Science

Year 4
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 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 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 materials and uses these to describe how the materials are fit for a particular purpose (WS6). 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) and to predict likely outcomes of investigations (WS5). The student uses equipment to make observations (WS5). The student organises data in simple column graphs (WS5) and tables (WS6) and identifies patterns in data (WS5). The student suggests explanations for observations (WS5, WS6), compares findings to predictions (WS5) and suggests some reasons why the investigation methods were fair or not (WS5, WS6). The student completes a range of simple reports to communicate methods and findings (WS2, WS3, WS5, WS6).

Design task: Amusement park ride

Year 4 Science achievement standard

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

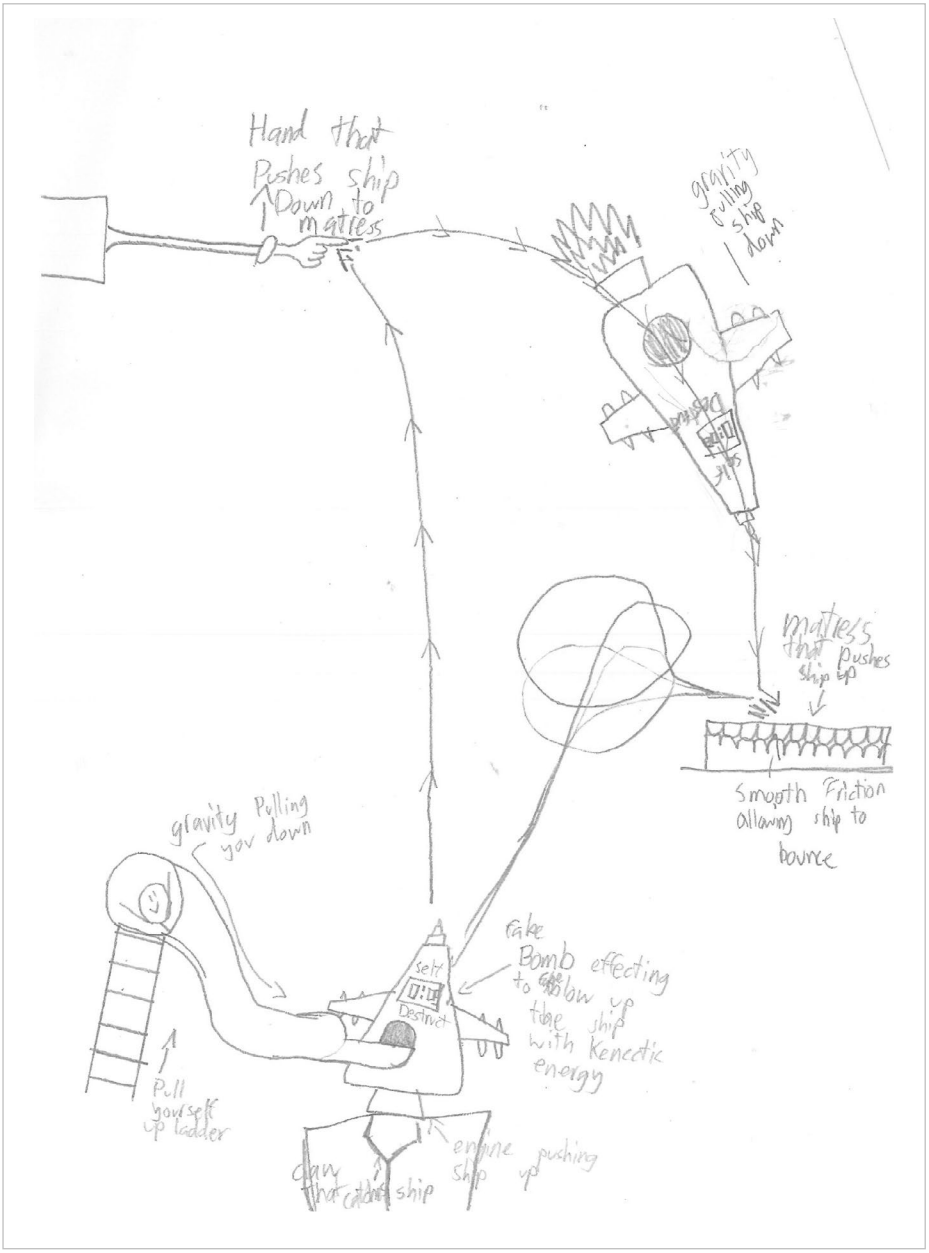
> *By the end of Year 4, students apply the observable properties of materials to explain how objects and materials can be used. They use contact and non-contact forces to describe interactions between objects. They discuss how natural and human processes cause changes to the Earth's surface. They describe relationships that assist the survival of living things and sequence key stages in the life cycle of a plant or animal. They identify when science is used to ask questions and make predictions. They describe situations where science understanding can influence their own and others' actions.*
>
> *Students follow instructions to identify investigable questions about familiar contexts and predict likely outcomes from investigations. They discuss ways to conduct investigations and safely use equipment to make and record observations. They use provided tables and simple column graphs to organise their data and identify patterns in data. Students suggest explanations for observations and compare their findings with their predictions. They suggest reasons why their methods were fair or not. They complete simple reports to communicate their methods and findings.*

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.

