Name: _____

Group: _____

Natural Science

2020

Year 2 Term 2

Content

Term 2

Theme	TOPIC	TIME ALLOCATED	CAPS %
Matter and Materials	Phases of Matter	3 weeks	33%
	Metals and Non-Metals	3 weeks	42%
	Processing Materials	2 weeks	50%

Assessment

Assessment type	Topic	Time	Mark	SBA %
Practical	**Processing materials**	**May**	**____ / 40**	**37.5%**
Examination	**June Exam**	**June**	**____ /60**	**50%**

GCE: TO CAPS: LIFE SKILLS

NATURAL SCIENCE

YEAR 2

TERM 2

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ATP – Week 1 – 3: Date: _____

Solids, liquids and gases

KEY QUESTIONS

• How are the 3 states of matter different from each other?
• How can we draw pictures of the 3 different states of matter, that show how the particles in the matter behave?
• When matter changes from one state to another, do the particles themselves change, or only their behaviour?
• What is needed to make matter change from one state to another and back again?

VOCABULARY

Word	Discription
Solid	A substance in a solid form.
Liquid	Liquids flow and take on the shape of the container they are in.
Gas	Take on the shape of the container, particles move freely.
Evaporation	A liquid change into a gas when heat is added.
Condensation	When gas cools down and forms a liquid.
Freezing	When a liquid forms a solid when cooled.
Melting	When a solid turns into a liquid when heat is added.
Particle	Smallest part of a particle.

Arrangement of particles

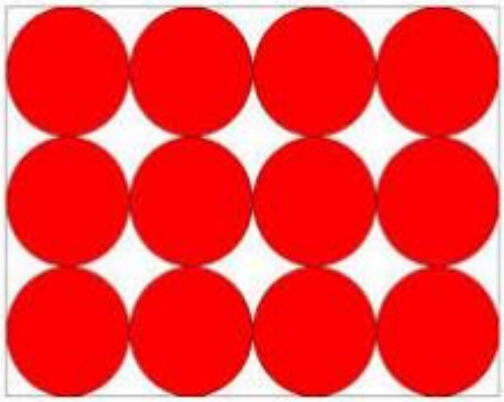
We have learnt that matter can exist in 3 different states: solids, liquids and gases. All the materials around us are in one or more of these three states. For example, you have all three states in your body! There is bone in your skeleton. There is water in your blood. There is air in your lungs. We have also learnt that each of the states (solids, liquids and gases) has unique properties:

The particles in a solid

Let's imagine that we can shrink ourselves down to the size of such a 'matter particle'. What would we see if we could look around inside a solid?

We would see the particles in the solid are **packed tightly together**. This explains why solids cannot be squeezed into a smaller shape - solids **cannot be *compressed***.

We would also see that the particles in the solid have **fixed positions**; they cannot move from their positions. This explains why solids **keep their shape**.

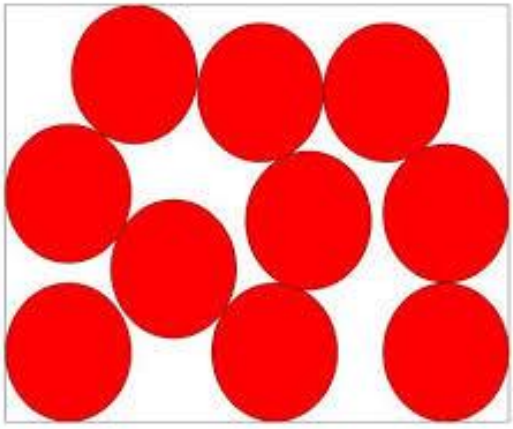


- are packed closely together in an orderly manner.
- extremely small spaces beween particles.
- particles cannot move freely but vibrate.
- strong force keeps particles together.
- has a fixed shape and volume

The particles in a liquid

If we could shrink ourselves down to the size of a 'matter particle', and we could look around inside a liquid, what would we see?
We would see that the particles in the liquid are also very **close together**.
Like solids, liquids **cannot be compressed** either.

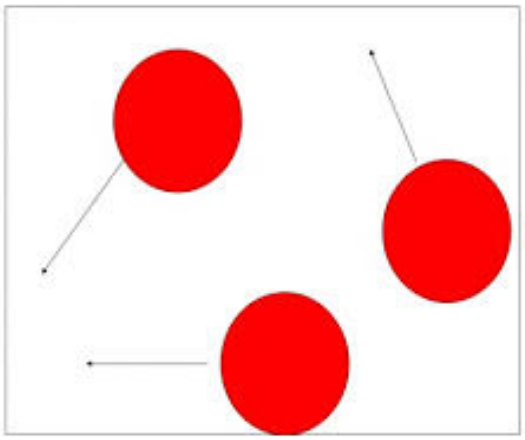
Unlike solids, the particles in a liquid **do not have fixed positions**. They are always moving around. This explains why **liquids flow**, to take the shape of their container.



