

High Marks: Regents Living Environment Made Easy is clear, easy to understand, and teaches the students what they need to know for the Regents exam. The book has sample questions (from the living environment regents) with solutions to give the students practice for these exams. The homework questions are also from living environment regents exams.

Here are sample pages from High Marks: Regents Living Environment Made Easy by Sharon H. Welcher.

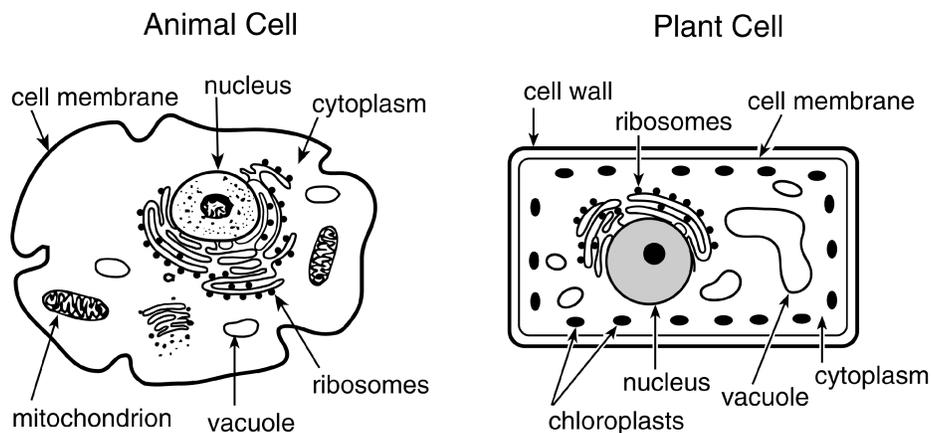
## CHAPTER 1: LIVING THINGS

### SIMILARITIES AND DIFFERENCES

#### CELLS

Living things (organisms) are made up of one or more cells. You can see cells using a compound light microscope. Each cell carries out the life processes and all the cells work together in a coordinated manner.

Look at the picture of the cell. The cytoplasm is the jellylike substance inside the cell, surrounded by the cell membrane. The cytoplasm **transports** (carries) material through the cell. Many chemical reactions take place in the cytoplasm.



Look again at the picture of the cell. The **structures** (examples: nucleus, ribosomes, mitochondria) that are **inside the cell** are called **organelles**.

## Organelles

**Organelles** are **structures** (examples: nucleus, ribosomes, vacuoles) that are **inside** the **cell**. Each organelle (examples: nucleus, ribosomes) carries out a specific life function (see below). All organelles together do all life functions; all life functions (examples respiration, synthesis, nutrition) together are called metabolism.

**Cell membrane** surrounds the cell. Cell membrane is made mostly of fats (lipids) and some proteins. The cell membrane controls (regulates) which materials (or how much of a material, example how much water) enters the cell or leaves the cell; you will learn about this later. The cell membrane lets digested food (example, simple sugar) enter the cell. The cell membrane lets wastes leave the cell (waste disposal).

**Nucleus** is the control center; it controls all life processes (metabolism). The nucleus stores genetic information (information storage); information in the nucleus directs protein synthesis (the synthesis of proteins (joining together of smaller molecules to form proteins (large molecules))).

**Vacuoles** storage sacs that are inside the cytoplasm. Some vacuoles store food and digest food; other vacuoles store water and get rid of excess (too much) water and other vacuoles store wastes. Vacuoles can store different materials, such as food, water, or waste.

**Mitochondria** are called the **powerhouse** of the **cell**. Mitochondria are the place where **cellular respiration** takes place. Mitochondria contain enzymes that take the energy out of food and **produce energy** in the form of **ATP**. Cells that need more energy (example muscle cells) have more mitochondria to produce more energy (in the form of ATP).

**Ribosomes** site (place) of protein synthesis (place where protein is made). Some ribosomes are attached to membranes; other ribosomes are floating in the cytoplasm.

**Chloroplasts** are **only** in **plants** (and some one celled organisms) but not in animals. **Plants** have chloroplasts (contain chlorophyll) and can **make their own food** in the presence of light (when there is light). When plants make their own food (glucose) in the presence of light, it is called **photosynthesis**.

**Cell walls** are found in plant cells and not in animal cells. Cell walls are outside the cell membrane and are made of a hard, nonliving material (cellulose). Cell walls support the plant.