Design task: Amusement park ride



Annotations

Identifies that a push can initiate movement.

Identifies that gravity pulls the ship down.

Identifies that an object (the mattress) exerts a push on a colliding object (the ship).

Identifies that the engine in a ship causes a push away from the ground.

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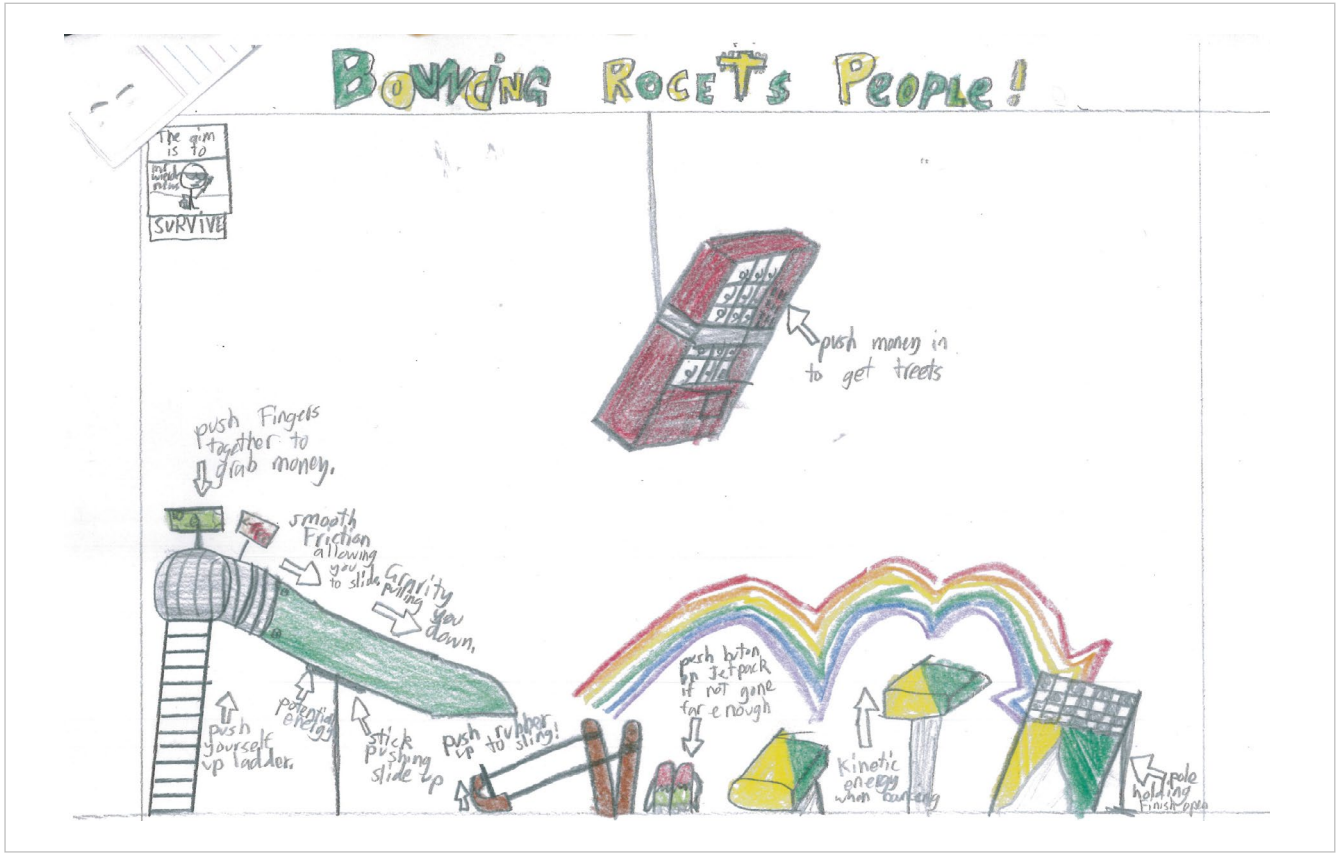
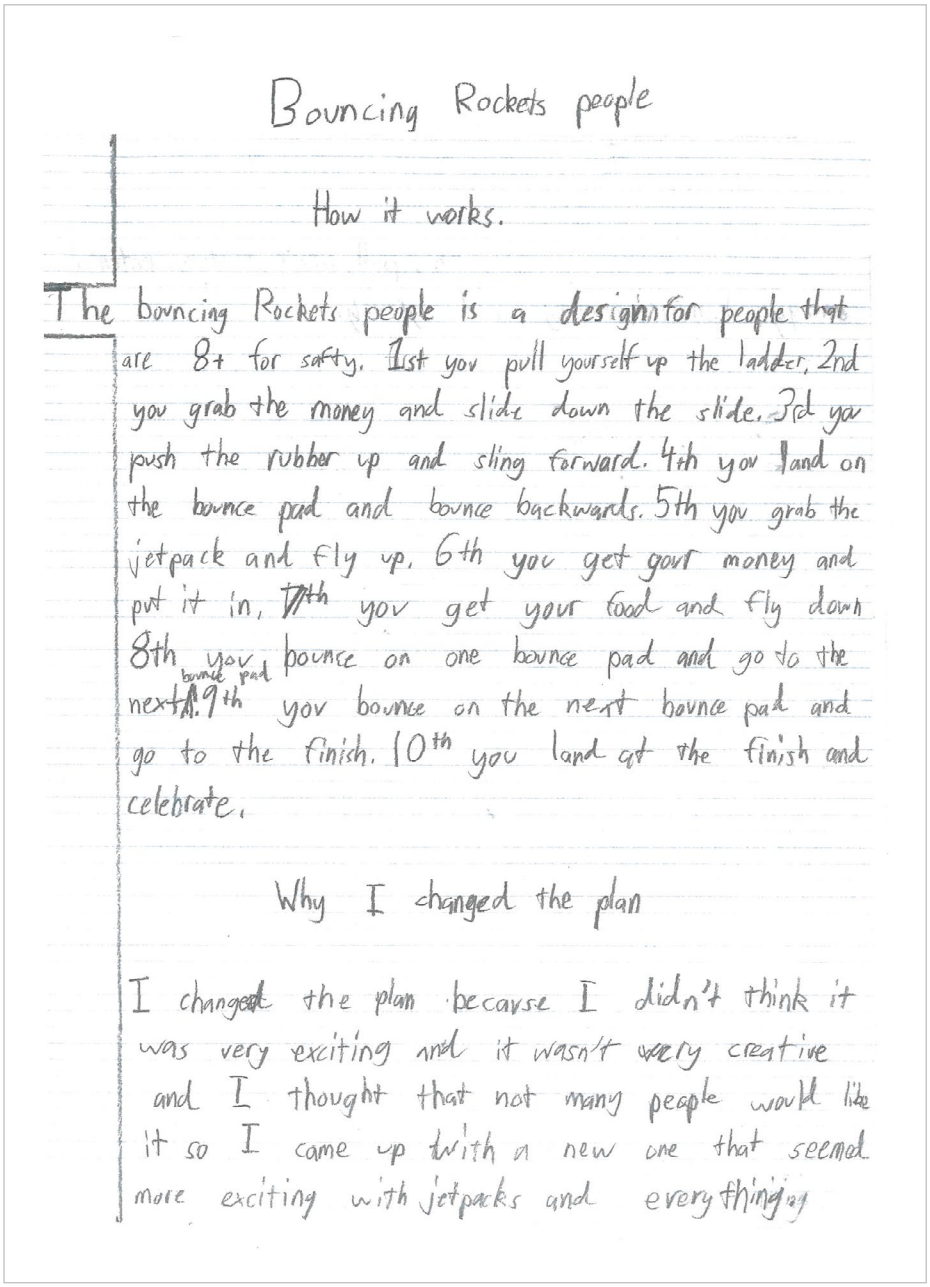
Design task: Amusement park ride



