Science

Year 4
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 4 SCIENCE

This portfolio provides the following student work samples:

Sample 1 Design task: Amusement park ride
Sample 2 Report: Sports science
Sample 3 Report: Living on the reef
Sample 4 Pamphlet: Plant life cycle
Sample 5 Investigation report: Seed germination
Sample 6 Design report: Convict bag
Sample 7 Investigation report: Physical weathering effects
Sample 8 Investigation report: Properties of shoes

In this portfolio, the student identifies contact and non-contact forces and explains how objects have been pushed or pulled by these forces (WS1, WS2). The student describes the relationships between living and non-living components of ecosystems that assist survival of living things (WS3) and sequences stages in the plant life cycle (WS4). The student identifies the observable properties of a range of objects and materials and uses these to describe how the objects or materials are fit for a particular purpose (WS6, WS8). The student investigates analogies of weathering processes and describes their effects on rocks (WS7). The student identifies where science can be used to ask questions and make predictions (WS2).

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The student demonstrates the ability to follow teacher instructions to identify an investigable question about a familiar context (WS5, WS7) and to predict likely outcomes of investigations (WS5, WS7). The student uses equipment to make observations (WS5, WS7). The student organises data in simple column graphs (WS5) and tables (WS7, WS8) and identifies patterns in data (WS5, WS7). The student suggests explanations for observations (WS5, WS7, WS8), compares findings to predictions (WS5, WS7) and suggests some reasons why the investigation methods were fair or not (WS5, WS8). The student completes a range of simple reports to communicate methods and findings (WS2, WS3, WS5, WS6, WS7, WS8).

Design task: Amusement park ride

Year 4 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 unit on forces, particularly exploring the action of contact and non-contact forces. As a class they had shared their favourite amusement park experiences, including reflecting on a class excursion to a waterslide park. They had discussed what made the ride enjoyable, and the types of forces involved in the experience.

In this task, students were required to design an amusement park ride that made use of contact and non-contact forces. They were required to annotate their diagram to indicate where the forces acted. Students completed a draft and final copy over two class lessons.

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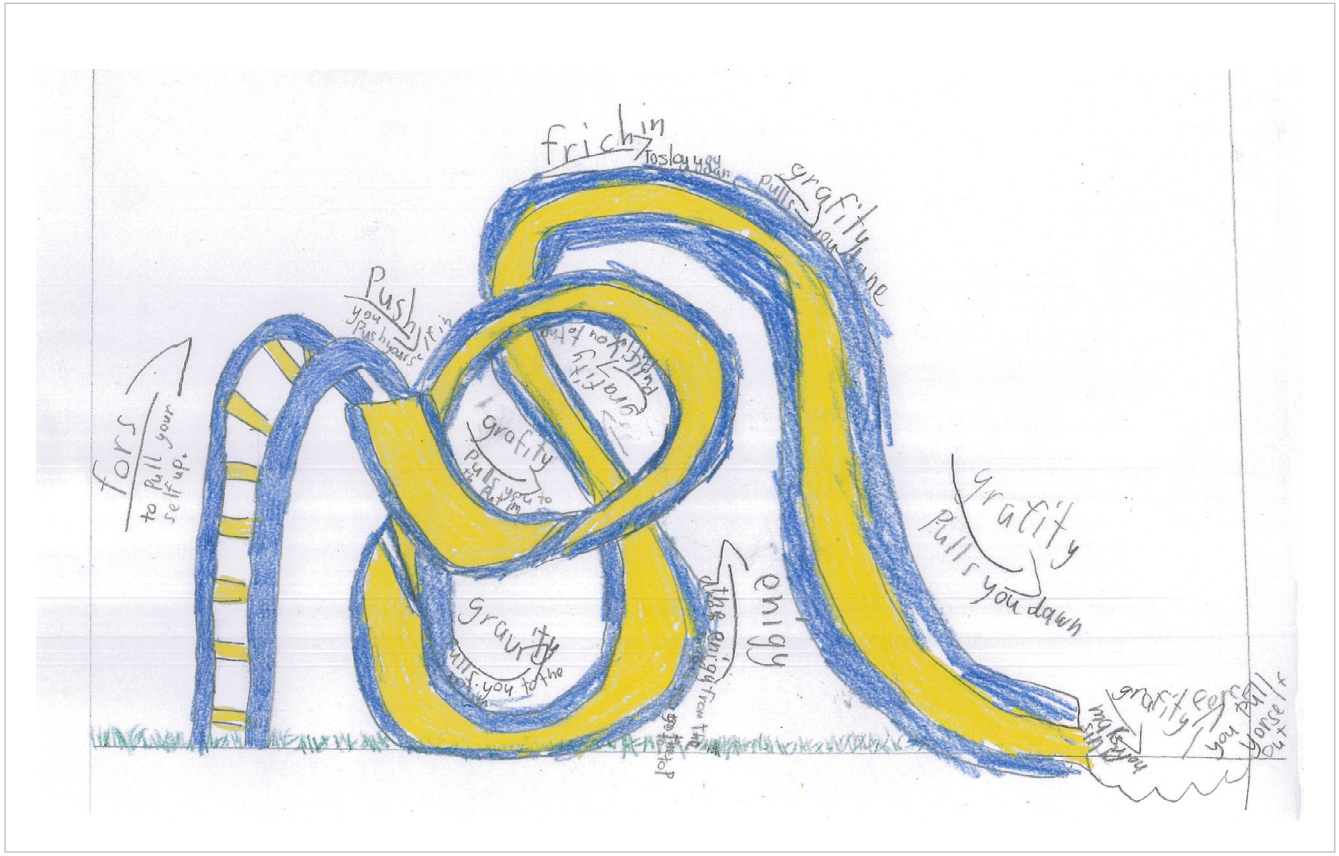
Design task: Amusement park ride



Annotations

Identifies that friction slows the person on the slide down.

Identifies that a push can initiate movement.

Identifies that gravity pulls the person down the slide.

Annotations (Overview)

The student produces an annotated diagram to communicate ideas and findings.

Report: Sports science

Year 4 Science achievement standard

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Summary of task

Students had been investigating what a force is and how forces are exerted by one object on another. They had engaged in hands-on activities to develop an understanding of pushes, pulls, friction, gravity and magnetism, and had classified these as contact or non-contact forces. As they explored forces, students brainstormed different sports that used these forces and developed a class display showing the different sports.

