Science

Year 5
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 5 SCIENCE

This portfolio provides the following student work samples:

Sample 1	Worksheet: Solids, liquids, gases
Sample 2	Data analysis: Patterns in the solar system
Sample 3	Investigation report: Bird beaks
Sample 4	Investigation report: Hide and seek
Sample 5	Investigation report: Viscosity
Sample 6	Investigation report: Can light go around corners?

In this portfolio, the student classifies a range of common substances as solids, liquids and gases, and demonstrates an understanding of the observable properties and behaviours that enable that classification (WS1). The student describes a number of planets in our solar system and compares them to Earth in terms of size and distance from the sun (WS2). The student investigates different adaptations and explains how structural features relate to function (WS3, WS4). The student applies the understanding that light travels in straight lines and is reflected to direct light around a corner (WS6).

Science

Year 5

Satisfactory

The student demonstrates the ability to follow teacher instructions, to pose questions for investigation, predict the outcome of changing variables (WS4, WS5) and to use equipment safely to achieve a desired outcome (WS5). The student collates data in a provided table (WS2, WS3, WS4) and constructs a column graph to organise data and identify patterns (WS3, WS4, WS5), using the data to explain their reasoning (WS2, WS3, WS4).The student describes ways to improve the fairness of investigation methods (WS4, WS5) and communicates ideas, methods and findings using a range of text types (WS2, WS3, WS4, WS5, WS6).

Worksheet: Solids, liquids, gases

Year 5 Science achievement standard

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

> *By the end of Year 5, students classify substances according to their observable properties and behaviours. They explain everyday phenomena associated with the transfer of light. They describe the key features of our solar system. They analyse how the form of living things enables them to function in their environments. Students discuss how scientific developments have affected people's lives and how science knowledge develops from many people's contributions.*
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> *Students follow instructions to pose questions for investigation, predict what might happen when variables are changed, and plan investigation methods. They use equipment in ways that are safe and improve the accuracy of their observations. Students construct tables and graphs to organise data and identify patterns. They use patterns in their data to suggest explanations and refer to data when they report findings. They describe ways to improve the fairness of their methods and communicate their ideas, methods and findings using a range of text types.*

Summary of task

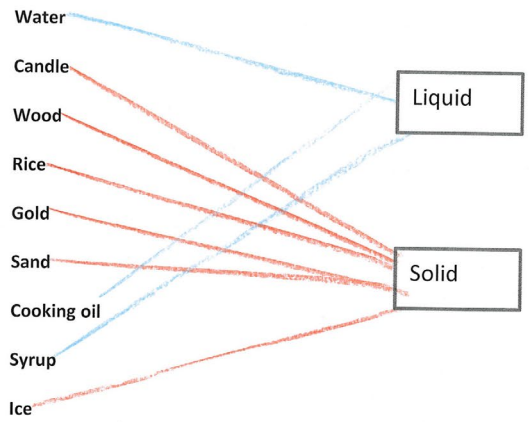
Students had completed a unit on classifying states of matter (solid, liquid and gas) based on observable properties.

They were required to complete this worksheet as a review of their learning across the unit. They completed the task over one hour in class.

Worksheet: Solids, liquids, gases

Solids, liquids and gases

1. These solids and liquids are all mixed up. Draw an arrow to show which of the materials are liquid and which are solid.



2. Fill in the table by **putting a cross (x) in the correct box or boxes**:

	Solid	Liquid	Gas
a. It fills the shape of its container		√	
b. It stays the same shape	√		
c. The air around us is made of this			√
d. If you freeze a liquid it will become a...	√		
e. If you boil water it will become a...			√
f. It has weight	√		

3. Use the words from the list below to complete the sentences:

Word list: **heat, solids, freezes, shape, volume, cool, melts**

a. Liquids change ..... shape ..... when you move them in a container.

b. ..... Solids ..... don't change shape when you move them.

Annotations

Classifies common solids and liquids.

Identifies most properties of solids and liquids and some properties of gases.

Identifies that solids have weight.

Worksheet: Solids, liquids, gases

c. Moving a liquid from a bottle to a glass does not change its ....Volume.....

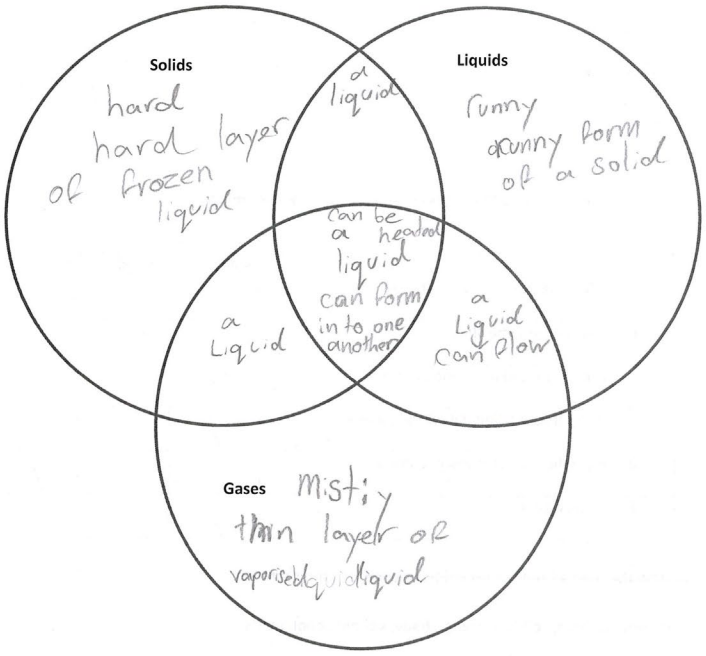
d. When a solid ....melts..... it turns into a liquid.

e. When a liquid ....freezes..... it turns into a solid.

f. To turn a solid into a liquid, you must ....heat..... it.

g. To turn a liquid into a solid, you must add ....cool.....

4. Complete the Venn diagram below to show as much as you know about solids, liquids and gases. Remember to use the overlapping parts of the diagram to show what they have in common.



Annotations

Identifies that adding or removing heat can cause a change of state.

Identifies that liquids can change state to become solids and gases.

Data analysis: Patterns in the solar system

Year 5 Science achievement standard

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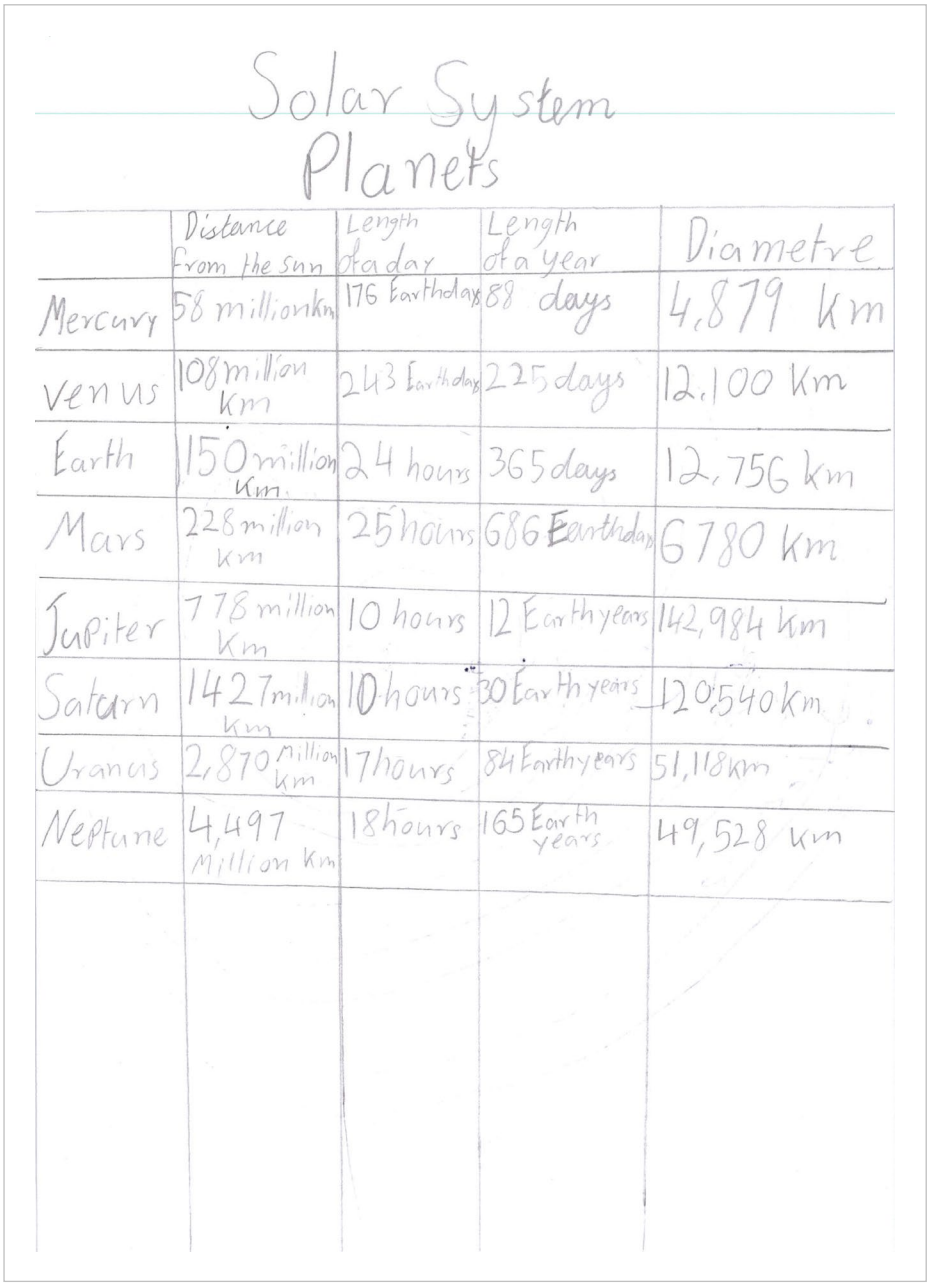
Summary of task

