



Geography

The Earth's Water



For Upper Primary

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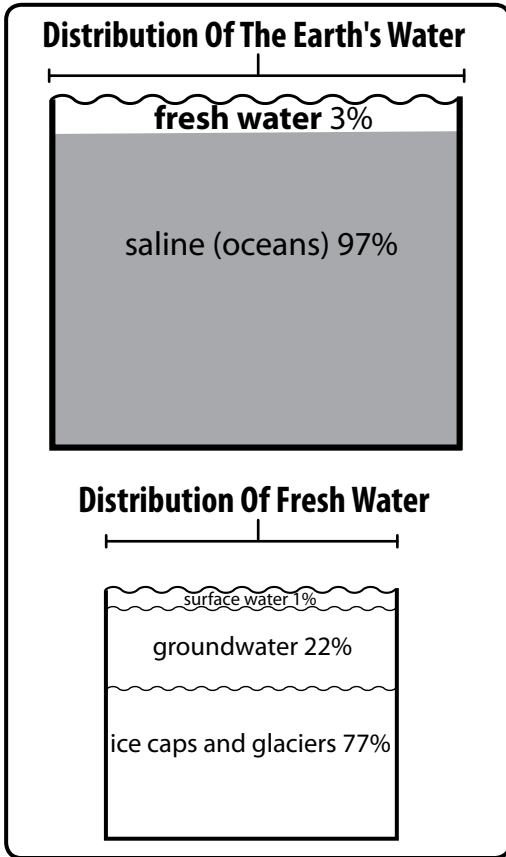
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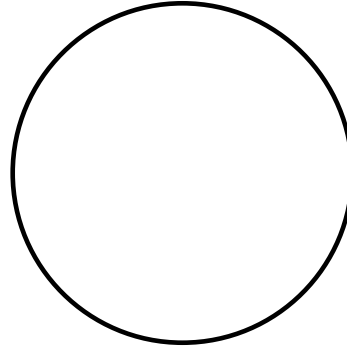
Using And Accessing Water

Read the information and complete the tasks.



A. Record the information left as a pie graph and a bar graph.

The Distribution Of The Earth's Water



The Distribution Of Fresh Water



B. Think about your family's daily water usage. Estimate how much water you use for each activity listed in the table right. You could choose from the percentages below to complete the table.

2% 25% 9% 39% 1% 4% 7% 6%



Water Use	Estimated Percentage
1. showers and baths	
2. toilets	
3. washing machines	
4. taps – brushing teeth, washing hands, glasses of water	
5. evaporative air conditioners	
6. dishwashers	
7. watering gardens	
8. pool and/or spa	

Did You Know?

Businesses and industries in Australia use less scheme water in total than private users. To ensure that businesses achieve this they are required to submit a Water Efficiency Management Plan.

Rainfall And The Water Cycle

Read the information and complete the tasks.



It is hard to imagine, but there is a limited amount of water in the world. The water that you may drink today has actually been recycled millions of times before it reaches your cup. This process of water recycling is known as the water cycle. The next time you have a drink of water think about where it has come from - it may have been a part of the iceberg that the Titanic hit or water which was once snow on the top of Mount Everest!

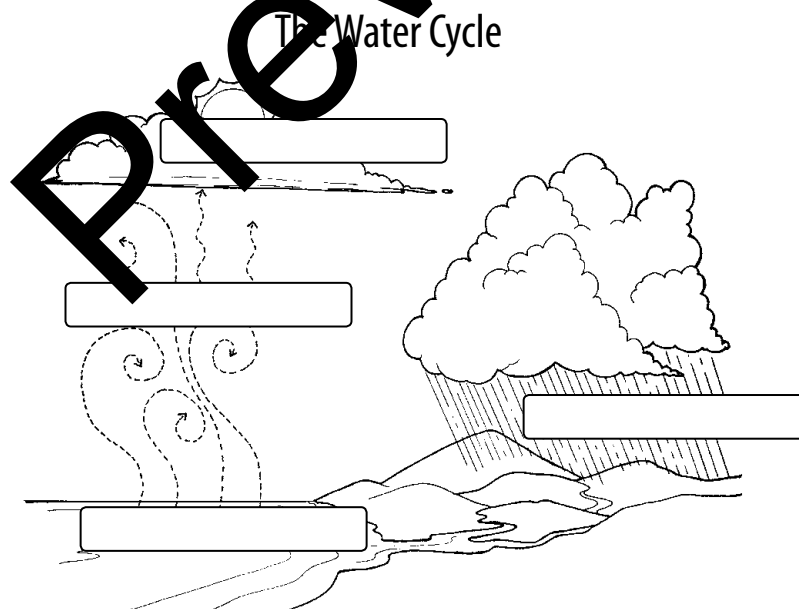
Water is constantly being recycled throughout the world. Water is considered a precious resource due to the large differences in its availability in different countries. Some

