



GEOGRAPHY
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GEOGRAPHY: BOTTLED WATER INQUIRY PROJECT

Background Information for teachers

Curriculum focus

Geography: Geographical Knowledge and Understanding (Geographies of Interconnections), Geographical Inquiry and Skills.

See list of curriculum links at the end of the geography activity instructions for more information.

Aim: Students identify how the trade of bottled water connects us with people and places around the world. Students will use geographical inquiry skills to research the effects of production and consumption of bottled water on places and environments.

Summary of activities:

There are three activities in this package.

1. How does bottled water connect us with other places and people?
2. The bottled water life cycle
3. A bottled water inquiry project

Suitable for: Year 9
(and possibly Year 10)

Duration: Four to five weeks

Background information

There are many steps involved in producing and consuming a bottle of water. Each step of the bottled water life cycle has impacts on places and environments. The inquiry project researches these impacts. It is based on the Year 9 work sample portfolio provided on the ACARA website www.acara.edu.au/curriculum/worksamples/Year_9_Geography_Portfolio.pdf.

For more information and statistics on bottled water in Australia please see the bottled water background information in the introduction to this guide.

Cross-curriculum links

This guide is designed to be used as a cross-curriculum unit with many subject areas looking at the topic of bottled water from different angles. This creates opportunities for sharing across subject areas and year levels. You could invite:

- an English class to present persuasive speeches including actions we can take to reduce plastic waste (Inquiry question 7)
- a maths class to share their research on cost of bottled water and where it comes from (Inquiry question 1)
- a science class to share what happens when plastic ends up in the ocean (Inquiry question 6).

You might also like to share some of the students' research, including suggestions about how to reduce our use of plastic, in the newsletter or at an assembly.

GEOGRAPHY: BOTTLED WATER INQUIRY PROJECT

Activity Instructions

Activity 1. How does bottled water connect us with other places and people?

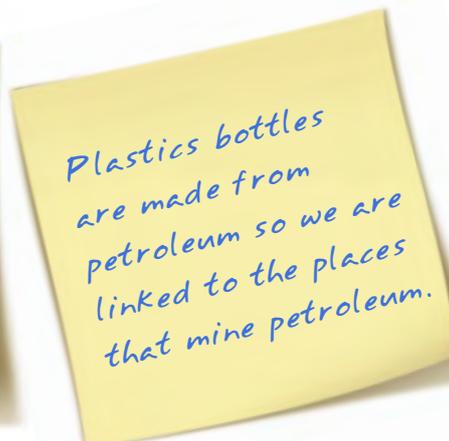


For this activity you will need: A bottle of water (or an image of bottled water), sticky notes, butchers paper with 'bottled water connects us to these people and places' written on it. You will need a projector, speakers and access to the internet.

1. Show students a bottle of water (or an image of bottled water).
2. Ask students to close their eyes, or lower their heads, and imagine the journey of this bottle of water. While they are quiet, ask them some simple questions such as:
 - a. Where might the bottled water journey start?
 - b. How might the bottled water get to us?
 - c. What happens to the plastic after we drink the water?

Ask students to discuss their ideas with the person next to them then share the responses with the class.

3. On a piece of butchers paper write 'bottled water connects us to these people and places'
4. Give each student (or group of students) some sticky notes. Ask the students to write down the people and places that are connected through a bottle of water. Ask them to write each person or place on a sticky note (one idea per sticky note) along with a description of the connection. Give them a few minutes to do this and then ask them to put the sticky notes on the butchers paper.