Students had investigated models of the solar system, including exploring a digital learning object. They had discussed the types of data that could be gathered about the solar system, and the ways in which patterns in data can assist us in making predictions.

Students were asked to extract and organise a set of data related to the planets in the solar system. As a whole class they constructed a scale model of the solar system on the school oval. They were then provided with a set of questions that prompted them to identify patterns in the data. Students spent one lesson constructing their table from the provided data, another lesson constructing and discussing their scale model, and a final lesson completing the discussion questions.

Data analysis: Patterns in the solar system



Solar System Planets

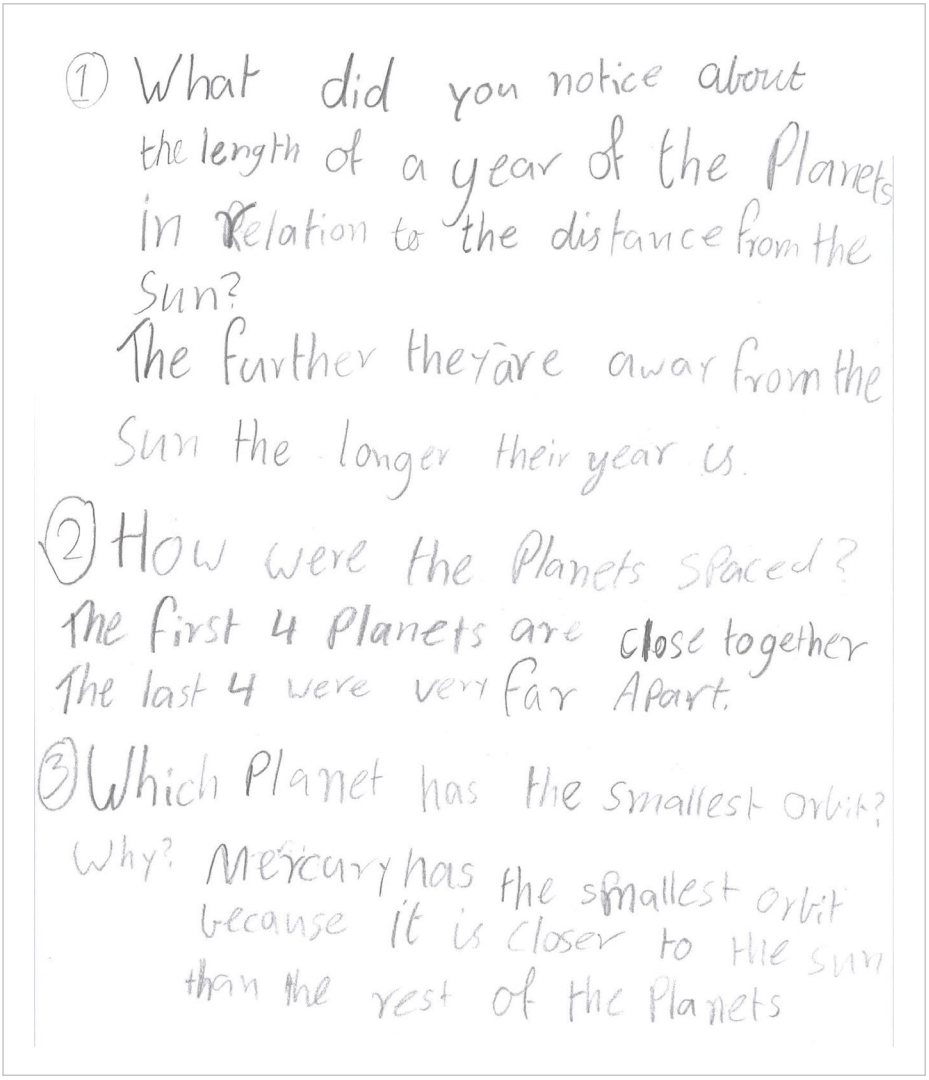
	Distance from the sun	Length of a day	Length of a year	Diametre
Mercury	58 millionkm	176 Earthdays	88 days	4,879 km
venus	108million km	243 Earthdays	225 days	12,100 km
Earth	150million km.	24 hours	365 days	12,756 km
Mars	228million km	25hours	686 Earthdays	6780 km
Jupiter	778million km	10 hours	12 Earth years	142,984 km
Saturn	1427million km	10hours	30 Earth years	120,540km
Uranus	2,870million km	17hours	84 Earth years	51,118km
Neptune	4,497 Million km	18hours	165 Earth years	49,528 km

Annotations

Constructs a table to record and organise data collected.

Identifies the planets in the solar system, and that they have varying properties (distance from the sun, day length, year length, diameter).

Data analysis: Patterns in the solar system



(1) What did you notice about the length of a year of the Planets in Relation to the distance from the Sun?
The further they are awar from the Sun the longer their year is.

(2) How were the Planets spaced?
The first 4 Planets are close together The last 4 were very far Apart.

(3) Which Planet has the smallest orbit?
Why? Mercury has the smallest orbit because it is closer to the sun than the rest of the Planets