For this task, students were required to select one sport and develop a presentation to explain how they would help athletes improve their performance in the sport. As part of the presentation they were required to include a description of the sport, an explanation of how forces are important in the sport, a list of the types of questions a sports scientist would consider and a description of the types of improvements a sports scientist would recommend. Students completed the task over approximately four lessons.

Report: Sports science

Annotations

Report: Sports science

Rock climbing

- Rock climbing is a tough sport where people climb up natural or artificial rock walls.
- The goal is to reach the top without falling in the fastest time.
- Rock climbing can be dangerous and involves special techniques and equipment.

Image of indoor rock climbers.

Annotations

Report: Sports science

Forces in rock climbing

- Friction is important for the climber to grip the rock with their fingers, toes and sometimes knees and elbows.
- Gravity is important because you have to fight gravity not to fall down!
- Pushing force is important when you push from your toes.
- Pulling forces is important when you pull up with your fingers.

Image of indoor rock climbers.

Annotations

Identifies contact and non-contact forces involved in rock climbing.

Explains how the forces are involved in the motion of the climber.

Report: Sports science

Annotations

Suggests how science can be used to ask questions.

Report: Sports science

Improvements

- I think that if the shoes had more grip that would give better friction and also you could put springs in the shoes that would help the climber to get a better push from their toes.
- You could have really strong magnets in the carabeenars that connect with magnets in the rope to stop you from falling too far.
- You could also make a special chalk that has more grip so that you get better friction with your fingers.

Image of climbing shoes, chalk bag and harness.

Annotations

Uses science understanding to make predictions.

Explains how changes to materials could improve friction.

Annotations (Overview)

The student constructs a simple report to communicate ideas and research findings.

Report: Living on the reef

Year 4 Science achievement standard

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Summary of task

Students watched parts of an animation and a short documentary about life on the Great Barrier Reef. They reviewed the difference between living and non-living things and identified some examples of living and non-living components of the reef ecosystem through class discussion. They also reviewed the needs of living things, and discussed how fish breathe under water.

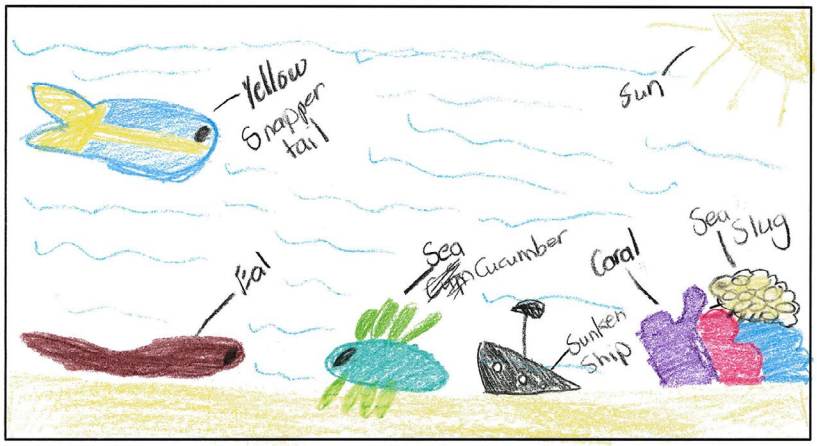
Students were asked to draw a reef showing and labelling living and non-living components. They were asked to choose one of the animals presented in the films and explain what living and non-living parts of the environment it needed to survive.

Report: Living on the reef

Living on the reef

Draw the **living** and **non-living** parts of the reef. Make sure you include these types of animals: a predator, a prey, a scavenger, a herbivore, and a carnivore. Label all the parts of your diagram.

Challenge: Can you draw a relationship where two organisms (hint: one is an algae!) help each other to survive? Label this with a star!



My animal is: Shark. A shark is a predater.

Survival needs of my animal:

Non-living parts of the environment

Part	Because...
Water	Water helps it breath since it has gills

Living parts of the environment

Part	Because...
Fish	It has meat in its body which the Shark feeds on
Human	It has meat in its body which the Shark feeds on!

If we took away Water (*non-living part*) from the environment, my animal would not be able to breath and it would die.

If we took away One type of fish (*living part*) from the environment, my animal would eat another kind of fish.

Annotations

Draws a labelled diagram of a coral reef showing living and non-living components.

Identifies how a living thing requires a non-living aspect of the environment for survival.

Identifies how a living thing requires other living things as prey to survive.

Describes how removing a non-living component of the environment (water) essential for the animal's survival would result in its death.

Describes how living components of the environment can be replaced as prey by other living components.

Annotations (Overview)

The student completes a simple report, including an annotated diagram, to communicate ideas and findings.

Pamphlet: Plant life cycle

Year 4 Science achievement standard

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Summary of task

Students had completed a unit of work on plant life cycles. They had investigated plant life stages, including exploring digital learning objects, and discussed what is meant by a life cycle. They had planted seeds and made observations in their science journals as the seeds germinated.

In this task, students were required to reflect on their learning and independently construct an informative pamphlet on the plant life cycle, including a description of life stages. They completed the task over a 60-minute lesson.

