

# Biology college essay



**ASSIGN  
BUSTER**

Unit 1: Matter and Energy for Life1. Explain the cell theory.

All living organisms are composed of one or more cells.

Cells are the basic units of the structure and function of all organisms.

All cells derive from pre-existing cells.

In a multi-cellular organism, the activity of the entire organism depends on the total activity of its independent cells.

2. Explain Biogenesis and Abiogenesis.

Biogenesis is the idea that living organisms develop only from other living things and not from non-living matter.

Abiogenesis is the erroneous idea that life can arise spontaneously from lifeless matter.

3. Compare Prokaryotic and Eukaryotic cells.

Prokaryotic cells are cells that lack a true nucleus and most other types of organelles. Examples: Bacteria and Archaea.

Eukaryotic cells are cells containing nuclei and other types of membrane-bound organelles. Examples: Protists, fungi, plants and animals.

4. Compare Plant and Animal cells in terms of Organelles.

There are two very big differences between plant and animal cells. The two cells are made up of mostly the same organelles except that the plant cell has a much larger vacuole than the animal cell. The other main difference is

that plant cells contain chloroplast, this is used to synthesize food and also make plants look green.

#### 5. Define Selective Permeability.

It means that it will allow the molecules of some substances (such as water) to pass through it while preventing others from doing so.

#### 6. Explain Osmosis, Diffusion, and Facilitated Diffusion.

Osmosis is the diffusion of a solvent across a semi permeable membrane separating two solutions.

Diffusion is the movement of molecules from an area of high concentration to an area of low concentration.

Facilitated diffusion is the passive movement of a substance in or out of a cell along a concentration gradient through a carrier protein molecule.

#### 7. Explain the importance of the processes of photosynthesis and cellular respiration for individual organisms.

The importance of photosynthesis is that it converts solar energy into a type of energy that can be used by autotrophs themselves, and heterotrophs that can eat those autotrophs. The importance of cellular respiration is to provide cells with energy they need to perform the tasks that they need to perform in order to survive.

#### 8. Using equations, explain the complementary nature of photosynthesis and cellular respiration.

Photosynthesis:  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$  = (Carbon dioxide plus water produces glucose and oxygen)  
Cellular Respiration:  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2$  = (Glucose plus water produces water plus carbon dioxide)  
In Photosynthesis and cellular respiration that products and reactants are switched.

Unit 2: Biodiversity  
1. Compare the characteristics of living and non-living things.

Characteristics of living things  
They are organized systems made up of one or more cells.

They metabolize matter and energy.

They interact with their environment and are homeostatic.

They grow and develop.

They reproduce themselves (only living things can reproduce)  
They adapt to their environment.

2. List and describe the 7 major categories of the modern classification system.

Kingdom, Phylum, Class, Order, Family, Genus, Species.

\*Kenny Penton came on Friday gone Saturday\*  
Kingdom is the largest taxon and it includes many thousands of species. Species is the smallest taxon and it includes only one particular species in it. Between kingdom and species there is 5 other taxa which forms the hierarchy of groups.

### 3. Explain the advantages of binomial nomenclature.

It is the system of using two word names for each species. The first word is the genus (this word should be capitalized) and the second word is species. Since the genus can contain more than one species, organisms with the same genus are very closely related. It is an advantage to use binomial nomenclature because common names that you use everyday are not very precise. Common names are misleading so this system makes it possible to refer to an organism without confusion.

### 4. Explain why viruses do not fit into the modern classification system.

They do not fit because they do not have cell structure, that means they are not organisms. Viruses have no cytoplasm, organelles, or cell membrane. They do not carry out cellular respiration or any other common life processes.

### 5. Describe the general characteristics of the 6 kingdoms.

Eubacteria and Archaeobacteria are the only ones that have prokaryotic cells. Protista, fungi, plantae, and animalia have eukaryotic cells, all usually have cell walls except animalia.

Eubacteria, archaeobacteria, and protista are unicellular. The rest are multicellular.

Eubacteria, archaeobacteria, protista and fungi get their nutrients from absorption. Plantae gets its nutrients by photosynthesis and animalia gets its nutrients by ingestion.

## 6. Compare plants and animals in terms of general characteristics.

They both have eukaryotic cells but plants have cell walls and animals do not. Both are multicellular and both reproduce sexually but plants also reproduce asexually. Plants are non motile like animals. Their nutrition is different as animals get theirs by ingesting and plants get their nutrients from photosynthesis.

