Dear Learners and Parents below is revision for term 2 Natural Science and Technology for grade 6.

A mark allocation has been given only to allow learners to engage with the questions as if they were engaging in an assessment. **This however is not a formal assessment.** A mark allocation allows you to measure the level of quality and quantity that is required in your answers, so that you may answer appropriately. This revision is an opportunity for the learners to revise their knowledge and understanding of term 2 Natural Science and Technology in this time of uncertainty.

We look forward to seeing you again.

Natural Science and Technology – Grade 6

Revision work for term 2: ([1] solids, liquids, and gases + [2] mixtures + [3] solutions as special mixtures + [4] dissolving + [5] mixtures and water resources + [6] process to purify water).

1. Solids liquids and gases:

- All matter (solids, liquids and gases) is made up of particles.
- The particles are arranged differently in solids, liquids and gases.

- **In solids** the particles are **tightly packed** in a **fixed pattern**. The spaces between the particles are small and the **particles vibrate in one place.**

- **In liquids** the particles are **closely packed** in **no fixed pattern** – spaces between the particles are small but **particles can move around each other**.

- **In gases** the particles are **far apart** from each other – spaces between the particles are big and **particles move in all directions.** So just like in liquids, particles in gases have **no fixed pattern.**

Exercise 1: Solids liquids and gases:

1. Revise section 1 (solids, liquids and gases) in *Thunderbolt Kids* (www.thunderboltkids.co.za)
2. Watch '*states of matter for kids*' on YouTube (https://youtu.be/wclY8F-UoTE)

3.1. Describe the behaviour of particles in a liquid. (3)

_____

_____

_____

3.2. Illustrate (draw) how particles would behave in a solid in block A, and how they would behave in a gas in block B. (6)

A	B

3.3. List 3 differences between the behaviour of particles in a solid compared to the behaviour of particles in a gas. (6)

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3.4. What are the simplest particles that make up matter called? (1)

_____

2. Mixtures

A mixture consists of at least two different substances/ materials mixed together.

- In some mixtures, the different substances are still clearly visible after mixing.

- The substances in such mixtures can be separated by physical means such as sieving, filtering, hand sorting, settling and decanting.

- There are different types of mixtures that exist – between solid and solid, liquid and liquid, gas and gas, solid and liquid. You may also find mixtures of gas in liquid and gases and solids but in grade 6 you will not be focusing on those types of mixtures (but it doesn't hurt to read up on it).

Exercise 2: Mixtures:

1. Revise section 2 (mixtures and materials) in Thunderbolt Kids (www.thunderboltkids.co.za).

2.1. List 3 examples of a solid and solid mixture. (3)

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_____

_____

2.2. List 3 examples of a liquid and solid mixture. (3)

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2.3. What natural (meaning in nature) example of a gas to gas mixture can we find in our everyday lives? (1)

_____

2.4. What is the most effective method of separation you would use to separate rice and beans? (1)

_____

2.5. What is the most effective method of separation you would use to separate Lego blocks and marbles? (1)

_____

2.6. What is the most effective method of separation you would use to separate iron filings from sand? (1)

_____

2.7. What is the most effective method of separation you would use to separate water from oil? (1)

_____

2.8. Is blood a mixture? Explain. (3)

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_____

3. Solutions as special mixtures

Solutions are also mixtures.

- Some solutions can be made by mixing a solid and a liquid together such as sugar and water or salt and water.
- Solutions are uniform (meaning the same throughout) in appearance and the solid cannot be seen after mixing.
- **Soluble substances** - soluble solids (solutes) can dissolve in water (solvent). The substances in solutions cannot be separated by sieving, filtering, hand sorting, settling and decanting. Some solutes can be recovered (separated) by evaporating the solvent (such as recovering salt from sea water). When substances dissolve, solute particles become dispersed in the spaces between the solvent particles.
- **Saturated solutions** - A solution is saturated when no more solute can dissolve in a given amount of solvent.
- **Insoluble substances** - Some solids will not dissolve to form a solution in water, these solids are called insoluble.

Exercise 3: Solutions

1. Revise section 3 (solutions as special mixtures) in Thunderbolt Kids (www.thunderboltkids.co.za).
2. Watch 'Mixtures and solutions' on YouTube (https://youtu.be/AOqH5ktwoDE). Optionally you can watch 'Mixtures' on YouTube (https://youtu.be/TlxajGi8bAI).

3.1. What is the difference between a standard mixture like sand in water and a solution like salt in water? (2)

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_____

_____

3.2. Below is an image of salt being mixed into water to create a saltwater solution.

3.2.1. Which substance in the above example is the solvent and which substance is the solute? (2)

_____

_____

3.2.2. What method of separation would you use to separate the salt from the water? Why would this method be effective? (3)

_____

_____

_____

_____

3.3. Explain what it means for a solution to be saturated by using sugar water as an example. (2)

_____

_____

_____

4. Complete the table below by stating (with a tick) whether the following substances are soluble or insoluble in water. (8)

Substance	Soluble in water	Insoluble in water
salt		
sand		
iron filings		
coffee granules		
sugar		
sodium		
chalk		
copper		

4. Dissolving

Rates of dissolving

- Factors that affect the rate (time taken) of dissolving.