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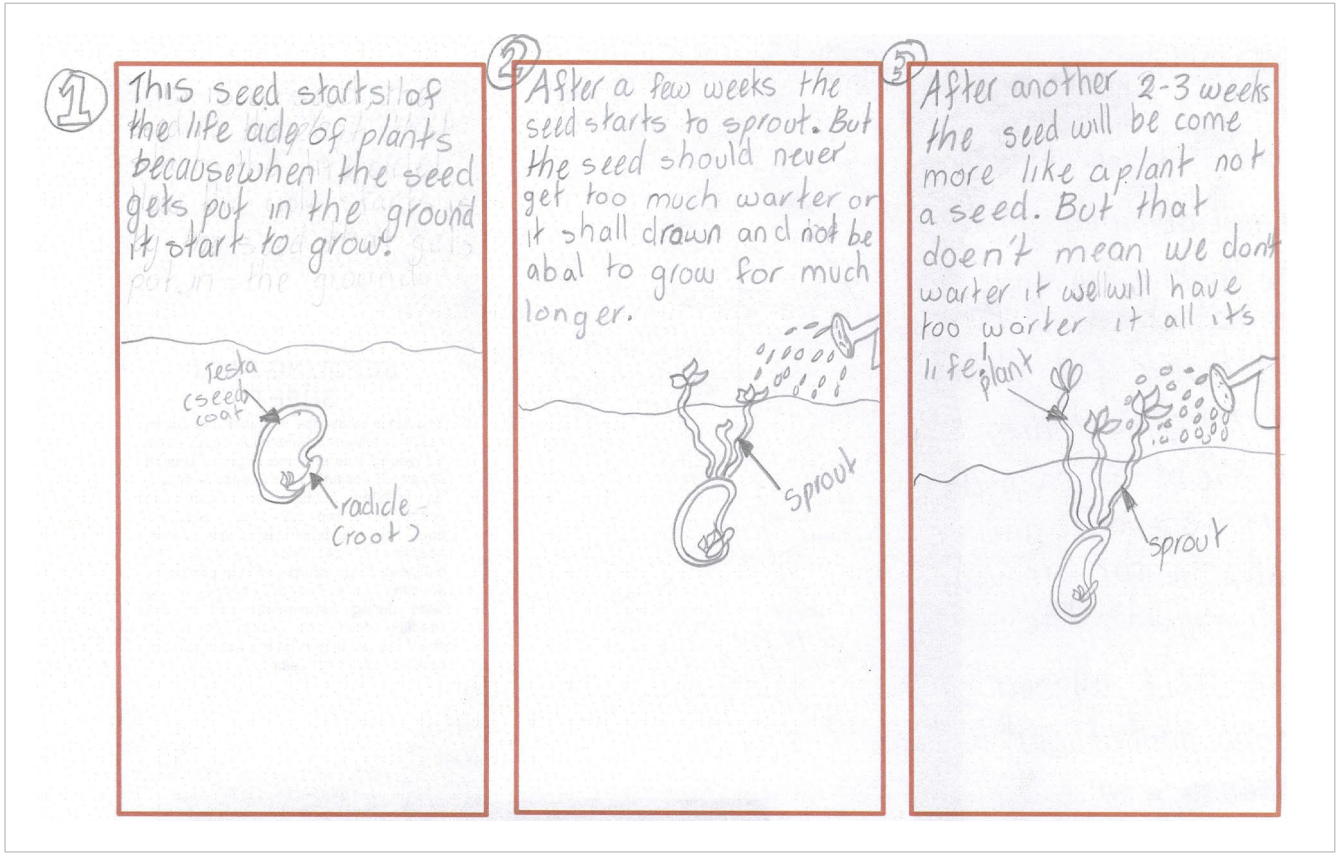
Pamphlet: Plant life cycle

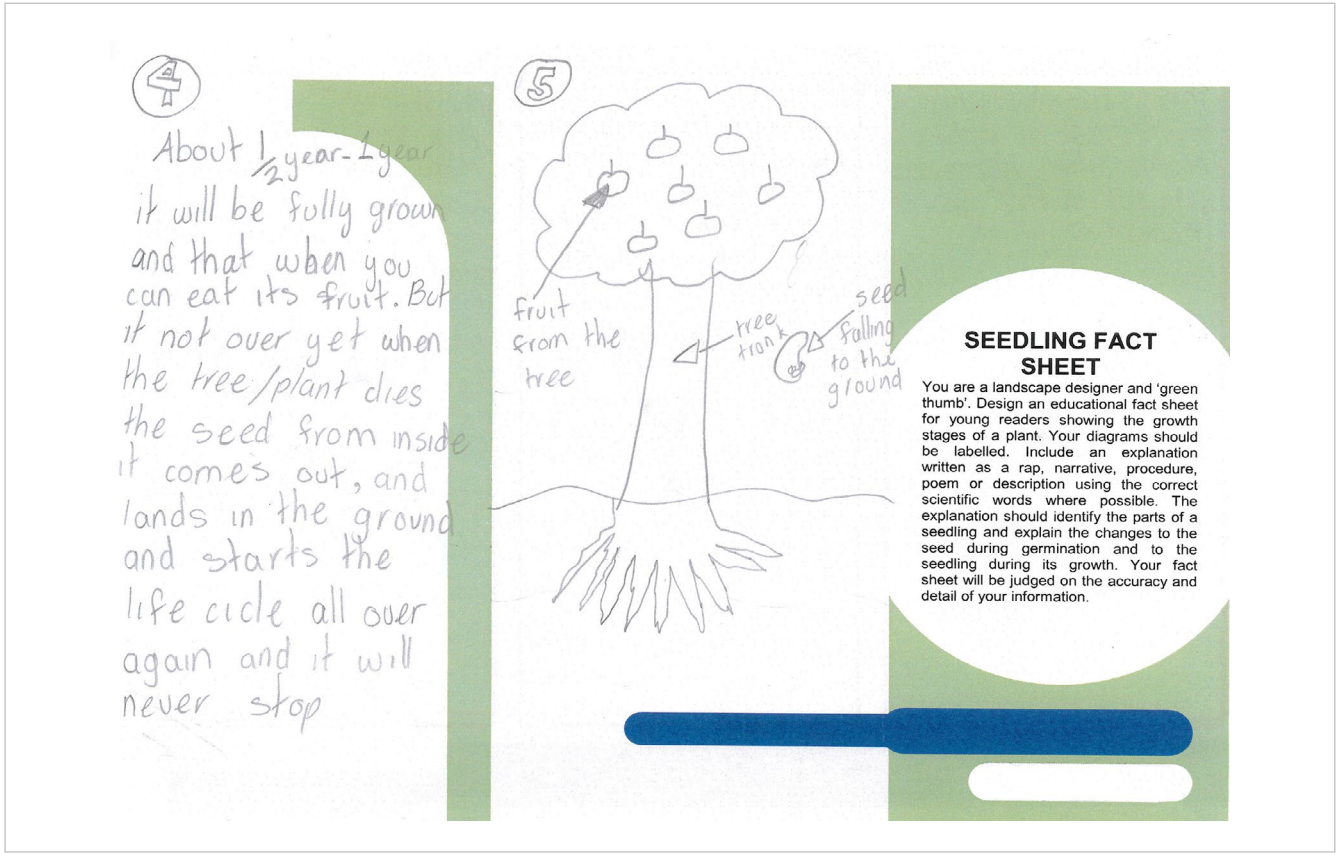


Annotations

Draws a labelled diagram of a seed showing structural features.

Constructs labelled diagrams showing germination and growth.

Pamphlet: Plant life cycle



Annotations

Identifies fruiting as a stage in the plant life cycle.

Identifies that the life cycle begins again with the seed from the plant.

States that the death of the plant is required for the life cycle to repeat.

Annotations (Overview)

The student completes a simple report, including an annotated diagram, to communicate ideas and findings.