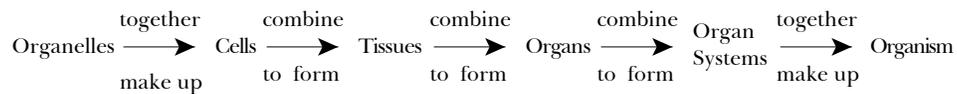
**Organelles work together:** You know **organelles** are **structures** (example, nucleus) **inside the cell**. These **organelles interact** (work together) to **maintain a balanced internal environment (homeostasis)**. Examples:

1. The nucleus and ribosomes are interrelated. The nucleus is the control center; it directs the cell what to do and tells the ribosome what protein to make. Ribosome makes proteins (protein synthesis) by joining together (synthesis) amino acids to form

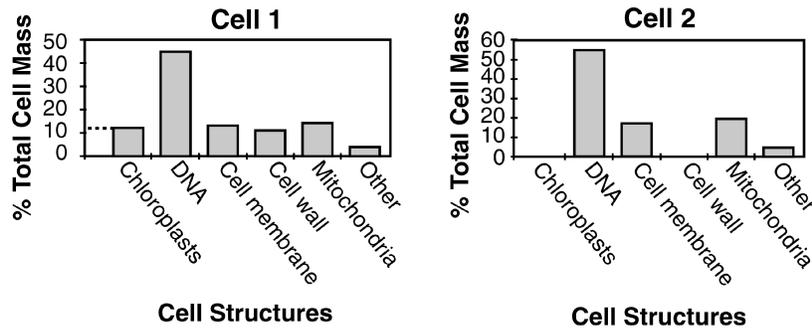
proteins.

- Mitochondria and ribosomes interact. Mitochondria contain enzymes that take the energy out of food and **produce energy** in the form of **ATP**. Ribosomes use energy in the form of ATP to make protein.
- Cell membrane and ribosomes interact. Cell membrane lets amino acids enter the cell. Ribosomes use the amino acids as building blocks (synthesis) to make protein.

Organelles, cells, tissues, organs, and organ systems work together to maintain homeostasis (constant internal environment).



There are two bar graphs below, one bar graph of a plant cell and one bar graph of an animal cell. Look at the bar graphs (a bar graph uses bars ).

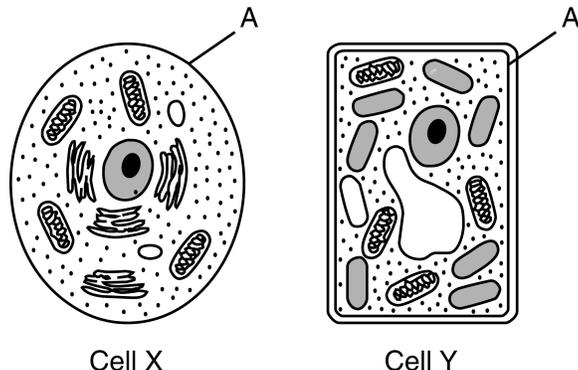


On the vertical axis is percent cell mass (example, mitochondria make up what percentage of the cell). You can tell that **cell 1** is a **plant cell** because it has **chloroplasts** and a **cell wall**. Chloroplasts and cell wall are only in plants and not in animals. Look at the top of the bar for chloroplasts; the student draws a dotted line to the vertical axis (see Cell 1). You see the dotted line is a little above 10% but less than 20%, therefore the chloroplasts are about 12% of the cell mass (material).

Look at cell 2. Cell 2 has **no (zero) chloroplasts** and **no cell wall** (there is no bar above the word chloroplasts and no bar above the word cell wall). **Cell 2** is an **animal cell**.

**PRACTICE QUESTIONS AND SOLUTIONS**

**Question:** The diagram below represents two cells, X and Y.

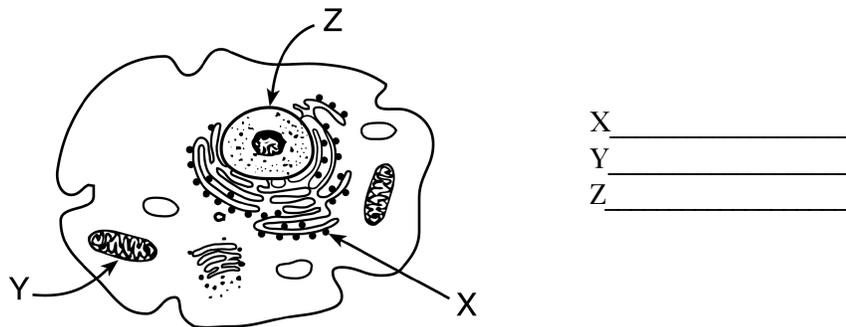


Which statement is correct concerning the structure labeled A?

- (1) It aids in the removal of metabolic wastes in both cell X and cell Y.
- (2) It is involved in cell communication in cell X but not in cell Y.
- (3) It prevents the absorption of CO<sub>2</sub> in cell X and O<sub>2</sub> in cell Y.
- (4) It represents the cell wall in cell X and the cell membrane in cell Y.

