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 6 SCIENCE

This portfolio provides the following student work samples:

Sample 1  Worksheet : Reversible and irreversible changes
Sample 2  Pamphlet: Generating electrical energy
Sample 3  Worksheet: Energy transformations
Sample 4  News report: Natural disasters
Sample 5  Investigation poster: Mouldy bread
Sample 6  Investigation report: Insulation

In this portfolio, the student classifies changes to materials as reversible and irreversible (WS1). The student describes the energy transformations that occur in the generation of electrical energy from a range of energy sources (WS2, WS3). The student explains how a natural event caused rapid change to Earth’s surface (WS4) and demonstrates understanding that living things are affected by environmental conditions (WS5). The student identifies how scientific knowledge is used in decision-making in a range of areas (WS3, WS4, WS5).
Work sample portfolio summary

Science

Year 6
Above satisfactory

The student demonstrates the ability to follow procedures to develop investigable questions and design investigations into simple cause and effect relationships, including identifying variables to be changed and measured (WS5, WS6) and articulates potential safety risks when planning their investigation methods (WS5). The student collects, organises and interprets investigation data (WS2, WS5, WS6) and identifies where improvements to their methods could improve the data (WS5, WS6). The student interprets, describes and analyses trends in data using graphic representations (WS5, WS6) and constructs multimodal texts to communicate ideas, methods and findings (WS2, WS3, WS4, WS5, WS6).
Worksheet: Reversible and irreversible changes

Year 6 Science achievement standard

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

By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity. They explain how natural events cause rapid change to the Earth’s surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge is used in decision making and identify contributions to the development of science by people from a range of cultures.

Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using graphic representations and construct multimodal texts to communicate ideas, methods and findings.

Summary of task

Students studied a unit of work on changes to materials. They explored a range of changes, including melting, freezing, dissolving, burning and rusting, and classified these as reversible or irreversible.

Students were asked to complete the worksheet independently as a summary of what they had learned over the unit.
Worksheet: Reversible and irreversible changes

Reversible and irreversible changes – Part A

1. Look at each of the changes and fill in the blanks to say whether the changes are reversible or irreversible.
2. For the reversible changes, draw another arrow below the first one, pointing the other way.
3. For each change, explain why you thought it was reversible or irreversible.

Melting chocolate is ___ reversible ___ change because:

Chocolate hardens when it’s cooled down, therefore, if you were to put the melted chocolate on the fudge, it would go hard, baked would go back to its original shape unless there was a model.

An iron nail rusting is ___ irreversible ___ change because:

The rust is the metal becoming old and getting rid of the rust would be like getting rid of the metal, and that’s what the nail is made of.

Baking a cake is ___ irreversible ___ change because:

The ingredients are mixed together and bake. The flour can not be separated from the egg once it’s been mixed, and you can’t pull the egg and flour soda into a blended cake once it’s been mixed.

Annotations

Correctly classifies changes associated with heating and rusting as reversible or irreversible and provides an explanation based on observable properties.
Worksheet: Reversible and irreversible changes

Annotations

Suggests examples of reversible and irreversible changes, including heating and dissolving, based on observed phenomena.
Pamphlet: Generating electrical energy

Year 6 Science achievement standard

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Summary of task

Students had been investigating electrical energy and energy transformations. They had constructed electrical circuits and explored the ways in which electrical energy could be transformed into heat, movement and light energy. Students had been introduced to the concept of renewable and non-renewable resources and had viewed a documentary on the ways in which electrical energy can be generated.

Students were asked to develop an information pamphlet to describe the energy transformations that occur when electricity is being generated and to show the difference between renewable and non-renewable energy sources. Students were provided with stimuli in the form of key words and energy-related graphics. They completed the task over three 60-minute lessons.
Pamphlet: Generating electrical energy

Annotations

Identifies solar, wind and water energy sources as renewable.

Constructs flow charts to organise collected data on electrical energy generation.

Describes energy transfers and transformations that occur during generation of electrical energy from a range of sources.

Annotations (Overview)

The student constructs a multimodal text to communicate ideas and findings.
Worksheet: Energy transformations

Year 6 Science achievement standard

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By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity. They explain how natural events cause rapid change to the Earth’s surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge is used in decision making and identify contributions to the development of science by people from a range of cultures.

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Summary of task

Students had completed a unit of work in which they learned how energy from a variety of sources can be used to generate electricity.

