UNIT LEARNING PACKS

FOCUS IN ACTION

Grade 8 Science Focus

Unit 2 - Cells and Systems

EDQUEST
MIDDLE SCHOOL SCIENCE RESOURCES

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'Focus in Action' UNIT LEARNING PACKS

These booklets are designed to provide Grade 8 students with all the resources needed to review or reinforce concepts, covered in the Alberta Science Curriculum, and included in the Grade 8 Science Final Exam in June. There are circumstances in which **an entire unit** may be missed and covering the concepts from that unit (for the final exam) can be difficult. This can happen for a number of reasons:

- Students – new to the school – register throughout the year (from other provinces, school jurisdictions or countries)
- Students may be ill or have surgery and often can miss one or more units
- Students have extended holidays throughout the year
- Transfers from another school, who have completed the units in a different order

For additional support, students are directed to the **Edquest Middle School Science Website** or, Scienceman Resource (www.scienceman.com/scienceinaction/pgs/hot_8u1.html)

Unit 2 – Cells and Systems



- **Topic 1 Notes & Quiz** (Page 4)
- **Topic 2 Notes & Quiz** (Page 7)
- **Topic 3 Notes & Quiz** (Page 10)
- **Topic 4 Notes & Quiz** (Page 13)
- **Topic 5 Notes & Quiz** (Page 16)
- **Topic 6 Notes & Quiz** (Page 21)
- **Topic 7 Notes & Quiz** (Page 25)
- **Unit Summary** (Page 29)
- **Review Booklet** (Page 30)
  (Covered in class, prior to the Final Achievement Exam)
- **Unit 1 – Cells and Systems Test** (Page 37)
- **Answer Key for Section Quizzes and Unit Test** (Page 44)

Additional support will be provided, in the form of practice Achievement Test Questions, during the course review in June. Multiple Choice Questions and Numerical Response Questions will be reviewed, as these are the types that will make up the Science 8 Final Exam

Handouts and other activities, to reinforce the concepts covered in this Unit, will be made available based on need. If you require further information or resources, email Edquest directly: edquest@gmail.com.

Finding Solutions to Problems, instead of Making Excuses

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Student Instructions for use of this Learning Pack

The purpose of this Learning Unit Pack is to provide you with the resources that will help you cover the material from the curriculum that will be tested on the Final Exam in June.
Follow these steps to successfully complete this Unit Learning Pack:

Step 1 – Read the **Topic Notes**

Step 2 – Use a **highlighter** to identify the key words or phrases in the Topic Notes and reread the material again paying close attention to those words that you highlighted. If necessary, modify your highlights to make sure you understand the material in the notes.

Step 3 – Complete the **Topic Quiz**

Step 4 – Correct the Topic Quiz by **checking the answers** in the back of this Learning Pack.

Step 5 – Using your **textbook** and the **completed quiz**, find the page where the question and correct answer can be found and write it next to the question number in your Learning Pack.

Step 6 – **Repeat Steps 1-5** for each of the other Topics in this Unit.

Step 7 – Look over the **Unit Outline** to review the **Key Concepts** once you have completed all of the Topics.

Step 8 – Complete the **Unit Review**, using your **Learning Pack** and **Textbook**.

Step 9 – **Highlight** those sections of the Review that you had difficulty with and review those sections with your teacher prior to taking the Unit Test.

Step 10 – Take the **Unit Test** and correct it using the answer key provided in the back of the Learning Pack.

Step 11 – You should now be ready to answer any questions on the **Final Exam** related to this Unit.

Anything you still do not understand should be discussed with your teacher. Congratulations on your **Independent Study**, and Good Luck on the Final Exam. I hope you have made good use of this resource. Please provide feedback to your teacher, so that this resource can be improved.

Additional support is available in the form of practice Achievement Test Questions. **Multiple Choice Questions** and **Numerical Response Questions** will be made available on request, as these are the types that will make up the **Science 8 Achievement Exam**.

Handouts and other activities, to reinforce the concepts covered in this Unit may be acquired by visiting the Edquest Middle School Science Resource Website

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Topic 1 – Living Organisms (pgs. 98 – 102)

Characteristics of Living things …

Functions		Structures
	Energy Living organisms need energy	
	Environment Living organisms respond and adapt to their environment	
	Reproduction Living organisms reproduce	
	Growth Living organisms grow	
	Wastes Living organisms produce wastes	

Do Find out Activity p.99 'Functions and Structures' to complete the table

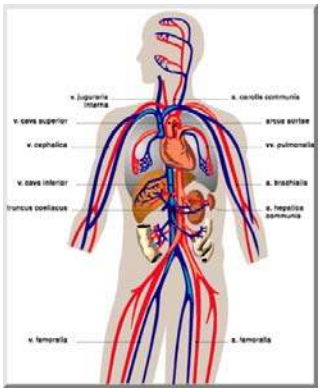
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Levels of Organization in Organisms

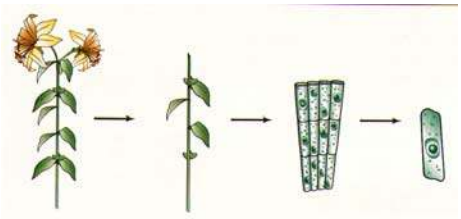
- organisms have **systems** which perform the functions that keep that organism alive
- systems are made up of **organs**
- organs are made from **tissue**
- tissues are composed of **cells**

Examples:

- figure 2.1A ***The Human Circulatory System***



- figure 2.1C ***A Plant's Shoot System***



Cells Work Together

The cells of an organism all work together to help perform the various functions that need to occur if the organism is to live. The specialized cells of the body perform task that enable the organism to survive despite the actions and or habits it is involved in on a daily basis.

The Pika eats only plants and bacteria in the Pika's stomach help it to digest the nutrients it needs to stay alive. The Seabird ingests salt every time it eats fish, but specialized cells concentrate the salt and allow the seabird to get rid of the excess salt out of a small tube in it's beak. Other animals get needed nutrients by the natural occurrence of high concentration in the environment in which these organisms live (salt licks for moose)

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Cells and Systems
Topic 1 – Living Organisms Practice Quiz

1. Characteristics of living organisms include all of the following, EXCEPT…

    A. They need energy produce wastes
    B. They reproduce and grow
    C. They respond to their environment and adapt
    D. They grow and move freely in their environment

2. The basic unit of every system is a …

    A. Nucleus
    B. Cell
    C. Tissue
    D. Organ

3. The stomach is a major organ of the digestive system. The specialized tissue that enables this organ to perform its function, to break down food, is …

    A. Blood tissue
    B. Nerve tissue
    C. Muscle tissue
    D. Digestive tissue

4. Plants use their shoot system to make food for the plant. The stem is the organ of the plant that gives it support. The specialized cells in the stem are able to provide support because they have …

    A. Thick walls
    B. A large nucleus
    C. Very little water
    D. Chlorophyll

5. The Pika is an example of a multi-cellular organism that is able to survive because of the way that its cells are organized. The special baglike chamber, where chewed and semi-digested food collects, enables them to help break down the food. They are …

    A. Specialized tissues
    B. Tiny bacteria
    C. Very strong chemicals
    D. Muscle cells

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Topic 2 – Microscopes and Cells (pgs. 103 – 114)

A World Too Small To See …

- when an object is made to appear larger than it's actual size, it is said to be **magnified**..

Early Microscopes …

- micro-organisms were first discovered by **Anton van Leeuwenhoek**. His hobby of grinding lenses led him to eventually make the first simple microscope to study blood samples, pond water and plaque (which he scraped from his teeth) The organisms he found – that were single cells – he called '***animalcules'***
- **Robert Hooke** was also experimenting with microscopes he had built to look at different things, such as a tiny piece of cork. The small holes that were honeycombed were described as 'little rooms or boxes' and the word ***cellulae*** was used to name them (Latin form of 'cell').

Cells in All Living Things …

- Two scientists (Matthias Schleiden and Theodore Schwann) who studied cells combined their observations to make a hypothesis … ***all living things are made up of cells***.
- A cell is the basic unit of life, because all the functions carried out by living things are carried out by their individual cells
- Rudolf Virchow contributed his observation and together the **Cell Theory** was formulated:
    - all living things are composed of one or more cells
    - cells are the basic units of structure and function in all organisms (Web: http://library.thinkquest.org/3564/?tqskip=1)

Microscopes Today …

- Technology improvements have lead to the development of compound light microscopes (2000X magnification) and electron microscopes (2,000,000X magnification).
- there are two types of electron microscopes:
    - **TEM** (transmission electron microscope) and
    - **SEM** (scanning electron microscope)
- The microscope has become a valuable tool for the investigation of the microscopic world



See the electron microscopic images on page 114

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Cells and Systems
Topic 2 – Microscopes and Cells Practice Quiz

1. Anton van Leeuwenhoek was the first person to see tiny organisms, made up of only one cell, using a very simple microscope. His occupation, at the time that he discovered these tiny cells, was a …

    A. Lens grinder
    B. Doctor
    C. Linen merchant
    D. Lens crafter

2. The scientist, who originally named these tiny cells, which reminded him of honeycombs, was …

    A. Anton van Leeuwenhoek
    B. Robert Hooke
    C. Matthias Schleiden
    D. Theodore Schwann

3. The cell theory was based on these two points. All living things …

    A. Have many cells and these cells are always in motion
    B. Have many cells and they are too small to see
    C. Are made up of one or more cells and they are the basic units of structure and function
    D. Are able to reproduce and have many cells with specialized functions

4. Two Canadians developed the first practical electron Microsoft. To test this very valuable laboratory instrument, they first looked at a …

    A. Cork
    B. Razor blade
    C. Copper wire
    D. Drop of pond water

5. To calculate the Field of View, you first need to …

    A. Determine the diameter of the field of view for the low power lens
    B. Calculate the magnification power of the lens you are using
    C. Count the number of cells in the low power field of view
    D. Multiply the magnification by the number of cells in the field

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Topic 3 – The Cell and Its Structures (pgs. 115 – 126)

The Cell

- All cells, plant and animal, have structures and each structure performs a specific function in order for the cell to maintain life.
- When viewed with a compound light microscope these cell structures become visible to the naked eye.

