

Adapting to Climate Change

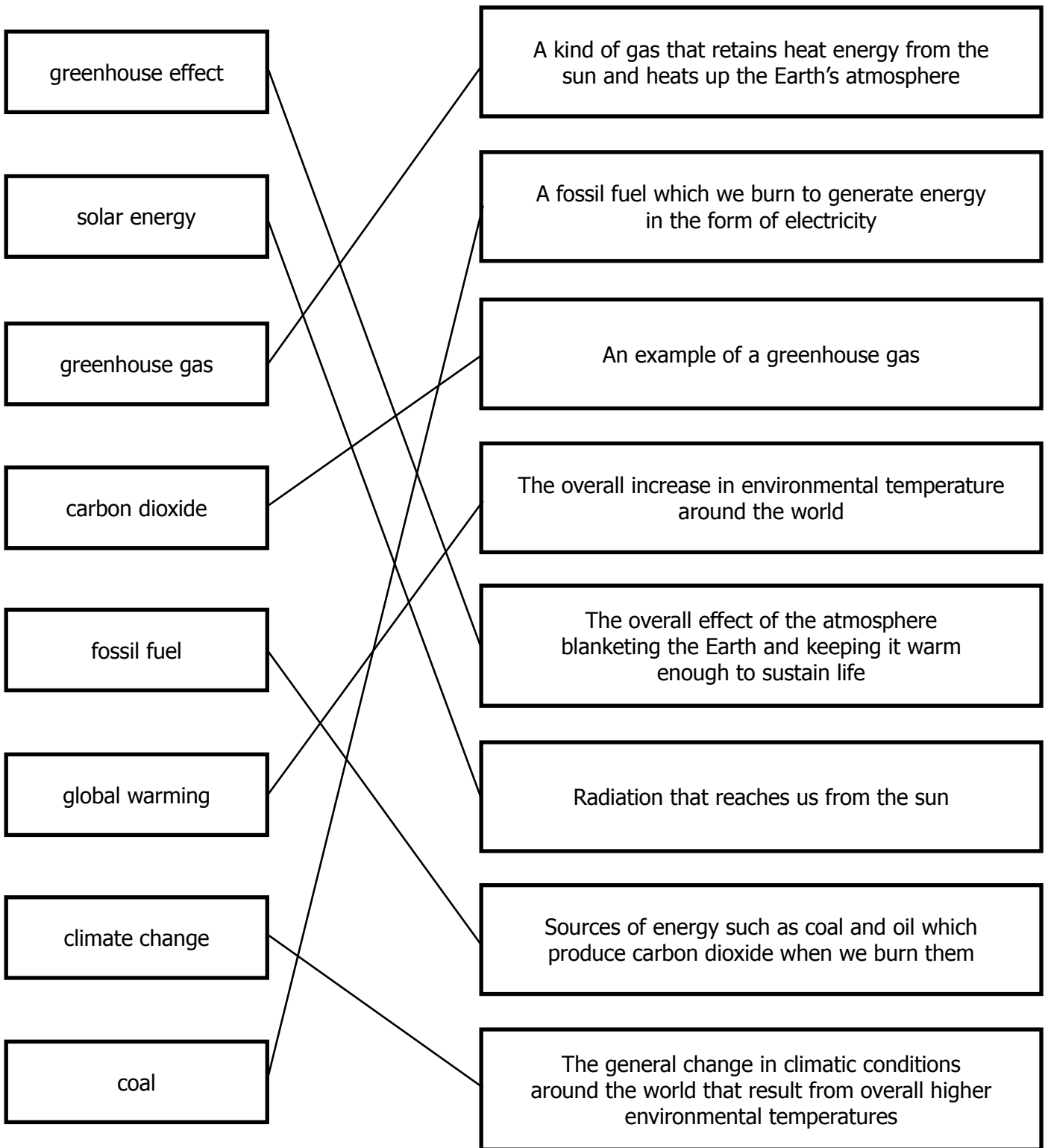
Level 5 Activities – SOLUTIONS

L5A1 What is climate change?

1. This starter activity is aimed at identifying student knowledge and understanding of the concept of the greenhouse effect. You can expect most students to have some awareness and their shared discussion will help them refine their ideas and create explanations. Expect starting points that include the experience of the family car warming up even on mild days. A range of responses will be acceptable here.
2. When the sun's rays enter the Earth's atmosphere, solar radiation is absorbed by particles in the air, warming them. Some solar radiation is reflected back to space, but greenhouse gases in particular re-emit the sun's radiation, further warming the atmosphere.
3. Current carbon dioxide concentrations in our atmosphere are at far greater concentrations than occur naturally. This is mostly due to human activity such as burning fossil fuels. It is a problem because higher carbon dioxide levels are linked to higher atmospheric temperatures, which in turn alter global climatic patterns. Changes in climate will change the conditions for living things.



4.



L5A2 Climate Change – The Movie

1. Evidence that climate change is occurring includes global warming over past century and data that shows the past decade as the warmest on record since 1850.
2. Increased greenhouse gas levels caused by human activities including
 - Land use change
 - Agriculture
 - Burning fossil fuels

3.

