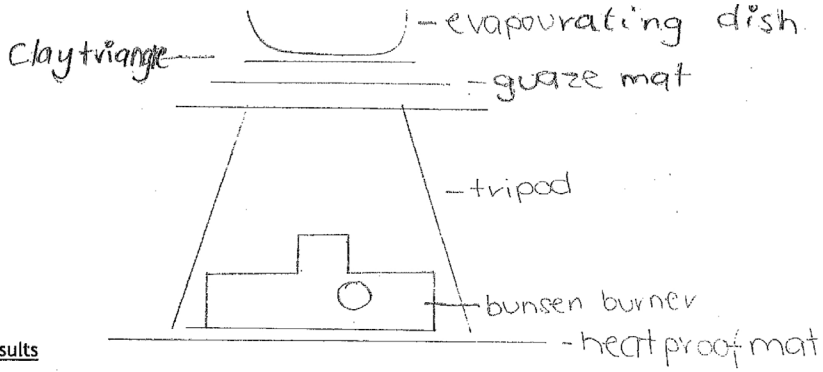
Investigation report: Separating mixtures

Diagrams of 2 of the procedures *(Make sure diagrams are drawn correctly in pencil and labelled.)*

1. Filtration



2. Evaporation



Results

1. **Iron ore recovery**

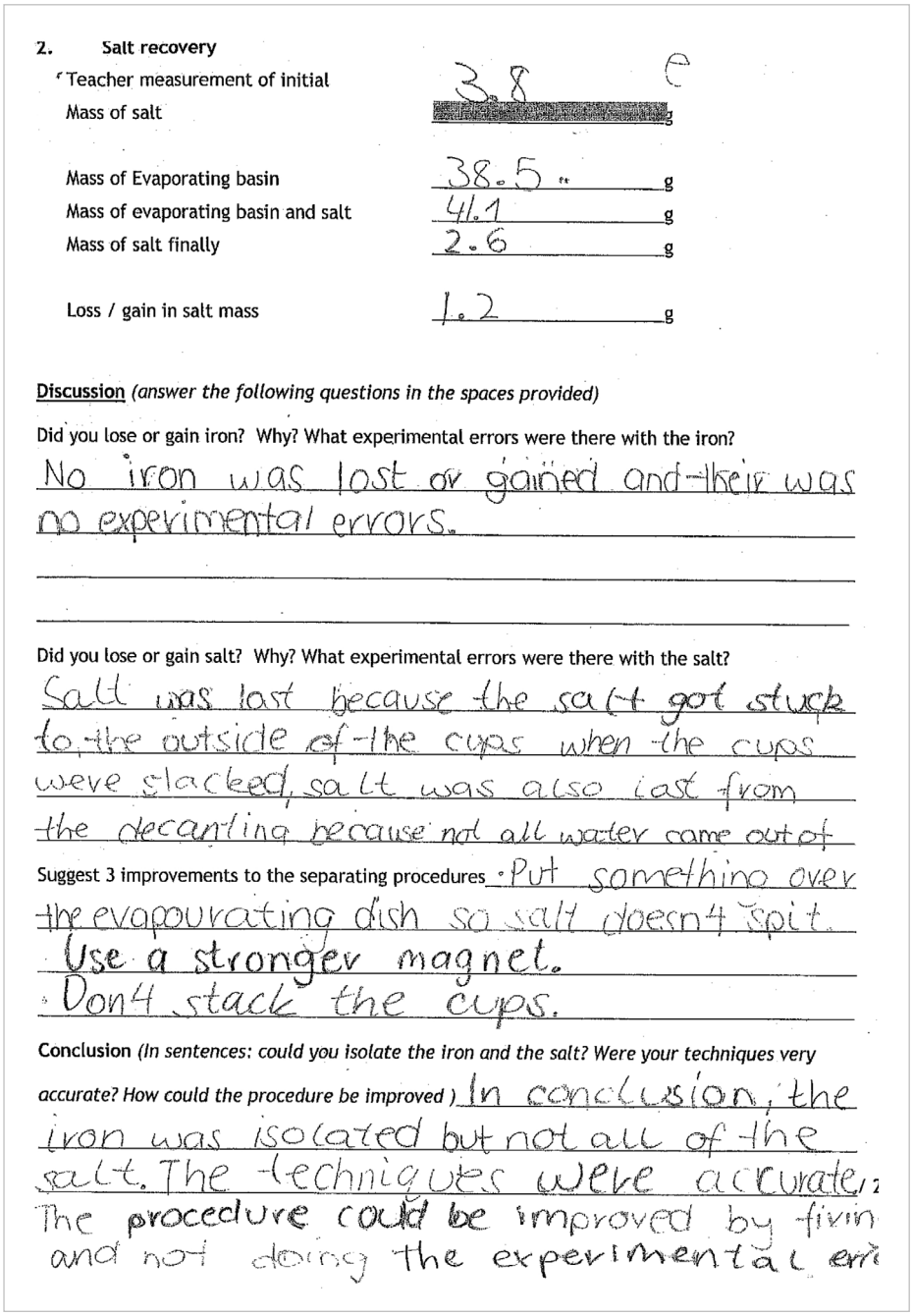
Teacher measurement of initial Mass of iron pisolites	6.2 g
Mass of Watch glass	33 g
Mass of Watch glass and iron pisolites	39.2 g
Mass of iron pisolites finally	6.2 g
Loss / gain in iron pisolites mass	0 g

Annotations

Uses scientific diagrams to represent separation techniques.

Records data collected and compares recovered quantities to original quantities.

Investigation report: Separating mixtures



2. Salt recovery

Teacher measurement of initial Mass of salt: 3.8 g

Mass of Evaporating basin: 38.5 g

Mass of evaporating basin and salt: 41.1 g

Mass of salt finally: 2.6 g

Loss / gain in salt mass: 1.2 g

Discussion *(answer the following questions in the spaces provided)*

Did you lose or gain iron? Why? What experimental errors were there with the iron?

No iron was lost or gained and their was no experimental errors.

Did you lose or gain salt? Why? What experimental errors were there with the salt?

Salt was lost because the salt got stuck to the outside of the cups when the cups were stacked, salt was also lost from the decanting because not all water came out of

Suggest 3 improvements to the separating procedures • Put something over the evapourating dish so salt doesn't spit.
• Use a stronger magnet.
• Don't stack the cups.

Conclusion *(In sentences: could you isolate the iron and the salt? Were your techniques very accurate? How could the procedure be improved)* In conclusion, the iron was isolated but not all of the salt. The techniques were accurate. The procedure could be improved by fivin and not doing the experimental err

Annotations

Describes likely sources of error in procedures based on discrepancies in data.

Suggests improvements to procedures that could minimise identified errors.

Annotations (Overview)

The student uses scientific language and diagrams to communicate methods and findings.

Investigation report: Water purification

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
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Summary of task

Students were investigating the ways in which different substances could be separated from a range of mixtures. They had undertaken guided practical tasks using filtration apparatus and were familiar with basic measuring equipment. Students were also aware of the requirements for carrying out fair tests and the need to control variables.

In this task, students worked in groups of three to design and conduct an investigation comparing how well household materials filter polluted water. Each group was given 150 mL of polluted water. Students were required to supply their own filtering materials and other household equipment. Three 50-minute lessons were allocated to complete the scaffolded planning worksheet, three lessons to undertake the experiment and two lessons for the final scientific report.

Students were warned not to ingest the polluted water.

Investigation report: Water purification

Investigation Planner **Name:** _____

Title of investigation: Water Purification

Aim:

The aim of the investigation is to determine.... ~~the effectiveness of~~

The aim of this investigation is to compare the effectiveness of different materials as filters for polluted water. The materials that we will test are a tea towel, kitchen chux, sponge

Hypothesis:

It is expected that.... the sponge will be the most effective material for filtering polluted water. This is because the sponge material will be able to trap the dirt from the polluted water.

(Include a reason why you believe this will be the case)

Variables:

List all the variables *(factors that can alter the result of the experiment)*

- Amount of water
- Size of filtering material
- Pollution of water
- Temperature of the water
- How fast the water is poured
- Type of filtering material

Name the independent variable. *(This is the factor which you will experiment with.)*

Type of filtering material

Name the dependent variable: *(This is the variable which will be affected which you will assess.)*

Appearance of the water after filtering (this is called the filtrate).

The amount of solid collected by the filtering material.

Annotations

Identifies independent and dependent variables.

Investigation report: Water purification

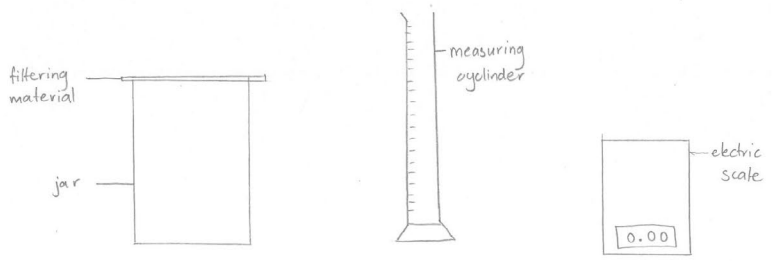
List the variables that will be kept the same. These are factors which you will control.

Controlled variable	How you will ensure it remains constant for all situations.
1. Amount of water	Use a measuring cylinder to measure equal volumes of water for each test.
2. Size of filtering material (and thickness)	Use jars of the same size so that the area that the water can pass through is the same. Fold the materials to make them the same thickness.
3. Pollution of water	Take the water from the same place.
4. Temperature of water	Do the experiments on the same day.
5. How fast the water is poured	Pour the water in the same way for each test and at the same speed.

Materials: List all the equipment you need.

- Polluted water
- 3 jars (make sure they are the same size)
- Measuring cylinder
- Tea towel
- Kitchen chux
- Coffee filter paper
- Sponge
- Scissors
- Electric scale
- Rubber bands

Draw a diagram of how you will use the equipment.



Annotations

Provides a thorough list of variables to be controlled and describes detailed strategies to control them.

Constructs a scientific diagram to represent equipment set-up.

Investigation report: Water purification

Introduction

Water purification is when sediments and substances that make it polluted are removed from the water. This makes the water safe to drink. Filtering water is one of the steps that is used to purify water but it's not the only step because there are still bacteria in the water after filtering. Filtering is useful for removing solids from the water like sand and other sediments. Boiling the water could be another step to make it pure because this would kill the bacteria. Knowing how to make purified water at home could be important in case there was a natural disaster that caused the water supply to be cut. This experiment will see what is the best material to use for filtering polluted water.

Aim: The aim of this investigation is to compare the effectiveness of different materials as filters for polluted water. The materials that we will test are a tea towel, kitchen chux and a sponge.

Hypothesis: It is expected that the sponge will be the most effective material for filtering polluted water. This is because the sponge material will be able to trap the dirt from the polluted water.

Method

1. The materials and equipment were collected.
2. The tea towel and chux were folded to make them the same thickness as the sponge.
3. The weight of each piece of filtering material was measured with the electric scale.
4. The filtering materials were cut to a size that fitted over the jar with extra material hanging over the edge.
5. A rubber band was used to attach the materials to the tops of the jars.
6. 50 ml of the polluted water was measured with a measuring cylinder.
7. The polluted water was slowly poured over the tea towel on the first jar.
8. Another 50 ml of polluted water was measured with a measuring cylinder.
9. The polluted water was slowly poured over the chux on the second jar.
10. The last 50 ml of polluted water was measured with a measuring cylinder.
11. The polluted water was poured over the sponge on the third jar.
12. The appearance of the filtrates in the three jars was recorded in the results table.
13. The jars were left over night to let the filtering materials and sediment dry.
14. The filtering material was taken off the jars and weighed with the electric scale.
15. The weights were recorded in the results table.

Annotations

States a clear aim for the investigation.