countries have an abundance of water such as New Zealand; other countries, such as Australia, have little water due to long periods of drought and large desert areas. Even within one country the availability of water can change greatly. For example, parts of Australia such as New South Wales and Victoria often suffer from extreme flooding due to heavy rainfall, while other outback regions frequently experience droughts.

Water is capable of taking many forms to serve many purposes. Firstly, water in its liquid form evaporates. Evaporation occurs when the sun heats up the water in lakes,

rivers and oceans, and turns it into vapour or steam. The vapour then rises into the air. This is the start of the water cycle. The water vapour gets cold in the air and changes back into a liquid, forming the clouds. This is called condensation. The third step in the water cycle process is precipitation - another name for rain. Rainfall occurs when the air can no longer hold the condensed air, and it falls back to Earth. The last step in the water cycle is collection - the return of the rain (water) back into the Earth's oceans, rivers, lakes and groundwater.

A. Label the diagram to show the four stages of the water cycle. You could provide further explanation of each stage in the spaces around the diagram.



B. Tell a partner how the water cycle works without looking at this sheet.

Challenge

C. The Australian Bureau of Meteorology (BOM) publishes daily reports on dam water levels, rainfall predictions and actual annual rainfall in each region of Australia. Look up the actual rainfall recorded in your area for June for the last three years. Has the amount of rainfall increased or decreased during this time? Record your findings on the back of this sheet.

Surface And Groundwater 1

Read the information and complete the tasks.



If you have ever tried digging a hole in your backyard and you live near a river, lake or ocean, you may have come across water as you have dug down. This water is known as groundwater.

Groundwater is the water which has soaked into the ground from rain, hail, snow

and sleet. Groundwater is used for drinking, irrigation, and for use in households and businesses. Due to gravity, the water moves down into the ground between the particles of soil, gravel, sand and rock until it reaches the other stored groundwater - this area is called the saturation zone.

GROUNDWATER

The top of this zone is called the water table. An aquifer is the name given to the water-bearing permeable rock from which the groundwater is extracted through a water well. The water table can be either close to the ground's surface or hundreds of metres below it.

A. On the back of this sheet or in your workbook draw a diagram which explains how groundwater is formed and extracted. Label your diagram using the words: new groundwater; particles of soil, gravel, sand and rock; stored groundwater and saturation zone.



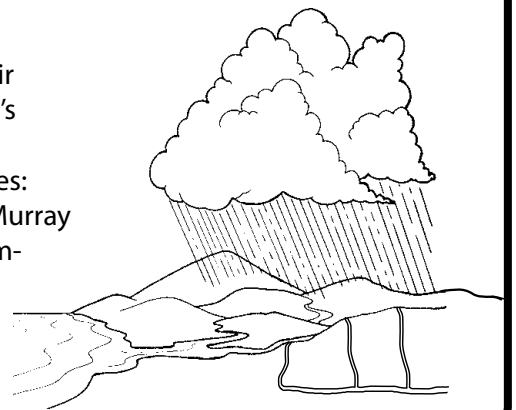
The water in rivers, lakes and ponds is called surface water. Surface water can soak down into the ground and become groundwater. Surface water is replenished by the water cycle.

The management of water resources is very important. In Australia the *Rights in Water and Irrigation Act (2014)* regulates how companies such as The Water Corporation manage the use of available water. Water allocation plans, state how much water is available from a particular

groundwater aquifer at any given time and how much water needs to remain in order for the groundwater to replenish. Licences are issued to companies and individuals in order to make them accountable for their usage. For example, Perth's Kwinana Peel region has five groundwater resources: Cockburn groundwater, Murray groundwater, Rockingham-Stakehill groundwater, Serpentine groundwater and South West Coastal

SURFACE WATER

groundwater. Licences are issued to all those in need of the water; they are then accountable for how the water is used and how much is used.