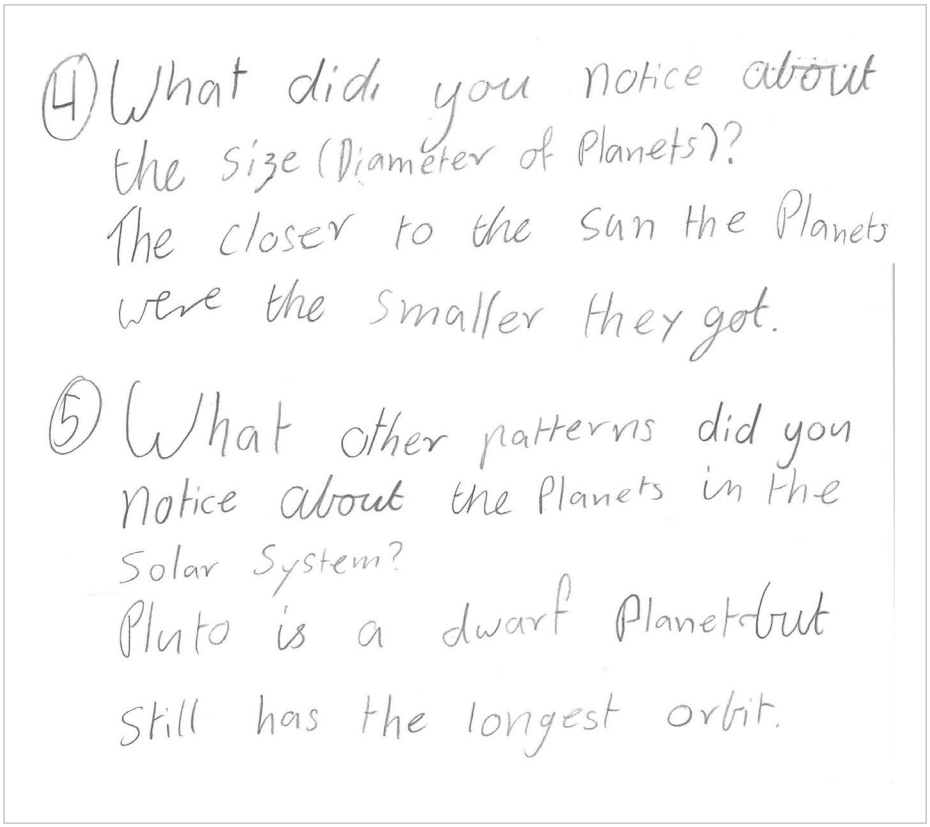
Annotations

Identifies patterns in data by relating two variables.

Observes patterns in the data.

Uses data to answer a research question and provides an explanation with reference to features of the solar system.

Data analysis: Patterns in the solar system



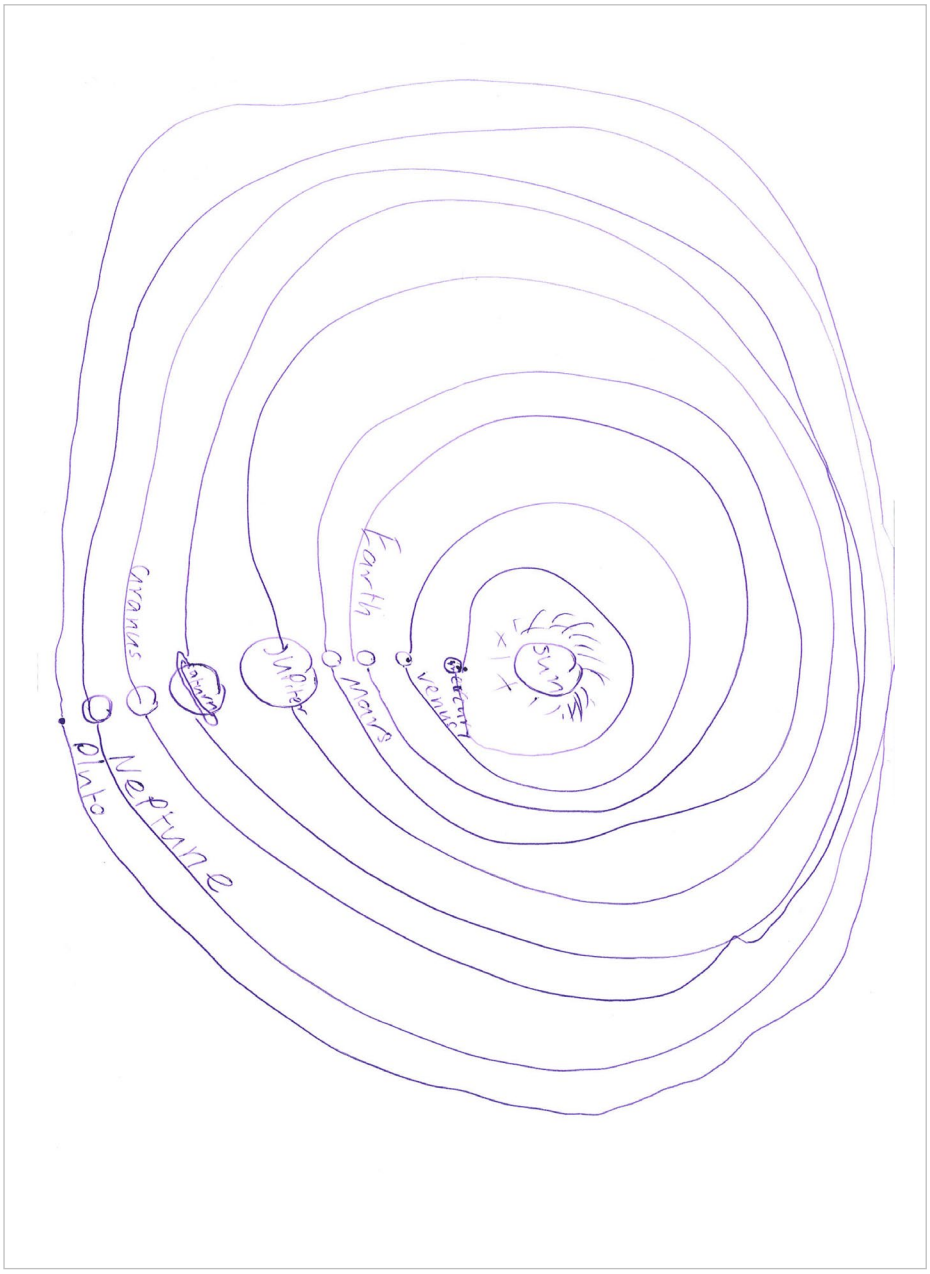
(4) What did you notice about the size (Diameter of Planets)?
The closer to the Sun the Planets were the smaller they got.

(5) What other patterns did you notice about the Planets in the Solar System?
Pluto is a dwarf Planet but still has the longest orbit.

Annotations

Identifies a phenomenon that does not fit the observed pattern.

Data analysis: Patterns in the solar system



Annotations

Constructs a labelled diagram of the solar system.

Annotations (Overview)

The student communicates ideas and findings using tables, written text and labelled diagrams.

Investigation report: Bird beaks

Year 5 Science achievement standard

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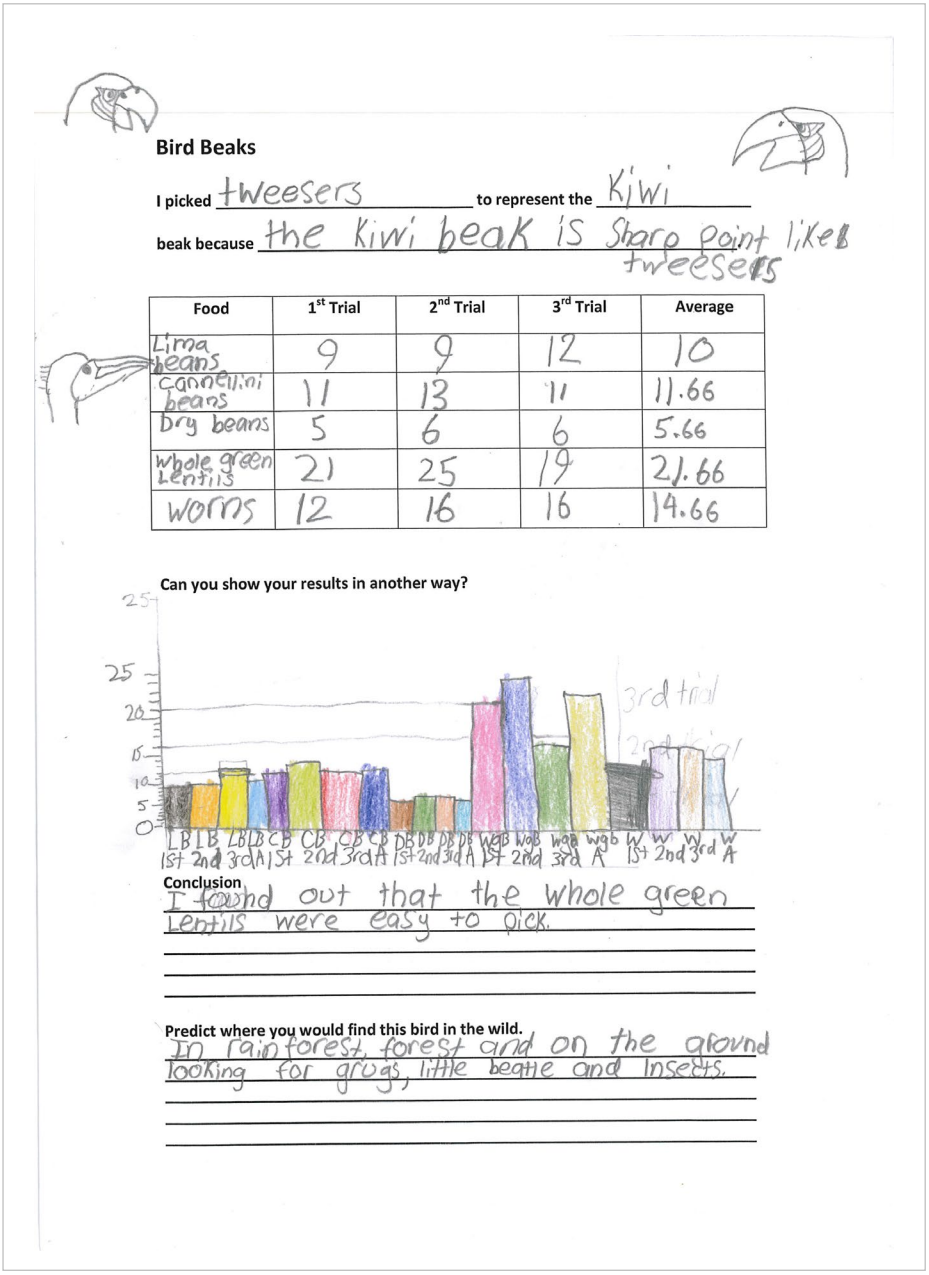
Summary of task