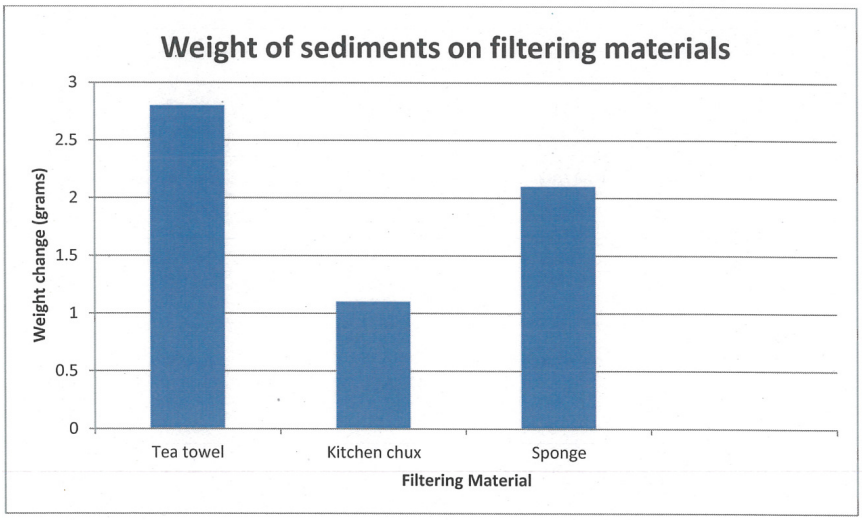
Constructs a hypothesis and justifies reasoning.

Describes an appropriate and detailed method for the investigation including references to controlled variables.

Investigation report: Water purification

Observations and Results

Filtering material	Weight before (grams)	Weight after (grams)	Weight change (grams)	Appearance of filtrate
Tea towel	22.1g	24.9g	2.8g	Clear mostly Slight orangey colour No sediment
Kitchen chux	15.7g	16.8g	1.1g	More orangey colour Little bit of sediment
Sponge	18.5g	20.6g	2.1g	Clear mostly Medium orangey colour Very tiny bits of sediment



Annotations

Constructs an appropriate table to record quantitative and qualitative data.

Uses a bar graph to represent summarised quantitative data.

Investigation report: Water purification

Discussion and Analysis

The results give us information that we can use to work out which is the best filtering material for polluted water. The two pieces of information are the appearance of the filtrate and the weight of the sediment collected on the filtering material. From this information you can see that the tea towel was the most effective material for filtering since it collected the most sediment and also had the clearest filtrate. This wasn't what we were expecting since our hypothesis said that the sponge would be the best at trapping the dirt but it was still pretty good. The reason that the tea towel was the best must have been because it was folded over which meant that there were more layers to trap sediment and so it became a better filter than the sponge.

Even though we tried to make it a fair test and control all of the variables some things went wrong. We couldn't get the thickness of all three of the materials to be exactly the same and maybe it wasn't fair to have layers of tea towel and kitchen chux when the sponge was only one layer. Also some of the sediment stayed in the measuring cylinder and since different amounts stayed in for each test we can't say that it was fair each time. Next time we could use some extra clean water to rinse out the measuring cylinder and as long as the same amount of water was used for each test then it would be fair.

Conclusion

Out results show that the tea towel was the most effective filtering material for polluted water. This contradicts our hypothesis which said that the sponge would be the best.

Annotations

Analyses the results and summarises investigation findings.

Considers sources of error in the method design and suggests ways to overcome the problems encountered during the investigation.

Annotations (Overview)

The student uses scientific language and representations to communicate methods and findings of an investigation.

Presentation: Should we recycle water for drinking?

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
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Summary of task

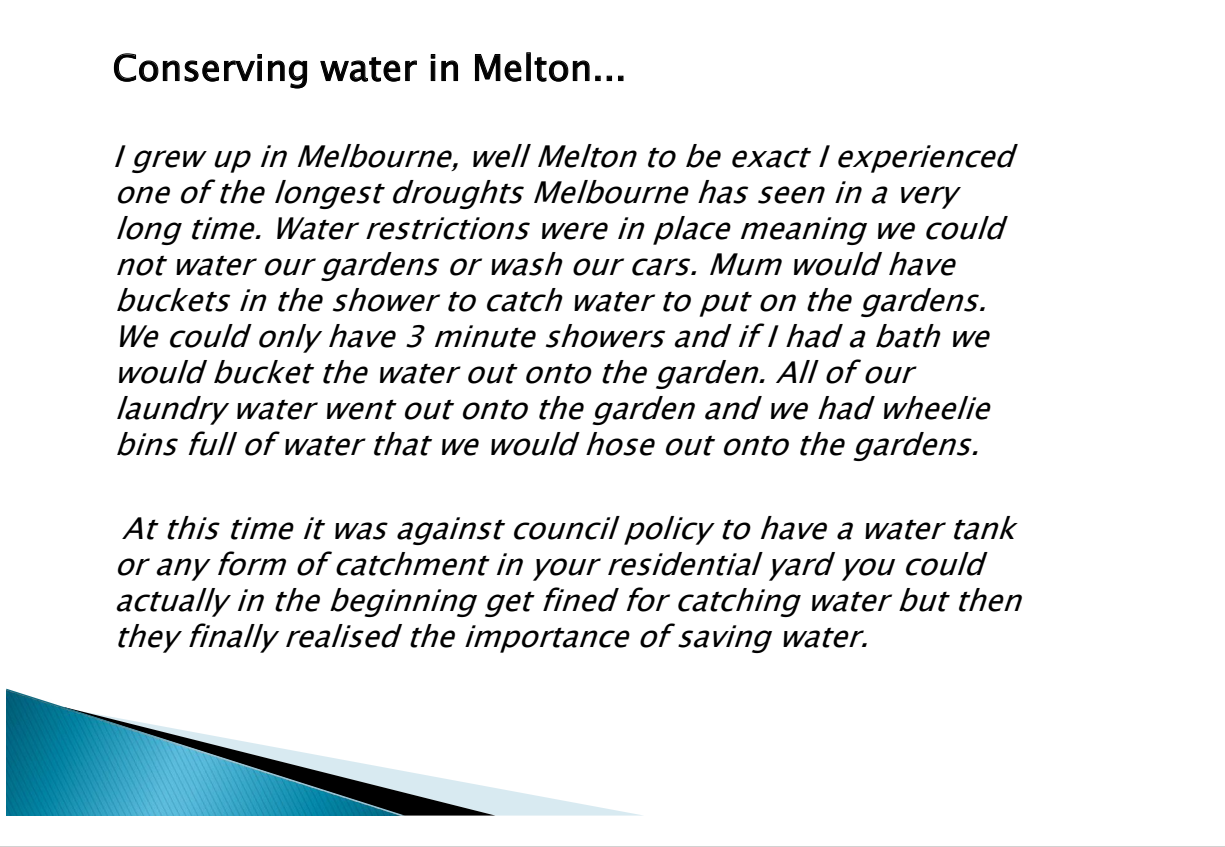
This task was undertaken at the end of a unit of work on water as an important resource. Throughout the unit, students performed various experiments and tests on water samples. They investigated the water cycle from Indigenous perspectives and analysed water use throughout the world. They also researched media reports on the issue of recycling water.

The question posed to students was, 'Should waste water be recycled and used for drinking?' Students were given approximately two weeks to complete the task, including four lessons to carry out their research. Students were asked to present their findings using a visual aid of their choice.

Presentation: Should we recycle water for drinking?

Annotations

Presentation: Should we recycle water for drinking?



Annotations

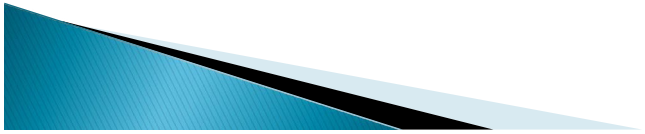
Uses links to personal experience to demonstrate an understanding of the need for sustainable use of water.

Presentation: Should we recycle water for drinking?

Our catchment dam Melton reservoir was so low that large amounts of chlorine and softeners were being used just so we could have drinking water. It really smelled when we had a shower! Mum and dad put a new filtering tap in which had a filter that cleaned the water so we could drink it without boiling it.

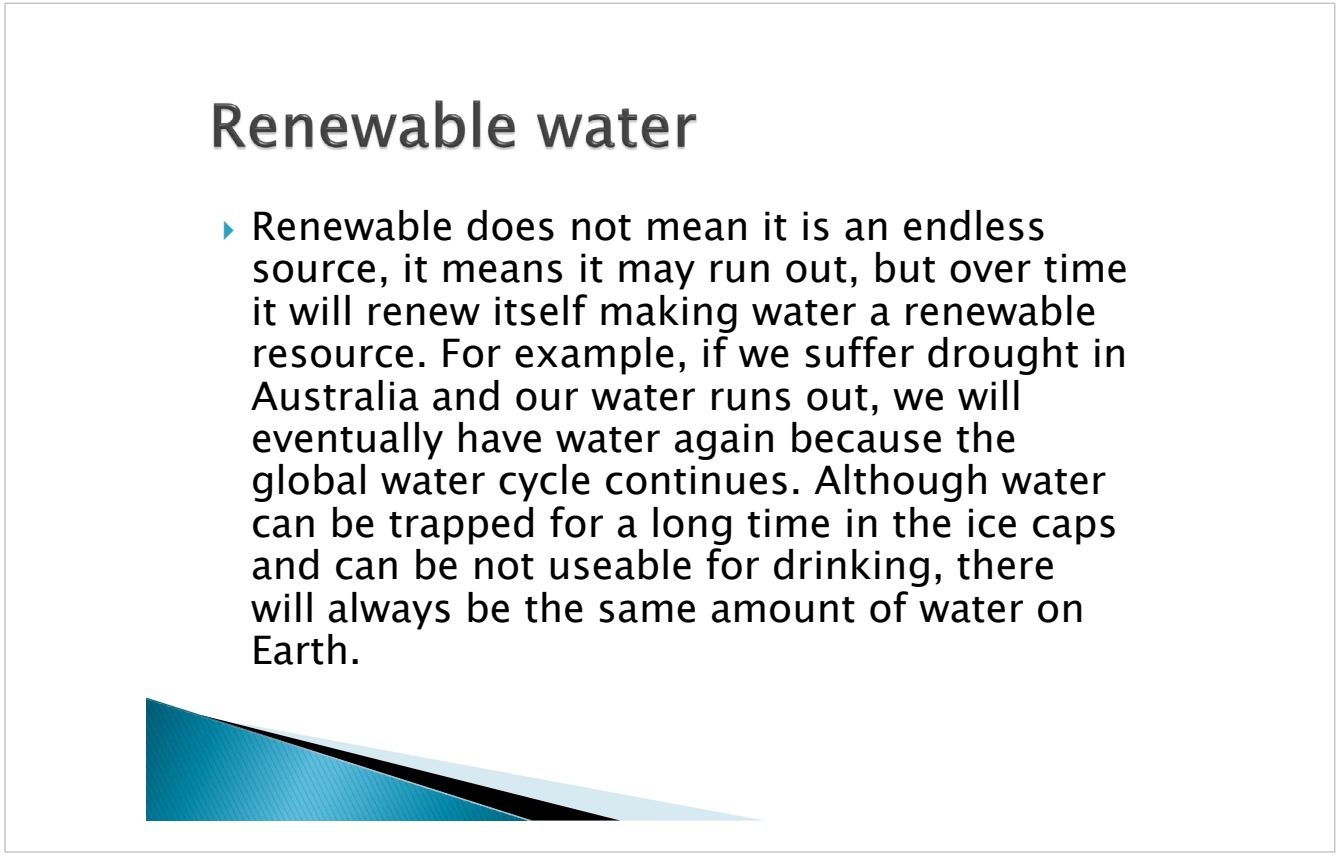
I understand the need for water conservation because water is precious and we all really need it.

I will leave you with one final note; my grandad runs a 40-acre farm in Toolern Vale and he has two water tanks one for drinking, the other just to hold water. He has access to town water but chooses not to use it so when we are on the farm we are using his water tanks and we understand the value of water and what it means to the farm.



Annotations

Presentation: Should we recycle water for drinking?

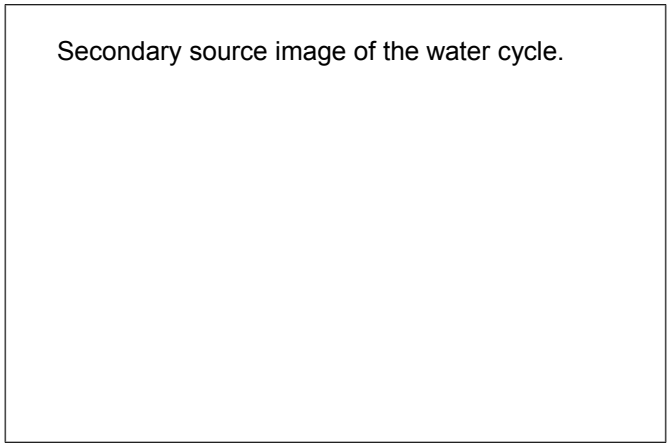


Annotations

Describes water as a renewable resource and identifies that renewable resources may be depleted in the short term but replaced in the longer term.