Annotations

Identifies that gravity causes a downward pull and a smooth surface allows movement.

Design task: Amusement park ride



Bouncing Rockets people

How it works.

The bouncing Rockets people is a design for people that are 8+ for safty. 1st you pull yourself up the ladder, 2nd you grab the money and slide down the slide. 3rd you push the rubber up and sling forward. 4th you land on the bounce pad and bounce backwards. 5th you grab the jetpack and fly up. 6th you get your money and put it in. 7th you get your food and fly down 8th you bounce on one bounce pad and go to the next bounce pad 9th you bounce on the next bounce pad and go to the finish. 10th you land at the finish and celebrate.

Why I changed the plan

I changed the plan becarse I didn't think it was very exciting and it wasn't very creative and I thought that not many people would like it so I came up with a new one that seemed more exciting with jetpacks and everything

Annotations

Annotations (Overview)

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

Report: Sports science

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 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

ABOUT ARCHERY

Image of a recurve bow.

- Archery is a sport where archers compete to score points using a bow and arrows. Archers compete with a recurve bow which has its limbs curving up to the top. The targets have a centre (usually ten points) a and two or more outer areas (points can vary). Here is an example of a target:

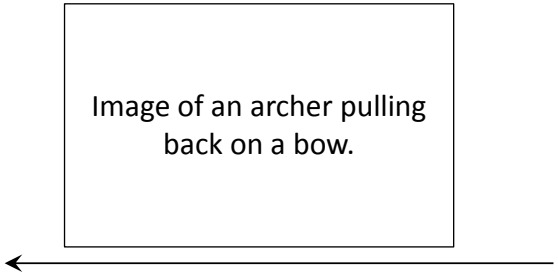
Image of an archery target.

Annotations

Report: Sports science

FORCES IN ARCHERY

- Friction is important for the archer to grip onto the bow and its important for the archer to grip onto the ground.



Annotations

Identifies contact and non-contact forces involved in archery.