Investigation report: Seed germination

Year 4 Science achievement standard

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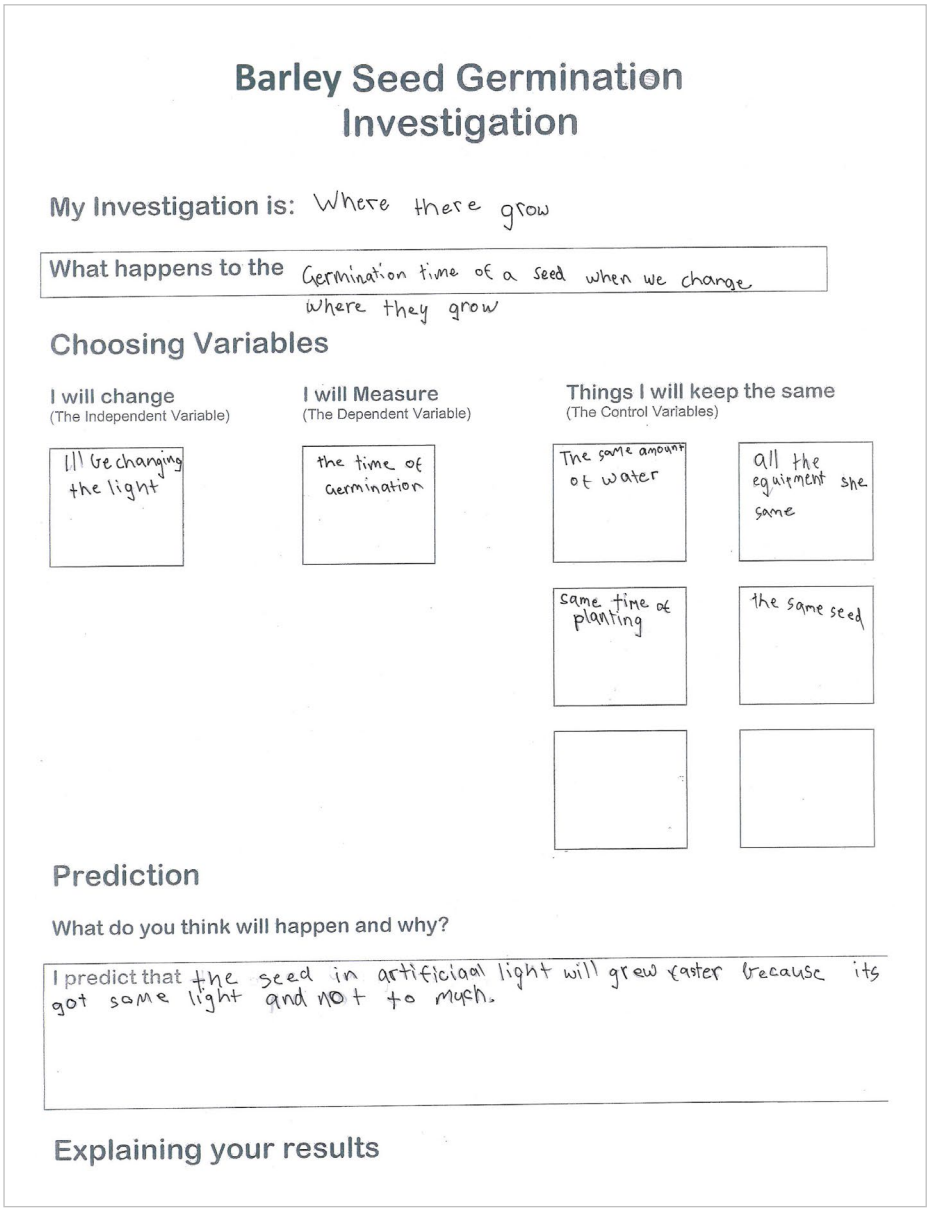
Summary of task

Students were engaged in a unit about life cycles. They had discussed plant life cycles and particularly looked at life stages associated with germination, and the conditions required for germination.

For this task, students conducted a guided investigation into the effect of light on the germination of barley seeds. They were provided with an investigation report sheet to complete and each stage of the investigation was scaffolded through whole group and individual discussion.

Investigation report: Seed germination



Barley Seed Germination Investigation

My Investigation is: Where there grow

What happens to the Germination time of a seed when we change where they grow

Choosing Variables

I will change (The Independent Variable)	I will Measure (The Dependent Variable)	Things I will keep the same (The Control Variables)	
Ill be changing the light	the time of germination	The same amount of water	all the equipment she same
		same time of planting	the same seed

Prediction

What do you think will happen and why?

I predict that the seed in artificial light will grew faster because its got some light and not to much.