- are not arranged in an orderly manner.
- small spaces between particles.
- move fast and freely but bump against each other.
- take on the shape of the container it is in.
- force between particles are weaker than solids.

The particles in a gas

If we could shrink ourselves down to the size of a 'matter particle', and we could look around inside a gas, what would we see?
We would see that the particles in the gas are **far apart**. The spaces between the particles are huge compared to the size of the particles themselves. These spaces are empty! We call this a vacuum. This explains why gases **can be compressed** - they can be squeezed into a smaller shape by pushing them closer together.



- are not arranged in an orderly manner
- large spaces between particles.
- move quickly and easily the seldom bump each other.
- take on the shape of the container it is in.
- force between particles is very weak.

Here is a summary:

Solids	Liquids	Gases
Have a definite shape	Have no definite shape	Have no definite shape
Takes up a definite space	Takes up a definite space	Takes up all the space available
Do not flow	Can flow	Can flow
 Big boulders of rock are solids.	 Milk and orange juice are liquids.	 These balloons are filled with helium gas.

Activity 1:

Date: _____

Complete the table with the following.

A. Solid / Liquid / Gas

B. Definite form / No definite form

C. Use specific space / Use all the space

D. Can flow / Can not flow

		
A)		
B)		
C)		
D)		

Change of state

Remember that we spoke about the states of matter? These were solid, liquids and gases. A substance can change from one state to another. For example a solid can change into a liquid.

For example water can be a liquid in your glass or in the freezer water is ice. Ice is a solid. But what makes these substances change from one state to another?

What causes a change of state?

We know that matter can be in the solid, liquid or gas state. Let's use water as an example. The difference between the freezer and the sun outside is that one is hot and the other is cold.

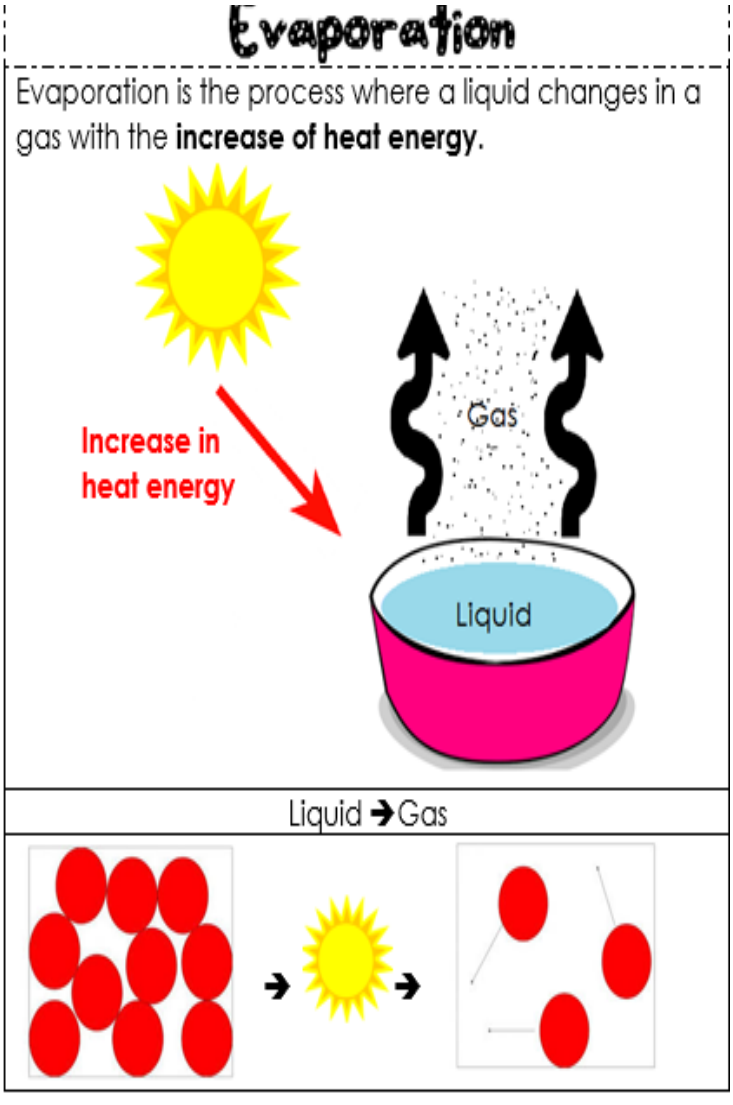
So if we place the water in a place that is cold enough, it freezes. If we place the ice cubes in a hot place, they melt.
This is because the state of matter can be changed from one to another by adding or removing heat.