Report: Sports science

SPORTS SCIENCE ANALYSIS

1. How heavy should the arrows be?
2. How tall should the bow be compared to your height?
3. What materials make the best bows and arrows?
4. How can we make arrows go faster and further away?

Annotations

Suggests how science can be used to ask questions.

Report: Sports science

IMPROVEMENTS TO ARROWS

- I think that if the arrows are tipped with a strong north magnet and the target has big, strong south magnets implemented into it then when shot, the arrows will be a lot more accurate and they will go a lot faster due to the magnetism of the north and sound magnets pulling together. Also I think that if you put grease on the arrows it will decrease the friction allowing the arrows to go faster.

Annotations

Uses science understanding to make predictions.

Demonstrates an understanding of non-contact forces involved in magnetism.

Suggests a way friction could be decreased to increase speed.

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Report: Sports science

IMPROVEMENTS TO GLOVES

- I think that if the gloves had more friction then would be able to grip on to the bow better. You should put bumps on the fingers of the gloves.

Annotations

Suggests a way friction could be increased to improve grip.

Report: Sports science

IMPROVEMENTS TO THE BOW

- I think that if the cord of the bow was more stretchy and strong then it would allows the cord to be pulled back further therefore letting the arrow go further and faster.

Annotations

Suggests that increasing the elasticity and strength of the cord would enable the arrow to go further and faster.

Report: Sports science

THE ARCHER

- The archer needs to be very careful when pulling back a bow otherwise he/she might get twanged on his/her arm. To prevent this most archers wear arm guards. Also the archer needs to be careful where the bow is aimed otherwise someone might get involved in a horrific accident. And before entering a competition the archer would need to have trained well.

Annotations

Report: Sports science

THE END

- Thank you for watching!

Annotations

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.

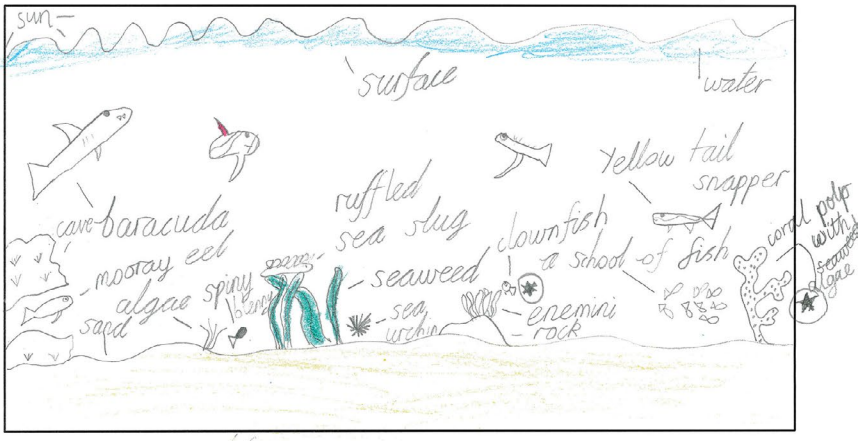
Students were asked to draw a reef showing and labelling living and non-living components. They were asked to choose one of the animals presented in the films and explain what living and non-living parts of the environment it needed to survive.

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: spiny blenny – a predator, a carnivore

Survival needs of my animal:

Non-living parts of the environment

Part	Because...
sun	it transfers energy onto the fish.
water	it enables the fish to breathe.
a small cave	it serves as a home.
sand	

Living parts of the environment

Part	Because...
algae	it is a food source for the fish it eats.
plankton	it is a food source for the fish. Prey.
Krill	it is a food source for the fish. Prey.

If we took away water (*non-living part*) from the environment, my animal would die from suffocation.

If we took away Krill (*living part*) from the environment, my animal would have less food to choose from, and eventually, it would die because he would not have enough food to eat.

Annotations

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

Identifies two organisms that help each other to survive.

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

Identifies how a living thing requires a range of 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 but that over time the animal may have fewer food sources, which may impact its survival.

