

UNIT LEARNING PACKS

FOCUS IN ACTION

Grade 8 Science in Action

Unit 2 - Cells and Systems

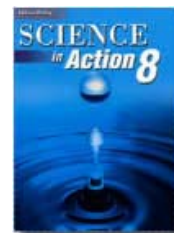
'Focus in Action' UNIT LEARNING PACKS

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_8u2.html)

Unit 2 – Cells and Systems



- **Section 1 Notes**
- **Section 1 Quiz**
- **Section 2 Notes**
- **Section 2 Quiz**
- **Section 3 Notes**
- **Section 3 Quiz**
- **Section 4 Notes**
- **Section 4 Quiz**
- **Unit Summary**
- **Review Booklet**
(Covered in class, prior to the Final Achievement Exam)
- **Unit 1 Test**
- **Answer Key for Section Quizzes and Unit Test**

The Human Body:

<http://users.tpg.com.au/users/amcgann/body/>

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

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

<http://www.edquest.ca>



Learning Pack Notes by Section,
followed by a Section Quiz

Section 1.0 – Living things share certain characteristics and have structures to perform functions.

1.1 – The Characteristics of Living Things

When trying to determine what is living and non-living, most scientists agree on these **six characteristics** that are common to all living organisms:

- Organization** - Living organisms are made of cells
- Energy** - Living organisms need energy
- Environment** - Living organisms respond and adapt to their environment
- Reproduction** - Living organisms reproduce
- Growth** - Living organisms grow and develop
- Wastes** - Living organisms produce wastes

Cells

The cell is the **basic unit of life**. It can perform all the processes that allow life to happen. All organisms are made up of at least one cell and every cell comes from another cell.

Energy

Energy is the ability to make things move and change. Everything that an organism does needs energy. Energy is obtained from the environment. Plants and animals differ in how they obtain their energy. Plants use the energy of the sun to make their own food, whereas animals get their food from the environment around them. **Nutrients** are substances that provide the energy and materials that organisms need to grow, develop, and reproduce. All of the processes that occur inside the organism to sustain its life are called the organism's **metabolism**.

Responding To The Environment

A **stimulus** is anything that causes a response in an organism. The organism's reaction to this stimulus is called a **response**.

Growth and Development

Organisms have the ability to replace some cells that are worn out or damaged. As organisms grow and develop their body size and shape can change. This is called **development**.

Reproduction

All living things come from other living things. **Reproduction** is not necessary for the organism to survive (because it will eventually die), but it is necessary for the species to survive.

Spontaneous generation was mistakenly thought to explain how living things could come from non-living things (eg. flies from meat). http://www.kent.k12.wa.us/staff/rlynch/sci_class/chap01/spontaneous.html

Adaptations

An adaptation is a characteristic that allows an organism to survive in its environment. Organisms adapt to their environment for survival. There are two types of adaptations:

- structural – in which organisms have a structural feature that is a part of them that enables them to adapt
- behavioral – is an action the organism does to survive

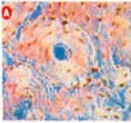
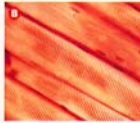
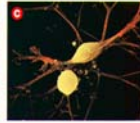

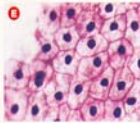
1.2 – Structure and Function

Organisms have developed many different ways of doing the things that keep them alive. The structures (body parts) they have developed to perform these tasks have different functions.

Spiracles are holes on the sides of the abdomen on some insects. The insect can adjust the size of the spiracle to control the amount of air entering their body.

http://users.rcn.com/kimball.ma.ultranet/BiologyPages/T/Tracheal_Breathing.html

Different cells have different *structures and functions*: (from Science Focus 8)

Type of Cell	Shape (Structure)	Function	Can you identify each?
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 fibers 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	

Different Structures For Similar Functions

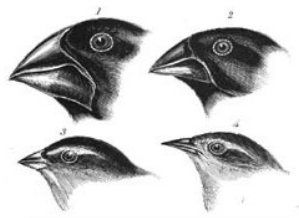
All organisms have to perform certain tasks or functions to stay alive, but different plants and animals have developed different structures for doing similar functions.

Function	Plant	Animal
moving	Most plants don't move from place to place	wings, legs, fins, tails
food gathering	roots	claws, hands, tentacles, mouths, tongues
breathing	leaves, needles	gills, lungs, spiracles, skin

Variations In Structure

Similarity in structure with some variability can be seen among animals living in the **Galapagos Islands**. Charles Darwin studied many of the animals on the Galapagos Islands and determined the '*Origin of the Species*' as a result of his observations. Darwin's 13 closely related species of finches have different bill structures to perform the function of gathering food.

Variations In Bill Shape



Bill Type	Describe the best type of feeding each bill is adapted to ...
Finch 1	_____
Finch 2	_____
Finch 3	_____
Finch 4	_____

1.3 – Organs and Organ Systems

Use the **Body Systems Summary Sheet** for this subsection.

Access the sheet using this link: <http://www.edquest.ca/pdf/bodysystems.pdf>

Cells and Systems - Section 1 Quiz

- Characteristics of living organisms include all of the following, **EXCEPT** ...
 - they need energy and produce food**
 - they reproduce and grow
 - they respond to their environment and adapt
 - they grow and are made of cells
- The basic **unit** of every system is a ...
 - nucleus
 - cell**
 - tissue
 - organ
- Energy is the **ability to do make things move or change** and is needed by all organisms. The sum of all the different processes that happen in an organism is referred to as the organism's ...
 - nutrient flow
 - metabolism**
 - energy flow
 - nutrient balance
- 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 ...
 - reflex hammer**
 - brain
 - spinal cord
 - leg
- Growth and development occur in all living organisms. When this **organ** in a human gets worn away it is replaced ...
 - liver
 - lung
 - skin**
 - kidney
- Reproduction** is not actually necessary for an individual organism to survive, but it is necessary for the survival of ...
 - extinct organisms
 - male organisms
 - each type of organism**
 - female organisms
- Adaptation is a change in the organism that allows it to survive in its environment. There are two types adaptations. **Structural adaptations** enable organisms to change their appearance, whereas, **behavioral adaptations** enable organisms to change their behavior. Which of the following adaptations is behavioral?
 - snowshoe hare grows a white coat of fur
 - cactus has spines
 - birds fly south**
 - giraffes have long necks

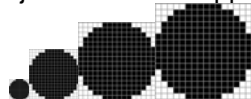
8. '**Spiracles**' are small holes on the sides of an insect's abdomen. These holes enable the insect to ...
- A. sweat
 - B. **breath**
 - C. secrete poison
 - D. get rid of waste
9. Organisms have different structures for similar functions. An example that illustrates this would be ...
- A. bird wings – spiracles
 - B. human lung – snake tongue
 - C. barnacles – web feet
 - D. **fish gills – plant leaves**
10. **Charles Darwin** observed variation in structure. He found 13 closely related species of finches here ...
- A. **Galapagos Islands**
 - B. Western New Guinea
 - C. East Africa
 - D. Easter Island
11. Darwin's finches have different variations in bill size that account for their feeding pattern. A warbler-like finch long sharp pointed bill would have this **type of bill** because it eats ...
- A. berries on bushes
 - B. fruit found in tall trees
 - C. **insects hiding in the bark of trees**
 - D. seeds and nuts found on the ground
12. 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
13. The largest organ in the human body is the skin, which is also called the **Integumentary System**. It has two functions, which are ...
- A. waste removal and transportation of nutrients
 - B. **protection and sensory awareness**
 - C. movement and protection
 - D. waste removal and sensory awareness
14. 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
15. 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

Section 2.0 – Cells play a vital role in living things

2.1 – The Microscope Extends the Sense of Sight

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**..



Introducing the Compound Microscope

A microscope magnifies (enlarges) the images of small objects. With the aid of a microscope 'invisible' becomes 'visible'.

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').

Peeking Inside

Microscopes come in many shapes and sizes. Fiber optics is a technology that allows light to travel down a flexible tube. Medical researchers now use fiber optics to create microscopes that can be used to see inside the body and to assist in locating operating regions that help surgeons do their work more effectively.



Identify the parts, function and handling hints of the **Compound Light Microscope** (SIA p. 101)

Technology improvements have led 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

Preparing Slides

Preparing a Wet mount

- Gather all the materials you need (a clean glass slide and cover slip, an eyedropper, tweezers, a small amount of water and your specimen)
- Pick up the slide properly (touching only the edges and ends)
- Use the eyedropper to place one drop of water on the center of the slide and place your specimen (using the tweezers) right side up on the drop.
- Pick up the cover slip (using the tweezers) and lower it slowly over the specimen (try to avoid getting air bubbles).