B. Explain what is happening in the diagram above left. Label surface water and groundwater.

C. Define surface water and groundwater in your own words.

Surface water: _____

Groundwater: _____

Surface And Groundwater 2

Complete the tasks.

A. Water is regulated in Australia thoroughly. Each region has its own office representing the Government's Department of Water. Look at the divisions listed in the table below. Use the internet to find out what each division is responsible for and how they meet their responsibilities. Go to the Government Department of Water in your state or territory to find your answers.

Divisions	Notes – What Do They Do?	Questions / Thoughts
Water Licensing		
Resource Planning		
Groundwater and Surface Water Allocation		
River Care/River Restoration		
Waterways Planning and Recreation Management		
Information Collection, Management and Analysis		

Preview

B. Ask your parents if they know anyone who works in the water industry. Find out what their job title is and what they do. Share your information with the class in a feedback session.



SOIL MOISTURE

Soil moisture is an important source of water. Farmers measure the level of soil moisture on their land in order to use their irrigation systems more efficiently by using only the minimum amount of water required to grow their food crops.

Measuring soil moisture is also important as plants grow best in optimum soil moisture for each product. Soil moisture sensors are used more in suburban gardens to save water and on public and private golf courses to prevent over-watering as well as in agriculture.

C. Bananas require a high soil moisture level in order to grow. Explain what would happen to a banana plantation if there was low rainfall or drought.

Availability Of Fresh Water

- Read the information about why fresh water is limited more in Australia than in other continents, then complete the task.



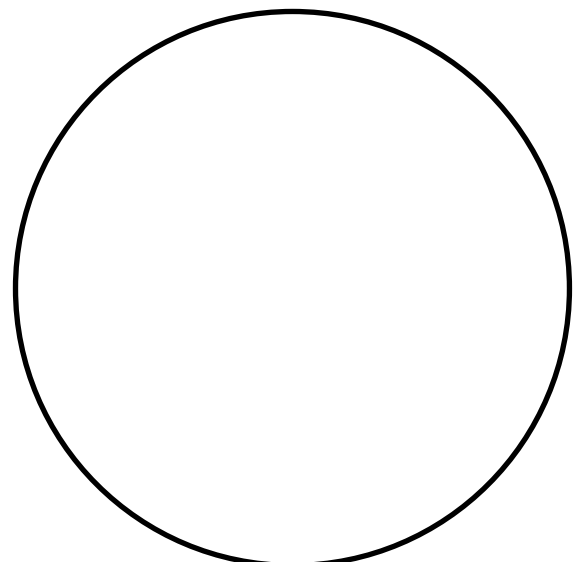
Fresh water is water which naturally occurs on the Earth's surface. It exists in glaciers, ice caps, ponds, lakes, rivers, bogs, streams and as groundwater in aquifers and underground streams. The amount of fresh water varies greatly from continent to continent, country to country and region to region. Fresh water is essential for all ecosystems to survive. We need fresh water for irrigation, to grow food or for industry to produce goods and resources. If fresh water is contaminated it can have a negative effect on ecosystems. For this reason water is carefully managed. Rainfall adds to the amount of fresh water available in an area. Australia has a lower rainfall than Europe, Africa, North America, South America, and Asia (excluding Antarctica). Low rainfall leads to low surface water and seasonal river systems which affects water availability. Each year Australia's rainfall can

vary greatly - this is due to a phenomenon known as El Nino. The El Nino-Southern Oscillation is linked to ongoing seasonal anomalies in many parts of the Earth. Tropical cyclones, heat waves and bushfires are all associated with El Nino. Australia's low and variable rainfall causes environmental concern about the availability of and the use of fresh water. Other countries and continents in the world have a larger fresh water supply than Australia however, they also have much higher populations to sustain. Five hundred million people live in southern Asia alone. The challenge in Asia and countries like it, is not so much how much water they have, but how it is managed and who has access to it. Millions of people die each year from contaminated water supplies in many parts of Asia. Australia is the driest inhabited continent in the world and also the largest. It has

many different climates and landscapes. Fresh water is a limited resource and is affected by the landscape and climate it is in. The natural environment in Australia includes arid inland tropical regions in the north, and cooler temperate climates in the south-east and south-west. Australia has been very successful in managing its water supply and building structures which allow water to reach mainly dry inland areas. This has meant that extensive agricultural industry, productive mining and tourist activities have flourished due to careful handling and legal restrictions. Settlement and economic growth have been made possible due to large scale damming, diversion, pumping and drainage of surface waters, extraction of groundwater for domestic and industrial use and the reclamation of wetlands. Balancing the needs of our nation is a major task carefully undertaken by the Australian Government.