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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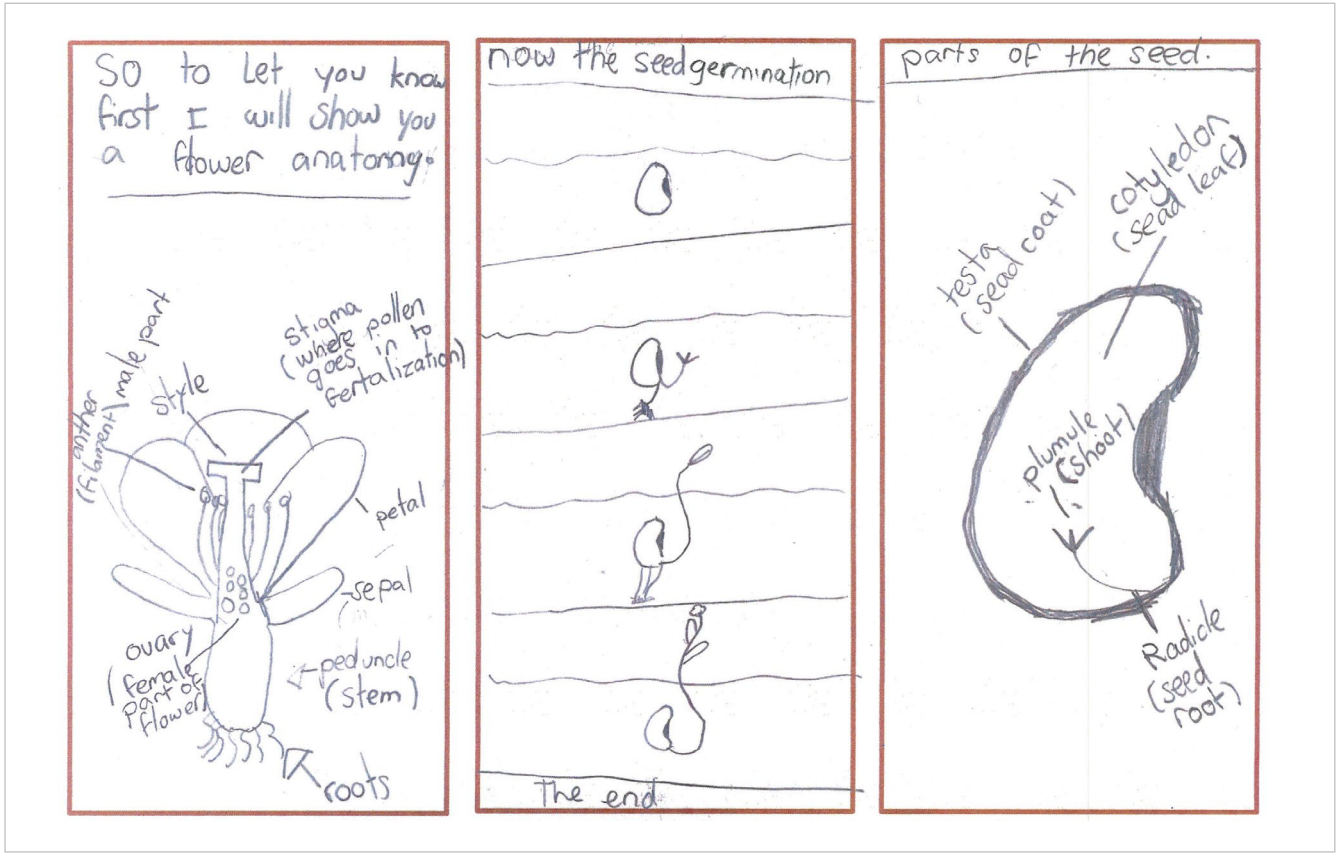
Pamphlet: Plant life cycle



Annotations

Constructs a labelled diagram of a flower showing structural features.

Constructs diagrams showing germination and growth.

Constructs a labelled diagram of a seed showing structural features.

Science

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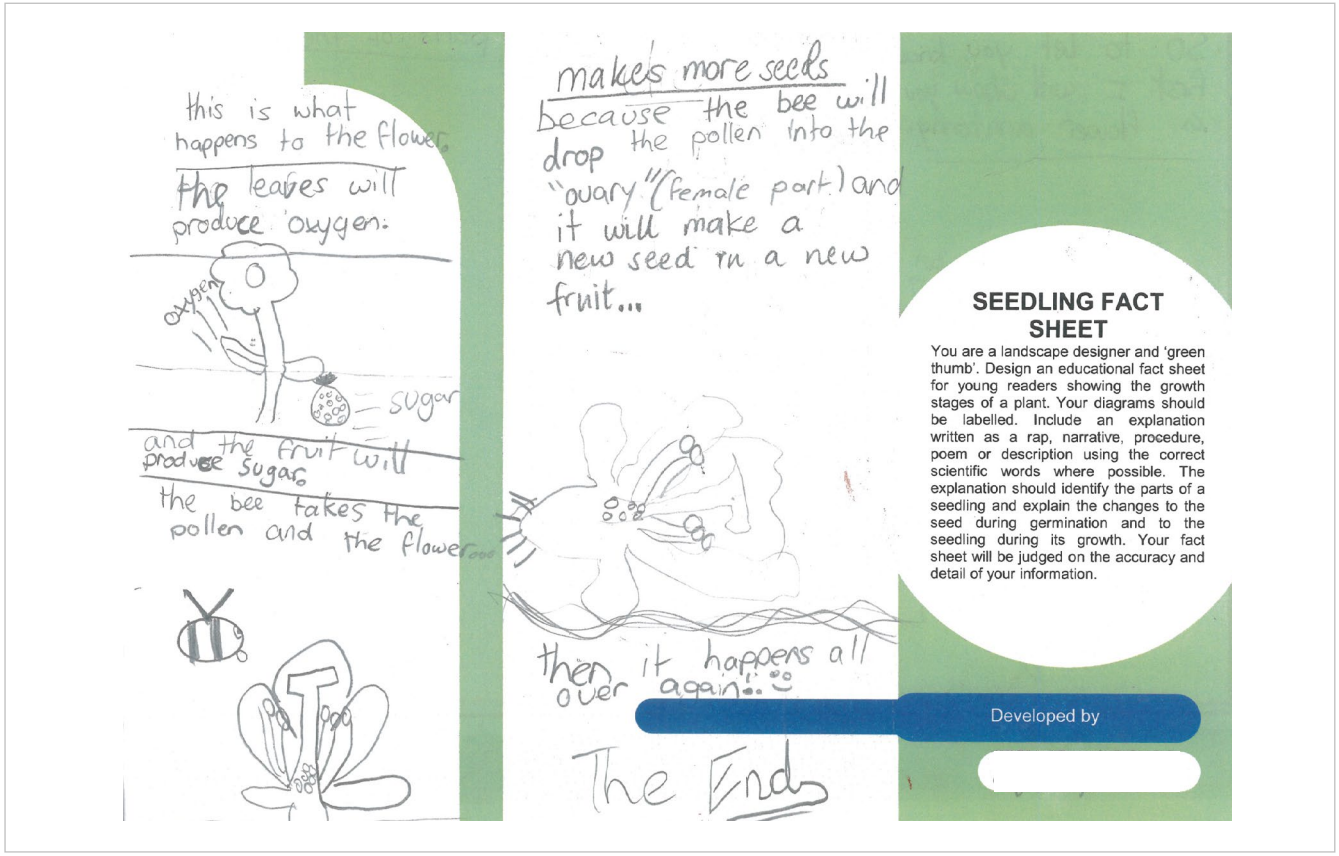
Pamphlet: Plant life cycle