5. Watch the video report on the production of Fiji bottled water
<http://www.youtube.com/watch?v=VUeEEvP8m3w>

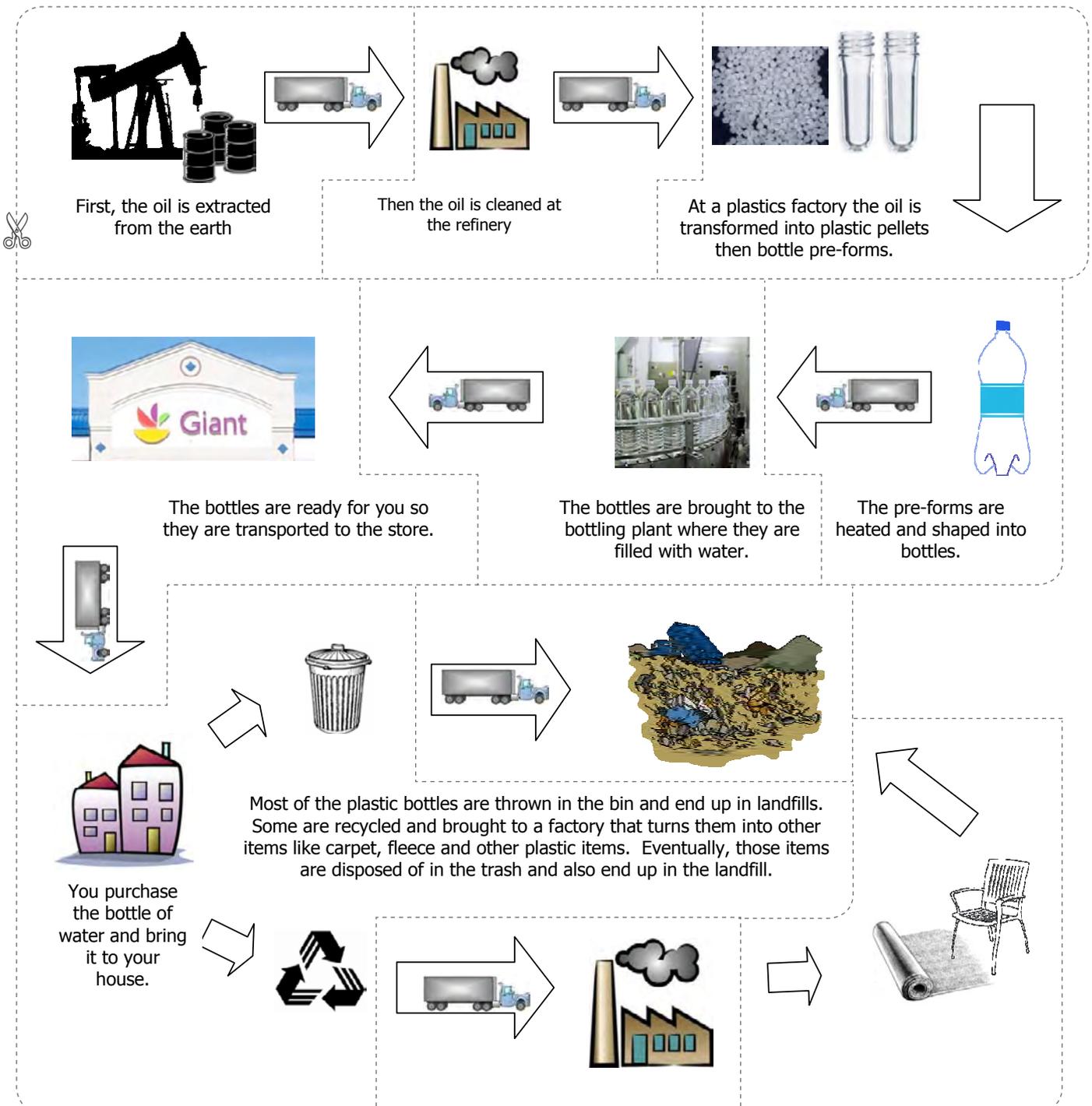
Ask the students to use more sticky notes to add to their responses about how bottled water connects people and places.

6. Discuss the video (optional)
 - a. Is the video from a trustworthy site? Who posted the video?
 - b. What could you do to check the facts in the video?



Life cycle of a plastic bottle

There are many steps involved in making a plastic bottle of water and throughout the process many natural resources are used. Each step in the process may also have impacts on places and environments.



Source: Montgomery County Public Schools

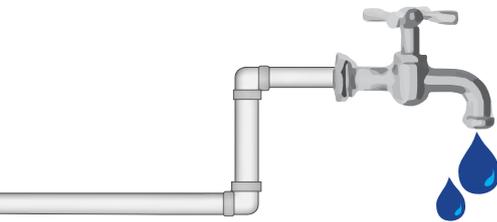
www.montgomeryschoolsmd.org/uploadedFiles/curriculum/outdoored/programs/waterbottlefactpages.pdf

Activity 2. The bottled water life cycle



For this activity you will need: A projector, speakers and access to the internet to show a short clip plus several copies of the bottled water supply chain on the previous page, available for download at www.montgomeryschoolsmd.org/uploadedFiles/curriculum/outdoored/programs/waterbottlefactpages.pdf.