**Solution:** The structure labeled A is the cell membrane. The cell membrane lets wastes leave the cell which means the cell membrane helps the cell remove (get rid of) wastes both from animal cells (cell X) and plant cells (cell Y). *Answer 1*

**Question:** The diagram represents one cell and some of its parts. Identify the organelles labeled X, Y, and Z.



X \_\_\_\_\_  
 Y \_\_\_\_\_  
 Z \_\_\_\_\_

**Solution:** X ribosome  
 Y mitochondrion (mitochondria)  
 Z nucleus

**Question:** An organelle that releases energy for metabolic activity in a nerve cell is the

- (1) chloroplast (2) ribosome (3) mitochondrion (4) vacuole

**Solution:** Mitochondria contain enzymes that take energy out of food and produce (release) energy in the form of ATP. Answer 3

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*Now Do Homework Questions #9-23, pages 42-44.*

Chap. 1:8 Similarities/Differences

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## CHAPTER 2: HOMEOSTASIS (DYNAMIC EQUILIBRIUM)

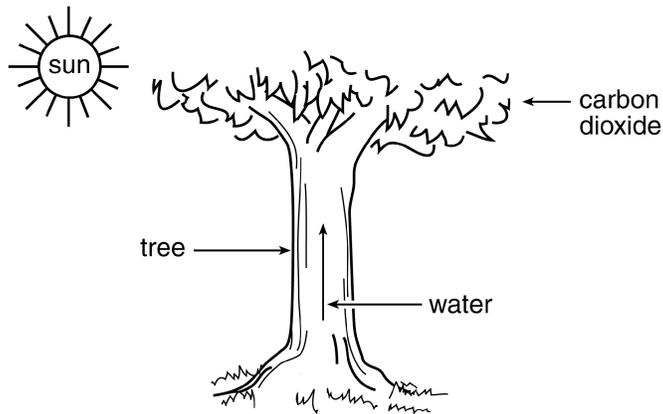
You will learn in the chapter that biochemical processes of photosynthesis, respiration, enzymes, feedback, immune system, and regulation (by using hormones and nerves) help to maintain homeostasis.

Organisms (living things) need energy and raw materials (example, oxygen) to live (survive). **Photosynthesis** and **cellular respiration** are **biochemical processes** (see below) that produce energy; energy is needed for obtaining (getting) raw materials (example water and minerals in plants), for active transport (example water goes from areas of **less** concentration of **water** to areas of **more** concentration of **water**), for changing small molecules to large molecules, for eliminating waste, etc.

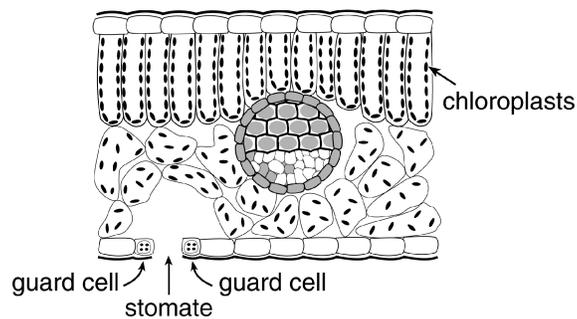
### Photosynthesis

Plants and algae carry on photosynthesis. In **photosynthesis**, in the presence of **sunlight**, **plants take in carbon dioxide** (CO<sub>2</sub>) and **water** (H<sub>2</sub>O) and **produce glucose** (a single sugar) and **oxygen** (O<sub>2</sub>). Glucose provides energy for life processes (examples digestion, respiration, transport).

**Plants** and **algae** carry on **photosynthesis, making their own food** (glucose, a simple sugar); plants and algae are called **autotrophs (autotrophic nutrition)** because they make their own food.

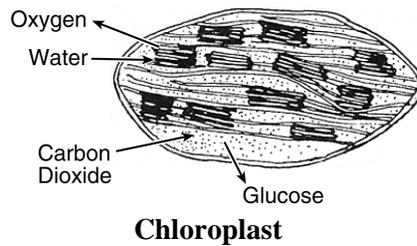


Look at the leaf diagram below. There are openings in the leaf called stomates. Carbon dioxide enters (goes into) the leaf through the stomates (openings) and oxygen goes out (gas exchange, meaning exchange of gases, carbon dioxide (gas) goes in and oxygen goes out). The guard cells that surround the openings regulate the amount of carbon dioxide going in and oxygen and water vapor going out.

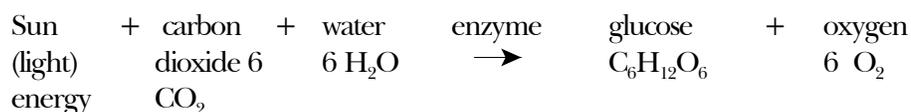


Cross section of leaf

You learned the **chloroplasts** in the cells of the plant **leaf** and in one-celled organisms such as **euglena** are the site (place) of **photosynthesis**. **Photosynthesis** takes place in the **chloroplasts**. The chloroplasts have a



green pigment called chlorophyll. The chlorophyll takes in the **sun's (light) energy**, the roots take in water which goes up the stem and to the leaf, and the leaf takes in carbon dioxide (see figure of tree); this produces glucose (simple sugar) and oxygen (see equation below). A specific enzyme is used in photosynthesis. An enzyme (biological catalyst) affects the **rate of a chemical reaction**, but the enzyme is not used up in the reaction.