- A.** The statistics below show how fresh water is used each year in Australia. Record the information as a pie chart.

Fresh Water Consumed In Australia Each Year (Approx)	Gigalitres	%
Total	22186	100
Agriculture	15502	70
Households	1829	8
Water Supply, Sewerage And Drainage Services	1706	8
Electricity And Gas	1308	6
Manufacturing	725	4
Mining	570	4



Distribution Of Fresh Water

The information on page 7 together with your research skills will help you to complete the tasks on this page.

A. Analyse the following pictures to determine where fresh water is being used in each area of the Australian community.



1.



2.



3.



4.



5.



6.

B. When there are only limited amounts of resources available for a community to use, who do you think is involved in making sure that the resources are used fairly? Write down a list of people who you think would be involved in monitoring this process and say why.

Person's Role	Why

C. Use the back of this sheet to plan a newspaper article entitled 'Australians Use More Than One Million Litres Of Fresh Water Per Person Each Year'. Write up the final copy in your workbook or use the computer to make it look like a real newspaper article.

Challenge

D. Write a persuasive piece of writing to convince someone that water will not always be classified as a renewable resource.

Limited Stocks Of Water 1

Complete the task and read the information.

- A. Before reading the information below, complete the 'Before Reading' section of the Anticipation Guide. When you have read the information below, record how accurate you were by completing the 'After Reading' section of the Anticipation Guide.

ANTICIPATION GUIDE - GLOBAL WATER STOCKS

Selected Statements	Before Reading	After Reading
1. The world's population currently stands at four billion.	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False
2. The melting of polar ice caps will increase the world's fresh water supply.	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False
3. Fresh water stocks are readily available worldwide.	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False
4. Nine countries in the world hold half the world's water.	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False
5. A significant increase in the world's population will not affect fresh water availability.	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False	I think this statement is ... <input type="checkbox"/> True <input type="checkbox"/> False



GLOBAL STOCKS OF FRESH WATER

It is estimated that the world's population currently stands at six billion. This is thought by some scientists that in the next 40 years the world's population will double. This means that there will still be the same amount of water in the world but the human demand for it will be twice as much. Already, only 3% of the world's water can be used directly for human consumption.

Fresh water is not evenly distributed throughout the world. Half of the world's water supply is located in just nine countries: the USA, Canada, Brazil, Colombia, the Democratic Republic of Congo, Russia, India, China and Indonesia. Even in these

countries some people go without clean drinking water due to a lack of sanitation. The amount of fresh water in the world is estimated at about 10 million cubic kilometres, it is mostly contained in polar ice caps and underground aquifers. The rest comes from the following four areas:

- rainfall: 119,000 cubic kilometres;
- lakes: 91,000 cubic kilometres;
- human-made reservoirs: 5,000 cubic kilometres;
- rivers: 2,120 cubic kilometres.