## 7. Explain why angiosperms are the most diverse plant group.

One reason why angiosperms are so successful is because of their specialized leaf tissue. They have sunken stomata, which helps reduce water loss. Also, some angiosperms have small leaf hairs which serves the same function. The most important reason for their success is the structure that contains their reproductive organs: the flower. When pollination occurs, the pollen grain grows an extension, called a pollen tube. This carries the sperm to the eggs with the ovules in the ovary. The sperm and egg cells unite to form the zygote which undergoes mitosis to produce an embryo with an immature root, stem and one or two cotyledons. Meanwhile the wall of the ovule hardens and becomes a protective seed coat. This seed coat ensures the safety and success of the seed. See figure 6. 13 on page 176.

## 8. Describe the differences that exist between the invertebrate phyla (symmetry, body cavity, reproduction, and digestion).

Platyhelminthes, nematoda, annelida, mollusca, and arthropoda have bilateral symmetry. Cnidarians and echinodermata have radial symmetry and porifera has asymmetrical symmetry.

Porifera, cidarians, and platyhelminthes's body cavity is not present.

Nematoda, annelida, mollusca, arthropoda, and echinodermata's body cavity is present.

Porifera does not go through digestion. Cidarians, platyhelminthes, nemtoda, annelida, mullusca, arthropoda, and echinodermata does go through digestion.

Porifera, cidarians, and platyhelminthes reproduce both asexually and sexually. Nematoda, annelida, mollusca, arthropoda, and echinodermata reproduce sexually.

Examples: Porifera – Sponge.

Cidarians – Hydras, sea anemones, jelly fish and corals.

Platyhelminthes – Planarians, flukes, and tapeworms.

Nematoda – Pinworms, and hookworms.

Annelida – Earthworms, leeches, and tubeworms.

Mollusca – Clams, oysters, squids, snails, slugs, and scallops.

Arthropoda – Spiders, insects, and lobsters.

Echinodermata – Starfish, sand dollars, and sea urchins.

9. Explain why arthropods are the most successful class of animals.

One reason for their success is their rigid external skeleton. This provides a water proof protective “ armour”, a site for muscle attachment, and

protection against water loss from the moist tissues beneath. Another success factor is the specialized nature of the body segments, some of which are fused into distinct regions such as head, thorax, and abdomen. The jointed appendages that attach to these regions are adapted for a wide range of functions. A third reason is that they have a well developed nervous system. The fourth reason is the way they get their nourishment. Most arthropods use plants or plant materials, thus utilizing the most substantial source of nutrition on the planet. Others use animals tissues for nutrition.

10. Describe the differences that exist between the vertebrate phyla (symmetry, body cavity, circulation, respiration, reproduction, and endoskeleton).

Agnatha and chondrichthyes have an endoskeleton made of cartilage. Osteichthyes, amphibia, reptilia, aves and mammalia have an endoskeleton made of cartilage and some bone.

Agnatha, chondrichthyes, and osteichthyes breath through gills. Amphibia, reptillia, aves, and mammalia breath through lungs.

Agnatha, chondrichthyes, and osteichthyes's circulation occurs in a two chambered heart in a one circuit pathway through the body. Amphibia, and reptillia's circulation occurs in a three chambered heart in a two circuit pathway through the lungs and body. Aves and mammalia's circulation occurs in a heart that has a distinct right and left half, the right pumps to the lungs and the left pumps to the rest of the body.



Agnatha, chondrichthyes, osteichthyes, and amphibia reproduce and develop externally. Reptilia, aves, and mammalia reproduce and develop internally.

Examples: Agnatha – Lamprey and hagfish.

Chondrichthyes – Sharks and rays.

Osteichthyes – Trout, salmon, and cod.

Amphibia – Frog.

Reptilia – Snake  
Aves – Robins, and bluejays.

Mammalia – Humans.

11. Explain the life cycle of a sample organism from each kingdom, including a representative virus.

Bacteria: As a cell grows it makes a copy of its original, single, chromosome. Then the cell separates into two chromosomes. The septum begins to form and when it is complete there are two distinct walls formed. Then the cells separate, and everything happens again.

Diatoms (Protista): During asexual reproduction they split in two. Each half grows a new half to fit inside the old one. The rigid cell wall of the diatoms cannot grow once it has been formed so each generation of the diatoms is smaller than the one before. The reduction in size over generations continues until they reproduce sexually, producing a zygote. A zygote will grow to the full size before secreting a new cell wall.