- temperature of the mixture

- stirring or shaking the mixture

- grain size of the solute

Exercise 4: Dissolving rates

1. Revise section 4 (dissolving) in Thunderbolt Kids (www.thunderboltkids.co.za).

2. Watch Rate of Dissolving - Increase the Rate - Surface Area - Stir - Temperature - Straight Science on YouTube (https://youtu.be/BE5zHhpsGRw).

3.1. Explain how the temperature of a mixture influences the rate that solutes dissolve. (2)

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_____

_____

_____

3.2. Explain how stirring or shaking a mixture influences the rate that solutes dissolve. (2)

_____

_____

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_____

3.3. Explain how grain size influences how fast the solute will dissolve in the mixture. (2)

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5. Mixtures and water resources.

Water pollution

- In the environment, many things mix or dissolve in water. Water can be polluted by:

- insoluble substances, such as oil, plastics, tyres, tins, glass, toilet waste.

- soluble substances such as soaps, fertilizers, insecticides, acids and living germs from toilet waste causing water-borne illnesses such as diarrhoea.

Importance of wetlands

- Natural wetlands are important for removing soluble and insoluble substances from water, acting like sponges and regulating the flow of water.

Exercise 5: Mixtures and water resources.

1. Revise section 5 (mixtures and water resources) in Thunderbolt Kids (www.thunderboltkids.co.za).
2. Watch" What *is water pollution| environmental chemistry| chemistry| Fuseschool.*" On YouTube (https://youtu.be/Zk1J2EW-nmQ).

3.1. Give three examples of insoluble pollutants. (3)

_____

_____

3.2. Give three examples of soluble pollutants. (3)

_____

_____

3.3. Give one example of a disease one could acquire from drinking polluted/unclean water. (1)

_____

3.4. Why can soluble pollutants potentially be more dangerous and problematic than insoluble pollutants. (2)

_____

_____

_____

6. Process to purify water

Clean water

- A clean supply of water is important for people, plants and animals to survive.
- Water can be cleaned by processes such as sieving, filtering, settling and decanting, boiling and adding chemicals to kill germs.
- Municipal water is cleaned before and after we use it.

Exercise 6: Process to purify water:

1. Revise section 6 (Process to purify water) in Thunderbolt Kids (www.thunderboltkids.co.za).

2.1. What method of separation that you have already learnt does wetlands use in the process of water purification? (1)

_____

2.2. By using your own words as much as possible, explain how wetlands purify water flowing through it. (4)

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2.3. Water filtration is excellent for removing insoluble pollutants from water but is less effective when removing soluble pollutants.

2.3.1. What other water purifying method can we use along with water filtration to ensure the water is clean? Why would it be effective? (2)

_____

_____

_____

2.3.2. Although water purifying systems used by the municipalities remove almost all pollutants in water to make it safe to drink there are certain pollutants that are not removed using our current purification systems. Give an example of one of these pollutants. (1)

_____

Challenging questions to allow you to think deeper:

1. If the atoms in a solid are not standing still but vibrating in a fixed position, why do we not see solid objects vibrating with our eyes. (2)

_____

_____

2. Fill in the appropriate answers in the spaces below. Consider the process of the water cycle to help you with your answers. (6)

Water collecting in a lake enters the lake in a _____ state. Over the course of the day heat from the sun makes it _____ and rise up into the air in the state of a _____ called water vapour. The water vapour floating high in the air eventually cools and starts to form clouds. The water vapour collecting in clouds is cooled and changes into a _____ state. This eventually leads to the water leaving the clouds in the form of rain. Sometimes if it becomes very cold in the sky where the clouds are it may _____ the water and turn them into a _____ state we call hail or snow. During precipitation all water returns back to the surface of the earth.

3.1. Why would it not be effective to use magnetic separation as a method to separate iron filings from nickel coins? (2)

_____

_____

3.2. What would be a more effective method of separation in this case? (1)

_____

4. Fahima likes to have a lot of sugar in her water, she usually adds three teaspoons of sugar to every glass of water she drinks. No one is the wiser because the sugar dissolves and it looks like a plain glass of water. One day she decides that she will pour herself a glass of water and mix in thirty teaspoons of sugar. However, after the tenth spoon of sugar the sugar is no longer dissolving and can still be seen floating in the mixture.

4.1. Why is the sugar no longer dissolving in the water? (1)

_____

_____

4.2. Explain your answer to question 4.1. What does it mean for something to be in that state? Think about it in terms of the particles in the mixture.

_____

_____

_____

_____ (3)

5. Explain Eutrophication in your own words. (3)

_____

_____

_____

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_____

6. Explain the process of aeration in your own words. (2)

_____

_____

_____

Total: 90

"A problem is a chance for you to do your best" - Duke Ellington