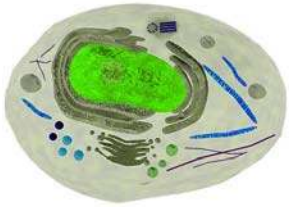
Cell Structures

The structures inside the cell are called **organelles**.
See pgs 122-123

Plant Cell



Animal Cell



Cell Membrane - surrounds and protects the contents of the cell

Cell Wall - are much thicker and more rigid than membranes, providing support for the plant or fungi

Cytoplasm - distributes materials to different parts of the cell

Nucleus - controls the cell's activities

Vacuoles - is a membrane-bound sac acting as a storage space for surplus food, wastes and other substances the cell is unable to use immediately

Chloroplasts - are the structures in which photosynthesis takes place (found in green plants)

Cell Size and Function

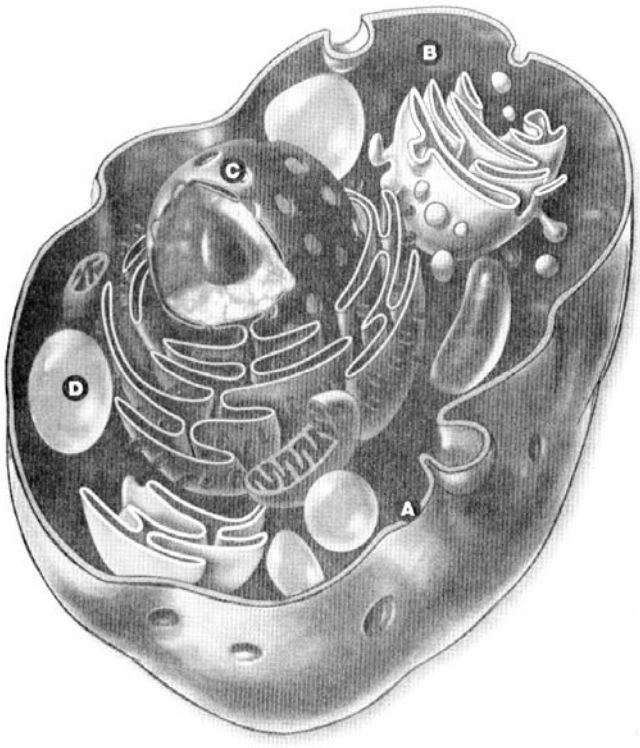
- to carry out their work, cells need a constant supply of materials, such as oxygen, water and food particles and they also need to get rid of waste products, all these materials must pass through the cell membrane, most cells fall into a very narrow range of size between 10 - 50 micrometers (μm)

WRAP-UP p. 127

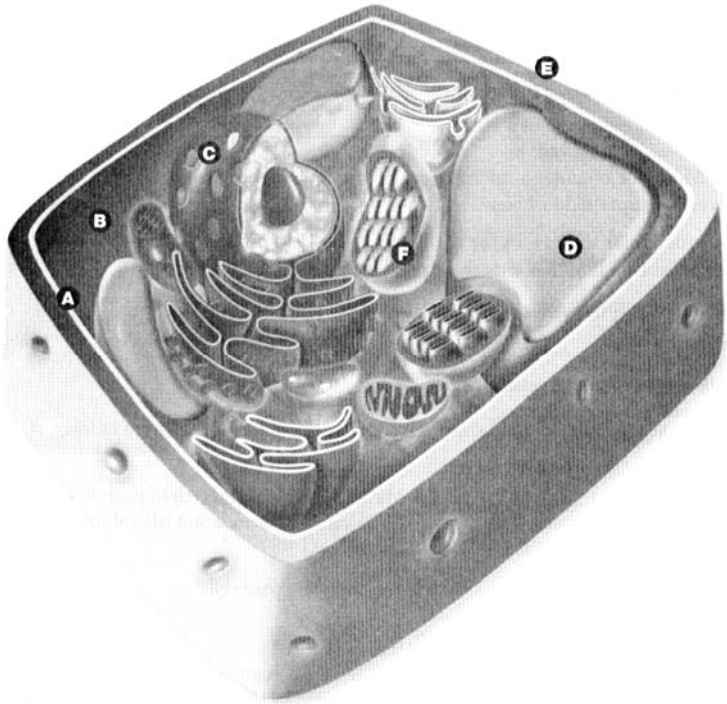
>>>> A good review of Topics 1 – 3 in this Unit <<<<

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Animal Cell



Plant Cell



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Cells and Systems
Topic 3 – The Cell and its Structure Practice Quiz

1. Structures, the unicellular organisms, such as a euglena, or a chlamydomonas have for movement are called …

    A. Flagella
    B. Cytoplasm
    C. Stentor
    D. Diatoms

2. In the sample of pond water you may have studied, the amoeba moves by changing its shape. It pushes its cytoplasm against one part of its cell membrane, causing a bulge. This bulge is called a …

    A. Pseudonym
    B. Pseudoplasm
    C. False fingers
    D. False foot

3. A typical plant cell viewed under a compound light microscope reveals that many different parts that have different functions. The part of the cell which surrounds and protects the contents of the cell is called the …

    A. Nucleus
    B. Cytoplasm
    C. Cell membrane
    D. Vacuole

4. The chloroplasts of a plant cell have a very specialized function. They are the structures where …

    A. Food is transported to other parts of the cell
    B. Photosynthesis takes place
    C. Food is stored by the cell unit it is needed
    D. Energy for reproduction is released

5. Cells are various sizes and shapes. They are normally measured in units called …

    A. Nanometers
    B. Micrometer
    C. Minimeters
    D. Macrometer

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Topic 4 – Fluid Movement in Cells (pgs. 128 – 137)

The Cell Membrane

- A cell membrane allows some substances to enter or leave the cell, while stopping other substances. It is a **selectively permeable** membrane. (A **permeable** membrane allows all materials through, while an **impermeable** membrane does not allow anything through)

Diffusion

- The structure of the cell membrane controls what moves in or out of a cell. Particles - moving in all directions, bumping into each other, eventually spread out evenly throughout the cell (**diffusion**).
- Diffusion plays a part in moving substances into and out of a cell. **Concentration** determines the direction that a substance takes through the cell membrane – particles move from higher concentration areas to lower concentration areas (equal concentration allows the movement of particles in and out equally – whereas, a higher concentration of particles on the inside of the cell will move to an area of lower concentration on the outside (so movement will only occur from inside to outside) – until there is a balance.

Osmosis

- The diffusion of water through a selectively permeable membrane is called **Osmosis**.
- Water helps to dissolve many of the substances involved in cell processes. When water is lost (moves out of the cell) it leaves behind a high concentration of the dissolved substances – when water moves back into the cell, the substances become more diluted and can be used by the cell for it's life functions.

Fluid Movement in Plants

- Plants require a large supply of water to make sugars in the process of **photosynthesis**. A group of cells, that perform similar functions, are called **tissue**. The transportation of nutrients is the role of plant tissues.
- **Vascular tissues** connect the roots to the leaves.
- **Phloem Tissue** transports sugars manufactured in the leaves to the rest of the plant.
- **Xylem tissue** conducts water and minerals, absorbed by the root cells, to every cell in the plant.
    - Xylem and Phloem tissue usually occur together, along the length of plant stems and roots

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From Root to Leaf

- The root system contains fine ' **root hairs** '. These hairs are extensions of epidermal cells (which protect the outside of the plant)
- When the concentration of water is greater on the outside of these ' root hairs ' then water can pass through the membrane by osmosis – which continues from cell to cell, until it reaches the xylem tissue.
- The tube-shaped xylem cells then move the water by a build up of water pressure in the root hairs (high pressure to low pressure) forcing the water up the xylem tissue, like water up a straw, into the stems and leaves.

Leaves are the plant's food-producing organs (this is where **photosynthesis** takes place). Photosynthesis takes place in the layer of cells that contain **chloroplasts** (these cells are called **palisade** cells). They are thin, allowing a large amount of light in (large surface area), and enabling the gases (in the air) to diffuse into the leaf cells. (see figure 2-19)

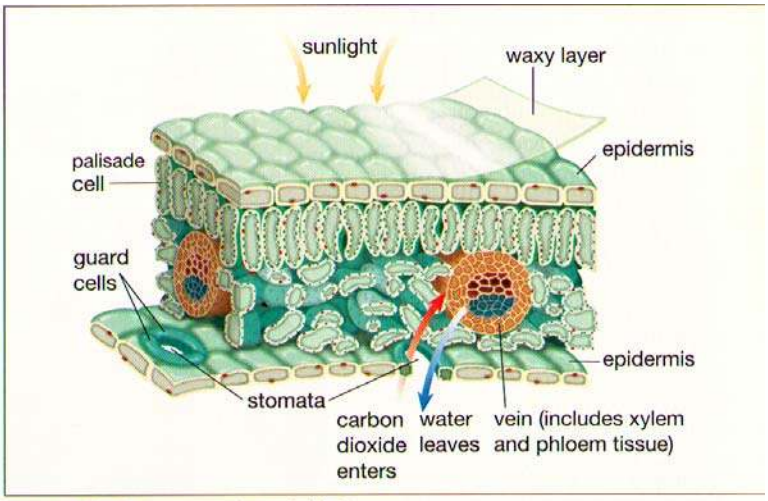


Figure 2.19 The structure of a typical leaf

- The tiny openings, called **stomata**, allow air to enter the leaf (supplying oxygen for respiration and carbon dioxide for photosynthesis). The spaces between leaf cells allow the air to flow and the **guard cells** open and close the stomata.

