Science

WORK SAMPLE PORTFOLIOS

These work sample portfolios have been designed to illustrate satisfactory achievement in the relevant aspects of the achievement standard.

The December 2011 work sample portfolios are a resource to support planning and implementation of the Foundation to Year 10 Australian Curriculum in English, Mathematics, Science and History during 2012. They comprise collections of different students' work annotated to highlight evidence of student learning of different aspects of the achievement standard.

The work samples vary in terms of how much time was available to complete the task or the degree of scaffolding provided by the teacher.

There is no pre-determined number of samples required in a portfolio nor are the work samples sequenced in any particular order. These initial work sample portfolios do not constitute a complete set of work samples - they provide evidence of most (but not necessarily all) aspects of the achievement standard.

As the Australian Curriculum in English, Mathematics, Science and History is implemented by schools in 2012, the work sample portfolios will be reviewed and enhanced by drawing on classroom practice and will reflect a more systematic collection of evidence from teaching and learning programs.

THIS PORTFOLIO – YEAR 3 SCIENCE

This portfolio comprises a number of work samples drawn from a range of assessment tasks, namely:

Sample 1	Investigation – Ice cubes and heat
Sample 2	Data analysis – Weather records
Sample 3	Investigation – Things I know about heat
Sample 4	Venn diagram – Features of living things
Sample 5	Investigation report – Germination

In this portfolio, the student describes everyday phenomena involving heat and uses understanding of the effects of heat and the movement of heat to explain aspects of these phenomena (WS1, WS3). The student demonstrates an understanding of the movement of the Earth relative to the sun and uses this to explain some observations (WS2), identifies a number of features common to living things (WS4) and identifies instances of the use science knowledge in people's lives (WS3).

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The student makes and records formal measurements of temperature, height, volume and time to describe qualitative observations (WS1, WS2, WS5). The student follows procedures to collect and present observations (WS1, WS5) and uses provided tables to present data (WS1, WS2). The student interprets data to answer teacher-generated questions, including identifying patterns, and suggests possible reasons for their findings (WS1, WS2). The student identifies aspects of fair testing, including describing, with teacher guidance, variables to be kept the same, changed and measured (WS1). The student selects appropriate scientific language and constructs representations such as drawings to communicate findings and ideas (WS1, WS2, WS3, WS4, WS5).

The following aspects of the achievement standard are not evident in this portfolio:

- *describe how they can use science investigations to respond to questions*
- *use their experiences to pose questions and predict the outcomes of investigations*
- *describe how safety was considered in their investigations.*

Science

Work sample 1:
Investigation – Ice cubes and heat

Relevant parts of the achievement standard

By the end of Year 3, students use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations. They describe features common to living things. They describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives.

Students use their experiences to pose questions and predict the outcomes of investigations. They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their investigations. They use diagrams and other representations to communicate their ideas.

Summary of task

Students had participated in class discussion about their everyday observations of the effect of heating on food and other objects. They had explored the concept of fair testing and the idea of selecting variables to keep the same, change and measure. They had been introduced to techniques for using and reading thermometers. The teacher had discussed the safety requirements for thermometer use.

Students were engaged in a whole class discussion to design an investigation into which location would result in more ice melting. The teacher then developed a pro forma for students to demonstrate their understanding of the investigation design and to record and interpret their results.

Students were asked to conduct the investigation in small groups and completed the pro forma individually.

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Work sample 1:
Investigation – Ice cubes and heat

IS THIS A FAIR TEST?

How do we ensure this is a fair test?

What will I keep the same? Amount of ice, ice container (tub), plastic surface, same position.

What will I change? Surrounding temperature due to different location to each group.

What will I measure? I will measure the amount of liquid which has melted in each beaker

I will measure the temperature of the air around the beaker at the beginning of the investigation.

How will I record my results?

I will record my results in a table.

Results: Table to record melting rate of ice cubes when exposed to varied temperatures

Every 15 minute recordings	Ice cubes in coolbox (control)	Ice cubes next to window on carpet	Ice cubes on bench under oak tree	Ice cubes on step outside classroom	Ice cubes in full sun on grass
Temperature surrounding beaker at start.	20°C	29°C	21°C	21°C	24°C
Time: 2:05 mL of water	28mL	39mL	55mL	37mL	52mL
Time: 2:20 mL of water	25mL	25mL	48mL	42mL	29mL
Time: 2:35 mL of water	12mL	23mL	32mL	25mL	29mL
total	65mL	87mL	135mL	104mL	110mL

Annotations

Identifies the variables that should stay the same to ensure the test is fair.