Annotations

Identifies the role of fertilisation in the plant life cycle.

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

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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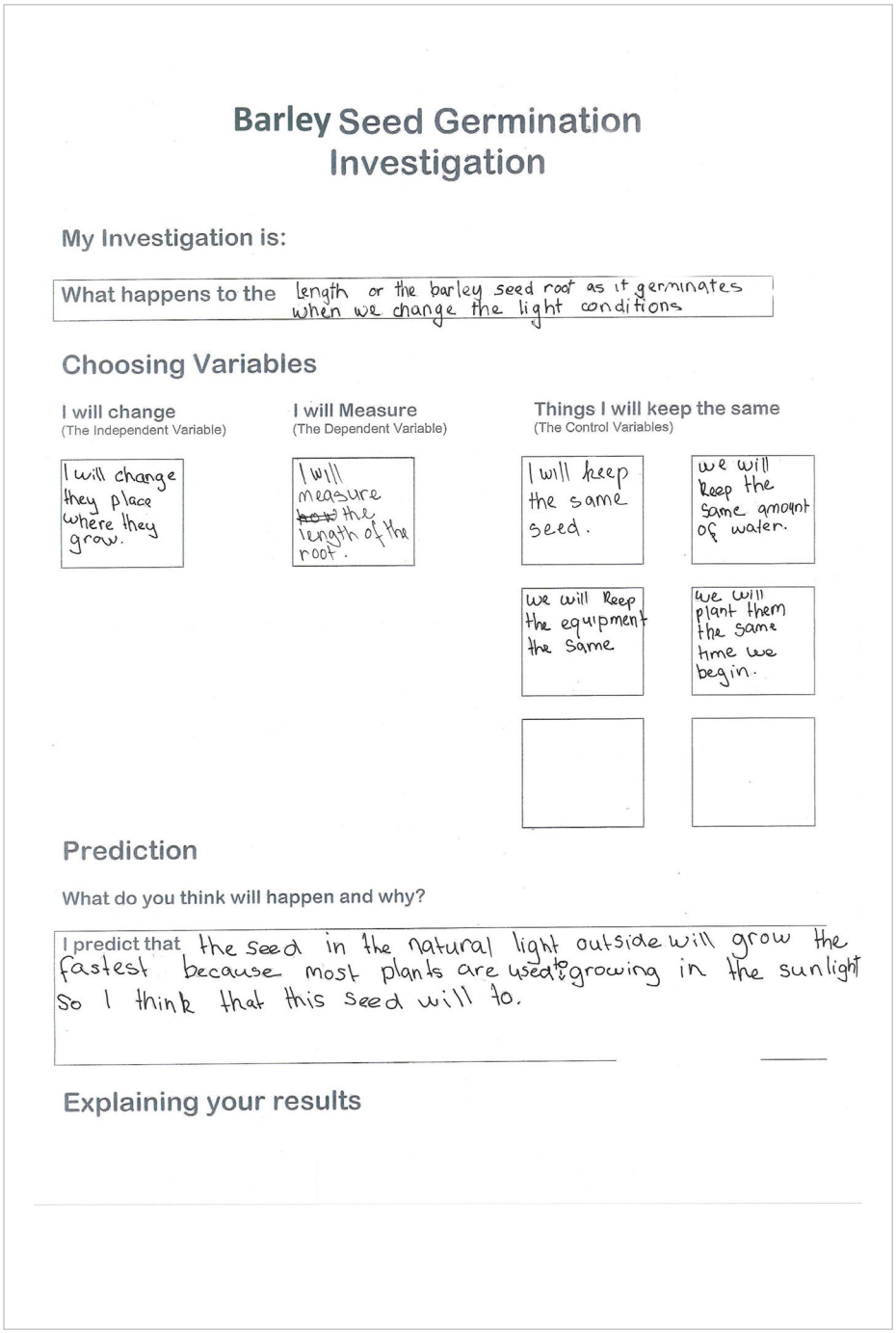
Summary of task