Transpiration

- The loss of water (in a plant) happens through evaporation and is called transpiration. It is not a problem, unless, the plant loses too much water and doesn't replace it by the roots.
- The movement of water throughout the plant happens because of the differences in pressure – high pressure in the root hairs to lower pressure in the leaves – (pushing and pulling water throughout the whole plant)

Pushing and Pulling

Water particles are attracted to each other throughout the plant's transportation network. Water is drawn in by osmosis, pushed up as it fills up and pulled up by process of transpiration. All these actions are necessary to move the water to the top of the plant.

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Cells and Systems
Topic 4 – Fluid Movements in Cells Practice Quiz

1. Certain materials are allowed to pass through it and others are prevented from passing through. The type of cell membrane that is present in a plant and animal cell is called a ...

    A. Selectively impermeable membrane
    B. Selectively permeable membrane
    C. Permeable membrane
    D. Impermeable membrane

2. A process which enables substance to spread out, throughout a solution, eventually becoming evenly distributed in the solution, is called …

    A. Distillation
    B. Dissolving
    C. Desalination
    D. Diffusion

3. Whenever nutrients are moved in about out of cells, the process takes place through the cell membrane. This process occurs because of different …

    A. Types of nutrients present
    B. Concentration present
    C. Types of membranes
    D. Sizes of openings in the membrane

4. Osmosis is the diffusion of water through a selectively permeable membrane. This process occurs because water will move from an area of …

    A. Low concentration to high concentration
    B. High concentration to low concentration
    C. Low concentration to low concentration
    D. High concentration to high concentration

5. The transportation of nutrients in plants is the role of the plant's tissue. Specialized tissue connects the roots to the leaves. The Phloem tissue transports …

    A. Water from the leaves to the air in a process called transpiration
    B. Water from the roots to the leaves
    C. Sugars, manufactured in the leaves to the rest of the plant
    D. Energy to the vacuole to utilize the food stored there

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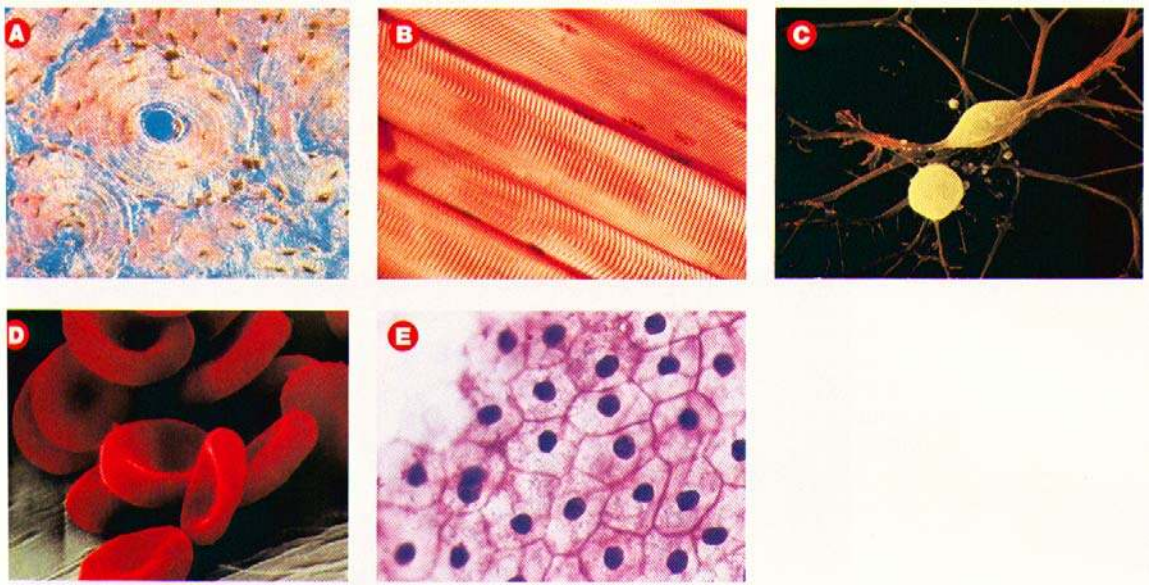
Topic 5 - Cell Specialization and Organization (pgs. 138 – 144)

Specialized Cells

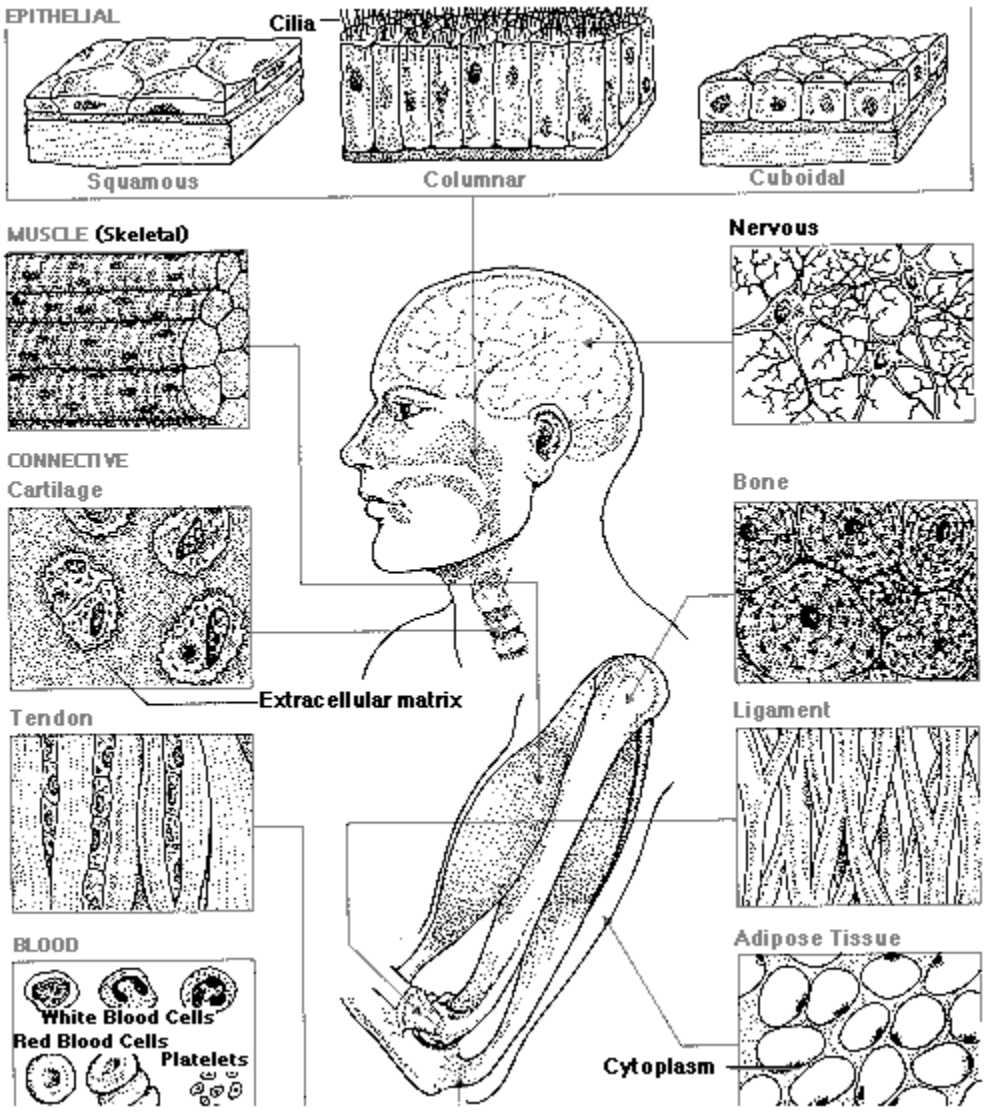
Different cells have different structures and functions:

Type of Cell	Shape (Structure	Function
Muscle	Elongated and tapered on either end	Move parts of the body
Skin	Flat and thin, brick-shaped or honeycomb	Fit closely together to form a continuous protective layer
Nerve	Long branched fibres running from the main part of the cell	To carry nerve signals from one part of the body to another
Blood	Thin, disc-like	Carry oxygen in the bloodstream (giving them a large surface area to collect oxygen)
Bone	Thick, mineral matrix	To provide support