Identifies the variables to change.

Identifies the variables to measure.

Makes and records measurements in a provided table.

Records measurements using correct scientific conventions.

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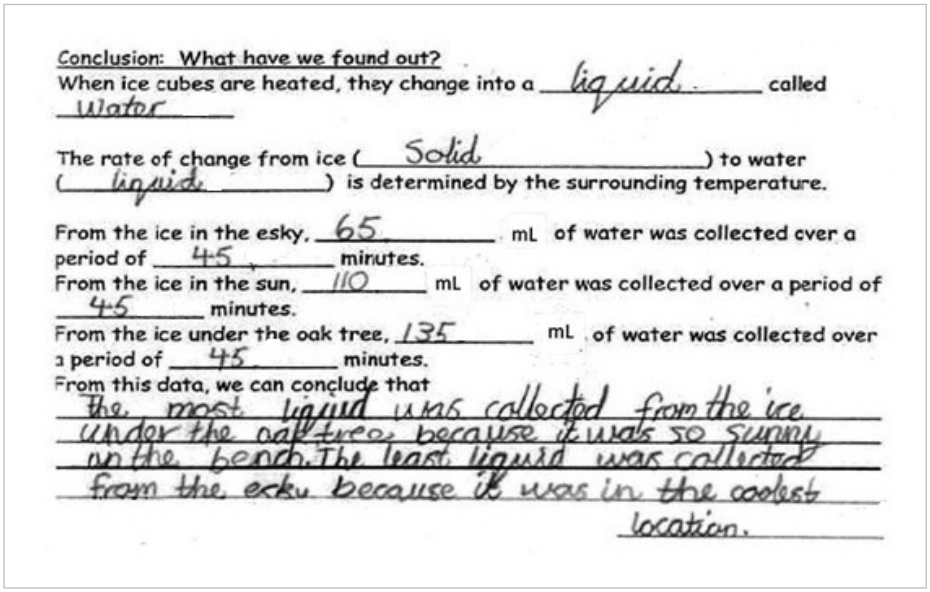
Work sample 1:
Investigation – Ice cubes and heat



Conclusion: What have we found out?

When ice cubes are heated, they change into a liquid called water

The rate of change from ice (solid) to water (liquid) is determined by the surrounding temperature.

From the ice in the esky, 65 mL of water was collected over a period of 45 minutes.

From the ice in the sun, 110 mL of water was collected over a period of 45 minutes.

From the ice under the oak tree, 135 mL of water was collected over a period of 45 minutes.

From this data, we can conclude that the most liquid was collected from the ice under the oak tree, because it was so sunny on the bench. The least liquid was collected from the esky because it was in the coolest location.

Annotations

Communicates ideas using correct scientific terms, for example 'liquid' and 'solid'.

Interprets data and attempts to explain why different amounts of water were collected at each site by connecting the amount of water to the conditions of each location.

Links sunny conditions to greater melting and cooler conditions to less melting of the ice.

Annotations (Overview)

This work sample demonstrates the communication of science ideas using appropriate language and representations (e.g. temperature and volume measures).

Acknowledgment

ACARA acknowledges the contribution of trial school teachers and students for providing the tasks and work samples. The annotations are referenced to the Australian Curriculum achievement standards.

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Work sample 2:
Data analysis – Weather records

Relevant parts of the achievement standard

By the end of Year 3, students use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations. They describe features common to living things. They describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives.

Students use their experiences to pose questions and predict the outcomes of investigations. They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their investigations. They use diagrams and other representations to communicate their ideas.

Summary of task

This assignment was part of a unit of work on weather. Whole class discussions included changes in historical scientific understanding of the movement of the sun and Earth.

Students were asked to collect and record the following information from local newspapers over a two week period:

- sunrise times
- sunset times
- maximum temperature
- minimum temperature
- general weather conditions.

Students were asked to analyse the data they collected to identify patterns, and determine whether statements made in relation to the data were definitely true, probably true or couldn't tell. Students were required to give reasons why the patterns occurred.

