ASPIRE
INTERNATIONAL SCHOOL

Science Department

2023/2024

Year 8

Term 1

End of Unit 1 Notes & Questions

Name: …….

Class: ……

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Summary notes for unit 1:

Photosynthesis and the carbon cycle

Lesson 1: Photosynthesis

- Photosynthesis occurs in chloroplasts and is the process by which plants make carbohydrates, using the energy from light.
- Word equation for photosynthesis (carbon dioxide + water➔ glucose + oxygen, in the presence of light and chlorophyll)

- Carbon dioxide + water $\xrightarrow[\text{Chlorophyll}]{\text{Sunlight}}$ Glucose + Oxygen.

- The reactants in photosynthesis are Carbon dioxide and water
- The products in photosynthesis are Glucose and oxygen
- Photosynthesis takes place Chloroplast
- To test the oxygen gas produced in photosynthesis: Light splint will glow and relight
- it was best to use a water plant in Detecting of gas produced by photosynthesis, So that the gas can be collected over water
- As the light intensity increases the rate of photosynthesis will also increase.
- When a plant is photosynthesising, bubbles of oxygen will be visible; it is possible to count these bubbles for a given amount of time to compare the effect of light intensity on the rate of photosynthesis.

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Photosynthesis versus respiration

Similarities

- The both involve glucose, oxygen, carbon dioxide and water.

Differences

Respiration

- Happens in all living cells.
- Happens in cytoplasm and mitochondria.
- No need to sunlight.
- The reactants are glucose and oxygen.
- The products are carbon dioxide and water

Photosynthesis

- photosynthesis only happens in some plant cells.
- happens in chloroplasts.
- Photosynthesis needs sunlight,
- The reactants in photosynthesis are Carbon dioxide and water
- . The products are glucose and oxygen.

Why is photosynthesis important?

First Reason

It is the process by which plants make carbohydrates, using the energy from light.

These carbohydrates contain some of the energy that was originally in the sunlight. All the energy in all the food in the world comes from plants.

Second Reason

it provides oxygen for the Earth's atmosphere. Animals and plants, of course, need oxygen for respiration.

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In any investigation there are 3 types of variables:

- Independent variable: what I change
- Dependent variable: what I observe or measure
- Controlled variable: what I keep the same

How to record the results in a table:

First column must include the independent variable with its unit while the second one must include the dependent variable with its unit.

Independent variables (unit)	Dependent Variables (unit)

Example:

Colour of light	number of bubbles of water plant

If the dependent variable has many Trial you have to calculate the mean:

Independent Variable	Dependent Variable			Mean
	Trial 1	Trial 2	Trial 3	

How to calculate the mean= $\frac{Sum\ of\ all\ the\ results}{Number\ of\ trials}$

$$\textbf{Mean (average)} = \frac{\text{Sum}}{\text{Count}}$$

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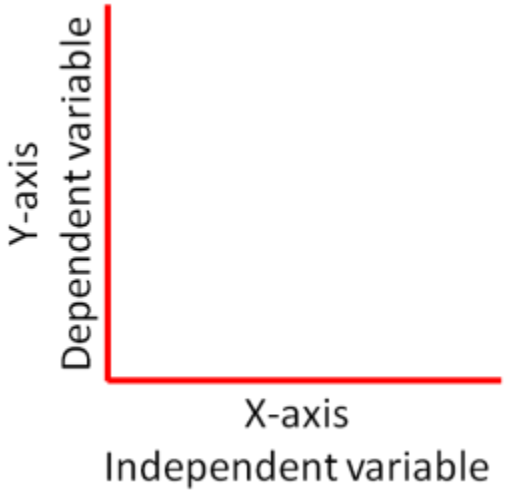
Example:

Colour of light	Number of bubbles per minute			
	1st try	2nd try	3rd try	mean
white	11	13	12	12
red	10	12	11	11
green	4	5	6	5
blue	8	12	10	10

How to Draw Graph:



- ❖ X-axis will include the independent variable
- ❖ Y-axis will include the dependent variable.
- ❖ You'll write the types of variable on the axis with the "UNIT".
- ❖ Add a title for the graph.
- ❖ Choose the right scale on the axis depending on the results of the table.