Explaining your results

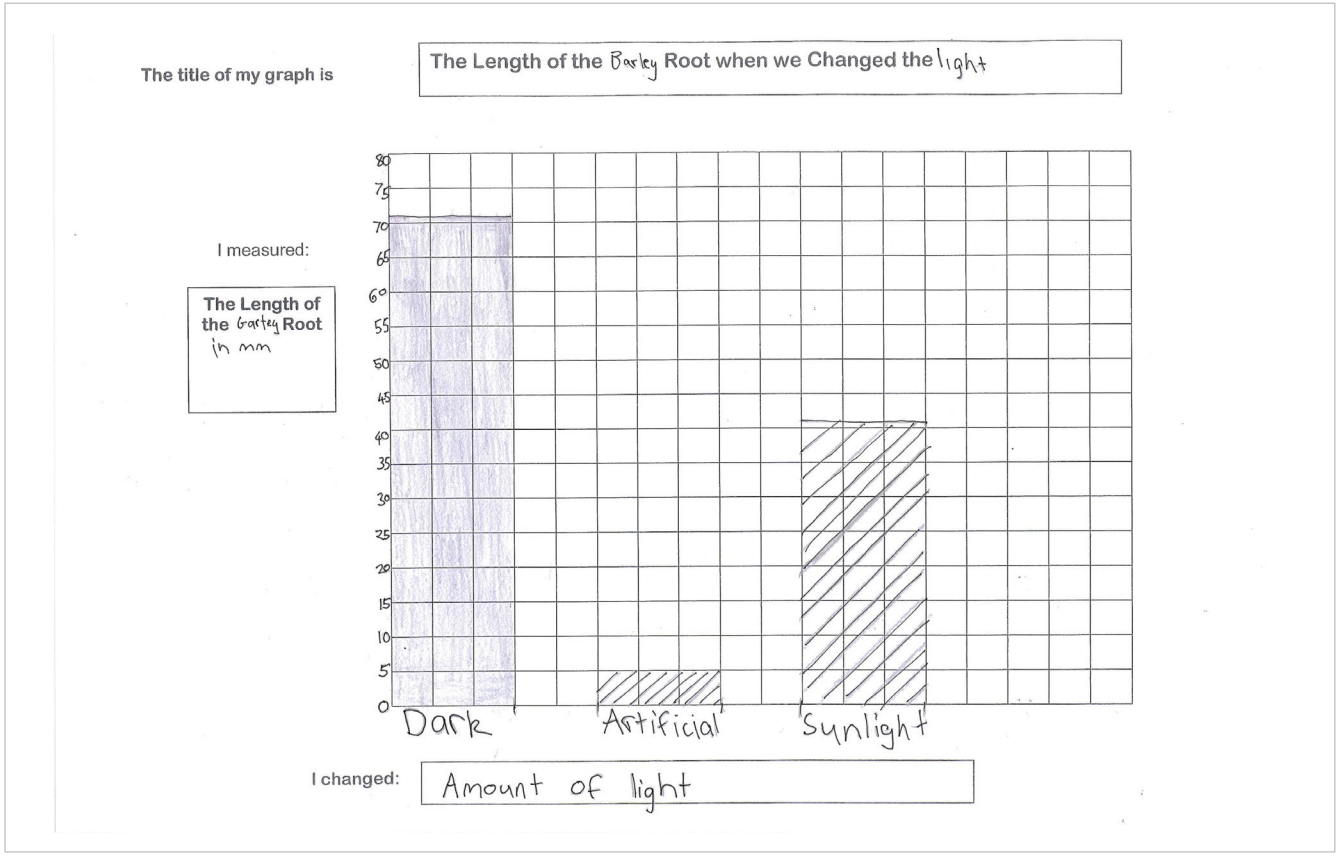
Annotations

With teacher guidance, constructs a question to be investigated.

Identifies the variables to be changed and measured and suggests some variables to be controlled.

Makes a prediction based on everyday experiences.

Investigation report: Seed germination

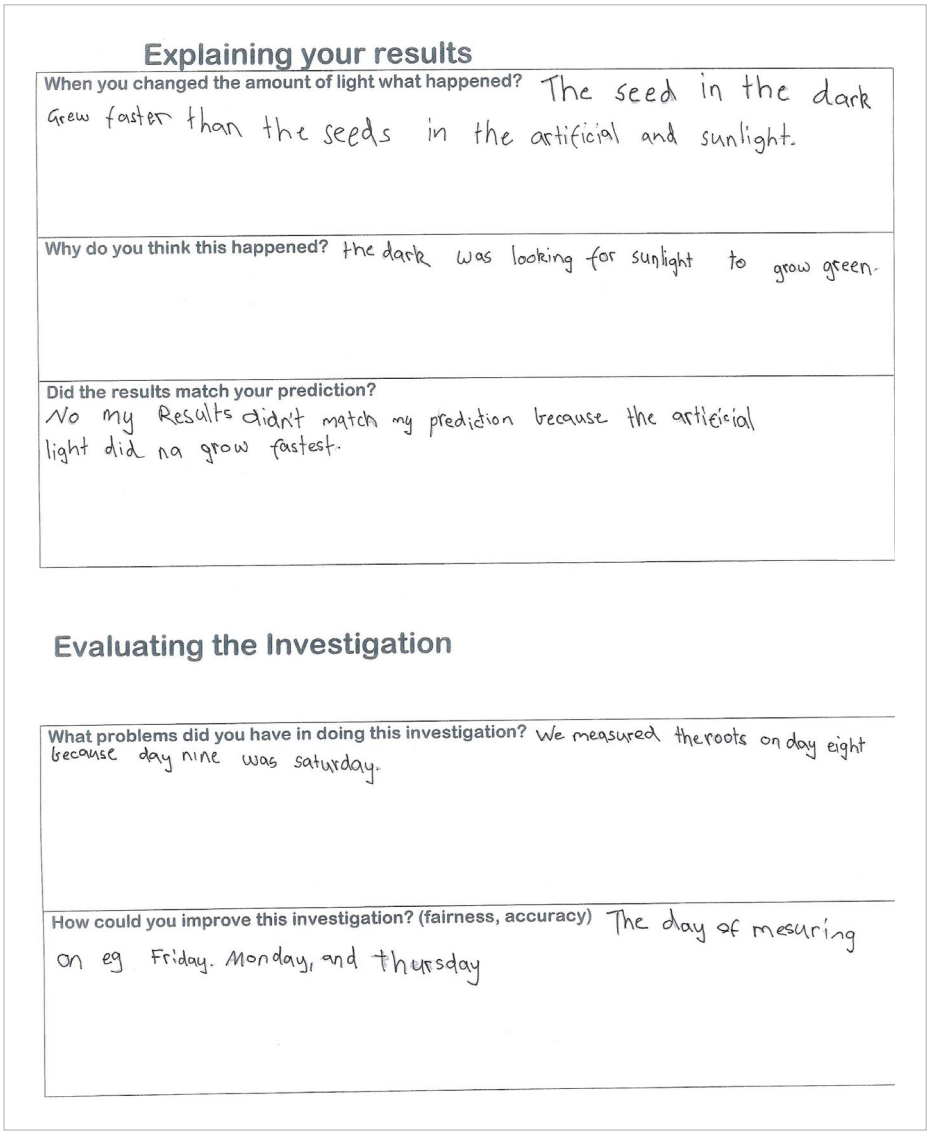


Annotations

Follows scaffolds to construct a column graph to organise data.

Records measurements made using a ruler.

Investigation report: Seed germination



Explaining your results

When you changed the amount of light what happened? The seed in the dark Grew faster than the seeds in the artificial and sunlight.

Why do you think this happened? the dark was looking for sunlight to grow green.

Did the results match your prediction?
No my Results didn't match my prediction because the artificial light did na grow fastest.

Evaluating the Investigation

What problems did you have in doing this investigation? We measured theroots on day eight because day nine was saturday.

How could you improve this investigation? (fairness, accuracy) The day of mesuring on eg Friday. Monday, and thursday

Annotations

Identifies the trend in the data collected.

Suggests an explanation for observations based on everyday knowledge.

Compares findings with predictions.

Identifies an improvement to the method.

Annotations (Overview)

The student completes a simple report, including a simple column graph, to communicate ideas, methods and findings.