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Work sample 2:
Data analysis – Weather records

Conditions	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T
Sunrise	6.44 am	6.45 am	6.47 am	6.43 am	6.44 am	6.45 am	6.45 am	6.46 am	6.47 am	6.47 am	6.48 am	6.49 am	6.50 am	6.50 am
Sunset	5.49 pm	5.48 pm	5.47 pm	5.46 pm	5.45 pm	5.44 pm	5.43 pm	5.42 pm	5.41 pm	5.40 pm	5.39 pm	5.38 pm	5.37 pm	5.37 pm
Maximum temp. (and time measured)	26°	24°	23°	24°	24°	24°	27°	29°	27°	24°	23°	25°	25°	23°
Minimum temp. (and time measured)	13°	16°	13°	9°	11°	15°	11°	10°	12°	13°	14°	11°	11°	9°
Cloud cover	cloudy Periods	Cloudy	Partly cloudy	Sunny day	Sunny	Am Cloud	Sunny	Sunny	Partly cloudy	Partly cloudy	Partly cloudy	Sunny	Partly Cloudy	Sunny
General weather	South east winds	pm Shower	Am S-SW winds	E-SE winds pm	S-SW pm	pm East winds	E-SW winds	Pm S-SW winds	Pm NNE-NW winds	Am W-SW winds	Pm S-SW winds	Pm NW-N winds	P S-SW winds	E-SE winds

Weather Records (21.4.10 – 4.5.10)

Use the data in the table to say whether the statements are definitely true, probably true or can't tell from the data.

	Definitely	Probably	Can't Tell
Today the sun will set at 5:36pm.		✓	
It has been partly cloudy for the majority of the 14 day period.		✓	
On the weekend there will be East to South-East winds.			✓
The lowest temperature recorded was 9 .	✓		
Next Wednesday it will be partly cloudy.			✓
Today the sun rose at 6:51am.		✓	

What is the difference between the highest and lowest temperature recorded? 20°C

What pattern in the rising and the setting of the sun was observed? The sun was rising one minute later every day and setting one minute later every day.

Why do you think this occurred? The days are getting closer to winter.

Annotations

Transcribes data using a provided table.

Interprets data to make plausible predictions about future weather events.

Interprets data and attempts to describe patterns in their data.

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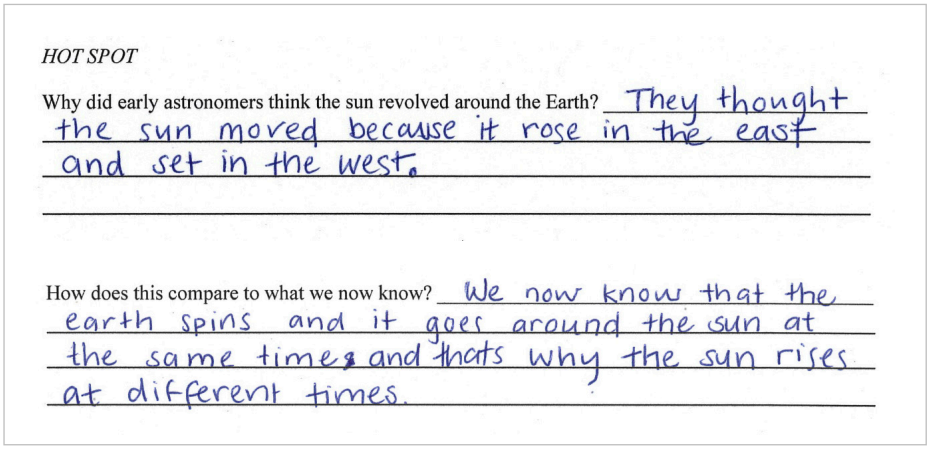
Work sample 2:
Data analysis – Weather records



HOT SPOT

Why did early astronomers think the sun revolved around the Earth? They thought the sun moved because it rose in the east and set in the west.

How does this compare to what we now know? We now know that the earth spins and it goes around the sun at the same time and thats why the sun rises at different times.

Annotations

Identifies in simple terms how the Earth moves in relation to the sun and how this relates to observed phenomena.

Annotations (Overview)

The student uses correct scientific terminology and conventions to record data and communicate science ideas.

Acknowledgment
ACARA acknowledges the contribution of trial school teachers and students for providing the tasks and work samples. The annotations are referenced to the Australian Curriculum achievement standards.

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Work sample 3:
Poster - Things I know about heat

Relevant parts of the achievement standard

By the end of Year 3, students use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations. They describe features common to living things. They describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives.