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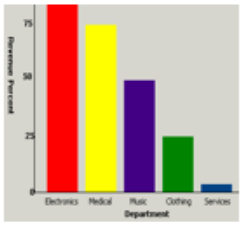
The differences between bar chart and line graph

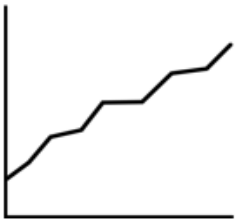
Bar: Values/Words

e.g. hair colour



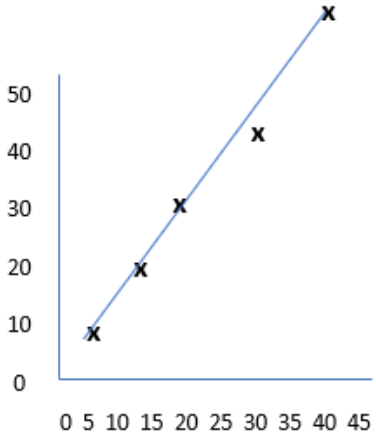
Line: Numbers

e.g. Temperatures, time



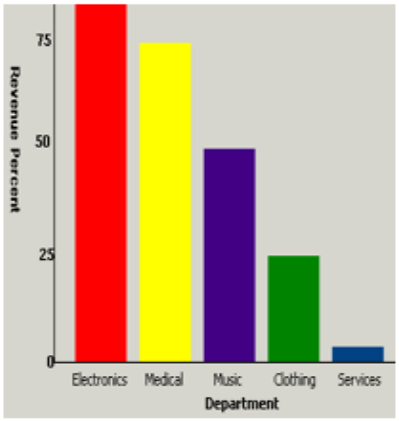
Line or Curve of Best Fit

- Line: Use a ruler to draw line through most points.
- Curve: Don't use a ruler. Free hand draw a curve through points. No wiggles or bumps!



Plotting for Bar Graph

- Columns same width
- Equally sized gaps between each bar.



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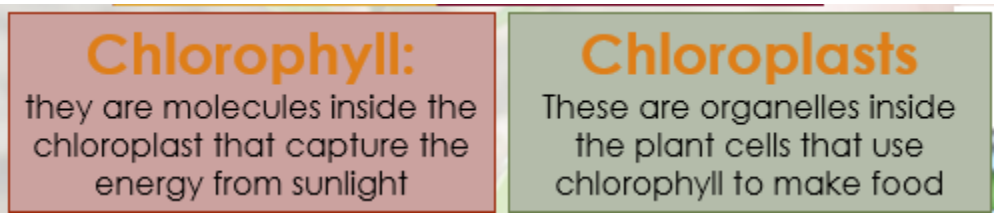
How to write Hypothesis

It must include the dependent and independent variables, be testable and measurable.

1.2 More about photosynthesis

Chlorophyll VS Chloroplast



- Plant needs carbon dioxide which enter to the leaf through tiny hole called stomata, also needs water through roots and sunlight absorbed by chlorophyll in chloroplast.
- Plants produce oxygen, some of the oxygen diffuses out of the leaf and Some of the oxygen is used in respiration
- Plants store carbohydrates as starch. They store the starch inside the chloroplasts in their cells.
- One way to check whether a leaf has been photosynthesizing is to **test it for starch by Using iodine solution will turn into blue black.**
- **Ethanol is a flammable liquid, to heat it, you have to use hot water bath for the test tubes that contain ethanol.**
- **Starch is stored in the chloroplasts.**
- **There must be spaces between each plant to reduce competition for light, water or minerals,**

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Function of each part in the leaf

Name of the part	Upper epidermis	Lower epidermis	Palisade layer	Spongy layer	Stoma (plural: stomata)	Waxy layer	Vein
Function of each part	protects the cells inside the leaf	protects the cells inside the leaf	contains cells that do most of the photosynthesis	has lots of air spaces. The cells in the spongy layer do a small amount of photosynthesis	is a tiny hole in the lower epidermis. These holes let carbon dioxide from the air get into the leaf	on the leaf surface stops the leaf cells from drying out	carries water to the cells in the leaf

Minerals and plant growth

- Farmers add fertiliser to their fields because it makes the crops grow larger and produce a higher yield.
- **importance of nitrogen for plant to make protein.**
- **importance of Magnesium for plant to make chlorophyll.**

How to plan an investigation:

1-Write your hypothesis

2-List the equipment

3-Write the method (procedure) including the 3 types of variables (dependent, independent and controlled)

4- Write the safety precautions

5- Your conclusion and record the results in a table and graph.