Factor	Explain link to increased greenhouse gases
Burning fossil fuels	Fossil fuels are high in carbon; when they are burned the carbon combines with oxygen in the atmosphere forming carbon dioxide gas (which is a greenhouse gas). The more fossil fuels we burn, the higher the level of carbon dioxide in the air.
Agriculture, eg. cattle	Cattle produce methane gas (flatulence). Methane is a greenhouse gas. The more cattle, the greater the methane output.
Clearing forests	Through photosynthesis green plants, including trees, recycle carbon dioxide and return oxygen to the air. When we clear large areas of forest we reduce the number of trees available for this recycling. The less trees the more carbon dioxide remains in the atmosphere.

4.
 - a. Atmospheric temperatures INCREASE
 - b. Rainfall DECREASE
 - c. Frosts DECREASE
 - d. Snowfall DECREASE
 - e. Heatwaves INCREASE
 - f. Fires INCREASE
 - g. Drought INCREASE
 - h. Flood INCREASE
 - i. Storm surges INCREASE
 - j. Biodiversity DECREASE
5. Any logical response is acceptable here. Examples of student responses include:
 - a. Atmospheric temperatures increase – the summers are hotter and more uncomfortable; we could plant more shade trees around our homes, in school grounds and parks and gardens.
 - f. Increased likelihood of fires – people in high bushfire risk areas will be on high alert in summer; they may build, rebuild or extend using fire-resistant materials; they can install water tanks and power generators; they might build a fire shelter or bunker; they may move to areas of reduced fire risk.



L5A3 Climate Change – The Movie Part II

1. Less water, more frequent bushfires and hotter summers will threaten ecosystems.
2. Native plants and animals that are unable to adapt to their changed environments are unlikely to survive.
3. Plants and animals that are resilient enough to survive may move to more suitable environments or use different resources, including different foods.
4. Agricultural and livestock industries need to operate on less water availability; some face changing the kinds of crops they grow.
5. Older people and those with disabilities and chronic illnesses are likely to be at greater risk from increased heat/overheating; the elderly and sick are likely to have reduced effectiveness at keeping their bodies cool in the face of high external temperatures. Often these represent the disadvantaged in the community, living in poor quality housing that is not equipped to keep them cool.
- 6a. Changing the way we build houses can make them more effective at keeping cool in summer and warm in winter without overusing energy resources such as fossil fuels (for electricity to run air conditioners and heaters). Changing the way we build and use transport systems will increase the numbers of people transported in this way, and reduce the number of cars on the road, thereby reducing fuel usage and greenhouse gas emissions.

b.

Activity	Changed management	Benefits
Use private & public transport	Less private transport such as cars More people using public transport such as trains	Less cars on the road so less greenhouse gas emissions, especially when large numbers of cars carry one or two people only More effective transport with increased numbers of people per transport vehicle; reduces amount of greenhouse gas per person
Build our homes	Increased use of solar panels for heating, cooling and electrical needs Numbers of windows and orientation of homes Changing some materials from which homes are constructed	Clean (no greenhouse gas) & renewable energy to meet electrical needs Makes most effective use of sun's light and heat Increases insulation of homes thereby reducing need to heat & cool
Use of water	Shorter showers Water-saving shower heads Dual flush toilet systems Cold wash for laundry Recycle laundry water for garden	Conserves water Reduces energy needed to heat water for washing



L5A4 The little things are the big things!

1. There has been an overall significant increase in greenhouse gas emissions for Victoria, with a small decrease between 2006 & 2007.
2. Individual student responses will vary for all parts of this item.
3. Individual responses will vary. Students should be guided by their response to 2c, where they have identified key activities contributing to greenhouse gas emissions – this will provide direction about changing behavior aimed at reducing emissions.

Other benefits for families might include lower electricity bills related to reduced usage, lower water bills if having shorter showers due to less power used to heat.

L5A5 Handle with care!