The process of photosynthesis uses solar energy (sun's energy) to combine carbon dioxide and water into glucose (which has chemical bond energy) and oxygen; oxygen is given off to the environment (see equation above). Chemical bond energy (example, chemical bond energy in glucose) provides energy for life activities (life processes), such as digestion, transport, and growth.

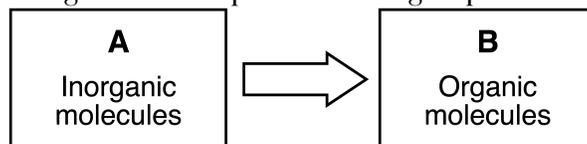
In photosynthesis, glucose is produced. Glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) is an organic molecule because it has both C (carbon) and H (hydrogen). Water ( $\text{H}_2\text{O}$ ) and carbon dioxide ( $\text{CO}_2$ ) are inorganic molecules because they do not have both C and H.

Note: When there is very little sunlight (example, far down in the ocean), very little photosynthesis takes place in plants and algae. Also, the amount of photosynthesis depends on the color of the light. In the presence of red light or blue light, plants can easily carry on photosynthesis; in green light, very little photosynthesis takes place.

Note: When there are more algae or plants in a lake or ocean, more photosynthesis takes place and more glucose and oxygen are produced.

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**Question:** The diagram below represents a biological process.



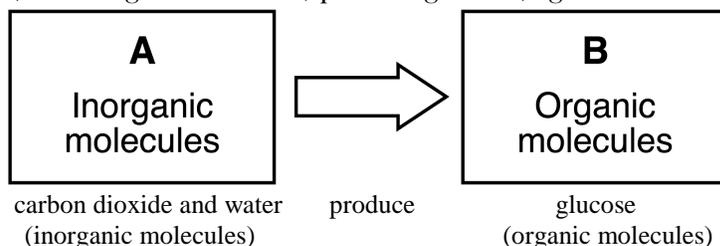
Which set of molecules is best represented by letters A and B?

- (1) A: oxygen and water      B: glucose
- (2) A: glucose                      B: carbon dioxide and water
- (3) A: carbon dioxide and water      B: glucose
- (4) A: glucose                      B: oxygen and water

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**Solution:** You learned **organic** molecules have both C and H (example **glucose**,  $\text{C}_6\text{H}_{12}\text{O}_6$ ). **Inorganic** molecules do not have both C and H (examples **carbon dioxide**  $\text{CO}_2$  and **water**  $\text{H}_2\text{O}$ ).

You learned in the process (biological) of photosynthesis, carbon dioxide and water (both inorganic molecules) produce glucose (organic molecules).



Answer 3

**Now Do Homework Questions #1-22, pages 33-38.**

*High Marks: Regents Living Environment Made Easy Homeostasis Chap. 2:5*

## CHAPTER 5: EVOLUTION

In the dictionary, evolve or evolution means change (slowly over time). New life forms appeared over time. Three billion years ago, there were the first simple one-celled (single-celled, unicellular) organisms, then later more complex single-celled organisms (living things). One billion years ago, there were simple multicellular (many-celled) organisms. After that, there were complex multi-cellular organisms, such as shellfish, then other fish, then amphibians (example frogs), then reptiles (example dinosaurs), then birds, then mammals, and then humans. As time went on, there was an increase in diversity (more different types or more species) of complex multicellular organisms. **Evolution** is **change over time** (example change of species over time, how a species, such as a horse, changes over time). A species is a group of similar organisms that can interbreed (produce offspring together). Geologic evolution means how the Earth (geology) changed over time. The Earth has existed for 4½ billion years, which is called geologic time.

### Evolutionary Trees

Look at the evolutionary tree (evolutionary pathways), showing ancestors and the species evolving (changing or becoming different) from the ancestors. Letters ADFGEHIXY represent different species.

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1. The **bottom** of the **tree** (A) is the **oldest ancestor**, which is the oldest species. The **top** of the **tree** (letters **F, G, H, I**) is the **newest species** (example, species that exist today).