1. Watch the infographic on the life cycle of bottled water
www.youtube.com/watch?v=glAPkpeKvfE
2. Explain to students that a supply chain is a network of people and activities that help move a product from start to consumption by the end user (National Geographic). A supply chain captures all the processes involved in production or manufacturing of a product. Discuss one or two examples of a supply chain such as fruit at a local farmers market or grocery store.
3. Print the life cycle of bottled water from the previous page and cut it up into small pieces as shown by the cutting lines. Give each student one piece of the life cycle and ask them to put them in order.

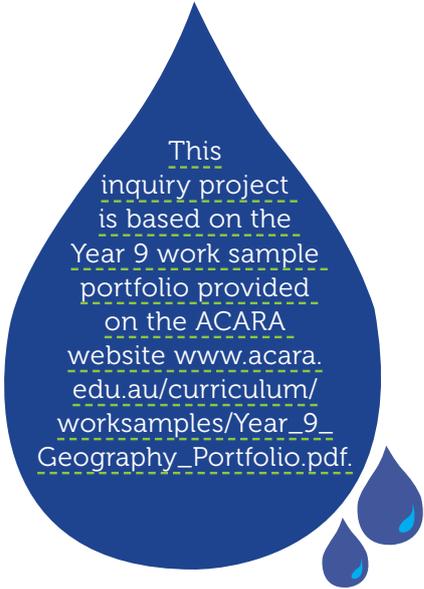


There are 10 pieces in the puzzle. You may like to print the life cycle on two or three different coloured pieces of paper so that each student has a different piece of the puzzle. Students will need to group themselves according to the colour of their piece.

4. Discuss with students:
 - a. How many times are materials transported in the life cycle of bottled water? What are the impacts?
 - b. What other impacts are associated with your piece of the puzzle?

Activity 3. Bottled water inquiry project

1. Split your class into seven groups and assign each group to complete one part of the inquiry task outlined on the next page.
2. Assign time for each group to complete their part of the inquiry project.
3. Ask each group to present their research back to the class. Alternatively, groups could share their research through a collaborative website such as Padlet. Padlet is available for free at <http://padlet.com>.



This inquiry project is based on the Year 9 work sample portfolio provided on the ACARA website www.acara.edu.au/curriculum/worksamples/Year_9_Geography_Portfolio.pdf.



Scaffolding the project

We have compiled a matrix with our favourite links and videos to share with groups that require scaffolding in this inquiry project. Alternatively, you could use the matrix to conduct a series of lessons with your class instead of the group inquiry project.

Student leadership

Inspired students might like to participate in, or organise, an event to encourage other students to join them in giving up plastic bottles for a day, a week or month. The details of this campaign are outlined in the student leadership section of this document.

Bottled water inquiry project

Investigate the impacts of production and consumption of bottled water on places and environments.



The following questions will assist with your inquiry.

1. **The source of water:** Research the cost, type of water (municipal, spring or artesian), location of water source and location of bottling plant for a variety of brands. To do this you might like to record brands of bottled water available in a local shop (e.g. supermarket) and find out where each is produced. You may need to contact the companies directly to find out where the water is sourced and bottled. How does the water on our supermarket shelf connect us to other people and places?
2. **Impacts of plastic production:** How is a PET plastic bottle made? Where is petroleum mined? What impacts are associated with mining petroleum? How much water and energy are required to make plastic? How does the manufacturing of a plastic bottle connect us to other people and places?
3. **Impacts of water extraction, bottling and transportation:** What types of water are bottled? How does extracting and bottling water impact on people and environments? How is bottled water transported? What impacts are associated with transporting water? How does bottling and transporting water connect us to people and places?
4. **Consumption of bottled water:** How much bottled water is consumed in Australia? How has this changed over time? Which countries consume the most bottled water? What do you know about these countries? Do they have access to clean water? Are they wealthy?
5. **Plastic bottle waste**
 - a. How much plastic waste is created from drinking bottled water? What happens to the waste?
 - b. We don't just trade the water, we trade the waste too. Plastic is Australia's third largest waste export (after paper and metal). How much PET plastic is exported? Where is it exported to? Why are materials exported for recycling?
 - c. How does recycling compare to using raw materials in recycled plastic products? Does it use more energy and water? Is bottled water made from recycled plastic?
 - d. How does waste connect us to other people and places?
6. **Impacts of littering:** Some plastic bottles are littered and end up in our oceans. What happens to plastic in our oceans? What are the impacts of plastic in our oceans? How does littering connect us to other people and places?
7. **What actions can we take to reduce our use of plastic?**