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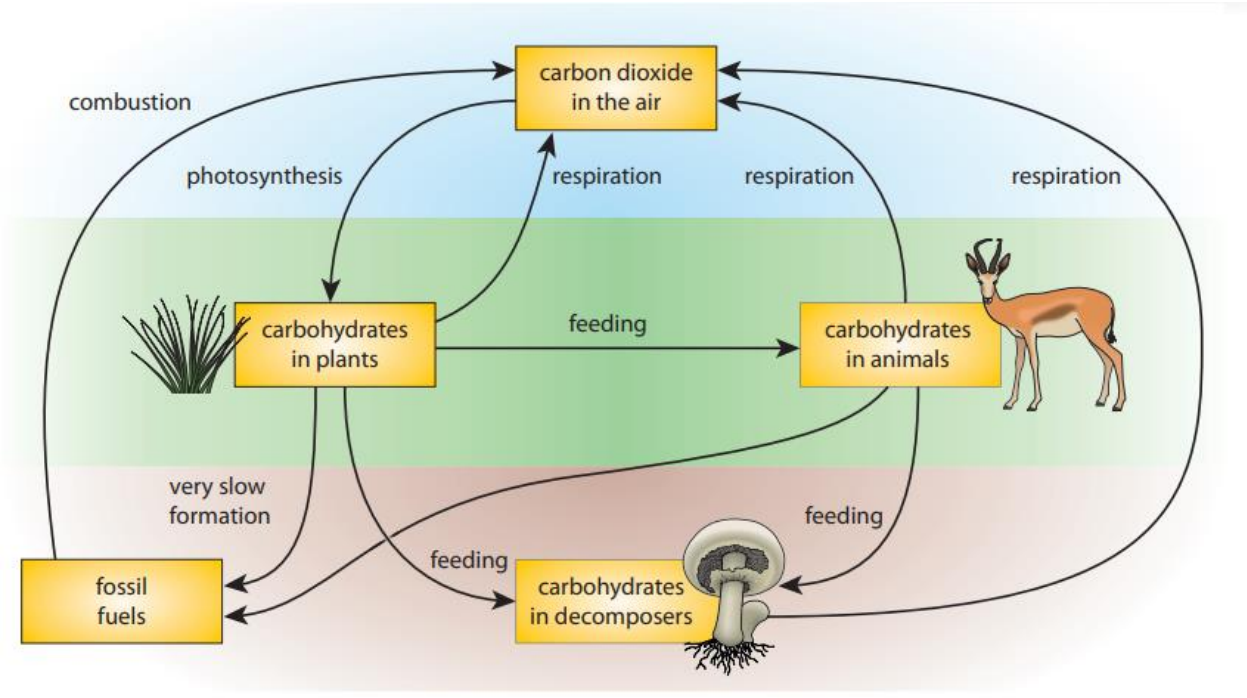
1.3 the carbon cycle

❖ **Organisms cannot use carbon in the form of an element. They can only use it when it is part of a compound.**



All important Processes in the Carbon Cycle

Photosynthesis	Respiration	Decomposition	Combustion	Feeding
-the formation of glucose and oxygen by green plants -decreases the amount of carbon in the atmosphere	The release of energy from the breakdown of glucose	The breakdown of dead and decaying waste material	The burning of fossil fuels	Carbohydrate moves from one organism to another organism

- Photosynthesis: Decrease the carbon dioxide.

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- Respiration, combustion: Increasing the carbon dioxide.
- Plants get carbon dioxide through photosynthesis process.
- Animals, & plants release carbon dioxide through respiration.
- Fossils fuels release carbon dioxide through combustion or burning.
- Animals get energy from plants through feeding.