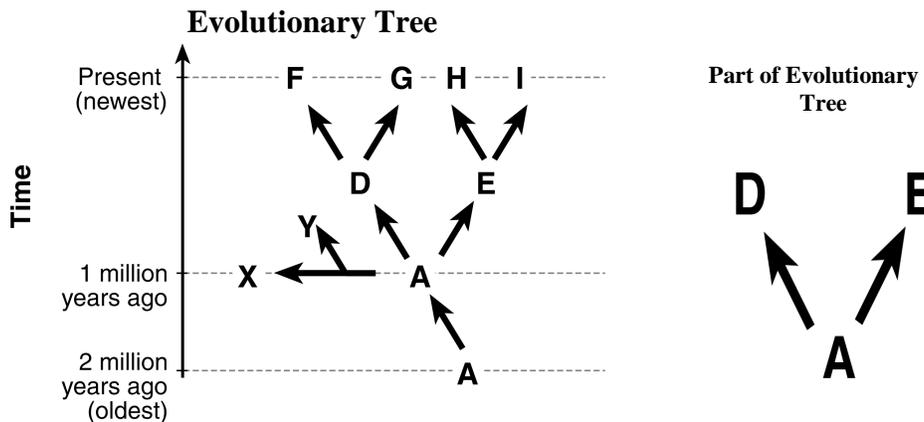
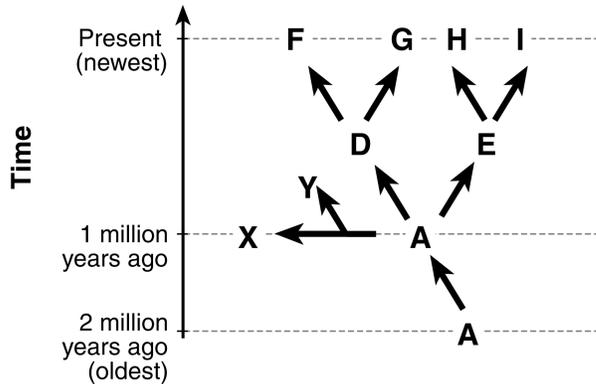
Look at the diagram. A is the original ancestor to F and also to G. D is a newer ancestor to F and G. F and G might have similar DNA

(genes) to D and also similar DNA and genes to A (oldest original ancestor). A is the original ancestor to H and I. E is a newer ancestor to H and I. H and I might have similar DNA (genes) to E and also to A (the original ancestor).

2. Look at the arrow from A to A. In this example, A lasted from two million years ago to one million years ago, meaning **A lasted one million years**. Species A lasted the **longest period of time** in this evolutionary tree (one million years). There were probably changes in the environment over the one million years, but species A was more able to adapt (adjust) to the changes in the environment and survive.

3. By looking at the evolutionary tree, you can see which **species evolved into other species** and which **species are closely related** (similar DNA, genes, and proteins). Species A lasted one million years. One million years ago (maybe environment caused it, or changes in the genes (mutation), or sorting, or recombination), species A evolved (changed) into two different species, species D and species E (see evolutionary tree diagrams below).

Since **species D and species E directly branch from species A (common (same) ancestor)**, **D and E are closely related**. *This can be compared to children born from the same parents (common ancestor); the children are closely related.*



Look at the evolutionary tree diagram above. Since **species F and species G directly branch from species D (common (same) ancestor)**, **F and G are closely related**. *This can be compared to children born from the same parents (common ancestor); the children are closely related.* By looking at the diagram, you reach the conclusion (valid inference) that F and G are closely related.

Since **species H and species I directly branch from species E (common (same) ancestor)**, **H and I are closely related**. *This can be compared to children born from the same parents (common ancestor); the children are closely related.* By looking at the diagram, you reach the conclusion (valid inference) that H and I are closely related.

Look at the evolutionary tree again. **F and I are NOT closely related** (less closely related) because **F branches from D** and **I branches from E** (different ancestors D and E). But also follow the line of arrows F D A and I E A and you see F and I both come from the same original ancestor A. In short, **F and I are related but not as closely related** because F and I **have different ancestors D and E**, but the **same common original ancestor A**. This can be compared to children born from different parents (ancestors) but the same grandparents (older ancestor). The children are related, but not as closely related as if they were born from the same parents (ancestors).

4. **Species X and species Y ended** at a **certain time** (became **extinct**) (see evolutionary tree diagram above). **Species X and species Y do not exist today** (at the present time); species X and Y end before the present.

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*Evolution Chap. 5:3*

## **CHAPTER 7: HOW HUMANS AFFECT THE ENVIRONMENT**

**Question:** Base your answers to these two questions on the information below and on your knowledge of biology:

Our national parks are areas of spectacular beauty. Current laws usually prohibit activities such as hunting, fishing, logging, mining, and drilling for oil and natural gas in these areas. Congress is being asked to change these laws to permit such activities.