Students had been studying adaptations and the way they could model animal adaptations to make predictions about how those adaptations enabled the animal to survive in their environment.

Students were asked to independently complete an investigation into the relationship between bird beak shape and food size. The investigation required them to model the beak shape of a chosen bird, and see how much of each food type they could collect in 10 seconds. Timing was completed by counting, for example, 'one thousand and one, one thousand and two'.

Investigation report: Bird beaks



Bird Beaks

I picked tweesers to represent the Kiwi

beak because the Kiwi beak is Sharp point like a tweesers

Food	1st Trial	2nd Trial	3rd Trial	Average
Lima beans	9	9	12	10
Cannellini beans	11	13	11	11.66
Dry beans	5	6	6	5.66
Whole green Lentils	21	25	19	21.66
worms	12	16	16	14.66

Can you show your results in another way?

Conclusion

I found out that the whole green Lentils were easy to pick.

Predict where you would find this bird in the wild.

In rainforest, forest and on the ground looking for grugs, little beatle and insects.

Annotations

Selects a tool to model the beak based on structural properties of the beak.

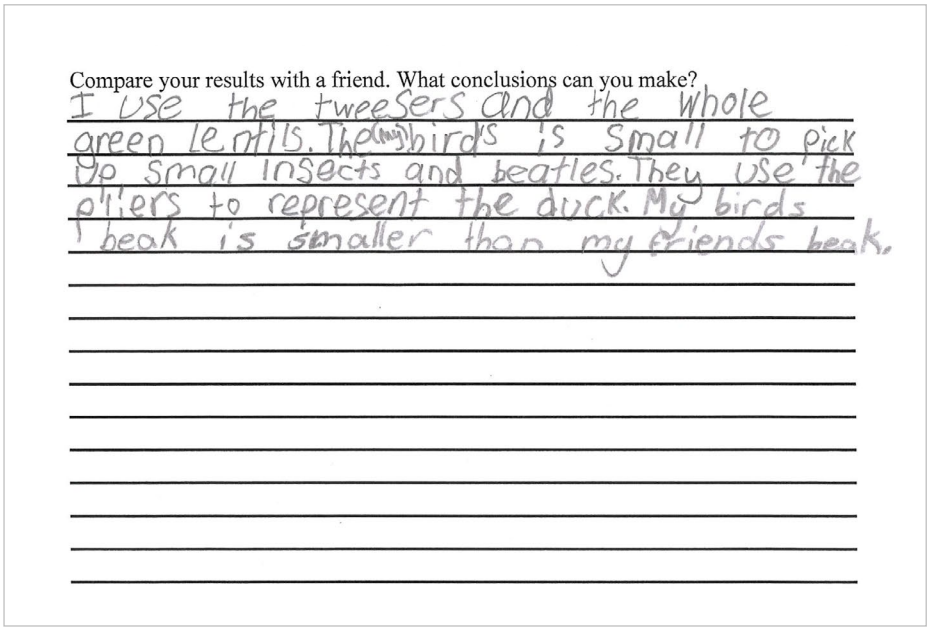
Records data in a table and calculates summary data.

Constructs a column graph to represent all the data collected in the table (trial and average data).

States a conclusion based on data collected.

Predicts where the bird might be found, and the type of food it might eat.

Investigation report: Bird beaks



Compare your results with a friend. What conclusions can you make?

I use the tweesers and the whole green lentils. The (my) bird's is small to pick up small insects and beatles. They use the p'liers to represent the duck. My birds beak is smaller than my friends beak.

Annotations

Explains that different tools were required to model different beak sizes on different birds.

Annotations (Overview)

The student communicates ideas and findings using tables, graphs and written text.

Investigation report: Hide and seek

Year 5 Science achievement standard

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Summary of task

The class participated in a brainstorming activity in which they identified the physical adaptations of a range of animals and the advantages of those adaptations. Students then separated into small groups to complete an activity which used small coloured sticks to represent organisms in a range of 'environments', such as green grass, leaf matter, soil and sand.

The students reviewed the data collection process as a whole group. They were then asked to graph their data and compare the survival rates of the organisms in each environment. They were also required to apply their findings to various real-world scenarios. The final stage of the activity involved an analysis of the fairness of the investigation and consideration of possible improvements to the investigation.

Investigation report: Hide and seek

Hide and Seek

List three animals and their physical adaptation and how it is important for their survival in the environment.

Remember to state how these adaptations are important.

1. Lion - Sharp teeth to bite their preys flesh to their preys bones.
2. The Arabian Camel - their hump helps them survive by storing fat and gives them food and water when they need it.
3. Giraffe - their long neck helps them see over trees to see if there are any predators approaching.

Investigation:

You will investigate the effect colour can have on the survival of organisms in different habitats. Working in groups of three, one group member will need to scatterer the match-sticks and the other two will be the collectors or 'predators'. You will need to select three different environments or 'habitats'. For example: green grass; drier grassy area; dirt; sandy ground; concrete; paving; leaf litter; etc. Predict which coloured matchstick or 'animal' would have the best chance of surviving in each of your three environments.