Preparing and Viewing a Cell Specimen

- Remove a single layer of the specimen (placing it very carefully on the slide and try to avoid getting air bubbles between the specimen and the slide).
- Continue following the procedures for **preparing a wet mount**.

2.2 – The Cell Is The Basic Unit of Life (<http://library.thinkquest.org/3564/?tqskip=1>)



(Student Resources)

Looking At Cells

A cell is the basic unit of life, because their individual cells carry out all the functions carried out by 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.**

Rudolf Virchow contributed his observation and together the **Cell Theory** was formulated:

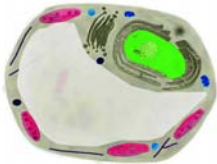
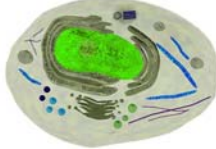
- all living things are composed of one or more cells
- cells are the basic units of structure and function in all organisms

When viewed with a compound light microscope these cell structures become visible to the naked eye. There are certain factors that can affect what you are able to see inside a cell.

These factors are:

- The type of microscope you use
- The power of the lenses
- The quality of the prepared slides

All cells, plant and animal, have structures and each structure performs a specific function in order for the cell to maintain life. The specialized structures inside the cell are called **organelles** and they carry out specific functions.

Cell Structures	Plant Cell	Animal Cell
<p><i>Check out the Virtual Cell Tour</i></p>		
Cell Membrane 'Controlled Gateway'	- surrounds and protects the contents of the cell (looks like a thin line surrounding the cell)	
Cell Wall 'Frame'	- are much thicker and more rigid than membranes, providing support for the plant or fungi (a rigid frame-like covering that surrounds the cell membrane)	
Cytoplasm 'Kitchen'	- distributes materials to different parts of the cell (a liquid inside the cell, which has grainy-looking bits in it)	
Nucleus 'Command Center'	- controls the cell's activities (a fairly large, dark, spherical structure that's usually near the center of the cell)	
Vacuoles 'Storage Rooms'	- is a membrane-bound sac acting as a storage space for surplus food, wastes and other substances the cell is unable to use immediately (clear, liquid-filled spaces in various places within the cytoplasm)	
Chloroplasts 'Solar Panels'	- are the structures in which photosynthesis takes place (greenish structures found only in a plant cell)	
Mitochondria 'Powerhouse'	- chemical reactions occur that convert energy into useable forms (small circular structure with little stringy bits inside)	

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 (um)

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.

2.3 – Organisms Can Be Single-Celled or Multicellular

Unicellular VS Multi-cellular

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

Common Unicellular Organisms

Amoeba

Amoebas are common unicellular organisms that live in water. They move around using foot-like projections called **pseudopods** (*false feet*). They extend a pseudopod and the cytoplasm fills it. They also use their pseudopods to capture food by surrounding it between two pseudopods and absorbing it.



Paramecium

Paramecium move swiftly through the fresh water where they live. They are covered in hair-like structures called **cilia**, which move back and forth like little oars, moving it through the water. Cilia also help gather food, by channeling the food to an **oral groove**, which is also lined with cilia, sweeping the food into the cytoplasm forming a food vacuole.



2.4 – How Substances Move Into and Out of Cells

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)

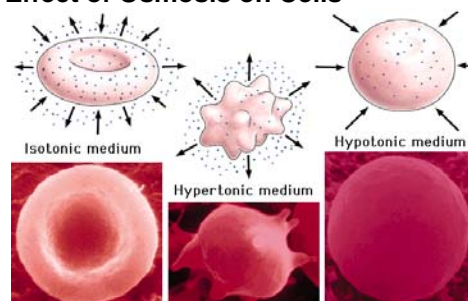
Diffusion

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 spreading 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 its life functions.

The Effect of Osmosis on Cells



2.5 – Cells In Multicellular Organisms Combine To Form Tissues, Organs and Organ Systems

Cells Reproduce

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.

(Remember the chart 'Structure and Function of Specialized Cells' in Section 1.2)

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.

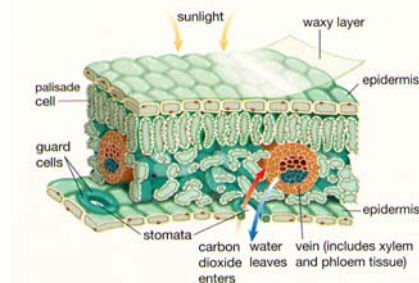
** Xylem and Phloem tissue usually occur together, along the length of plant stems and roots*

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.



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)

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)

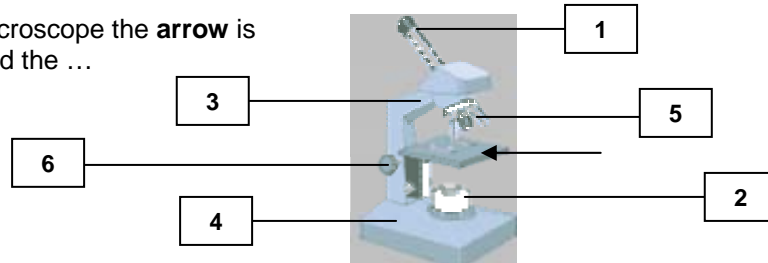
Systems

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.

Cells and Systems Section 2 Quiz

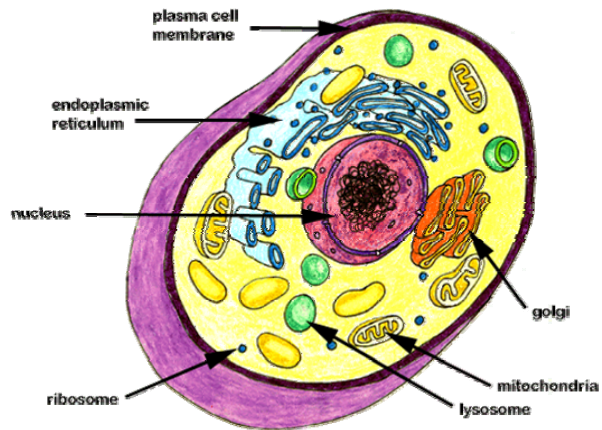
- Any microscope that has two or more lenses is a ...
 - multi-dimensional microscope
 - multi-functional microscope
 - complex microscope
 - compound microscope

- The part of the microscope the **arrow** is pointing to is called the ...



- condenser lens
 - diaphragm
 - stage
 - base
- This part of the microscope provides different powers of magnification. It is identified by the number ...
 - 6
 - 5
 - 2
 - 1
 - When you carry your microscope from place to place, you should hold it by this number and place your hand under this part - identified by this number ...
 - 3, 5
 - 1, 6
 - 2, 3
 - 3, 4
 - The technology that allows light to travel down a flexible tube – enabling surgeons to create microscopes that can be used inside the body – is called ...
 - fiber optics
 - flex fibers
 - optical lens
 - flex lights
 - The organization of units in a living organisms follows this pattern...
 - cells form organs, tissues, and systems
 - cells form tissues, organs, and systems
 - cells form systems, organs, and tissues
 - cells form organs, systems, and tissues
 - There are three factors that can affect your ability to see details of the internal parts of cells. The three factors include all of the following EXCEPT, the
 - number of cells
 - type of microscope
 - power of the lenses
 - quality of the prepared slides

8. The illustration shown here is an animal cell. The function of the **mitochondria** is to ...



- A. direct all activities in the cell - The 'Command Center'
 B. convert energy into useable forms – 'The Powerhouse'
 C. control the flow of nutrients – 'The Gateway'
 D. Store nutrients the cell needs – 'The Storage Room'
9. When preparing slides to be used under the objective lens of the microscope you cover the specimen you are going to view with a ...
 A. glass slide
 B. drop of indicator
 C. toothpick
 D. slip cover
10. Plant cells are different from animal cells because they contain ...
 A. a cell membrane
 B. a cell wall
 C. vacuoles
 D. cytoplasm
11. The 'solar panels' of the plant cell are found in the leaves. The structures that carry out photosynthesis, converting the sun's energy into food for the cell are called the ...
 A. mitochondria
 B. vacuoles
 C. chloroplasts
 D. stomata
12. The largest organism in the world is the ...
 A. Baleen whale
 B. Great white shark
 C. Blue whale
 D. Humpback whale
13. 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

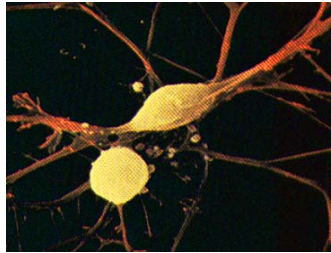
14. In the sample of pond water you may have studied, the amoeba moves by changing its shape. It pushes its cytoplasm against one part of its cell membrane, causing a bulge. This bulge is called ...
- A. pseudopods
 - B. pseudoplasms
 - C. false fronts
 - D. true feet
15. The *excretory system* is connected 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
16. The largest unicellular organism is so big that you can see it without using a microscope. It is a member of the plant-like algae family, measures 5-7cm and is called ...
- A. mycoplasma
 - B. acetabularia
 - C. diatoms
 - D. paramecium
17. Antony Van Leeuwenhoek was the first person to see tiny unicellular organisms, 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
18. Certain materials are allowed to pass through this 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
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
20. 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

21. 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
22. 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
23. Different cells have different functions and their structure is different. Identify the cell illustrated.