**Question 1:** For each activity listed above, state one way that activity could harm the ecosystem.

**Question 2:** For each activity, state one way allowing the activity could benefit society.

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**Solution 1:** Possible Correct Answers:

<b>Activity</b>	<b>How it Harms the Ecosystem (Negative Effects)</b>
1. hunting, fishing	Hunting and fishing caused animals (and fish) to die, therefore other animals might not have enough food to eat and might die; killing fish and animals disrupts food chains
2. logging (chopping down trees)	could destroy habitats (places which might be the home of some living organisms)
3. mining (getting minerals from the ground, such as copper, lead, iron)	could destroy habitats
4. oil drilling	danger of oil spills (could pollute the ecosystem); damages habitats

**Solution 2:** Possible Correct Answers:

<b>Activity</b>	<b>How it Benefits (Helps) Society (Positive Effects)</b>
1. hunting, fishing	people have food to eat; killing off deer prevents deer-car accidents; helps keep ecosystem in balance -deer do not have enough food and would starve - there are no large predators (example wolves) to control the deer population
2. logging (chopping down trees)	prevents forest fires (too many trees help fires to spread)
3. mining (getting minerals from the ground, such as copper, lead, iron)	getting minerals
4. oil drilling	oil used by power plants to provide energy. gasoline used in cars, buses, etc. comes from oil using domestic oil (from the U.S.) instead of foreign oil. creates jobs. getting more oil causes prices to go down (lower prices)

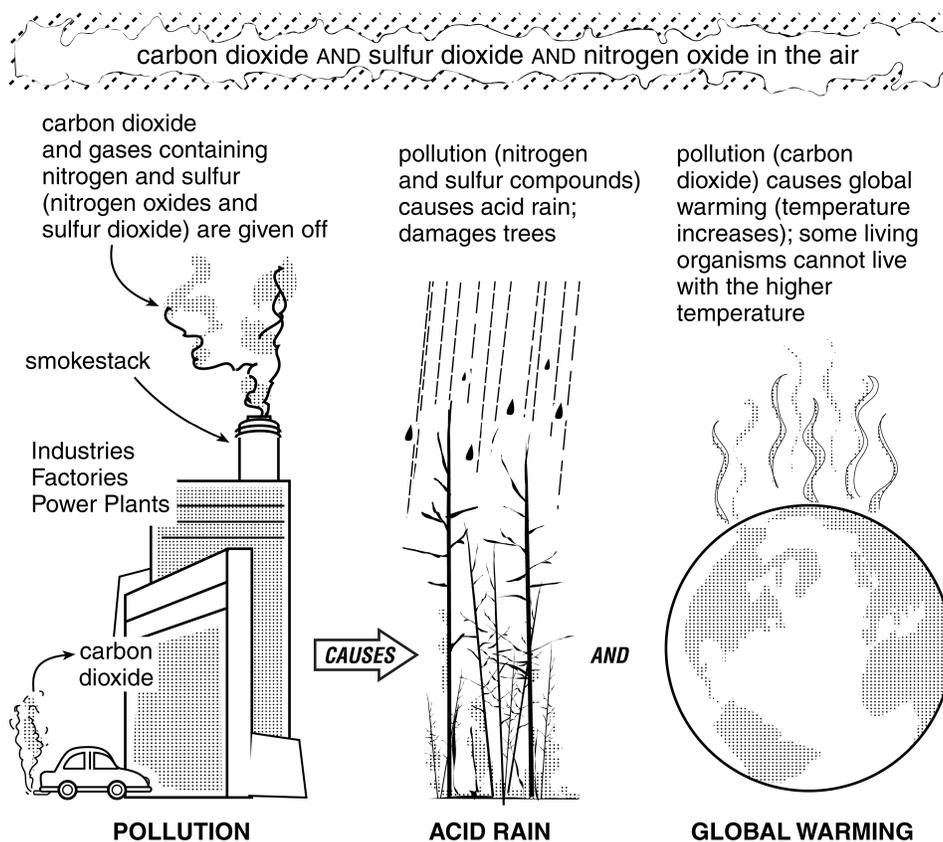
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## AIR POLLUTION

**Air pollution includes acid rain, smog, global warming, and ozone depletion** (see below). Industries burn fossil fuel for energy, giving off (emitting) pollutants through smokestacks (chimneys) into the air. **Fossil fuels** (examples coal and oil) **burn, giving off pollutants**, such as **carbon dioxide** and **gases** that contain **sulfur** or **nitrogen**. When it rains, the rain water carries the pollutants from the air into rivers, lakes, soil, etc. Air pollution harms living organisms and damages the habitat (example trees).

### Air Pollution



Industries burn fossil fuels (example coal and oil) giving off pollutants (carbon dioxide in large amounts, carbon monoxide, and gases containing sulfur and nitrogen) see figure above. Motor vehicles (cars, buses, and trucks) also give off carbon dioxide and sometimes give off carbon monoxide (when the exhaust system is not working properly).

**High Marks: Regents Living Environment Made Easy**

This book, **High Marks: Regents Living Environment Made Easy**, teaches students how to **draw line graphs** and **bar graphs** and how to **interpret them**, which is needed for the living environment regents. The graphs in this **book** are **regents** or **regents-type problems**.

### Drawing Line Graphs

Let's see how we can draw graphs based on experimental data. Data (from an experiment) is written on a data table. Draw the graphs based on the data table.