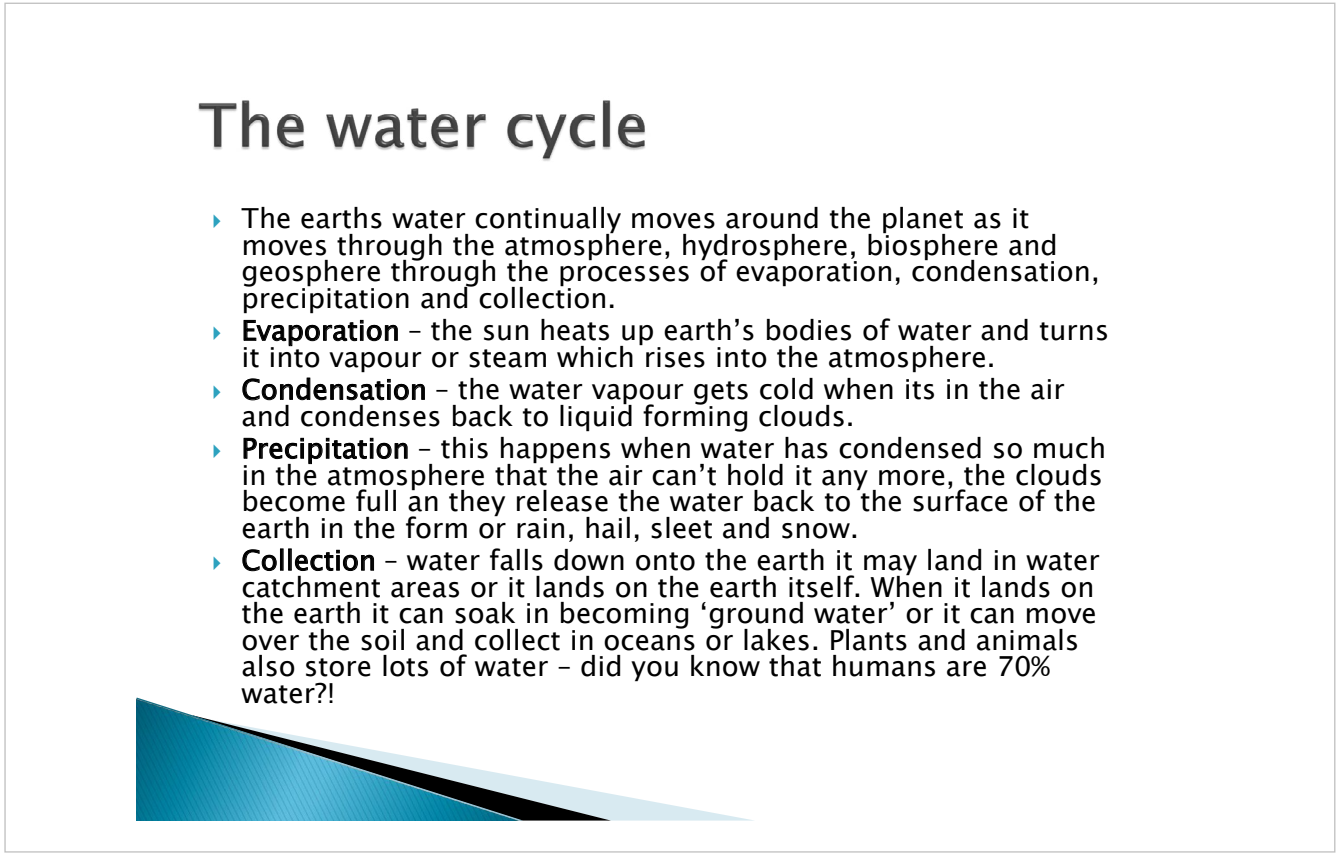
Presentation: Should we recycle water for drinking?

The water cycle



Annotations

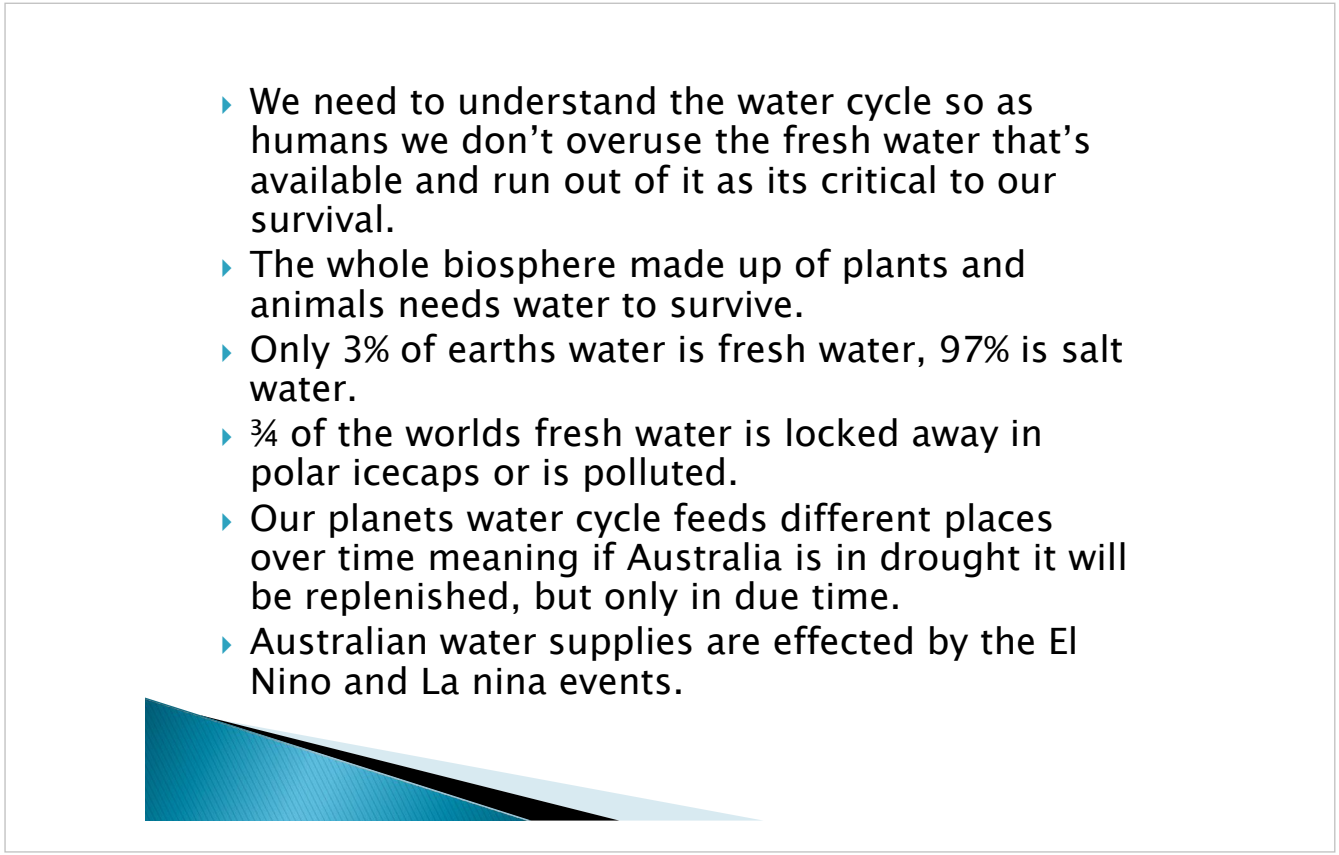
Presentation: Should we recycle water for drinking?



Annotations

Provides a description of the water cycle that indicates movement of water between Earth systems.

Presentation: Should we recycle water for drinking?



Annotations

Identifies that the global water cycle is affected by climatic events and that rainfall varies locally in consequence.

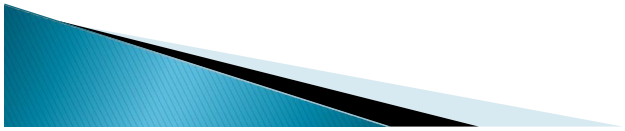
Presentation: Should we recycle water for drinking?

- Australia is currently entering into an El nino period meaning the ocean temperatures across the pacific and Indian oceans have changed. The West coast of Indonesia has colder water temperatures but the East Coast of Africa has warmer ocean temperatures. This reduces evaporation and moisture throughout the tropical oceans which is normally carried into the Australian atmosphere, this reduction will lead to less rain falling in Australia for a period of 12 months to 2 years.
- La nina occurs in tropical oceans not as often as el nino, cooler than average water temperatures occur meaning less or no rain falling in regions causing drought. The wind blows strongly moving sun warmed surface water further west and increasing cold water in the eastern regions, this has an impact on the southern osciallation and brings drought to south America and heavy rain to Australia and Indonesia.

Annotations

Presentation: Should we recycle water for drinking?

- All Australians living in all areas of Australia should not take water for granted, Darwin has the smallest population in Australia but uses the most water per head than anyone!
- With our population growing we will soon experience the affects of El nino and the added pressure of human water use on the Darwin River dam, this will be a very alarming situation for Darwin.



Annotations

Presentation: Should we recycle water for drinking?

Darwin River Dam

- Darwin River Dam is Darwin's main water source and refills in the wet season.
- The dam is broad but shallow, with 265,000 megalitres of water covering 41 square kilometres with an average depth of 8 metres
- Climate change and the demand for water will see an increase in demand which will see more taken from the dam each year.

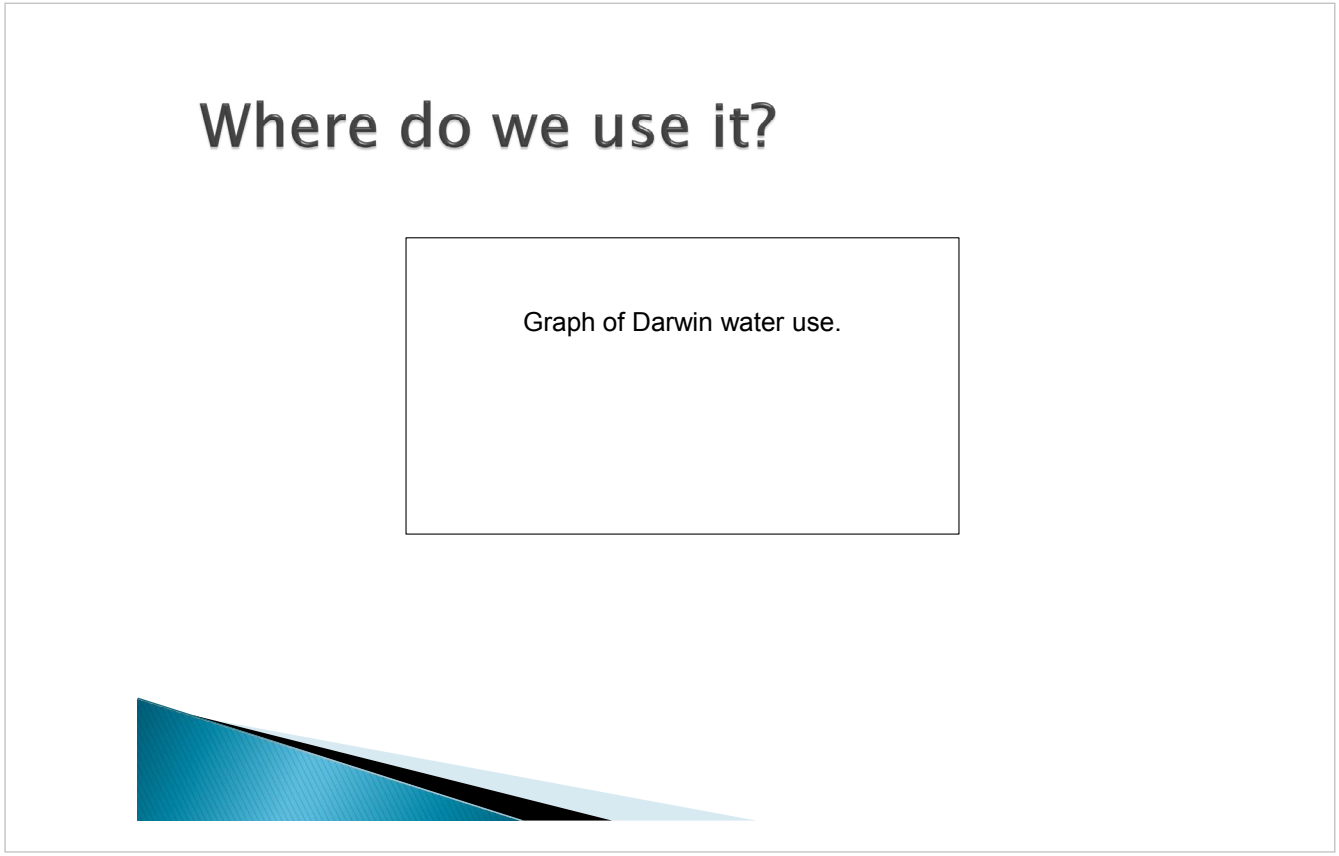
- **THE PEOPLE OF DARWIN USE TWICE AS MUCH WATER PER HEAD AS PEOPLE IN OTHER CAPITAL CITIES. SO MUCH, IN FACT, THAT WE ARE REACHING THE LIMITS OF CURRENT CAPACITY.**

Graph of Darwin River Dam Water Level and Rainfall

Annotations

Analyses the sustainability of Darwin's water supply by considering storage, patterns of use, recycling and possible effects of climate change.

