



**Western Cape
Government**

Education

Directorate: Curriculum GET

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GET Term 2 Take Home Package Natural Sciences and Technology

Grade 6

GRADE 6 Natural Sciences and Technology Solids liquids & gases, Solutions & Dissolving

ACTIVITY 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question only has ONE correct answer. Write only the letter (A-D) next to each question number.

1.1	Identify the following state for a substance: The particles are loosely arranged. They are still close together. Particles can move quite fast. They can slide past each other.	
	A. Liquid	
	B. gas.	
	C. solid.	
	D. melting.	(1)
1.2	When a solid changes phase and becomes a liquid	
	A. The spaces between the particles stay the same	
	B. The repulsive forces between the particles disappear	
	C. The space between the particles enlarge	
	D. Another type of particle is formed	(1)
1.3	The movement of particles is the least orderly in	
	A. Solvents	
	B. Liquids	
	C. Solids	
	D. Gases	(1)
1.4	Smoke particles move continuously in a gas. This is proof that	
	A. gas particles consist of large invisible particles	
	B. large spaces exist between the small particles	
	C. gas particles attract one another	
	D. gas particles are continuously moving	(1)
1.5	Substances usually dissolve faster when.....	
	A. the solute has large crystals	
	B. the solvent is left alone	
	C. the solvent is shaken or stirred	
	D. the solvent is cooled	(1)
		(5)

ACTIVITY 2:

2.1	Define the following terms:	
	a) Solution	(2)
	b) Solvent	(2)
	d) Solute	(2)
		(6)

ACTIVITY 3:

The diagrams below shows three images of water in the different states of matter. Study the diagram and answer the Questions that follows.



3.1	Which type of energy must be added for the ice to change to liquid water?	(1)
3.2	Identify two physical properties of ice cube that will change as it melts to a liquid.	(2)
3.3	Which state of matter is water vapour?	(1)
3.4	People wrap water pipes in winter. Explain the reason for this.	(2)
3.5	When ice in the arctic region melts it causes increase in flooding. It also causes rise in sea level in different parts of the world. Why are the ice melting?	(2)
3.6	Suggest ways to protect our environment from flooding and rise in sea levels.	(2)
		(10)

ACTIVITY 4:

Zukiswa investigated how different temperatures affect the rate at which sugar dissolves in water. She added 100 ml of water of different temperatures in FOUR different clear plastic cups of the same size. Her results are indicated in the table below.

She used a thermometer to measure the temperature of water each time. She then added the same amount of sugar (ONE Tablespoon) in each cup containing water at different times. She used her watch to measure how long it took the sugar to dissolve in different temperatures of water. She did not stir the sugar. She repeated her investigation three times. Study her results in the table below and answer the questions that follows.

Temperature in °C	Time for sugar to dissolve in seconds			Average time for sugar to dissolve in seconds
	Trial 1	Trial 2	Trial 3	
20	30	29	31	
30	25	26	24	
40	20	15	19	
50	15	14	16	

4.1			
4.1.1	Name the solvent that was used during this investigation.	(1)	
4.1.2	Name the solute that was used during this investigation.	(1)	
4.1.3	Identify THREE factors that Zukiswa kept the same.	(3)	
4.1.4	Explain why she kept these factors the same.	(2)	
4.1.5	Name the factor that she measured for this investigation.	(2)	
4.1.6	What instrument was used to measure the factor in Question 4.1.5?	(1)	
4.1.7	Explain why Zukiswa repeated the investigation THREE times.	(2)	
4.2			
4.2.1	Study the results and explain the pattern that you can see from this results.	(2)	
4.2.2	Calculate the average for the different temperatures. Write it down in the last column of the table.	(4)	
4.3	4.3.1	Draw a line graph of the average for the different temperatures.	(10)