Students use their experiences to pose questions and predict the outcomes of investigations. They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their investigations. They use diagrams and other representations to communicate their ideas.

Summary of task

Students had been studying the behaviours of heat. They had explored sources of heat and how heat can move from one object to another.

Students were asked to independently produce a poster demonstrating what they had learnt about heat.

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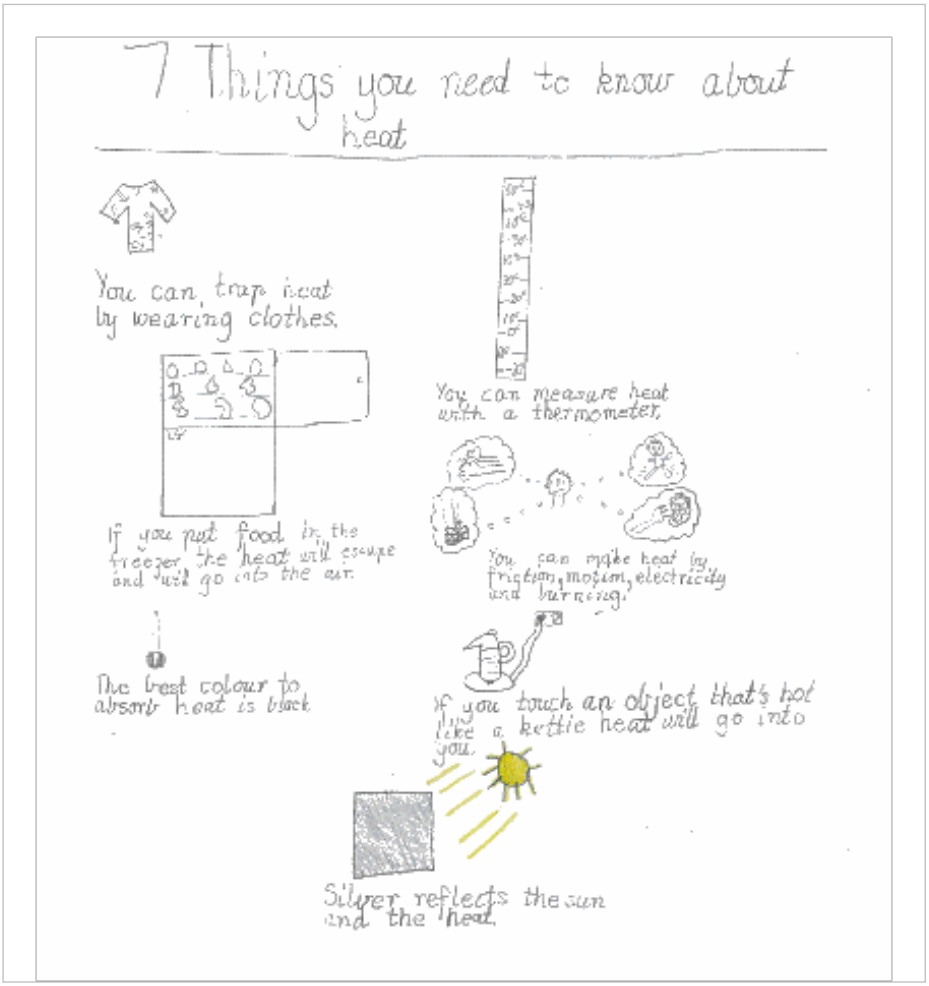
Work sample 3:
Poster - Things I know about heat



Annotations

Identifies a variety of situations in which heat is involved.

Identifies that heat can move from one object to another.

Describes everyday phenomena in terms of the movement of heat.

Identifies a number of instances where science knowledge is used in everyday life, i.e. wearing clothes to trap heat.

Annotations (Overview)

The student uses scientific terminology and drawings (representations) to communicate science ideas.

Acknowledgment
ACARA acknowledges the contribution of Department of Education, Western Australia for providing the tasks and work samples. The annotations are referenced to the Australian Curriculum achievement standards.

Science

Work sample 4:
Venn diagram – Features of living things

Relevant parts of the achievement standard

By the end of Year 3, students use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations. They describe features common to living things. They describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives.

Students use their experiences to pose questions and predict the outcomes of investigations. They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their investigations. They use diagrams and other representations to communicate their ideas.

Summary of task

Students had begun to explore living and non-living things and to describe the features of different living things.

Students were asked to select two living things, describe each living thing and then identify the features common to both living things. They were provided with a Venn diagram to organise their ideas and completed the task independently.