Presentation: Should we recycle water for drinking?



Annotations

Presentation: Should we recycle water for drinking?

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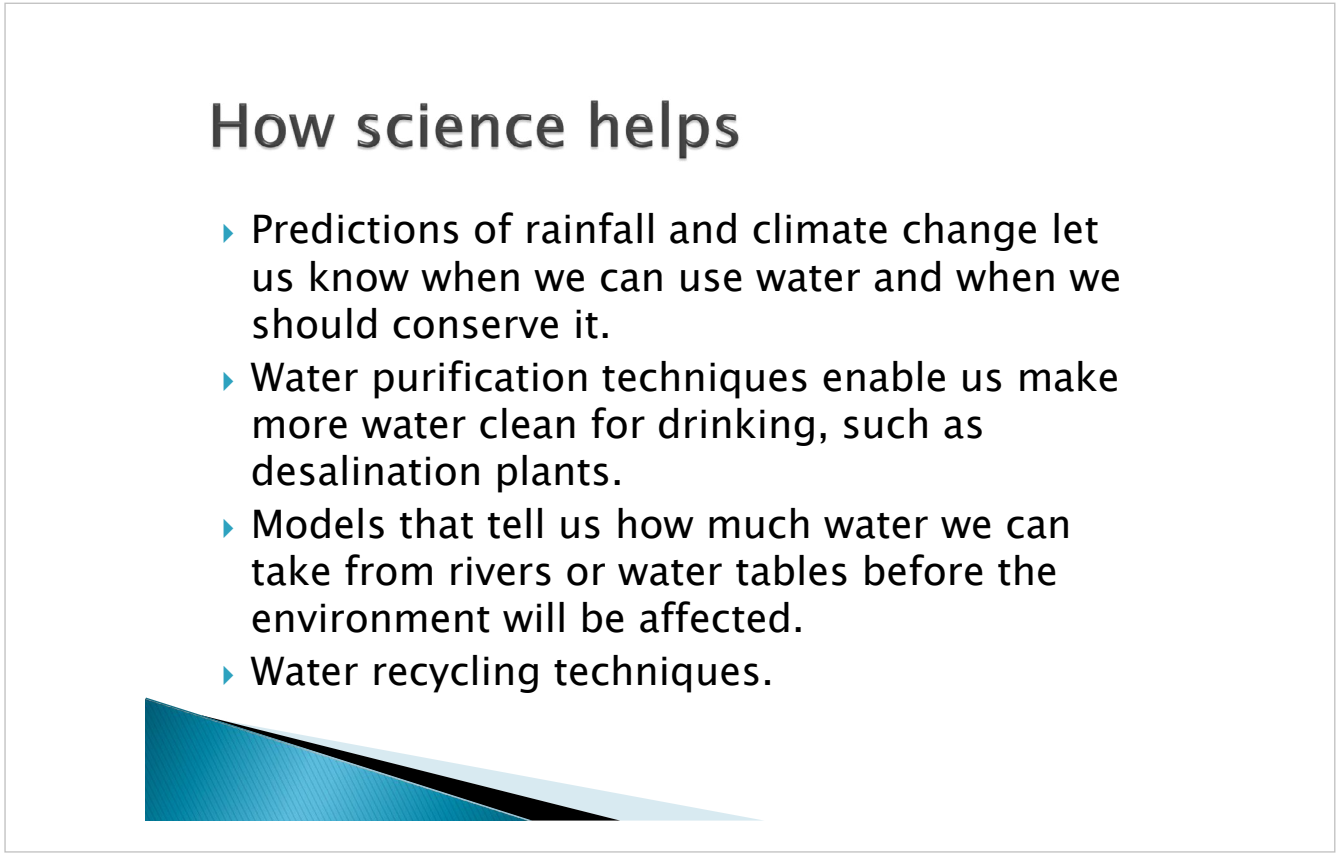


Annotations

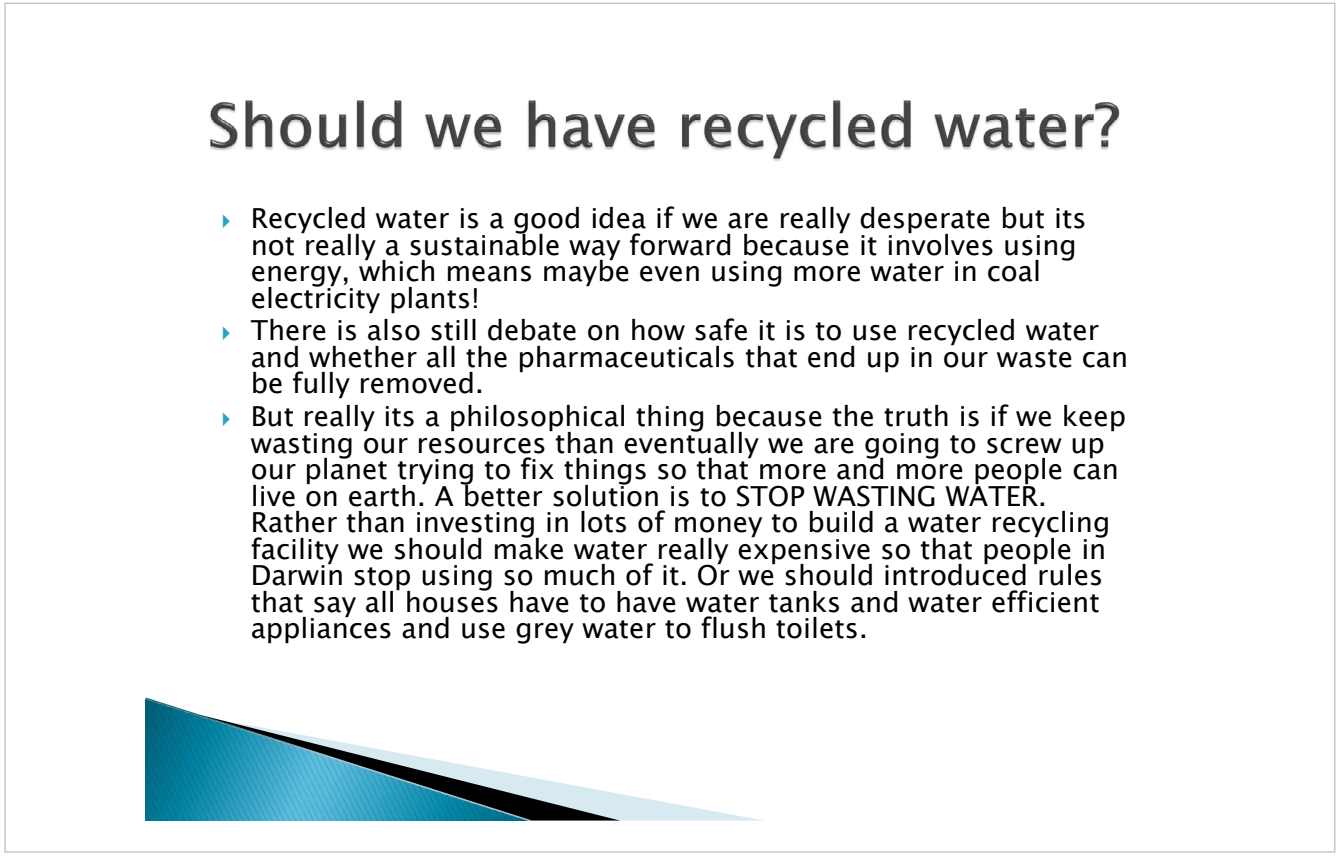
Identifies a range of contributions of science and scientists to water conservation.

Science

Year 7

Above satisfactory

Presentation: Should we recycle water for drinking?



Annotations

Evaluates the value of recycling drinking water with reference to the impacts on the environment and society.

Annotations (Overview)

The student constructs evidence-based arguments based on data from a range of sources and uses scientific language and appropriate representations to communicate ideas and research findings.

Video analysis: Forces in sport

Year 7 Science achievement standard

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Summary of task

Students were part way through a unit investigating forces. They had explored the effect of pushes and pulls, gravity and friction on the motion of objects. They had discussed the concepts of balanced and unbalanced forces, and how these could be inferred by analysing the motion of objects.

In this task, students were asked to take on the role of a sports scientist and make observations about an athlete's performance in pole vaulting. After watching a short video clip of an athlete competing in this event, students considered the forces involved and their effects on the athlete's motion and the pole. They used force arrows to show the direction and relative size of the forces and were asked to make predictions based on scenarios in which the forces were changed. Students also considered how the athlete's performance could be improved in light of their understanding of the forces involved.

Video analysis: Forces in sport

Simple Machines and Sport

In an effort to improve performance at the next Olympics, the Australian Institute of Sport has decided to recruit you as a trainee **Sport Scientist** because of your knowledge of simple machines and levers. A Sport Scientist (also known as a **Biomechanist**) makes observations and interprets data in relation to sporting performance and provides advice to coaches about how to help their athletes improve. Watch the following clip to learn more about biomechanics:

http://www.ausport.gov.au/participating/coaches/videos/intermediate/basic_biomechanics

The sport you have been chosen to assist with is **Pole Vault**. This is a track and field event where the athlete uses a long, flexible pole (usually made of fibreglass or carbon fibre) to help them leap over a bar. Ancient Greeks, Cretans and Celts competed in pole vaulting events. It has been an Olympic sport for men since 1896 and women since 2000.
Source: http://en.wikipedia.org/wiki/Pole_vault

http://olympics.time.com/2012/06/27/how-they-train-pole-vaulting-with-joel-stein/

Watch the following clip of Steve Hooker, an Australian Olympic athlete, competing to qualify for the London Olympics and then answer the questions below.

http://www.youtube.com/watch?v=eYoEWZqFjNM&NR=1&feature=endscreen

1. Thinking about the athlete and his complete journey, list as many forces as you can that are involved in pole vaulting and explain briefly the effect of each force on the athlete or the pole.

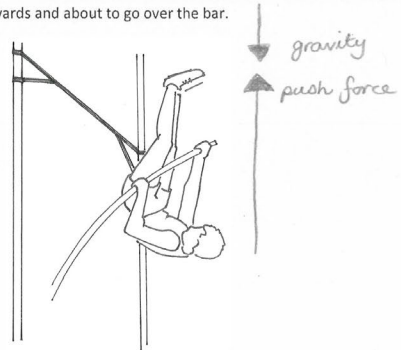
Push force - the athlete pushes the pole into the ground and then pushes his body off the pole and over the bar.

Friction - friction between the pole and the ground holds the pole in its place and friction between the pole and the persons hands let him hold onto the pole.

Gravity - gravity acts in the opposite direction of the pole vauter as he moves upwards and pulls him back down when he gets over the bar.

Air resistance - air resistance acts in the opposite direction to how the pole vaulter is moving through the air and on his way up.