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

24. Different cells have different functions and their structure is different. Identify the cell illustrated.



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

25. The function of specialized tissues in plants enables the plant to perform many different activities. The transportation of water from the roots to the other parts of the plant is the function of this plant tissue ...
- A. Protective tissue
 - B. Root hairs
 - C. Phloem tissue
 - D. Xylem tissue

Section 3.0

– Healthy human function depends on a variety of interacting and reacting body systems. -

Virtual Body <http://www.medtropolis.com/VBody.asp>

Body Systems (Student Site) http://www.stcms.si.edu/hbs/hbs_student.htm

Science Flash Movies <http://www.brainpop.com/science/seeall.weml>

Human Body Links (Research on all Systems) <http://edtech.kennesaw.edu/web/humanbo.html>

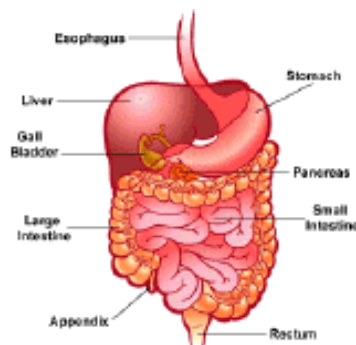
3.1 – Digestive System

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.

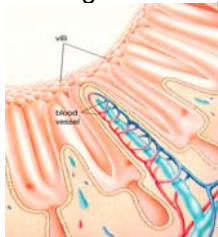
(Figure 3.2)

There are two types of digestion:

- **mechanical digestion** involves the physical breakdown of food into useable pieces.
- **chemical digestion** breaks down the smaller pieces using **enzymes**



Digestion begins in the **mouth** with the mechanical breakdown of food. **Saliva** (produced by the salivary glands) mixes with the food to make it easier to swallow. **Salivary amylase**, an **enzyme**, begins the chemical digestion process by breaking the large starch molecules into smaller sugar molecules. The **epiglottis** is a flap of skin that covers the windpipe so that food will not enter the lungs. The food is pushed down the **esophagus** by contractions of muscle tissue. This is called **peristalsis**. The stomach churns the food mixing it with gastric juices (composed of mucus, hydrochloric acid, water and digestive enzymes). The **mucus** helps to protect the stomach from digesting itself. The food then enters the **small intestine** where chemical digestion continues with digestive enzymes added from the pancreas. The inner surface is covered with **villi**,



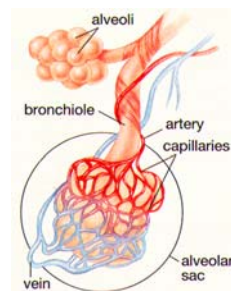
which increase the surface area for absorption of the nutrients that have been digested. **Microvilli** further this absorption of nutrients. In the **large intestine**, digestion is complete and those nutrients that have not been absorbed are formed into **feces**, which collect in the **rectum** and release from the body through the anus.

3.2 – Respiratory System

Breathing is the process, which moves air in and out of the lungs. The **diaphragm** muscles cause the air to be pushed out of and pulled into the lungs.



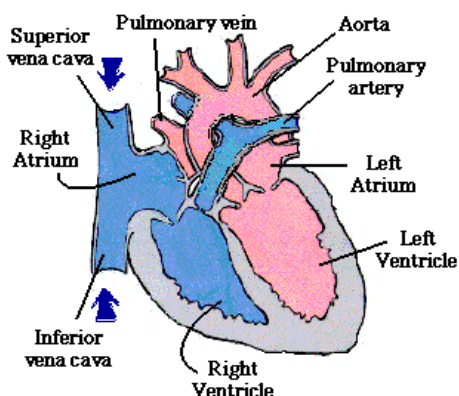
Diffusion occurs between the **alveoli** (tissues of the respiratory system) and the **capillaries** (tissues of the circulatory system)



3.3 – Circulatory System

Transports food and gases throughout our body.

The Heart



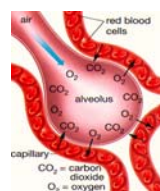
Arteries, Veins, and Capillaries

The blood vessels that carry blood away from your heart and transport it to all part of the body are called **arteries**.

The blood is returned to the heart from all parts of the body by the **veins**.

Arteries and veins are connected by **capillaries**, which allow the exchange of nutrients and gases. Capillaries have two adaptations for this:

- they are made of specialized epithelial tissue that is *only one layer thick*
- they are *very narrow* so that blood cells must pass through in single file



Oxygen goes from the alveoli to the capillaries and *Carbon Dioxide* goes from the capillaries to the alveoli

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

(Composition)

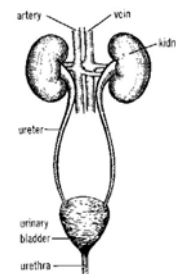
About 8% of an adult's body weight is blood, made up of:

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 cell	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

3.4 – Excretory System

Waste removal in the body is done through the organs of the **excretory system**. (The respiratory and circulatory systems also assist in the process) **Ammonia** is a chemical waste that the body produces when cells break down protein. The **liver** converts the ammonia to a less harmful substance called **urea**. The urea is carried to the kidneys, where it is mixed with water, and other salts to produce **urine**. The urine is transported to the bladder through the **ureter** tubes. The **bladder** expands and then releases the urine out through the **urethra**.

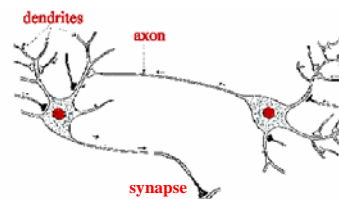
The **skin** also gets rid of waste (excess salt that the body does not need). This process, called '**sweating**' also keeps you cool.



Urine can reveal diseases – That is why you often take a urine test for a doctor to determine if certain processes in the excretory system are functioning properly. (See Section 4 Notes)

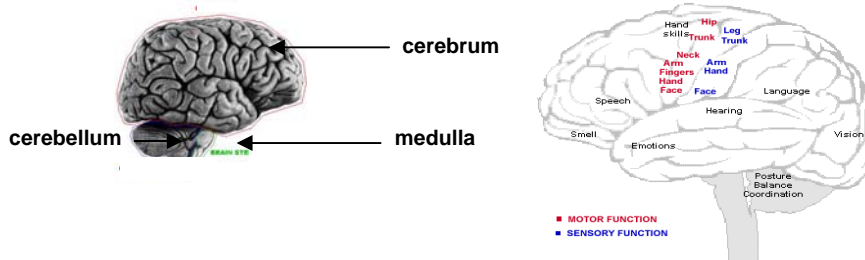
3.5 – Nervous (Sensory Awareness) System

Nervous tissue is made entirely of specialized cells called **neurons**. A neuron's job is to *send and receive messages*. Small branches in the neuron, called **dendrites**, *receive messages*, which then pass them on through the cell body to the axon. The **axon** then *passes the messages on* to neighboring dendrites at a **synapse**.



The nervous system consists of two main divisions:

- the **central nervous system**, which is composed of the brain and the spinal cord
- The brain receives stimuli from the outside world through sensory organs in the body. Internal stimuli are also received from inside the body. It reacts to all this stimuli and responds appropriately. The brain is divided into three main sections:



The **spinal cord** connects the brain to the peripheral nervous system. It contains **interneurons**, which connect one neuron to another.

- the **peripheral nervous system** is made up of the cranial (head) and spinal nerves, which travel to all parts of the body

Sensory neurons carry information from the body to the central nervous system. **Motor neurons** carry information from the central nervous system to the muscles and organs. The responses to these stimuli can be **automatic** (autonomic nervous system) or **voluntary** (somatic nervous system).