1.4 Climate change

What will happen if :

There is too much Carbon dioxide on Earth

1-The Temperature of the Earth will increase
2-there is more energy in the Atmosphere
3-Increase the chance of hurricanes and typhoons
4-increase in the number of storms-
5- sea level rises
6-Increase the chance of flooding
7-Drought
8-Extreme weather events

There is no Carbon dioxide on earth

-The temperature of the earth will decrease

-More ice ages will be formed

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Describe the consequences of asteroid collision with the earth including (climate change and mass extinctions)

Describe the consequences of asteroid collision with another asteroid.

Asteroids colliding with each other	Asteroids colliding with Earth
• The collision produced huge quantities of dust. • The dust reduced the amount of light and heat from the Sun reaching the Earth's surface. • This triggered an ice age. • The Earth became much colder – • the ice caps spread much further from the poles • sea level fell	• it threw huge quantities of rock and dust into the air • The dust in the air meant that less light reached the Earth's surface. • Plants could not photosynthesise, so animals had less food. • the Earth became much colder • a massive tsunami
	• The asteroid caused a ***mass extinction.*** • Up to 75% of all the species on Earth that were alive at that time are thought to have become extinct because of the asteroid collision.

- **Scientists believe a collision between the Earth and a huge asteroid happened millions of years ago.**
- **Scientists believe this caused the extinction of the dinosaurs because of the following reasons:**
- **composition of atmosphere changed**
- **lack of food, lack of light, lack of shelter**
- **dinosaurs could not escape the danger from the asteroid collision**
- **extreme global cooling**
- **no/less photosynthesis in plants collision caused a fire that destroyed their habitat**

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Describe the historical and predicted future impacts of the climate change:

More extreme weather events	Less predictable rainfall	Rising sea levels
• Hurricanes and typhoons • increase in the number of storms • Severe flooding destroyed homes and fields, damaging people's livelihoods.	• Rains may come late, or might not come at all. Or rain may fall when it doesn't normally fall – or fall much more heavily, causing flooding • When rains fail, people may lose their harvests. • Long droughts also increase the risk of wildfires. • All of these changes affect not only people, but also plants and animals	• Water expands as it is heated, so if the sea temperature increases, sea level rises. • Melting ice caps and glaciers add extra water to the oceans • Sea level has been rising at a rate of about 3 mm per year. • Scientists estimate that more than 600 million people are at risk from flooding caused by sea level rise by the end of this century.

What can we do to help slow down the climate change?

- **Plant** more trees, because they will photosynthesize and take carbon dioxide out of the air.
- **Stop** deforestation (same reason).
- **Stop** burning fossil fuels, to reduce combustion.
- **Stop** using so much energy, so that we do not need to use as much fuel.
  - eating less meat (because production and transport of meat uses a lot of energy and produces a lot of carbon dioxide)
  - reducing air travel.

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Questions on Unit 1

1 Building a carbon cycle

Cut out the boxes. Then stick them into the correct places on the diagram of the carbon cycle.