2. On the diagram below draw an arrow to show the direction and relative size of each of the forces acting on the athlete. The athlete is travelling upwards and about to go over the bar.



Annotations

Provides a detailed description of the forces acting on a pole vaulter, including identifying air resistance.

Uses arrows to represent the relative size of the opposing forces acting on a pole vaulter.

Video analysis: Forces in sport

3. Using the diagram above, predict what would happen to the athlete if:
   a) the force of gravity was larger than the pushing force of the athlete?

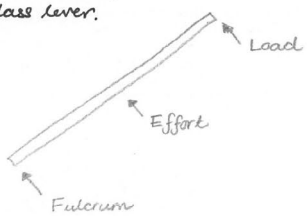
If the force of gravity was larger than the pushing force it would pull the pole vaulter to the ground.

   b) the opposing forces are balanced?

If the forces were balanced the pole vaulter would keep moving in the same direction at a constant speed.

4. Draw a diagram that shows how the pole is being used as a lever. Identify the fulcrum, load and effort and label these on your diagram.

The pole in pole vaulting is a third class lever.



5. As a trainee Sport Scientist, what advice would you give to a pole vaulting coach to help them improve their athletes?

A pole vaulter performance will improve if they can run really fast while they are carrying the pole, reach really high on the pole, leap really high when they take off from the ground and pushes upside down off the pole and over the bar.

The coach needs to train the athlete to help them do all of these things so they need to do sprinting practice and jumping, reaching and pushing practice.

Annotations

Describes the effect of unbalanced forces on a pole vaulter.

Describes the effect of balanced forces on a pole vaulter.

Annotations (Overview)

The student communicates ideas using scientific language and appropriate representations.

Poster: Super suits

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
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> *Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations.*

Summary of task

Students were investigating the forces that act on athletes and objects in various Olympic sports. They were familiar with concepts such as friction, gravity, thrust and buoyancy and the way that they impact on motion. They had considered examples in which scientific knowledge of forces had been used to improve the performance of athletes.

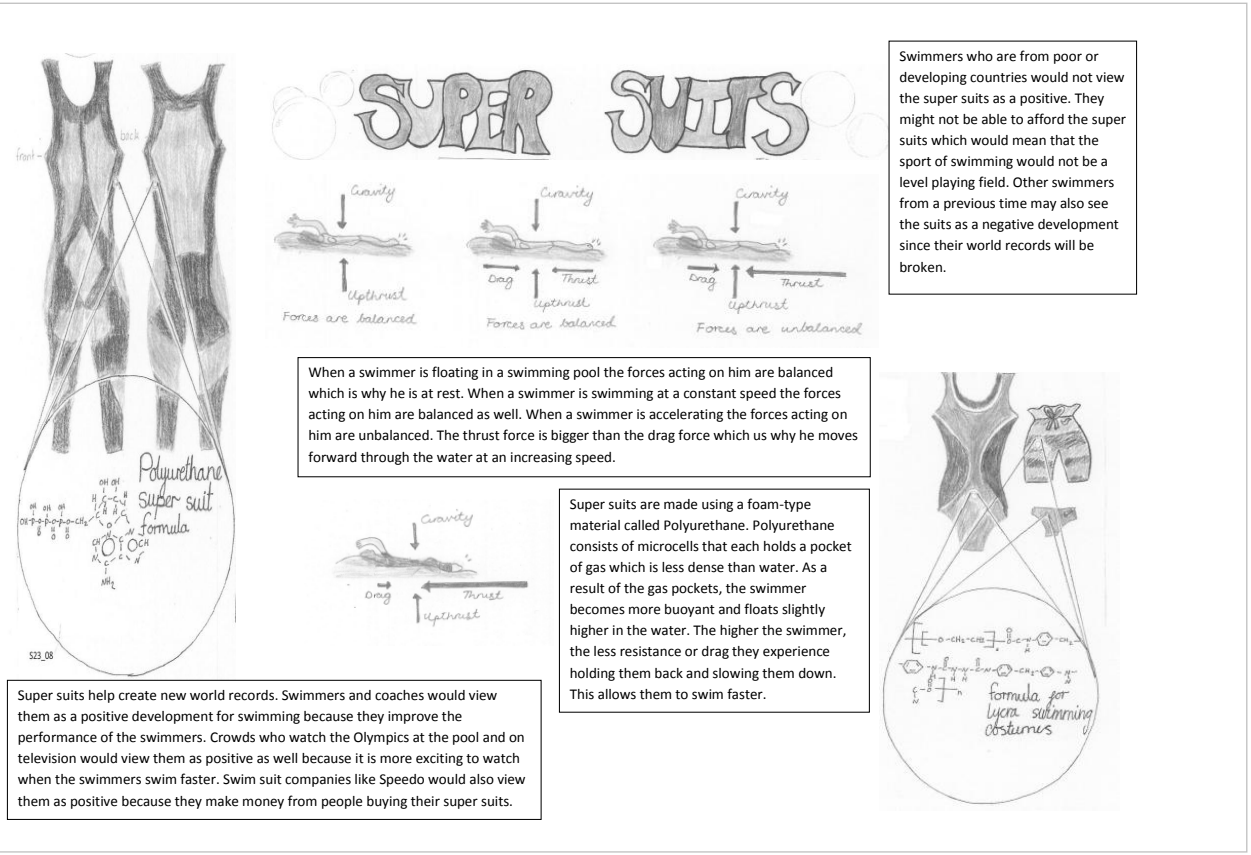
In this task, students were required to answer a series of questions relating to the forces that act on swimmers and the role that improved swimsuits have had on swimmers' performance. Students were encouraged to use their workbooks and carry out research to help them to answer the questions. They were required to present their answers in the form of a small poster. Students commenced the task during a 100-minute lesson and completed it in their own time over the following week.

Science

Year 7

Above satisfactory

Poster: Super suits



Annotations

Constructs force diagrams to illustrate the forces acting on a swimmer at rest, moving at constant speed and accelerating.

Identifies when the forces acting on the swimmer are balanced and unbalanced.

Identifies several societal groups who viewed the development of the super suits positively and negatively and explains why they hold these views.

Explains the effect of the super suits with references to the forces that affect the swimmer's movement.

Explains how science has improved the performance of Olympic swimmers.

Annotations (Overview)

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

Report: The Earth–sun–moon system

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
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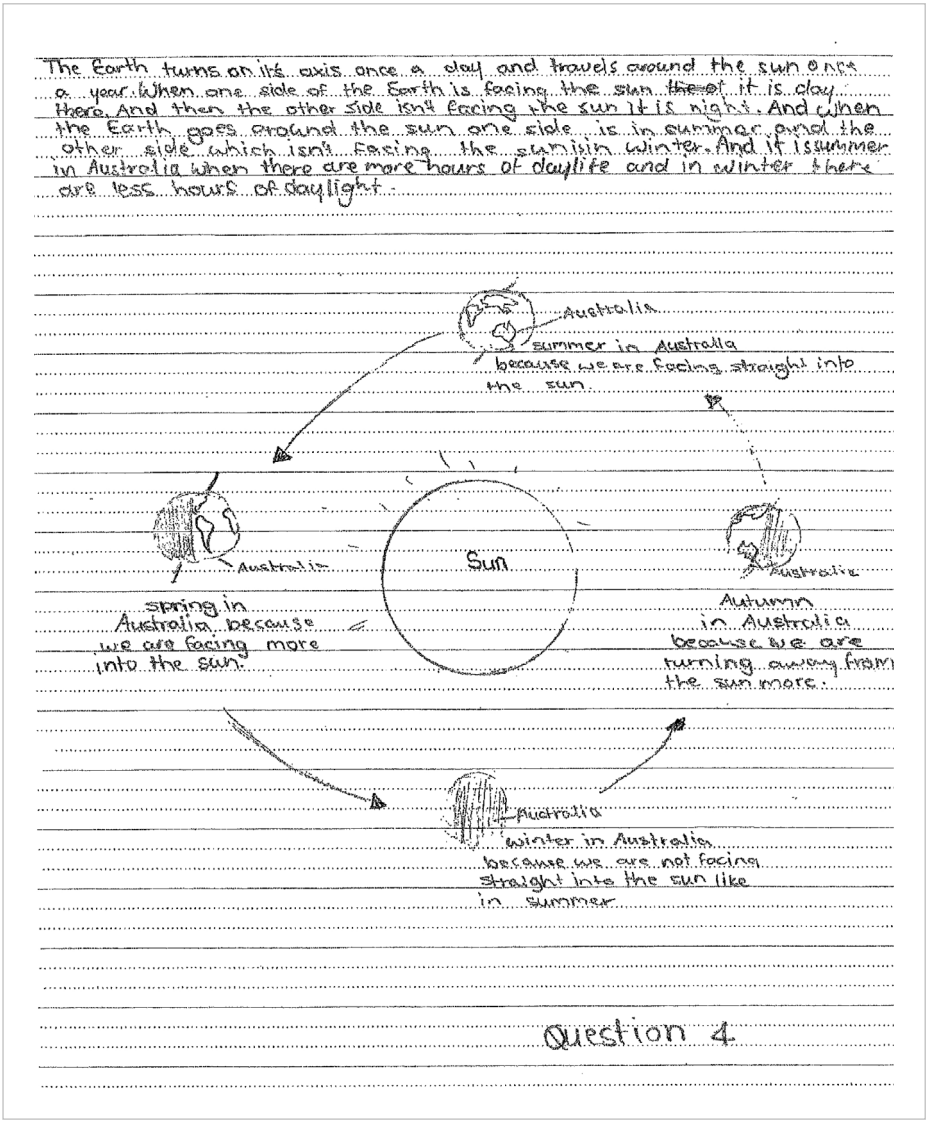
Summary of task

Students had been investigating the Earth–sun–moon system, including manipulating physical and digital models and engaging in role plays to explore the relative movement of each body.

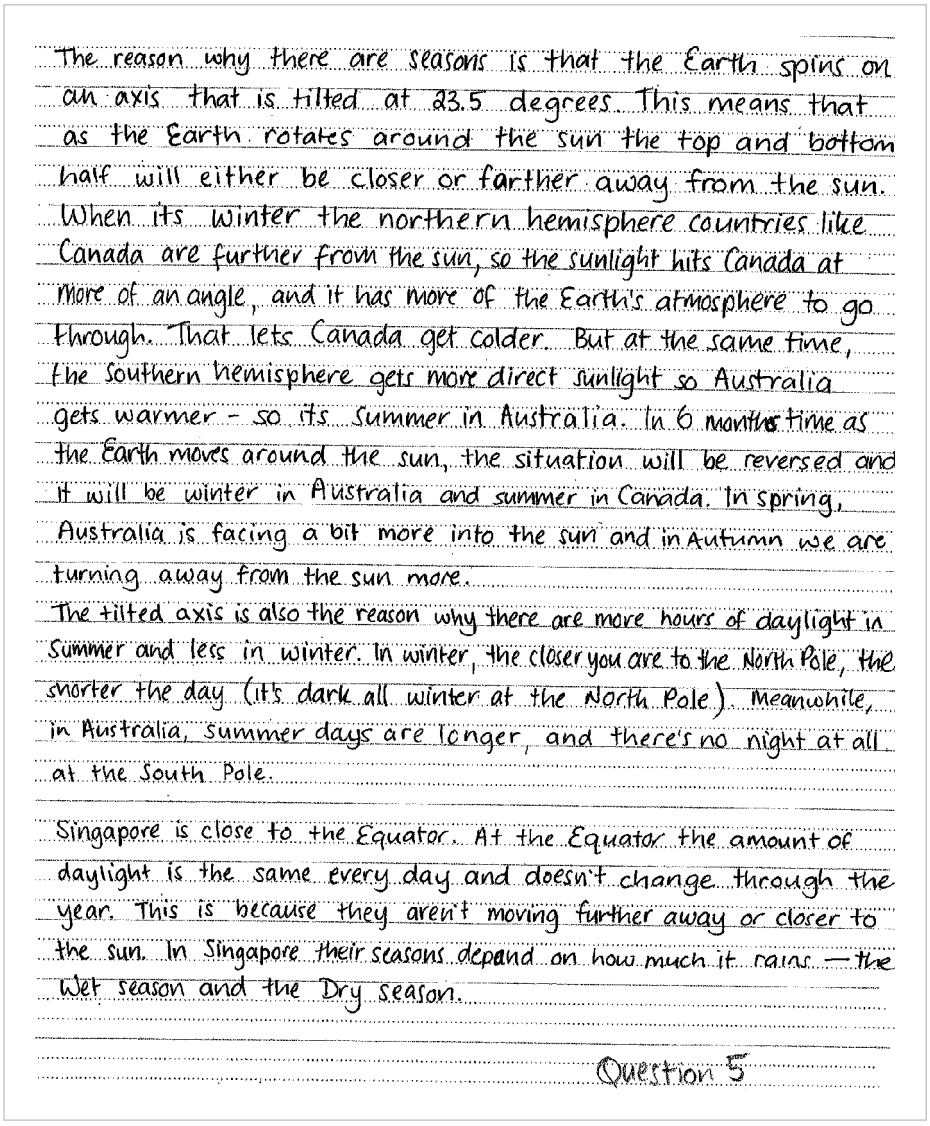
Students were asked to provide a written or word-processed response to a number of questions relating to the Earth–sun–moon system. Students began the task in class during a 50-minute lesson, and were required to complete the task for homework. Students were encouraged to draw on their existing knowledge and understanding and undertake research to ensure that their answers were factually correct.