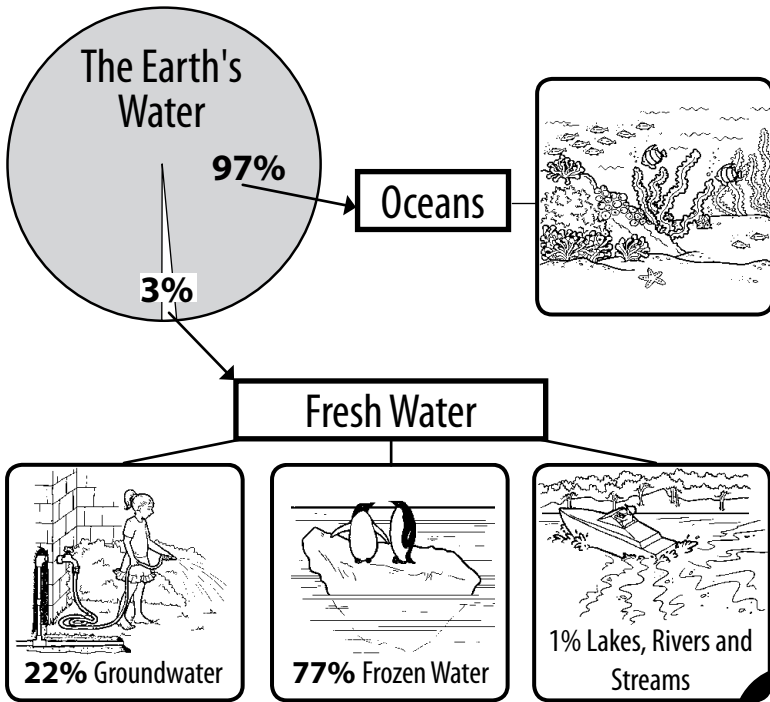
There is some concern that if global warming continues to melt glaciers in polar regions the amount of available fresh water may actually decrease.

The first threat comes from the fresh water in the glaciers melting and merging into the oceans' salt water. The second threat comes from an overall increase in the oceans' volume from the melted glaciers - two thirds of the world's fresh water is locked up in glaciers which could cause a rise in the sea level resulting in the contamination of fresh water sources along coastal regions.



Limited Stocks Of Water 2

☐ The information on this page and on page 9 will help you to complete the tasks below.



A. Use the information in the diagram to explain the current status of fresh water available in the world.

B. List the nine countries in the world that hold the most water.

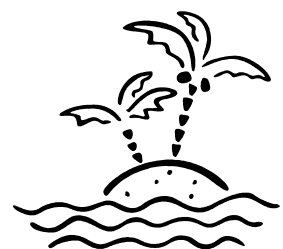
1.	4.	7.
2.	5.	8.
3.		9.

C. What Am I? Solve the riddles.

- I hold 77% of the Earth's fresh water but nobody can drink from me.
- I am under the ground but not everyone knows that I am there for them to drink.
- I currently have six billion inhabitants but that will double in the next 40 years.
- I flow on the Earth's surface for all to see but I hold only 1% of the world's fresh water.
- I hold 97% of the world's water but no matter how thirsty you are you can't drink me.

Challenge

D. A group of islands known as the Maldives have already been affected by rising sea levels. Find out how this group of islands has been affected. On the back of this sheet or in your workbook write down what they have done to adjust to this situation.



Competing Water Usage

Read the information then complete the task.



Direct And Indirect Uses Of Water

Water can be used either directly or indirectly. Direct water use is when you turn on a tap to take a shower or to fill your glass with water, or flush the toilet. Indirect water use is when you use a service or product that requires water. For example, you swim in a public swimming pool or buy a soft drink which has water as an ingredient.

Competing Uses Of Water

In any given rural or semi-rural area, water is used for many reasons. In some rural towns companies are allowed to bottle the groundwater and sell it for a profit. In other towns bottle water has been banned in the shops as it is considered an unnecessary use of groundwater. This is an example of competing interests in water usage.

