

Initiated by:



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Introduction

Hello teachers and kids!

Welcome to this environmental activity book. This activity book contains 4 fun-to learn environmental-themed modules which are:

Module 1: Our Environment

Module 2: River

Module 3: Water

Module 4: Waste

This activity module aims to open up the minds of young children and expose them to the concept of the environment, which we all deeply depend on. In a world of advancing technologies and developments, it is important to nurture our children about protecting our environment where most of our resources come from.

With the teacher's guidance, each module consists of different topics that will not only allow young children to gain knowledge but also allowing them to explore their own creativity and intuition.

Now let us go on an environmental learning journey and have fun!

Teachers Guide: How to use this book

Attention to teachers!

Each module will have two main parts: a **teacher's guide** followed by the **activity sections**. Not only teachers can use the guide for ideas and extra knowledge but also engaging kids in various activities which can be expanded from the topic.

The last section of this module will be the **answer sheet**. Activities involving coloring has no definite correct or wrong answers but the main idea is to gain their own perception from the activities.

Let's kick start our roles and educate our future generation on the importance of protecting and conserving the environment!



Disclaimer

The pictures used in this environmental activity book are mostly found on the internet and from various sources.

This activity book is neither intended as a substitute for environmental advice nor to replace any proper training of the sort, but it is meant to educate and engage children in fun-learning activities on the topic.

Names, characters, businesses, places, events and incidents especially from the short story in **Activity 4.1** are either the products of the author's imagination or used in a fictitious manner. Any resemblance to actual persons, living or dead, or actual events is purely coincidental.

Table of Contents

Module 1: Our Environment	
Teacher's Guide	
Activity	
Module 2: River	
Teacher's Guide	
Activity	
Module 3: Water	
Teacher's Guide	
Activity	
Module 4: Waste	
Teacher's Guide	
Activity	
Answer Sheets	

Module 1

OUR ENVIRONMENT

MODULE 1: OUR ENVIRONMENT

INTRODUCTION:

The natural environment comprises all naturally occurring surroundings and conditions in which living things grow and interact on Earth. These include natural systems such as plants, animals, rocks, and natural phenomena plus non-local or universal natural resources such as air, water and climate.

SUB-TOPICS:

1.1 ENVIRONMENTAL ELEMENTS

1.2 ANIMAL KINGDOM – VERTEBRATES AND INVERTEBRATES

1.3 PLANTS

1.4 ECOSYSTEM INTERACTIONS

1.5 MALAYSIAN BIODIVERSITY

1.6 ENVIRONMENTAL POLLUTION

LEARNING OUTCOMES:

Things to be learnt in this module:

1. Grouping items into three (3) main environmental elements (natural, living things and man-made).
2. Classification of animals into their main groups – vertebrates and invertebrates.
3. Interactions between different components in an ecosystem.
4. Understanding and constructing a simple food chain and food web.
5. The Malaysian environment scene and its biodiversity.
6. Unique species of animals and plants in Malaysia and their habitat.
7. Types of environmental pollution and the impacts on our environment.

1.1 ENVIRONMENTAL ELEMENTS

What is an environment? It is anything and everything that which environs or surrounds; surrounding conditions, influences, or forces, by which living forms are influenced and modified in their growth and development.

Our environment ecosystem comprises of three (3) major components, which we name it the ABC formula:

Formula	Component	Description	Example(s)
A	Abiotic	Non-living things	Sun, Rain, Water, Clouds etc.
B	Biotic	Living things	Animals, Plants etc.
C	Cultural	Interactions between A & B	Food chains, food webs etc.

This is a great activity for children to learn and group subjects and items that they see every day into the three different environmental elements, whether it's indoors or outdoors.

Activity Guide (1.1 – 1.2)

- In **Activity 1.1**, Teachers will introduce the three environmental elements and conduct a read-aloud session.
- After explaining to students on the three environmental elements, ask the students what more examples they can think of. What is natural? What are living things? What are made by humans?
- After the discussion, ask the students to match the pictures accordingly in **Activity 1.2**.
- To further their understanding, conduct the activities below:
 - Use available resources to help them familiarize with the three environmental elements (e.g. classroom items, outdoor nature)
 - Assign each of the students to hold an environmental picture/card and ask them to group themselves according to the three environmental elements.

1.2 ANIMAL KINGDOM – VERTEBRATES AND INVERTEBRATES

Living things, especially animals are divided into vertebrates and invertebrates. Vertebrates are **animals with a backbone**, and are also classified into further groups. Teachers can explain them accordingly with their features and examples:

Vertebrate Group	Features	Examples
Mammals	Feeds the young; has hair	Humans, kangaroo, dog, cat, dolphin
Reptiles	Cold-blooded; scaly skin	Snakes, lizard, crocodile
Birds	Has feathers	Penguin, eagle, peacock
Fishes	Live in water	Shark, seahorse, tuna, salmon
Amphibians	Live in both land and water	Frog, toad, salamander, newt

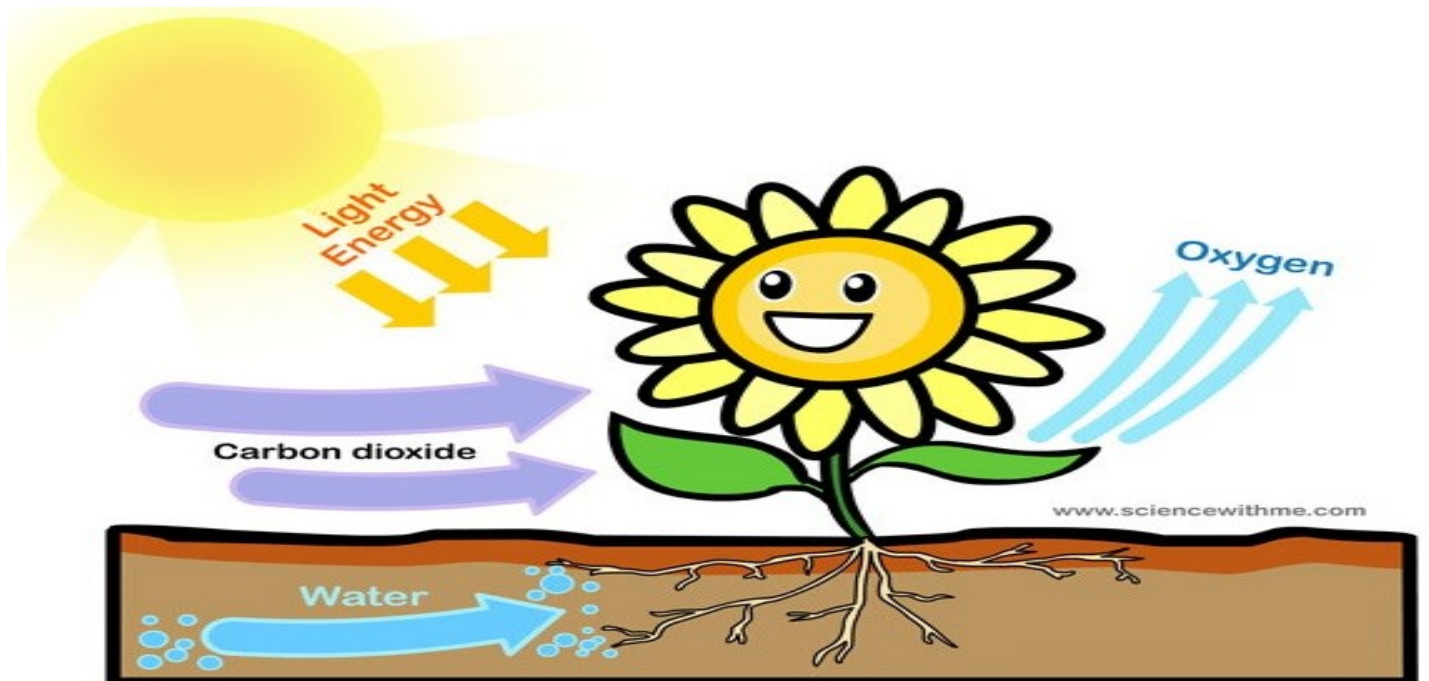
Invertebrates are **animals without a backbone**. They are also classified into further groups, though for simpler understanding for young students, the examples include insects, worms and molluscs.

Activity Guide (1.3)

- a. Teachers can first introduce to students about vertebrates and invertebrates. Example of questions that may raise their curiosity:
- What makes a vertebrate? Are humans vertebrates?
 - What are distinctions between the five groups of vertebrates? Can they name more examples? Can they name more examples of invertebrates?
- b. After the students familiarise with the concept, ask them to match the animal cartoons to their respective groups in **Activity 1.3**.

1.3 PLANTS

Plants use light from the Sun to produce their own food. In addition to availability of water, this allows them to grow anywhere. Most plants get their green colour from chlorophyll inside their cells. Plants withdraw energy from the Sun using chlorophyll and along with carbon dioxide and water, they create food. This process is called photosynthesis, which plants create food as well as the oxygen we breathe.



Image©sciencewithme.com

Activity Guide (1.4)

- a. Teachers can first introduce to students about the importance and various functions of plants. Example of questions that may raise their curiosity:
- What do plants do? What are their benefits to our environment?
 - How do plants make food? What do they offer us besides food?
- b. After the students familiarise with the concept, ask them to colour and explain the diagram further in **Activity 1.4**

1.4 ECOSYSTEM INTERACTIONS

Referring back to Topic 1.1, the cultural factor of the environment refers to the interactions between abiotic and biotic factors. The ecosystem consists of trophic levels, and good examples for children to learn include food chains and food webs.

Trophic level	Subject	Where it gets food	Example
1	Producer	Makes its own food	Plants make food
2	Primary consumer	Consumes producers	Insects eat plants
3	Secondary consumer	Consumes primary consumers	Birds eat insects
4	Tertiary consumer	Consumes secondary consumers	Snakes eat birds

Activity Guide (1.4– 1.7)

- a. Teachers can first introduce to students about simple food chains and food webs. Examples that will form a picture include:
- c. What gives life especially plants on earth? (the sun)
- d. What are the roles of plants? What life forms feed on plants?
- e. Or even simpler question: What different food do different animals feed on?
- b. After the students familiarise with the concept, ask them to construct the food chain by linking the pictures using arrows in **Activity 1.4**. Discuss with them on the food chain.
- c. For **Activity 1.5**, the students can further their understanding by completing the food web (a combination of a few food chains).

1.5 MALAYSIAN BIODIVERSITY

Our country is one of the 12 mega-diverse countries in the world, alongside Mexico, Colombia, Ecuador, Peru, Brazil, Zaire, Madagascar, China, India, Indonesia and Australia.

Blessed with a biologically diverse tropical forest habitat, we have 15,000 identified flowering plants; 1,500 vertebrates and 150,000 invertebrates (insects being the single largest group). In overall there are 286 species of mammals, 1,200 butterfly species, and 12,000 moth species and over 8,000 fish species.

Examples of Unique Animals and Plants in Malaysia



Rhinoceros Hornbill



Bornean Orangutan



Leatherback Turtle



Rafflesia Flower



Lesser Mousedeer (Kancil)



Flying Lemur



Bamboo Orchid



Malayan Tapir



Large-leaved Pitcher

Images©WanderWisdom.com

All these animal and plants species that is so diverse in our country have a home – which is their natural habitat, such as forests, river, lakes, and caves and so on. It is vital to nurture children from a young age that most living things, like us humans, deserve a home without disturbances.

Activity Guide (1.6 – 1.7)

- a. Teachers will first introduce the students about Malaysian biodiversity.
- b. They can ask students the following questions:
 - What are the Malaysian flowers/plants that they've seen or like most?
 - What are the Malaysian animals that they've seen or like most?
- c. In **Activity 1.6**, students will try to complete the name of famous Malaysian animals and plants. After completing the task, teachers and students can discuss further about animals and plants that are not in the list.
- d. After getting to know Malaysian biodiversity, teachers will talk about the natural habitats of the animals and emphasize that each has their own home.
- e. In **Activity 1.7**, after matching the animals to their respective habitats, the teachers can discuss with students by asking the following questions:
 - Why do they belong to that specific habitat? (e.g. rivers, forests)
 - How do they interact with each other?
 - How do the habitats relate in our environment?

1.6 ENVIRONMENTAL POLLUTION

Despite our biodiversity and rich resources, our environment is under attack. One of the factors that has led to this state of affairs is that there is neither sustainable management nor management integration which has given rise to all sorts of pollution that are harmful to the environment and us.

Pollution is an act or process that induces the presence of unknown substances in the form of solid, gas and liquid. These unknown substances can cause changes in the quality of the surrounding environment which has direct negative impact on it, and can be from either natural or human causes.

Natural Causes	Flooding, earthquakes, tsunami, volcanic eruption, animal litter
Human Causes	Solid waste/garbage, industrial waste, agricultural waste, sewage

There are **three (3) main types** of environmental pollution:

i. Land Pollution

- Degradation of earth's land surfaces often caused by human activities and their misuse of land resources
- Exploitation of minerals and improper use of soil from inadequate agricultural and industrial practices

ii. Water Pollution

- Organic waste (human sewage, animal waste, food waste)
- Pesticides and fertilizers
- Industrial waste (toxic chemical by-products)
- Siltation and sedimentation
- Solid waste
- Oil pollution

iii. Air Pollution

- Contamination of atmosphere by discharge of harmful airborne substances
- Indoors
 - Tobacco smoke
 - Cooking and heating appliances
 - Vapour from building materials
 - Paints and furniture in buildings
- Outdoors
 - Primarily automobile exhausts and industrial emissions

And what are the consequences and impacts?

Type of pollution	Impacts
Land Pollution	Land degradation, odour and bad smell
Water Pollution	Water-borne diseases, destruction of aquatic life, shortage of water resources
Air Pollution	Air-borne diseases, acid rain, global warming

Activity Guide:

- a. In **Activity 1.8**, Teachers will introduce generally on environmental pollution. Read the story (or tell it in your own way) and engage students with the questions on the story.
- b. Explaining the main types of pollution – land, water and air and engage students to give more examples.
- c. After familiarizing with the types, ask students to match the types of pollution to the relevant pictures in **Activity 1.9**.

After matching the types, match the pollutions and its relevant impacts in **Activity 1.10**.

Topic 1.1 –Environmental Elements

Activity 1.1: Read Aloud!



SUN



WATER



BOOKS



HUMAN



FLOWER



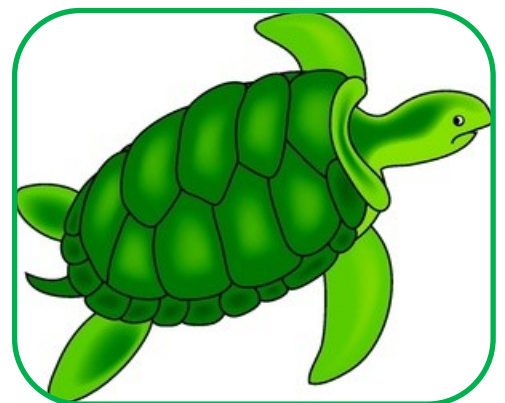
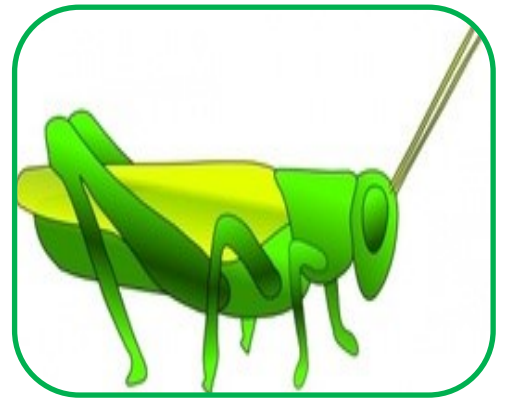
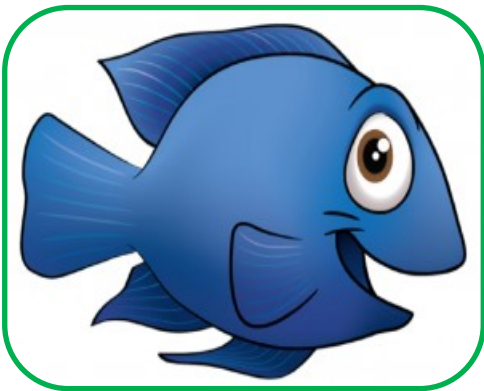
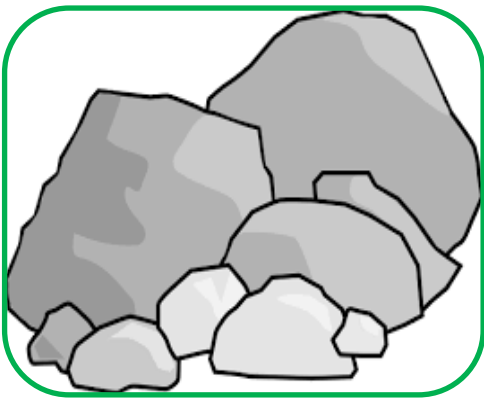
CHAIR

What are the differences between them?

Which ones are natural? Which ones are not?

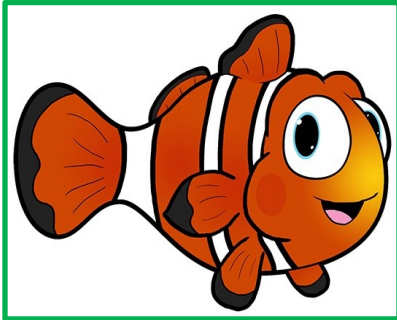
What more examples can you give?

What did you learn from the first activity? Try and match the pictures that are similar in nature!



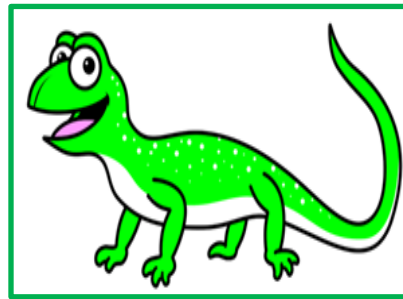
Topic 1.2 – Animal Kingdom

Activity 1.3: Help the animals below to find their own respective groups!

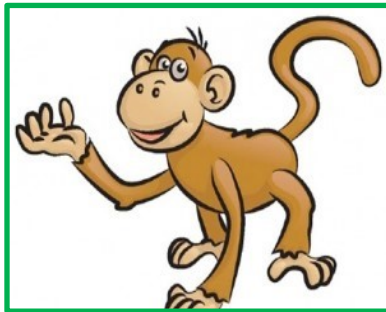


MAMMALS

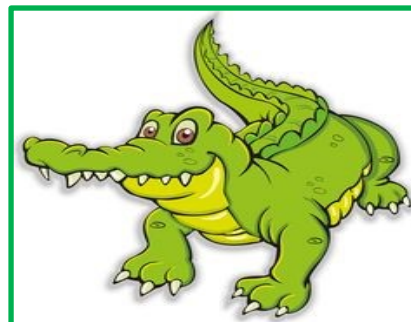
AMPHIBIANS



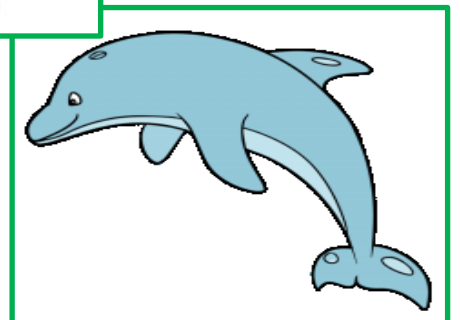
FISHES



BIRDS

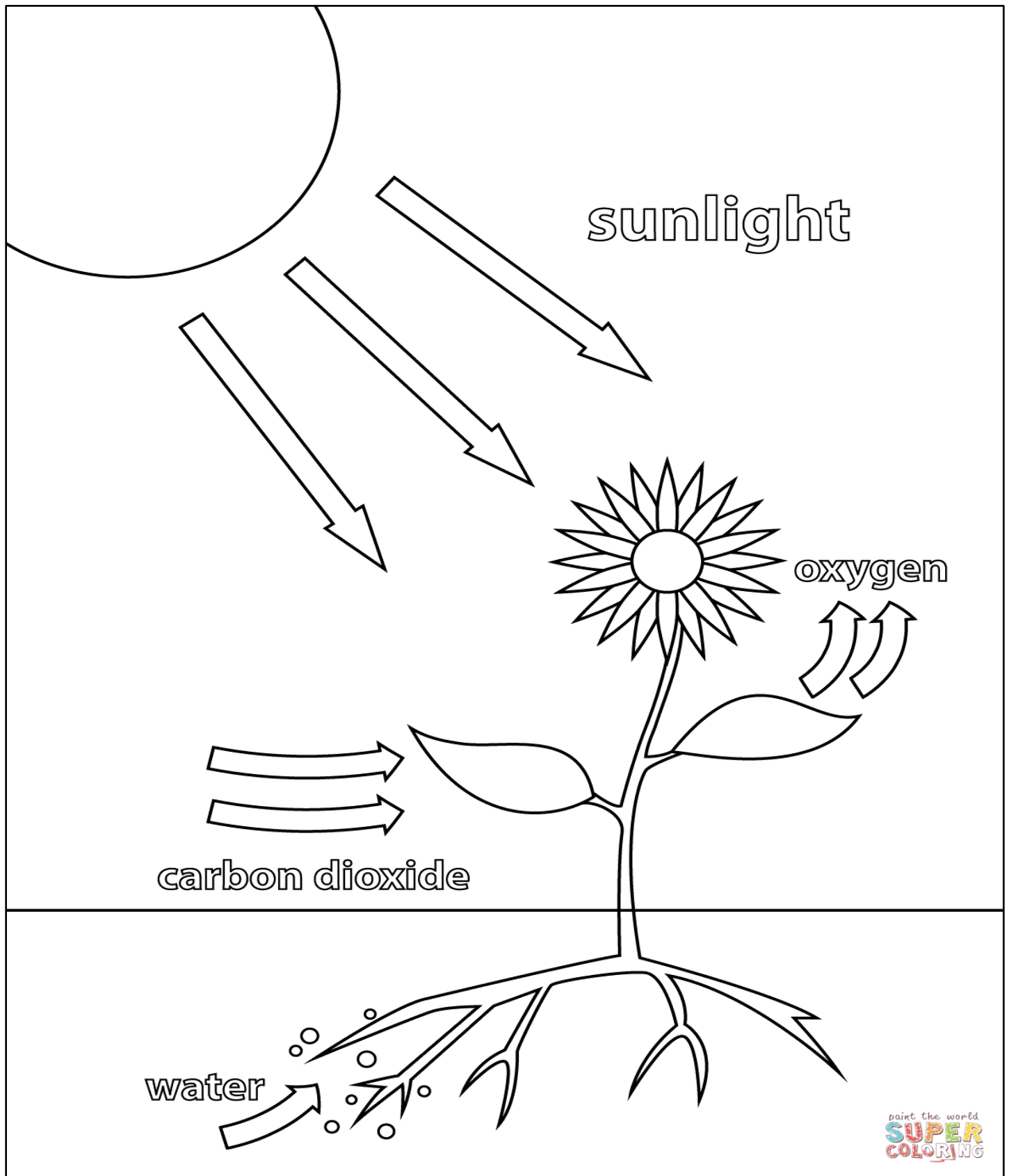


REPTILES



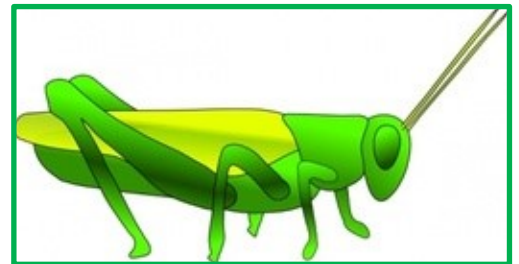
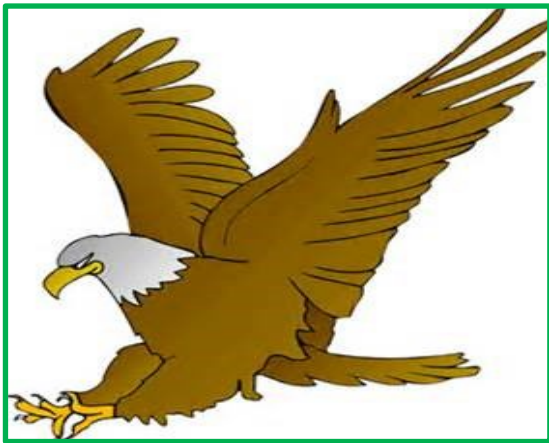
Topic 1.3 – Plants

Activity 1.4: Colour the picture below!