The nervous 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.

The Reflex Response

Sensory and motor nerves work together, sometimes not involving the brain. This is known as a **reflex**.

- 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 coordinated by the nervous system (brain, spinal cord and nerves) and the **endocrine system** (glands that produce **hormones**).

Cells and Systems – Section 1.3, 3.0, 4.0 – Body Systems Quiz

1.3 Organs and Organ Systems

1. This organ is the largest organ in the body and belongs to this system ...
 - A. Heart – Circulatory system
 - B. Brain – Nervous system
 - C. Small Intestine – Digestive system
 - D. Skin – Integumentary system
2. This body system defends the body against disease ...
 - A. Digestive system
 - B. Integumentary system
 - C. Nervous system
 - D. Circulatory system
3. The chemical digestion of food begins in this structure, which breaks down the food into nutrients that can be used by the various cells in the body. It is the ...
 - A. stomach
 - B. esophagus
 - C. mouth
 - D. small intestine
4. The sensory organs belong to this body system ...
 - A. Muscular
 - B. Skeletal
 - C. Circulatory
 - D. Nervous
5. This organ system removes chemical and gaseous wastes from the body. This body system is the ...
 - A. Digestive system
 - B. Excretory system
 - C. Circulatory system
 - D. Respiratory system
6. These structures move organs such as the heart and stomach, so they can perform their function...
 - A. nerves
 - B. muscles
 - C. bones
 - D. capillaries

3.0 Healthy human function depends on a variety of interacting and reacting systems

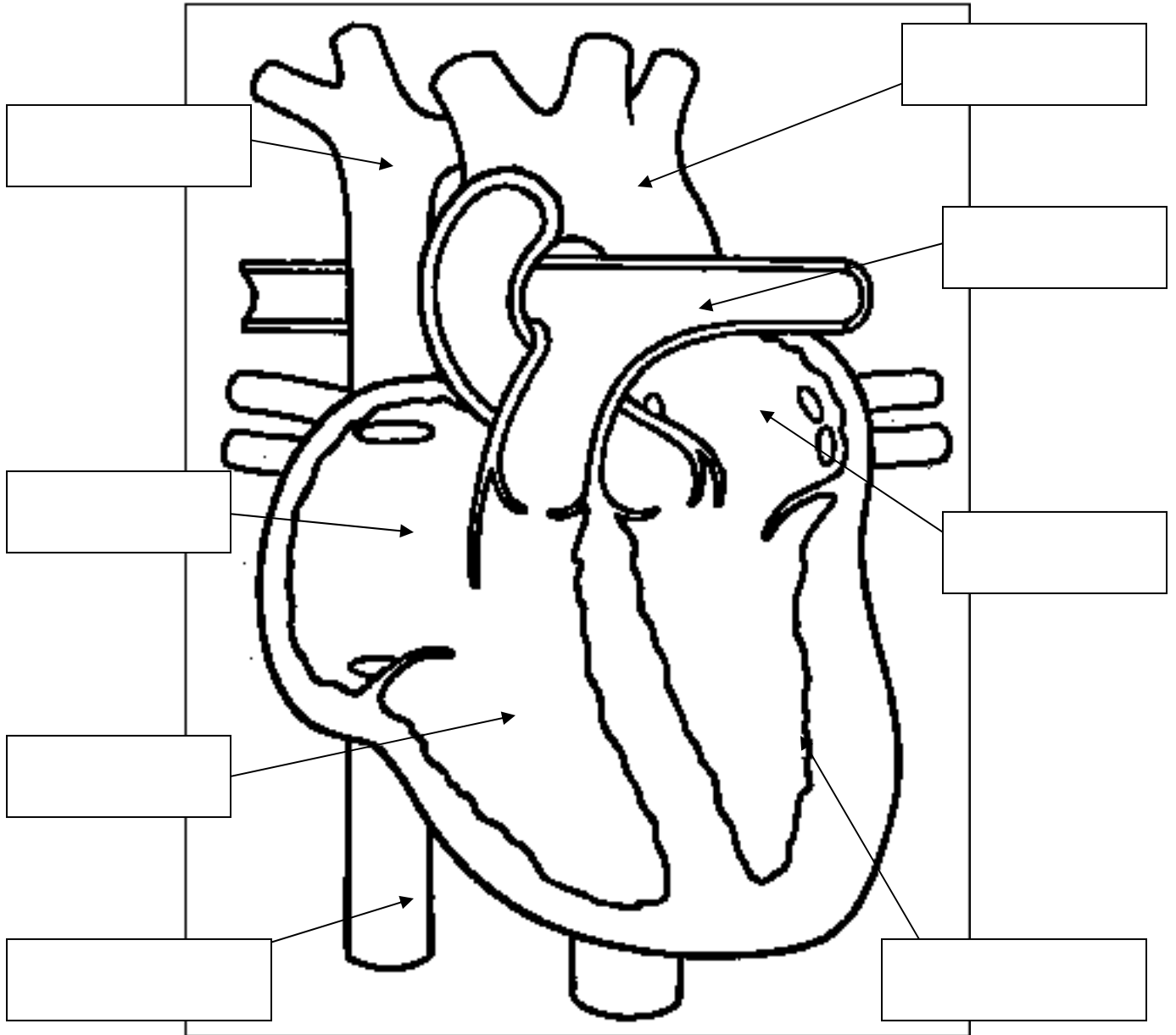
7. Peristalsis is the action caused by contractions of muscles in this structure in the digestive system ...
 - A. liver
 - B. pancreas
 - C. esophagus
 - D. trachea

8. Gastric Juice is composed of mucus, hydrochloric acid, water and digestive enzymes. The purpose of the mucus is ...
- A. **digest proteins into smaller particles**
 - B. **prevent the gastric juice from digesting the stomach**
 - C. **assist the hydrochloric acid with digestion**
 - D. **prevent heartburn from occurring**
9. 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 respiratory system and the ...
- A. **circulatory**
 - B. **digestive**
 - C. **sensory**
 - D. **integumentary**
10. Oxygen-rich air is drawn into the lungs through tube-like passageways called bronchi. The bronchi are lined with tough connective tissue in order to ...
- A. **keep the walls from collapsing**
 - B. **expand the surface area**
 - C. **extend the life of the bronchi**
 - D. **allow the air to pass through easily**
11. This part of the heart is the part that receives the oxygen rich blood from the lungs and pumps it into the left ventricle ...
- A. **right atrium**
 - B. **left atrium**
 - C. **right ventricle**
 - D. **aorta**
12. Capillaries have two adaptations for exchanging gases and nutrients: they are made of specialized epithelial tissue that is only one cell thick and they ...
- A. **are reinforced with a double membrane**
 - B. **can reverse the flow of gases when they need to**
 - C. **are very narrow, so the blood cells have to pass through in single file**
 - D. **can collapse on bacteria, preventing it from getting to the heart**
13. The liver is a very important organ in the excretory system. The function of this organ is to convert a highly toxic substance into a less harmful substance. The highly toxic substance that is converted into urea in the excretory system is ...
- A. **hydrochloric acid**
 - B. **ammonia**
 - C. **sodium chloride**
 - D. **gastric juice**
14. In the excretory system, the bladder's primary function is to ...
- A. **filter urine**
 - B. **perform dialysis**
 - C. **store urine**
 - D. **clean urea**
15. A neuron receives messages from small branches of the nerve cell called ...
- A. **axons**
 - B. **interneurons**
 - C. **somatic nerve**
 - D. **dendrites**
16. 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**

4.0 Scientific investigation leads to new knowledge about body systems and new medical applications

17. In the late 1700's, Edward Jenner, an English country doctor, developed the first vaccine. The vaccine he developed made people immune to smallpox. This vaccine was ...
- A. insulin
 - B. cowpox
 - C. e-coli
 - D. rabies
18. Louis Pasteur was originally a chemist. His first great discovery was finding out what made beer and wine spoil. He discovered micro-organisms, floating in spoiled batches of beer and wine. The micro-organisms were ...
- A. spoiled grapes
 - B. alcohol insects
 - C. yeast
 - D. anthrax
19. 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. emphasya
 - D. lung cancer
20. This disorder of the respiratory system is common in children in Canada. There are half a million children who suffer from it. It can be triggered by many different environmental factors. The disorder is ...
- A. bronchitis
 - B. asthma
 - C. emphysema
 - D. collapsed lungs
21. The reason why fries and chocolate taste so good is because they contain a lot of fats. These fats are converted into a lipid, called cholesterol, which enters your arteries and can clog the flow of blood. This disorder, or condition is referred to as ...
- A. high blood pressure
 - B. arteriosclerosis
 - C. hypertension
 - D. peptic ulcer
23. 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

Bonus ... Label the main chambers, arteries and veins of the heart



Section 4.0

Scientific investigation leads to new knowledge about body systems and new medical applications

4.1 – Developing A Theory For Disease

If you lived in before the 17th Century, chances are that a simple cut or broken bone would have killed you. This is because of infection and the lack of knowledge about cleanliness.