The ice lollies were frozen and cold. When they were placed in the sun, they started to warm up. This heat caused a state change to take place. The ice changed to a liquid. This is called **melting.**

The liquid was poured into the shape of an ice lolly and then they were cooled as heat was removed and they froze. When a liquid changes to a solid, this is called **solidifying.**

Here is a summary of the different state changes:

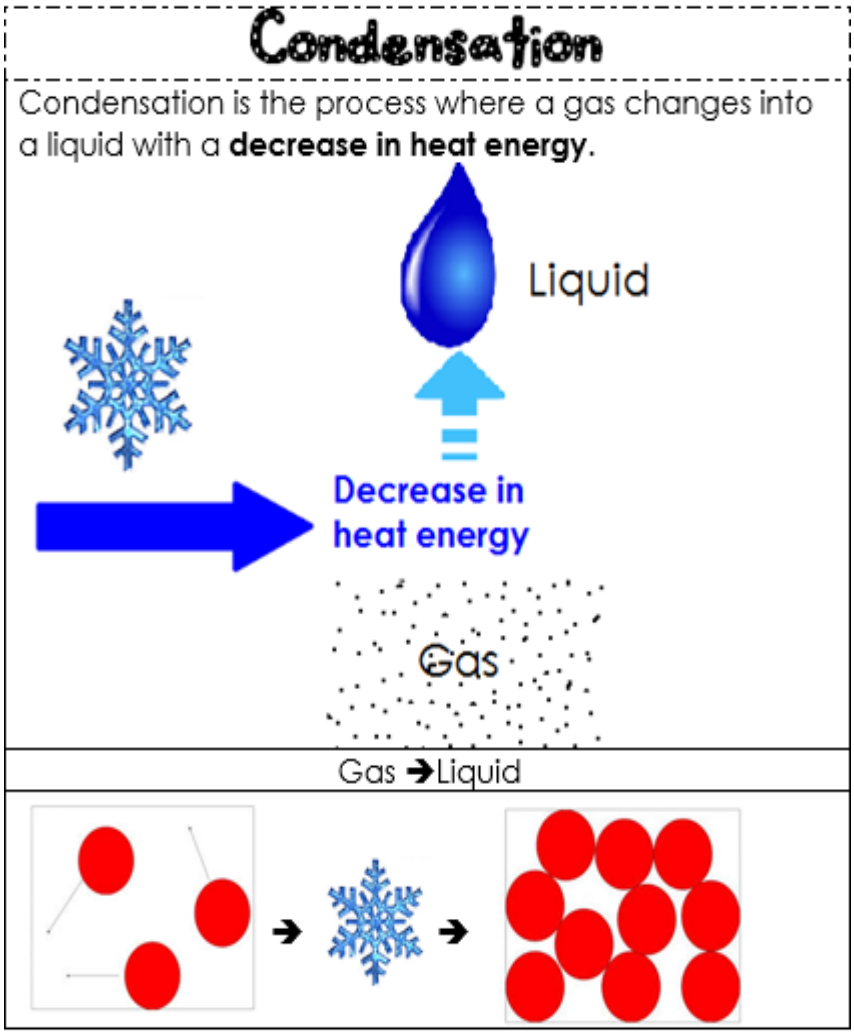
Change of state	Heating or cooling?	We call the process
Solid to a liquid	Heating	Melting
Liquid to a gas	Heating	Evaporating
Gas to a liquid	Cooling	Condensing
Liquid to a solid	Cooling	Freezing or solidifying



Evaporation takes place when heat is added to the liquid. It means the water changes from the liquid to the gas state.

The steam that comes out of the kettle is extremely hot and you cannot see it. The steam quickly cools and forms tiny droplets in the air. These tiny droplets are visible and form the "cloud" that you see.

When these tiny droplets hit the mirror they cool more and form the bigger droplets which you see forming on the mirror.