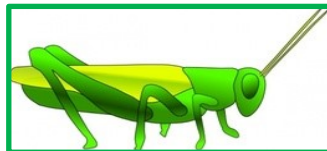
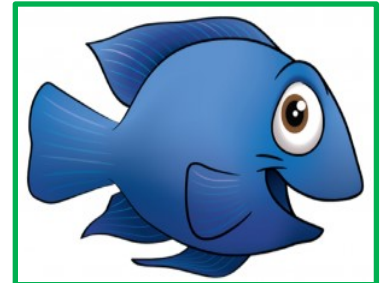
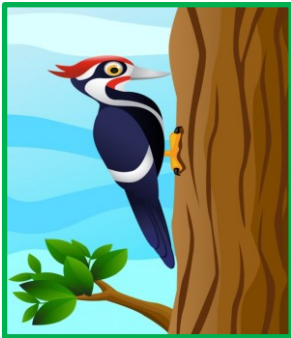
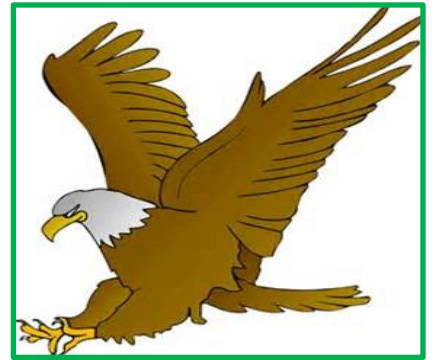
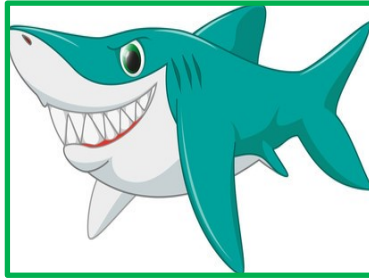


Topic 1.4 – Ecosystem Interactions

Activity 1.5: Use arrows and complete the food chains below!



Activity 1.6: Now, use arrows and complete the food web below!



Topic 1.5 – Malaysian Biodiversity

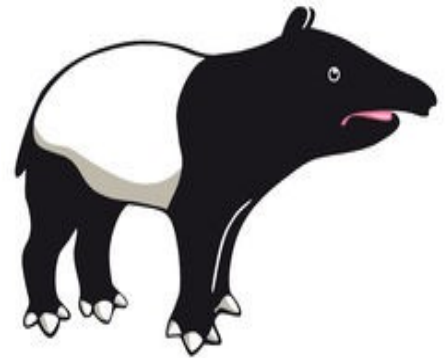
Activity 1.7: Do you know about the unique animals and plants that can be found in our country? Complete their names below and find out!



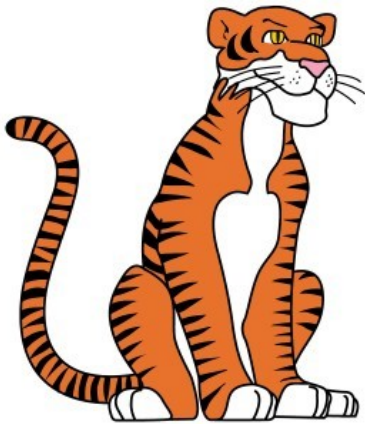
H _ R N B _ _ L



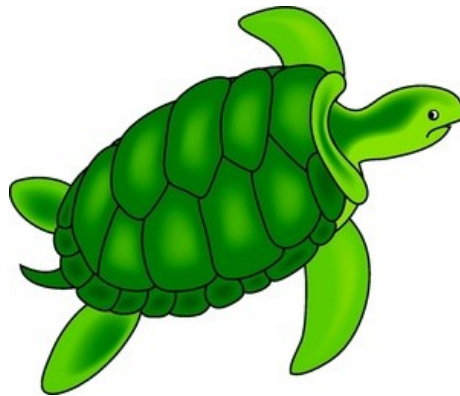
_ R C _ I D



_ A _ I R



T _ _ _ R



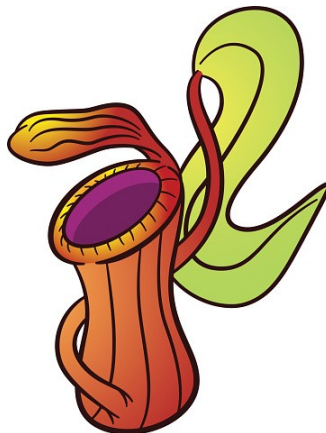
T _ _ T _ E



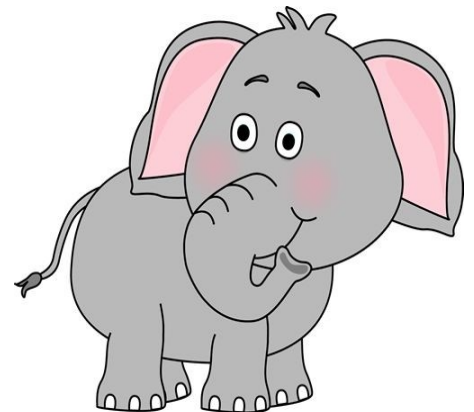
R _ F F _ _ S _ A



K _ N _ I _

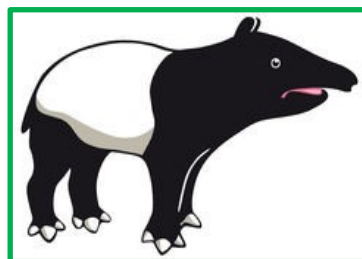
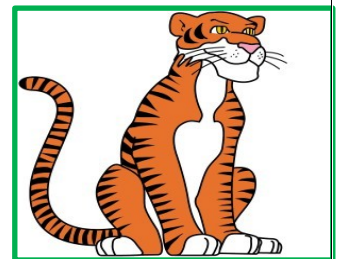
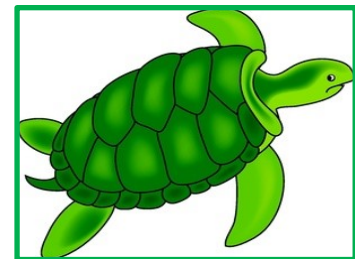
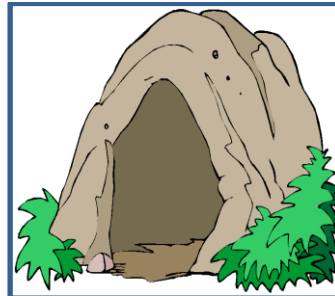
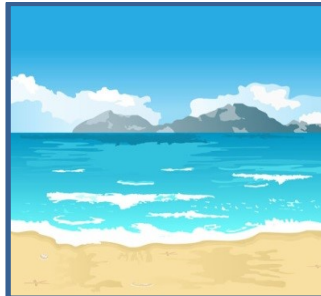


P _ T C _ E R



E _ E P _ A N _

Activity 1.8: Help our animals and plants below to find their homes!



Topic 1.6: Environmental Pollution

Activity 1.9: Types of Environmental Pollution – Match the pictures below!



**LAND
POLLUTION**



**WATER
POLLUTION**

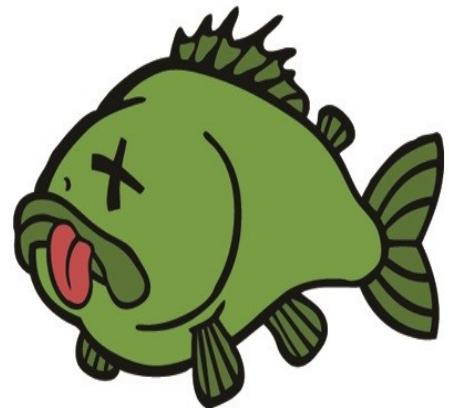


**AIR
POLLUTION**



Activity 1.10: Impacts of Environmental Pollution

What will happen if you pollute the environment in different ways? Link the relevant pictures to each other!



Module 2

RIVER

MODULE 2: RIVER

A river is an entire living entity and not merely a channel for water to flow. There are living things that depend on the river for survival, both in the water and on the land the river supports. The riverine habitat supports a variety of plants and trees that contribute nutrients, shade, soil stability, habitat, and organic materials for small organisms to eat. Rivers contain living things including aquatic plants and animals which utilize the river for many purposes. As such, rivers provide a great variety of habitats and services for all living things and it is important to maintain both physical and biological diversity in and around rivers.

SUB-TOPICS:

2.1 RIVERS & RIVER BASIN

2.2 RIVERS IN MALAYSIA

2.3 CHARACTERISTICS OF NATURAL RIVERS

2.4 IMPORTANCE AND USES OF RIVER

2.5 RIVER MONITORING

2.6 RIVER POLLUTION

LEARNING OUTCOMES:

Things to be learnt in this chapter:

8. The concept of rivers and their properties.
9. Where a river starts and ends as well as the river components
10. River basin and the names of the components (river vocabulary)
11. Names of important rivers in Malaysia.
12. Characteristics of natural rivers.
13. Listing the importance and difference uses of river.
14. Connect rivers and daily lives through classroom activities.

2.1 RIVERS & RIVER BASIN

A **river** is a natural waterway on the Earth's surface, which channels freshwater from the mountains to the sea. Rivers begin as small trickles of water up in the mountains. This is its source, and it eventually forms a small stream which then flows down the mountain. The water erodes the land, carving a bigger channel and forms the main river.

A **river basin** is the entire area drained by a river including its tributaries. That means all water in the river basin area drains into the river and its tributaries. Therefore, the flow of water sets the boundaries of a river basin.

Hydrologists sometimes refer to river basins as catchments or drainage basins. The term watershed is used synonymously with river basin, especially in the U.S.

River basins catch precipitation and accumulate water, which flows across or under the landscape. They come in many different shapes and sizes. River basins can be hilly, mountainous, or nearly flat and can be comprised of many land uses including forests, farms, towns and cities.

Activity Guide (2.1-2.2)

- a. Help the students familiarise with the river basin concept. For example, ask them to imagine themselves as water droplets beginning on top of mountain. Where does it come from? Where does it flow to?
- b. In the **Activity 2.1**, conduct a read-aloud session with the students on the words and fill in the blanks on the river basin figure below.
- c. With a similar concept but different learning perception in **Activity 2.2**, find all the words related to the river basin.
- d. To further their understanding with a different approach and philosophy, conduct an art session (either individual or in groups)
 - Construct a river basin
 - Illustrate/draw their river basin



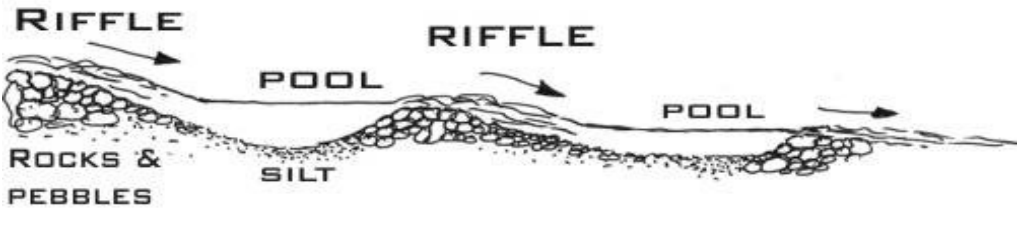

2.2 RIVERS IN MALAYSIA

There are 189 river basin systems with 2986 rivers in Malaysia. The total length of the rivers is estimated to be 38,000km. Most of the rivers in Peninsular Malaysia originate from the central mountain ranges. East Malaysia contains the country's two longest rivers: the Rajang in Sarawak and the Kinabatangan in Sabah. They are each 560km (350mi) long and navigable for part of their courses. Peninsular Malaysia's longest rivers include the Pahang River (470km/290mi long), the Kelantan River (about 400km/250mi long), and the Perak River (about 240km/150mi long).

The major role of rivers today is to provide clean water for the 25 million people currently living in Malaysia. Rivers **supply 97% of the water supply throughout Malaysia**. Despite the importance of rivers as our main source of drinking water, many of our urban rivers today are heavily polluted with all sorts of chemicals and rubbish due to unsustainable development and improper management of rivers.

2.3 CHARACTERISTICS OF NATURAL RIVERS

Natural rivers possess four main characteristics:

<p>Living entity</p> <ul style="list-style-type: none"> • voice of the stream • cleansing power 	
<p>Meanders</p>	
<p>Riffles and pools</p>	
<p>Living things (flora and fauna)</p>	

Activity Guide (2.3)

- Conduct a read aloud session with students on the characteristics of natural rivers. Explain to them particularly on the voice of the stream, riffles and pools, meanders and living flora and fauna which is rarely seen in the urban area.
- Match the words with available pictures.

- c. For a practical experience, during field trips to natural rivers, ask the students to sit down and close their eyes to listen to the voice of the stream. Show them the natural features of the river that are destroyed in developed areas and channelized rivers.

2.4 IMPORTANCE AND USES OF RIVERS

Besides rivers being a natural environment, humans depend on rivers as they support their economic development, social and cultural needs as well as religious beliefs.



Potable Water



Industry



Transportation



Commerce



Domestic Use



Power Generation



Tourism/Recreation



Culture/Religion



Agriculture



Aquaculture



Sanitation/Health



Ecological Functions

Activity Guide (2.4)

- a. Teachers will interact with children and brainstorm about uses of rivers.
- What would you do if you are living beside a river?
 - How does someone cross to the other land if there is a river in between the lands?
- b. In **Activity 2.4**, complete the words which are related to river and water uses. Ask students on further examples they can think of on the uses of river.
- c. Conduct an art session to allow children to illustrate ways people use the river, at the same time showcasing their talents and creativity.

2.5 RIVER MONITORING

River monitoring is an essential skill for everyone to have whether it's for future studying purposes or just acquiring a new skill. Why? As 97% of the water is supplied from rivers in our country, it is good to determine river water quality if one has the basic skills in river monitoring, be it a river near your house, school, or workplace. First, you have to get to know your river basin and its pollution sources, and they can be done with finding out your **river address** and conducting a **river mapping** respectively.

River Address

To find out your river address, you need details of the following:

- Name of your house/school/workplace
- The nearest river to your house/school/workplace
- The river basin that the nearest river belongs to
- The name of the sewage treatment plant of the river
- The nearest water treatment plant of the river
- The ocean/endpoint that the river is flowing into

There are 3 methods for river monitoring which is physical, chemical and biological monitoring.

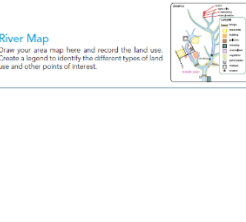
Physical Monitoring

Physical monitoring utilizes our 5 senses: touch, smell, observe, listening, and taste (not recommended – do not taste the river!) to assess the physical health and condition of the river.

The **River Report Card** by Global Environment Centre (GEC) is a simple tool that anyone can use to assess the health of their river. You can simply go to your nearest river and rate the physical condition based on **9 different categories**.

River Map

Draw your area map here and record the land use. Create a legend to identify the different types of land use and other points of interest.



River Hydrology

DISTANCE (A)		WATER		WATER	
T1	T2	W1	W2	W3	W4

AVERAGE VELOCITY (C)		AVERAGE RIVER DEPTH (D)	
D1	D2	D3	D4

DISCHARGE RATE
= (RIVER WIDTH × AVERAGE DEPTH × AVERAGE VELOCITY) = DISCHARGE RATE

DISCHARGE RATE = DISCHARGE RATE

Physical Monitoring* (PM)

Observe, identify and score based on the 9 categories below:

Category 1: Voice of the stream

CL	SCORE	WATER BEST SCORE (10)
6.1 No noticeable human waste	4.0	10
6.2 Some fecal matter (including animal, dog, monkey, etc.)	3.0	
6.3 Some fecal matter (including animal, dog, monkey, etc.)	2.0	

Category 2: Land use

CL	SCORE	WATER BEST SCORE (10)
6.4 Residential, commercial area and some industrial	4.0	10
6.5 Industrial, agricultural, residential, forest cover area, commercial	3.0	
6.6 No visible human activities, forest cover area, commercial	2.0	

Category 3: Rubbish

CL	SCORE	WATER BEST SCORE (10)
6.7 No visible rubbish (plastic, paper, etc.)	4.0	10
6.8 Rubbish (plastic, paper, etc.)	3.0	
6.9 Rubbish (plastic, paper, etc.)	2.0	

Category 4: Pipes & drains

CL	SCORE	WATER BEST SCORE (10)
6.10 No visible pipes or drains	4.0	10
6.11 Some visible pipes or drains	3.0	
6.12 Some visible pipes or drains	2.0	

Category 5: Structures/modifications

CL	SCORE	WATER BEST SCORE (10)
6.13 No visible structures/modifications	4.0	10
6.14 Some visible structures/modifications	3.0	
6.15 Some visible structures/modifications	2.0	

Biological Monitoring (BM): BWQI

Identify and record the organisms found here. Refer page 25 for the score.

SPECIES (A)	SCORE	TOTAL SCORE (B)	BWQI (B ÷ A)

Calculating Biological Monitoring Index (BWQI)

BWQI RANGE	BWQI INDEX	WATER QUALITY	WATER QUALITY SCORE
7.5-10	5	Very clean water	5
5.1-7.5	4	Clean water	4
2.6-5.0	3	Average	3
1.0-2.5	2	Dirty water	2
0.0-0.9	1	Very dirty water	1

BM INDEX

BM INDEX

River Ranger Index* (RRI)

Calculate the river's health by using River Ranger Index

CATEGORY	INDEX (A)	WEIGHT (B)	SUB-CATEGORICAL INDEX (A × B) (C)
PHYSICAL (C)		1.75	
CHEMICAL (D)		1.25	
BIOLOGICAL (E)		2	
RIVER RANGER INDEX (C + D + E)			

RIVER RANGER INDEX (RRI)	CLASS	RIVER STATUS	WATER QUALITY SCORE
4.50 - 5.00	A	Very good	5
3.50 - 4.50	B	Good	4
2.50 - 3.50	C	Moderate	3
1.50 - 2.50	D	Poor	2
1.00 - 1.50	E	Critical	1

Your River Health is

RIVER RANGER INDEX (RRI)

CLASS

RIVER STATUS

WATER QUALITY SCORE

GEC's River Report Card

15

16

17

18

Chemical Monitoring

Chemical monitoring and testing is one of the most accurate and reliable testing methods. Chemical testing is used to analyze drinking water. It is extremely useful for determining sources of pollution, as well as determining specific pollutants. GEC's RIVER Ranger Programme uses water testing kit that can test 6 different parameters and determine the water quality using a colour chart.



Water Testing Kit for Chemical Monitoring

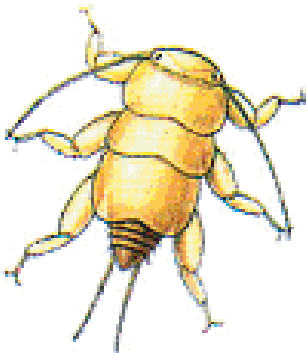


Tools for Biological Monitoring

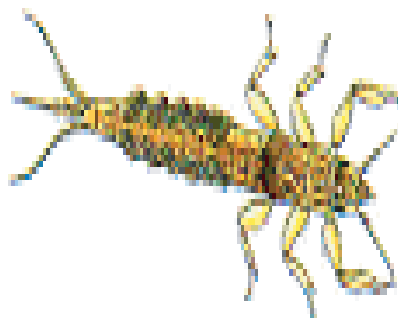
Biological Monitoring

Biological monitoring is the study of living organisms found in our waterways. The type and abundance of these organisms can be used as indicators of water quality because all organisms require specific conditions to live. This means that, some organisms are sensitive to pollutants (they require clean conditions) while some other are tolerant to pollution (they adapt to adverse/dirty conditions). Aquatic insects are good short-term biological indicators as they are easy to identify and determine the water quality once you familiarise with them.

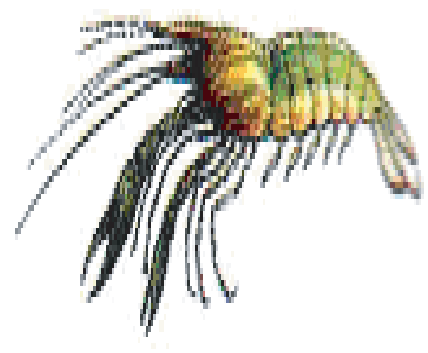
Examples of aquatic insects in clean conditions



Stonefly nymph

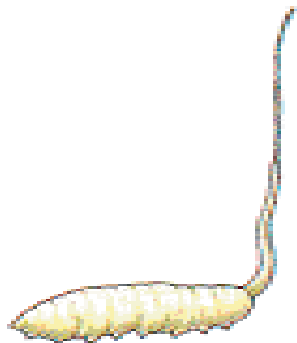


Mayfly larvae

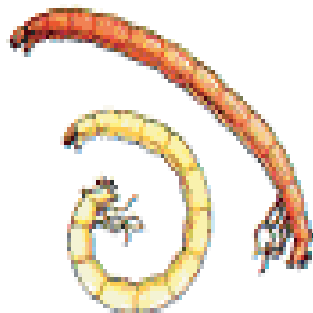


River prawn

Examples of aquatic insects in dirty conditions



Rat-tailed maggot



Non-biting midge larva



Leech

By identifying 'sensitive' aquatic insects, we can use them as 'bio-indicators' of different levels of water quality. These organisms can provide a relative view of the overall quality of a stream at any given moment and it is a relatively inexpensive and reliable method of acquiring an indication of the water quality and uses simple and inexpensive tools.

As most of the aquatic insects reside on the river vegetation banks, under rocks and sediments, tools such as aquatic nets and sieve trays are simple useful tools for collecting samples.

Activity Guide (2.5-2.7)

- Introduce the students to the facts of river pollution, and did they see any examples in their everyday life.
- In **Activity 2.5**, based on the steps, conduct an interactive session with students to find out your kindergarten/school's river address. Some homework will need to be done beforehand including a local map with rivers, and names of the sewage and water treatment plant of your river.
- In **Activity 2.6** and **2.7**, circle the aquatic insects that are found in clean water and dirty water respectively, and interact with students on whether they have seen any of the insects in real life.
- Explain to them about living conditions in a river and link with our own comfort in our living environment as well (e.g. swimming in clean water and rubbish in our neighbourhood).

2.6 RIVER POLLUTION

River pollution is identified as contamination of water bodies by foreign matter such as effluent, litter, sewage or runoff which changes the physical, chemical, biological and thermal properties of the water. These changes will lead to major impacts including deterioration of the water quality and affecting aquatic life as well as other beneficial uses.

There are two main types of river pollution which are point source and non-point source pollution, where point source pollution is discharged directly into a river from a specific point while non-point source comes from many sources and locations.