Students were asked to select a form of renewable energy and create a flow chart to illustrate how it can be transformed into energy for use in the home. They were also asked to complete a worksheet answering questions about how energy is transformed in order to generate electricity.
Worksheet: Energy transformations

Annotations

Constructs a flow chart to describe the energy transformations related to harnessing solar energy.
Worksheet: Energy transformations

Essential Energy

Answer the following questions:

1. What types of energy can be transformed into electrical energy?
   
   Some things that can be made into energy are wind, solar, fossil fuels, water and sound. There are some more than that.

2. How can types of energy be transformed?
   
   Like solar panels, the electricity from all ways that electricity is made goes through a series of places to get where it needs to go and when it is changed form.

3. Can you add extra steps into your flowchart? Which ones?
   
   I probably could add more like the electricity goes to a microwave to be heat energy.

4. Which sources of energy are renewable? Why do you think that?
   
   I think solar power is renewable because we will still have the sun for years and year (or forever) so we will always have this type of energy.

5. Which sources of energy are sustainable? Why do you think that?
   
   I am going to stick with solar energy because we will have the sun and the materials to make solar panels so we can keep the electricity maintained.

Annotations

Identifies a range of energy sources that can be transformed into electrical energy.

Identifies that transformations of energy involve energy changing from one form to another.

Explains that an electrical device can transform electrical energy into another form of energy (heat).

Identifies a renewable energy source and considers sustainability with reference to the energy source and the requirement for materials to construct the technology required.
Worksheet: Energy transformations

6. How does science help us to know which energy source is the best one to use in a particular place?

Science helps us with this because in a place that is mainly cloudy you want to use solar energy you may use wind, so it is needed to know what type of energy should be where.

7. How does science help us to know which energy source is the best one to use for sustainability?

It helps us so we know what will make this sustainable, by maybe making materials easier to reuse over and over again.

8. What are you still wondering about?

The thing I am wondering is if it becomes harder and harder to get materials for anything like solar panels and everything needed for making energy without doing pollution.

Annotations (Overview)

The student constructs a multimodal text to communicate ideas and findings.

Annotations

Identifies specific ways in which scientific knowledge informs decision-making.
News report: Natural disasters

Year 6 Science achievement standard

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By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity. They explain how natural events cause rapid change to the Earth’s surface. They describe and predict the effect of environmental changes on individual living things. and  identify contributions to the development of science by people from a range of cultures.

Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using graphic representations and construct multimodal texts to communicate ideas, methods and findings.

Summary of task

Students had been researching the cause, effects and characteristics of a variety of geological events and extreme weather conditions, including earthquakes, tsunamis, volcanic eruptions, floods, cyclones and droughts.

In this task, students were required to research a specific natural disaster and to plan and present a television news report on the event. Students were required to include information on how the event occurred and the effect it had on people and the environment. Students researched and produced their videos over 10 class lessons and in their own time.
News report: Natural disasters
Investigation poster: Mouldy bread

Year 6 Science achievement standard

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

**By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity. They explain how natural events cause rapid change to the Earth’s surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge is used in decision making and identify contributions to the development of science by people from a range of cultures.**

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Summary of task

Students had discussed the needs of living things and the effect of environmental changes on individual living things, exploring issues related to changes in their local bushland. The teacher also introduced the idea that an ecosystem can exist on pieces of food, with organisms such as mould inhabiting the food, and that these organisms are living things which also have needs and can be affected by changes to their environmental conditions.

For this task, students were required to work in small groups to design an investigation into the conditions in which mould grows best on bread. They were presented with a scenario in which a shopkeeper was finding that their bread was growing mouldy faster than a competitor’s, and wanted advice about what conditions might be causing this. Students were provided with steps to follow in designing their experiment and were required to present their findings on a poster, including a letter to the shopkeeper with their advice.

**Before undertaking the experiment, the teacher ensured that students were aware of the safety requirements for observing mouldy food. Students were told not to handle the food under any circumstances, and to ensure that the bags were kept sealed. The teacher checked all bags and supervised students when observing the bread.**
Investigation poster: Mouldy bread

Annotations
Investigation poster: Mouldy bread

Annotations

Constructs an investigable question to test two variables.

Designs an investigation to test the effect of changing growth medium (bread type) and light on the growth of the organism.

Identifies the needs of the mould.

Predicts that sunlight (and heat) will be the most influential variable on the growth of the mould.
Investigation poster: Mouldy bread

Annotations

Identifies safety risks and plans appropriate methods to reduce the risks.

Identifies variables to be controlled (amount of moisture, amount of growth medium (bread), bag type, exposure, treatment location) and variables to be changed (bread type, amount of light and heat).
## Investigation poster: Mouldy bread

### Annotiations

- Collects data and provides a visual representation of raw data.
- Organises detailed qualitative and quantitative observations in an appropriate table.