The three main areas which

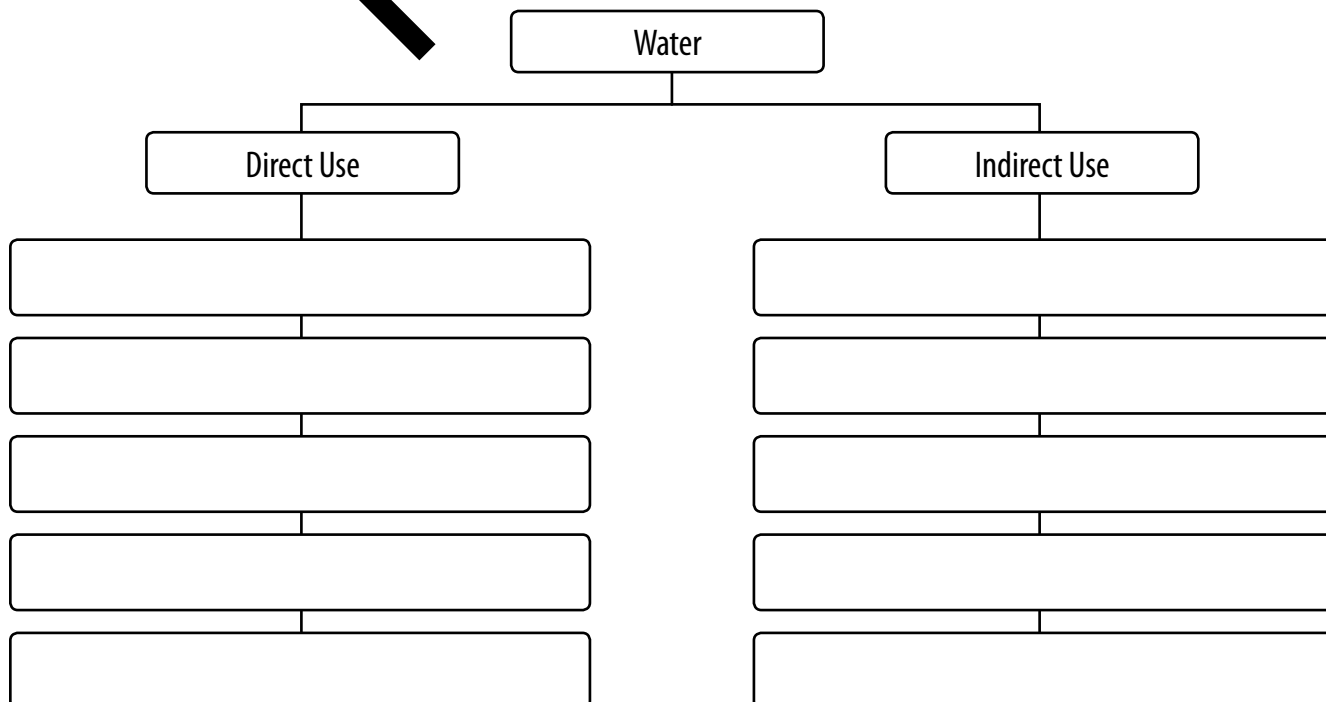
compete for water usage are: domestic, agricultural and industrial. In the past agriculture has taken up the majority of water usage each year, with approximately 65 % of water being used in this area. Industry is the second greatest user at 23 %, followed by domestic use at 12 %.

Urban and rural planning by the Australian Government manages these competing interests.

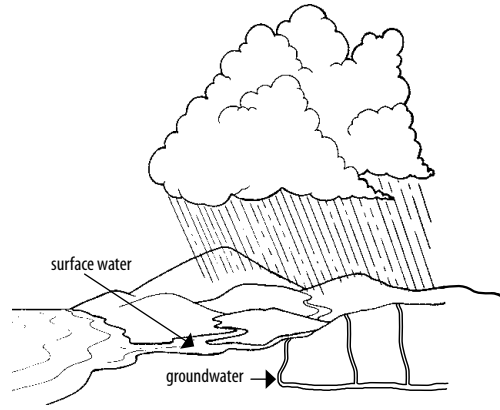
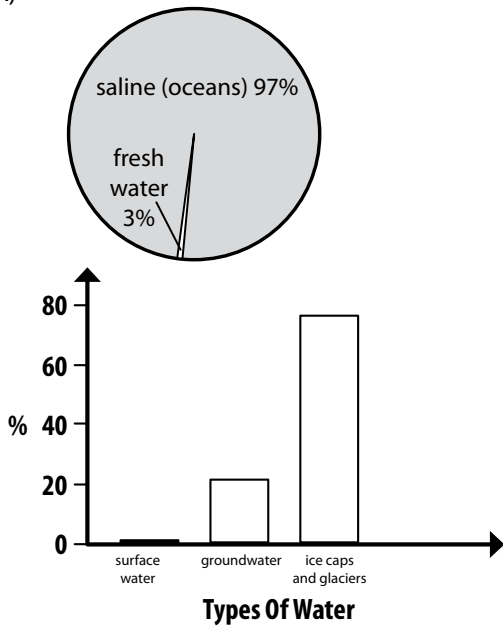
In many towns in Australia water has to be carefully managed. Pastoral farming would not be possible without viable access to groundwater. Similarly, many large-scale mining projects and much of the production industry are completely dependent on groundwater to run the projects. Much of this water is non-renewable.