Sources of River Pollution

Sources	Wastes		
	Solid	Liquid	Other sources/uses
Commercial & Industrial	<ul style="list-style-type: none"> Landfill leakage (leachate) Untreated sewage Solid waste Organic waste Illegal dumping 	<ul style="list-style-type: none"> Discharge partially treated/ untreated effluents directly into rivers Food outlets discharge liquid food waste into the river 	<ul style="list-style-type: none"> Water extraction Excess packaging
Agriculture	<ul style="list-style-type: none"> Untreated Manure Carcasses 	<ul style="list-style-type: none"> Excess fertilizer and pesticide use 	<ul style="list-style-type: none"> River encroachment
Residential	<ul style="list-style-type: none"> Organic waste Garbage Bulky waste 	<ul style="list-style-type: none"> Phosphates from detergents/bathroom use Oily/dirty discharge from kitchens 	<ul style="list-style-type: none"> Excess packaging

Impacts of River Pollution

- **Bioavailability of portable water**
 - **Water Supply : cost & volume**
- **Flooding**
 - **Due to volume of water & retention time**
- **Ecology**
 - **Aquatic life forms' habitat – food supply, breeding site destroyed**
- **Economy**
 - **food production, productivity, cost of production & processing, export market (green consumerism)**
- **Social**
 - **natural behaviors, community livelihoods, our youth's discipline and crime problems**
- **Health – wellness of people, human productivity, water related disasters**
 - **Nearly 90% of natural disasters were water related**
 - **50% from floods;**
 - **11% from droughts**
 - **29% from waterborne disease**
- **Aquatic animal – fish population**

Activity Guide (2.8-2.10)

- a. Introduce the students to the facts of river pollution, and did they see any examples in their everyday life.
- b. In **Activity 2.8**, ask the students to colour the two pictures, or compare the differences. How do they feel about the first picture? What is the difference and how do they feel about the second picture?
- c. In **Activity 2.9**, conduct the pollution mapping with the students. The picture on top is in a more rural setting near the source of the river while the one below is in an urban area.
- d. Referring back to imagining the water droplet activity, complete the maze in **Activity 2.10** by helping the water droplet to get to the sea and avoid all the pollution endpoints.

Topic 2.1 – Rivers & River Basin

ACTIVITY 2.1: Read the words below aloud and fill in the blanks along the river basin!

RIVER SOURCE

FLOODPLAIN

TRIBUTARY

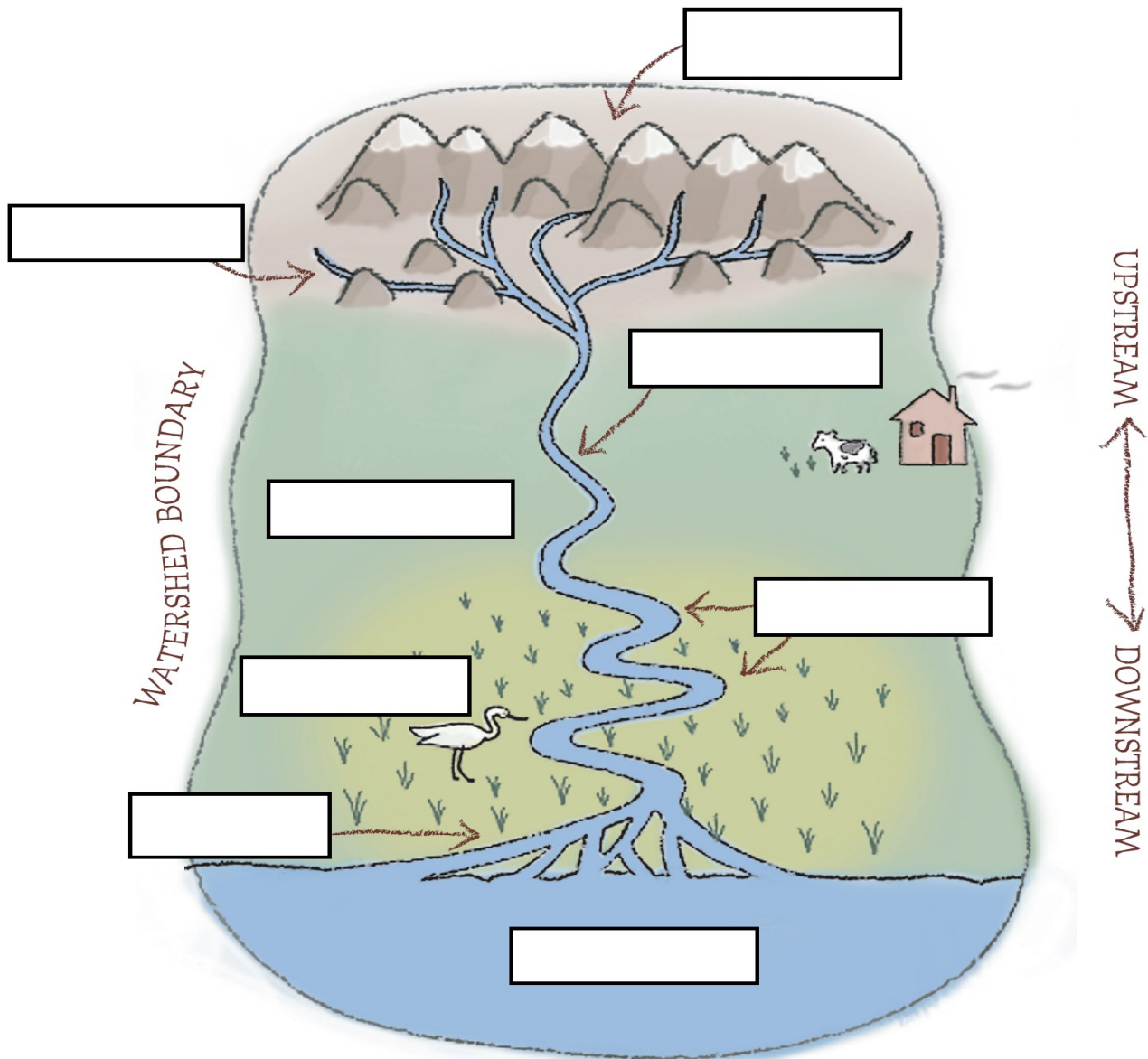
MEANDER

WETLAND

RIVER MOUTH

SEA

RIVER



ACTIVITY 2.2: Find the river words below!

B	R	V	S	O	U	R	C	E	U	L	E	P
A	I	W	E	T	L	A	N	D	S	K	U	O
T	G	T	D	F	G	N	V	E	Y	U	R	O
C	R	Z	Q	S	T	C	H	A	N	N	E	L
H	R	I	F	F	L	E	T	U	G	S	V	T
M	F	C	B	H	F	J	O	L	P	E	I	J
E	K	D	S	U	E	B	E	R	I	W	R	G
A	C	H	J	A	T	D	E	Y	T	B	A	C
N	U	M	L	P	F	A	F	D	S	N	B	Y
D	N	O	P	A	M	C	R	J	S	E	A	J
E	X	Y	H	I	K	X	A	Y	S	P	N	Q
R	O	M	O	U	T	H	Z	G	L	A	K	E

SOURCE

RIVER

POND

TRIBUTARY

CHANNEL

WETLAND

BANK

RIFFLE

MEANDER

BED

POOL

MOUTH

STREAM

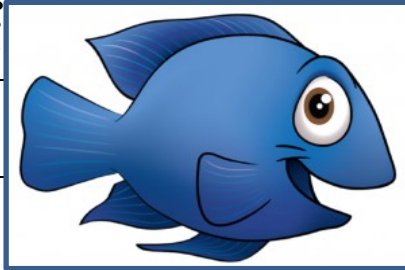
LAKE

SEA

Topic 2.3 – Characteristics of Natural Rivers

ACTIVITY 2.3: WHAT CAN YOU SEE OR FIND IN NATURAL RIVERS? READ ALOUD THE WORDS BELOW AND TRY TO MATCH THE CORRECT PICTURES BELOW!

R I F F L E



W E T L A N D

F I S H



M E A N D E R S



P O O L

V O I C E



L I F E

I N S E C T



Topic 2.4 – Importance & Uses of Rivers

ACTIVITY 2.4: COMPLETE THE WORDS BELOW TO FIND OUT THE DIFFERENT USES OF RIVERS, AND DISCUSS WITH YOUR FRIENDS AND TEACHERS ABOUT MORE OF THE USES!



W _ _ H _ N G



W _ T _ R



_ A B _ T _ T



F _ _ H I _ G



B _ _ T _ N G



H Y _ R _ P O W _ R

Topic 2.5 – River Monitoring

ACTIVITY 2.5: RIVER ADDRESS

Do you know your river address? Discuss with your teacher and friends and find out your river address according to the steps below:

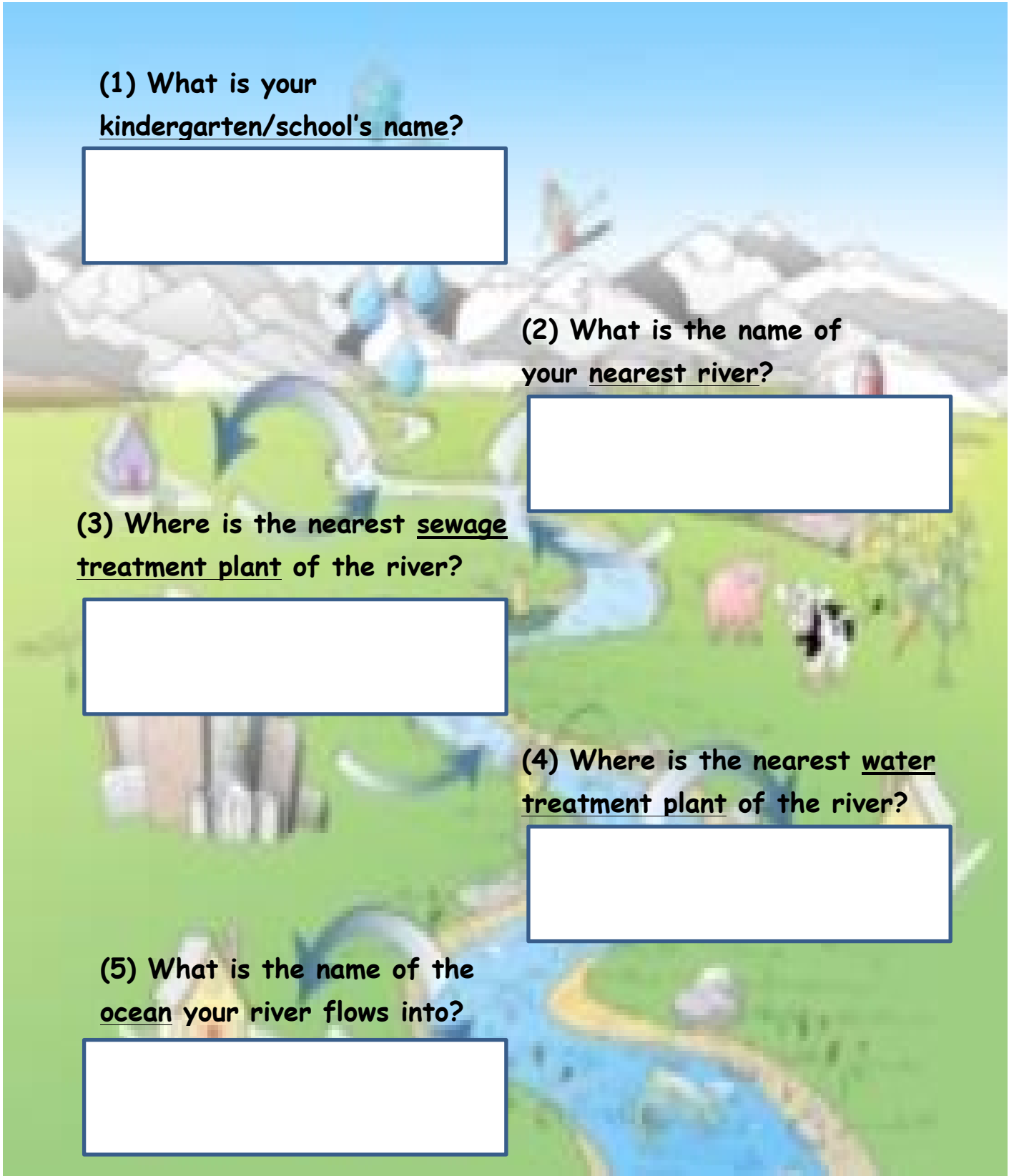
(1) What is your
kindergarten/school's name?

(2) What is the name of
your nearest river?

(3) Where is the nearest sewage
treatment plant of the river?

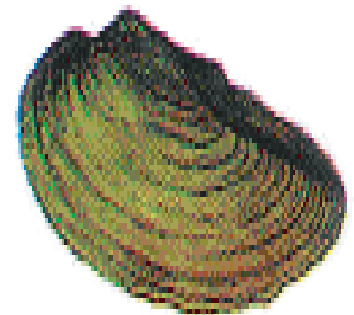
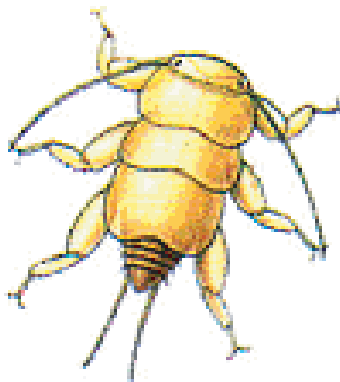
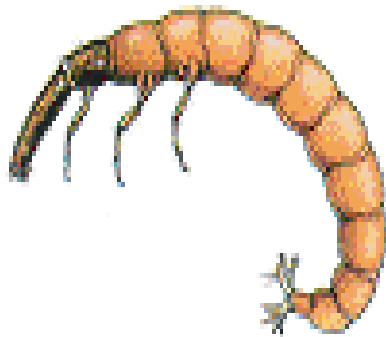
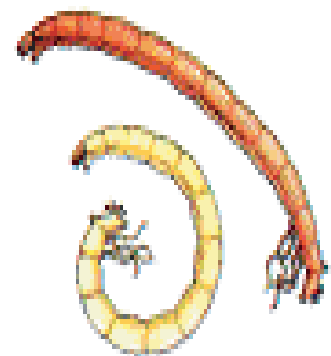
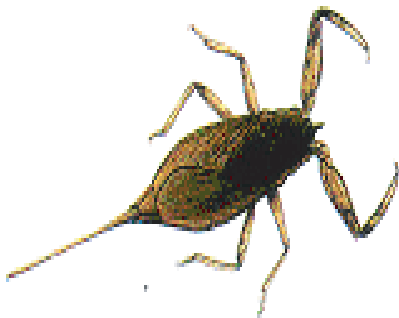
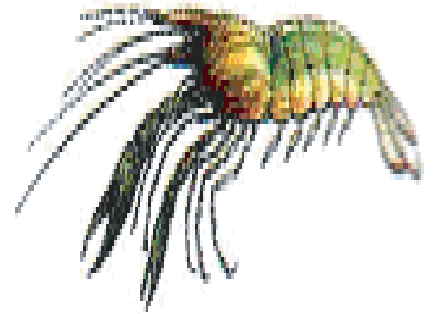
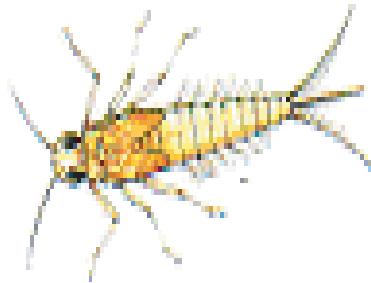
(4) Where is the nearest water
treatment plant of the river?

(5) What is the name of the
ocean your river flows into?



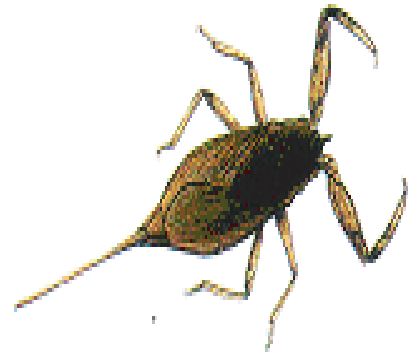
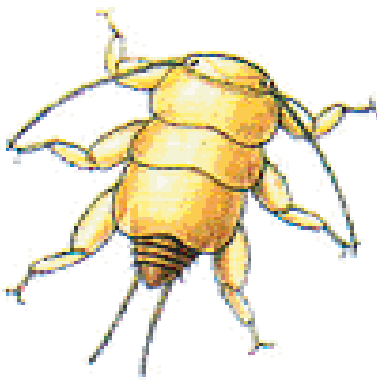
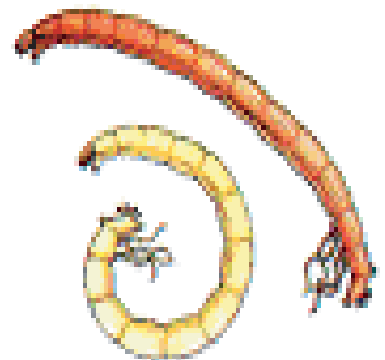
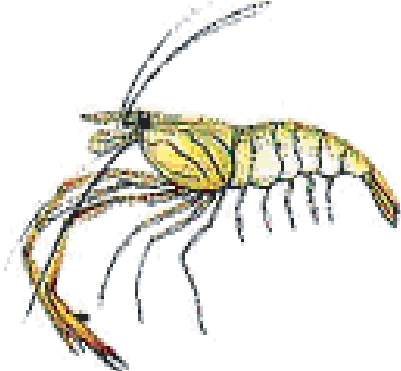
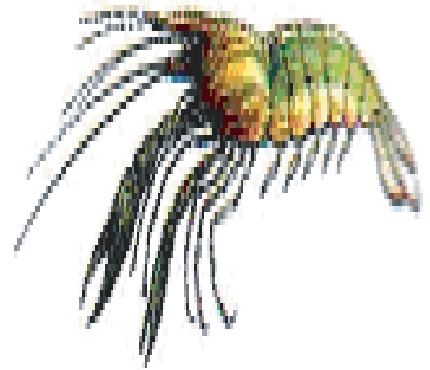
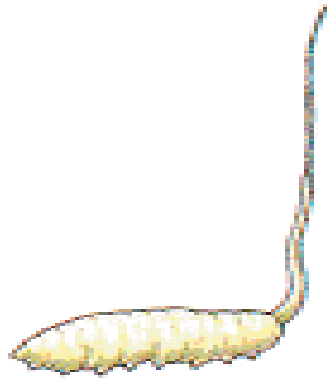
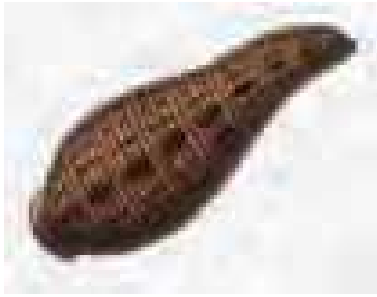
ACTIVITY 2.6: BIOLOGICAL MONITORING I

Choose the river insects below that lives in **CLEAN WATER**!



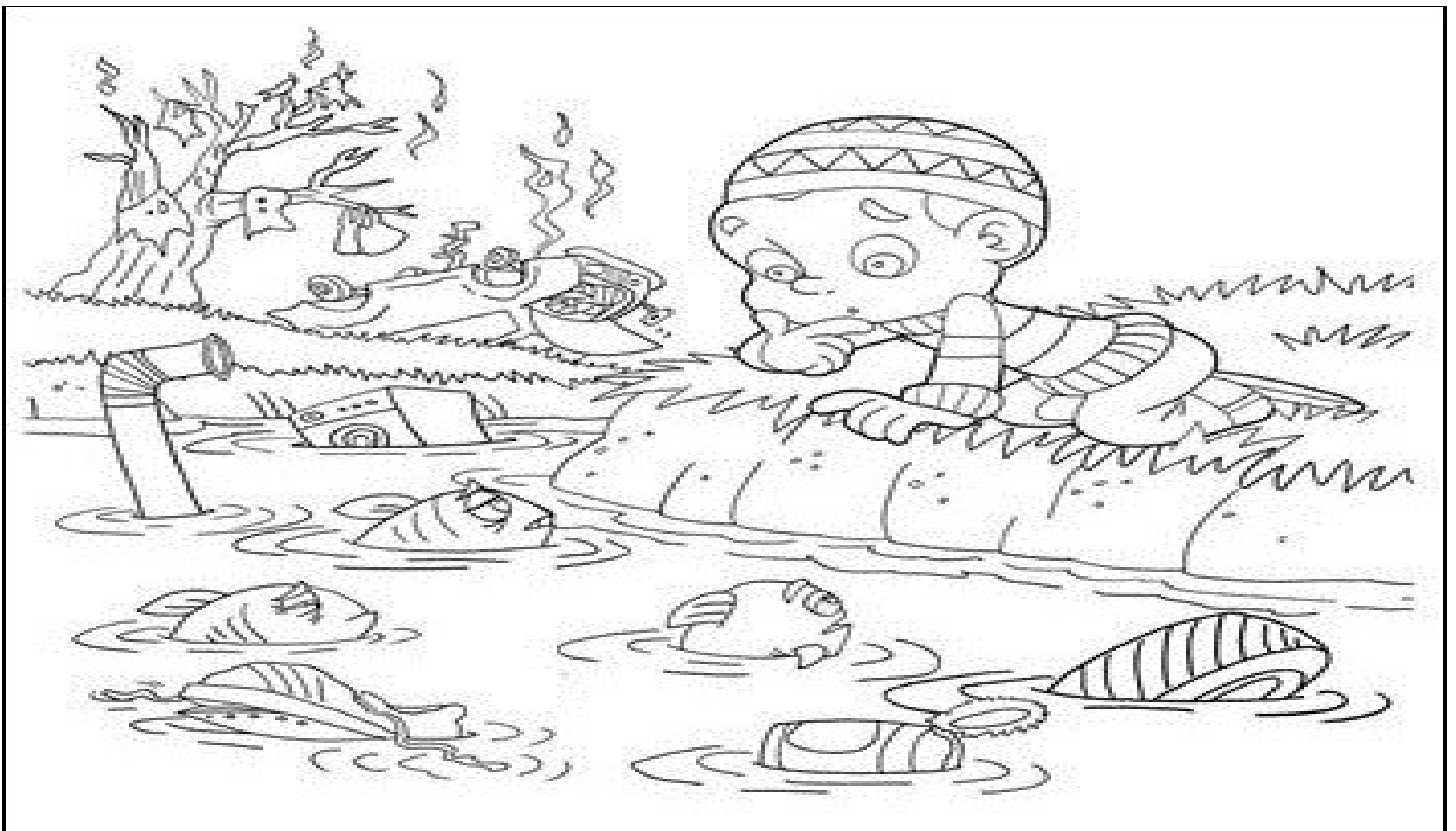
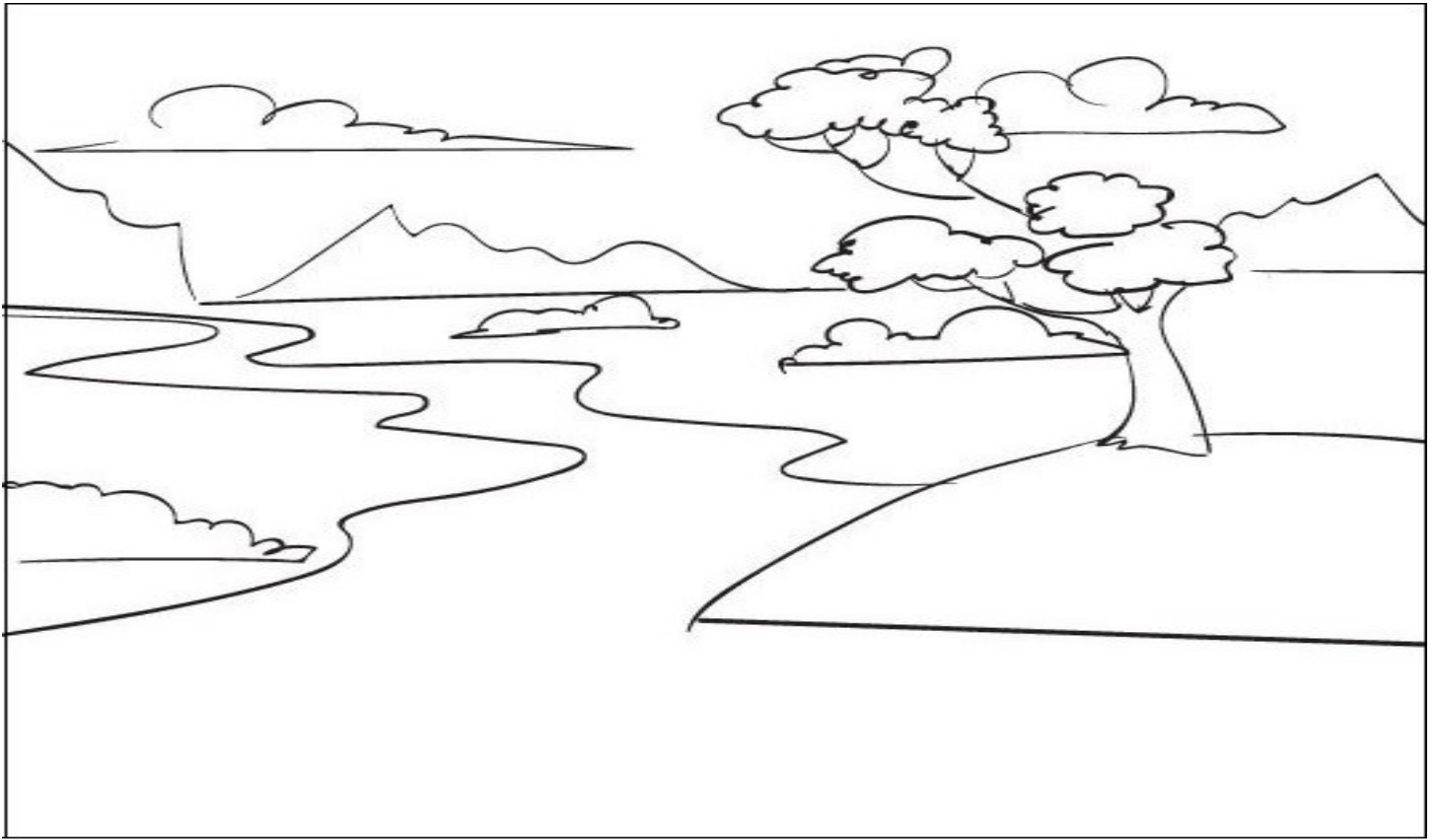
ACTIVITY 2.7: BIOLOGICAL MONITORING II

Choose the river insects below that lives in DIRTY WATER!