	4.3.2	Identify any results that do not fit the pattern.	(2)																		
	4.3.3	At which temperature did the sugar dissolve the fastest?	(2)																		
	4.3.4	Explain why sugar dissolved at a faster rate for the temperature identified in Question 4.3.3.	(2)																		
	4.3.5	How long did it take sugar to dissolve at 30°C?	(2)																		
	4.3.6	What conclusions can you draw from this investigation?	(2)																		
			(39)																		
		TOTAL	(60)																		
SOLUTIONS TO ACTIVITIES																					
ACTIVITY 1: MULTIPLE-CHOICE QUESTIONS																					
1.1	A ✓		(1)																		
1.2	C ✓		(1)																		
1.3	D ✓		(1)																		
1.4	D ✓		(1)																		
1.5	C ✓		(1)																		
			(5)																		
ACTIVITY 2:																					
2.1																					
a)	A solution is substances that do NOT form solids when they are mixed with water/can dissolve in a liquid ✓✓		(2)																		
b)	A solvent is a substance in which other substances can dissolve ✓✓		(2)																		
d)	A solute is a substance that dissolves ✓✓		(2)																		
			(6)																		
ACTIVITY 3:																					
3.1	Heat energy ✓		(1)																		
3.2	Solid ✓ and has shape ✓		(2)																		
3.3	Gas ✓		(1)																		
3.4	To prevent freezing ✓ of water and becoming solid ice ✓		(2)																		
3.5	Because of increase in temperature /global warming ✓✓		(2)																		
3.6	Reduce pollution, cutting down of trees/ deforestation, burning fuels etc ✓✓		(2)																		
			(10)																		
ACTIVITY 4:																					
4.1																					
	4.1.1	Water ✓	(1)																		
	4.1.2	Sugar ✓	(1)																		
	4.1.3	Same amount of water ✓ (100 mL); of clear plastic cups of the same size ✓; same amount of sugar ✓ (ONE Tablespoon)	(3)																		
	4.1.4	In order to make the investigation a fair test ✓✓	(2)																		
	4.1.5	She measure how long ✓ it took the sugar to dissolve ✓ in different temperatures of water	(2)																		
	4.1.6	She used a watch / timer ✓	(1)																		
	4.1.7	To ensure that the results she received were reliable. ✓✓	(2)																		
4.2																					
	4.2.1	The sugar dissolves faster ✓ as the temperature increases. ✓	(2)																		
	4.2.2																				
		<table border="1"> <thead> <tr> <th rowspan="2">Temperature in °C</th> <th colspan="3">Time for sugar to dissolve in seconds</th> <th rowspan="2">Average time for sugar to dissolve in seconds</th> </tr> <tr> <th>Trial 1</th> <th>Trial 2</th> <th>Trial 3</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>30</td> <td>29</td> <td>31</td> <td>30 ✓</td> </tr> <tr> <td>30</td> <td>25</td> <td>26</td> <td>24</td> <td>25 ✓</td> </tr> </tbody> </table>	Temperature in °C	Time for sugar to dissolve in seconds			Average time for sugar to dissolve in seconds	Trial 1	Trial 2	Trial 3	20	30	29	31	30 ✓	30	25	26	24	25 ✓	
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		40	20	15	19	18 ✓												
		50	15	14	16	15 ✓												
							(4)											
4.3	4.3.1	GRAPH: Correct Graph drawn ✓																
		<p style="text-align: center;">Average time for sugar to dissolve in second against the temperature of the water ✓ ✓</p> <table border="1" style="display: none;"> <caption>Data points from the graph</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Time (seconds)</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>30</td> </tr> <tr> <td>30</td> <td>25</td> </tr> <tr> <td>40</td> <td>18</td> </tr> <tr> <td>50</td> <td>15</td> </tr> </tbody> </table>					Temperature (°C)	Time (seconds)	20	30	30	25	40	18	50	15	(11)	
Temperature (°C)	Time (seconds)																	
20	30																	
30	25																	
40	18																	
50	15																	
	4.3.2	In the 40 °C test, the sugar dissolved much faster, at 15 seconds ✓ than in the other tests at 40 °C (i.e. at 20 and 19 seconds) ✓					(2)											
	4.3.3	50 ✓ °C ✓					(2)											
	4.3.4	Temperature increase ✓ makes sugar to dissolve faster ✓					(2)											
	4.3.5	25 ✓ seconds ✓					(2)											
	4.3.6	A temperature increase ✓ makes sugar to dissolve faster ✓ / sugar dissolves faster on hot water					(2)											
							(39)											
		TOTAL					(60)											

Revision Activity: Water Pollution

Read the article and answer the questions based on it.

Water Pollution

What is water pollution?

Water pollution is when harmful substances such as waste, chemicals, microorganisms or other particles enter a body of water (i.e. stream, river, ocean, [lake](#), aquifer), causing the water to become harmful to the people, plants, fish and animals that need the water to survive. Water pollution can disrupt and negatively impact nature's [water cycle](#) as well.

Natural Causes of Water Pollution

Sometimes water pollution can occur through natural causes like [volcanoes](#), algae blooms (red tide), animal waste, and silt from storms and floods.

Human Causes of Water Pollution

A lot of water pollution comes from human activity. Some human causes include sewage, pesticides and fertilizers from farms, wastewater and chemicals from factories, silt from construction sites, and trash from people littering.