What is the waste hierarchy and what is the most important step on the hierarchy? What are some people (schools, communities) doing in response to the impacts of bottled water and other plastics? What actions could you, the school or the community take to reduce the use of plastic?

Bottled water inquiry project matrix

Inquiry questions	What you need to do	Useful links
<p>1.The source of water:</p> <p>Research the cost, type of water (municipal, spring or artesian), location of water source and location of bottling plant for a variety of brands. To do this you might like to record brands of bottled water available in a local shop (e.g. supermarket) and find out where each is produced. You may need to contact the companies directly to find out where the water is sourced and bottled. How does the water on our supermarket shelf connect us to other people and places?</p>	<ul style="list-style-type: none"> Identify at least eight different brands of bottled water, including one that is not from Australia. Create a table of different brands including cost, type and location. Describe how the bottled water on supermarket shelves connects us to other people and places 	<p>Information about brands:</p> <p>www.fijiwater.com/faqs (Fiji Water)</p> <p>www.coca-colajourney.com.au/contact-us (Pump, Mount Franklin)</p> <p>www.schweppesaustralia.com.au/Footer-Pages/Contact-us.aspx (Coolridge, Frantelle, Ice house)</p> <p>www.noblebeverages.com/contact (Pureau)</p> <p>www.evian.com/en_SG/41-from-the-heart-of-the-Alps (Evian)</p> <p>www.aquapura.net.au/pure_water.html (Aqua Pura)</p> <p>http://yaruwater.com/our-source (Yaru)</p> <p>http://shop.coles.com.au/online/national/contact-us (Coles Spring Water)</p>
<p>2.Impacts of plastic production:</p> <p>How is a PET plastic bottle made? Where is petroleum mined? What impacts are associated with mining petroleum? How much water and energy are required to make plastic? How does the manufacturing of a plastic bottle connect us to other people and places?</p>	<ul style="list-style-type: none"> Describe how plastic bottles are made. Map where petroleum is mined. Identify environmental impacts (and social impacts) of extracting petroleum and making plastic. Describe how much water and energy are required to make plastic Describe how manufacturing plastic connects us to other people and places 	<p>Magic mass production of plastic bottles www.youtube.com/watch?v=sYfcRwMA_k8</p> <p>How plastic bottles are made www.youtube.com/watch?v=ed7XJeXl3b4</p> <p>Mining and the environment (ABS, Year Book Australia 2003) www.abs.gov.au/ausstats/abs@.nsf/90a12181d877a6a6ca2568b5007b861c/ce28d7f7be5faa308ca256cae0015da32!OpenDocument</p> <p>Bottled water factsheet www.cleanup.org.au/PDF/au/clean_up_australia_bottled_water_factsheet.pdf</p> <p>Bottled water and energy factsheet http://pacinst.org/publication/bottled-water-and-energy-a-fact-sheet/</p> <p>Producing bottled water http://cfs-fcee.ca/wp-content/uploads/sites/2/2013/09/BWFD-Factsheet-environmental-impact.pdf</p>