Topic 2.6 – River Pollution

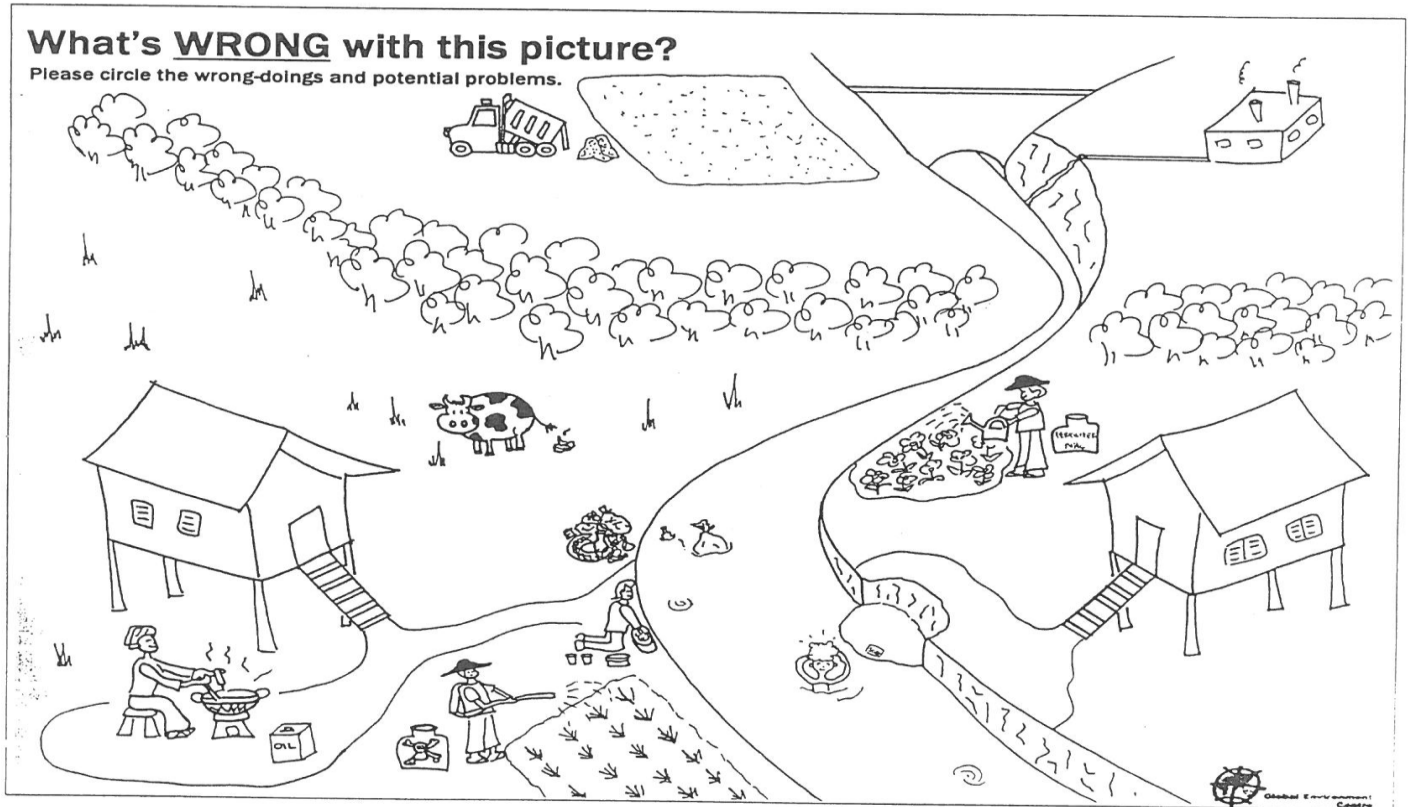
ACTIVITY 2.8: Colour the rivers below. What is their difference?



ACTIVITY 2.9: Map out the pollution sources of the river based on the two pictures below!

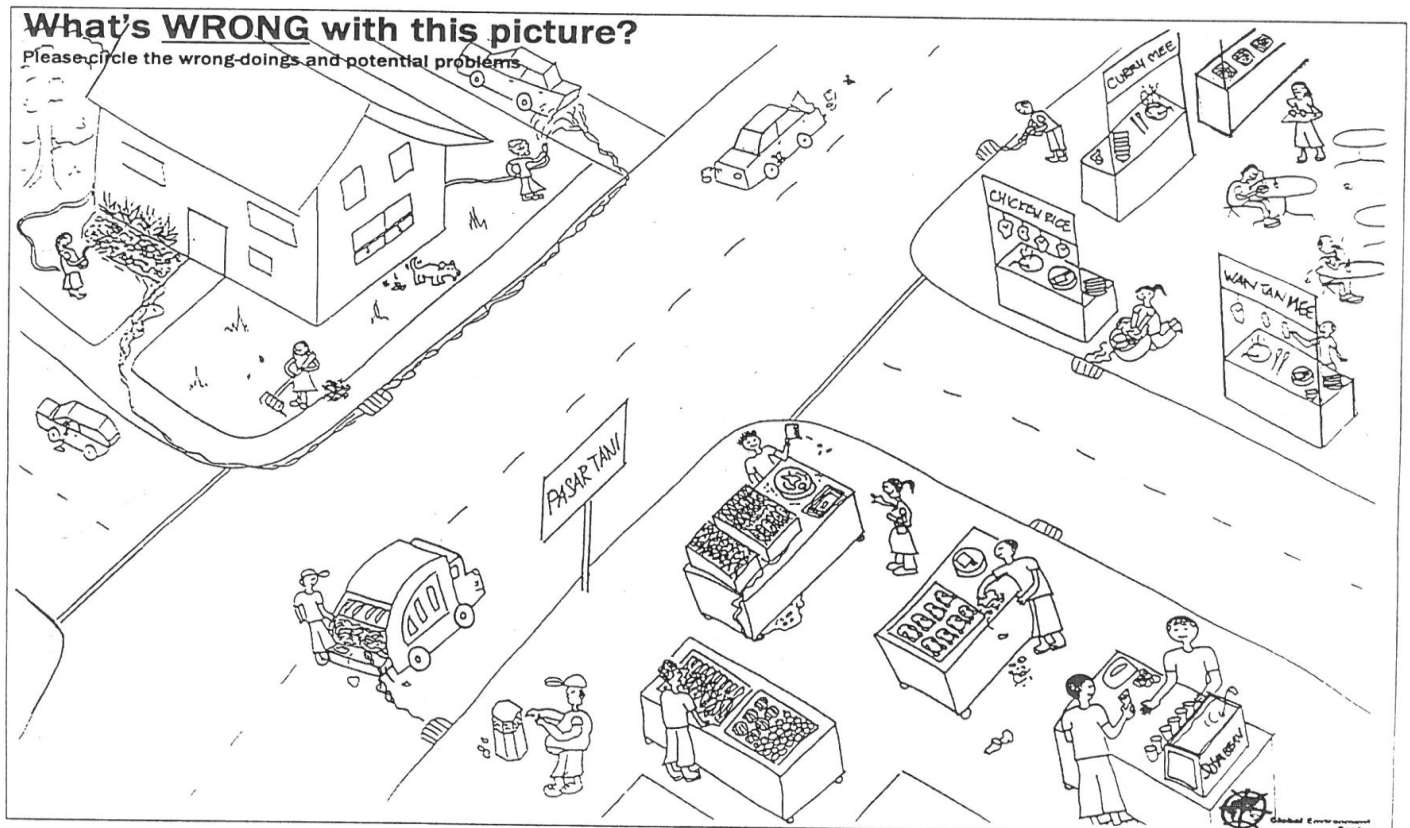
What's WRONG with this picture?

Please circle the wrong-doings and potential problems.

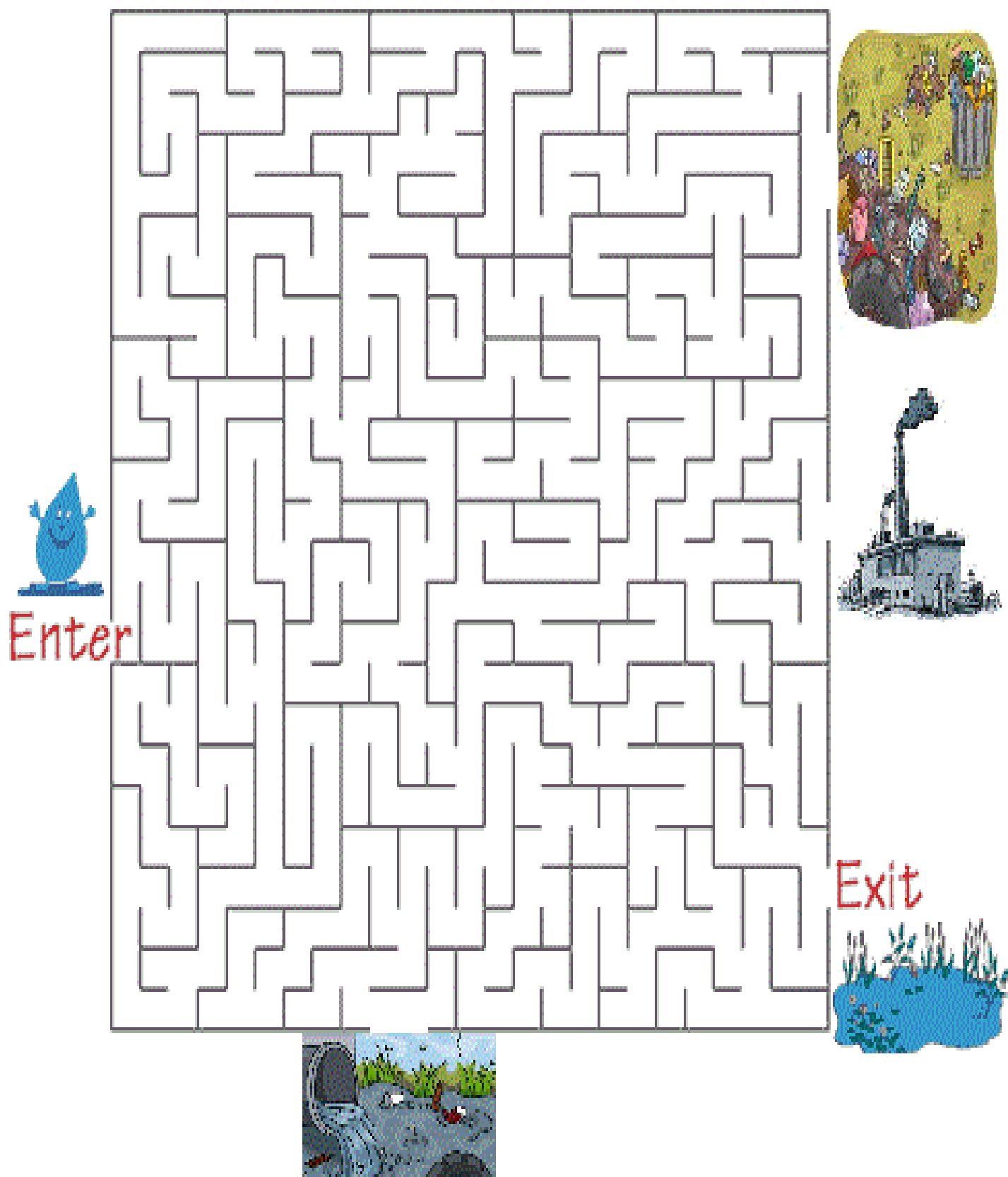


What's WRONG with this picture?

Please circle the wrong-doings and potential problems.



ACTIVITY 2.10: Journey of a Water Droplet - Help the water droplet to avoid the pollution sources and find its way from the mountains into the sea!



Module 3

WATER

MODULE 3: WATER

INTRODUCTION:

Water resources are sources of water that are useful or potentially useful to human beings. Their uses encompass agricultural, industrial, household and recreational activities. Water exists naturally in various forms and locations. They are everywhere: in the air, on the surface, below the ground and in the oceans. The total volume of water on our Earth is about 1.4 billion km³. Fresh water naturally occurs on Earth's surface in ice sheets, ice caps, glaciers, icebergs, ponds, lakes, rivers and streams, and underground as groundwater in aquifers and underground streams. The volume of freshwater resources is around 35 million km³, or about 2.5% of the total water volume. This means only a small fraction of the world's freshwater resources is readily available.

SUB-TOPICS:

3.1 WATER CYCLE

3.2 OUR WATER SOURCES

3.3 WATER USAGE

3.4 WATER CONSERVATION

3.5 VIRTUAL WATER

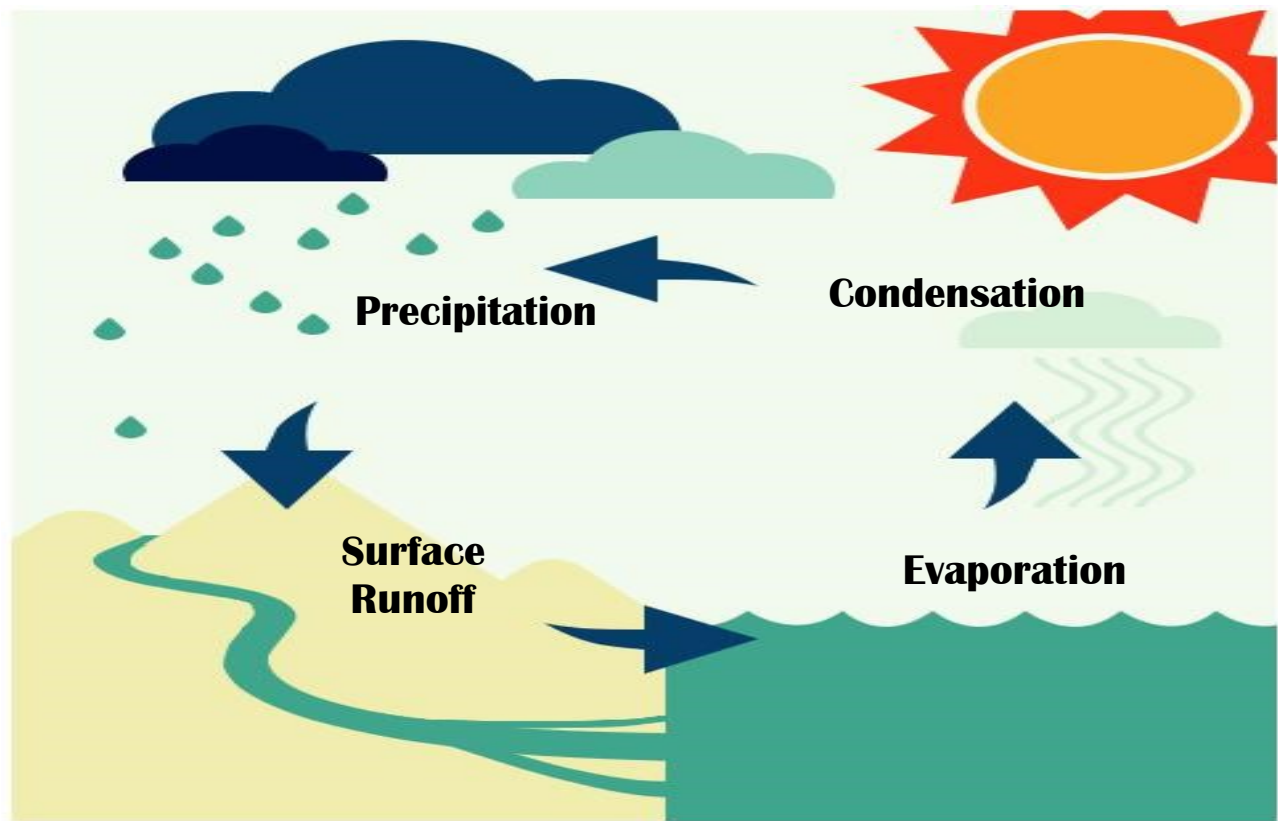
LEARNING OUTCOMES:

Things to be learnt in this module:

- 15. Where our water comes from – the water cycle.
- 16. Drinking water sources - where do we get our drinking water source
- 17. Water Usage – ways water is utilized in our lives and impacts if we do not manage or conserve our water resources.
- 18. Water Conservation – ways we can conserve water in daily activities.
- 19. Virtual water – how our food selection can reduce water consumption

3.1 WATER CYCLE

The water cycle is a natural process that collects, purifies and redistributes water; therefore recycling all of our planet's water powered using solar energy. Water moves around the earth in a process known as the water cycle. Water rises up into the atmosphere by evaporation and back down to the earth's surface as precipitation.



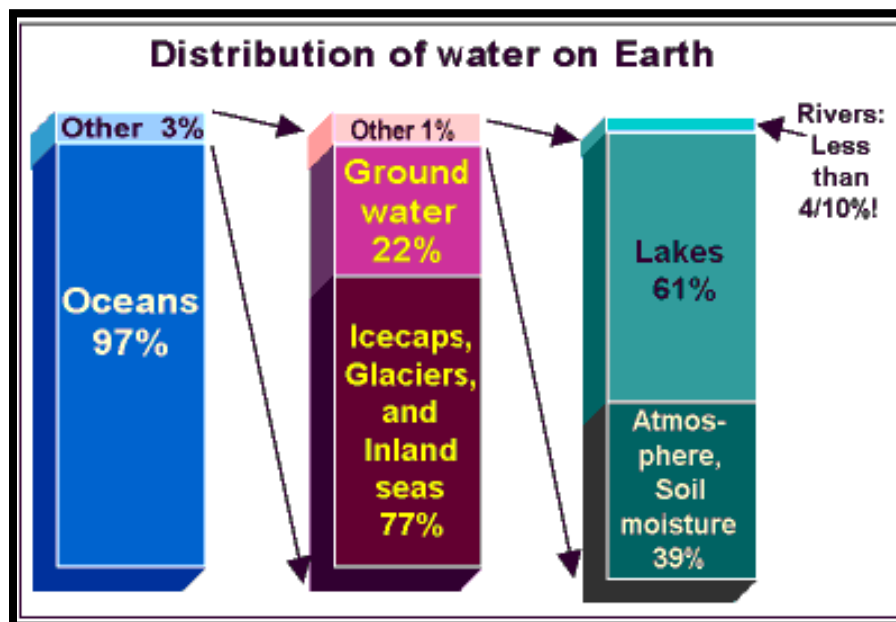
The Water Cycle

Activity Guide (3.1-3.3):

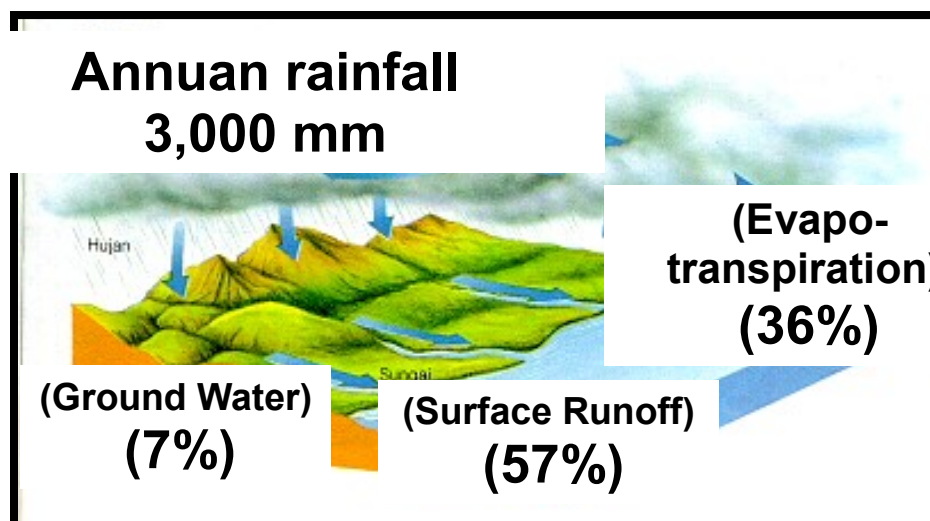
- d. Teachers will first introduce the water cycle concept. Example of questions that can raise their interest and curiosity include:
 - Where does our water come from?
 - If it comes from rain and ends in the ocean, why does the ocean level remain the same?
 - Where does the water go?
- e. After explaining the water cycle, they need to link each element of water cycle and explain the processes that change each form of water.
- f. In **Activity 3.1**, ask students to complete the steps in a water cycle.
- g. Communicate with the students whether they observed any one of the elements of water cycle in their daily life.
- h. In **Activity 3.2**, conduct a read-aloud or spelling session to get students familiarise with the water-related words.
- i. In **Activity 3.3**, fill the blanks with the words in **Activity 3.2**. After completion, explain the water cycle again based on the watershed model to further their understanding.
- j. Wrap up by explaining them that water formation is a cycle and any disturbances within the cycle will cause disruption to water cycle, thus disaster for humankind.

3.2 OUR WATER SOURCES

Each of us should know where our drinking water comes from. Our supply of drinking water is first treated before it reaches us and it will be interesting to know which treatment plant does the treatment of water that is directed to our houses. Besides that, the name and location of the river that provides us water need to be known too.



Distribution of water on Earth



Water Sources in Malaysia

Activity Guide (3.4):

- a. In **Activity 3.4**, teachers explain world water resources.
- b. Explain to the students on general percentage of water resources and availability.
- c. Explain on the major percentage of water resources and its accessibility for human drinking supply.
- d. Match the pictures to correct sections (the letters).

3.3 WATER USAGE

Imagine that every single person on our planet Earth is utilizing our water resources every day, despite only 3% of the Earth's water supply is available for use, most of them being freshwater sources including rivers and lakes.

Water Usage in Malaysia

A total of 97% of Malaysia's water sources come from rivers. As we learned in Module 2, there are 189 river basin systems with 2986 rivers in Malaysia which means we are blessed with abundant water resources. Despite this, our water consumption rate is very high.

As of 2015, our national water usage is **209 L/C/D** (litres per capita per day) compared to our neighbor country Singapore with 166 L/C/D. The UN recommended usage is only 100L/day.

There are two types of water usage:

- **Direct water usage:** where we turn on the tap and use the water for various purposes – bathing, drinking, washing, cooking etc.
- **Indirect water usage:** the invisible or “virtual” part of water usage we do not see directly – refers to the water used to produce goods/products and services that we use (detailed in **Sub-Topic 3.5 – Virtual Water**)

Activity Guide (3.5-3.7):

- a. In **Activity 3.5**, teachers explain about general household daily activities.
- b. Ask students their daily water activities and how they use it.
- c. Color the water activities and ask the students their respective frequency as well as duration of water activities daily (i.e. how many types they bath?/how long they bath)
- d. In **Activity 3.6**, ask the students the issue in the picture and ask what can be the best solution.
- e. Lead the students to terms like ‘saving’, ‘conservation’ and ‘efficient’.
- f. In **Activity 3.7**, ask the students to color the picture and discuss generally the meaning behind the picture.

g. Relate any current water issue and link to the global level.