Fungi: The simplest asexual method is fragmentation, in which pieces of the hyphae are broken off and grown into new mycelia. This can happen when the soil is disturbed by a gardener or a burrowing animal, which breaks up the mycelium under the soil surface. The resulting hyphae can each continue to grow and produce new mycelia. Then this one will be broken up and create a new cycle.

Algae (Plants): Release protected gametes into the water. After fertilization, the zygote develops inside a protective coat forming the seed. Once it has grown it can produce gametes itself.

Frogs (Animalia): First it hatches from the egg and it is a tadpole with a tail for swimming and gills for respiration. Then the older tadpole starts to get legs. When it is a young frog it will have well developed legs but no tail. Then when it is an adult frog, it will develop for life on land.

Unit 3: Maintaining Dynamic Equilibrium – Circulatory System  
1. Explain the concept of homeostasis and its critical nature to living things.

Homeostasis is the body's maintenance of a relatively stable physiological environment; the steady state resulting from conditions inside every cell remaining nearly constant. It is critical to living things because it allows the body to keep its stable state in the face of external stresses such as high or low temperatures and also in the face of internal stresses such as fever and infection.

2. Explain the importance of temperature regulation in maintaining homeostasis.

The importance of temperature regulation is that it keeps your body organs at the temperature for optimum functioning. It achieves this in several ways, one is the circulatory system.

### 3. Explain the need for a transport system.

There is a need for a transport system because it helps in homeostasis by transporting (circulating) the blood. The red blood cells transport oxygen to tissues and collect carbon dioxide from the tissues. White blood cells provide protection from viruses and bacteria, called pathogens. Blood also absorbs nutrients from the digestive system for transport to the tissues and collects waste products for removal.

### 4. Explain how the circulatory system contributes to the maintenance of equilibrium through its role in the transport of heat energy and matter.

Equilibrium is a state of balance achieved within an environment as the result of internal control mechanisms that continuously oppose outside forces that tend to change that environment. The circulatory system contributes to this because it takes in things that are needed, turns them into things that can be used by the body, and in the mean time, gets rid of wastes. This is how it creates equilibrium.

### 5. Describe the structure and function of an artery, a vein, and a capillary.

Arteries are blood vessels that transport blood away from the heart to the tissues and organs of the body. They have three different structural layers. The thickest layer is the middle layer which is made up of circular bands of elastic fibres and smooth muscle. Arteries have elastic walls. This elasticity

allows the artery to first expand as a wave of blood passes through it, and then snap back again.

Veins transport blood back to the heart from the organs and tissues. Veins have three layers also. The middle layer is very thin. Consequently veins do not push blood along as do arteries. Skeletal muscles squeeze the blood through the veins. Veins are equipped with one way valves that keep blood moving towards the heart. The valve prevents the blood from moving backwards.

Capillaries diffuse gases and nutrients/wastes, they also connect arteries to veins. They are the smallest of the blood vessels (they are microscopic). They reach every corner of the body. The capillary wall is a single layer.

6. Identify the main components of the heart and the role of each.

Right Atrium: Pumps blood to the right ventricle.

Right Ventricular: Pumps blood from the heart to the lungs through pulmonary arteries.

Left Ventricular: Pumps blood through the aorta to the systemic circulatory system  
Bicuspid Valve: Located between the left atrium and left ventricle, prevents blood from flowing the wrong way.

Tricuspid Valve: Located between the right atrium and right ventricle, prevents blood from flowing the wrong way.

Sinoatrial Node (S-A Node): Known as the pacemaker, it is a bundle of specialized tissues that stimulates the muscle fibres to contract and relax rhythmically.

7. Trace the pathway through the heart and describe the pulmonary and systemic pathways.

Pulmonary Circulation: The pathway of blood from the heart to lungs and back.

Systemic Circulation: The pathway of blood from the heart to the rest of the body.

Blood coming to the heart is deoxygenated and is in veins. It enters the heart through the superior vena cava. Blood then enters the right atrium, goes through the tricuspid valve and into the right ventricle. The blood travels from there through the semilunar valve into the pulmonary arteries which takes it to the lungs to be oxygenated. Oxygenated blood comes back from the lungs to the pulmonary veins and into the left atrium. It then goes through the bicuspid valve, into the left ventricle, through another semilunar valve, and into the aorta. It is then pumped to the rest of the body through arteries.