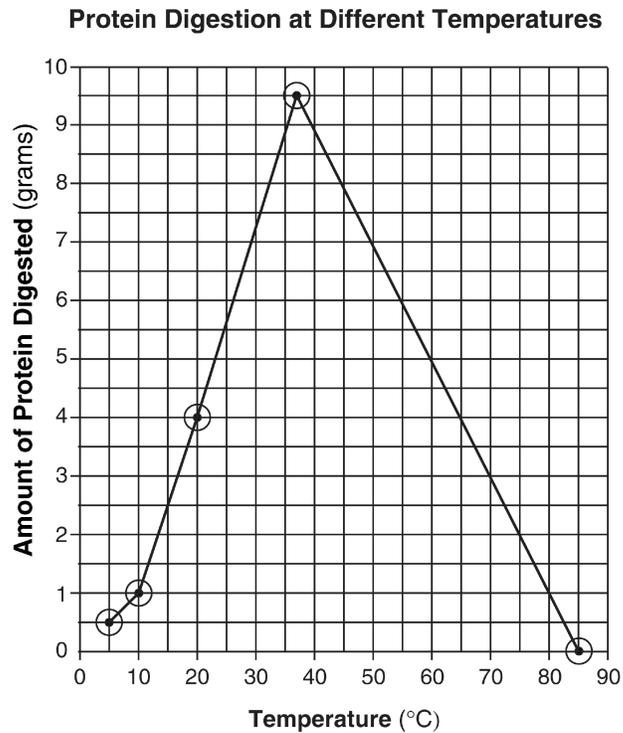
**Problem 1** (at the end of chapter 1): The experiment used five tubes to study the effect of temperature on protein digestion (amount or how much protein is digested). The results of the experiment are shown in the data table below.

**Protein Digestion at Different Temperatures**

<b>Tube #</b>	<b>Temperature (°C)</b>	<b>Amount of Protein Digested (grams)</b>
1	5	0.5
2	10	1.0
3	20	4.0
4	37	9.5
5	85	0.0

### How to draw the line graph:

1. On the x axis, put “Temperature, °C”. **The thing you change** (in this case temperature) is always put on the **x axis**. This is the independent variable. Space the lines along the axis equally. “Make an appropriate scale” by spacing the numbers on the graph so that all the data fits on the graph and it is easy to read. There must be an equal number of degrees between lines (see graph). On the x axis, put 10 °C between lines (every two lines) (scale on the x axis), then all the temperatures on the data table fit on the graph and it is easy to read.
2. On the y axis, put “Amount of Protein Digested (grams)”. The **result** you get (amount of protein digested) is always put on the **y axis**. This is the dependent variable. Space the lines along the axis equally. “Make an appropriate scale” by spacing the numbers on the graph so all the data fits on the graph and it is easy to read. There must be an equal number of grams of protein digested between lines (see graph.) On the y axis, put one gram of protein between lines (every two lines) (scale on the y axis), then all the grams of protein digested in the data table fits on the graph and is easy to read.
3. Plot the experimental data on the graph. Draw a circle around each point. Draw a line that connects the points. Do not continue the line past the last point.

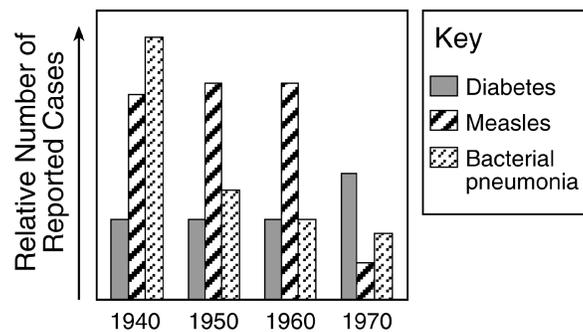


4. Put a title on the graph which shows what the graph is about. Examples: "Effect of temperature on protein digestion" or "Protein digestion at different temperatures."

**Problem 7** (from chapter 2).

**Question:** Base your answer on the graph below.

**Incidence of Three Human Diseases in Four Different Years**



The greatest difference between the incidence of measles and the incidence of bacterial pneumonia occurred in  
 (1) 1940      (2) 1950      (3) 1960      (4) 1970

**Solution:** From the key, you see  shows measles and  shows pneumonia.

The taller (higher) the bar, the more people had that disease. The shorter the bar, the fewer people had the disease.

In 1940, there was a small difference between the height of the bars for measles and pneumonia.



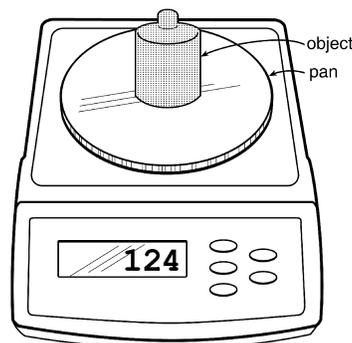
In 1960, there was the biggest difference (greatest difference) between the height of the bars for measles and pneumonia.