The First Vaccine

In the late 1700's **Edward Jenner**, an English country doctor, developed the first vaccine. He noticed that milkmaids who had cowpox (a mild form of smallpox) did not get smallpox. He began infecting people with cowpox so that they would become immune to smallpox, and it worked – the first **vaccine** was created. The last case of smallpox reported was in 1979.

Watch Out Germs!

Louis Pasteur was the first person to identify living micro-organisms as “germs”. He suggested, and later proved his theory that these germs were the cause of most infectious diseases. The process of heating food, to kill the micro-organisms, worked. The process was called pasteurization and is still used today.

Cleaning Up The Germs

Once doctors knew that ‘germs’ caused disease, other discoveries followed. **Joseph Lister** determined that these germs were entering his patients wounds, so he introduced the practice of cleanliness and sterilization to surgery.

Nutritional Research

During the time of discovery, explorers would travel on ships for very long periods of time. The only foods they could take along were ones that wouldn't spoil. Many sailors developed **scurvy** as a result – with open sores, bleeding gums, loose teeth, and an unsteady gait. James Lind treated these sailors by feeding them oranges and lemons. It was later discovered that scurvy was caused by a lack of Vitamin C. Researchers have discovered that various diseases can be treated by proper dietary choices. [Canada's Food Guide](#) was developed to show people how much of certain types of foods are necessary to stay healthy.

4.2 – Factors That Affect The Healthy Function of Body Systems

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

Scientific Research has also determined that there are many factors, which can affect your cells, and consequently, your body systems.

These factors include:

- Diseases or conditions that are inherited from family
- Sensitivity (allergies) to environmental conditions; such as smog, pollen, dust, dairy products, or peanuts. Asthma is a condition, which reflects this kind of sensitivity.
- How you respond to physical, emotional and psychological stresses.
- How you treat your body in general – making healthy choices, instead of unhealthy choices

Disorders, which can hospitalize Canadians include:

- circulatory system (15%)
- digestive system (11%)
- respiratory system (10%).

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

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

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).

Factors Affecting the Respiratory System - SMOKING -

The Contents of Cigarettes

There are over 400 different chemicals in a cigarette. Tar, carbon monoxide, and nicotine are the most destructive. **Tar** is a sticky substance formed when the cigarette is burned. As it is inhaled, the tar settles on the surface of organs (lungs) and interferes with the function of the cilia (to move mucus out of the respiratory tract). **Carbon monoxide** is also released when the cigarette is burned and gets absorbed by the red blood cells, during gas exchange. Less oxygen is absorbed by the red blood cells, causing the heart to work harder and faster. **Nicotine** is an addictive drug that causes the heart to speed up, and raises the blood pressure. Besides smoking, **air pollution** and **industrial by-products** (coal dust) can lead to disorders of the respiratory system.

Disorders of the Respiratory System (Smoking-Related diseases)

If the lining of the lungs becomes inflamed, it can lead to **bronchitis** (which makes breathing more difficult), which can further lead to damage of the lung tissue, causing **emphysema** (shortness of breath), which is a permanent condition. **Lung cancer** is caused by the tar and smoke in cigarettes, which cause the lung cells to grow out of control (tumours are formed) and overcome healthy cells.

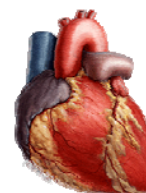
Factors Affecting the Circulatory System

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 (a lipid – 'fat') level**. Too much of a type of food that has a high content of fat will cause a build-up of cholesterol in the walls of the arteries. This build-up, called **arteriosclerosis**, makes it more difficult for blood to flow and can lead to a **heart attack**.)
- **Little exercise** (makes fatty deposits increase, because the nutrients are not used up completely.)

A Healthy Circulatory System

The heart circulates the blood throughout the body by pumping it to where it can supply nutrients and remove wastes.



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:

<u>Component</u>	<u>% of blood (by volume)</u>	<u>Main Function</u>
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

Disorders of the Circulatory System include: **high blood pressure** (hypertension), heart attacks (damage to heart muscle) and High blood pressure, or **hypertension** (*‘the silent killer’*) can lead to **strokes** (brain damage).

Measuring 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

Factors Affecting the 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. 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

Painful **ULCERS**; sores on the lining of the stomach, originally thought to be caused by stress, are caused by *H. pylori* (*Helicobacter pylori*), a bacteria present in the stomach..

High fibre diet is important, the 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**.

Healthy Life Style

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 feel better and helps your body resist disease. Your immune system will work best when you are well fed and rested.

REVIEW Outline

Unit 2 – Cells and Systems

1.0 Characteristics of Living Things

- ❖ They are made of cells, require energy, grow and develop, respond to their surroundings, reproduce and have adaptations to survive
- ❖ All organisms have structures which perform specific life functions
- ❖ Animals have organs and different organs that work together to perform a common function are organized into organ systems

2.0 Cells play a vital role

- ❖ A Microscope is a scientific tool used to see very small structures
- ❖ The cell is the basic unit of life - all organisms have at least one cell
- ❖ Structures in cells are called organelles which carry out specific life functions
- ❖ Organisms can be single celled or multi-celled
- ❖ Substances move in and out of cells by diffusion and osmosis
- ❖ All cells have a selectively permeable membrane
- ❖ Cells form tissue (four types – connective, epithelial, nervous and muscular), tissue forms organs and organs work together to make organ systems

3.0 Healthy Human Body Systems

- ❖ Digestive System, Circulatory System, Respiratory System, Excretory System, Nervous System
- ❖ Interactions between systems as a result of internal and external stimuli

4.0 Scientific investigation and Medical Applications

- ❖ Research to improve understanding of what causes diseases (smallpox)
- ❖ Health is affected by a number of factors which can lead to poor health of cells, organs and organ systems

1.0 Characteristics of Living Things

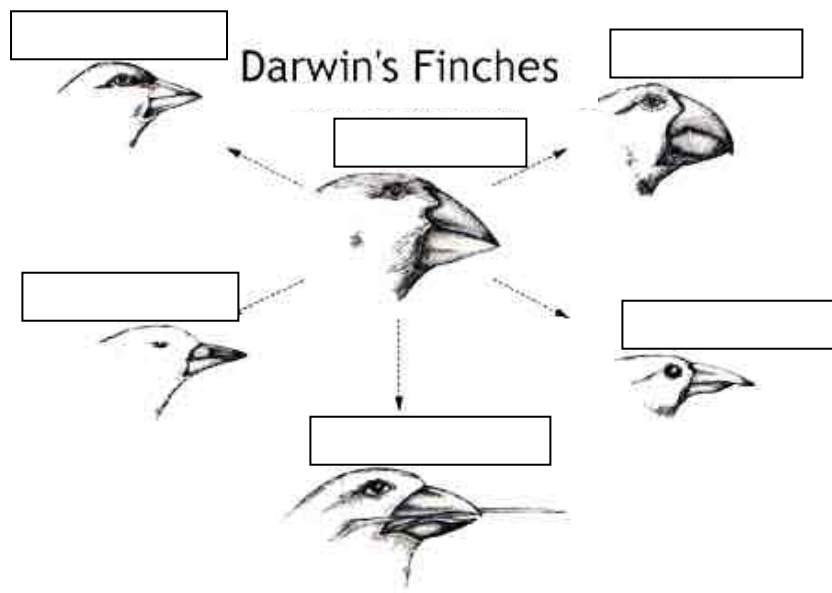
- Key Concepts:**
- Living things are made of cells, require energy, grow and develop, respond to their surroundings, reproduce and have adaptations to survive
 - All organisms have structures which perform specific life functions
 - Animals have **organs** and different organs that work together to perform a common function are organized into **organ systems**

What are the six primary characteristics that identify living things?

Identify specific structures in organisms to perform life functions

<i>Life function</i>	<i>Human Structure</i>	<i>Similar Structures on other organisms</i>
Exchange gases	Lungs, skin	
Gather food	Hands, mouth, teeth	
Move	Legs	
Maintain fluid levels		

Identify what type of food each bill type would be best suited for.