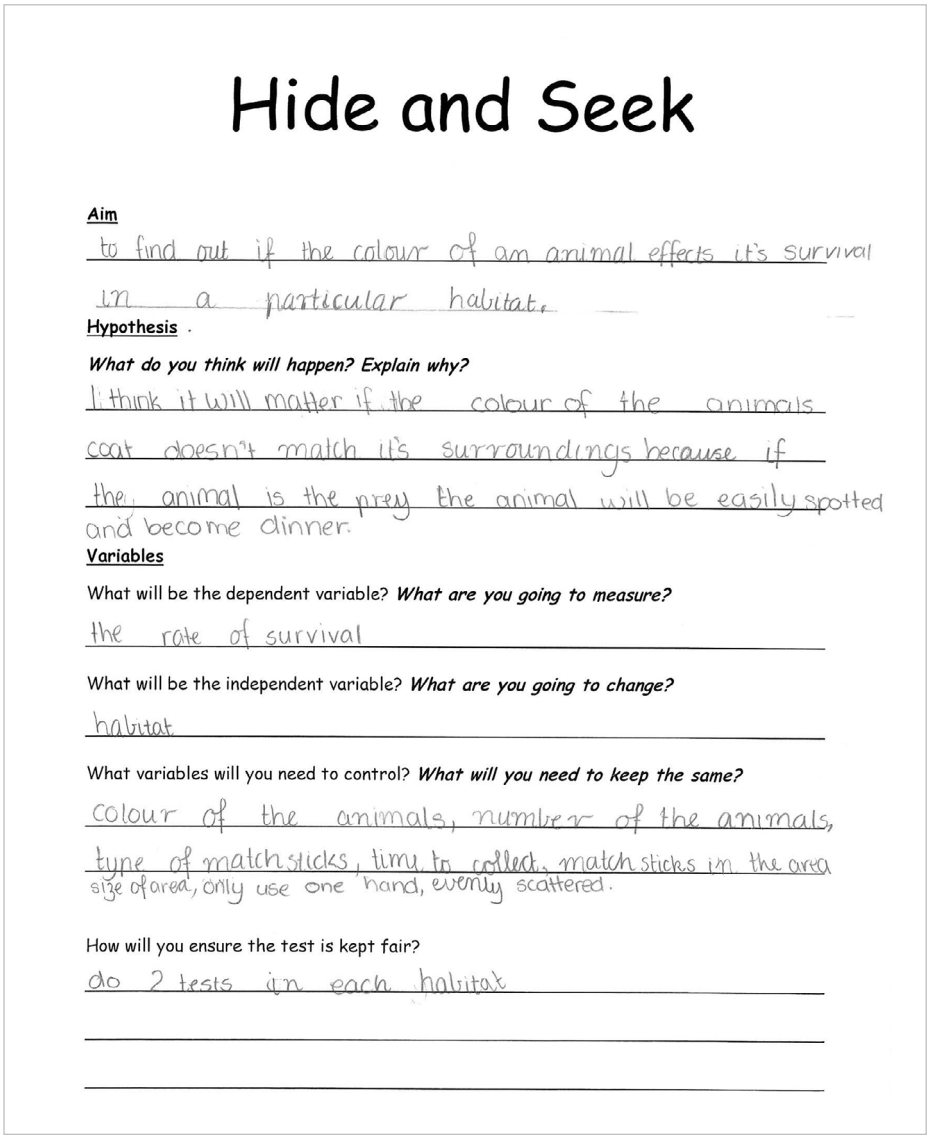
Method:

1. Measure out a 2m x 2m area on your selected surface. Mark the corners of the square with sticks or stones. Put string around the corners to mark out the square.
2. One person in the group scatters the matchstick over the marked area.
3. Start the stopwatch and allow the 'predators' 15 seconds to find as many matchsticks as they can.
4. Count the number of each colour of matchstick and record this in your data table.
5. Collect all the matchsticks and repeat steps 2-4.
6. Repeat steps 2-5 using other surfaces or environments.

Annotations

Identifies structural features of living things that help them to survive in their environments.

Investigation report: Hide and seek



Hide and Seek

Aim

to find out if the colour of an animal effects it's survival in a particular habitat.

Hypothesis .

What do you think will happen? Explain why?

I think it will matter if the colour of the animals coat doesn't match it's surroundings because if the animal is the prey the animal will be easily spotted and become dinner.

Variables

What will be the dependent variable? ***What are you going to measure?***

the rate of survival

What will be the independent variable? ***What are you going to change?***

habitat

What variables will you need to control? ***What will you need to keep the same?***

colour of the animals, number of the animals, type of matchsticks, time to collect, matchsticks in the area size of area, only use one hand, evenly scattered.

How will you ensure the test is kept fair?

do 2 tests in each habitat

Annotations

Makes a plausible prediction about what will happen when variables are changed.

Uses knowledge of animals' camouflage strategies to support the prediction.

Identifies variables to be measured, changed and controlled.

Investigation report: Hide and seek

Hide and Seek

Surface 1 dry grass

Colour of Match-stick	Test 1	Test 2	Average	% picked up	% Survived
Yellow	5	10	7.5	75%	25%
Red	6	8	7	70%	30%
Green	3	6	4.5	45%	55%
Brown	7	9	8	80%	20%
Blue	8	8	8	80%	20%

Surface 2 sand

Colour of Match-stick	Test 1	Test 2	Average	% picked up	% Survived
Yellow	8	10	9	90%	10%
Red	6	5	5.5	55%	45%
Green	6	6	6	60%	40%
Brown	6	3	4.5	45%	55%
Blue	7	6	6.5	65%	35%

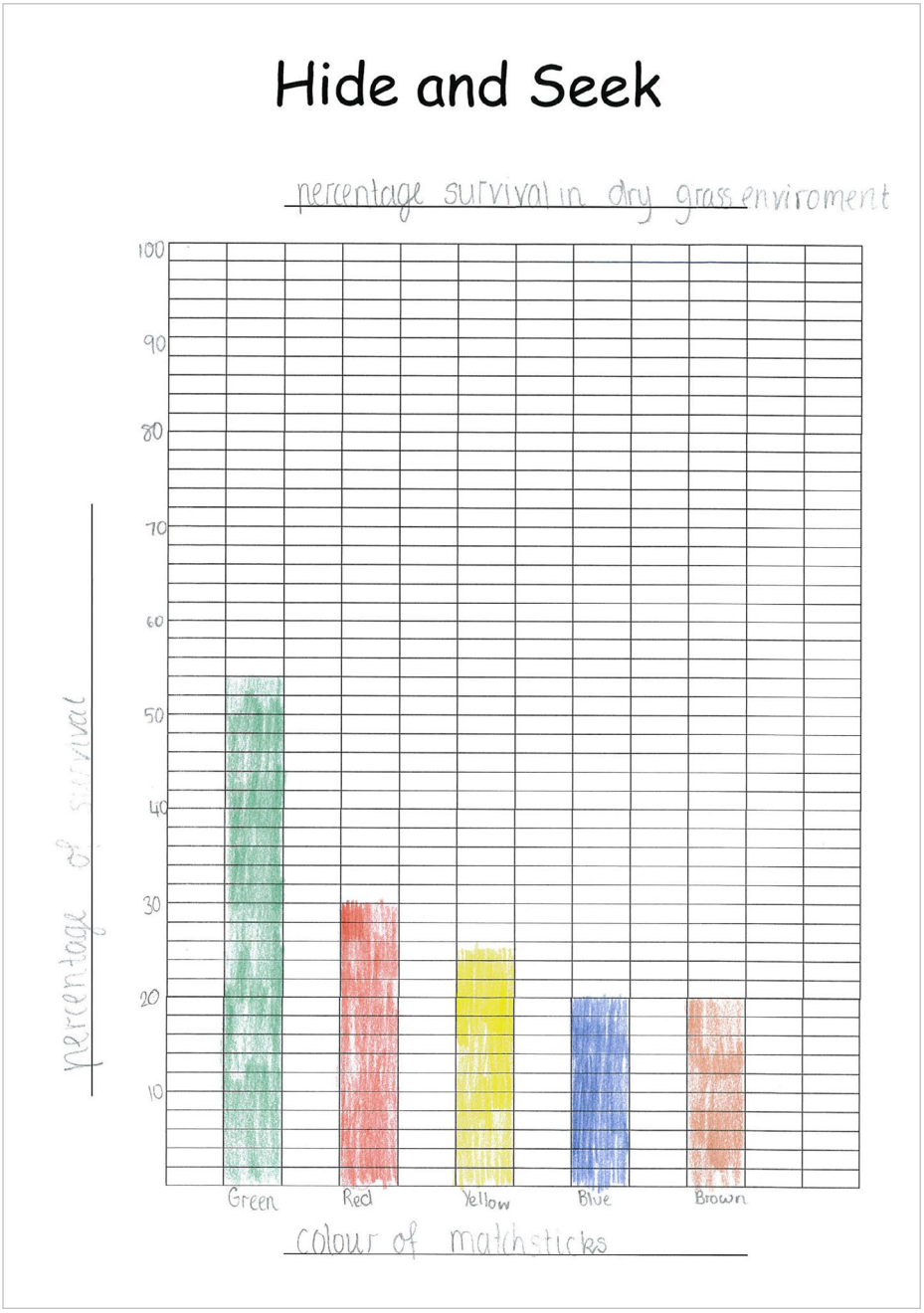
Surface 3 green grass

Colour of Match-stick	Test 1	Test 2	Average	% picked up	% Survived
Yellow	8	10	9	90%	10%
Red	9	8	8.5	85%	15%
Green	4	6	5	50%	50%
Brown	4	3	3.5	35%	65%
Blue	9	9	9	90%	10%

Annotations

Records and processes data in a provided table.