Inquiry questions	What you need to do	Useful links
<p>3. Impacts of water extraction, bottling and transportation:</p> <p>What types of water are bottled? How does extracting and bottling water impact on people and environments? How is bottled water transported? What impacts are associated with transporting water? How does bottling and transporting water connect us to people and places?</p>	<ul style="list-style-type: none"> Describe the different types of bottled water – municipal, artesian, spring. Identify the impacts on people, places and environments of extraction, bottling and transporting water. How far are some brands of bottled water transported? How is the water transported? What are the impacts of transporting water? Describe how bottling and transporting water connects us to people and places 	<p>What's in a name? www.coolclearwater.com.au/articles/BottledWater/CHOICEcomauSept07.pdf</p> <p>Watch the short clip about some of the impacts of bottled water www.youtube.com/watch?v=fZcnffJ3u4 (American documentary)</p> <p>Impacts of bottled water http://coolaustralia.org/bottled-water-secondary/</p> <p>Impacts of bottled water http://gracelinks.org/2379/bottled-water-and-water-conservation</p> <p>Bottled water and energy factsheet http://pacinst.org/publication/bottled-water-and-energy-a-fact-sheet/</p> <p>Bottled water factsheet www.cleanup.org.au/PDF/au/clean_up_australia_bottled_water_factsheet.pdf</p> <p>Impacts of production and transporting http://documents.foodandwaterwatch.org/doc/TakeBackTheTap_web.pdf#_ga=1.129386252.1408464220.1410830761</p>
<p>4. Consumption of bottled water:</p> <p>How much bottled water is consumed in Australia? How has this changed over time? Which countries consume the most bottled water? What do you know about these countries? Do they have access to clean water? Are they wealthy?</p>	<ul style="list-style-type: none"> Identify how much bottled water is consumed in Australia each year. Graph the consumption of bottled water over time, either in Australia or around the world. Identify the top five countries consuming bottled water. Graph water consumption per capita and GDP / clean water / other factors and identify any patterns. 	<p>www.bottledwatermatters.org/article/erroneous-article-national-geographic%E2%80%99s-online-green-living-section</p> <p>Statistics per capita and total consumption www.bottledwater.org/files/2011BWstats.pdf</p> <p>Map www.nationmaster.com/country-info/stats/Lifestyle/Food-and-drink/Bottled-water/Consumption#-graph</p> <p>Refers to when Australian started buying bottled water http://coolaustralia.org/bottled-water-secondary/</p> <p>How much bottled water is consumed in Australia www.bundyontap.com.au/bottledwater.html</p> <p>Trend in bottled water consumption www.smh.com.au/environment/water-issues/could-this-mean-the-end-of-the-line-for-the-plastic-water-bottle-20130302-2fcu1.html</p>

Inquiry questions	What you need to do	Useful links
<p>5. Plastic bottle waste</p> <p>a) How much plastic waste is created from drinking bottled water? What happens to the waste?</p> <p>b) We don't just trade the water, we trade the waste too. Plastic is Australia's third largest waste export (after paper and metal). How much PET plastic is exported? Where is it exported to? Why are materials exported for recycling?</p> <p>c) How does recycling compare to using raw materials in recycled plastic products? Does it use more energy and water? Is bottled water made from recycled plastic?</p> <p>d) How does waste connect us to other people and places?</p>	<ul style="list-style-type: none"> • How much PET plastic is recycled compared to the amount sent to landfill in Australia? How might this affect the future of landfills in Perth? • Identify the amount (or percent) of PET plastic that is recycled compared to the amount sent to landfill. • Describe how this might affect the future of landfills. • Identify where plastic is exported to • Explain why plastic is exported. • Compare raw materials, energy and water used in recycling compared to creating new plastic products. • Describe how waste connects us to people and places. 	<p>Impacts of bottled water http://coolaustralia.org/bottled-water-secondary/</p> <p>Percentage of plastic recycled and percentage exported (page 6) http://www.packagingcovenant.org.au/data/Publications/R03-03-A11011_NPRS_2012-13_Report_FINAL1.pdf</p> <p>What happens to our waste? www.news.com.au/finance/business/adam-minters-book-junkyard-planet-tells-fascinating-story-behind-global-scraping-industry/story-fnda1bsz-1226817580799</p> <p>Why water bottles don't contain recycled plastic www.crikey.com.au/2011/06/03/why-arent-bottles-recycled-people-dont-want-water-that-tastes-funny/</p>
<p>6. Impacts of littering:</p> <p>Some plastic bottles are littered and end up in our oceans. What happens to plastic in our oceans? What are the impacts of plastic in our oceans? How does littering connect us to other people and places?</p>	<ul style="list-style-type: none"> • Describe how plastic breaks down in our oceans. • How does plastic impact on the environment and on people. • How does littering plastic connect us to other people and places? 	<p>Plastic oceans www.youtube.com/watch?v=cwTDvqaqPIM</p> <p>ABC Behind the news www.abc.net.au/btn/story/s3591476.htm</p> <p>Surfing for Change www.youtube.com/watch?v=q1Pb6cEC_gw</p> <p>Seven news clip www.youtube.com/watch?v=os7OuSxP-JA</p> <p>Journey to the ocean www.youtube.com/watch?v=vh6MDuxYing</p> <p>CSIRO survey of coast www.smh.com.au/environment/dumping-is-trashing-australian-beaches-says-csiro-report-20140914-10gs10.html</p>