3.4 WATER CONSERVATION

Water conservation is a big thing, but every little bit helps, so don't think that what you does not matter. We must all make changes in our lifestyles and daily activities that will change the course of our water resources and its quality. Water conservation needs to be a way of life, not just something we think about once in a while. Since we all enjoy the benefits of having pure and clean water, we must help conserve water so that we may continue to enjoy these benefits. If we all do our part in conserving water, we can make a huge difference for the environment. The initiative to conserve water can be done by an individual, a school or a household.

Activity Guide (3.8):

- f. In **Activity 3.8**, teachers to explain about water saving practices at homes and school.
- g. In each of the daily activity, circle or mark the way that conserves more water.
- h. Ask students to justify on their selections. Why is better (the way they've chosen)?
- i. Wrap up by asking them to record how many water saving practices they can be practiced in a week. Ask them to record and share in the class.

3.5 VIRTUAL WATER

The indirect water footprint of a consumer is generally much larger than the direct one. In simpler terms, our food selection also contributes to low or high level of water usage or abstraction. This is because food production also uses indirectly water in its process from the raw material till the end of process, which consumer received it. So, it is vital to know the indirect water involved in food production, 'virtual water' in other words for us to conserve major portion of water.

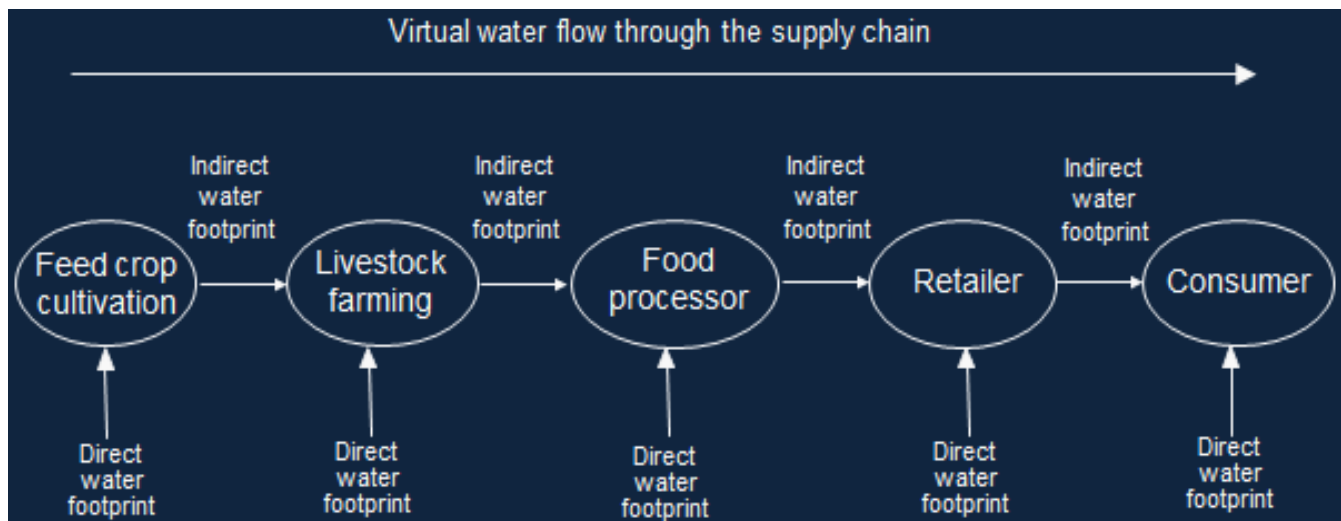


Chart of indirect water footprint or "virtual" water through a supply chain

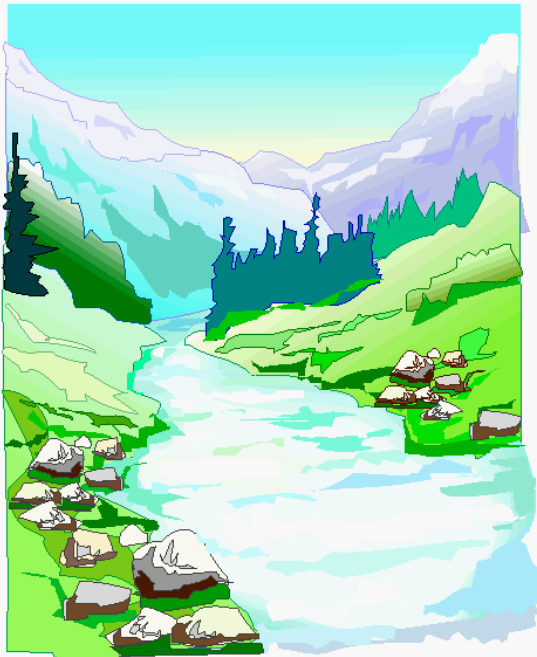
Activity Guide (3.9):

- a. Ask students about their daily diet. What do they eat for breakfast, lunch and dinner? Are there any additional meals? What are the contents?
- b. Now, look at **Activity 3.9** and ask the students to choose 5 items (number can be designated according to the teacher). After compiling their choices, check with the answer sheet and total up their water footprint. Who has the highest and who has the lowest?
- c. Discuss and explain to students on the hidden “virtual water” inside most of our products we use, not just food and drinks.

Topic 3.1 – Water Cycle

Activity 3.1: The Water Cycle

How is our water on earth redistributed? Find out by using arrows to complete the water cycle below!



Activity 3.2: Water Vocabulary

Read aloud and learn the water words below and fill in the blanks on the watershed model in the next activity!



W E T L A N D

C H A N N E L



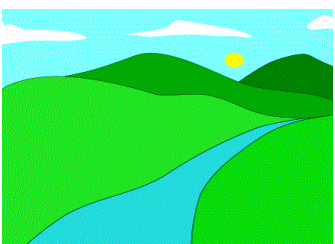
R A I N

T R I B U T A R Y



R I V E R B A N K

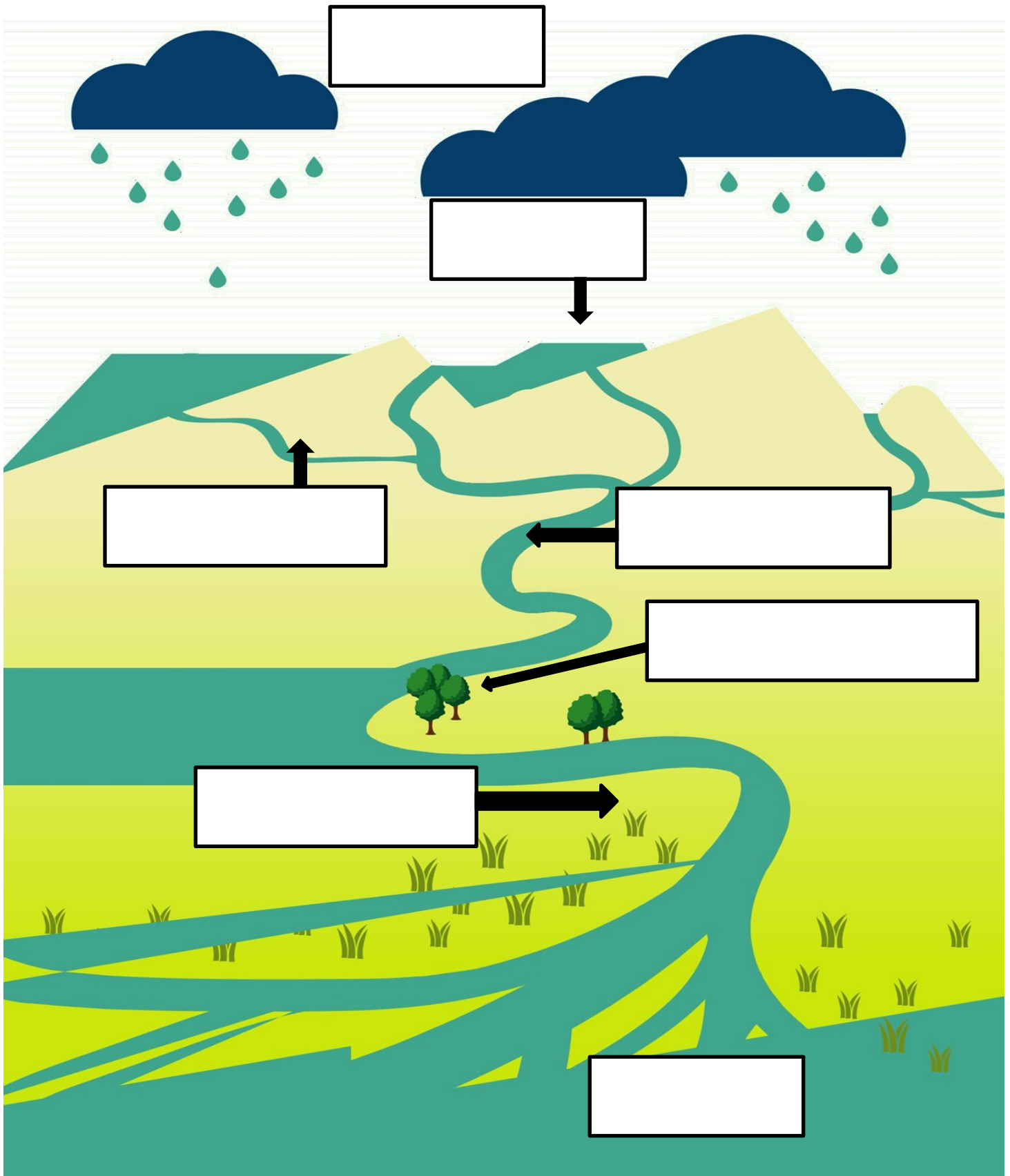
D E L T A



S O U R C E

Activity 3.3: Watershed Model

Using the completed words from the previous activity, fill in the blanks in the watershed model below!

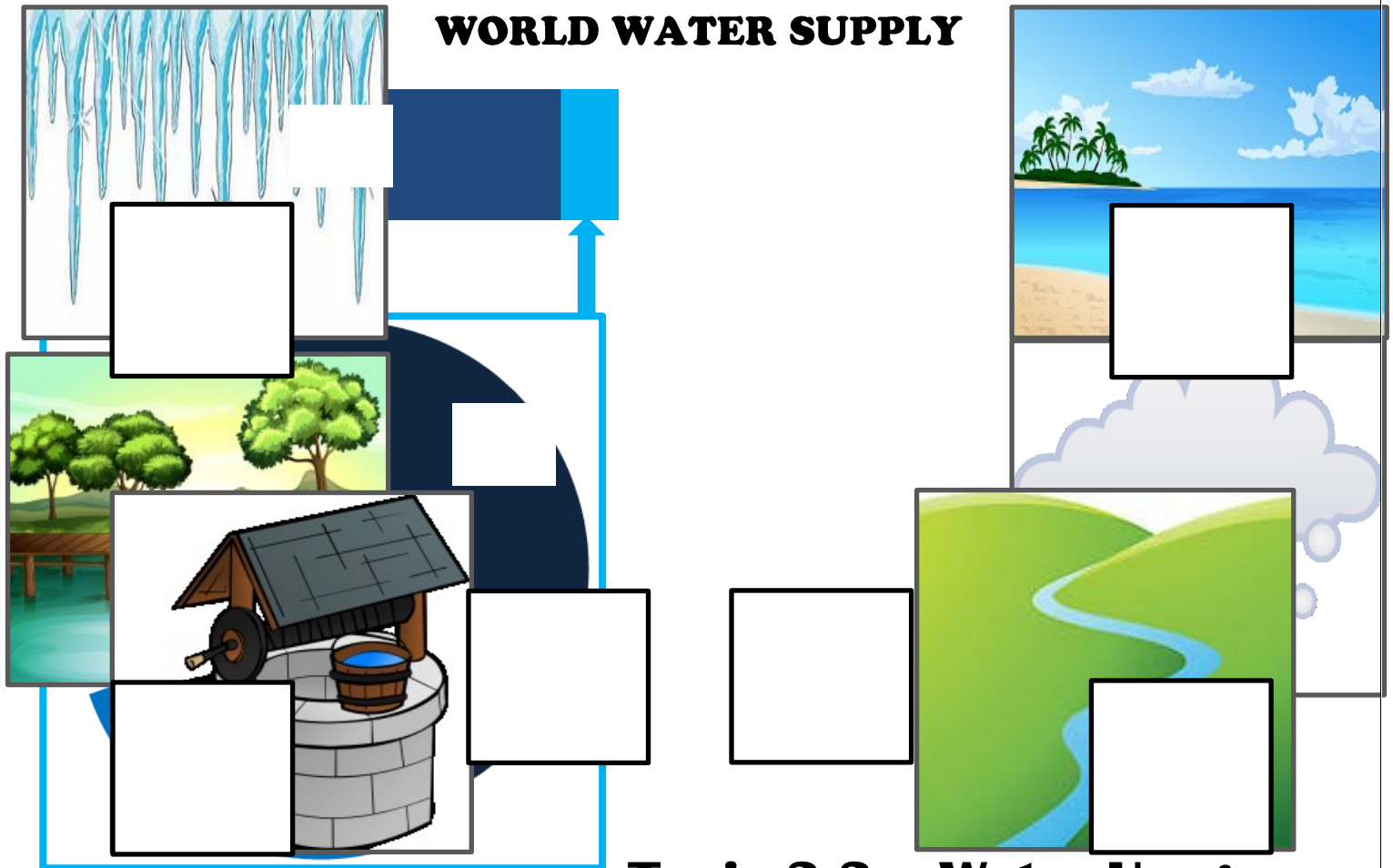


Topic 3.2 – Our Water Sources

Activity 3.4: World Water Resources

Our water resources come from different sources around planet Earth. Where do they come from? Match the pictures below and match them to the correct sections!

WORLD WATER SUPPLY



Topic 3.3 – Water Usage

Activity 3.5: Ways We Use Water

Colour the picture below and discuss the ways we use water at home, schools and more.



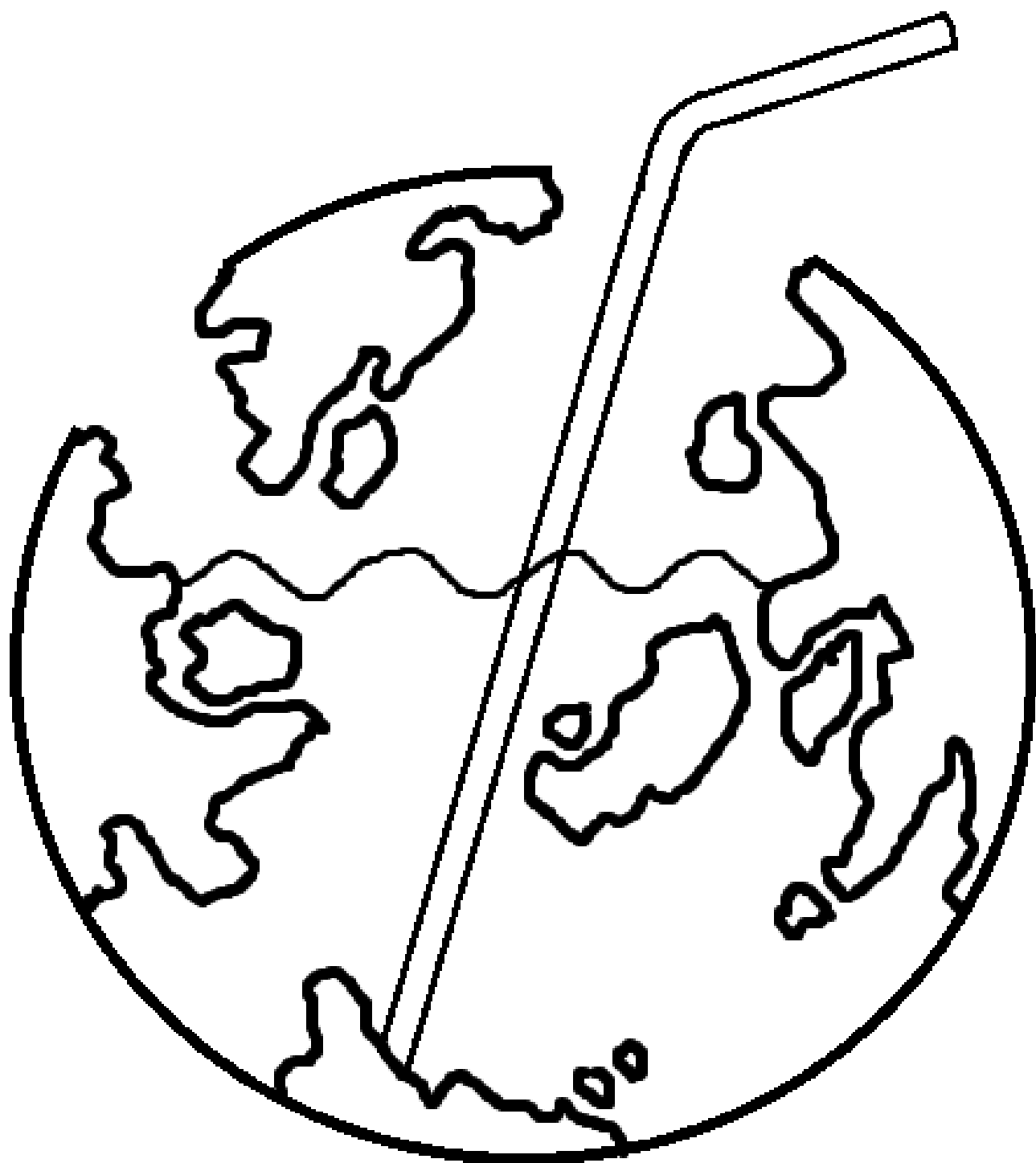
Activity 3.6: Water Wastage

Colour the picture below and discuss with your friends and teachers. What is the old man doing? What does it represent?



Activity 3.7: Our Limited Water Resource

Colour the picture below and discuss with your friends and teachers. What does it mean? What does it represent?



Topic 3.4 – Water Conservation

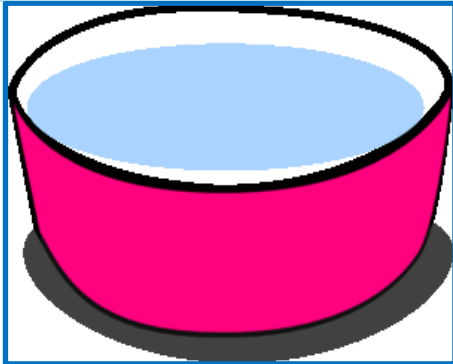
Activity 3.8: Water Saving

On each of the activities below, circle the one that saves more water.

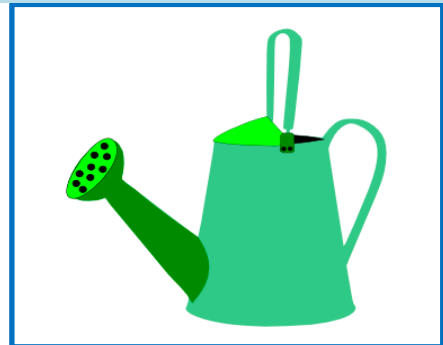
BATHING



WASHING PLATES



WATERING PLANTS

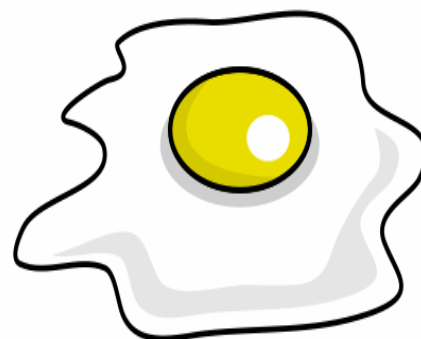
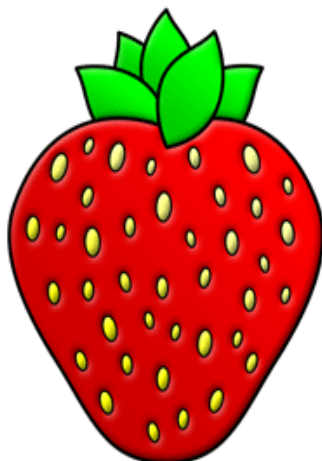
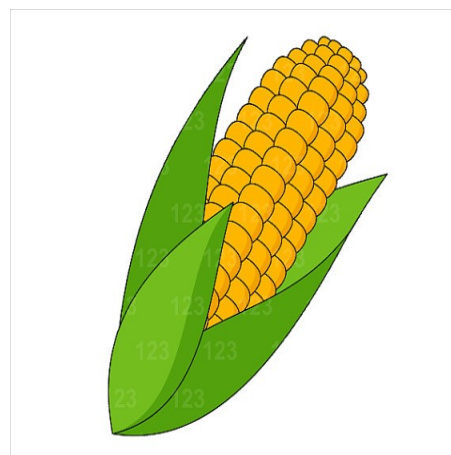
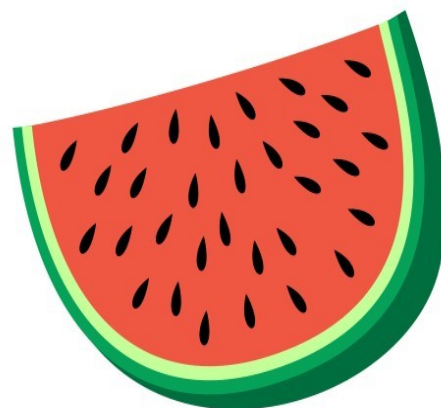
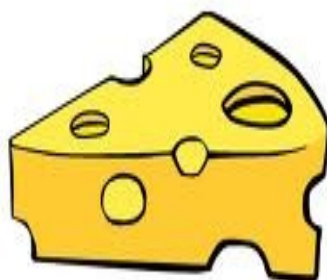
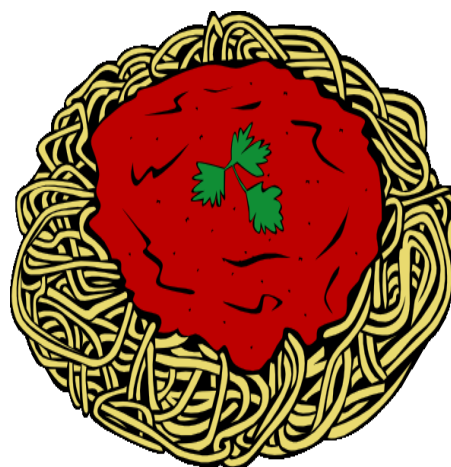
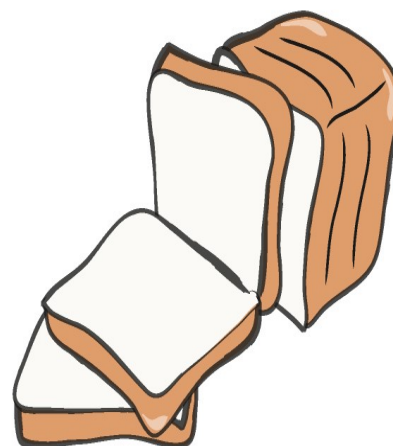
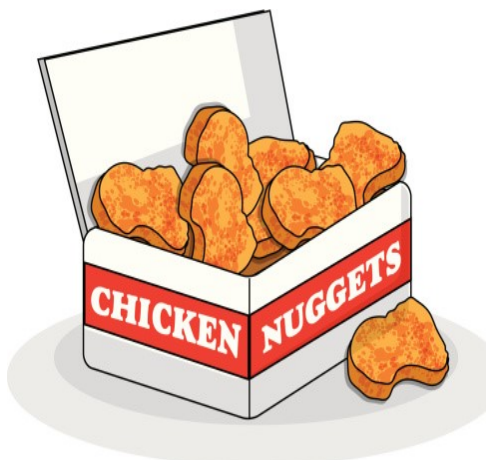
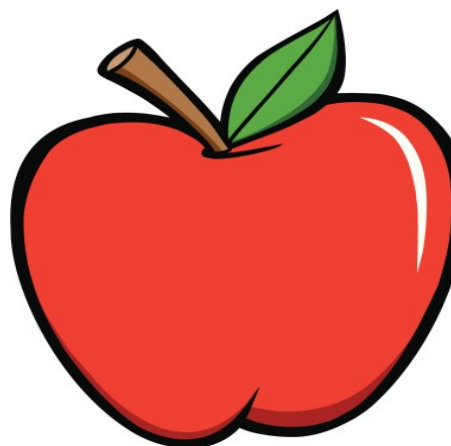


CLEANING THE FLOOR



Topic 3.5 – Virtual Water

Activity 3.9: Do you know how much water is hidden in your food? With your teacher's help, choose 5 items from the food menu below and pass it to your teacher. Let your teacher calculate and tell you how much water you have "eaten"!