We say the steam condensed to form water. The change of state is from the gas state to the liquid state. **Condensation** takes place when heat is removed.

KEY CONCEPTS

• Matter is everything around us
• Materials are matter used to make something
• Solids are matter that has a fixed shape
• Liquids are matter that runs or flows, can be poured, takes the shape of the container
• Gases are mostly invisible, takes the shape of the container and spreads out / flows in space
• A change of state is brought about by heating and cooling matter
• Adding heat to matter causes solids to change to liquids and liquids to change to gases
• Removing heat from matter causes gases to change to liquids and liquids to change to solids
• Water evaporates, condenses, freezes and melts in the water cycle

Activity 2:

Date: _____

Change of State

1.  In what phase is the sugar? [ ]	2.  The flame represents: [ ]	3.   Look carefully at the sugar in the spoon.	4. Underline: The sugar in the spoon **Froze** / **melted**	5. Underline: The change of phase was from a: Liquid ➔Gas. Solid ➔ Liquid. Liquid ➔Solid.
6. Pour the sugar in a bowl and allow to cool down. 	7. Underline: The sugar in the bowl: **solidified** / **melted**	8. Underline: The change of phase was from a: Solid ➔Liquid. Liquid ➔Gas. Liquid ➔ Solid.		
Complete the following example on your own: Making bricks from cement.				
1.  Cement mixture.	2. Underline: The cement mixture in the wheelbarrow in a: Gas / Liquid form.	3. Place the cement mixture in the brick mould and put it in the sun.  Underline: During this process the liquid in the cement will: Condensate / Evaporate 	4. Underline: The change in phase was from a: Gas ➔ Vaste stof Vloeistof ➔ Gas Vloeistof ➔ Vaste stof Vaste stof ➔ Vloeistof	

ATP: Week 4 – 6 Date: _____

Metals and Non-Metals

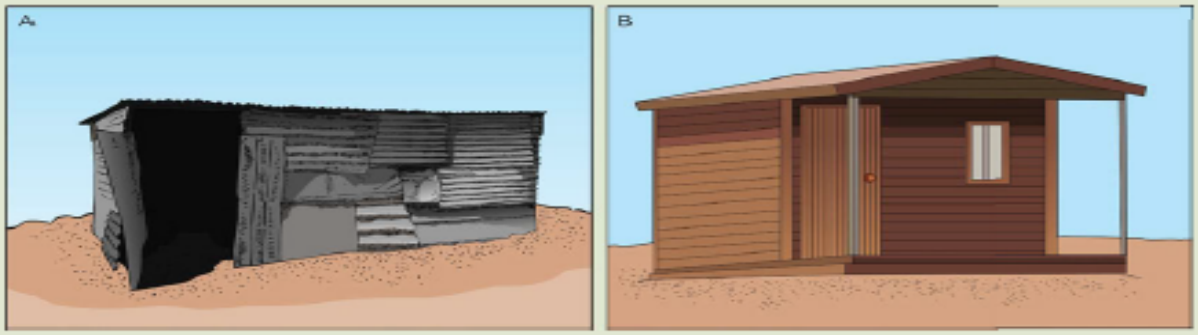
KEY QUESTIONS

• How can we tell if something is made of a metal or a non-metal?
• How do we decide what material to use when we want to make or build something?

ACTIVITY: Choosing a material to build a house

INSTRUCTIONS:

1. When we choose a material for a certain purpose, we look for a material with the right properties for the job. Look at the two pictures of houses below.
2. Can you see that house A and house B are made of different materials?
3. Answer the questions that follow.



QUESTIONS:

1. What material was used to build house A?

_____

2. What material was used to build house B?

_____

3. If you had to build a house next to the ocean, which one would you choose, house A or house B?

_____

_____

4. Write a reason why you would build this house next to the ocean, rather than the other one.

_____

_____

_____

5. Write down at least 3 other materials that could be used for building a house.

_____

_____

Properties of metals

- Metals are usually shiny. The shine that we see when light reflects of the surface of a metal is called the **LUSTRE** of the metal.
- Most metals are hard and they feel heavy.
- We say metals are dense as they have particles which are packed close together.
- Metals conduct electricity and heat well
- Metals are malleable (they can be shaped into flat sheets) and they are ductile (this means they can be made into thin wire).