Oil Spills

Some of the most infamous incidents of water pollution have been oil spills. One was the build-up of oil pressure in a pipeline below Cape Town Harbour on 24 May 1998. The pipe broke and almost 500 tons of oil leaked into an escape tunnel. 150 tons of oil found its way into the harbour and 5 tons into Table Bay. Another example is the [Exxon Valdez oil spill](#) which occurred when an oil tanker hit a reef off the coast of Alaska and over 41 000 tons of oil spilled into the ocean. Another bad oil spill was the Deepwater Horizon oil spill when an explosion at an oil well caused over 757 000 tons to spill into the Gulf of Mexico.



Acid Rain

Air pollution can also have a direct effect on water pollution. When particles like [sulphur](#) dioxide get high into the air they can combine with rain to produce acid rain. Acid rain can turn dams acidic, killing fishes and other animals.



Effects on the Environment

Water pollution can have disastrous effects on the environment.

- Pollution in the water can reach a point where there isn't enough oxygen in the water for the fish to breathe. The fish can actually suffocate!
- Sometimes pollution affects the entire food chain. Small fishes absorb pollutants, such as chemicals or

microplastic, into their bodies. Then bigger fishes eat the smaller fishes and get the pollutants too. Birds or other animals may eat the bigger fishes and be harmed by the

pollutants. One example of this was the use of the insecticide (bug killer) DDT. When birds of prey ate fishes that were infected with it, they would lay eggs with thin shells. The population of birds of prey began to drop until DDT was banished.

- Sewage can also cause major problems in rivers. Bacteria in the water will use oxygen to break down the sewage. If there is too much sewage, the bacteria could use up so much oxygen that there won't be enough left for the fish.
- Water pollution from major events like acid rain or oil spills can destroy marine habitats.



Polluted canal in an informal settlement

Effects on Health

One of the most precious and important commodities for life on planet Earth is clean water. For over 1 billion people on the planet, clean water is nearly impossible to get. Dirty, polluted water can make them sick and is especially tough on young children. Some bacteria and **pathogens** (disease carrying) in water can make people so sick they can die, e.g. cholera.

Types of Water Pollutants

There are many sources of water pollution. Here are a few of the major causes:

1. Insoluble pollutants:

- Sewage - Even today sewage is flushed directly into streams and rivers in many areas around the world. Sewage can introduce harmful bacteria that can make people and animals very sick.
- Farm animal waste - Waste from large herds of farm animals such as cows, sheep, goats and pigs can get into the water supply from the runoff of rain and large storms.
- Construction, floods, and storms - Silt from construction, earthquakes, floods, and storms can lower the oxygen content in the water and suffocate fish.
- Garbage that is not removed or littered on streets, parks and at the beach can blow into streams, rivers and dams. This can cause animals and fish to eat the garbage and suffocate or get injured when they swallow the garbage.

2. Soluble pollutants:

- Poisons and fertilizers - Pesticides, herbicides and fertilizers are often sprayed on crops and garden plants to kill bugs and weeds and encourage better growth. These strong chemicals can get into the water through runoff of rain and storms. They can also contaminate rivers and dams through accidental spills.
- Factories - Factories often use a lot of water to process chemicals, keep engines cool, and for washing things away. The used wastewater is sometimes dumped into rivers or the ocean. It can be full of pollutants.

3. Harmful microorganisms:



Soluble waste pouring into Milnerton Lagoon

- Harmful bacteria can cause diseases such as cholera, diarrhoea and bilharzia. People can come into contact with these harmful bacteria when they drink contaminated water, or swim in rivers and dams that have polluted water.

What can you do to help?

- Save water - Fresh and clean water is a precious resource. Don't waste it! Take shorter showers, ask your parents not to water the garden, make sure the toilet and taps are not leaking, and don't leave the tap running.
- Don't use weed killer - Ask your parents if you can pull the weeds in the yard so they don't need to use weed killer.
- Scrape your plates clean into the garbage and don't put grease into the kitchen drain.
- Garbage - Always pick up your garbage.

Facts About Water Pollution

- Soap from washing your clothes, your car, yourself, can run down the street drain and cause water pollution.
- Only around 1% of the Earth's water is fresh water. The other around 99% is salty, and we can't drink it.
- Most of the rivers and dams in South Africa are too polluted for humans to drink from.
- Between 5 and 10 million people die each year from water pollution related illnesses.

Source: https://www.ducksters.com/science/environment/water_pollution.php (2020/06/01)

Contextualise for South Africa: [Elmarie Petersen \(2020/06/05\)](#)

Questions:

1. Match the terms in column A with the explanations in column B and write the answer in column C.

Column A: Terms	Column B: Explanation	Column C: Answer
e.g. 1. sewage	e.g. A. Human waste flushed in a toilet.	e.g. 1. A
1.1 Cholera	a) An organism, such as a bacterium, virus or fungus, that is too small to see with the naked eye.	1.1 _____
1.2 Microorganisms	b) All different types of plants, animals and other living things that exist in the ecosystem.	1.2 _____
1.3 Soluble	c) A bacterial disease usually spread in water.	1.3 _____
	d) Substances that can dissolve into a solute like water.	
	e) A disease caused by infection with freshwater parasitic worms.	
	f) Substances that cannot dissolve into a solute like water.	