Organs with similar functions are organized into organ systems.
Complete the summary chart (pgs. 93-96)

Organ System	Organs	Functions of the Body System
Circulatory System		
Respiratory System		

Digestive System		
Nervous System		
Excretory System		
Skeletal System		
Muscular System		
Integumentary System		

2.0 Cells play a vital role

- Key Concepts:**
- A **Microscope** is a scientific tool used to see very small structures
 - The **cell** is the basic unit of life - all organisms have at least one cell
 - Structures in cells are called **organelles** which carry out specific life functions
 - Organisms can be single celled or multi-celled
 - Substances move in and out of cells by **diffusion** and **osmosis**
 - All cells have a **selectively permeable membrane**
 - **Cells** form **tissue** (four types – **connective, epithelial, nervous and muscular**), tissue forms **organs** and organs work together to make **organ systems**

Label the parts of the microscope and identify their function (see pgs. 100-101)

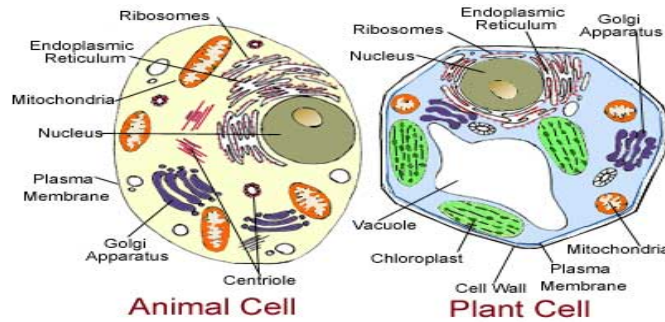
Microscope	Parts	Function
	1 _____	_____
	2 _____	_____
	3 _____	_____
	4 _____	_____
	5 _____	_____
	6 _____	_____
	7 _____	_____
	8 _____	_____
	9 _____	_____
	10 _____	_____

How are cells, tissues, organs and organ systems related?

Label the parts of the cell and explain what function each part has for both the animal cell and the plant cell

Animal and Plant Cells have most structures in common.

In addition, Plant cells have **chloroplasts** and a **cell wall**.



Cell Structure	Function
Cell (Plasma) Membrane	_____
Cytoplasm	_____
Nucleus	_____
Vacuoles	_____
Mitochondria	_____
Endoplasmic Reticulum	_____
Ribosomes	_____
Golgi Apparatus	_____
Cell Wall	_____
Chloroplasts	_____

What are some of the features of each structure in the cell that help you identify it?

Cell structure	How you can identify it easily
Cell membrane	
Cell wall	
cytoplasm	
nucleus	
vacuoles	

Describe the steps you follow to prepare a **wet mount**.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

Describe how to calculate the **field of view**.

Identify the Advantages and Disadvantages of Single-Cellular and Multi-cellular organisms.

Type of Organism	Advantages	Disadvantages
Single-Cellular (Unicellular)		
Multi-Cellular		

Illustrate and Label these **unicellular organisms** (p. 114)

Amoeba

Paramecium

Describe and illustrate how nutrients get in and out of cells.

*The Process of **Diffusion***

*The Process of **Osmosis***

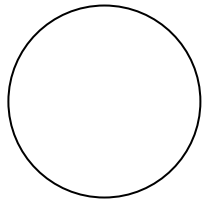
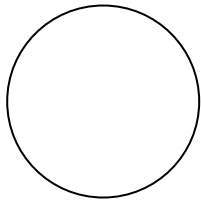
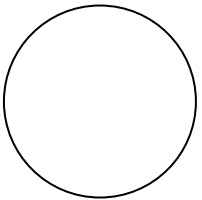
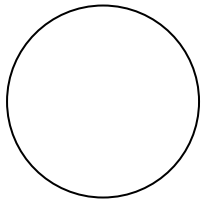
Illustrate how cells are affected by **Osmosis**

The Effect of Osmosis on Cells

What is **Reverse Osmosis**?

Illustrate how cells reproduce.

Illustrate the differences between different kinds of cells, and how they form tissue.

			
Connective Tissue	Epithelial Tissue	Nervous Tissue	Muscle Tissue

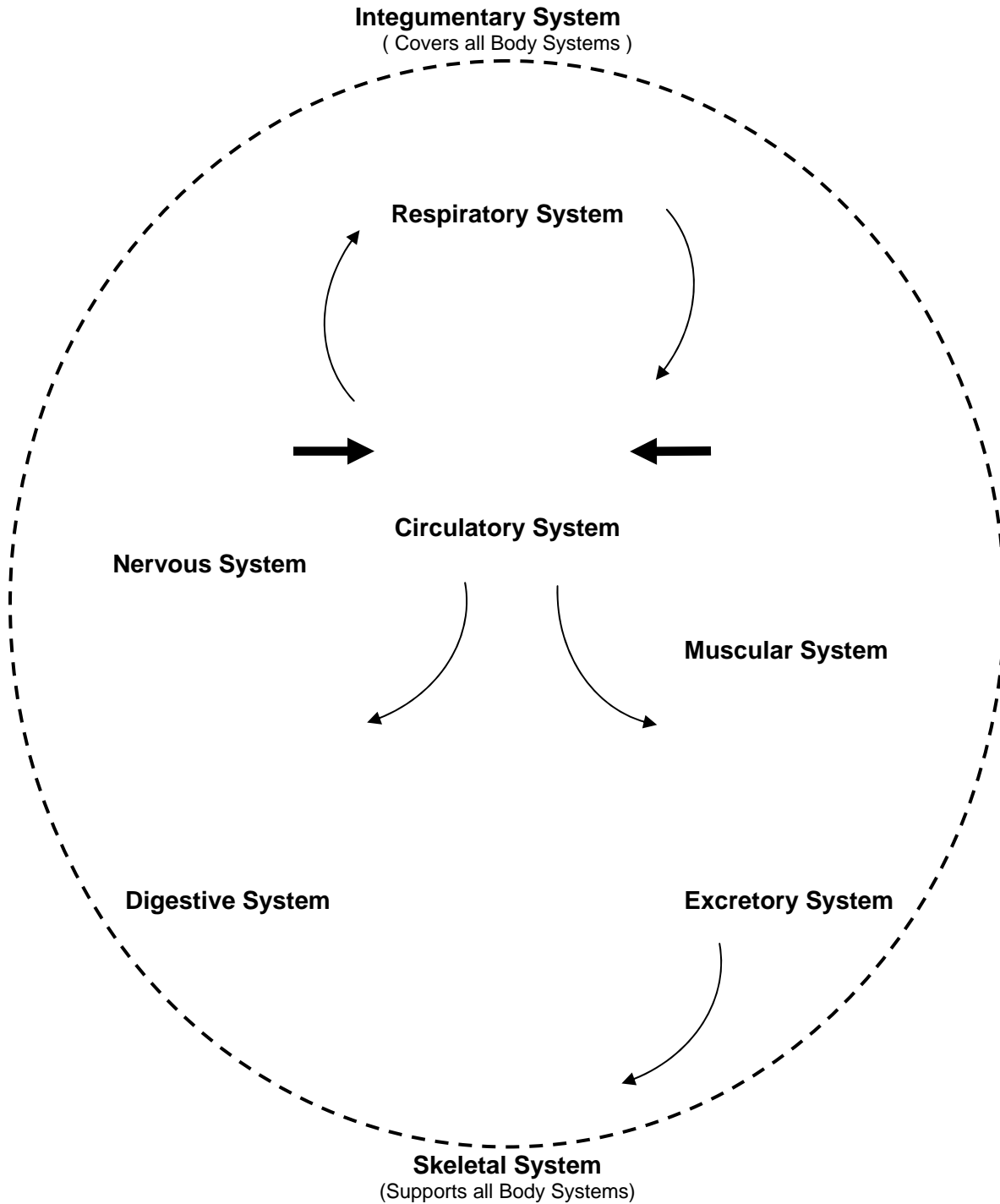
Illustrate three types of Plant Tissue (Leaves, roots and stems all have them) - explain how they function. (p. 123 - 124)



3.0 Healthy Human Body Systems

- Key Concepts:**
- Digestive System, Circulatory System, Respiratory System, Excretory System, Nervous System
 - Interactions between systems as a result of internal and external stimuli

Illustrate how different body systems interact
(See p. 126)



Digestive System

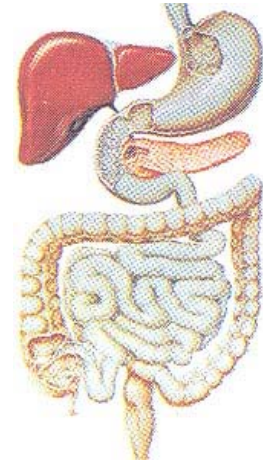
Describe the two different forms of digestion.