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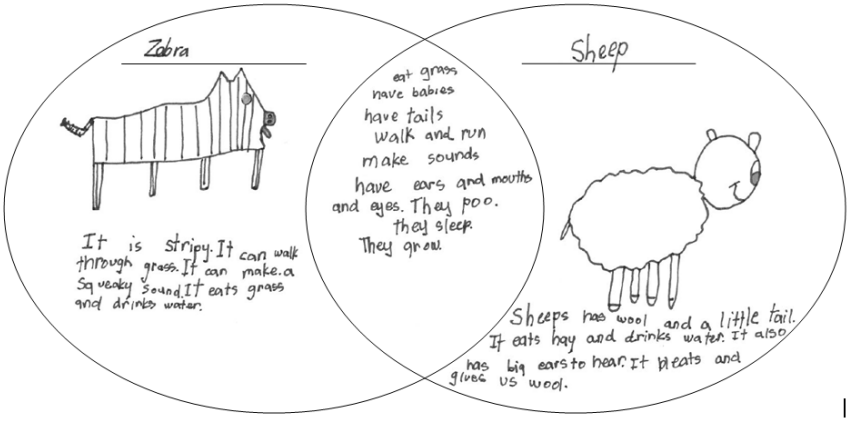
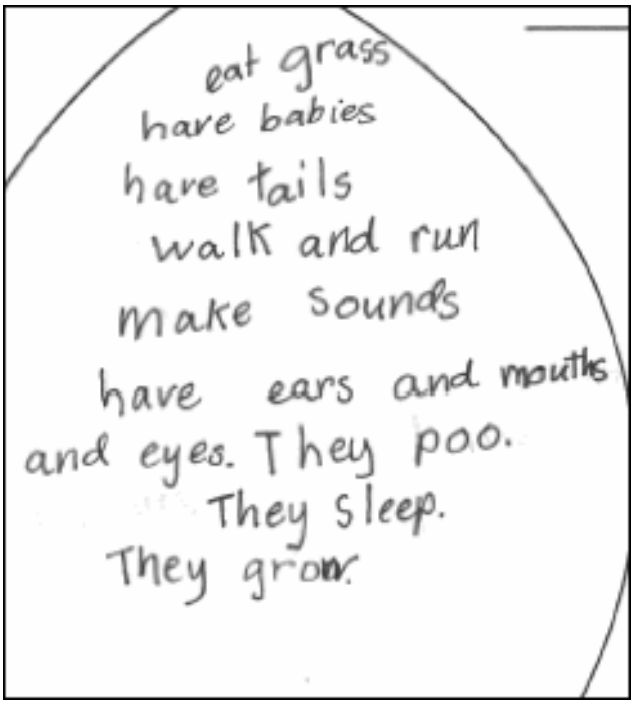
Work sample 4:
Venn diagram – Features of living things





Annotations

Describes features of two living things.

Uses a Venn diagram appropriately to identify features shared by both living things.

Identifies that living things share a number of common features, including eating, reproducing, moving, making sounds, creating waste and growth.

Annotations (Overview)

The student uses text and drawings (representations) to communicate science ideas.

Acknowledgment
ACARA acknowledges the contribution of trial school teachers and students for providing the tasks and work samples. The annotations are referenced to the Australian Curriculum achievement standards.

Science

Work sample 5:
Investigation report – Germination

Relevant parts of the achievement standard

By the end of Year 3, students use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations They describe features common to living things. They describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives.

Students use their experiences to pose questions and predict the outcomes of investigations. They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their investigations. They use diagrams and other representations to communicate their ideas.

Summary of task

Over a four week period, students observed the growth of a plant. Students had discussed how to record their observations using formal measurements and observations.

Students were asked to observe and record the growth of a plant and were guided by the teacher to present their findings as a photo story.