### Table

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST 1A: No Change in sight or feel.</td>
<td>TEST 1B: No Change in sight or feel.</td>
<td>TEST 1A: Condensation on the outer side of the bag.</td>
</tr>
<tr>
<td>TEST 1B: No Change in sight or feel.</td>
<td>TEST 1B: Condensation on the outer side of the bag.</td>
<td>TEST 1A: No Change in sight or feel.</td>
</tr>
<tr>
<td>TEST 1A: No Change in sight or feel.</td>
<td>TEST 1B: Condensation on the outer side of the bag. Bread has gone stale. Small amount of mould has grown where condensation has landed. (middle, bottom)</td>
<td>TEST 1A: No Change in sight or feel.</td>
</tr>
<tr>
<td>TEST 1B: No Change in sight or feel.</td>
<td>TEST 1B: Condensation on the outer side of the bag. Bread has gone stale.</td>
<td>TEST 1A: No Change in sight or feel.</td>
</tr>
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<td>TEST 1B: Condensation on the outer side of the bag. Bread has gone stale.</td>
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</tbody>
</table>
Investigation poster: Mouldy bread

Annotations

Provides a detailed analysis of data to compare finding with predictions.

Analyses data to form a conclusion that is consistent with the data and describes the effect of environmental conditions (light, heat and growth medium) on mould growth.

Suggests improvements to the method to improve the data collected.
Dear

My team and I have found out during our Mouldy bread investigation what environment is best to store your bread in. We started by planning where we were going to place our bread and what bread types were we going to use. We decided to use both types of bread without moisture – in darkness, artificial light and sunlight. We chose both bread types because we wanted to see if one particular bread was right in one particular environment. Our results came out very good hardly any mould was grown. We grew most mould in sunlight with heat so we recommend not storing it anywhere near heat in your supermarket e.g. near hot chickens or in store windows (besides you wouldn’t want mouldy bread on your shelf!). In the middle we had our 2 pieces of darkness bread grew quite a bit of mould then we expected! So only store it there if you are desperate. The one we recommend doing is artificial light with absolutely near no moisture! We saw other groups put moisture in their bags AND GROW MOULDL VERY QUICKLY!! So do not put it near moisture aisles such as the milk or yoghurt aisle. We hope this advice solves your problems of growing mould fast! Remember nowhere near moisture!

With lots of hope for your bread,

Annotations

Indicates how scientific knowledge can inform decision-making.

Annotations (Overview)

The student constructs a multimodal text to communicate ideas, methods and findings.
Investigation report: Insulation

Year 6 Science achievement standard

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

*By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity. They explain how natural events cause rapid change to the Earth’s surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge is used in decision making and identify contributions to the development of science by people from a range of cultures.*

*Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using graphic representations and construct multimodal texts to communicate ideas, methods and findings.*

Summary of task

Students had been studying Australian history, specifically life in the late 1880s. They had investigated the use of science in the context of large blocks of ice in ‘ice chests’ to keep food cool. They discussed how ‘icemen’ would transport the ice packed in hessian bags and sawdust to prevent it from melting too quickly. In a class discussion, students also considered the materials they might use to keep food cool in the absence of refrigeration devices.

Using this scenario as a stimulus, students were asked to plan and conduct an investigation to determine which materials were effective insulators of an ice cube. Students were provided with an investigation plan template and a range of materials. They planned and conducted their investigation in two class lessons, and spent a further lesson completing their investigation report.
Investigation report: Insulation

Insulation Investigation

In Australia, the first ice specifically for cooling food was made in 1851. Soon people bought big blocks of ice and put them in “ice chests”. Gradually “icemen” began to take ice packed in hessian bags and sawdust around the city streets, delivering ice once or twice a week.

Student name: ___________________________ Class: ___________________________

Other member/members of your team: ___________________________

What is to be investigated:

We are investigating early refrigeration and we are going to see which insulation is the best to keep the ice cold or frozen for the longest. Which insulation will keep the ice block the coldest?

Can you write it as a question?

What do you predict will happen? Explain why.

I predict that the ice chest with the bubble wrap for the insulation will keep the ice frozen for the longest because it has pockets of air that should help prevent warm air from melting the ice. I also predict that stuffing would let too much warm air in and that it would be too thin to keep the ice block from melting.