Report: The Earth–sun–moon system



Annotations

Report: The Earth–sun–moon system



The reason why there are seasons is that the Earth spins on an axis that is tilted at 23.5 degrees. This means that as the Earth rotates around the sun the top and bottom half will either be closer or farther away from the sun. When its winter the northern hemisphere countries like Canada are further from the sun, so the sunlight hits Canada at more of an angle, and it has more of the Earth's atmosphere to go through. That lets Canada get colder. But at the same time, the southern hemisphere gets more direct sunlight so Australia gets warmer - so its summer in Australia. In 6 months time as the Earth moves around the sun, the situation will be reversed and it will be winter in Australia and summer in Canada. In spring, Australia is facing a bit more into the sun and in Autumn we are turning away from the sun more.

The tilted axis is also the reason why there are more hours of daylight in summer and less in winter. In winter, the closer you are to the North Pole, the shorter the day (it's dark all winter at the North Pole). Meanwhile, in Australia, summer days are longer, and there's no night at all at the South Pole.

Singapore is close to the Equator. At the Equator the amount of daylight is the same every day and doesn't change through the year. This is because they aren't moving further away or closer to the sun. In Singapore their seasons depend on how much it rains — the Wet season and the Dry season.

Question 5

Annotations

Explains in detail how the tilt of Earth on its axis, and its position in relation to the sun, accounts for the seasons.

Recognises that the season different countries experience at a given time depends on their location on Earth's surface.

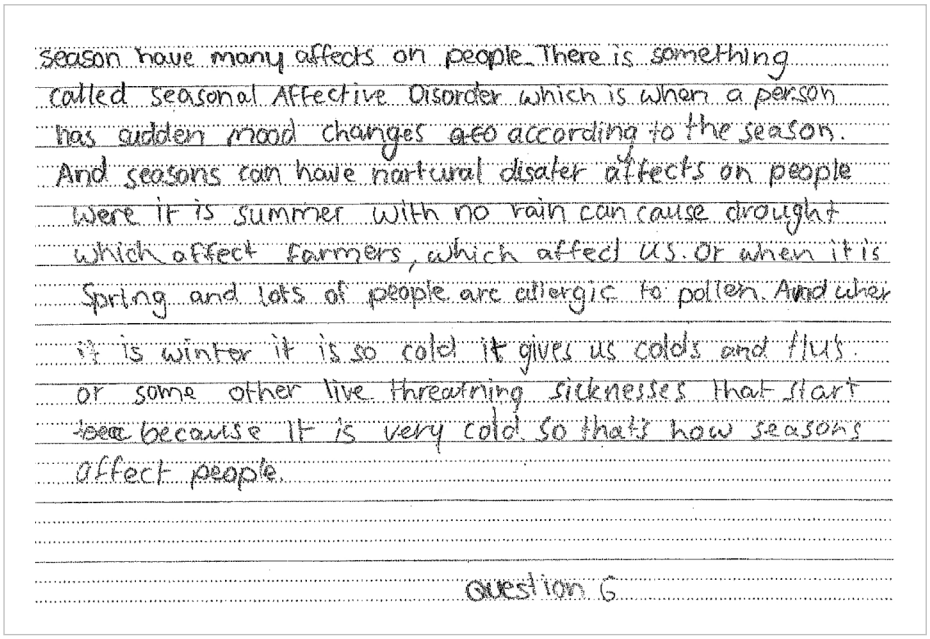
Explains why day length varies between locations on Earth at a given time.

Describes the seasons experienced by countries located near the equator.

Science

Year 7
Above satisfactory

Report: The Earth–sun–moon system



season have many affects on people. There is something called seasonal Affective Disorder which is when a person has sudden mood changes ato according to the season. And seasons can have nartural disater affects on people were it is summer with no rain can cause drought which affect farmers, which affect us. Or when it is Spring and lots of people are allergic to pollen. And wher it is winter it is so cold it gives us colds and flu's. or some other live threatning sicknesses that start beee because it is very cold so that's how seasons affect people.

Question 6

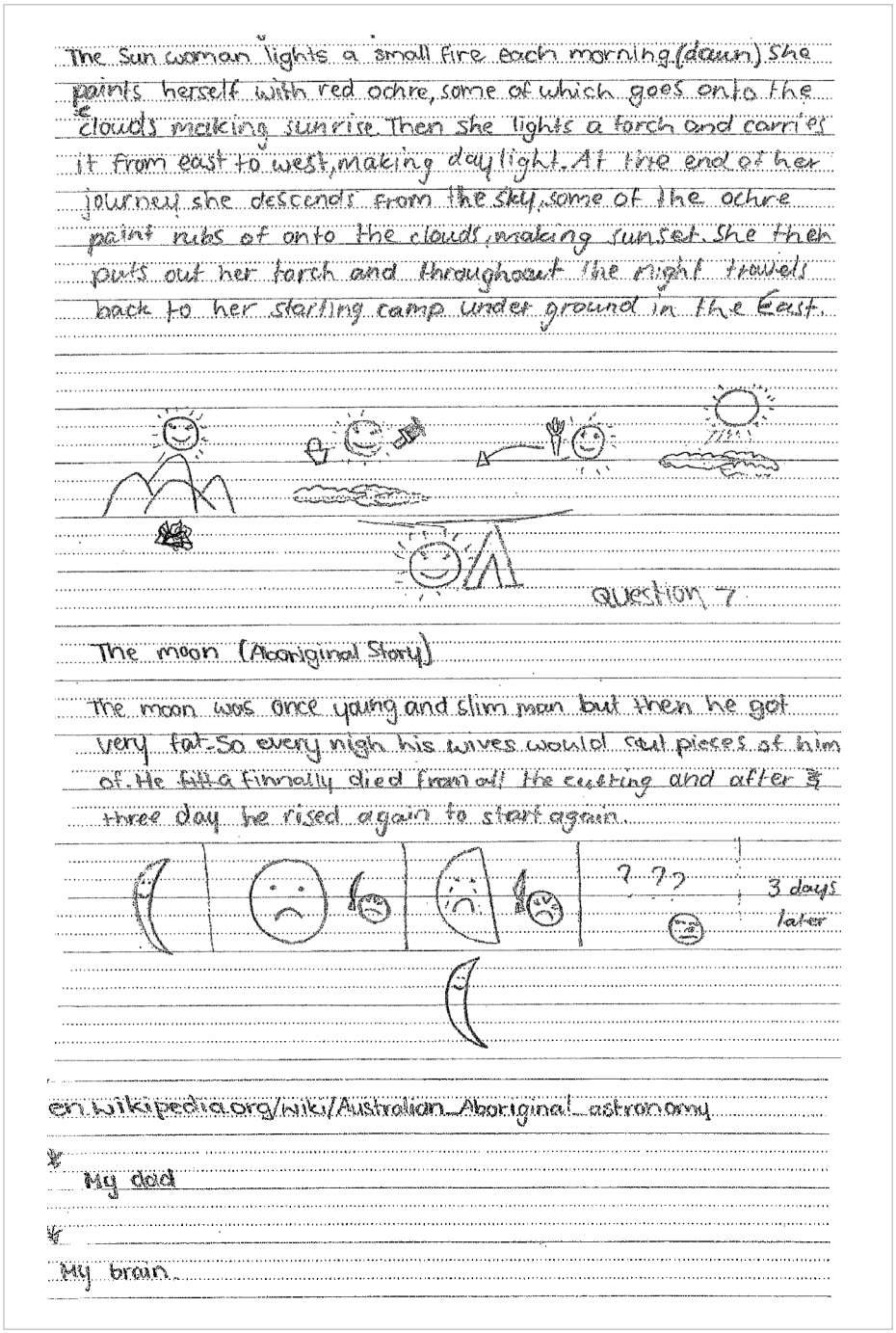
Annotations

Explains how seasons affect people in their daily lives.

Science

Year 7
Above satisfactory

Report: The Earth–sun–moon system



The Sun woman lights a small fire each morning (dawn) She paints herself with red ochre, some of which goes onto the clouds making sunrise. Then she lights a torch and carries it from east to west, making daylight. At the end of her journey she descends from the sky, some of the ochre paint rubs of onto the clouds, making sunset. She then puts out her torch and throughout the night travels back to her starting camp under ground in the East.

The moon (Aboriginal Story)

The moon was once young and slim man but then he got very fat. So every nigh his wives would eat pieces of him of. He fell a finnally died from all the eating and after 3 three day he rised again to start again.

en.wikipedia.org/wiki/Australian_Aboriginal_astronomy

* My dad

* My brain

Annotations

Annotations (Overview)

The student communicates ideas and findings using appropriate scientific language and representations.

Worksheet: Classification

Year 7 Science achievement standard

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

> *By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.*
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Summary of task

Students had investigated developing and using dichotomous keys to classify various groups of living and non-living things. They had discussed the role of classification generally, and its specific role in science.

Students were required to make observations at a local wildlife park and to complete a number of tasks related to classifying the animals at the park. They were required to complete the task individually.

Worksheet: Classification

WHY CLASSIFY?

There are millions (maybe tens of millions) of different species on Earth – some organisms are clearly different, whilst others share many similar features. Compare a kangaroo and emu – they appear very different, but what features do kangaroos and emus have in common? What features make them different?

Complete the table below:

Feature	Kangaroo	Emu
Live on land	√	√
Feathers	X	√
Fur	✓	×
Backbone	✓	✓
Warm blooded	✓	✓
Lays eggs	×	✓
Pouch	✓	×

Many organisms share common features, which allow them to be grouped – this is classification. Scientists classify organisms to make them easier to identify. The classification system begins with very big groups (lots of organisms) and moves down into smaller groups (fewer organisms).

Questions:

1) Explain *why* scientists classify living organisms? Because there are so many living organisms so ~~if~~ they need to ~~didn't~~ have a system to organise all of them. This means they are easier to study and also helps scientists to communicate with each other and share information about organisms. They can also measure the amount of diversity in an ecosystem and compare different ecosystems and see how they change over time.

because scientists can see the patterns relationships between organisms and how they are similar and different

2) Explain *how* scientists group organisms? Scientists look at the ~~things~~ features and characteristics that living organisms have in common and group them. They start with features that are most common and then move to ones that are less common. Eg scientists might first of all classify a living organism as a plant, animal, bacteria and then if it was an animal they might say is it a vertebrate or invertebrate and then what type of vertebrate and so on and so on.

Annotations

Identifies observable features of kangaroos and emus.

Explains that scientists classify organisms to share information, identify relationships between organisms, measure diversity and compare change over time.

Identifies that classification is based on observable features and grouping organisms.

Worksheet: Classification

WHAT IS A DICHOTOMOUS KEY?