2. Water pollutants can be divided into 3 categories. List the categories.

2.1 _____

2.2 _____

2.3 _____

3. Name one natural cause and one human cause for water pollution.

Natural cause: _____

Human cause: _____

4. If only about 1% of the Earth's water is fresh water, what about the other almost 99%?

5. What sea bird was severely affected by the oil spill in Table Bay in 1998?

6. Explain what **water pollution** is in your own words.

7. What do you think will happen if we do not make an attempt to stop water pollution (predict)?

8. What are the consequences of water pollution? Give at least three.

8.1 _____

8.2 _____

8.3 _____

9. Study the picture of a beach in the Cape Peninsula.



What can be done by the people in this area to reduce the pollution on the beach?
Come up with at least three solutions.

Revision Activity: Water Pollution

Memorandum

10. Match the terms in column A with the explanations in column B and write the answer in column C.

Column A: Terms	Column B: Explanation	Column C: Answer
e.g. 1. sewage	e.g. A. Human waste flushed in a toilet.	e.g. 1. A

10.1 Cholera	a) An organism, such as a bacterium, virus or fungus, that is too small to see with the naked eye.	1.1 C
10.2 Microorganisms	b) All different types of plants, animals and other living things that exist in the ecosystem.	1.2 A
10.3 Soluble	c) A bacterial disease usually spread in water.	1.3 D
	d) Substances that can dissolve into a solute like water.	
	e) A disease caused by infection with freshwater parasitic worms.	
	f) Substances that cannot dissolve into a solute like water.	

11. Water pollutants can be divided into 3 categories. List the categories.

11.1 Insoluble pollutants

11.2 Soluble pollutants

11.3 Harmful microorganisms

12. Name one natural cause and one human cause for water pollution.

Natural cause: **Volcanoes / Algae blooms / Animal waste / Silt from storms and floods**

Human cause: **Sewage / Poisons / Fertilizers / Wastewater / Chemicals / Silt from construction sites / Oil spills / Acid rain / Littering / etc.**

(Any one of the above answers as mentioned in the passage / Additional answers that the teacher or learners might have discussed in the classroom / Any additional answers that can be verified as fact.)

13. If only about 1% of the Earth's water is fresh water, what about the other almost 99%?

The other almost 99% is salty water.

14. What sea bird was severely affected by the oil spill in Table Bay in 1998?

Penguins were severely affected.

(If discussed in the class the learners can also refer to them by name: African Penguin / Cape Penguin / South African penguin / Jackass penguin)

15. Explain what **water pollution** is in your own words.

Water pollution is when harmful substances such as waste, chemicals, microorganisms or other particles enter a body of water (i.e. stream, river, ocean, lake, aquifer), causing the water to become harmful to the people, plants, fish and animals that need the water to survive.

(Written in such a way that the learner can make sense of it in their own terminology, e.g. When clean water becomes dirty through waste, chemicals, litter and other stuff that is thrown into the water and then cause diseases and death to all that uses or lives in the water such as fish or plants.)

16. What do you think will happen if we do not make an attempt to stop water pollution (predict)?

Water will become a rare source and we will die of thirst.

(This is an attempt at a possible prediction learners might make. Mark the prediction using your discretion. The prediction should be plausible and based on what we know and effects that can be verified.)

17. What are the consequences of water pollution? Give at least three.

17.1 Death to all living things

17.2 Extinction of species

17.3 Disruption to ecosystems

17.4 Diseases such as cholera

17.5 Little amount of clean, usable water compared to growing population numbers

(Answers can be taken from the passage, classroom discussions or any other verifiable source.)

18. Study the picture of a beach in the Cape Peninsula.

What can be done by the people in this area to reduce the pollution on the beach?
Come up with at least three solutions.

The people in this area can do the following to reduce the amount of pollution on the beach:

- 1. Have a clean-up drive where the community gather at the beach every Saturday morning for example, and pick up the garbage, load it on a truck and drive it to a dumpsite.**
- 2. Do an awareness campaign all along the beach, at schools, putting up posters, giving talks and making sure that other people using the beach are aware that they need to pick up their garbage.**
- 3. Using the litter on the beach as an opportunity to create jobs by employing people to clean the beach every day.**

(Any other viable solutions to the problem that can be seen as possibilities should be marked as correct. This is a paragraph style answer and should be marked as such. Use a rubric to mark an answer where there are multiple possibilities if this is done as a formal assessment.)