Design report: Convict bag

Year 4 Science achievement standard

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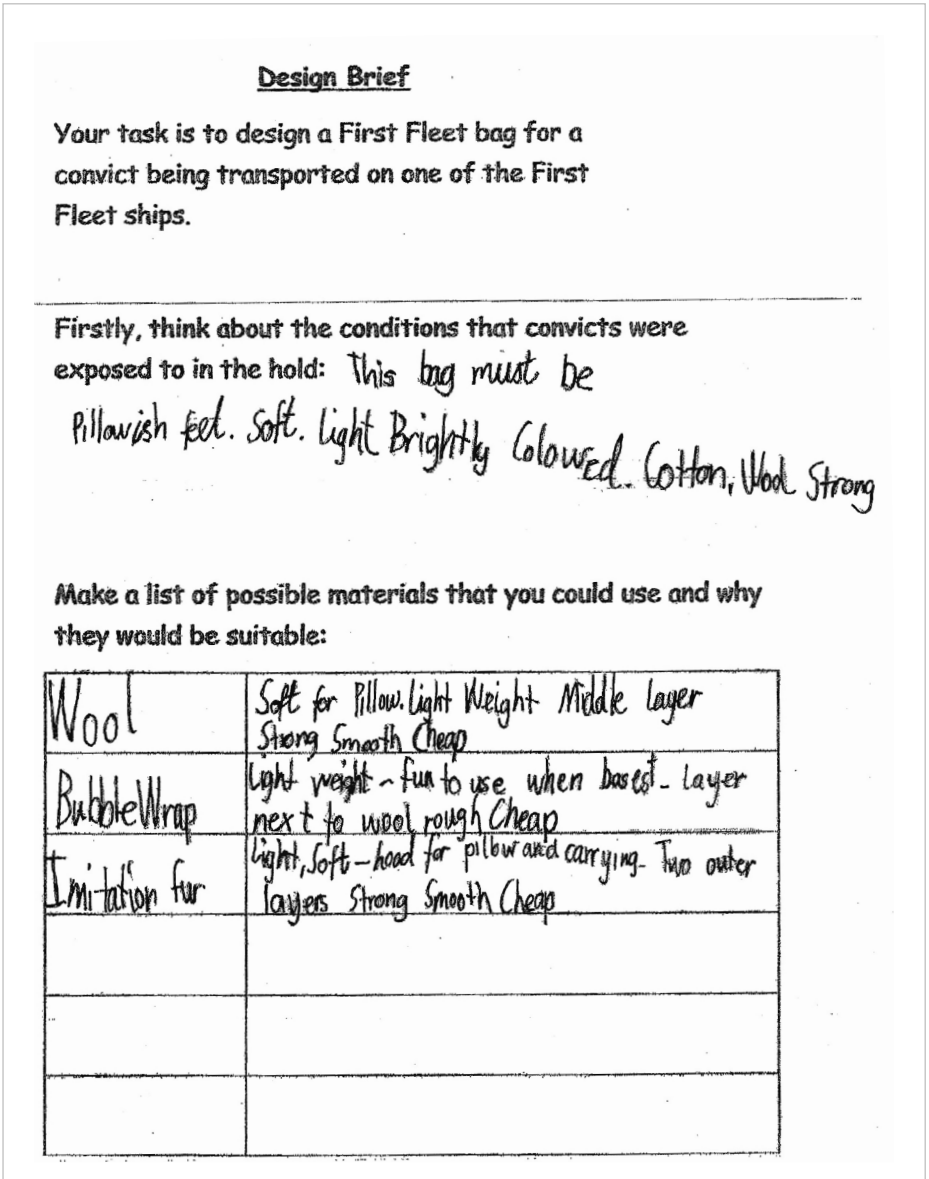
Summary of task

Students had investigated the experiences of convicts being transported on the First Fleet ships and discussed the conditions of life on board the ships. They had explored the properties of a range of natural and processed materials; and how the properties of materials can influence their use.

Students were asked to work individually to describe the conditions of life in the holds of the First Fleet ships and to design a bag for a convict that would suit these conditions and the situation of the convict.

Design report: Convict bag



Design Brief

Your task is to design a First Fleet bag for a convict being transported on one of the First Fleet ships.

Firstly, think about the conditions that convicts were exposed to in the hold: This bag must be Pillowish feel. Soft. Light Brightly Colowed. Cotton, Wool Strong

Make a list of possible materials that you could use and why they would be suitable:

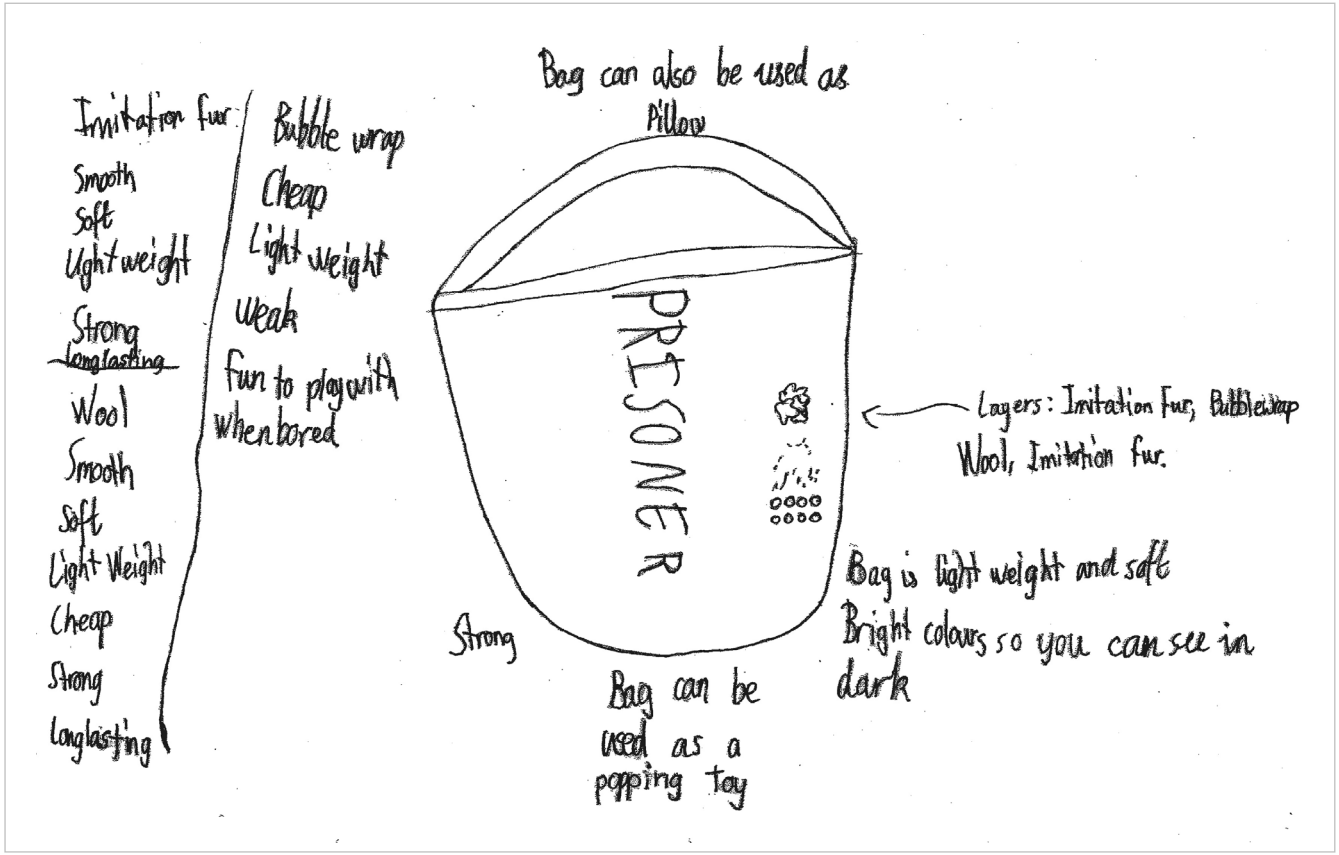
Wool	Soft for Pillow. Light Weight Middle Layer Strong Smooth Cheap
BubbleWrap	Light weight - fun to use when bored - Layer next to wool rough Cheap
Imitation fur	Light, Soft - head for pillow and carrying. Two outer layers Strong Smooth Cheap