Inquiry questions	What you need to do	Useful links
<p>7. What actions can we take to reduce our use of plastic?</p> <p>What is the waste hierarchy and what is the most important step on the hierarchy? What are some people (schools, communities) doing in response to the impacts of bottled water and other plastics? What actions could you, the school or the community take to reduce the use of plastic?</p>	<ul style="list-style-type: none"> • Describe at least two examples of what schools, businesses, events or local communities are doing to reduce the use of bottled water. • Describe the personal actions you could take. • Describe the actions your school or community could take. 	<p>Monte Sant' Angelo Mercy College www.youtube.com/watch?v=6U9-PFjlyY</p> <p>Sydney water tap pledge http://tapsydney.com.au/pledge/</p> <p>Plastic free July www.plasticfreejuly.org or www.youtube.com/watch?v=7u01LS9enPQ</p> <p>City of Perth www.perth.wa.gov.au/newsroom/featured-news/australian-first-perth-trials-public-drinking-fountain-alternative</p> <p>Putting a cap on bottled water http://splash.abc.net.au/media/-/m/1239528/putting-a-cap-on-bottled-water</p> <p>Bundanoon www.bundyontap.com.au</p>



GEOGRAPHY: CURRICULUM LINKS

Year 9:

GEOGRAPHICAL KNOWLEDGE AND UNDERSTANDING	<p>Unit 2: Geographies of interconnections (Year 9)</p> <p>The ways that places and people are interconnected with other places through trade in goods and services, at all scales (ACHGK067)</p> <p>The effects of the production and consumption of goods on places and environments throughout the world and including a country from North-East Asia (ACHGK068)</p>	<p>Activity 1, 2, 3</p> <p>Activity 2, 3</p>
	GEOGRAPHICAL INQUIRY AND SKILLS (YEAR 9 / 10)	<p>Observing, questioning and planning (Year 9 / 10)</p> <p>Develop geographically significant questions and plan an inquiry that identifies and applies appropriate geographical methodologies and concepts (ACHGS063 / (ACHGS072)</p>
<p>Collecting, recording, evaluating and representing (Year 9 / 10)</p> <p>Collect, select, record and organise relevant geographical data and information, using ethical protocols, from a range of appropriate primary and secondary sources (ACHGS064 / ACHGS073)</p>		<p>Activity 3</p>
<p>Evaluate sources for their reliability, bias and usefulness, and represent multi-variable data in a range of appropriate forms, for example, scatter plots, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS065 / ACHGS074)</p>		<p>Activity 3</p>
<p>Represent the spatial distribution of geographical phenomena by constructing special purpose maps that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS066 / ACHGS075)</p>		<p>Activity 3</p>
<p>Interpreting, analysing and concluding (Year 9 / 10)</p> <p>Evaluate multi-variable data and other geographical information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to make generalisations and inferences, propose explanations for patterns, trends, relationships and anomalies, and predict outcomes (ACHGS067 / ACHGS076)</p>		<p>Activity 3</p>
<p>Apply geographical concepts to synthesise information from various sources and draw conclusions based on the analysis of data and information, taking into account alternative points of view (ACHGS068 / ACHGS077)</p>		<p>Activity 3</p>
<p>Communicating (Year 9 / 10)</p> <p>Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate (ACHGS070 / ACHGS079)</p>		<p>Activity 3</p>
<p>Reflecting and responding (Year 9 / 10)</p> <p>Reflect on and evaluate the findings of the inquiry to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations; and explain the predicted outcomes and consequences of their proposal (ACHGS071/ACHGS080)</p>		<p>Activity 3</p>

Year 10:

GEOGRAPHICAL KNOWLEDGE AND UNDERSTANDING	<p>Unit 1: Environmental change and management</p> <p>The human-induced environmental changes that challenge sustainability (ACHGK070)</p>	<p>Activity 1, 2, 3</p>
GEOGRAPHICAL INQUIRY AND SKILLS	<p><i>Refer to table above for Year 9 / 10</i></p>	