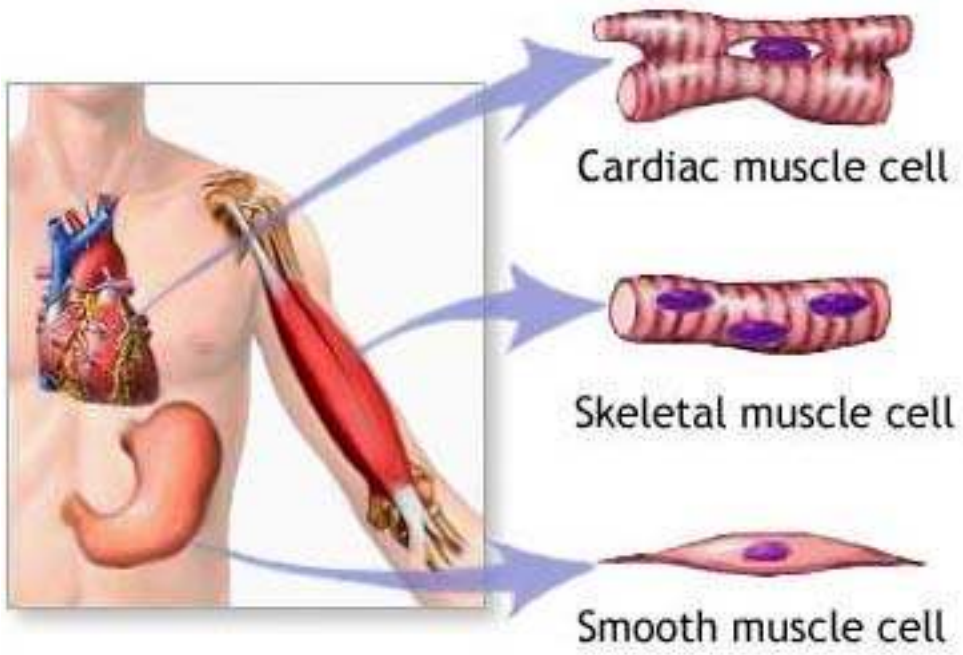
Can you identify each?

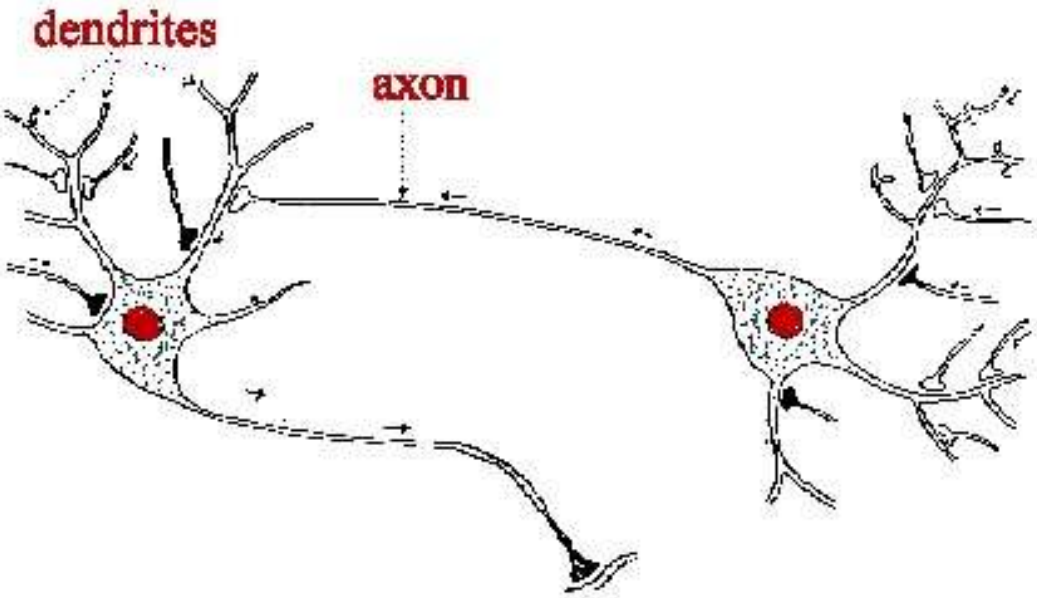


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The Advantages of Being Multi-cellular ….. Size ….. Versatility

Multi-cellular organisms can:

- live in a wide variety of environments
- grow very large
- obtain their energy from a wide variety of foods
- have complex bodies
- specialize functions and work in harmony with other cells

Cells with the same structure and function form tissue
Tissues form organs
Organs work together in organ systems
Systems work together to form an organism

Tissues

Tissues are groups of similar cells that work together, having similar structure and function. (Figure 2.22 and Figure 2.23 – page 141)

Organs

Each organ is made up of several tissues all working together. They are distinct structures in the body that perform particular functions. (Plants have organs as well – roots, stem and leaves)

Systems

Organs work together to perform activities that help the organism function as a whole. Plants typically have two systems (root system and shoot –stems and leaves – system). A reproductive system (flowers, fruits and seeds) is often produced at certain times as well.

WRAP-UP p. 145

>>>> A good review of Topics 4 – 5 in this Unit <<<<

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Cells and Systems
Topic 5 – Cell Specialization and Organization Practice Quiz

1. Specialized cells are specialized for particular tasks. These types of cells are specialized to provide structure and support. They are called …

    A. Nerve cells
    B. Muscle cells
    C. Blood cells
    D. Bone cells

2. There are many advantages to being a multi-cellular organism. The following are examples of some of these advantages, EXCEPT for one, which is that they …

    A. Have a specialized environment
    B. Can grow to be very large
    C. Can obtain food from many sources
    D. Have complex bodies

3. The organization of cells follows this pattern …

    A. Cells form organs, tissues and systems
    B. Cells form tissues, organs and systems
    C. Cells form systems, organs and tissues
    D. Cells form organs, systems and tissues

4. The stomach is an organ which is made up of different tissues. The connective tissue, in the stomach, is the specialized tissue that enables the stomach to …

    A. Hold its shape
    B. Move the contents around
    C. Line the walls of the stomach
    D. Co-ordinate all of the stomach's activities

5. Organs work together to make a system or network that performs a specialized function. Plants have only two main systems. They are the …

    A. Stems and the leaves
    B. Roots and the leaves
    C. Shoot and the roots
    D. Leaves and the shoot

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Topic 6 – Body Systems in Humans (pgs. 146 – 153)

The Digestive System

Food enters your body through the mouth and then passes to the stomach and intestines. It is broken down along the way into usable, soluble particles that can be used by different cells. (Figure 2.26)

The Respiratory System

Breathing (the exchange of gases) moves air in (**inhalation**) and out (**expiration**) of our bodies. (Figure 2.27)

The Circulatory System

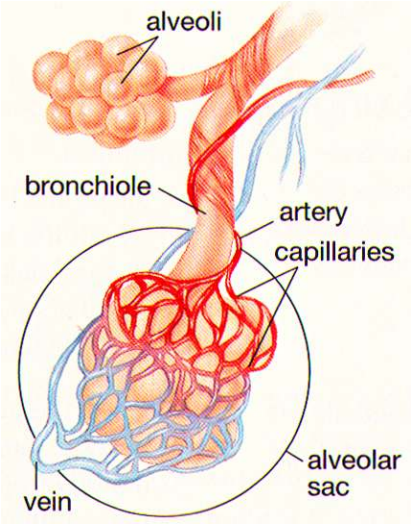
Transports food and gases throughout our body (Figures 2.28 and 2.29)

How the Respiratory and Circulatory Systems Connect

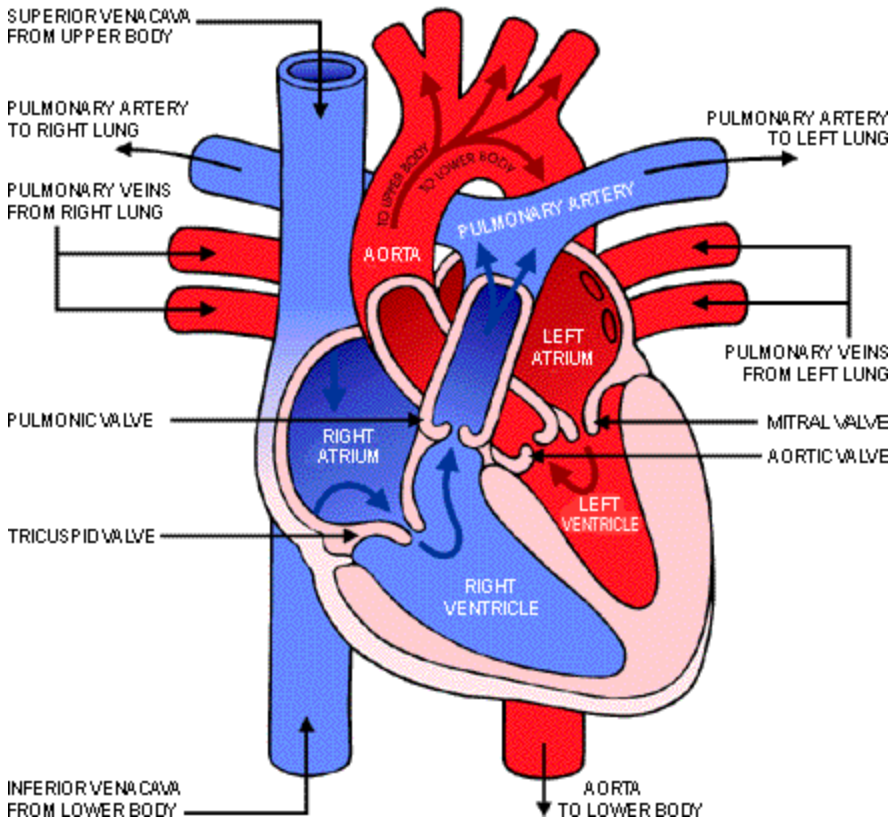
The respiratory system exchanges oxygen and carbon dioxide, while the circulatory system transports those gases throughout the body.