Annotations

Identifies the required properties of the bag.

Selects contemporary materials for use and describes the useful properties of the material.

Design report: Convict bag



Annotations

Designs a three-layered bag that meets several purposes.

Describes the properties of the bag as an object that combines three different materials.

Identifies the observable properties of materials that suit the identified purpose.

Annotations (Overview)

The student completes a simple report, including an annotated diagram, to communicate ideas and findings.

Investigation report: Physical weathering effects

Year 4 Science achievement standard

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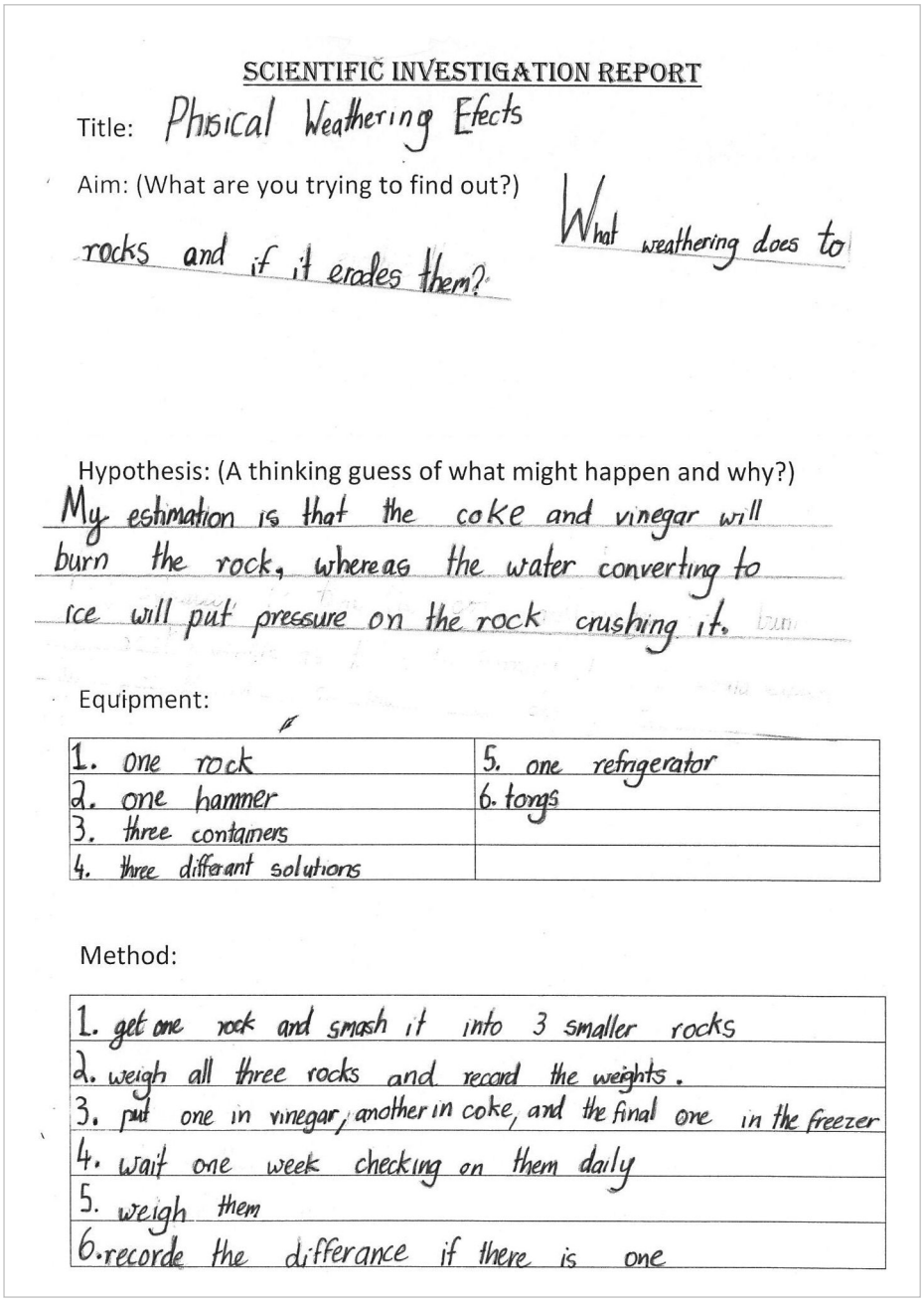
Summary of task

The class had explored a range of processes that impact on Earth's surface over time. They had investigated different models of weathering processes and had discussed how to plan investigations.

Students were asked to conduct an investigation on one cause of weathering. They were provided with a pro forma to represent their scientific investigation and were asked to reflect on their findings and compare their outcome with their initial hypothesis.