Module 4

WASTE

MODULE 4: WASTE

INTRODUCTION:

Waste is defined as any substance which is discarded after primary use, or it is defective or of no more value. Solid waste is one of many major environmental problems in Malaysia and is significantly reducing our environment capacity to sustain life. It is produced either as a by-product of production processor or arises from the domestic or commercial sector when solid objects or materials are discarded.

Currently, over 36, 000 tonnes of waste produced annually in Malaysia. The amount of waste generated continues to increase due to the increasing population and development, and less than 5% of the waste is being recycled.

SUB-TOPICS:

4.1 TYPES OF WASTE

4.2 WASTE MANAGEMENT

4.3 4R2C – THE ZERO WASTE CONCEPT

4.4 ART OF RECYCLING

4.5 COMPOSTING

4.6 NATURE CRAFT

LEARNING OUTCOMES:

Things to be learnt in this module:

20. The different types of waste we produce and its sources.
21. The problems and issues with waste management in Malaysia.
22. The impacts of inefficient waste management and its impacts on our environment.
23. Practicing 4R2C – the Zero Waste concept.
24. Recycling bins in Malaysia and their colours and which type of waste they are meant for.
25. Art of recycling – waste segregation according to bin colours.
26. Composting and its basic components.
27. Nature craft – producing art and crafts by reusing or using recycled items.

4.1 TYPES OF WASTE

Waste is generated continuously in every single way from our daily activities and each activity generates different types of waste which requires its own or specialized treatment. The types of waste commonly generated in Malaysia are as follows:

i. Municipal Solid Waste (MSW)

- Domestic/household waste
 - Generated from residential homes/buildings for living purposes
 - Organic fractions – paper, plastic, textile, garden waste etc.
 - Inorganic fractions – glass, tin, can, aluminium, dirt etc.
 - Others – bulky waste e.g. television, fridge, furniture etc.; household hazardous waste e.g. batteries, bulbs etc.
- Commercial waste
 - Generated from premises of trade/business/ recreation/entertainment purposes
 - Types of waste similar to domestic waste but composition depends on the source
- Community waste
 - Generated from public places and local authority activities i.e. operation and maintenance of municipal facilities
 - Types of waste include rubbish, special waste e.g. dead animals, bulky waste, debris from street sweeping, landscaping, green waste etc.
- Construction/renovation waste
 - Generated from construction/demolition site
 - Variable composition including dirt, stones, concrete, bricks, steel etc.
- Institutional waste
 - Generated from government centres, schools, hospitals and places of worship
 - Similar to domestic waste depending on nature of location

ii. Hazardous Waste

- Represent potential danger, immediate or not, to human life, wildlife and plants
- Main categories include inflammable, corrosive, reactive and toxic waste

iii. Industrial Waste

- Generated from industrial premises through industrial processes
- Variable degrees of composition and includes solids, liquids, gases and sludge

Sources of the types of waste we produce can be everywhere and vary widely:

Type of waste	Source/example
Domestic/municipal	Homes/offices – paper, plastics, organic, hazardous
Industry/manufacturing	“Non-value” waste materials from processes
Agriculture	Vegetation from clearing land, pesticides, fertilizers
Construction	Unwanted construction materials – debris, concrete, metal, tiles
Hospital/medical	Medical wastes, used needles, outdated drugs
Hazardous	Inflammable, corrosive, reactive and toxic characteristics

Activity Guide (4.1 – 4.2):

- a. Identification of things used daily and waste grouping.
- b. In **Activity 4.1.**, circle the items and identify the waste. Then, list the types of waste (solid or liquid).
- c. In **Activity 4.2.**, match the pair of waste according to their respective types.

4.2 WASTE MANAGEMENT

Despite the massive amount and complexity of waste produced, the standards of waste management in Malaysia are still poor. These include outdated and poor documentation of waste generation rates and its composition, inefficient storage and collection systems, disposal of municipal wastes with toxic and hazardous waste, indiscriminate disposal or dumping of wastes and inefficient utilization of disposal site space. Improper solid waste management (SWM) also contributes to climate change – decomposing waste produces methane and production of new products to meet demand emits greenhouse gases and utilizes natural resources.

The **problems and issues** associated with waste and management problems in Malaysia include:

- Increasing amounts and component of waste generated
- Limited community initiative and participation
- Reducing capacities of disposal sites
- Inadequate and insufficient regulation, guideline and planning as well as enforcement to control and manage waste

And what are the **impacts** of inefficient waste management?

Impacts	Description/Example
Climate Change	<ul style="list-style-type: none">• Emissions of greenhouse gases (methane; carbon dioxide)• Landfills, incineration
Water Quality	<ul style="list-style-type: none">• Release of leachate from landfills into water source• Water-borne diseases, habitat loss and water pollution
Energy Consumption	<ul style="list-style-type: none">• Production of raw materials uses more energy• Produces more greenhouse gases and uses more electricity• Increasing demand of raw materials
Carbon Footprint	<ul style="list-style-type: none">• Daily lifestyle and actions in terms of carbon dioxide emissions• Direct and indirect impacts (diet, clothes, resources etc.)• Biggest contributors – transport and electricity
Human Health	<ul style="list-style-type: none">• Potential birth defects, cancer and various diseases
Others	<ul style="list-style-type: none">• Aesthetic value, eyesore in environment

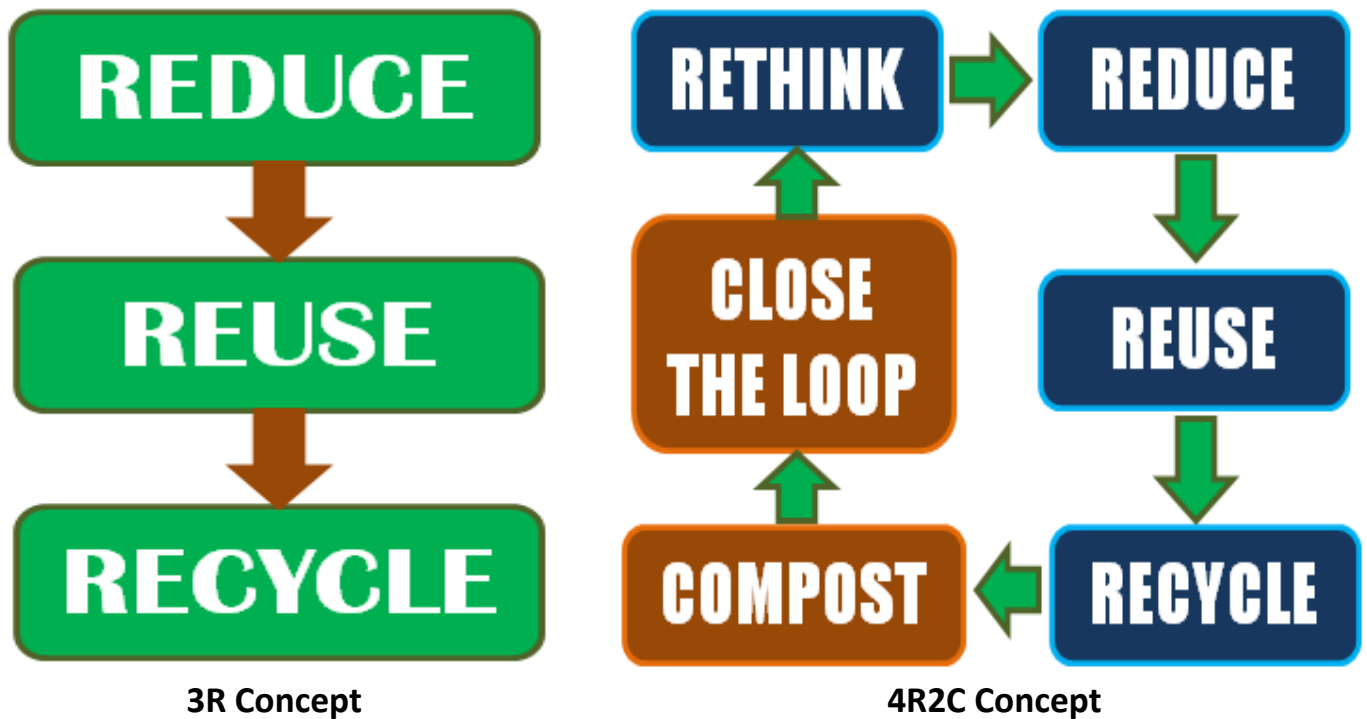
Activity Guide (4.3 – 4.4):

- In **Activity 4.3**, teachers first will ask students where they normally throw their waste. After that, ask further questions such as:
 - Do they dispose it in the bin? Or anywhere else (river?)
 - Have they ever littered on the ground?
 - Where does all the waste we throw end up?
- After the session, ask students to link the pictures by using arrows.
- In **Activity 4.4**, ask students to identify the waste and complete the maze.

4.3 4R2C – THE ZERO WASTE CONCEPT

The **3R** concept is a globally recognized concept which refers to reduce, reduce and recycle, applying to various areas of production and consumption in particular.

The **4R2C** concept has been designed and conceptualized by GEC which is specifically tailored to suit a zero waste system. **4R** comprises of the steps that make you an environmentally wise consumer (**Rethink**) via waste prevention and minimization (**Reduce**), reusing waste (**Reuse**) and maximizing recycling of unwanted items (**Recycle**). The 2Cs ensures the waste is recycled back to nature (**Compost**) and placed back to its marketplace (**Closing the Loop**).



The key function of this particular zero waste system is to **prevent and minimize the amount of waste generated**. If there is, or still waste that needs to be generated, the next step is to **recycle for inorganic waste** and **composting for organic waste**. Closing the loop is the final step by supporting new products made from recyclables.

Activity Guide (4.5 – 4.6):

- j. In **Activity 4.5**, teachers will ask students to colour the recycling logo, then ask further questions such as:
- What does the logo mean?
 - What do the arrows mean?
 - What colour suits the recycling logo best and why?
- k. In **Activity 4.6**, explain to students on 4R2C concept and expose the six words with them. Ask them to find the words, thus complete the cycle by right arrows in the diagram.

4.4 THE ART OF RECYCLING

Many may know about recycling, but many may not know “the art of recycling” - the right way to handle recyclable materials before being sent to collection centers. The art of recycling is in fact a convenient way to handle recyclables particularly in terms of storage and cleanliness. In Malaysia, there are three main types of recycle bins and each colour represents different wastes that can be recycled.

Activity Guide (4.7 – 4.8):

- a. In **Activity 4.7**, teachers will first introduce students on the recycling bins in Malaysia:
 - Blue (paper)
 - Brown (Glass)
 - Orange (Tin/Aluminium/Plastic)
- b. Ask students to name the colours of the bins and match them accordingly to the labels.
- c. In **Activity 4.8**, challenge the students to sort the waste accordingly based on the pictures.

4.5 COMPOSTING

Composting is nature's way of recycling organic matter. It is a process whereby; biodegradable organic matter is broken down by microorganisms in the presence of oxygen. The product of this process is compost, which benefits the environment as a natural fertilizer for gardening and farming. By recycling the organic material, valuable nutrients and organic matter are recycled, hence, alleviating the solid waste problem.

Four key ingredients of composting are brown material, green material, air and water. Green and brown materials are biodegradable organic matter that forms the main ingredient for composting. Green materials are rich in nitrogen and brown materials are rich in carbon. It is important to have a 50:50 ratio by weight of green and brown in a compost pile. Air and water is important for aeration and provide moisture for decomposer organisms. Complete and perfect compost should be friable, cool, dark in colour and exude an earthy smell.

4.6 NATURE CRAFT

Whether some unwanted items is recyclable or non-recyclable, nature crafts is the art of producing art and crafts using unwanted items by implementing environmental concepts as well as one's own innovation and creativity.

Examples of nature crafts:



Light bulb



Keychains from paper



CD paper/letter holder



Candle from used cooking oil



Decorative glass bottles



Soap from used cooking oil

Activity Guide (4.10):

- Discuss with students on the things that can be reused at home or even in class (referring back to 4R2C concept).
- Ask students to bring or collect simple (and safe to handle) unwanted items such as paper and magazines.
- Using examples in **Activity 4.10**, let students produce nature crafts (e.g. pencils, keychains) from their own creativity.

Topic 4.1: Types of Waste

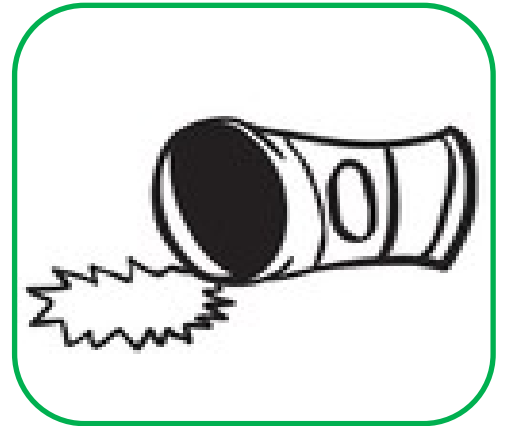
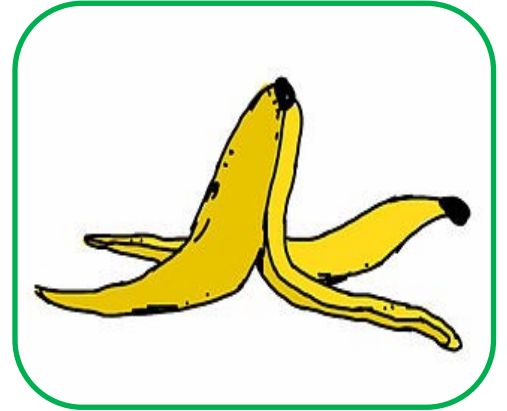
Activity 4.1: Look at the picture below and circle the items you can find. Try to list the types of waste you can find in the picture!



RECYCLE RIGHT

www.zerowaste.sa.gov.au

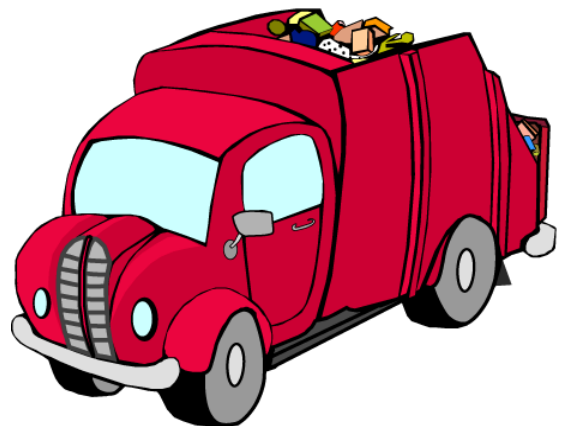
Activity 4.2: Match the pictures below according to their type of waste!



Topic 4.2: Waste Management

Activity 4.3: The Journey of Waste

How is your waste collected and disposed? Where do they go? Use arrows and arrange the pictures in order!



Activity 4.4: Recycling Maze

Help Johnny to manage all the waste thrown in the park! Circle the waste as you walk along the maze and help Johnny to get all the waste to the bin!



Image ©ColoringSky

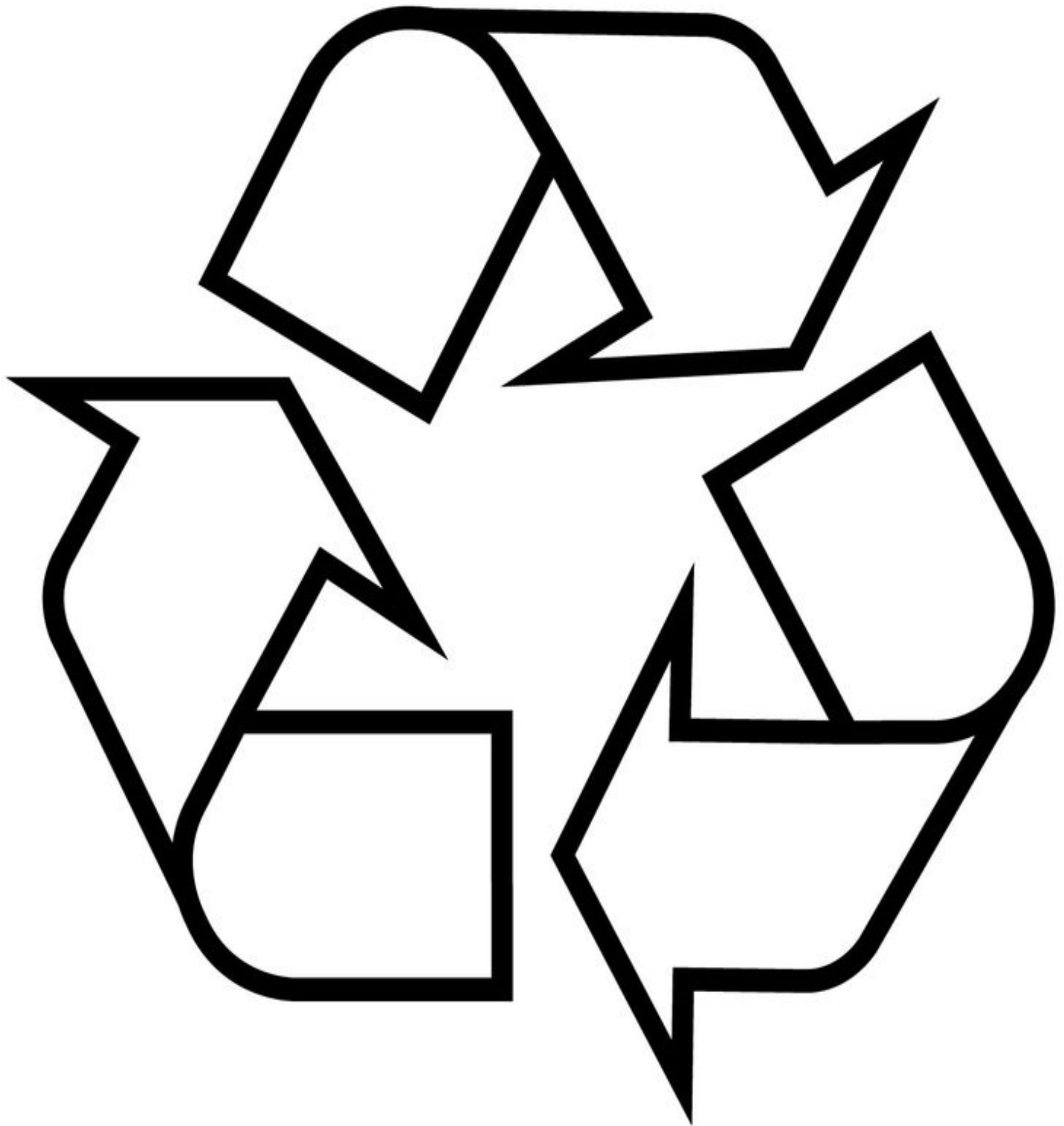
Discuss with your friends and teachers:

- Is it right to throw rubbish everywhere? Even when there's no bin?
- What should you do to correctly manage your waste at home and school?

Topic 4.3: 4R2C – The Zero Waste Concept

Activity 4.5: Let's Colour!

Colour the logo below and discuss with your teacher and friends. What does it mean? What does it represent? What is the BEST colour that fits the logo?



Activity 4.6: Find the 4R2C syllables and use arrows to complete the 4R2C cycle below!

Z	J	D	K	Q	V	Z	P	Y	U	W	C	O
E	A	L	R	C	M	P	X	B	O	T	O	A
G	K	C	I	E	L	B	T	A	M	F	M	S
C	L	O	S	E	T	H	E	L	O	O	P	Q
W	H	B	I	R	J	H	D	W	M	V	O	E
H	R	S	C	O	N	Q	I	P	N	Y	S	N
R	E	C	Y	C	L	E	C	N	Y	G	T	R
Y	U	X	T	D	I	K	R	H	K	E	X	L
F	S	E	R	E	D	U	C	E	S	M	R	O
G	E	V	F	U	J	Z	T	L	D	S	U	P



RETHINK



REDUCE

**CLOSE
THE LOOP**



REUSE

COMPOST

RECYCLE



Topic 4.4: Art of Recycling

Activity 4.7: Know Your Bin Colours!

Do you know the three (3) types of recycling bins in Malaysia? Name the colours below and match them to the relevant waste!



My colour is _____

PAPER



My colour is _____

GLASS

PLASTIC

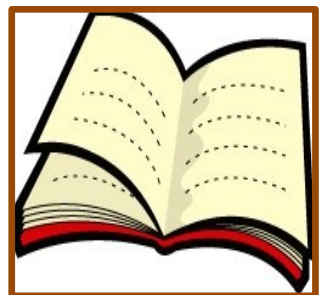
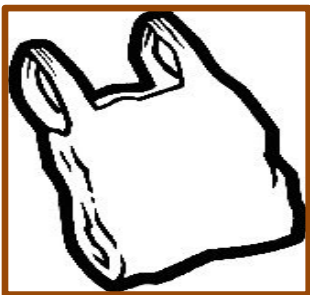
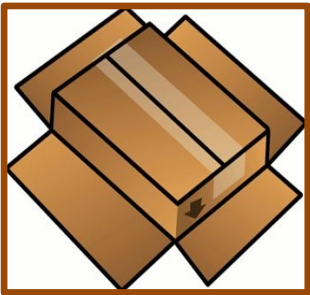


My colour is _____

TIN

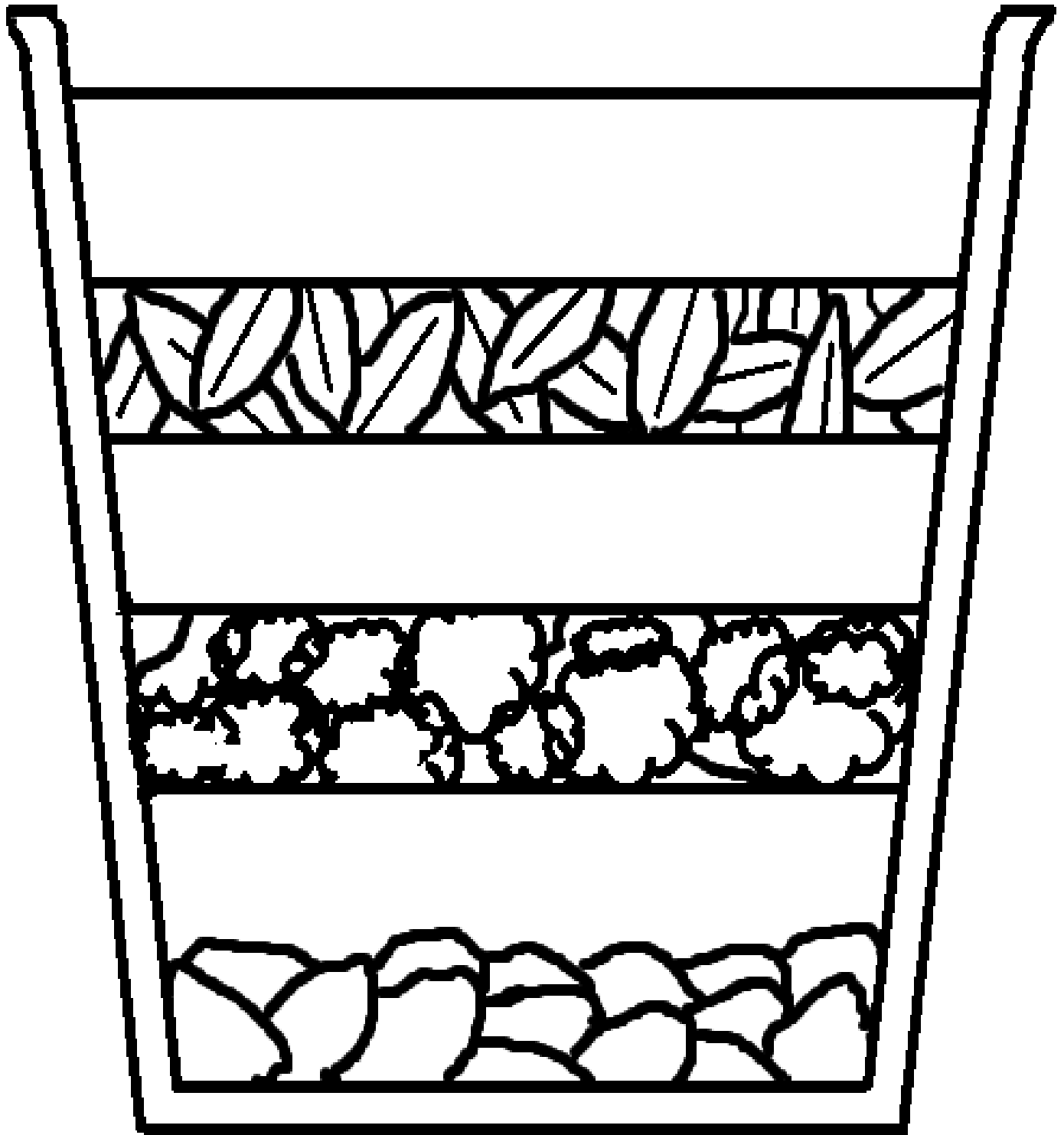
ALUMINIUM

Activity 4.8: Now that you've learned the colours and waste, let's match to correct bins!!