The interaction between these two systems happens in the tissues of the lungs

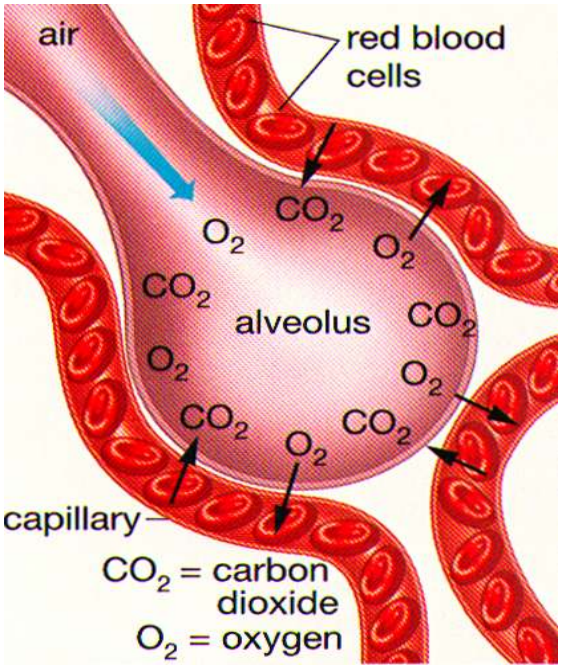
Diffusion occurs between the **alveoli** (tissues of the respiratory system) and the **capillaries** (tissues of the circulatory system)



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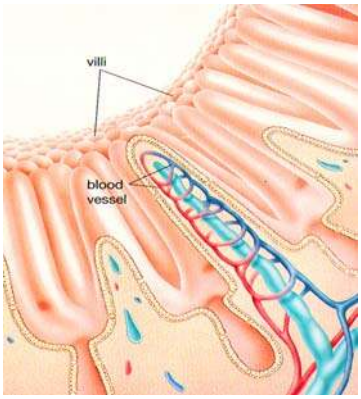
Oxygen goes from the alveoli to the capillaries and **carbon dioxide** goes from the capillaries to the alveoli



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How the Digestive and Circulatory Systems Connect

The transfer of food particles, from the digestive system to the circulatory system, takes place at the inner lining of the small intestine, through millions of tiny, finger-like projections, called **villi**, which contain a network of capillaries. The transfer of food particles is possible because of **absorption** (the villi absorb the food particles from the capillaries and then transport the nutrients to the cells, to be used as fuel).



The Excretory System

Filters waste materials from the blood.

The Sensory Awareness System

Allows each of the systems of the body to respond to changing conditions and make adjustments in order to maintain a stable internal environment, allowing the cells to function properly.

- Quivering muscles generate heat
- 90% of heat loss is through the skin (most of the rest is through the lungs)
- Hairs on the skin stand on end when the tiny muscle cells near the surface contract, creating ' **gooseflesh** ' (goosebumps)
- Fluffing body hair (in animals with thick fur) reduces heat loss by improving insulation
- Feeling flushed (red and hot) happens because tiny blood vessels in the skin expand, which increases blood flow
- Sweating helps cool down your body as moisture evaporates from the skin surface

The nervous system helps to keep your body temperature stable by monitoring conditions outside, using temperature receptors in the skin. The information is then transmitted to the **hypothalamus** (section of the brain which regulates body functions) which then decides what action needs to be taken – increasing activity to raise the temperature or, reduce it to prevent heat loss. Response to stimuli is co-ordinated by the **nervous system** (brain, spinal cord and nerves) and the **endocrine system** (glands that produce hormones).

Diet, exercise, drugs, injury and **disease** can affect body systems and how they perform their functions.

Summary Chart (Table 2.1 – Page 153)

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Cells and Systems
Topic 6 – Body Systems in Humans Practice Quiz

1. This organ system carries nutrients throughout the body, so that specialized cells can perform specialized functions. This body system is the …

    A. Digestive system
    B. Integumentary system
    C. Circulatory system
    D. Respiratory system

2. When different gases are exchanged in the lungs and then transported throughout the body, the systems working together are the …

    A. Respiratory and integumentary
    B. Respiratory and digestive
    C. Respiratory and circulatory
    D. Respiratory and sensory

3. The excretory system is connected to other systems, such as the circulatory system and the digestive system. The excretory system's primary function is to …

    A. Get rid of wastes
    B. Get nutrients to the cells
    C. Exchange gases
    D. To protect the other systems

4. Sensory awareness is important for all living things, so they can respond and adapt to their environment. When your muscles 'quiver' because you are cold, they generate …

    A. Wastes
    B. Heat
    C. Blood flow
    D. A nutrient imbalance

5. A knee-jerk reaction is a simple example of a feedback system that is controlled by the nervous system in the body. The stimulus used is a …

    A. Reflex hammer
    B. Brain
    C. Spinal cord
    D. Leg

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Topic 7 – Body Systems and Your Health (pgs. 154 – 162)

Muscles require more oxygen and nutrients as activity increases, making the heart work faster pumping blood (which supplies what is needed).

Blood – The Body's Transportation System

The blood vessels of the circulatory system form a complex network linking the outside environment with the internal environment of the body. The blood supplies all the living cells in the body with the nutrients they need to carry out their functions.
About 8% of an adult's body weight is blood, made up of:
(Table 2.2, page 155)

Component	% of blood (by volume)	Main Function
plasma	55%	carries nutrients, waste products, hormones, and blood cells
red blood cells	44%	carries oxygen (because they have **hemoglobin** – an iron- rich chemical, which attracts oxygen)
white blood cells	less than 1%	defends the body against infection and disease
platelets	less than 1%	causes the blood to clot (thicken) at site of wounds to prevent blood loss

The circulatory system must work closely with the respiratory system (which supplies the oxygen) and the digestive system (which supplies the nutrients)

Disorders, which can hospitalize Canadians include: circulatory system (15%), digestive system (11%) and respiratory system (10%).

A Healthy Circulatory System

The **heart** circulates the blood throughout the body by pumping it to where it can supply nutrients and remove wastes.
Disorders of the circulatory system include: high blood pressure (hypertension), heart attacks (damage to heart muscle) and strokes (brain damage).

Blood Pressure

The device used to measure blood pressure is called a **sphygmomanometer** (an inflatable cuff wrapped around the arm, with a pump attached – which is used to inflate it). The blood flow is slowed and then listened to by a doctor, with a **stethoscope**.
Blood pressure indicates:

- The volume of blood
- Heart rate
- Artery size
- Artery elasticity
- Blood viscosity

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Disorders of the Circulatory System

Certain conditions place people at greater risk of contracting a circulatory system disorder:

- Smoking (**nicotine** causes blood vessels to constrict, increasing the heart rate and raising blood pressure – **carbon monoxide** competes with oxygen in the lungs, reducing the blood's ability to carry oxygen)
- Poor diet (may produce a high **cholesterol** level – building fat in the arteries and restricting blood flow)
- Little exercise (makes fatty deposits increase, because the nutrients are not used

A Healthy Digestive System

Food provides nutrients in the form of carbohydrates, fats, proteins, vitamins, minerals and water – which provide energy and materials used for growth, development and repair.
Some foods cause poor health and promote disease (like refined sugar and low fibre foods) if consumed in large quantities over long periods of time.

Nutrients in Food

Starch and **sugars** are carbohydrates and provide the body with its main source of energy. **Fats** are also essential in our diet, providing us with energy and cushioning the internal organs from shock. **Proteins** are essential for growth and repair of body tissues. **Minerals** and **vitamins** are also needed for good health.

Disorders of the Digestive System

High fibre diet is important because fibre is used by the colon to process waste materials (low-fibre can irritate the colon wall and lead to **colon cancer**).

Long-term stress, smoking, excessive use of alcohol or aspirin can lead to a **peptic ulcer**.

A Healthy Respiratory System

Smoking, air pollution and industrial by-products (coal dust) can lead to disorders of the respiratory system.

Disorders of the Respiratory System

Cilia (small hair-like projections in your lungs) beat continuously to remove airborne particles.
Poisons in cigarette smoke and pollutants irritate the lining of the lungs, causing certain cells to produce more mucus. If this lining becomes inflamed, it can lead to **bronchitis**, which can lead to **emphysema**.
Lung cancer is caused by the tar and smoke in cigarettes, which cause the lung cells to grow out of control and overcome healthy cells.

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You and Your Body

Proper care means maintaining healthy organs and organ systems. This can be accomplished with clean air and water, nutritious foods, exercise and sleep. This is a healthy lifestyle, which makes you feels better and helps your body resist disease. Your **immune system** will work best when you are well fed and rested.