Answer 3

# CHAPTER 9: LABORATORY

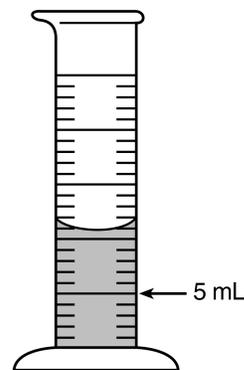
**Electronic balance:** You can also use an electronic balance to measure mass. Set the electronic balance to zero. Place an object on the pan of the balance. Read the number (example 124) shown on the electronic balance.



**Electronic Balance**

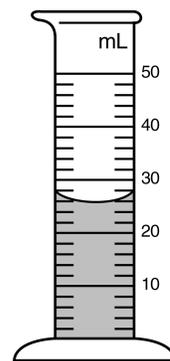
4. Use a **graduated cylinder** to **measure** volume (how much space it takes up). Volume is measured in mL (milliliters) and L (liters). Look at the graduated cylinder at right. This graduated cylinder has liquid (such as water) in it. The arrow points to the 5 mL line. In this graduated cylinder, there are 5 lines (4 small lines and 1 large line) up to 5 mL, therefore each line = 1 mL.

To find the volume of liquid, read the bottom of the meniscus (curve). There is 5 mL + 5 mL + 1 mL = 11 mL. The volume of the liquid (example water) = 11 mL.



**Graduated Cylinder**

This graduated cylinder is different than the previous one; there are five lines from 0 to 10 mL, therefore each line = 2 mL. Read the bottom of the meniscus (curve). There is 10 mL + 10 mL + 6 mL = 26 mL. The volume of the liquid (example water) = 26 mL.



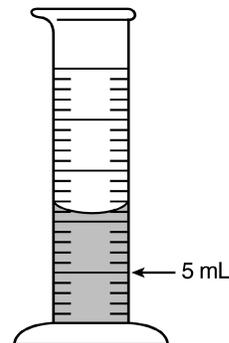
**Graduated Cylinder**

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**Question:** How much water should be removed from the graduated cylinder to leave 5 milliliters of water in the cylinder?

1. 6 mL      2. 7 mL  
3. 11 mL    4. 12 mL



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**Solution:** This graduated cylinder has water in it. The arrow points to the 5 mL line. In this graduated cylinder, there are 5 lines (4 small lines and 1 large line) up to 5 mL, therefore each line = 1 mL.

First find the volume of water by reading the bottom of the meniscus (curve). There is 5 mL + 5 mL + 1 mL = 11 mL. The volume of the water in the graduated cylinder = 11 mL.

Then, you must **remove 6 mL** of water to have **5 mL left**,

$$11 \text{ mL} - 6 \text{ mL} = 5 \text{ mL} .$$

Answer 1

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**Now Do Homework Questions #1-6, pages 35-36**

**High Marks: Regents Living Environment Made Easy    Laboratory    Chap. 9:5**

### **Classification**

There are different types of plants (examples, grass, oak trees) and different types of animals (examples, dogs, humans, birds). Let's discuss the animal kingdom. The **kingdom** has the most different types of animals. A **phylum** has fewer different types of animals. A **class** has even less, **genus** even less, and a **species** is only one type of animal.

Similarly in plants, the **kingdom** of plants has the most different types of plants, a **phylum** has fewer, a **class** even less, a **genus** even less, and a **species** is only one type of plant.

This chart shows the classification system. Classification is a way to group organisms by similarities (you do not have to memorize the names of the animals). Realize that all the members of a genus (see chart below) are more closely related (more similar to each other) than all members of a class, phylum, or kingdom.

	<i>Kingdom animals</i>	<i>Phylum chordates</i>	<i>Class mammals</i>	<i>Genus canis</i>	<i>Species familiaris</i>
<i>Different types of animals:</i>	<i>most</i>	<i>fewer types</i>	<i>even fewer</i>	<i>even less</i>	<i>only one</i>
	<i>dog wolf human monkey frog snake butterfly</i>	<i>dog wolf human monkey frog snake <del>NO butterfly</del></i>	<i>dog wolf human monkey <del>NO frog</del> <del>NO snake</del> <del>NO butterfly</del></i>	<i>dog wolf <del>NO human</del> <del>NO monkey</del> <del>NO frog</del> <del>NO snake</del> <del>NO butterfly</del> <i>In a genus, animals are most closely related.</i></i>	<i>dog</i>

The animal kingdom has all animals (all the animals listed above and many more animals). The phylum chordates are animals that have a backbone, therefore you have fewer types of animals in the phylum. The class of mammals are only animals that have a backbone and produce milk, therefore you have even fewer different types of animals (see chart above). The genus canis has even fewer different types (see chart above). A species has only one type of animal.

In short, in a kingdom (example animal kingdom) there are many different types of animals (all types of animals). In a genus (example genus canis) there are relatively only a few different types of animals, such as dog and wolf (see chart above), therefore the animals in a genus are more closely related.

**Now Do Homework Question #57, page 47**