Mechanical digestion _____

Chemical digestion _____

Describe what **peristalsis** is

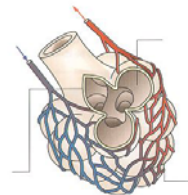
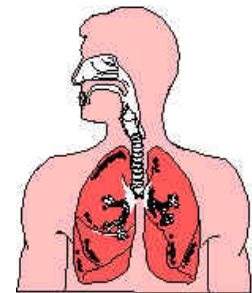
Describe the **digestive process** beginning with the food entering the mouth and ending with the waste leaving the rectum.



Respiratory System

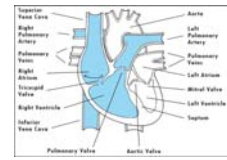
Describe the movement of the ribs and the diaphragm during **breathing**.

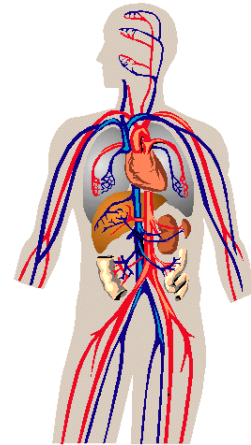
Describe the process of **gas exchange** in the lungs.



Circulatory System

Describe how the **heart** works – include in your description the process of carrying oxygen rich blood to the cells of the body and returning with waste products to be eliminated by the liver and lungs.





Describe the differences between **arteries**, **veins** and **capillaries**.

Illustrate and then describe the functions of each of the different types of **blood cells**

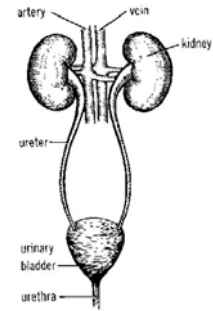
Red blood cell	White blood cell	Platelets
Function of each type of blood cell		
<hr/>	<hr/>	<hr/>

Describe differences in **heartbeats** within the animal kingdom (Provide at least 3 more examples)

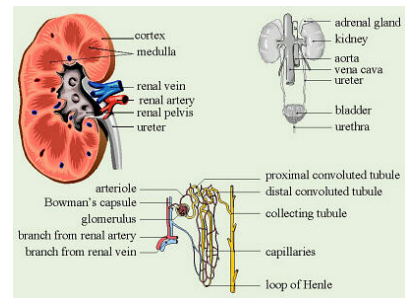
Excretory System

Identify the purpose of each of the organ in the Excretory system

Organ	Function ...
Liver	_____
Kidneys	_____
Ureters	_____
Bladder	_____
Urethra	_____
Skin	_____



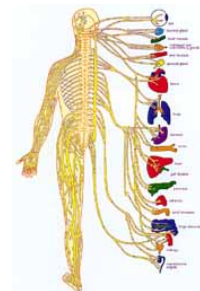
Explain the process of **urine formation** by the excretory system and what it can be used to show?



What is **dialysis**?

Nervous System

Illustrate and label a neuron.



What are the two distinct parts of the nervous system and what does each part control?

4.0 Scientific investigation and Medical Applications

- Key Concepts:**
- Research to improve understanding of what causes diseases (smallpox)
 - Health is affected by a number of factors which can lead to poor health of cells, organs and organ systems

What is a **vaccine**?

Describe how the **first vaccine** was developed, who developed it and what disease it was mean to control.

Briefly explain the contributions of the following scientists.

Scientist	
Louis Pasteur	
Joseph Lister	
Nutritional Research	
James Lind	
Canada's Food Guide	

Briefly describe the **4 factors** that affect human health.

Factors affecting the Respiratory System	Disorders/Diseases of the Respiratory System
---	---

Cigarettes ...

<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
---	---

Factors affecting the Circulatory System	Disorders/Diseases of the Circulatory System
---	---

Cholesterol ...

<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
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Factors affecting the Digestive System	Disorders/Diseases of the Digestive System
---	---

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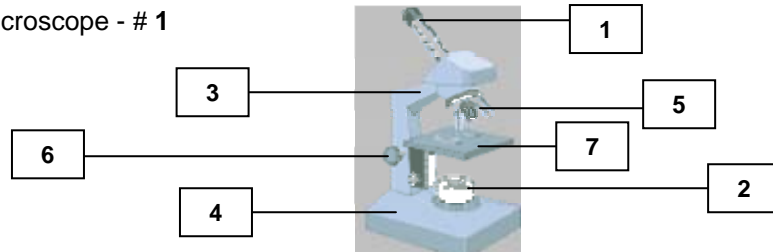
Cells and Systems Unit Test

1. Growth and development occur in all living organisms. When this organ in a human gets worn away it is replaced ...
 - A. liver
 - B. lung
 - C. skin
 - D. kidney
2. Energy is the *ability to do make things move or change* and is needed by all organisms. The sum of all the different processes that happen in an organism is referred to as the organism's ...
 - A. nutrient flow
 - B. metabolism
 - C. energy flow
 - D. nutrient balance
3. The basic unit of every system is a ...
 - A. nucleus
 - B. cell
 - C. tissue
 - D. organ
4. This organ is the largest organ in the body and belongs to this system ...
 - A. Heart – Circulatory system
 - B. Brain – Nervous system
 - C. Small Intestine – Digestive system
 - D. Skin – Integumentary system
5. This organ system removes chemical and gaseous wastes from the body. This body system is the ...
 - A. Digestive system
 - B. Excretory system
 - C. Circulatory system
 - D. Respiratory system
6. '*Spiracles*' are small holes on the sides of an insect's abdomen. These holes enable the insect to ...
 - A. sweat
 - B. breath
 - C. secrete poison
 - D. get rid of waste
7. Reproduction is not actually necessary for an individual organism to survive, but it is necessary for the survival of ...
 - A. extinct organisms
 - B. male organisms
 - C. each type of organism
 - D. female organisms
8. Charles Darwin found 13 closely related species of finches here ...
 - A. Galapagos Islands
 - B. Western New Guinea
 - C. East Africa
 - D. Easter Island

9. Darwin's finches have different variations in bill size that account for their feeding pattern. A warbler-like finch long sharp pointed bill would have this type of bill because it eats ...
- A. berries on bushes
 - B. fruit found in tall trees
 - C. insects hiding in the bark of trees
 - D. seeds and nuts found on the ground
10. Organisms have different structures for similar functions. An example that illustrates this would be ...
- A. bird wings – spiracles
 - B. human lung – snake tongue
 - C. barnacles – web feet
 - D. fish gills – plant leaves
11. There are two types adaptations. *Structural adaptations* enable organisms to change their appearance, whereas, *behavioral adaptations* enable organisms to change their behavior. Which of the following adaptations is behavioral?
- A. snowshoe hare grows a white coat of fur
 - B. cactus has spines
 - C. birds fly south
 - D. giraffes have long necks
12. This body system defends the body against disease ...
- A. Digestive system
 - B. Integumentary system
 - C. Nervous system
 - D. Circulatory system
13. These structures move organs such as the heart and stomach, so they can perform their function...
- A. nerves
 - B. muscles
 - C. bones
 - D. capillaries
14. 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
15. 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
16. The technology that allows light to travel down a flexible tube – enabling surgeons to create microscopes that can be used inside the body – is called ...
- A. fiber optics
 - B. flex fibers
 - C. optical lens
 - D. flex lights

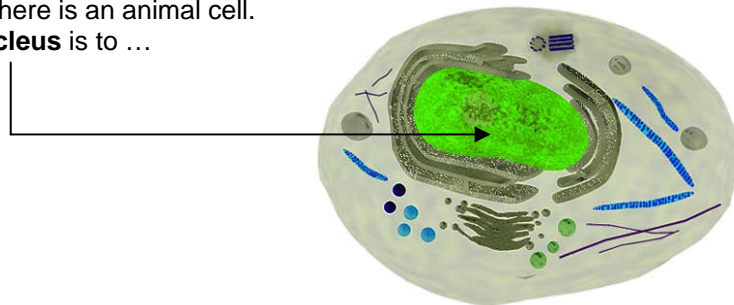
17. The *excretory system* is connected to other systems, such as the circulatory system and the digestive system. The excretory system's primary function is to ...
- get rid of wastes
 - get nutrients to the cells
 - exchange gases
 - to protect the other systems