- Most metals can be heated to high temperatures without melting or changing their shape, which is one of the reasons why pots and pans are made of metal.
- Metals are mined from the Earth.
- Cold to touch
- Can rust and/or become dull

Properties of non-metals

- Non-metals are not shiny but tend to be dull.
- Many non-metals are not bendy but brittle. This means that they will break when we try to bend them with enough force.
- Non-metals do not conduct electricity or heat well. We call them insulators.
- Could be soft or flexible like rubber.
- Could be hard and brittle like glass.
- Do not have a silvery appearance but tend to be dull.
- Could be grouped into different categories: wood, rubber, plastics, and ceramics etc.
- When you touch non-metals they are neither cold nor hot.
- Not very good conductors of heat.
- Do not have the ability to rust.

Comparing metals and non-metals

What have we learnt about the properties of metals and non-metals? Now we are ready to compare the properties of metals and non-metals. Read through the two lists below. Do you agree with the properties that have been listed? Are there other
properties that you would like to add?

Metals are (mostly):
• solid and strong;
• malleable and ductile (this means they can be hammered or bent into different shapes);
• shiny or silvery (lustrous), especially when they are new; and
• cold to touch.

Non-metals:
• can be soft or flexible, like rubber;
• can be hard and brittle, like glass;
• do not have a silvery (lustrous) appearance, but tend to be dull;
• can be grouped into different categories (ceramics, wood, rubber, plastic, glass etc.); and
• usually feels neither cold nor hot.

Uses of metals

We have learnt that, whenever we wish to make something new, we first have to decide what the purpose of that product will be.

Since we are learning about *Matter and Materials*, let us assume that the product will be a tool or any other kind of object that will be doing a job for us. Once we have decided what the purpose of the object will be, we can choose a material with the right properties for the job

Metals and corrosion (rust)

Have you ever noticed how some metal objects are shiny when they are new, but over time the shine disappears and they become dull and blotchy?

Rust has a reddish-brown colour and a rough texture. Rust is very common; it is the product that forms when iron corrodes. During corrosion, iron reacts with oxygen in the air or in water to form iron oxide (the chemical name for rust). Rust is a type of corrosion, but it is not the only type.

Other types of corrosion include:
• Tarnish, found on silver teapots, trays, trophies and jewellery.

• Patina, the green coating that we sometimes see on copper objects.
• Black spots that appear on brass.
• Aluminium oxide, which is a grey-white coating that forms on aluminium.

Processing of Materials

When we combine materials, new materials are made. The properties of the new materials are often different from the properties of the materials we started with.

There are many ways to process materials into new materials.

There are also many reasons why we would wish to process materials into new materials.

When we bake a cake, we are processing flour, eggs and other ingredients (that may not taste very nice on their own) into a cake which tastes really good!
We process materials to make them stronger, or more durable, or waterproof, or even just to make them look more beautiful or interesting. New materials that form after mixing different materials are sometimes called *mixtures*.

KEY CONCEPTS

• Materials can be processed in many different to make new materials or products.

• When we process materials, the new materials may have different properties.

• The purpose of most processing methods is to make materials more useful

Properties and uses

We call materials that have not yet been processed *raw materials*. Raw materials are made into other things. When raw materials are in the form in which they are found in nature, we can call them natural materials. A *natural material* is any material that comes from plants, animals, or the ground.

We have learnt that there are many different ways in which materials can be processed to give them new properties. After processing they may look, smell, feel or taste different. They will probably also be used for a totally different purpose from before. Processed materials are materials which have been refined or built by humans from raw materials. Some examples are paper, steel and glass.

Materials that have been processed are very useful to us because they have some special properties. We already know that processed materials can be strong and durable. But what other properties do they have?

Let's look at some example.
What do you put on when it is raining outside? Some processed materials are useful to use because they are waterproof. A rain jacket is made of a material which is waterproof, and so is an umbrella. Maybe you might wear gum boots or wellingtons? These shoes are very waterproof and made from specially processed plastic and rubber.

Activity 4: **Date:** _____

 Animal skin (hide) is used to make leather.	 Boots made from leather.
Describe the properties of the cow hide:	**Describe the properties of the leather:**

 Clay being moulded into a pot. [2]	 A pot made from clay which has been painted
Describe the properties of the clay:	**Describe the properties of the ceramic pot:**

Traditional processing
People have been processing materials from the earliest times. In the old days only natural materials were available and people found many clever ways to make these materials more useful.

The first people who lived in our land had ways to harden wood and bone for making tools and hunting weapons. They also had ways of reinforcing the mud used for making traditional huts. They knew which materials made the best clothes and blankets, and which grass made the softest beds. They also knew exactly which reeds would make the best mats to cover their walls, and how to build the best houses for their climate and their lifestyle.