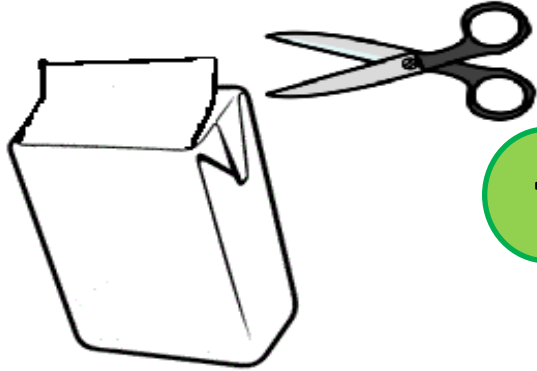
Topic 4.5: Composting

Activity 4.9: Colour the compost bin below and discuss. What are the different layers and what do they represent?



Topic 4.6 Nature Craft

Activity 4.10: Let's do some creative art from recycled items!

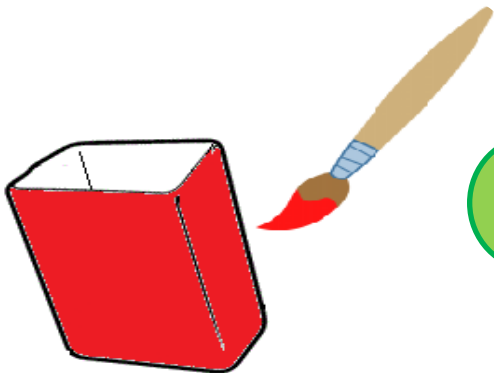
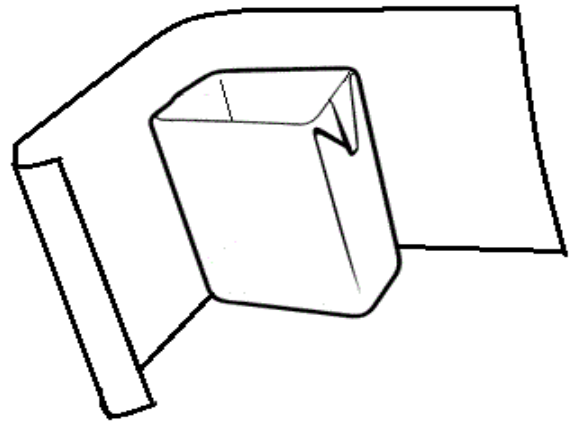


1

For example, use a tetrapak package after drinking, wash and cut the top.

Wrap the package with used paper (newspaper/magazines).

2



3

Colour the package with your own favourite colour!

Decorate the package with your own ideas and creativity. It's then ready for use! You can store stationery and other small items!

4



DISCUSS:

What other items can you reuse and create nature art and craft? Let's explore your inner creativity!

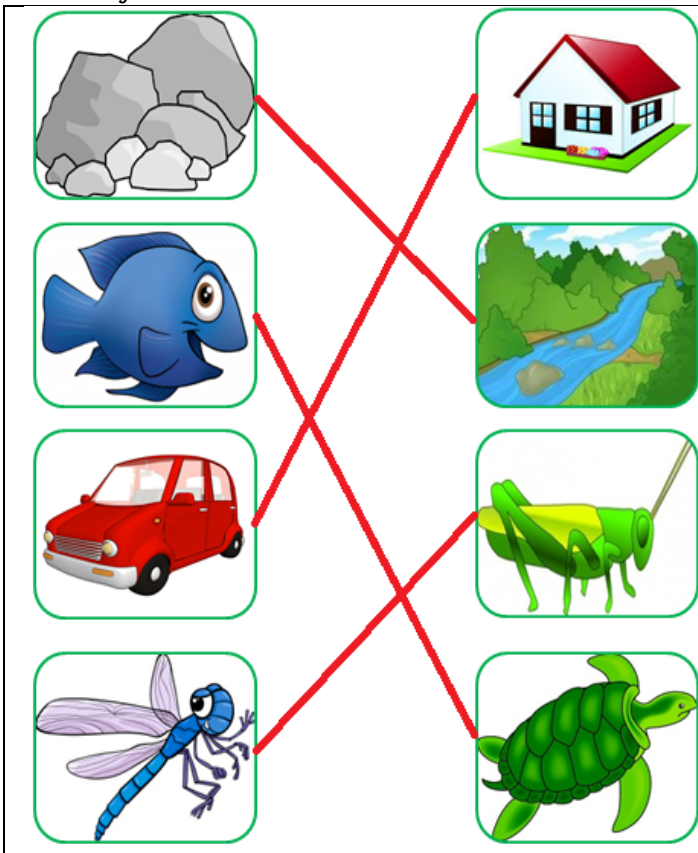
Congratulations!

You have completed the Environmental Activity Book.

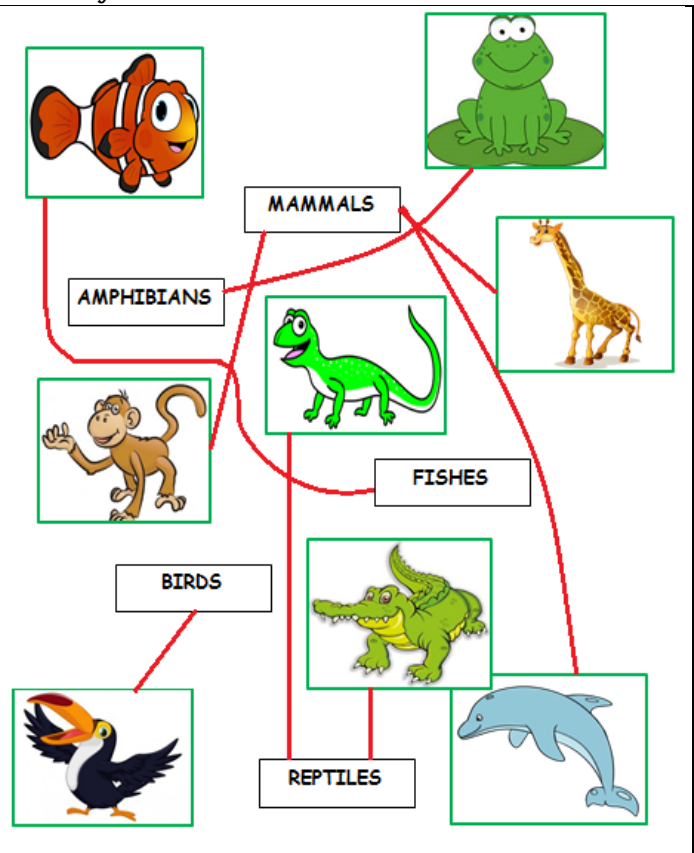
We hope this book is a profound experience in fundamental knowledge of our environment and resources and we hope you can continue to contribute towards protection and management of our environment!

Answer Sheet – Module 1: Our Environment

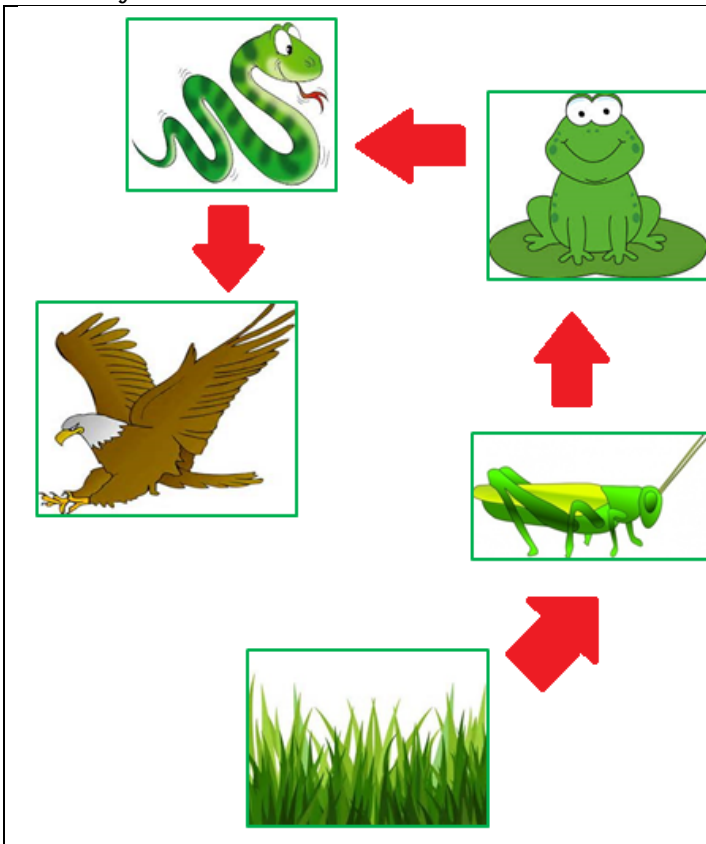
Activity 1.2



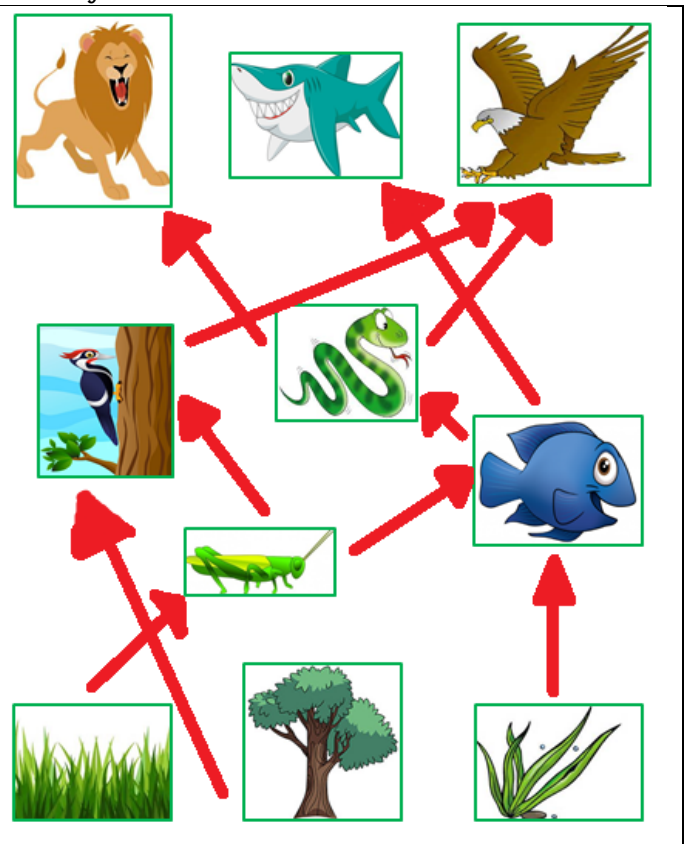
Activity 1.3



Activity 1.5



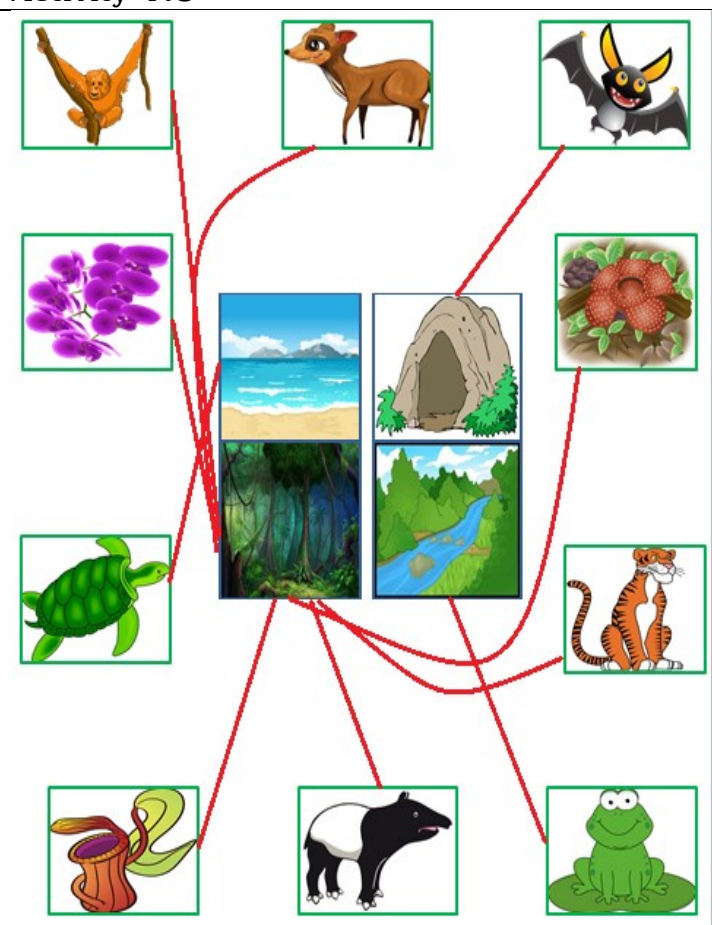
Activity 1.6



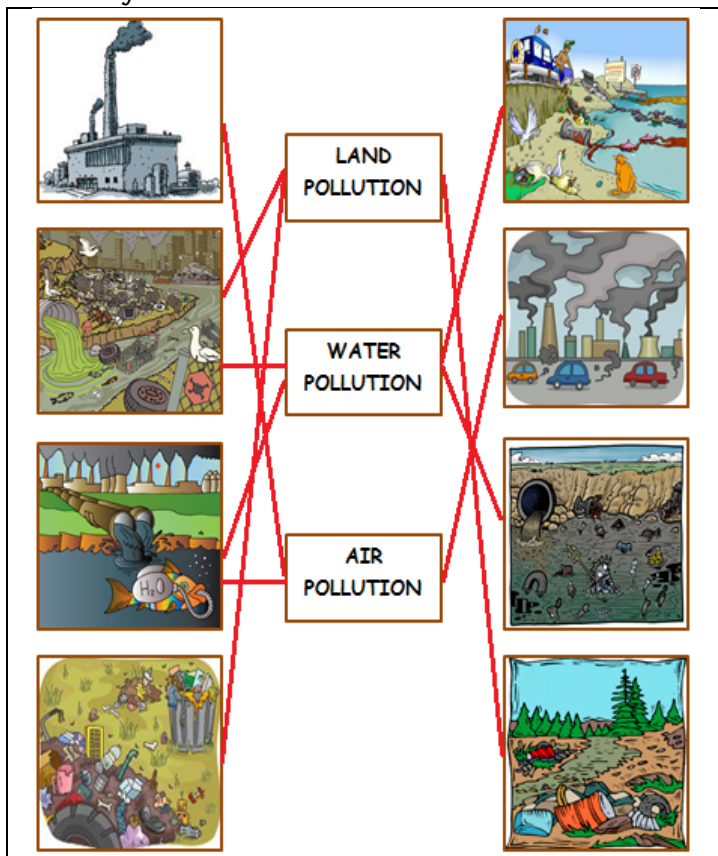
Activity 1.7



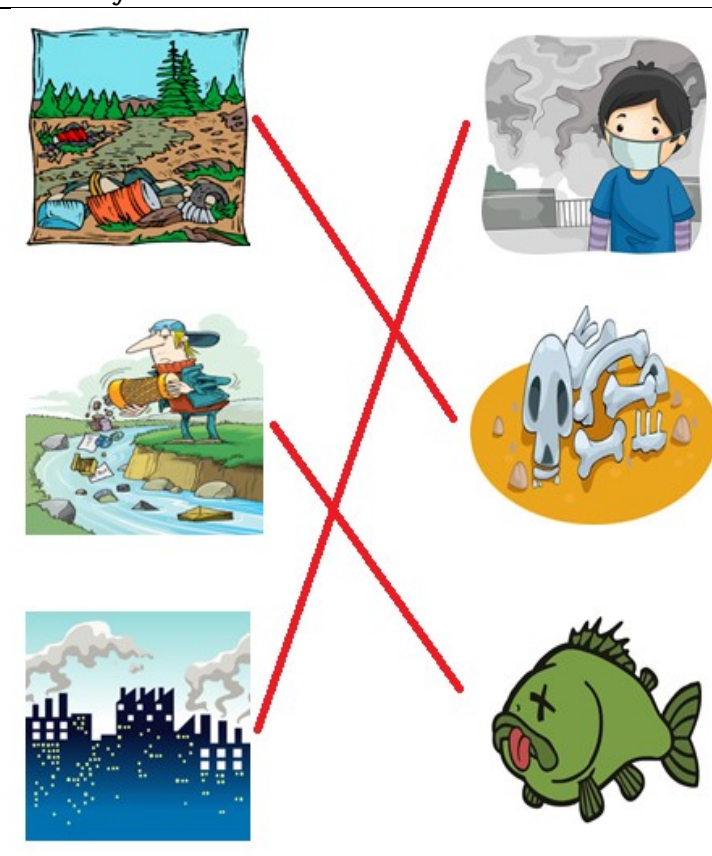
Activity 1.8



Activity 1.9

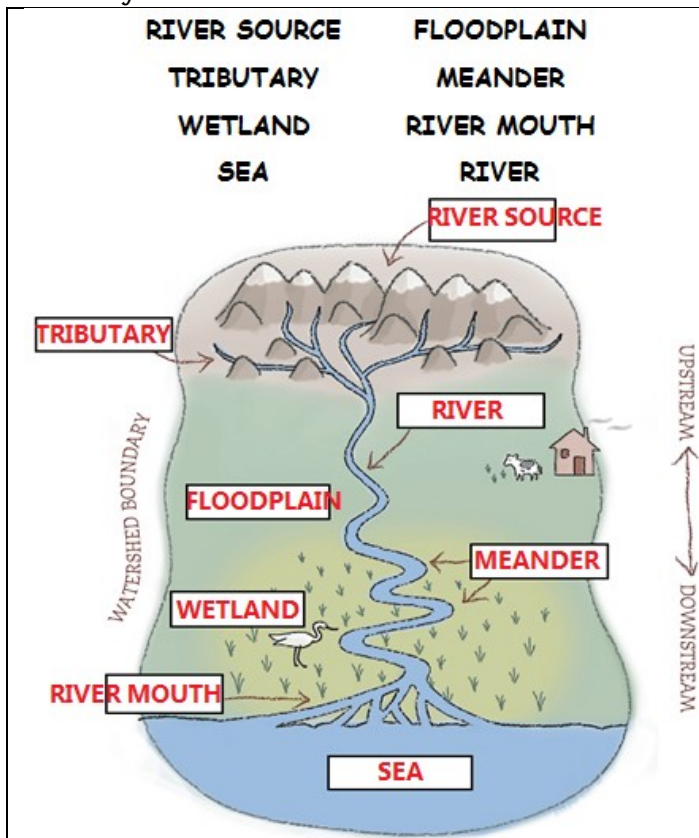


Activity 1.10



Answer Sheet – Module 2: River

Activity 2.1

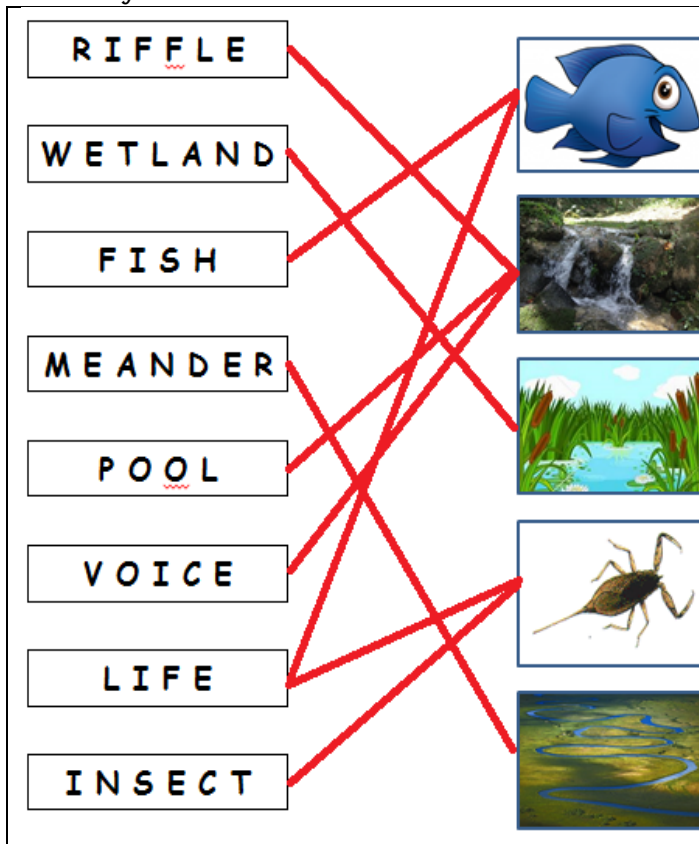


Activity 2.2



SOURCE	RIVER	POND
TRIBUTARY	CHANNEL	WETLAND
BANK	RIFFLE	MEANDER
BED	POOL	MOUTH
STREAM	LAKE	SEA

Activity 2.3



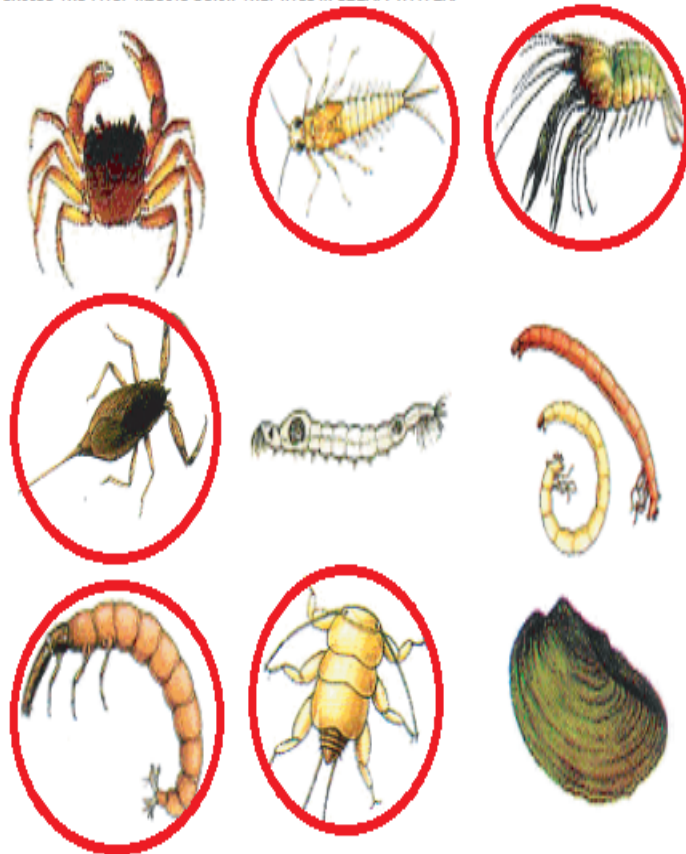
Activity 2.4



Activity 2.6

ACTIVITY 2.6; BIOLOGICAL MONITORING I

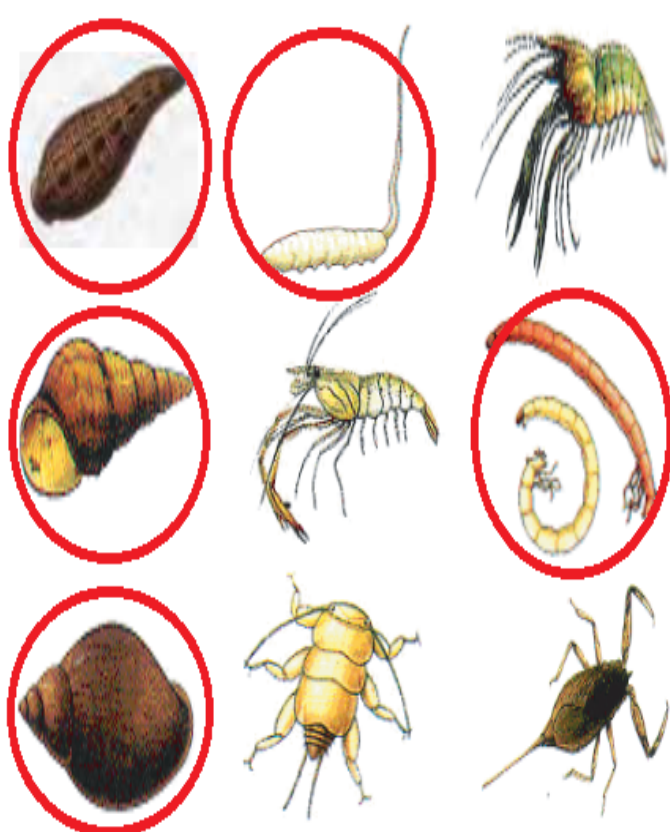
Choose the river insects below that lives in CLEAN WATER!