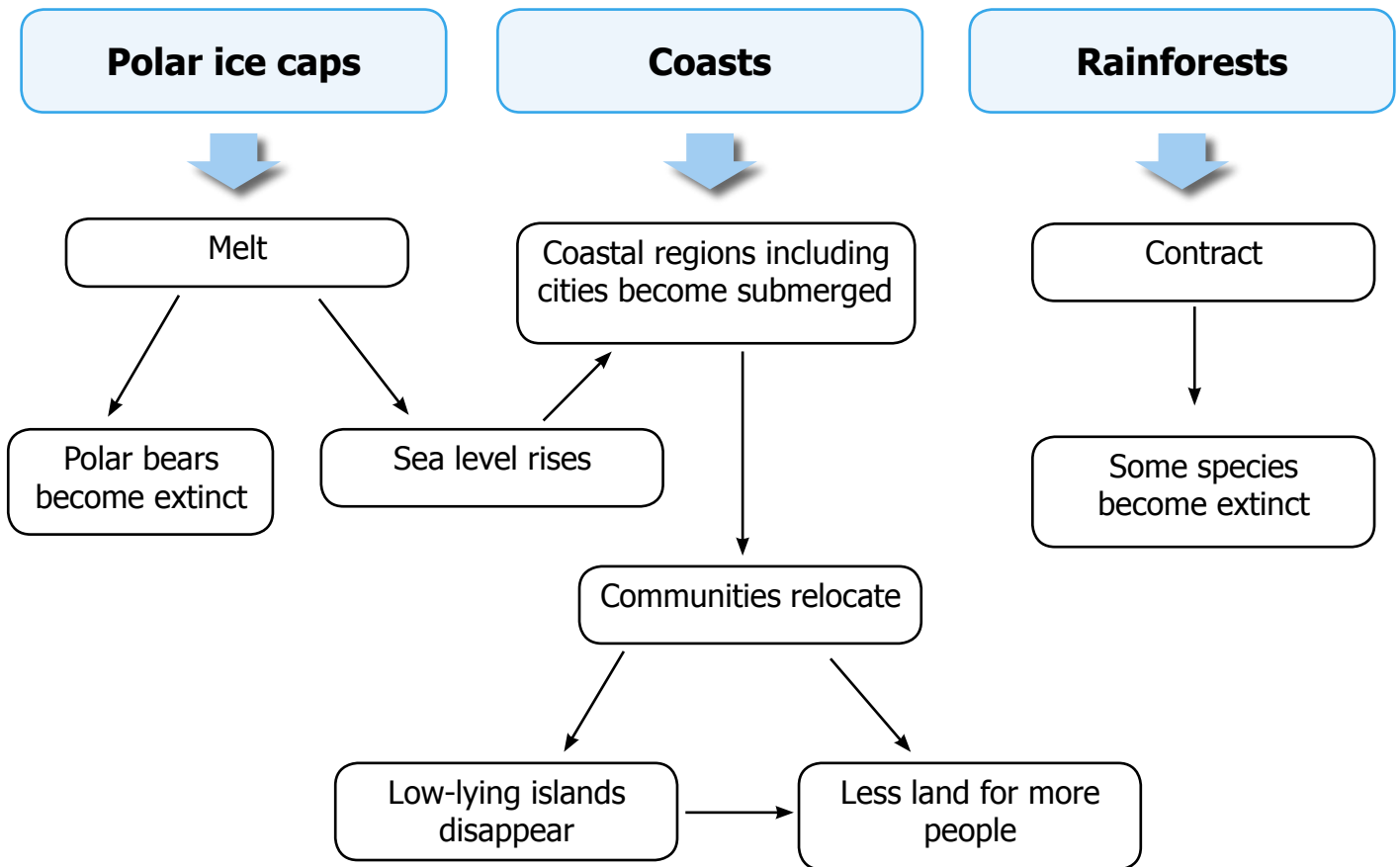
Action		How can I achieve this?	What are the costs?	What are the benefits?
1	Use less hot water	Have 4 minute showers Wash clothing in cold water	Small inconvenience None	Conserve water Lower water bill Reduce greenhouse gas emissions
2	Switch to Green Power	Register with your electricity provider to use wind, solar, hydro for electricity generation	Small additional cost	Significant reduction in greenhouse gas emissions
3	Use the right light	Use compact fluorescent light bulbs Turn lights off when not in use	Increased cost for light bulbs	Light bulbs last much longer & are more energy efficient Reduced cost electricity bill Reduced greenhouse emissions
4	Choose energy-efficient appliances	Buy electrical appliances that display energy star rating labels	May cost a little more	Cheaper running costs so lower electricity bill Reduced greenhouse emissions
5	Reduce your household waste	Compost Recycle Bulk buy	None	Reduce household waste Reduce landfill Buying in bulk offers long term savings
6	Take public transport, car-pool, walk or cycle	Buy a ticket Organise to share rides Get walking/riding	Cost of a ticket Shared running costs for car-pooling	Reduced costs for running/maintaining car Reduced greenhouse emissions from less cars on the road Get fitter



7	Choose a fuel-efficient car	Comparisons available on Green Vehicle Guide	Usually the cost of cheaper car	Smaller cars cost less to purchase, fuel and maintain Reduced greenhouse gas emissions
8.	Stop losing stand-by power	Turn off appliances when not in use	None	Reduced running costs Reduced greenhouse emissions
9.	Check the temperature of your home	Set central heating at 18 – 20°C in winter & no less than 25°C in summer	None	Reduced energy usage & reduce electricity bill Reduced greenhouse emissions
10	Draught-proof your home	Make sure your home is insulated Keep doors closed	Cost of insulation	Home more effective at keeping constant temperature Reduces need for heaters & air conditioners so reduced running costs Reduced greenhouse emissions

L5A7 There's so much more...

1.



- 2a. The more stars an appliance displays the more energy-efficient it is.
- b. Because appliances with higher star ratings are more energy-efficient they cost less to run, so the electricity bill be less when these appliances are used compared to items with less or no stars.
- c. The environment benefits when we use these appliances above others because less electricity is used to run them. This in turn means less greenhouse gases are produced.

L5A8 The future is in your hands!

1. A range of answers will be acceptable here as there are many different facts that students can record. It will be useful to share student responses at the conclusion of the exercise.