Investigation report: Physical weathering effects



SCIENTIFIC INVESTIGATION REPORT

Title: Physical Weathering Efects

Aim: (What are you trying to find out?)

What weathering does to rocks and if it erodes them?

Hypothesis: (A thinking guess of what might happen and why?)

My estimation is that the coke and vinegar will burn the rock, whereas the water converting to ice will put preesure on the rock crushing it.

Equipment:

1. one rock	5. one refrigerator
2. one hammer	6. tongs
3. three containers	
4. three differant solutions	

Method:

1. get one rock and smash it into 3 smaller rocks
2. weigh all three rocks and record the weights.
3. put one in vinegar, another in coke, and the final one in the freezer
4. wait one week checking on them daily
5. weigh them
6. recorde the differance if there is one

Annotations

Constructs a question for investigation.

Predicts the effects of the different weathering analogies on the rock.

Lists equipment required for the investigation.

Describes the steps to be followed in the investigation, including use of scales to collect formal measurements.

Investigation report: Physical weathering effects

Results: (Describe what happened)

After one week little shards of rock had broken off. I think that was caused by the pressure building up in the transformation of water to ice with the freez and thaw. the vinegar did the same thing as the freeze and thaw although the shards were powdery. The coke was gross, it was thick, moldy and even had dead flies in it.

Include a table to support your results:

TABLE OF RESULTS

Day1	Day2	Day3	Day4	Day5	Day6	Most affective
vinegar	64g	64g	64g	64g	64g	
coke	28g	28g	28g	28g	26g	*
Freeze and thaw	112g				112g	

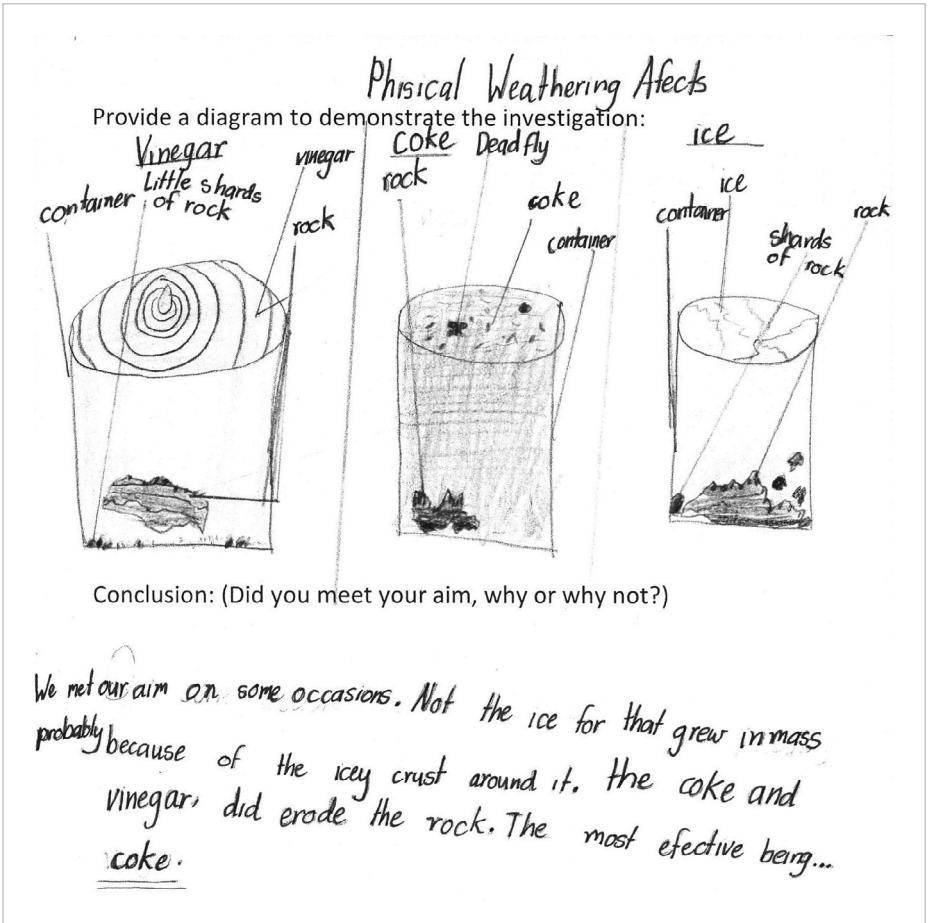
Annotations

Describes observations and suggests a reason for findings.

Refers to physical weathering associated with freezing and thawing.

Uses a table to organise data.

Investigation report: Physical weathering effects



Annotations

Describes observations and method using a labelled diagram.

Compares findings to predictions, that is, freezing the rock did not shatter the rock as expected but increased the mass.

Constructs a conclusion based on their observations and measurements.

Annotations (Overview)

The student completes a simple report, including an annotated diagram, to communicate ideas and findings.

Investigation report: Properties of shoes

Year 4 Science achievement standard

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Summary of task

Students investigated the properties of shoes used for different sports. They compared the structure and material of the soles and related this to the use of the shoe. They then conducted an investigation to gather data to support their ideas. They used a container to represent the shoe, and tested the ease with which different materials attached to the base would slide down a ramp. The students added marbles to see how much weight would be required to cause the container to move.

The students conducted the investigation in groups, with some teacher guidance, and completed a one-page record of their investigation. They were asked to reflect on the fairness of the investigation and to make an inference from their results about the best material for a particular purpose.

Investigation report: Properties of shoes

PROPERTIES OF SHOES

How many marbles will it take to move the container on the ramp?

Record the material on the base of the container and investigate what happens when you place marbles inside it.

MATERIAL	HOW MANY MARBLES?	WHAT HAPPENED?	WHY DO YOU THINK THAT HAPPENED?
foil paper	4	It slid	because marbles put weight
Sponge	30	It tipped	there was too much weight
material	60	It slid	because the material stuck
felt	12	It tipped	to much weight
paper bag	8	It slid	It was Sliperg
plastic bag	3	It slid	It was sliperg

Were the methods you used fair? Why/why not?

The method we used were fair because each time we used sticky tape. And we didn't change the ramp.

Choose one material and explain what kind of shoe it could be used on and why it is the best material for that shoe.

The material would be good for a shoe because it grips and can take a lot of weight and is flexible when you use it.

Annotations

Organises data in a provided table.

Suggests explanations for observations.

Explains that the methods were fair with reference to the way in which the equipment was set up.

Uses the observed properties of a material to explain a potential use of that material.

Annotations (Overview)

The student completes a simple report, including tabulated data, to communicate ideas and findings.