Some of these traditional ways of processing materials are still used today.

ACTIVITY 5: **Date:** _____

Making a mud house stronger

In this activity we are going to look at some videos and pictures for ideas on how to process mud into a strong and durable building material. If you are not able to watch the videos, then look at the pictures. Many of these traditional building methods have become very popular amongst modern-day people who want to live in a sustainable way.

INSTRUCTIONS AND QUESTIONS:
Follow the link to the first video. http://goo.gl/9tdsJ Watch the video and then answer the questions. Alternatively, you could study the picture of the boy learning how to build a mud wall below.

A boy helping to build a mud wall.

The wall of a mud house with a stick frame.

1. What material is the house in the video and in the pictures made of?

_____
_____
_____
_____

2. The man in the video used two methods to strengthen the walls of his house. What are they? Or else, look at the second picture above of a close up photo of a wall to see how they strengthened the wall.

_____
_____
_____
_____

Follow the link to the second video goo.gl/IUVXh . Watch the video and then answer the questions or look at the pictures below.

A close up photograph of a mud used to make the wall.

The mud mixture.

1. What materials are recommended to reinforce the mud?

_____
_____

2. Why do you think the wall should be built thicker at the bottom than at the top?

_____
_____
_____

3. Write a step-wise procedure for building a mud shelter.

_____

_____

_____

_____

_____

Follow the link to the third video that shows how to build a mud wall goo.gl/ybtMK . Alternatively you could look carefully at the pictures below.

The mixture of clay and straw the man is using to build thewall is sometimes called *cob*. Another way of building a cob wall is to use bricks made of cob.

The woman in the picture is making bricks for a new house. Look carefully at the picture of the bricks she has made, then answer the questions.

1. What material has the woman added to the mud to reinforce the bricks?

_____

_____

_____

2. What is this mixture called?

_____

3. Would it be possible to add the straw or grass after the bricks have been made? When should the straw be added to the clay?

_____

_____

_____

Research:

Research how bricks are manufactured using modern methods. Compare your findings with the traditional methods used. Write your findings in a short paragraph ‘n kort paragraaf.

_____

_____

_____

_____

_____

_____

_____

KEY CONCEPTS

• Natural materials come from plants, animals or the Earth

• Raw materials are materials that have not been processed.

• Processed materials are raw materials that have been changed or refined by humans.

• Humans have been processing materials from the earliest times.

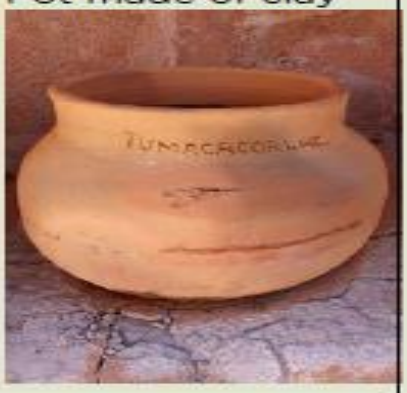
• In Africa, people have processed materials for hundreds of years, for example to make clay pots and woven products

Enrichment Date: _____

ACTIVITY: Classifying materials into raw or manufactured

INSTRUCTIONS:

1. Look at the pictures in the table below. How can we tell whether something is a raw or manufactured material?
2. Classify the objects into one of the groups, raw or manufactured material, by placing a tick in the right column.