WRAP-UP p. 163

>>>> A good review of Topics 6 – 7 in this Unit <<<<

Unit Review p. 168-171

>>>> A review of all of the Topics in this Unit <<<<

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Cells and Systems
Topic 7 – Body Systems and Your Health Practice Quiz

1. The type of blood cells that comprise less then 1% of the blood's volume and defends the body against infection and disease are the …

    A. Red blood cells
    B. White blood cells
    C. Plasma cells
    D. Platelets

2. Disorders of the circulatory system are the leading cause of death in North America. One of the most common is hypertension, which is …

    A. Damage to the heart tissue
    B. Heart attacks or strokes
    C. High blood pressure
    D. Waste remaining in the blood

3. Digestive system disorders are caused by poor lifestyle habits or disease. One such disorder may lead to colon cancer. It is caused by …

    A. Over exertion
    B. Low fiber diet
    C. High fiber diet
    D. Excessive use of aspirin

4. In the respiratory system, when the cilia (which remove airborne particles) are clogged by mucus, they cannot perform their function properly and over time, can become inflamed. This condition (which can be treated) is called …

    A. Bronchitis
    B. Ciliaitis
    C. Emphasyma
    D. Lung cancer

5. Your body needs to have the right conditions under which it can perform its functions properly. To maintain healthy organs and systems, the essential needs are …

    A. Clean air, water, nutritious food, exercise and sleep
    B. Dairy products, fruits and vegetables, meat and grains
    C. Oxygen, minerals, vitamins, relaxation, and medicine
    D. Fats, sugars, carbohydrates, proteins and salt

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Cells and Systems Review

What do living organisms have in common? What variations do we find in their structure and function? How do body systems work together to keep organisms healthy?	
Key Concepts (Unit At A Glance Science Focus 8 p. 168) Links to Topic Notes provided	Guiding Questions and Activities to Help you Study
Topic 1 Living organisms are made from cells Structures and Functions Levels	- What are the basic functions of all living things, and what are the structures that enable organisms to perform those functions? (p. 98) - How are living organisms organized. (p. 100-101)
Topic 2 The Microscope Calculating Field of View	- Describe the changes that too place in the development of the microscope over time. - What are the main parts of the microscope? (p.107) - Describe how to calculate the field of view. (p.111)
Topic 3 Structures of Cells (Plant and Animal)	- Identify the main component parts of both the plant cell and the animal cell.
Topic 4 Fluids in Cells Diffusion Osmosis Transpiration	- What is a selectively permeable membrane? (p.128) - Describe Diffusion. (p.129) - Describe Osmosis. (p.130) - What is Transpiration? (p.135) - Explain how a plant transports fluids, from the roots to the leaves.
Topic 5 Specialized Cells Organization of Cells	- Identify and describe the differences between different specialized cells. (p.138) - What are the primary advantages of multicellular organisms (compared to unicellular organisms)? - Describe the levels of cellular organization in a multicellular organism. (p.140)
Topic 6 Respiratory System Circulatory System Digestive System Excretory System Nervous System	- Can you identify the important parts of each of the body systems? - Describe how each body system has a particular function. (p.153) - How do the different body systems work together? Give specific examples.
Topic 7 Disorders Healthy Life Choices and Styles	- How can you keep each of your body systems healthy? - What disorders are common in each of the body systems? - What life style choices should be made if we want healthy bodies?
Design a Concept Map linking the ideas introduced and reinforced in this Unit on Cells and Systems	

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Unit 2 – Cells and Systems – Year End Review

Complete each of the following questions, relating to the specific learner outcomes, covered this year in Grade 8. The questions in this review reflect what you should have mastered and will be tested on in the Final Achievement Exam. The answers will be covered in class.

Part 1 – Characteristics of Living Things

What are the basic functions of all living things, and what are the structures that enable organisms to perform those functions? (p. 98)

_____

_____

_____

_____

_____

_____

How are living organisms organized. (p. 100-101)

Part 2 – The Microscope

Describe changes that took place in the development of the microscope over time.

_____

_____

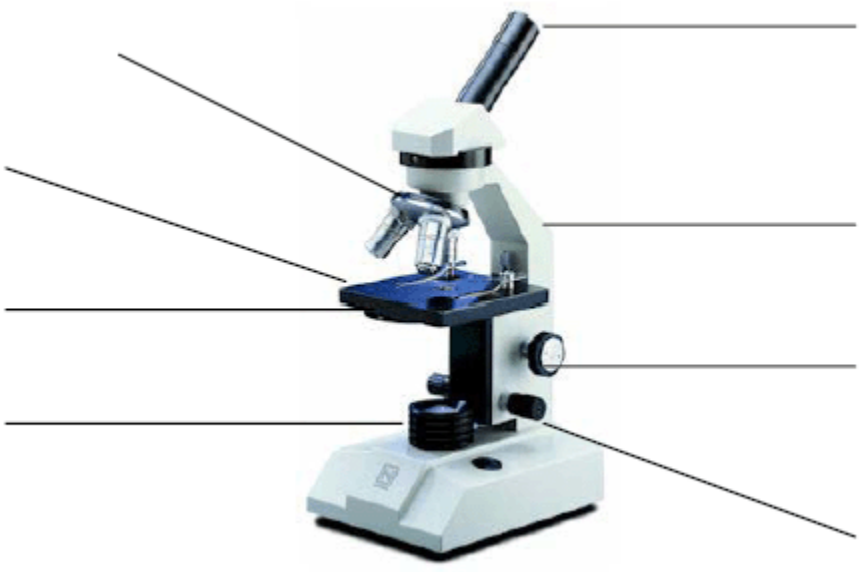
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What are the main parts of the microscope? (p.107) (Label as many parts as you can.)



Describe how to calculate the field of view. (p.111)

_____

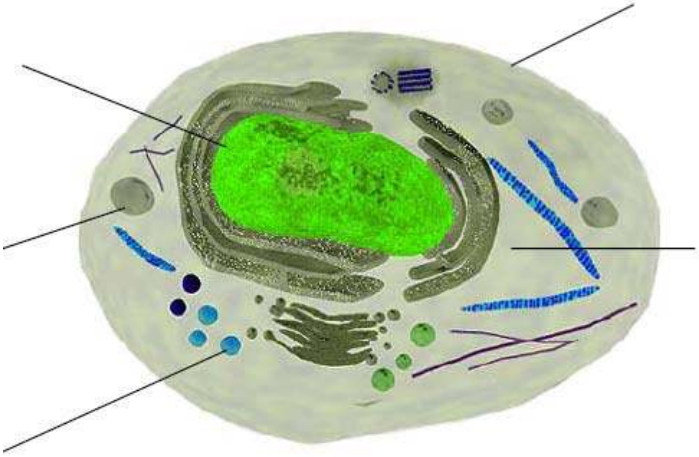
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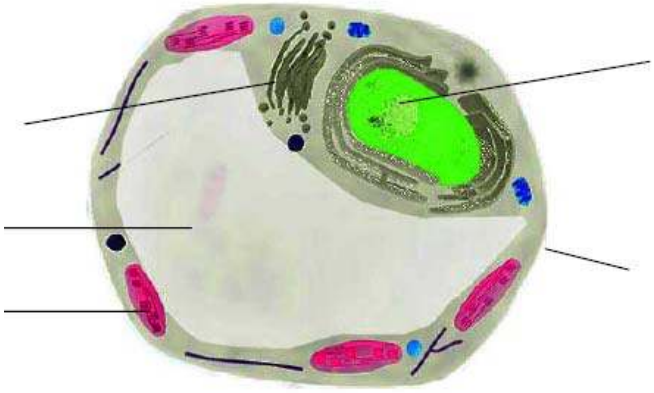
Part 3 – Cells

Identify the main component parts of the **animal cell**.



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Identify the main component parts of the **plant cell**



Part 4 – Cell Processes

What is a **selectively permeable membrane**? (p.128)

_____

_____

Describe **diffusion**. (p.129)

_____

_____

Describe **osmosis**. (p.130)

_____

_____

What is **transpiration**? (p.135)

_____

_____

Explain how a plant transports fluids, from the roots to the leaves.

_____

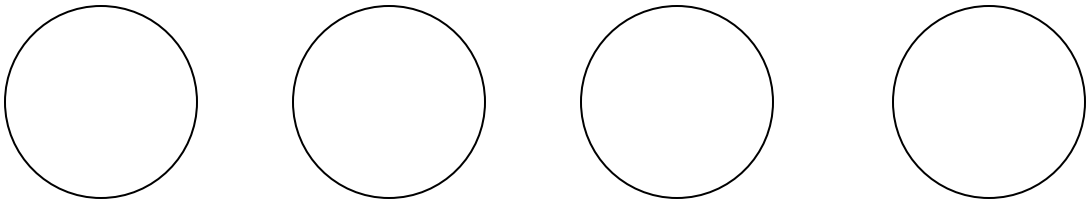
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Part 5 – Cell Specialization

Identify and describe the differences between different specialized cells. (p.138)



Muscle	Nerve	Skin (epithelial)	Bone (connective)

What are the primary advantages of multi-cellular organisms (compared to unicellular organisms)?

_____

_____

_____

_____

Describe the levels of cellular organization in a multi-cellular organism. (p.140)

_____

_____

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_____

_____

_____

_____

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Part 6 – Body Systems

Identify the important parts (structures) of each of the body systems and describe how each body system has a particular function. (p.153)

Body System	Structures (Parts)	Function of System
Respiratory	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____
Digestive	_____ _____ _____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____
Nervous	_____ _____ _____ _____ _____	_____ _____ _____ _____

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Excretory	_____ _____ _____ _____ _____	_____ _____ _____ _____
Skeletal	_____ _____	_____ _____ _____ _____
Muscular	_____ _____	_____ _____ _____ _____

How do the different body systems work together? Give specific examples.

_____

_____

_____

_____

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_____

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_____

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Part 7 – A healthy life style leads to a healthy body

How can you keep each of your body systems healthy?

_____

_____

_____

_____

_____

What disorders are common in each of the body systems?