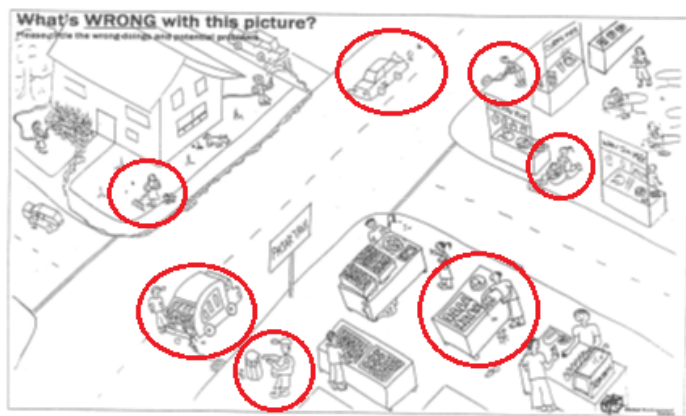
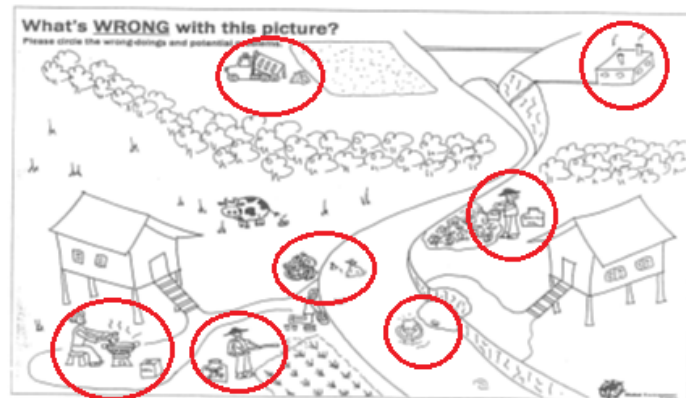
Activity 2.7

ACTIVITY 2.7: BIOLOGICAL MONITORING II

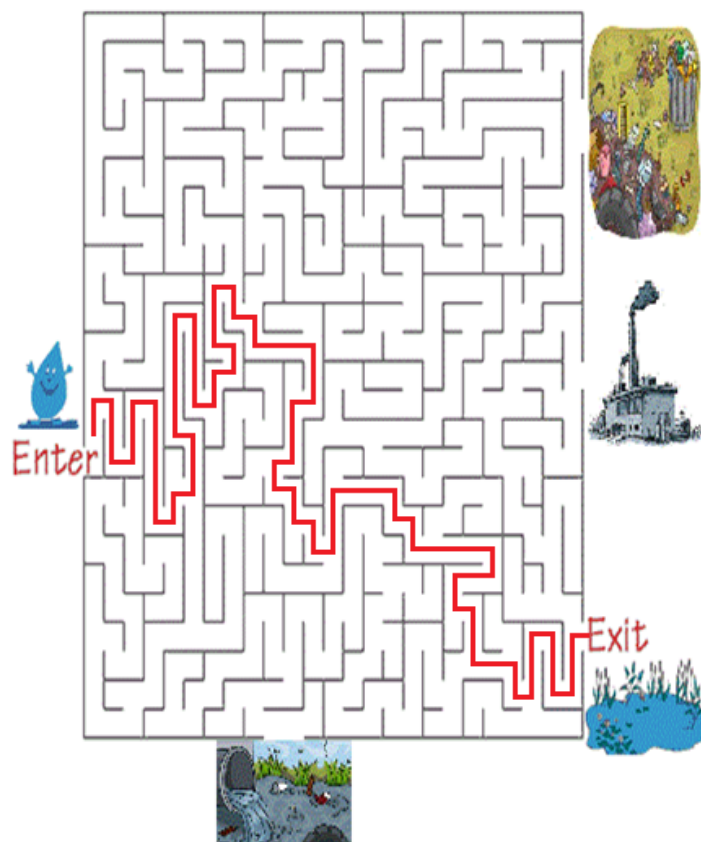
Choose the river insects below that lives in DIRTY WATER!



Activity 2.9

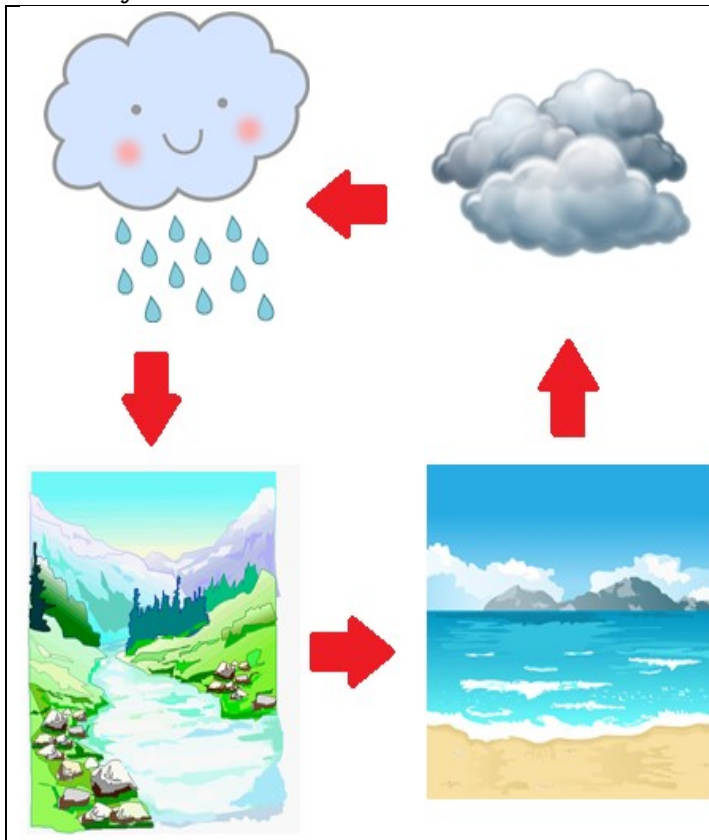


Activity 2.10

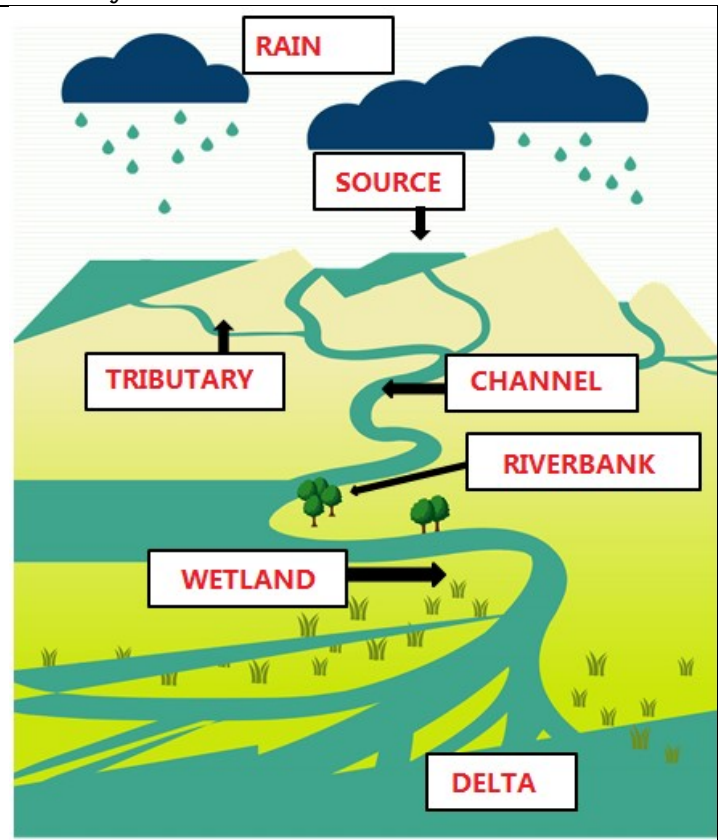


Answer Sheet – Module 3: Water

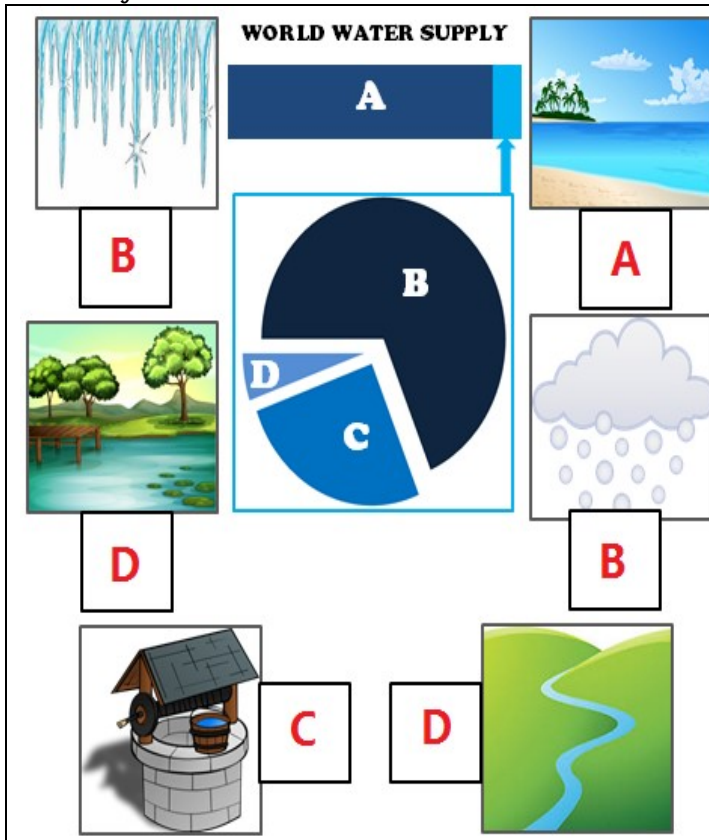
Activity 3.1



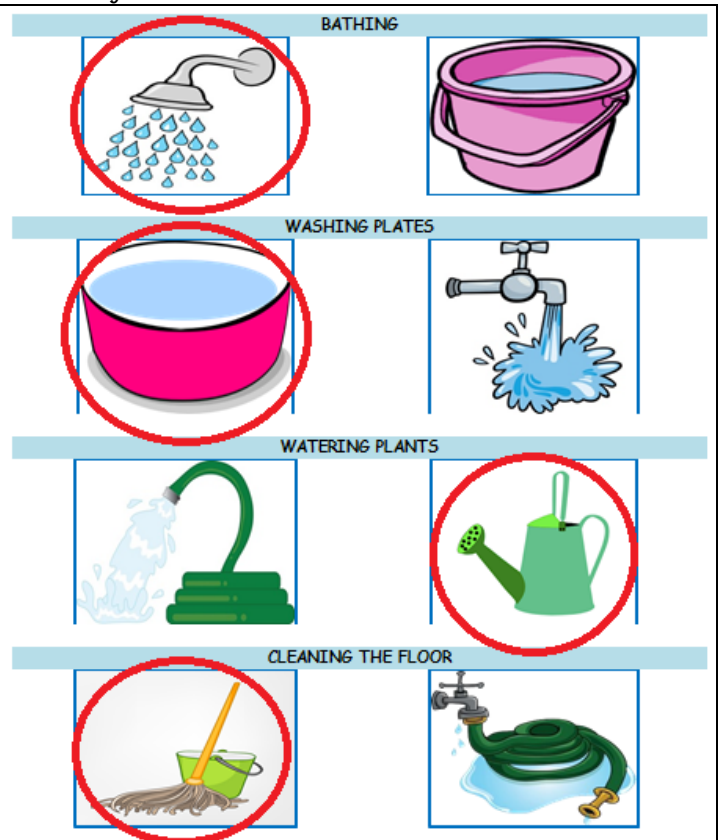
Activity 3.3



Activity 3.4



Activity 3.8



Activity 3.9

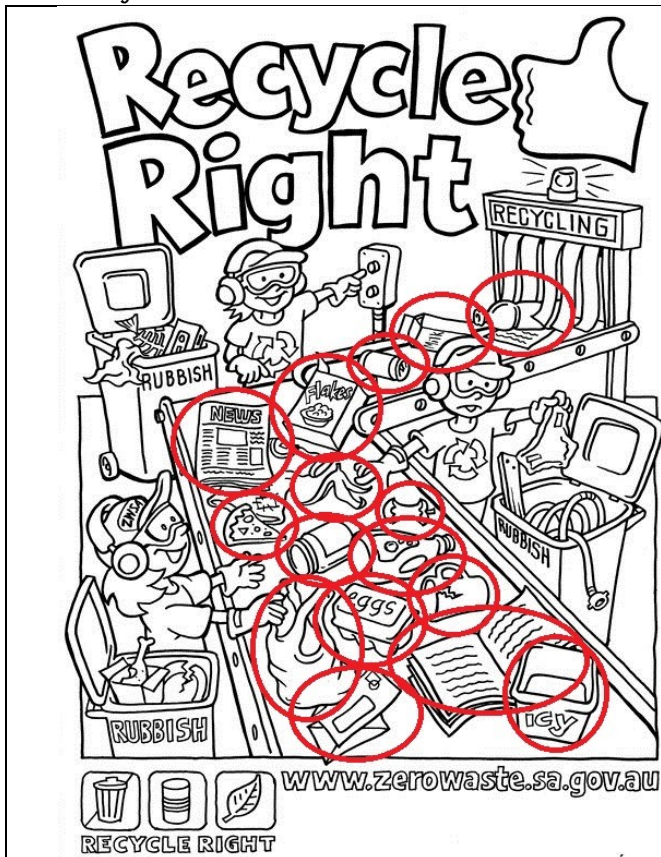


Based on the values below, calculate the water footprint for the student's selection and find out who has the highest and lowest water footprint.

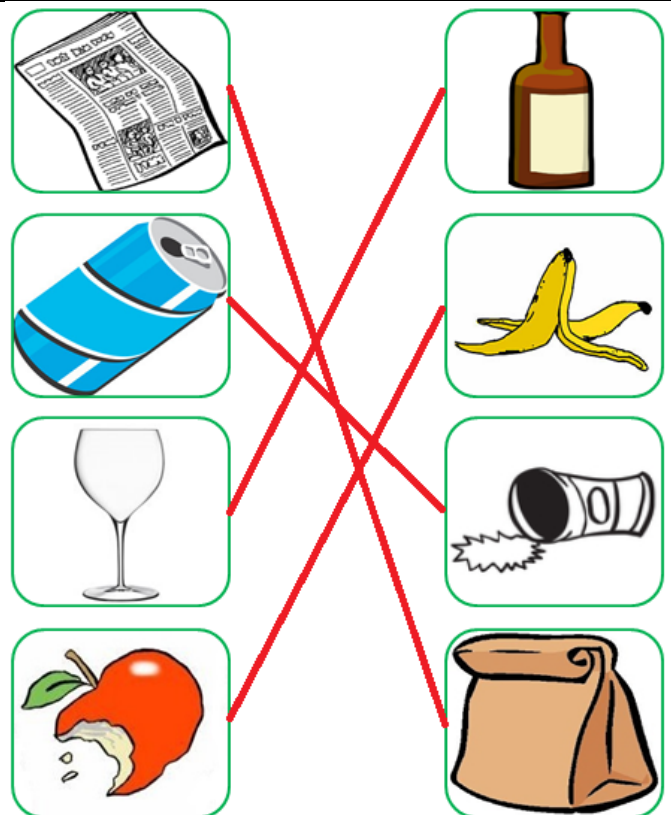
Selection	Water footprint (L/kg)
Apple	821
Chicken nuggets	3364
Bread	1608
Pasta	2036
Cheese	5060
Watermelon	260
Sweet Corn	700
Strawberry	347
Half-boiled egg	3276

Answer Sheet – Module 4: Waste

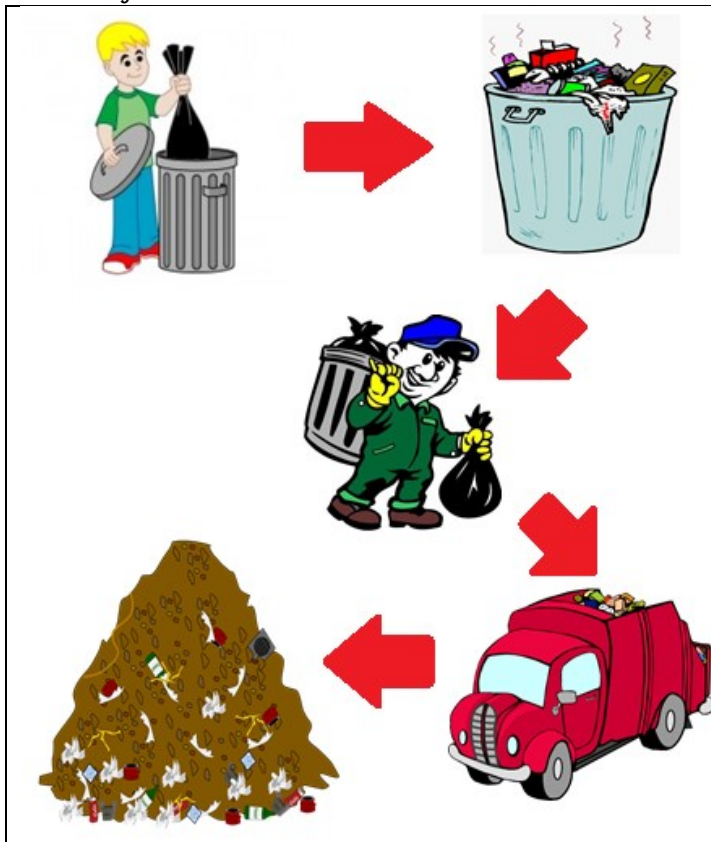
Activity 4.1



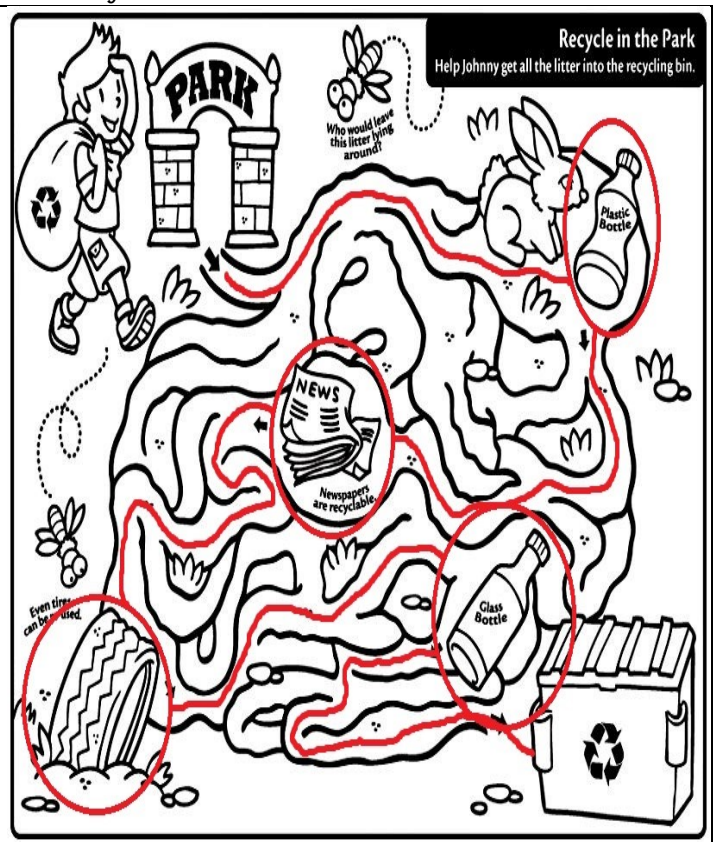
Activity 4.2



Activity 4.3

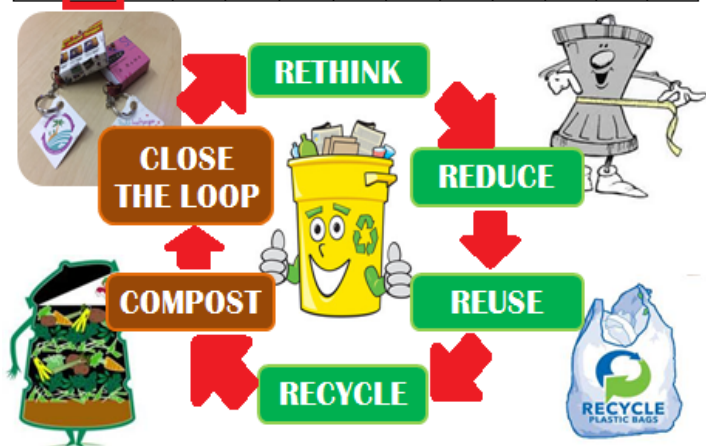


Activity 4.4



Activity 4.6

Z	J	D	K	Q	V	Z	P	Y	U	W	C	O
E	A	L	R	C	M	P	X	B	O	T	O	A
G	K	C	I	E	L	B	T	A	M	F	M	S
C	L	O	S	E	T	H	E	L	O	O	P	Q
W	H	B	I	R	J	H	D	W	M	V	O	E
H	R	S	C	O	N	Q	I	P	N	Y	S	N
R	E	C	Y	C	L	E	C	N	Y	G	T	R
Y	U	X	T	D	I	K	R	H	K	E	X	L
F	S	E	R	E	D	U	C	E	S	M	R	O
G	E	V	F	U	J	Z	T	L	D	S	U	P



Activity 4.7



My colour is BLUE

PAPER



My colour is CHOCOLATE

GLASS

PLASTIC



My colour is ORANGE

TIN

ALUMINIUM

Activity 4.8