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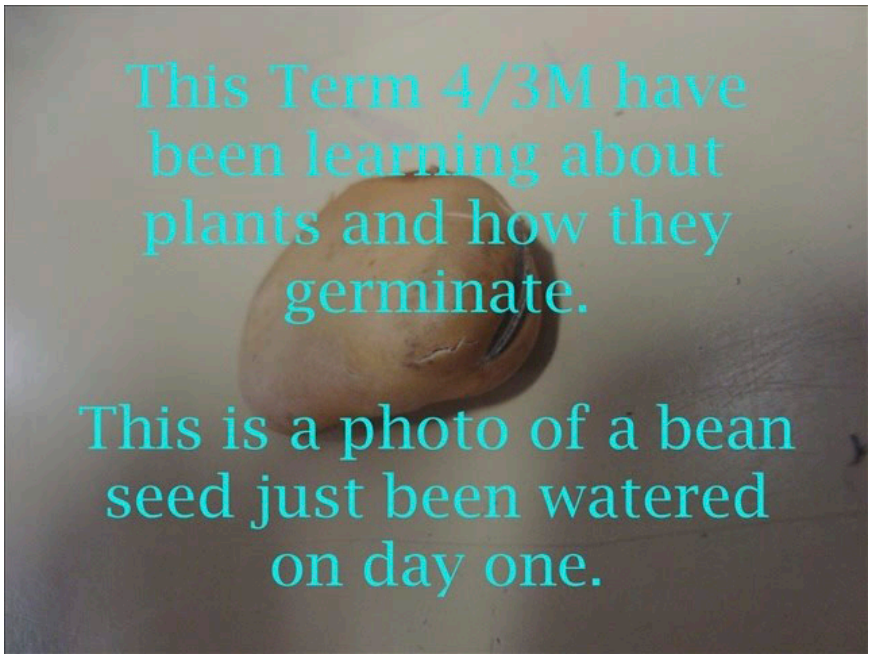
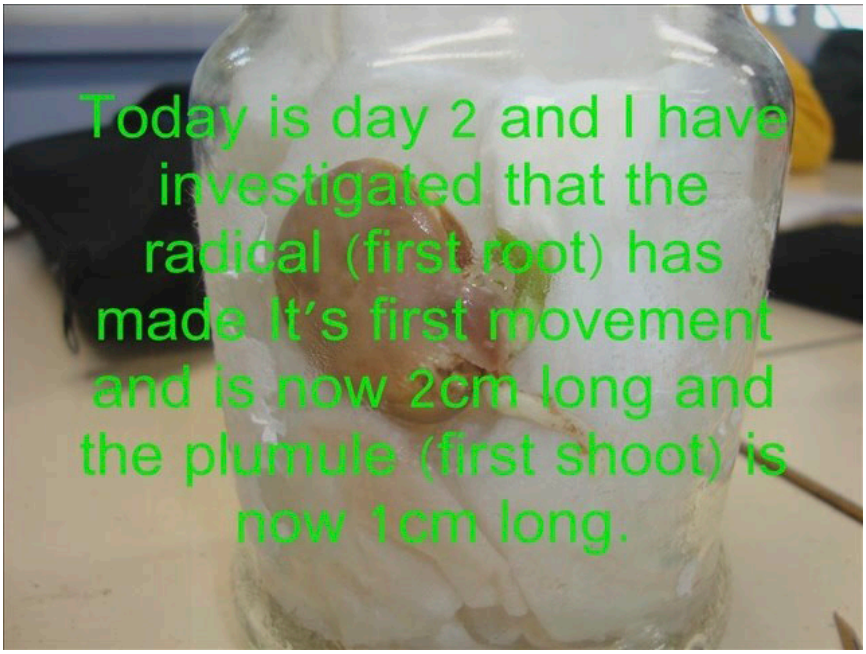
Work sample 5:
Investigation report – Germination





Annotations

Follows procedures to collect observations.

Makes formal measurements.