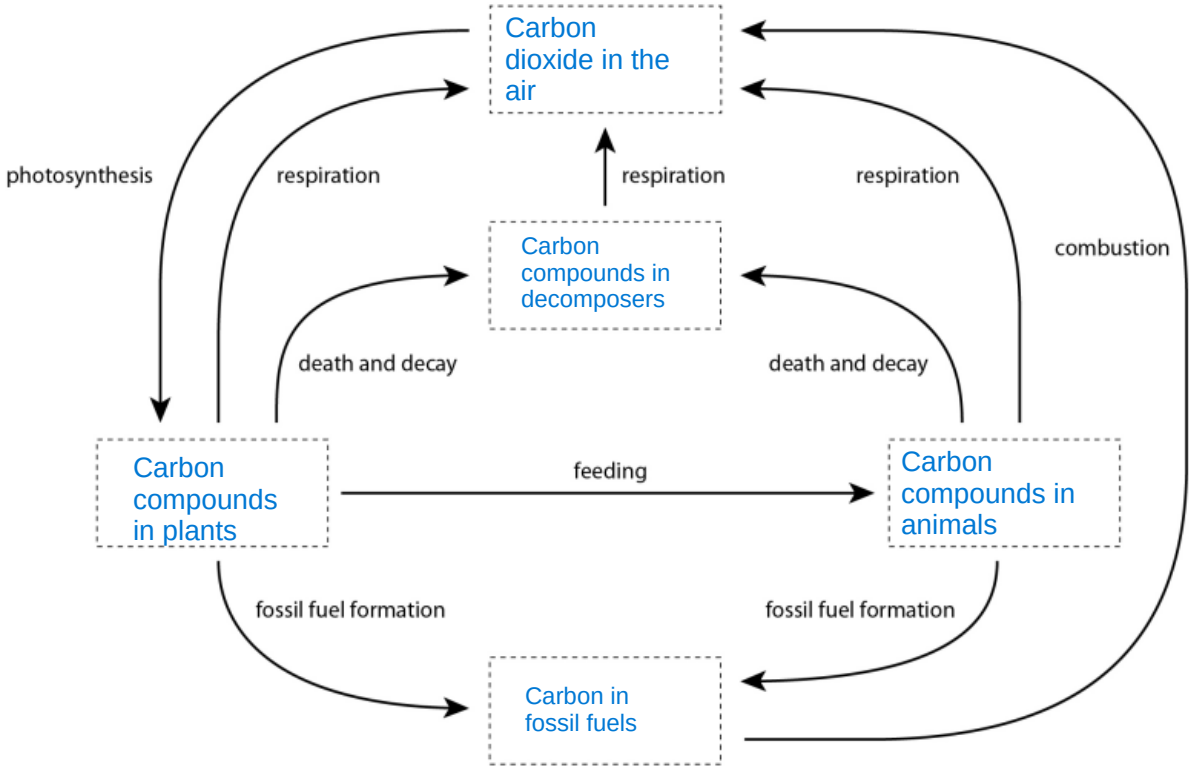
carbon dioxide in the air

carbon compounds in plants

carbon compounds in animals

carbon compounds in decomposers

carbon in fossil fuels



2 Complete the word equation for photosynthesis.

carbon dioxide + water → glucose + carbon dioxide [2]

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3 Pierre and Carlos investigate how light affects plant growth.

(a) Write down **two** factors they need to keep the same in their investigation.

1 Volume of water

2 Amount/ type of soil [2]

(b) Write down the factor they change.

Amount of light [1]

(c) What do they measure to get their results?

The height / length/ size / mass of the plant [1]

4 Complete the sentences.

Use words from the list.

carbon dioxide	**growth**	**nitrate**	**nitrogen**
oxygen	**photosynthesis**	**respiration**	**sunlight**

(a) Plants take in Carbon dioxide from the air to make glucose.

This process uses energy from Sunlight and is called

Photosynthesis [3]

(b) Plants also take in substances like nitrate through the roots

which they can use for growth . [1]

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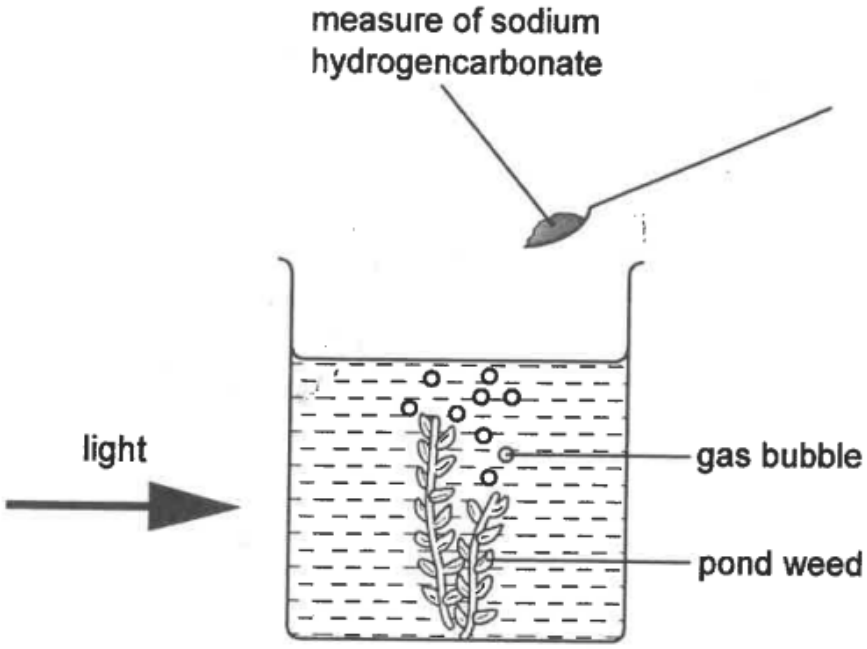
The diagram shows a pupil's investigation of photosynthesis.