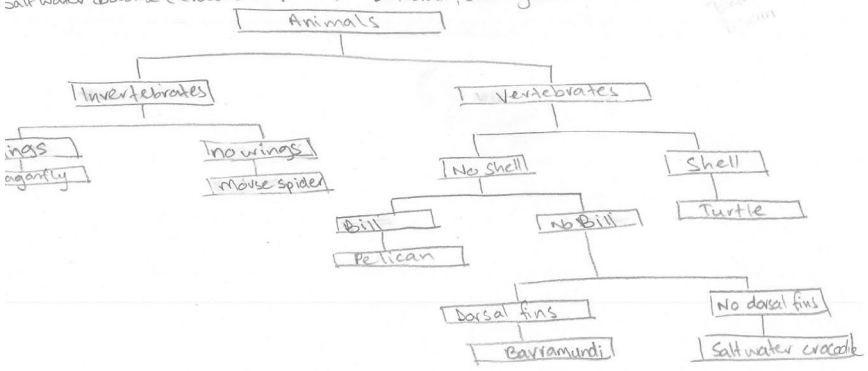
The word **dichotomous** means "divided in two parts". A dichotomous key consists of a series of two-part statements that describe the characteristics of living or non-living things. Each step of a dichotomous key presents two choices. Making the choice about a particular characteristic leads to a new branch of the key. Eventually you will be led to the name of the living or non-living thing that you are trying to identify.

Living things can be divided into five major kingdoms: Monera, Protista, Fungi, Plants and Animals. There are two main groups within the animal kingdom. Do you know what they are? Write their names in the space below.

Vertebrates and invertebrates

Your task is to create a **dichotomous key** that can be used to classify 6 different wildlife park animals. Be sure to choose animals from the two main groups that you identified above.

Dragonfly (Antipodogmphus dentosus) - invertebrate, wings, 6 legs, small antenae, large eyes
Pelican (Pelicanus conspicillatus) - vertebrate, wings, bill, webbed feet, black and white
Snapping Turtle (Elseya lavarackorum) - vertebrate, shell, brown
barramundi (Lates Calcarifer) - vertebrate, scales, dorsal fin with spines
Mouse spider (missulena pruinosa) - invertebrate, 8 legs, digs like a mouse, black
Salt water crocodile (Crocodylus porosus) - vertebrate, brown greenish scales, sharp teeth, 4 legs



Annotations

Collects data on the characteristics of animals and constructs a dichotomous key to classify them.

Annotations (Overview)

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

Written test: Living together

Year 7 Science achievement standard

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

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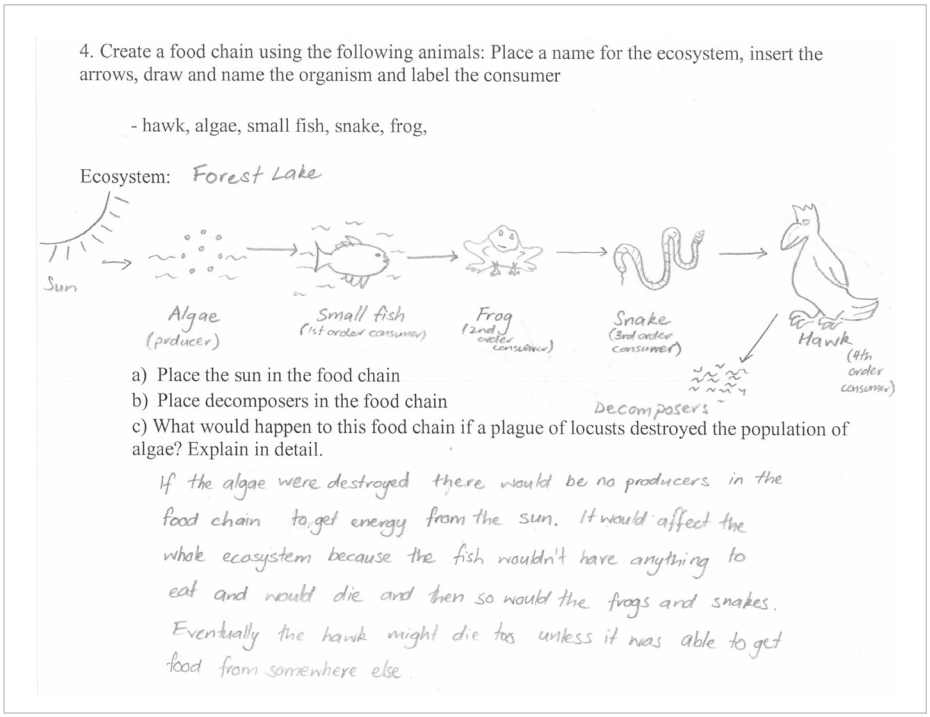
Summary of task

Students had undertaken a unit of work on ecosystems and the ways in which biotic components interact within ecosystems. They completed various field, online and classroom-based activities where they explored the features of different ecosystems, the ways in which organisms interacted, and the impact of environmental changes on those relationships.

Students completed a written test at the end of the unit. They were given 50 minutes to complete the test. This work sample includes a selection of the test questions.

Written test: Living together



4. Create a food chain using the following animals: Place a name for the ecosystem, insert the arrows, draw and name the organism and label the consumer

- hawk, algae, small fish, snake, frog,

Ecosystem: Forest Lake

a) Place the sun in the food chain
b) Place decomposers in the food chain
c) What would happen to this food chain if a plague of locusts destroyed the population of algae? Explain in detail.

If the algae were destroyed there would be no producers in the food chain to get energy from the sun. It would affect the whole ecosystem because the fish wouldn't have anything to eat and would die and then so would the frogs and snakes. Eventually the hawk might die too unless it was able to get food from somewhere else.

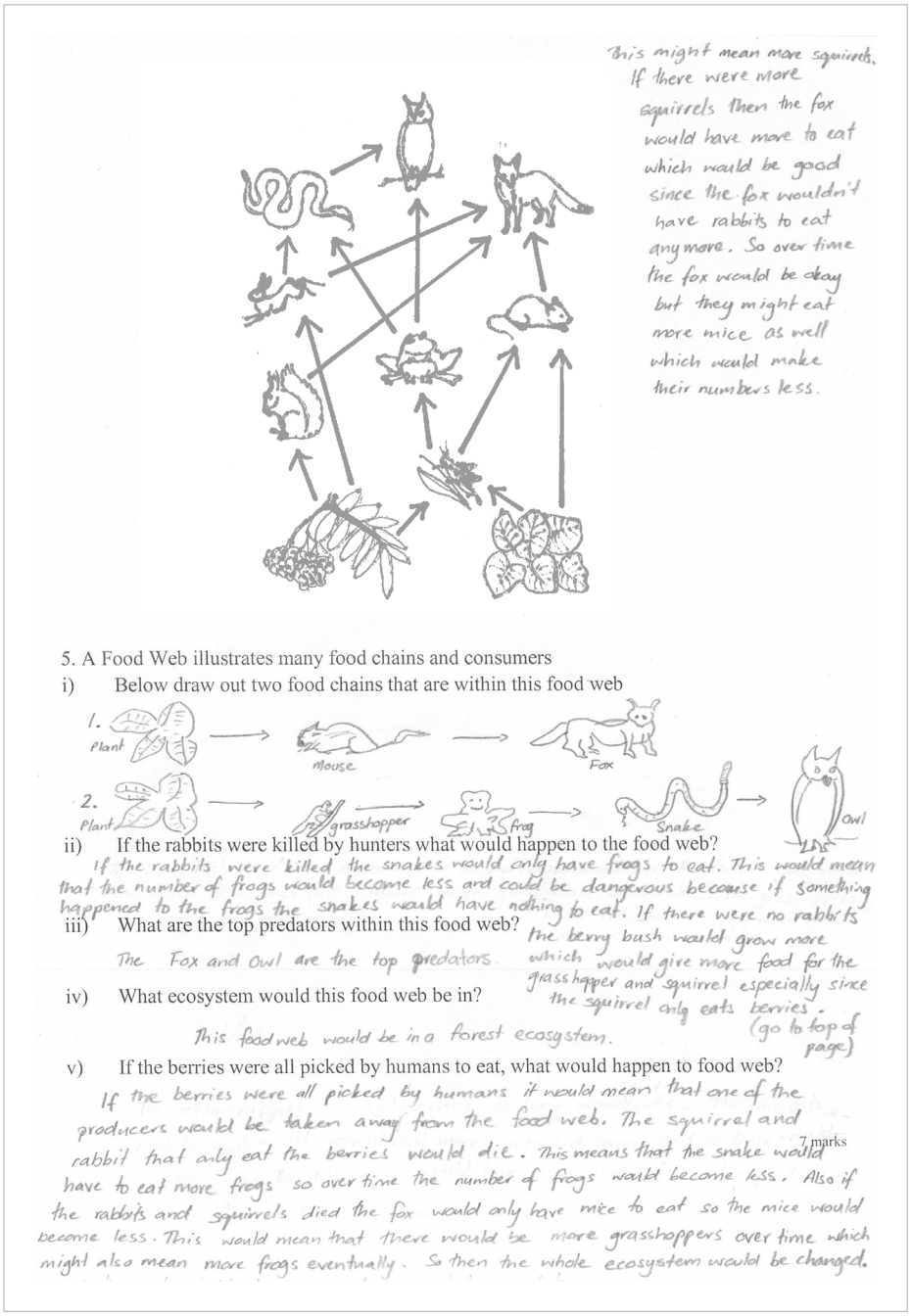
Annotations

Constructs a plausible food chain using appropriate representations.

Classifies organisms according to their feeding relationships.

Makes plausible predictions about changes to organism populations as a result of flow-on effects of environmental change.

Written test: Living together



This might mean more squirrels. If there were more squirrels then the fox would have more to eat which would be good since the fox wouldn't have rabbits to eat any more. So over time the fox would be okay but they might eat more mice as well which would make their numbers less.

5. A Food Web illustrates many food chains and consumers

i) Below draw out two food chains that are within this food web

1. Plant → Mouse → Fox

2. Plant → Grasshopper → Frog → Snake → Owl

ii) If the rabbits were killed by hunters what would happen to the food web?

If the rabbits were killed the snakes would only have frogs to eat. This would mean that the number of frogs would become less and could be dangerous because if something happened to the frogs the snakes would have nothing to eat. If there were no rabbits the berry bush would grow more which would give more food for the grasshopper and squirrel especially since the squirrel only eats berries. (go to top of page)

iii) What are the top predators within this food web?

The Fox and Owl are the top predators.

iv) What ecosystem would this food web be in?

This food web would be in a forest ecosystem.

v) If the berries were all picked by humans to eat, what would happen to food web?

If the berries were all picked by humans it would mean that one of the producers would be taken away from the food web. The squirrel and rabbit that only eat the berries would die. This means that the snake would have to eat more frogs so over time the number of frogs would become less. Also if the rabbits and squirrels died the fox would only have mice to eat so the mice would become less. This would mean that there would be more grasshoppers over time which might also mean more frogs eventually. So then the whole ecosystem would be changed.

7 marks

Annotations

Identifies two different food chains within a food web.

Makes plausible predictions about the effect of population change on organisms within a food web, with reference to consumer, predator–prey and competitive feeding relationships.

Identifies that changes to producer populations have flow-on effects for all organisms within the food web and that these changes can accumulate over time to change the ecosystem.

Annotations (Overview)

The student uses scientific language and constructs appropriate representations to communicate ideas.