Respiratory _____

Digestive _____

Nervous _____

Excretory _____

Skeletal _____

Muscular _____

What life style choices should be made if we want healthy bodies?

_____

_____

_____

_____

_____

_____

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Cells and Systems Unit Test

Student Name Class

1. Characteristics of living organisms include all of the following, EXCEPT ...

A. they need energy and produce wastes

B. they reproduce and grow

C. they respond to their environment and adapt

D. they grow and move freely in their environment

2. The basic unit of every system is a ...

A. nucleus

B. cell

C. tissue

D. organ

3. The stomach is a major organ of the digestive system. The specialized tissue that enables this organ to perform its function, to break down food, is ...

A. blood tissue

B. nerve tissue

C. muscle tissue

D. digestive tissue

4. Plants use their shoot system to make food for the plant. The stem is the organ of the plant that gives it support. The specialized cells in the stem are able to provide support because they have ...

A. thick walls

B. a large nucleus

C. very little water

D. chlorophyll

5. The Pika was described in the text as an example of a multi-cellular organism that is able to survive because of the habits and the environment of the organism, which direct the way that cells are organized. The special baglike chamber, where chewed and semi-digested food collects, enable these, to help break down the food. They are ...

A. specialized tissues

B. tiny bacteria

C. very strong chemicals

D. muscle cells

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6. Anton van Leeuwenhoek was the first person to see tiny organisms, made up of only one cell, using a very simple microscope. His occupation, at the time that he discovered these tiny cells, was a ...

A. lens grinder
B. doctor
C. linen merchant
D. lenscrafter

7. The Scientist, who originally named these tiny cells, which reminded him of honeycombs, was ...

A. Anton van Leeuwenhoek
B. Robert Hooke
C. Matthias Schleiden
D. Theodore Schwann

8. The cell theory was based on these two points. All living things ...

A. have many cells and these cells are always in motion
B. have many cells and they are too small to see
C. are made up of one or more cells and they are the basic units of structure and function
D. are able to reproduce and have many cells with specialized functions

9. Two Canadians developed the first practical electron microscope. To test this very valuable laboratory instrument, they first looked at a ...

A. cork
B. razor blade
C. copper wire
D. drop of pond water

10. To calculate the Field of View, you first need to ...

A. determine the diameter of the field of view for the low power lens
B. calculate the magnification power of the lens you are using
C. count the number of cells in the low power field of view
D. multiply the magnification by the number of cells in the field

11. Many single-celled (unicellular) organisms have different ways of moving, obtaining food and carrying out other essential functions for living. Structures, that unicellular organisms, such as a euglena, or a chlamydomonas have for movement are called ...

A. flagella
B. cytoplasm
C. stentor
D. diatoms

12. In the sample of pond water you may have studied, the amoeba moves by changing its shape. It pushes its cytoplasm against one part of its cell membrane, causing a bulge. This bulge is called a ...

A. pseudonym
B. pseudoplasm
C. false front
D. false foot

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13. A typical plant cell viewed under a compound light microscope reveals the many different parts that have different functions. The part of the cell which surrounds and protects the contents of the cell is called the ...

A. nucleus

B. cytoplasm

C. cell membrane

D. vacuole

14. The chloroplasts of a plant cell have a very specialized function. They are the structures where ...

A. food is transported to other parts of the cell

B. photosynthesis takes place

C. food is stored by the cell until it is needed

D. energy for reproduction is released

15. Cells are various sizes and shapes. They are normally measured in units called ...

A. nanometers

B. micrometer

C. minimeters

D. macrometers

16. Certain materials are allowed to pass through it and others are prevented from passing through. The type of cell membrane that is present in a plant and animal cell is called a ...

A. selectively impermeable membrane

B. selectively permeable membrane

C. permeable membrane

D. impermeable membrane

17. A process which enables substances to spread out, throughout a solution, eventually becoming evenly distributed in the solution, is called ...

A. distillation

B. dissolving

C. desalination

D. diffusion

18. Whenever nutrients are moved in and out of cells, the process takes place through the cell membrane. This process occurs because of different ...

A. types of nutrients present

B. concentrations present

C. types of membranes

D. sizes of openings in the membrane

19. Osmosis is the diffusion of water through a selectively permeable membrane. This process occurs because water will move from an area of ...

A. low concentration to high concentration

B. high concentration to low concentration

C. low concentration to low concentration

D. high concentration to high concentration

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20. The transportation of nutrients in plants is the role of the plant's tissue. Specialized tissue connects the roots to the leaves. The Phloem tissue transports ...

A. water from the leaves to the air in a process called transpiration
B. water from the roots to the leaves
C. sugars, manufactured in the leaves to the rest of the plant
D. energy to the vacuole to utilize the food stored there

21. Specialized cells are specialized for particular tasks. These types of cells are specialized to provide structure and support. They are called ...

A. nerve cells
B. muscle cells
C. blood cells
D. bone cells

22. There are many advantages to being a multi-cellular organism. The following are examples of some of these advantages, EXCEPT for one, which is that they ...

A. have a specialized environment
B. can grow to be very large
C. can obtain food from many sources
D. have complex bodies

23. The organization of cells follows this pattern -

A. cells form organs, tissues, and systems
B. cells form tissues, organs, and systems
C. cells form systems, organs, and tissues
D. cells form organs, systems, and tissues

24. The stomach is an organ which is made up of different tissues. The connective tissue, in the stomach, is the specialized tissue that enables the stomach to ...

A. hold its shape
B. move the contents around
C. line the walls of the stomach
D. co-ordinate all of the stomach's activities

25. Organs work together to make a system or network that performs a specialized function. Plants have only two main systems. They are the ...

A. stems and the leaves
B. roots and the leaves
C. shoot and the roots
D. leaves and the shoot

26. This organ system carries nutrients throughout the body, so that specialized cells can perform specialized functions. This body system is the ...

A. digestive system
B. integumentary system
C. circulatory system
D. respiratory system

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27. Each body system works with other body systems to perform its function effectively. When different gases are exchanged in the lungs and then transported throughout the body, the systems working together are the ...

A. respiratory and integumentary
B. respiratory and digestive
C. respiratory and circulatory
D. respiratory and sensory

28. The excretory system is connected to other systems, such as the circulatory system and the digestive system. The excretory system's primary function is to ...

A. get rid of wastes
B. get nutrients to the cells
C. exchange gases
D. to protect the other systems

29. Sensory awareness is important for all living things, so they can respond and adapt to their environment. When your muscles 'quiver' because you are cold, they generate ...

A. wastes
B. heat
C. blood flow
D. a nutrient imbalance

30. A knee-jerk reaction is a simple example of a feedback system that is controlled by the nervous system in the body. A sharp tap of the reflex hammer to the knee sends a signal, up the spinal cord, to the brain, where the brain interprets and then sends a message to the leg to react. The stimulus in this example is the ...

A. reflex hammer
B. brain
C. spinal cord
D. leg

31. Blood is the body's transportation system. The blood is composed of different types of cells which have a very specialized function. The type of blood cells that comprise less than 1% of the blood's volume and defends the body against infection and disease are the ...

A. red blood cells
B. white blood cells
C. plasma cells
D. platelets

32. Disorders of the circulatory system are the leading cause of death in North America. One of the most common is hypertension, which is ...

A. damage to the heart tissue
B. heart attacks or strokes
C. high blood pressure
D. waste remaining in the blood

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33. The digestive system can also malfunction, causing severe repercussions for an individual and even death. These disorders are caused by poor lifestyle habits or disease. One such disorder may lead to colon cancer. It is caused by ...

A. over exertion
B. low fiber diet
C. high fiber diet
D. excessive use of aspirin

34. The respiratory system can also malfunction due to poor lifestyle choices. When the cilia (which remove airborne particles when they beat continuously) are clogged by mucus they cannot perform their function properly and over time, can become inflamed. This condition (which can be treated) is called ...

A. bronchitis
B. ciliaitis
C. emphysema
D. lung cancer

35. Your body needs to have the right conditions under which it can perform its functions properly. To maintain healthy organs and systems, the essential needs are ...

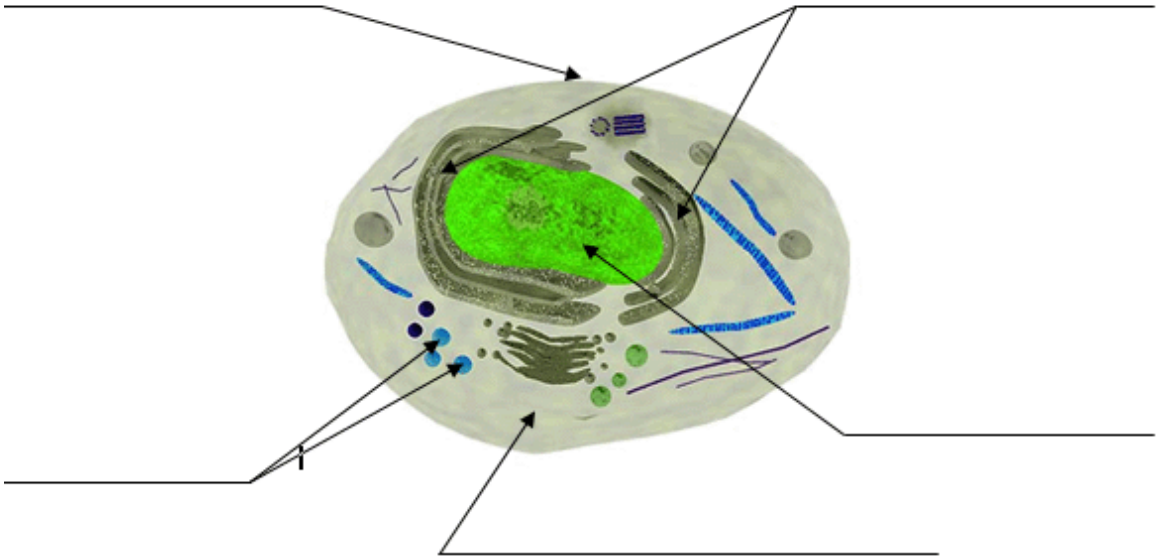
A. clean air, water, nutritious food, exercise and sleep
B. dairy products, fruits and vegetables, meat and grains
C. oxygen, minerals, vitamins, relaxation and medicine
D. fats, sugars, carbohydrates, proteins and salt

The last part of this Test is to be completed in this booklet.