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:

What happens to the length or the barley seed root as it germinates when we change the light conditions

Choosing Variables

I will change (The Independent Variable)	I will Measure (The Dependent Variable)	Things I will keep the same (The Control Variables)	
I will change they place where they grow.	I will measure ~~how~~ the length of the root.	I will keep the same seed.	we will keep the same amount of water.
		we will keep the equipment the same	we will plant them the same time we begin.

Prediction

What do you think will happen and why?

I predict that the seed in the natural light outside will grow the fastest because most plants are used to growing in the sunlight so I think that this seed will to.

Explaining your results

Annotations

With teacher guidance, constructs a detailed question to be investigated.

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

Makes a prediction and provides reasoning based on everyday experiences.

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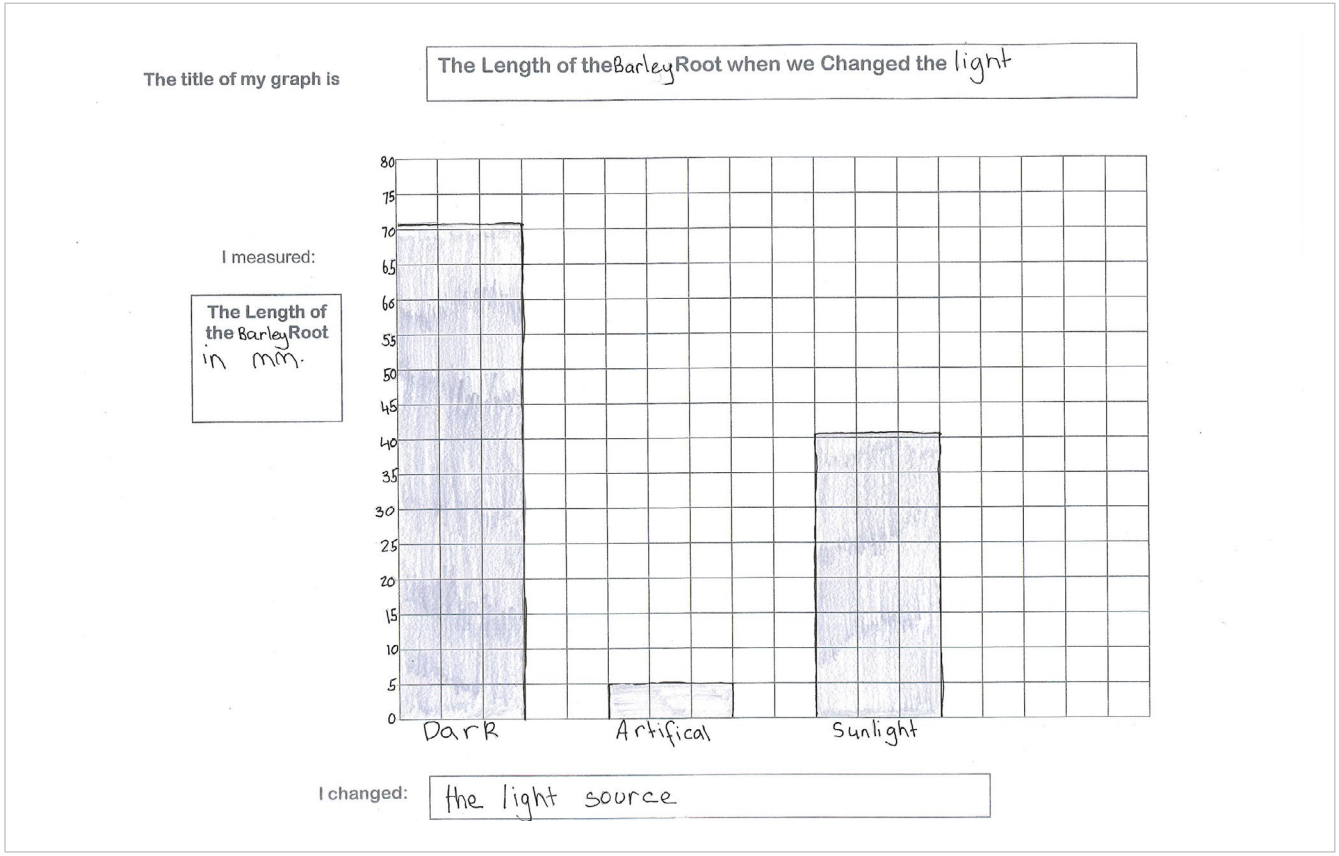
Investigation report: Seed germination