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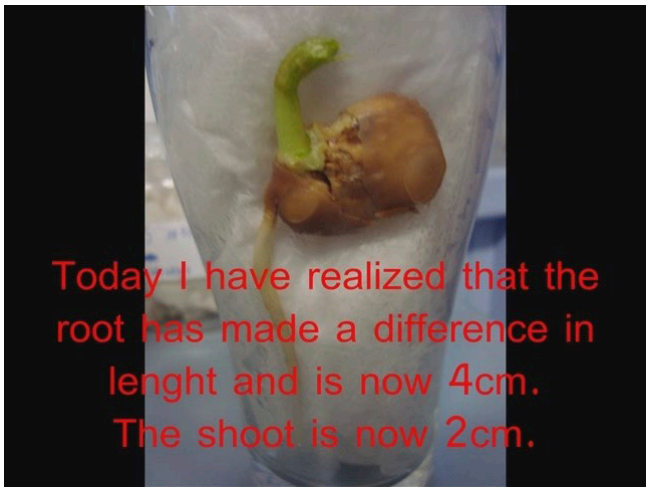
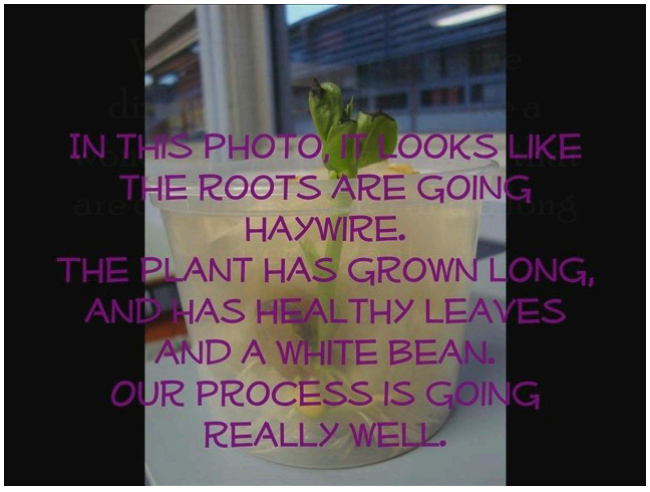
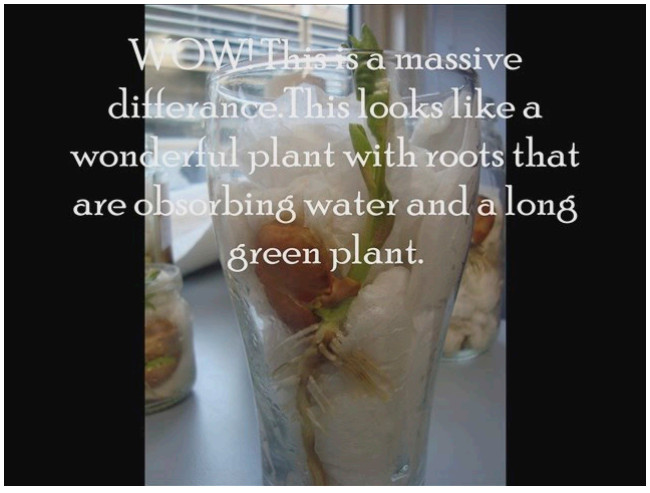
Work sample 5:
Investigation report – Germination







Annotations

Uses formal measurements to compare observations.

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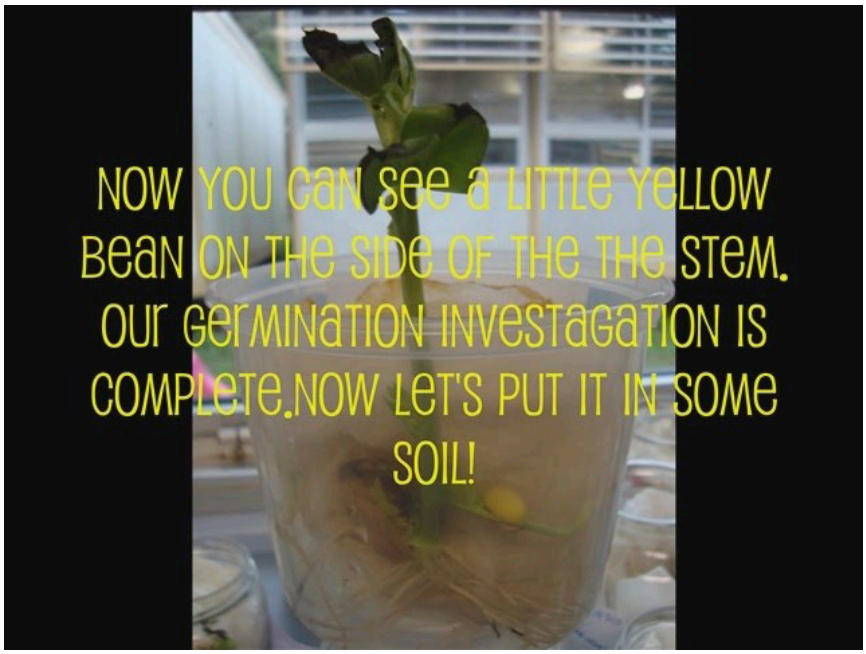
Work sample 5:
Investigation report – Germination



Annotations (Overview)

Uses annotated photographs to order observations and communicate findings.

Acknowledgment
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