Sodium hydrogencarbonate can be added to the water to increase the concentration of dissolved carbon dioxide.

A group of pupils added measures of sodium hydrogencarbonate to the water and counted the number of gas bubbles given off by the pond weed.

Their results are shown in the table.

number of measures of sodium hydrogencarbonate	number of bubbles given off per minute
0	5
1	10
3	20
5	30
7	40

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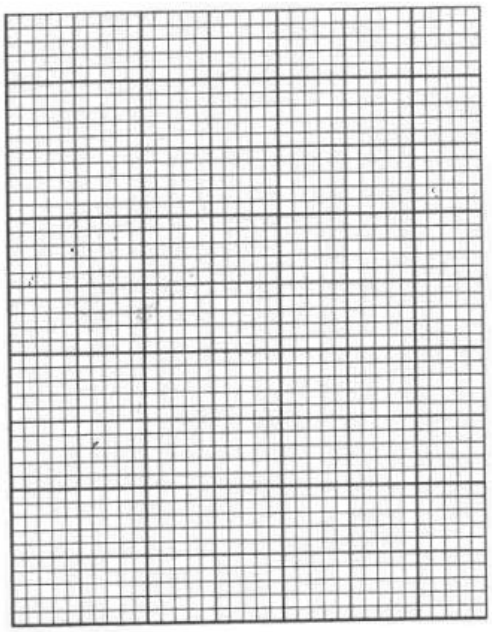
5 **(a)** Plot a line graph using these results. Label the axes.

number of bubbles given off per minute



[3]

number of measures of sodium hydrogen carbonate

(b) How many bubbles would you expect to be given off per minute if the experiment was repeated using 4 measures of sodium hydrogen carbonate?

25 bubbles per minute ..... [1]

(c) What do these results suggest about the composition of the water at the start of the experiment?

its already contains carbon dioxide

..... [1]

6 **Write down the importance of:**

1- Nitrogen: to make protein

2- Magnesium: to make cholorophyll

3- Chlorophyll: absorb sunlight to make photosynthesis

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7-Write down the impact of a collision between the Earth and a huge asteroid.

Plants could not photosynthesise,
so animals had less food.
the Earth became much colder
a massive tsunami
asteroid caused a mass extinction

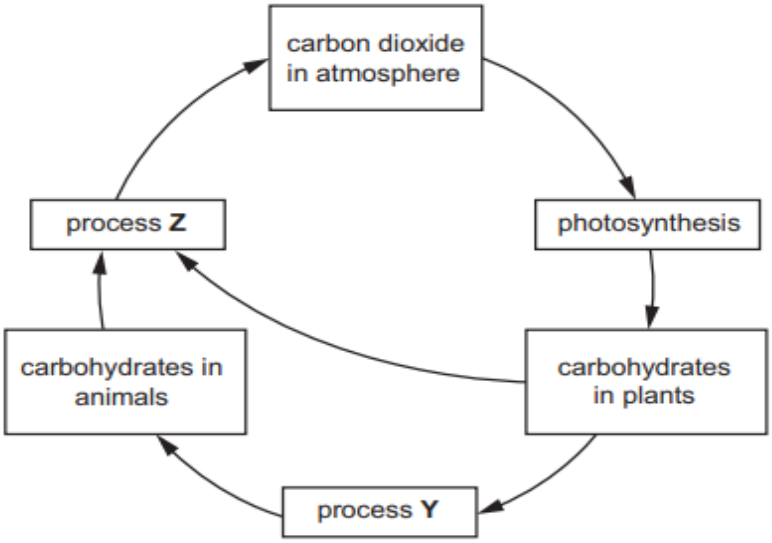
8-Describe the impacts of climate change.

More extreme events
Rising sea level
less predictable rainfall
flooding
drought
storms
Hurrican , typhoon

9

(a) This question is about carbon dioxide in the atmosphere.

Look at the diagram of the carbon cycle.



(i) Write down the name of process **Y**.

Feeding ..... [1]

(ii) Write down the name of the gas needed for process **Z**.

Oxygen ..... [1]