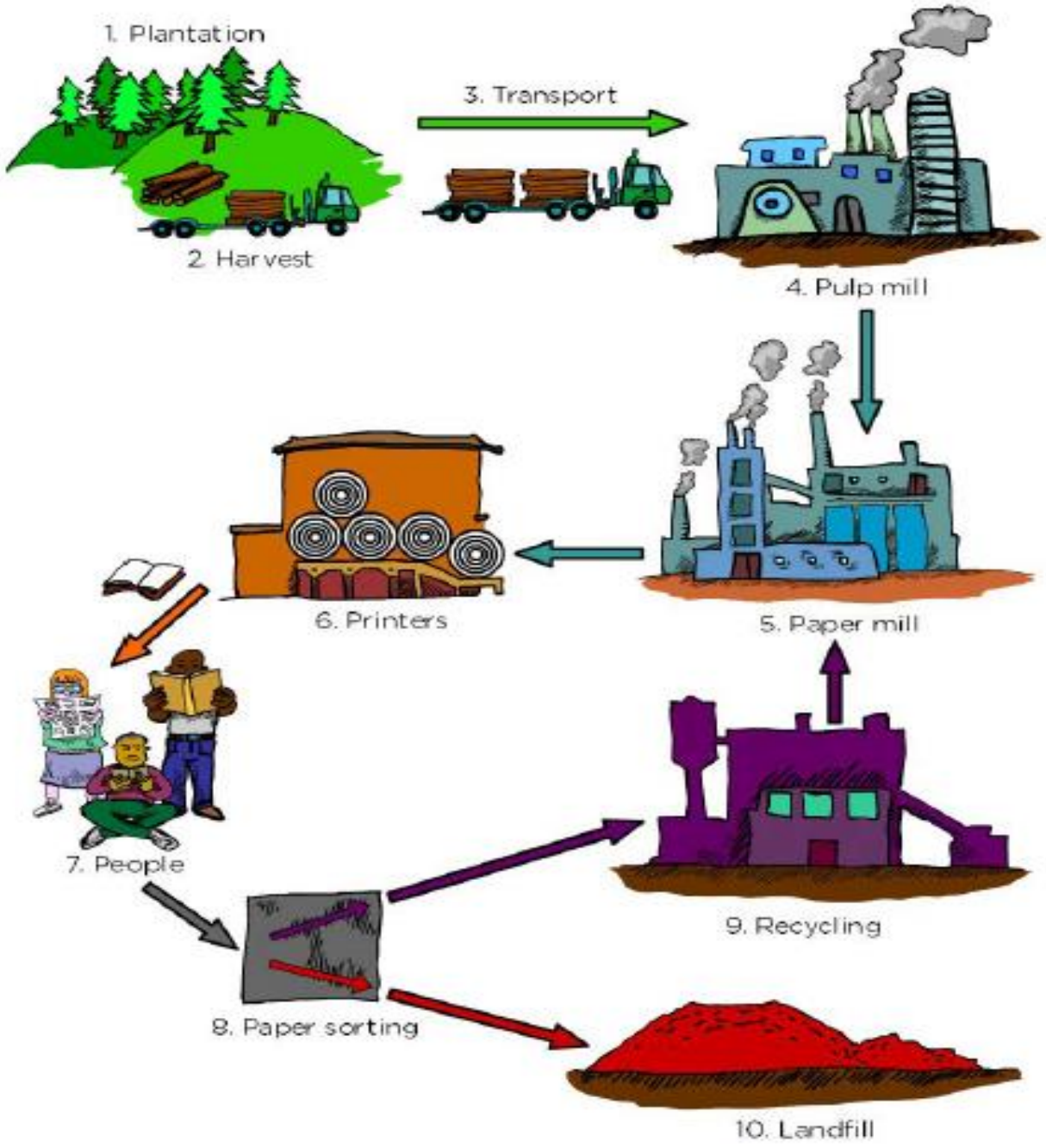
Object	Raw material	Manufactured material
Pot made of clay 		
Plastic bag 		
Wood 		
Sand 		

Object	Raw material	Manufactured material
Watermelon 		
Glass 		
Feathers 		
Coins 		
Diamond 		

A field trip with the Thunderbolt Kids! Date: _____

The Thunderbolt Kids had just been learning about paper in their class. Tom wanted to know more about how plant fibres from trees are actually made into paper. So, the Thunderbolt Kids decided to visit a paper mill to learn more about the life cycle of making paper.

They were each given a diagram to help explain the papermaking process. You have also been given a copy of the diagram. The processes that take place at each stage were explained to the Thunderbolt Kids at the mill and Tom wrote down his notes. You will see his notes below for each stage - make sure you read these too!



Tom's Notes:

1. **Plantation**
    - Trees are planted in well-managed forests. These are called plantations.
    - The trees are allowed to grow for several years before being cut down.
    - The main types of trees used to make paper are the Eucalyptus (gum trees) and Pine trees.
2. **Harvest**
    - Once the trees reach a certain height they are cut down. This is called harvest.
    - The logs are cut into smaller pieces so that they can be transported
3. **Transport**
    - The logs are all loaded onto big trucks and transported to the mills
4. **Pulp mill**
    - The logs are first debarked, meaning all the bark is taken off, and then chopped up into smaller pieces, called chips
    - The chips are mixed with water and other chemicals to make a soft pulp
    - Pulp consists of wood fibres and water
5. **Paper mill**
    - The pulp then flows to the paper mill
    - At this mill the pulp is washed, bleached and cleaned before the paper is made.
    - The pulp is pressed and dried and then rolled or cut into sheets of paper.