Investigation poster: Parachute design

Year 7 Science achievement standard

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

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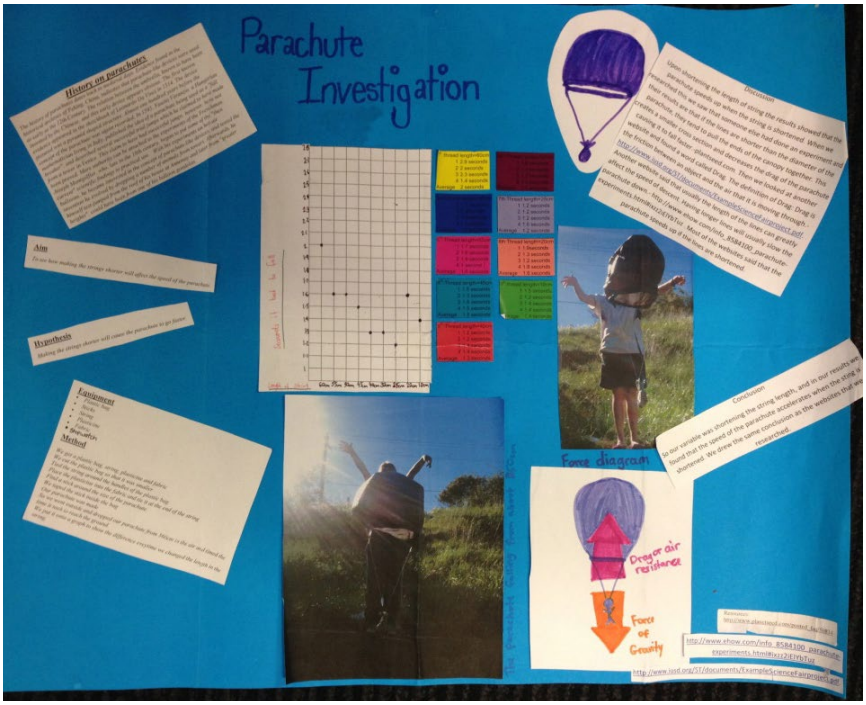
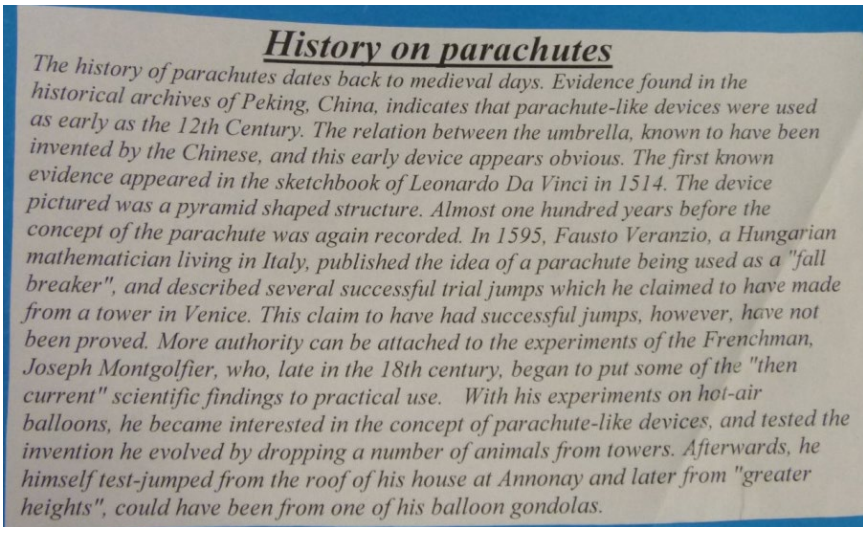
Summary of task

As part of a unit on unbalanced forces, students were assigned the task of investigating parachute design and constructing an experiment into one variable. Students independently selected their investigation question and designed an experimental method. They were required to present their method and findings in the form of a poster for an audience of their peers.

Students were provided with three lessons in class to design and conduct their investigation. They completed the work in their own time.

Investigation poster: Parachute design



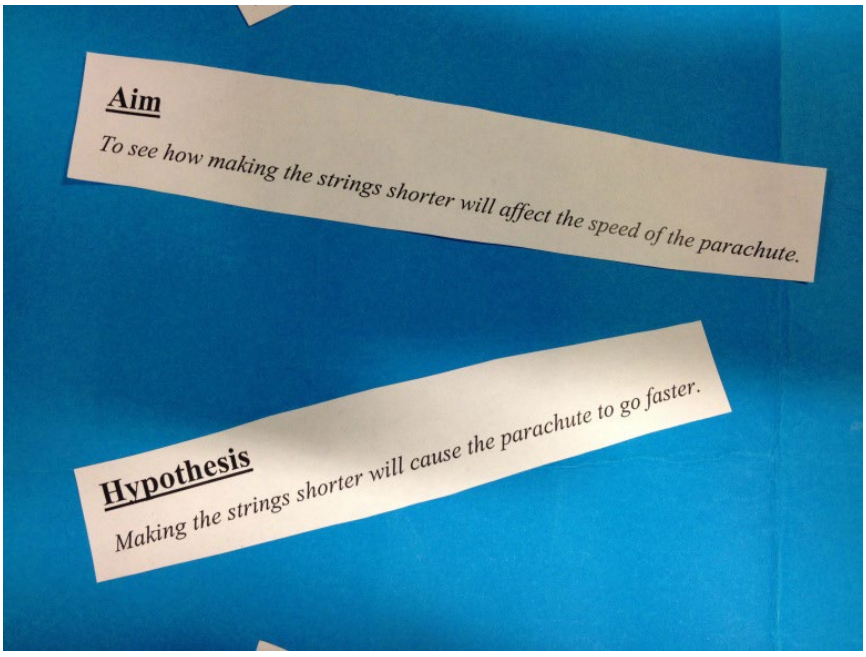


History on parachutes

The history of parachutes dates back to medieval days. Evidence found in the historical archives of Peking, China, indicates that parachute-like devices were used as early as the 12th Century. The relation between the umbrella, known to have been invented by the Chinese, and this early device appears obvious. The first known evidence appeared in the sketchbook of Leonardo Da Vinci in 1514. The device pictured was a pyramid shaped structure. Almost one hundred years before the concept of the parachute was again recorded. In 1595, Fausto Veranzio, a Hungarian mathematician living in Italy, published the idea of a parachute being used as a "fall breaker", and described several successful trial jumps which he claimed to have made from a tower in Venice. This claim to have had successful jumps, however, have not been proved. More authority can be attached to the experiments of the Frenchman, Joseph Montgolfier, who, late in the 18th century, began to put some of the "then current" scientific findings to practical use. With his experiments on hot-air balloons, he became interested in the concept of parachute-like devices, and tested the invention he evolved by dropping a number of animals from towers. Afterwards, he himself test-jumped from the roof of his house at Annonay and later from "greater heights", could have been from one of his balloon gondolas.

Annotations

Investigation poster: Parachute design

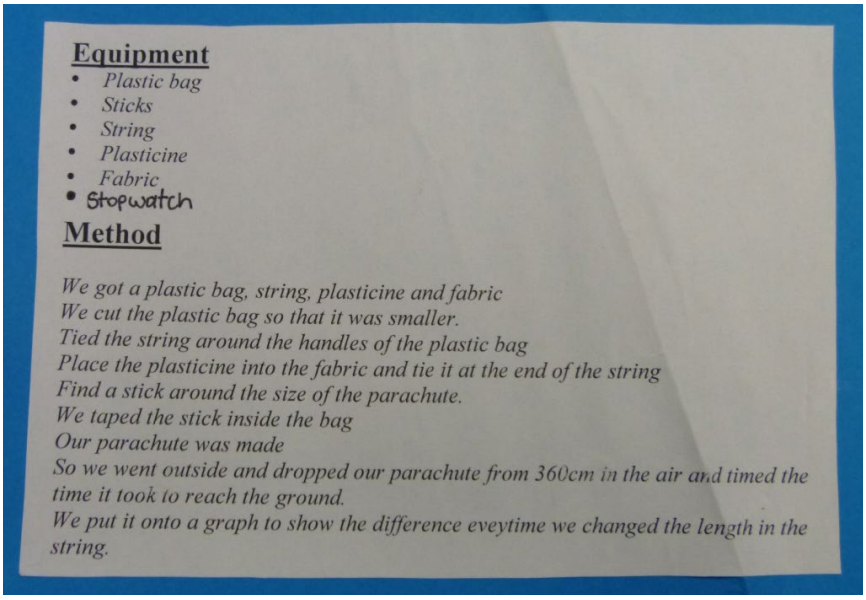


Annotations

Constructs a force diagram to indicate the effects of gravity and air resistance on the movement of the parachute.

Poses a clear question about the relationship between two variables that can be investigated scientifically.

Investigation poster: Parachute design



Equipment

- *Plastic bag*
- *Sticks*
- *String*
- *Plasticine*
- *Fabric*
- *Stopwatch*

Method

We got a plastic bag, string, plasticine and fabric
We cut the plastic bag so that it was smaller.
Tied the string around the handles of the plastic bag
Place the plasticine into the fabric and tie it at the end of the string
Find a stick around the size of the parachute.
We taped the stick inside the bag
Our parachute was made
So we went outside and dropped our parachute from 360cm in the air and timed the time it took to reach the ground.
We put it onto a graph to show the difference eveytime we changed the length in the string.

Annotations

Plans a fair experimental method by identifying the variables to be controlled (height of drop, timing approach).

Selects equipment to improve accuracy of data collection (a stopwatch).

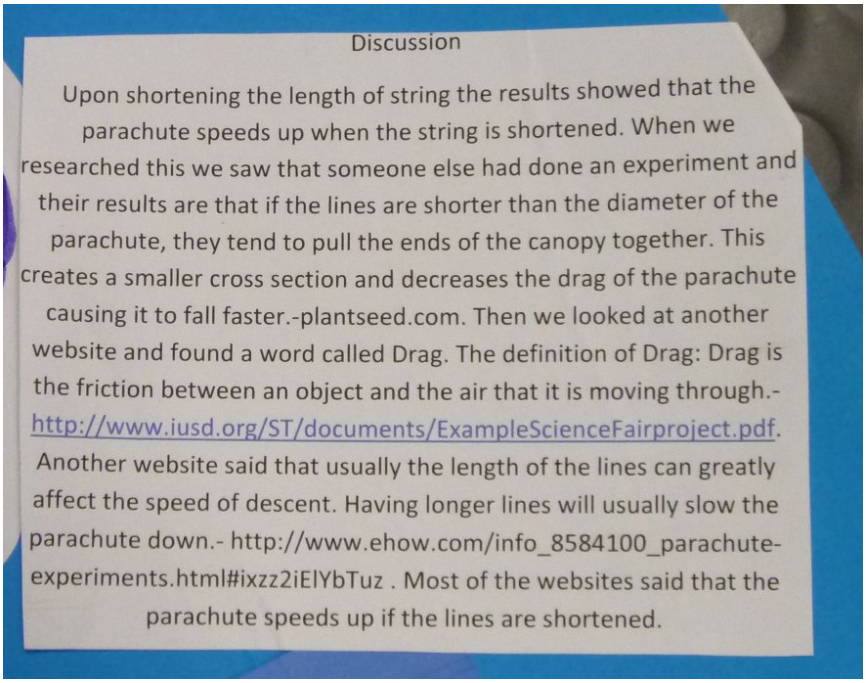
Identifies the variables to be changed and measured.

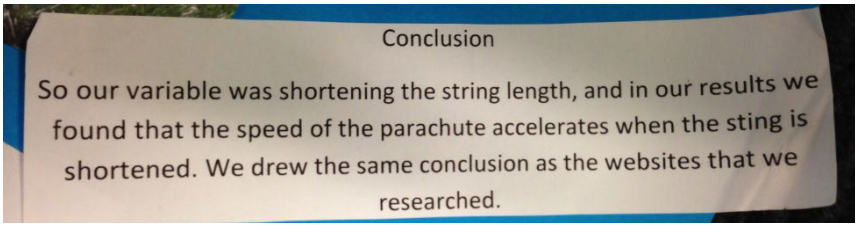
Includes use of repeat trials in the investigation design.

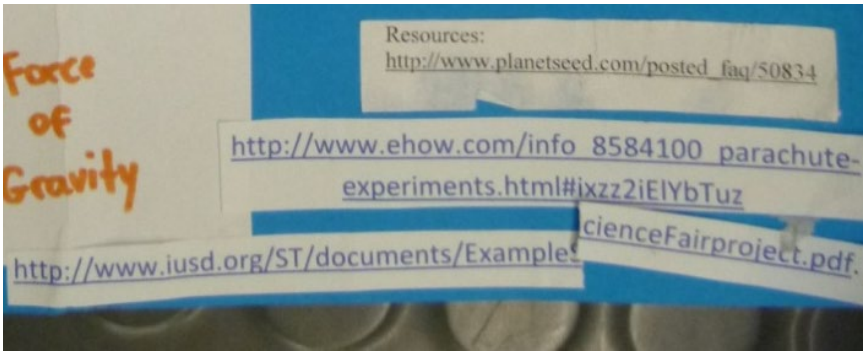
Constructs appropriate tables to record data and summary data (average).

Constructs a graph to display summary data.

Investigation poster: Parachute design







Annotations

Describes the trend observed and gives an explanation based on an understanding of the forces involved.

Supports the explanation using evidence from secondary sources.

Draws a conclusion based on observed evidence and evidence from secondary sources.

Acknowledges information sources.

Annotations (Overview)

The student communicates methods and findings of a scientific investigation using appropriate scientific language and representations.