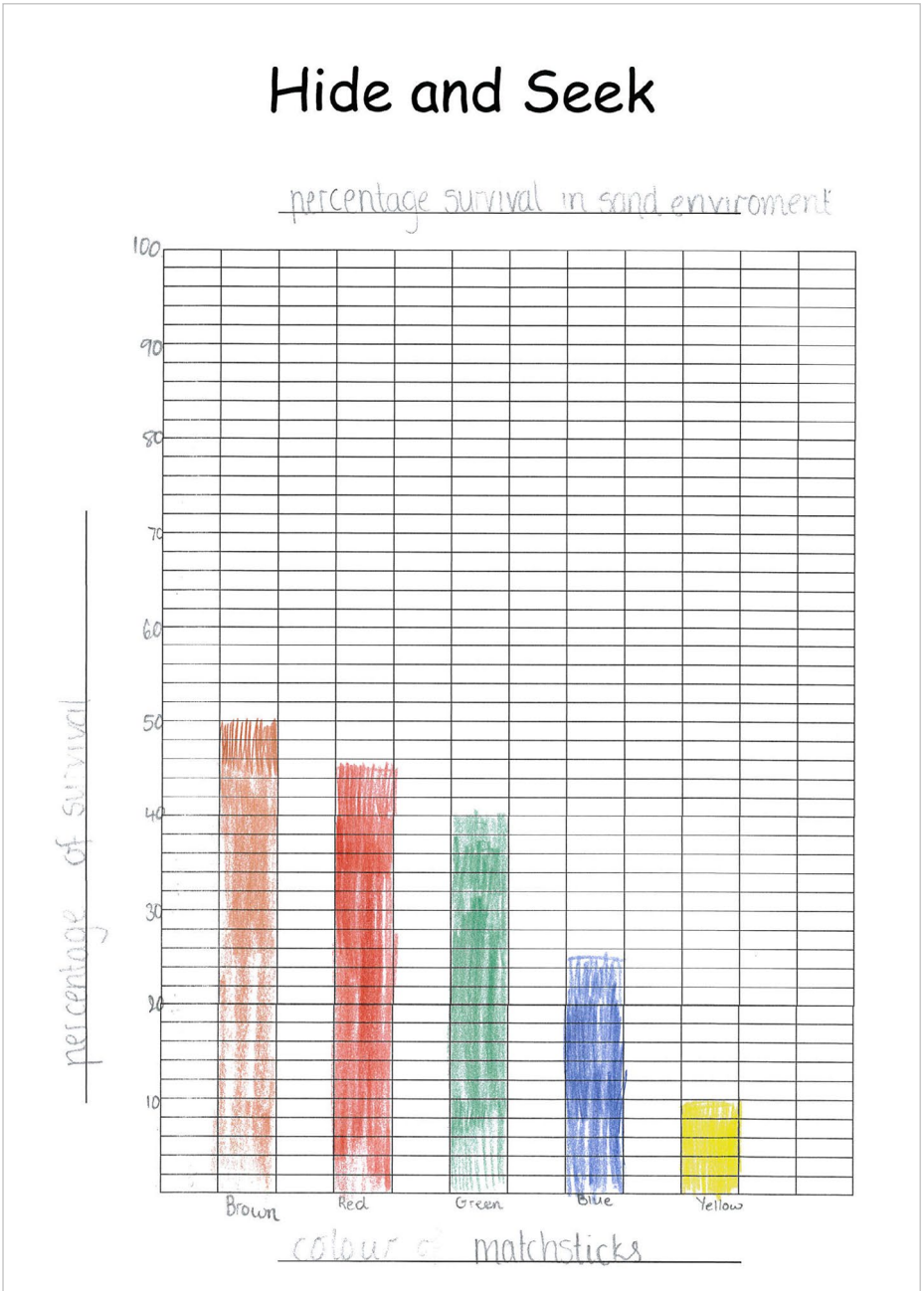
Investigation report: Hide and seek



Annotations

Follows graphing conventions to construct graphs of summary data.

Investigation report: Hide and seek



Annotations

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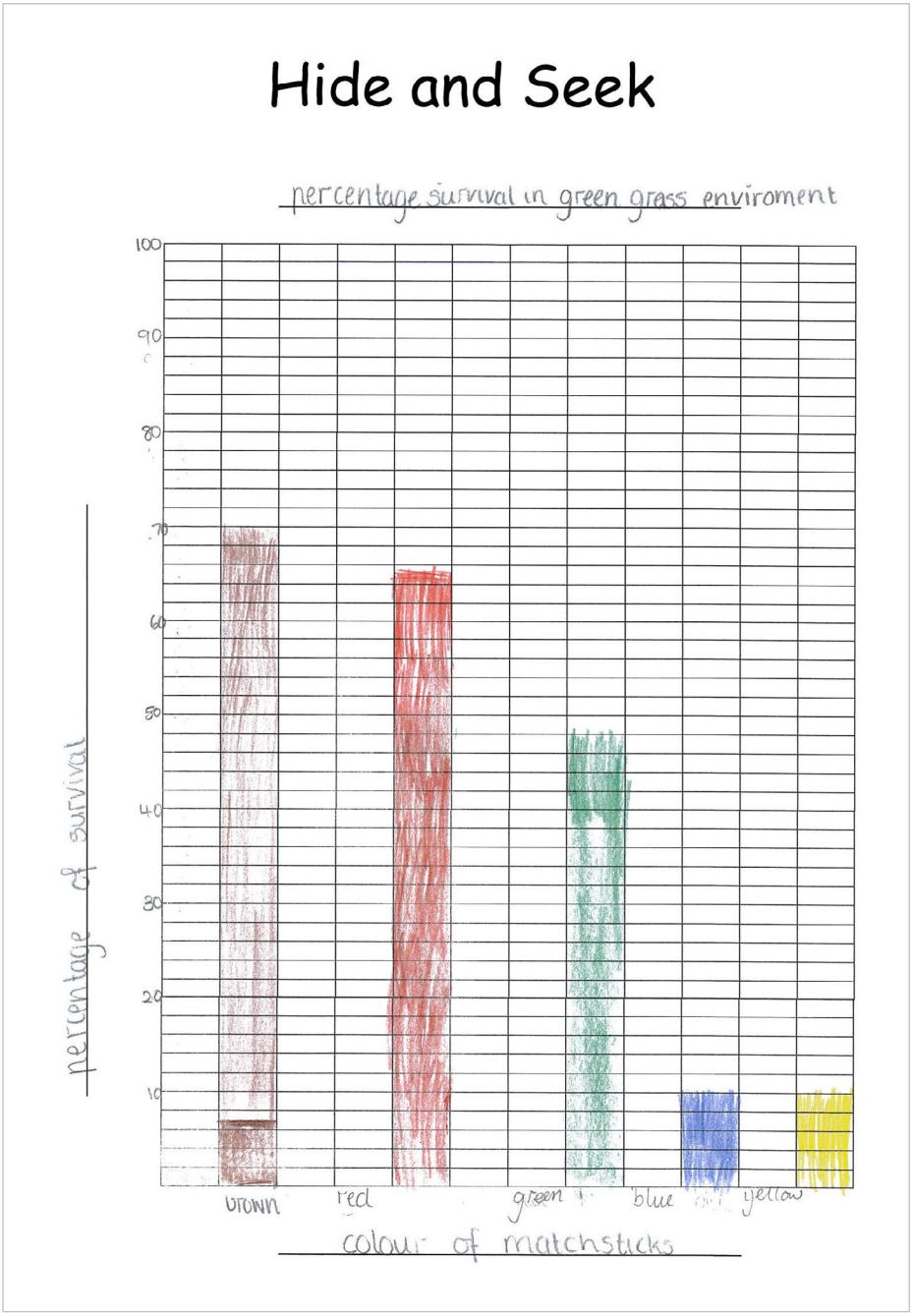


Annotations

Investigation report: Hide and seek

Hide and Seek

Compare the survival rate for the different environments. Why do you think there is a difference in survival rates?

I think their is a difference in survival rate because all the enviroments have different colours and that has an effect on the prey / matchsticks.