Give scientific explanations for your opinion.
### Investigation report: Insulation

<table>
<thead>
<tr>
<th>To make the test fair, what things (variables) are you going to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change?</strong></td>
</tr>
<tr>
<td>We are going to change the insulation in each plastic container.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change only one thing</th>
<th>What would the change affect?</th>
<th>Which variables will you control?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Annotations**

Identifies variables to be changed, measured and controlled.

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Investigation report: Insulation

Describe how you will set up and conduct the investigation.

1. Find and collect all of your materials and put them on to your desk.
2. Get a glue gun, 2 plastic cups and 1 type of material. Glue the material into the plastic cups.
3. Put an ice block in the cup.
4. Repeat steps 2 and 3 as many times as you want, but each time make sure you use a different material for each.
5. Now you have to wait for them to melt and find which material works best.
6. Make sure you measure and observe.

Use drawings, label and explain in steps.

Annotations

Designs an investigation method including collection of data.
Investigation report: Insulation

What equipment will you need?

- plastic tubs x 2
- masking tape
- bubble wrap
- foil
- stuffing
- foam/foam insulation
- home insulation
- roof insulation
- newspaper
- neoprene

Use dot points

Write, draw and/or take photos about your observations as you conduct the investigation.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>OVEN INSULATION</th>
<th>OVEN INSULATION</th>
<th>LENGTH OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>bubble wrap</td>
<td>10:11:45</td>
<td>11:31</td>
<td>1 hr 46 mins</td>
</tr>
<tr>
<td>foam insulation</td>
<td>8:3:11:45</td>
<td>2:46</td>
<td>3 hrs 1 min</td>
</tr>
<tr>
<td>stuffing</td>
<td>32:11:45</td>
<td>2:39</td>
<td>2 hrs 5 mins</td>
</tr>
<tr>
<td>newspaper</td>
<td>16:11:45</td>
<td>1:11</td>
<td>1 hr 16 mins</td>
</tr>
<tr>
<td>neoprene</td>
<td>24:11:45</td>
<td>1:59</td>
<td>2 hrs 5 mins</td>
</tr>
<tr>
<td>velvet</td>
<td>22:11:45</td>
<td>1:46</td>
<td>2 hrs 1 min</td>
</tr>
<tr>
<td>roof insulation</td>
<td>16:11:45</td>
<td>1:14</td>
<td>1 hr 29 mins</td>
</tr>
<tr>
<td>hessian</td>
<td>10:11:45</td>
<td>1:28</td>
<td>1 hr 26 mins</td>
</tr>
<tr>
<td>foam</td>
<td>23:11:45</td>
<td>1:54</td>
<td>2 hrs 9 mins</td>
</tr>
<tr>
<td>foil</td>
<td>13:11:55</td>
<td>12:57</td>
<td>1 hr 12 mins</td>
</tr>
<tr>
<td>plastic control</td>
<td>13:11:45</td>
<td>12:55</td>
<td>1 hr 10 mins</td>
</tr>
<tr>
<td>sawdust</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Annotations

Constructs a table to present and organise quantitative data.
Investigation report: Insulation

Annotations

Constructs a graph to show trends in data, including most graphing conventions.
Investigation report: Insulation

Anchors, 

Explaning results

Write a statement to summarise your findings.

Out of the materials that we tested, we found that more insulation is the best insulator by preventing the ice cube from melting. Some insulation was closely followed by stuffing which I predicted would be the worst. Our results showed that any material is better than nothing because the ice in the ice chest with no insulating material melted first. Soon after, our first ice block melted our second one melted, it was the ice block in the ice chest with the salt on the insulator.

I was surprised to see that foil was almost the worst insulator but melted in 2 minutes after our worst (nothing).

Did the results match your prediction? Why or why not?

No, because I predicted that stuffing would be the worst but it ended up being the second best insulation. Also, I predicted that salt/milk would be the best insulation when it ended up being in the middle (coming out)

Why did this happen?

I think the home insulation worked the best because it had quite a lot of air that stopped the warm air from getting to the ice blocks. I think that the foil and the plain ice cubes worked best because those materials did not have much air in them. This would allow the heat to get to the ice easily.

Why did this happen?

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Evaluating the investigation

What challenges did you have doing this investigation?

One of our challenges were keeping track of the time so we could check them every 5 minutes.

How could you improve this investigation?

We could improve the investigation by running it more than once to make sure the outcome is the same as the first.

Annotations (Overview)

The student constructs a multimodal text to communicate ideas and findings.

Anchors, 

Interprets data to order materials with reference to insulation effectiveness.

Attempts to explain results with reference to observable properties of the materials.

Identifies that repeating the investigation could improve the data.