A. Complete the tree diagram by showing how you use water both directly and indirectly on a typical day.



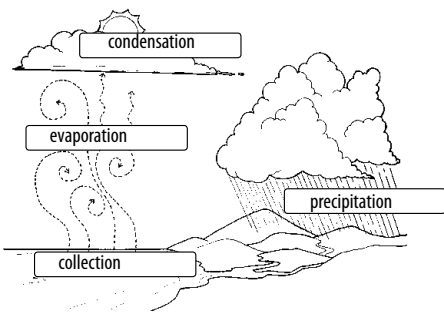
A)



C) Surface water is water which is held in rivers, dams and oceans, etc. Groundwater is water which has soaked into the ground.

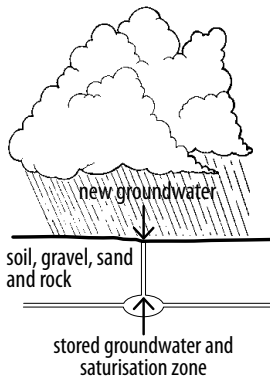
B) Possible answers: 1. 25% 2. 9% 3. 7% 4. 6% 5. 4% 6. 1% 7. 39% 8. 2%

Page 4



Page 5

A) Below is an example of a diagram which students might draw.



B) The diagram shows how rain is collected in rivers, lakes or oceans. This is known as surface water. When surface water soaks into the ground, it becomes groundwater.

Page 6

A) Water Licensing: The issuing of licences for people to use water.

Resource Planning: Protecting and managing water for the community and for business and industry.

Groundwater and Surface Water Allocation: Plan how water will be allocated in the community.

River Care / Water Restoration: A team which ensures rivers are cared for and restoration works carried out.

Waterways Planning and Recreation

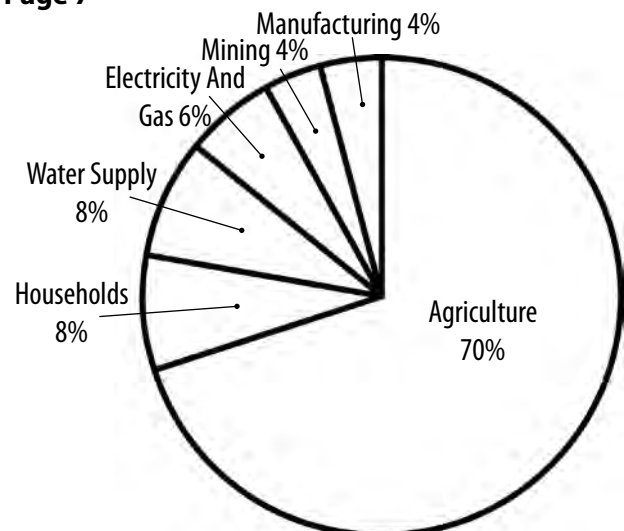
Management: Proactive policy development and management to ensure waterways are clean.

Information Collection, Management and Analysis: A system set up to collect data on the use of water.

C) Bananas would not grow to their full size or have their usual flavour if the soil moisture content was not high enough due to low rainfall or soil moisture.

Suggested at home activity: If you have a school vegetable garden or a vegetable garden at home, check the soil moisture by placing a trowel deep into the soil to see if the soil is dry or wet.

Page 7



Page 8

- A) 1. In the mining industry.
2. For food production.
3. For tourism or recreation.
4. In households.
5. In agriculture (food production).
6. In a rural household.
- B) Possible answers: farmers, government department representatives, local community members, police officers, volunteer fire brigades, etc.

Page 9

- A) After Reading: 1. True 2. False 3. True
4. False 5. True

Page 10

- A) The majority of fresh water in the world is frozen in icebergs, 22% is located in groundwater and 1% is found in lakes, rivers and streams. 97% of the Earth's water is salt water found in oceans.
- B) 1. USA 2. Canada 3. Brazil 4. Colombia 5. The Democratic Republic of Congo
6. Russia 7. India 8. China 9. Indonesia
- C) 1. glaciers 2. groundwater 3. Earth
4. surface water 5. oceans

Page 11

- A) Direct (suggestions): showering, using the tap, drinking, washing hands, washing clothes, washing dishes.
Indirect (suggestions): eating food produced with water, swimming in a pool, using a public oval, using electricity.

Preview