Imagine that an animal population, featuring the five colours you investigated, were in the same environments with the same 'predators'. What do you think would happen to this population over time. Give reasons for your prediction.

In the green grass enviroment overtime there will be more brown and green matchsticks. In the dry grass enviroment there will be more green and red matchsticks over time. In the sand enviroment overtime there will be more brown and red matchsticks over time.

Now imagine that a bushfire had passed through each environment. Assume that many of the 'matchstick' creatures survived the fire. Explain what you now think would happen to the population.

The population will slowly reduce because lots of them will not be able to camouflage as well as they did before so they will die from predators and lots will die from starvation.

Using your results, what can you say about the effect of colour on the survival of organisms in a particular habitat?

The colour of the animal has an impact on its habitat.

Annotations

Identifies that survival rate reflects a relationship between prey colour and environment colour.

Uses patterns in data to respond to an investigation question.

Uses understanding of animal camouflage to predict the effect of environmental change on a population over time.

States a conclusion.

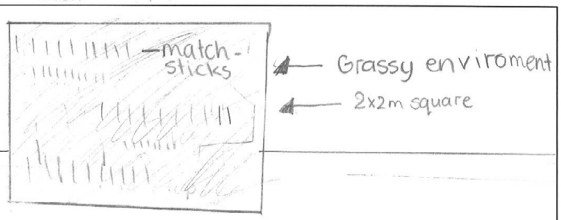
Investigation report: Hide and seek

Hide and Seek

Scientists look to nature for solutions to problems. Where and how do you think scientists could use the information you have gathered? What 'problems' could be solved? Give examples.

Scientists can use the number of matchsticks to see how well the colours of the animals camouflage into their surroundings

Draw an example.



Was this a fair test? yes Why / why not?

It was a fair test because no-one hid the matchsticks. and we always found all 50 matchsticks at the end.

Were there any problems that you encountered during this investigation?

Yes, sometimes we weren't concerntrating on the time because we were talking to the predators

Explain how do you think this investigation could be improved?

We could have watched the time more then talking to the predators

Annotations

Identifies how scientists could use the investigation to study camouflage.

Identifies better self-management as a possible improvement to the method.

Annotations (Overview)

The student communicates ideas, methods and findings through tables, graphs, written text and annotated diagrams.

Investigation report: Viscosity

Year 5 Science achievement standard

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Summary of task

Students had been investigating the properties of liquids and the characteristics of a fair test. They participated in a brainstorming activity in which they identified a number of different liquids and discussed how the liquids could be categorised based on their properties.

Students were asked to work in small groups to investigate the viscosity of the liquids. Students were given a variety of liquids and asked to predict which ones would flow easily and which would not. They were then asked to plan an investigation to test their prediction about the viscosity of each liquid. Students were required to identify the dependent, independent and controlled variables, and consider how they could ensure that their tests were fair and the number of tests they would perform. They were also asked to determine how they would tabulate their data.

Following analysis of their individual results, students participated in a class discussion and compared their results with those of other groups. Students were asked to account for any differences and to suggest ways to improve the investigation.

Investigation report: Viscosity

Viscosity

What do you know about liquids? In the space below write as many words as you can that describe liquids.

runny. transparant. Sticky flowing fluid. Liquids Squishy Cold& hot Can take any form. wet. drip gooyey

Different liquids have different properties. Today you are going to be investigating the viscosity of liquids. ***Viscosity*** is a liquid's resistance to flowing. Not all liquids are the same. Some are thin and flow easily these have a **low viscosity**. Others are thick and gooey and have a **high viscosity**.

Aim

Compare the rate of flow for a variety of liquids and classify them according to their viscosity.

Hypothesis

What do you think will happen? Explain why?

The liquid will run down quickly because of the angle it is on.

Variables

What will be the dependent variable? ***What are you going to measure?***

how far liquid has travled by the drops.

What will be the independent variable? ***What are you going to change?***

We will change the liquid.

What variables will you need to control? ***What will you need to keep the same?***

The angle that the paper is on and the paper. Number of drops, time to travel the distance.

Annotations

Identifies properties and behaviours of liquids.

Makes a prediction related to a controlled variable.

Identifies the variable to be measured and changed, and some variables to be controlled.

Investigation report: Viscosity

Viscosity

Investigation Sequence:

1. One group member collects equipment, set up in a cleared area.
2. Put an equal amount (two or three drops) of each liquid at the top of your race sheets.
3. Start the timer as the card is carefully lifted to rest on overturned bookend (use some Blutack® to keep the card in place.)
4. Record how far the droplet travels in 15 seconds
5. Repeat steps 2 to 4 two more times.

How will you be sure that you have completed a fair test?

By keeping the controlled variables.

Safety

What are the potential risks with this investigation and how will you ensure you and your team members are using the equipment safely.

Using the pipette safely and not drinking the liquids.

Distance Travelled in 15 Seconds

Dish washing	Glucose	milk	water	olive oil
1cm	0cm	5cm	25cm	4cm
2cm	0cm	15cm	15cm	5cm
0cm	0cm	29cm+	29cm+	7cm
Average 1.3%	0%	16.3%	23%	5.3%

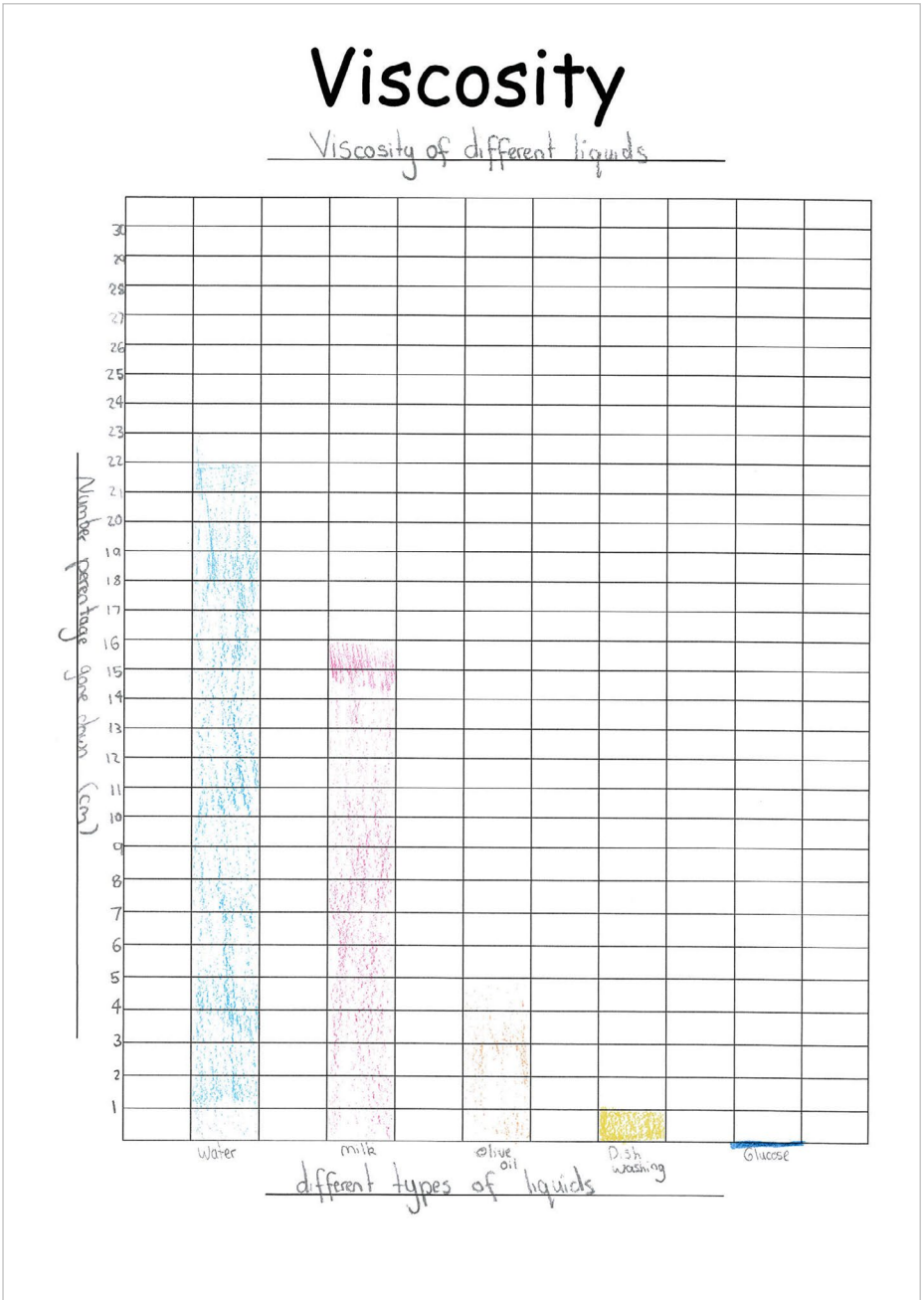
Annotations

Identifies the controlled variables as important in a fair test.