6. **Printers**
    - The paper is transported to other buyers and printers in big rolls
    - These printers make the paper into other products such as books, magazines and newspapers
7. **People**
    - The finished products are transported to shops where people buy the products
    - When people are finished using the paper products, such as reading a newspaper, they throw it away in the dustbin or recycle it.
8. **Paper sorting**
    - All the rubbish paper is collected after it has been thrown away and it is sorted
    - Some paper can be recycled, but some cannot, so the paper is sorted into two different groups
9. **Recycling**
    - Used paper can be collected and used again. This is called recycling.
    - The paper that can be recycled is converted into other products
    - Or it is made into recycled fibre which can then be used at the paper mill again
10. **Landfill**
    - Paper which cannot be recycled is taken to the landfill sites where it is dumped
    - Landfill sites have a negative impact on the environment, so it is best to try hard to reduce the amount of waste which ends up at landfill sites by recycling

After the field trip, Sophie was really interested in how she could set up recycling at their school to help reduce their impact on the environment. Farrah showed her arty side when she made some earrings and a cover for her notebook from recycled paper. Jojo was just happy that he had his favourite sports magazine to read, which is made from paper. And Tom was really happy that he got to learn more about the papermaking process.

ACTIVITY: The Papermaking Process

Date: _____

INSTRUCTIONS:

1. Read through the diagram again that the Thunderbolt Kids were given at the paper mill and the notes that Tom wrote down.
2. Answer the questions below.

QUESTIONS:

1. What are some of the final products that paper can be made into?

_____

_____

2. What species of trees are mostly used to make paper?

_____

3. What is pulp made of?

_____

4. What does "debarked" mean?

_____

_____

5. What is a landfill site?

_____

_____

6. Arrange the processes in the process of papermaking in the correct way.

   A. Chips go into the pulp mill.

   B. Wood logs are transported by trucks

   C. Pulp flows to the paper mill.

   D. Paper is transported to buyers who make other paper products.

   E. The pressed and dried pulp is rolled or cut into sheets as paper.

   F. Wood is harvested from trees growing in a plantation.

   G. Pulp is washed, bleached and cleaned and dried.

_____

7. Talk to a partner about the section of the papermaking process that interested you most. Explain why you find it interesting.

_____

_____

_____

8. Do you think many people work in the papermaking industry? Explain your answer.

_____

_____

_____

9. Do you think the papermaking process is a long or a short process. Give a reason for your answer.

_____

_____

10. Name 2 of the major papermaking companies in South Africa that you know of.

_____

_____

We mentioned recycling as a part of the papermaking process. Recycling is a very important process as it allows us to reduce our waste and use things over again. Not only paper can be recycled. You can also recycle glass, tin and plastic.

Bins for recycling. Watch out for these types of bins in your area! [10]

QUESTIONS

1. Is there a paper recycling project in your school or environment?

_____

2. Why do you think we need to recycle paper?

_____

_____

_____

Date: _____

REVISION:

1. List as many properties of metals as you can think of.

_____

_____

2. Are non-metals magnetic?

_____

3. Tom used magnetism to help his uncle. Which metal in the junkyard was attracted to the magnet?

_____

4. Are all metals magnetic?

_____

5. Why are most pots and pans made of metal?

_____

_____

6. Why do some pots and pans have handles made of plastic or wood?

_____

_____

7. Why does iron that is shiny when it is new become dull and blotchy when it stands outside for a long time?

_____

8. What does rust look like? (Describe what it looks and feels like.)

_____

_____

9. What is another name for rust?

_____

10. Do all metals rust?

_____

11. Your dad is putting up a new iron fence in front of your hose. What would you tell him to do to make the fence last long?

_____

_____

12. Look at the picture below of a hammer. What is the head of each hammer made from and why do you think this material was used?

Different sized hammers.

_____

_____

13. If you had to advise your parents or a family friend who wants to buy a set of chairs and tables for their garden to replace the plastic ones which have broken, what would you advise them are the best types of furniture for outside in the garden? Explain your answer.

14. Some jewellery is made from metal. What types of metal is jewellery made from and why do you think some of these metals are so expensive.

15. Why do you think your kitchen utensils (such as knives, forks and spoons) are normally made from metal and not plastic and wood? Why then do fast food restaurants give you plastic utensils with your take aways?

16. Below is a picture of a fire engine truck. Can you imagine a fire engine made from plastic or wood?! What properties of metal make it suitable for the fire engine?

A fire engine made of metal.