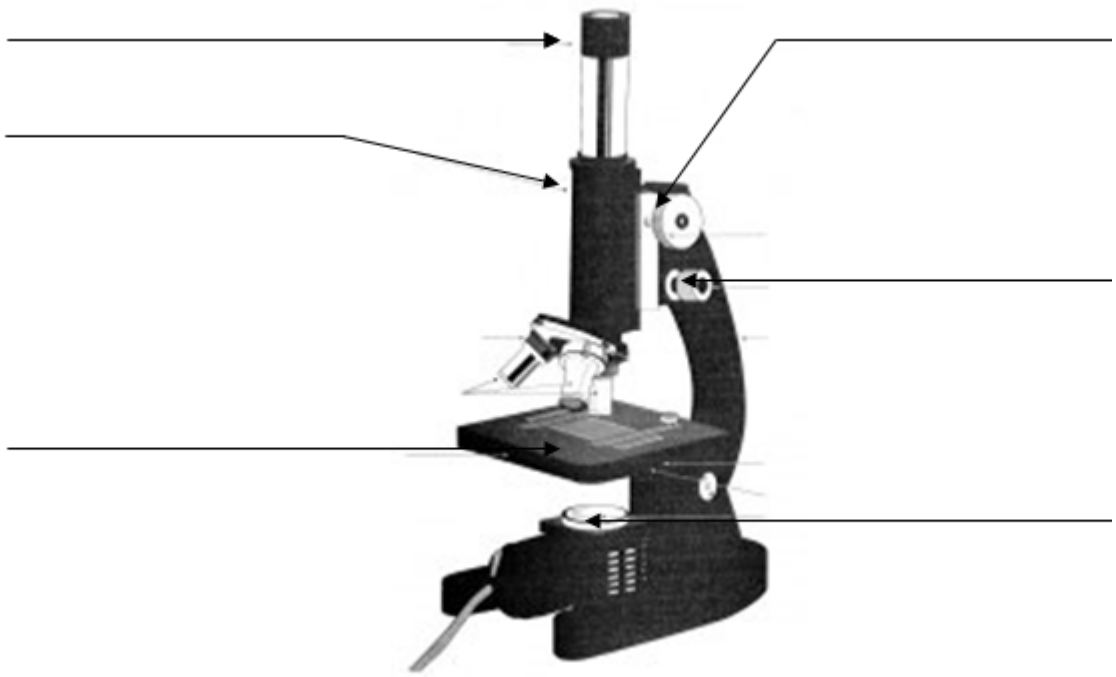
The diagrams, which follow, are to be labeled, as directed.

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36 – 40 *(5 Marks)*
Label the parts of the **Animal Cell**



41 – 45 *(5 Marks)*
Label the parts of the **Microscope**



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Science Focus 8
Cells and Systems Answer Key

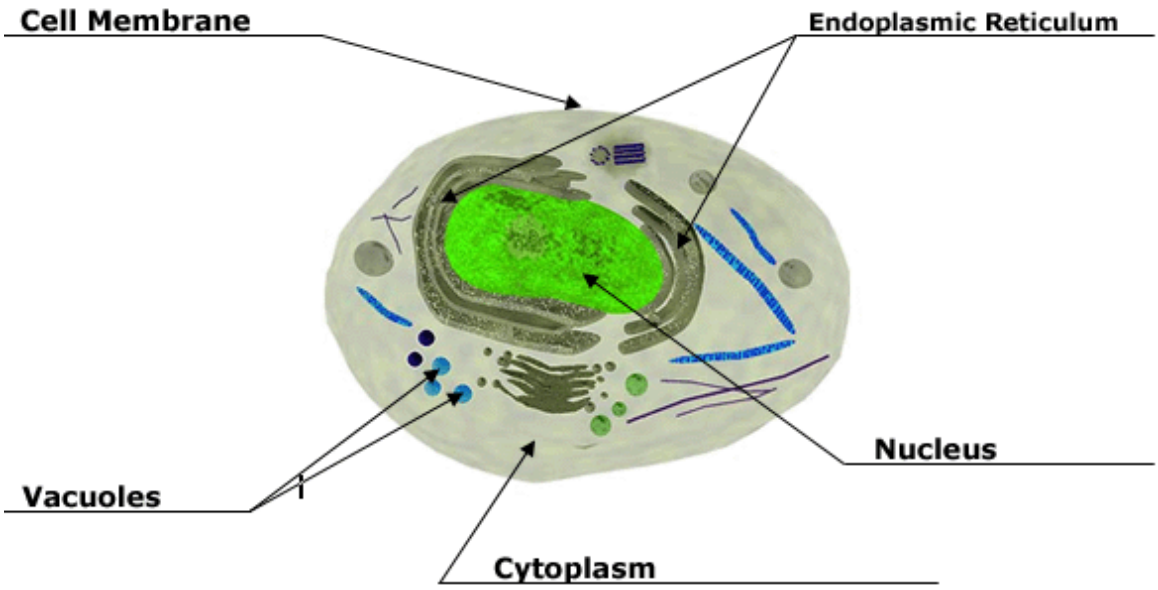
	Question 1	Question 2	Question 3	Question 4	Question 5
Topic 1	D	B	C	A	B
Topic 2	C	B	C	B	A
Topic 3	A	D	C	B	B
Topic 4	B	D	B	B	C
Topic 5	D	A	B	A	C
Topic 6	C	C	A	B	A
Topic 7	B	C	B	A	A

Cells and Systems … Answer Key

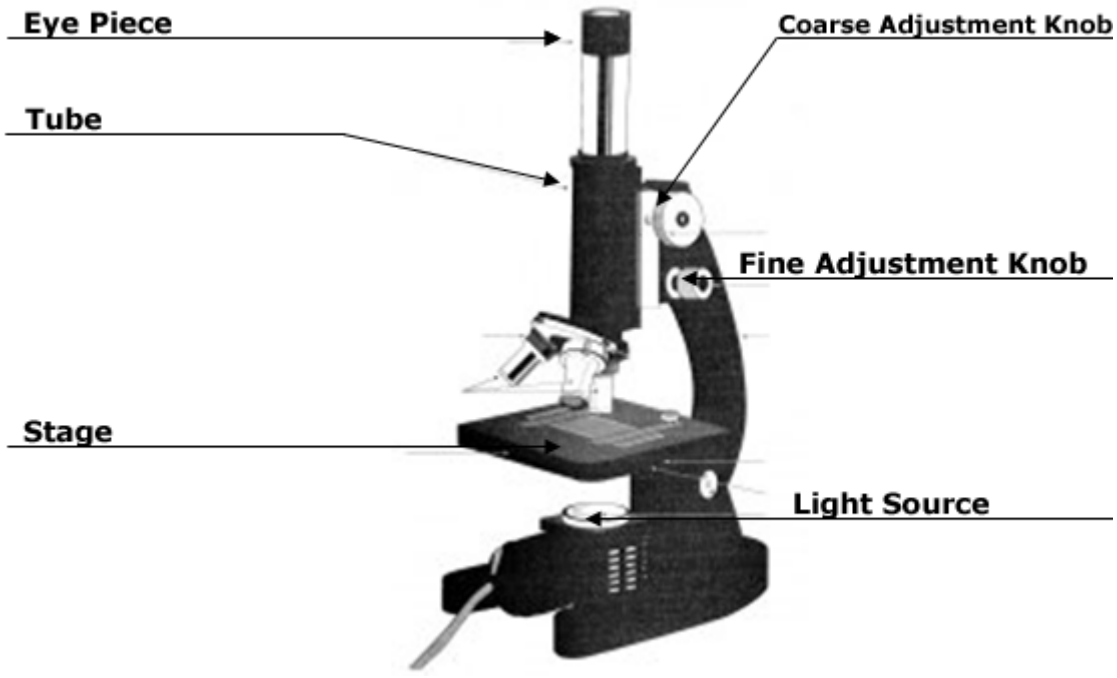
1	D	**11**	A	**21**	D	**31**	B
2	B	**12**	D	**22**	A	**32**	C
3	C	**13**	C	**23**	B	**33**	B
4	A	**14**	B	**24**	B	**34**	A
5	B	**15**	B	**25**	C	**35**	A
6	C	**16**	B	**26**	C		
7	B	**17**	D	**27**	C		
8	C	**18**	B	**28**	A		
9	B	**19**	B	**29**	B		
10	A	**20**	B	**30**	A		

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36-40 (5 Marks)
Label the parts of the **Animal Cell**



41-45 (5 Marks)
Label the parts of the **Microscope**



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