Identifies ways to use equipment safely.

Constructs a table to collect and organise data and attempts to express summary data.

Investigation report: Viscosity



Annotations

Follows graphing conventions to construct a graph of summary data.

Investigation report: Viscosity

Viscosity

Using your results, compare the rate of flow for the different liquids. Which liquids have a high viscosity, which have a low viscosity? Why?

Glucose has a high viscosity because it sticks easily to things. It's also very thick in texture, as well as very gooey. Water has a low viscosity because it is slippery and can run down things easily. Milk is the same.

Compare your results with those of another team. How were they similar, how were they different? ?

All groups except one got 290mm. All groups except one got 0% for glucose. The rest of the liquids had lots of different types of viscosity.

Explain why might there be a difference in the two set of results?

Maybe the sheet of paper wasn't on a proper angle and maybe they started the timer too early or too late.

Was this a fair test? Yes Why / why not?

We kept the controlled variables controlled and changed the liquid.

Were there any problems that you encountered during this investigation?

When we put the glucose on the sheet it stuck there and we couldn't get it off.

Explain how do you think this investigation could be improved?

By doing the glucose last.

Annotations

Uses qualitative observations to compare viscosity of liquids.

Identifies variation in class results and suggests plausible reasons for the variation.

Suggests an improvement to the method based on an identified problem.

Annotations (Overview)

The student communicates ideas, methods and findings through tables, graphs and written text.

Investigation report: Can light go around corners?

Year 5 Science achievement standard

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

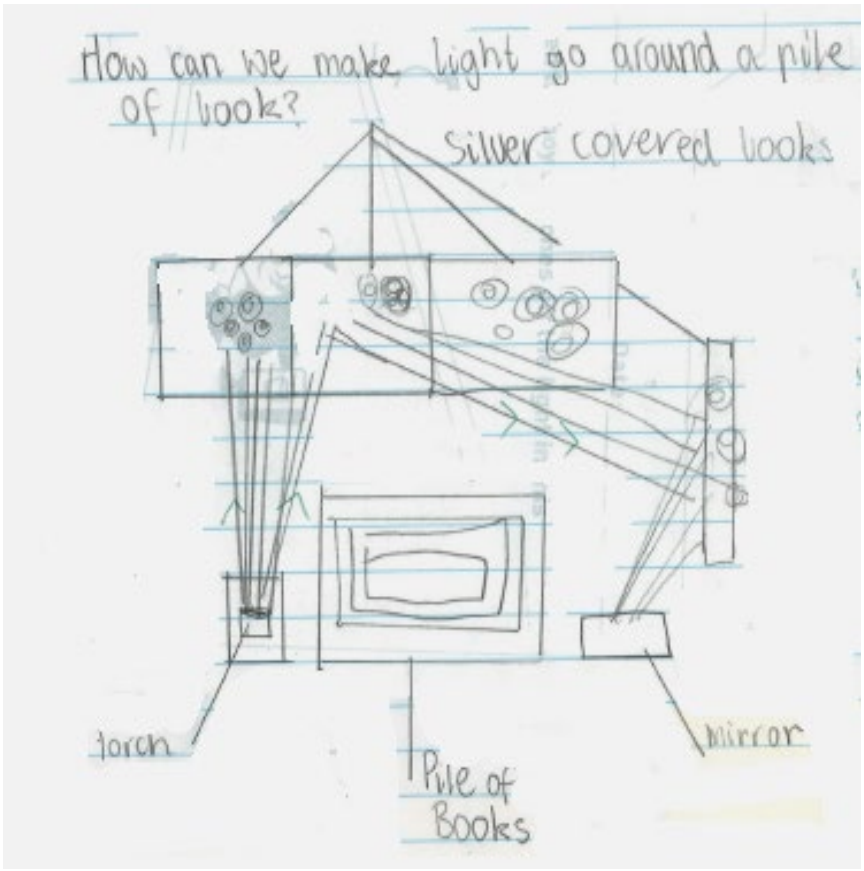
> *By the end of Year 5, students classify substances according to their observable properties and behaviours. They explain everyday phenomena associated with the transfer of light. They describe the key features of our solar system. They analyse how the form of living things enables them to function in their environments. Students discuss how scientific developments have affected people's lives and how science knowledge develops from many people's contributions.*
>
> *Students follow instructions to pose questions for investigation, predict what might happen when variables are changed, and plan investigation methods. They use equipment in ways that are safe and improve the accuracy of their observations. Students construct tables and graphs to organise data and identify patterns. They use patterns in their data to suggest explanations and refer to data when they report findings. They describe ways to improve the fairness of their methods and communicate their ideas, methods and findings using a range of text types.*

Summary of task

Students had been studying phenomena associated with light. They had been introduced to the idea that light travels in straight lines and that this could be represented using ray diagrams. They discussed the types of questions they could investigate using classroom resources and how they could refine their questions to ensure they were appropriate for an investigation.

Students were asked to develop an appropriate question about light. They independently conducted the investigation and communicated their findings.

Investigation report: Can light go around corners?



Annotations

Poses question for investigation.

Proposes solution based on knowledge of light and investigation findings.

Uses rays to show that light travels in straight lines and reflects off different surfaces.

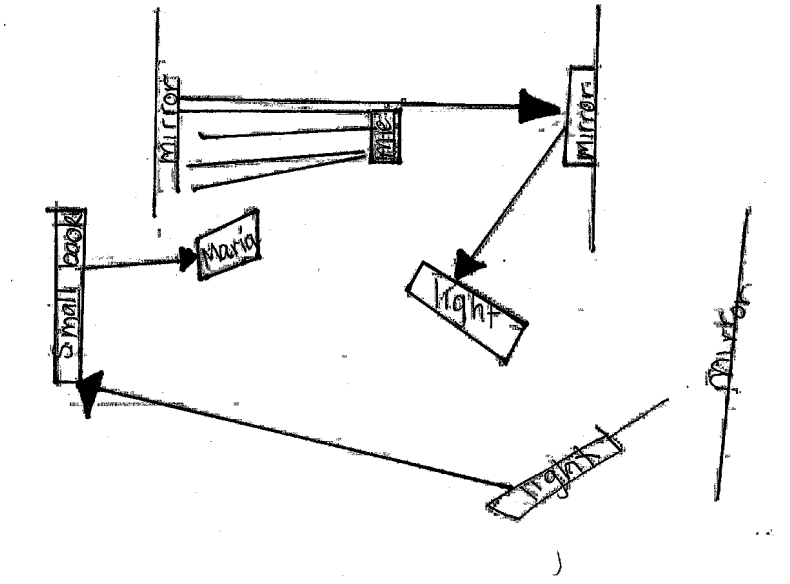
Represents solution as an annotated diagram.

Investigation report: Can light go around corners?

The Investigation

To get the light we tried at least five different ways. At fist we started without a mirror, half way we then got a mirror. We tried making tunnels, path ways and all sorts of other options. First we tried making tunnels. It started of to work but the book fell over after a period of time. The books we used we not any ordinary books, they have a silver covering that reflects in the light. The items we used were ..
- a torch
- 5 books
- mirror

It worked in the end. The light reflected on each book until it got to my eye.



Annotations

Uses trial and error and evaluates each trial to improve quality of solution.

Identifies the need for a reflective surface to redirect the light.

Describes how light can be reflected from a surface to the eye.

Annotations (Overview)

Communicates ideas, method and findings using text and annotated diagrams, including ray representations.