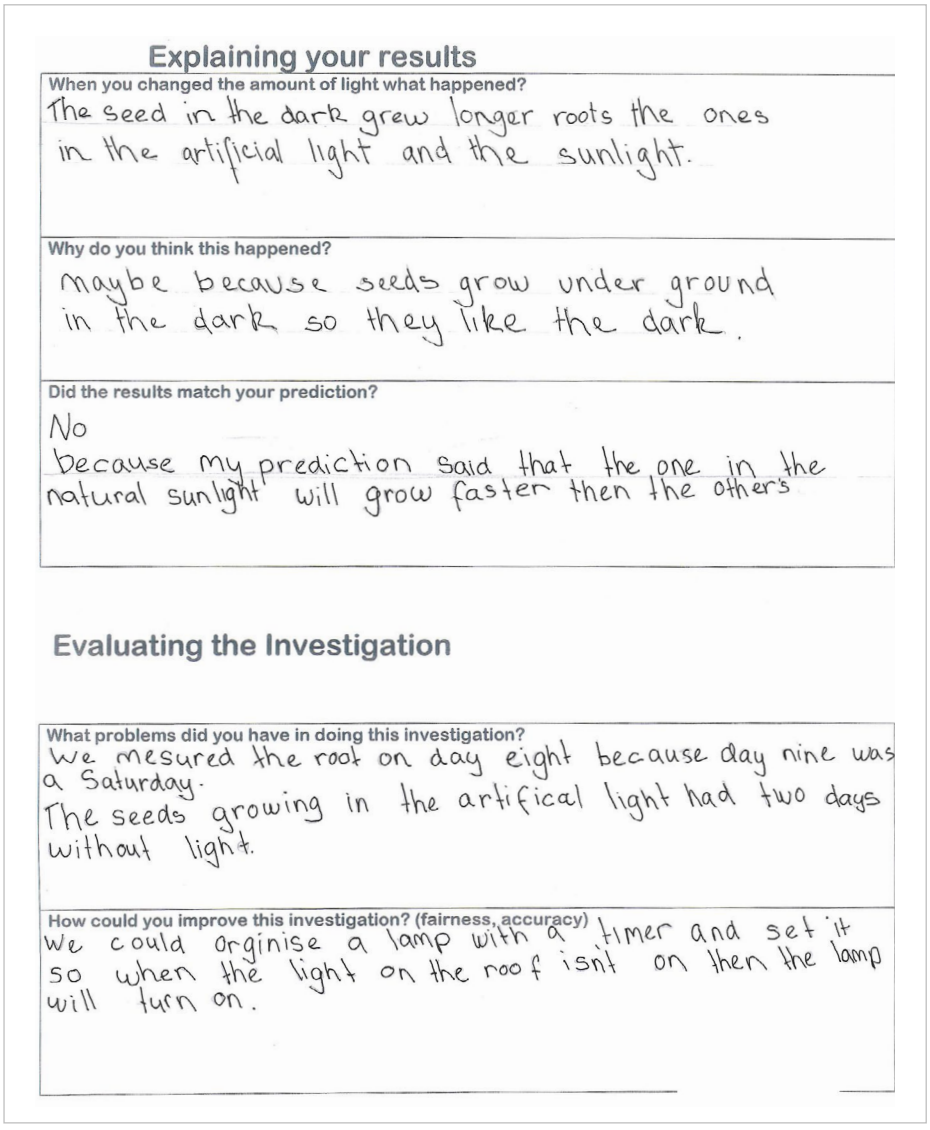


Annotations

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 longer roots the ones in the artificial light and the sunlight.

Why do you think this happened?

maybe because seeds grow under ground in the dark so they like the dark.

Did the results match your prediction?

No
because my prediction said that the one in the natural sunlight will grow faster then the others

Evaluating the Investigation

What problems did you have in doing this investigation?

We mesured the root on day eight because day nine was a Saturday.
The seeds growing in the artifical light had two days without light.

How could you improve this investigation? (fairness, accuracy)

We could orginise a lamp with a timer and set it so when the light on the roof isnt on then the lamp will turn on.

Annotations

Provides a detailed description of the trend in the data collected.

Suggests a plausible explanation for observations based on everyday knowledge.

Compares findings with predictions.

Identifies a problem with the method and a plausible improvement to improve fairness.

Annotations (Overview)

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

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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?
felt	3	it side down very fast	Because it had endde weight on it.
cloth	12	it sloly sid down	Because it didnt have endde weight.
Paper Bag	0	~~It~~ as soon as we let go it slided	Becase it was smoth
~~fail~~ foil	0	~~Because it is slipery~~	Because it was slippery
Spung	7	it moved slowly	Beause it is more gripply
Plastic bag	0	as soon as it got slid	Because is it was very smoth and slipey

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

Yes. Because some were slipery and some were not slipery. And we ~~tosed~~ used the sme high for the nemp and we droped it with the same force

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

the spunch was good for every thing on a shoe because it is verry gripply.

Annotations

Organises data in a provided table.

Suggests plausible explanations that explain different observations.

Explains that the methods were fair with reference to the equipment set up and the way the investigation was conducted.

Uses an observed property 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.