18. This part of the microscope - # 1 is called the ...

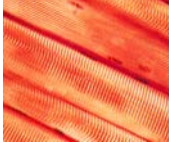
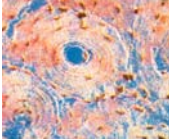


- eyepiece
 - diaphragm
 - stage
 - base
19. This part of the microscope is the coarse adjustment of the stage. It is identified by number ...
- 2
 - 4
 - 5
 - 6
20. There are three factors that can affect your ability to see details of the internal parts of cells. The three factors include all of the following EXCEPT, the
- number of cells
 - type of microscope
 - power of the lenses
 - quality of the prepared slides

21. The illustration shown here is an animal cell. The function of the **nucleus** is to ...



- direct all activities in the cell - The 'Command Center'
 - convert energy into useable forms - 'The Powerhouse'
 - control the flow of nutrients - 'The Gateway'
 - store nutrients the cell needs - 'The Storage Room'
22. When preparing slides to be used under the objective lenses of the microscope you always begin with a the objective lens that is the ...
- highest power
 - lowest power
 - cleanest
 - clearest

23. The function of specialized tissues in plants enables the plant to perform many different activities. The transportation of water from the roots to the other parts of the plant is the function of this plant tissue ...
- Protective tissue
 - Root hairs
 - Phloem tissue
 - Xylem tissue
24. The 'solar panels' of the plant cell are found in the leaves. The structures that carry out photosynthesis, converting the sun's energy into food for the cell are called the ...
- mitochondria
 - vacuoles
 - chloroplasts
 - stomata
25. Certain materials are allowed to pass through this and others are prevented from passing through. The type of cell membrane that is present in a plant and animal cell is called a ...
- selectively impermeable membrane
 - selectively permeable membrane
 - permeable membrane
 - impermeable membrane
26. Osmosis is the diffusion of water through a selectively permeable membrane. This process occurs because water will move from an area of ...
- low concentration to high concentration
 - high concentration to low concentration
 - low concentration to low concentration
 - high concentration to high concentration
27. Different cells have different functions and their structure is different. Identify the cell illustrated.
- 
- bone
 - blood
 - nerve
 - muscle
28. Different cells have different functions and their structure is different. Identify the cell illustrated.
- 
- bone
 - blood
 - nerve
 - muscle
29. The liver is a very important organ in the excretory system. The function of this organ is to convert a highly toxic substance into a less harmful substance. The highly toxic substance that is converted into urea in the excretory system is ...
- hydrochloric acid
 - ammonia
 - sodium chloride
 - gastric juice
30. Peristalsis is caused by contractions of muscles in this structure in the digestive system ...
- liver
 - pancreas
 - esophagus
 - trachea

31. 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
32. Gastric Juice is composed of mucus, hydrochloric acid, water and digestive enzymes. The purpose of the mucus is ...
- A. digest proteins into smaller particles
 - B. prevent the gastric juice from digesting the stomach
 - C. assist the hydrochloric acid with digestion
 - D. prevent heartburn from occurring
33. 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
34. Each body system works with other body systems to perform its function effectively. When the body feels hot and cold on the skin, the systems working together are the ...
- A. Circulatory and Respiratory
 - B. Sensory and Integumentary
 - C. Sensory and Muscular
 - D. Integumentary and Circulatory
35. Oxygen-rich air is drawn into the lungs through tube-like passageways called bronchi. The bronchi are lined with tough connective tissue in order to ...
- A. keep the walls from collapsing
 - B. expand the surface area
 - C. extend the life of the bronchi
 - D. allow the air to pass through easily
36. Capillaries have two adaptations for exchanging gases and nutrients: they are made of specialized epithelial tissue that is only one cell thick and they ...
- A. are reinforced with a double membrane
 - B. can reverse the flow of gases when they need to
 - C. are very narrow, so the blood cells have to pass through in single file
 - D. can collapse on bacteria, preventing it from getting to the heart
37. This part of the heart is the part that receives the oxygen rich blood from the lungs and pumps it into the left ventricle ...
- A. right atrium
 - B. left atrium
 - C. right ventricle
 - D. aorta
38. Plant cells are different from animal cells because they contain ...
- A. a cell membrane
 - B. chloroplasts
 - C. vacuoles
 - D. a nucleus

39. Tapping a bent knee with a hammer results in a *knee-jerk reaction*. The feedback system is controlled by the nervous system in the body. The reflex would be the ...
- A. leg kicking
 - B. brain receiving a message
 - C. spinal cord making the pathway clear
 - D. reflex hammer hitting the knee
40. When kidneys fail to perform their function properly a machine can do the job for them, allowing them to lead relatively normal lives. The machine is called a ...
- A. Urinalysis machine
 - B. Bladder contraction
 - C. Dialysis machine
 - D. Cholesterol machine
41. In the late 1700's, Edward Jenner, an English country doctor, developed the first vaccine. The vaccine he developed made people immune to smallpox. This vaccine was ...
- A. insulin
 - B. cowpox
 - C. e-coli
 - D. rabies
42. Louis Pasteur's first great discovery was finding out what made beer and wine spoil. He discovered micro-organisms floating in spoiled batches of beer and wine. The micro-organisms were actually ...
- A. spoiled grapes
 - B. alcohol insects
 - C. yeast
 - D. anthrax
43. A disorder common in half a million children in Canada, can be triggered by many different environmental factors. This disorder is ...
- A. bronchitis
 - B. asthma
 - C. emphysema
 - D. collapsed lungs
44. There are two many ingredients in cigarettes that are harmful to your health. This drug makes you addicted because it speeds up the heart and raises the blood pressure. It is ...
- A. carbon monoxide
 - B. carbon dioxide
 - C. nicotine
 - D. mucus
45. The reason why fries and chocolate taste so good is because they contain a lot of fats. These fats are converted into a lipid, called cholesterol, which enters your arteries and can clog the flow of blood. This disorder, or condition is referred to as ...
- A. high blood pressure
 - B. arteriosclerosis
 - C. hypertension
 - D. peptic ulcer

Answer the following **Numerical Response** Questions in this booklet

Unit B – Cells and Systems

NR1 - Living organisms have specific structures that perform life functions. Match the structure with the function from the list provided.

1. food-gathering structures
2. breathing structures
3. moving from place to place
4. protection

___ ___ ___ ___

tentacles spiracles pseudopod spines

	.	.	
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

NR2 - Body Systems interact in many ways. Identify the interacting system ...

- 1 - Respiratory
- 2 - Circulatory
- 3 - Nervous
- 4 - Digestive

___ **Carries the nutrients to cells of the body**

___ **Carries and exchanges gases in the lungs**

___ **Carries messages which control body functions**

___ **Carries the nutrients to the place where they are broken down**

	.	.	
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

NR3 - Heartbeats vary from organism to organism in the animal kingdom. The hummingbird has a heartbeat of 1000/min. A human is about 70/min. and an elephant has only 25/min.

About how many times
does your heart beat in 15 seconds?

	.	.	
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Cells and Systems Section Quiz - Answer Keys

Section 1 Quiz		Section 2 Quiz				Section 1.3, 3.0, 4.0 Quiz			
1	A	1	D	16	B	1	D	16	A
2	B	2	C	17	C	2	D	17	B
3	B	3	B	18	B	3	C	18	C
4	A	4	D	19	B	4	D	19	A
5	C	5	A	20	A	5	B	20	B
6	C	6	B	21	C	6	B	21	B
7	C	7	A	22	C	7	C	There is no # 22	
8	B	8	B	23	B	8	B	23	B
9	D	9	D	24	C	9	A		
10	A	10	B	25	D	10	A		
11	C	11	C			11	B		
12	C	12	C			12	C		
13	B	13	A			13	B		
14	C	14	A			14	C		
15	A	15	A			15	D		

Cells and Systems Unit Test Answer Key

1	C	10	D	19	D	28	A	37	B
2	B	11	C	20	A	29	B	38	B
3	B	12	D	21	A	30	C	39	A
4	D	13	B	22	B	31	A	40	C
5	D	14	C	23	D	32	B	41	B
6	B	15	C	24	C	33	C	42	C
7	C	16	A	25	B	34	B	43	B
8	A	17	A	26	B	35	A	44	C
9	C	18	A	27	D	36	C	45	B

Numerical Response Questions	NR1	NR2	NR3
	1234	2134	17.5