8. Identify the main components of the blood and describe the role of each.

Red blood cells make up 44% of the total volume of blood. The red cell is specialized for oxygen transport. These cells greatly increase the oxygen carrying capacity of the blood. They also contribute to the transport of carbon dioxide to the blood.

White blood cells make up about one percent of the total volume of blood, but can increase to more than double if fighting and infection. The job of white blood cells is to attack unfamiliar cells and get rid of them.

Platelets make up the third major component of blood. They are not cells but they are fragments of cells that were created when larger cells in bone marrow broke apart. They help to protect the body from excessive blood loss after injury, they play a key role in the blood clotting process.

9. Identify the impact of circulatory diseases on the homeostasis of an organism.

Most circulatory diseases have some impact on the blood flow through veins and arteries. If this occurs then it will affect homeostasis of the organism because their blood will not be flowing properly and things may not be getting done as efficiently or at the speed that is needed in the organism.

10. Describe the disorders linked to the circulatory system and their affect on homeostasis of the system and the organism as a whole: hypertension, atherosclerosis, arteriosclerosis, and coronary blockage.

Hypertension is chronically elevated blood pressure. It greatly increases the risk of heart disease. Conditions that either increase the volume of the blood or reduce the elasticity of the arteries can cause hypertension. Causes are: a diet high in cholesterol causing arteries to become clogged, artificial stimulants such as caffeine, nicotine and alcohol that cause your heart rate to speed up, and also age, heredity, lack of exercise, and smoking.

Atherosclerosis is the narrowing of the arteries due to the deposit of cholesterol and fat under the inner lining of the arteries. This can cause blood clots which can cause strokes and heart attacks.

Coronary Blockage is when there is a blockage (blood clot) in a blood vessel.

Coronary bypass is used to create a new pathway around the blockage.

11. Describe the process from bypass surgery to modern techniques such as stents, angioplasty and clot bursting drugs.

Coronary bypass surgery is a surgical procedure that involves removing a segment of healthy blood vessel from another part of the body and using it to create a new pathway around the blockage in a blood vessel near the heart.

Angioplasty is a surgical procedure used to open partially blocked coronary blood vessels. A cardiologist inserts a fine plastic tube into a clogged artery and when the tube reaches the site in the artery that is constricted by plaque, a tiny balloon is pushed out from the top of the tube. The inflating balloon forces the artery to open.

Clot bursting drugs open up the coronary arteries, restoring blood flow to the heart, increases the oxygen level in the heart, and preventing tissue death.

Systems: Respiratory System1. Explain how the respiratory system helps maintain homeostasis.

The respiratory system helps maintain homeostasis by removing carbon dioxide from the body.

2. Explain the need for a respiratory surface in humans.

The respiratory surface is the surface area available for gas exchange. It must be big enough for the exchange of oxygen and carbon dioxide to occur at a rate that will meet the organisms metabolic needs. It must also take place in a moist environment, so that the oxygen and carbon dioxide are dissolved. Since humans need oxygen to survive, and need to get rid of carbon dioxide, a respiratory surface is essential.

3. State the function of: nasal cavity, trachea, bronchi, bronchioles, alveoli, and a diaphragm.

Nasal cavity: the nostrils conduct air to the nasal cavity where thin bones, called turbinates, hang suspended. Their presence increases surface area. The turbinates are covered with a thin membrane that secretes mucus, which moistens and warms the air to protect the delicate tissues of the lungs.

Trachea: carries air to the bronchi.

Bronchi: carries air to the lungs.

Bronchioles: carries air to the alveolis.

Alveolis: site of external respiration.

Diaphragm: a muscle layer which separates the region of the lungs (thoracic cavity) from the region of the stomach and liver (abdominal cavity). It assists in the ventilation of the lungs by moving down during inspiration, so the lungs can extend, and up during exhalation, helping push the air out.



4. Explain the mechanics of inhalation/exhalation and regulation of the breathing cycle.

Inhalation is when oxygen enters the lungs. The intercostal muscles contract, lifting the rib cage up and out. At the same time, the diaphragm contracts and moves downwards. As the lungs expand, air moves out.

Exhalation occurs after inhalation. The oxygen diffuses into the body and is replaced by carbon dioxide, which exits the lungs. The intercostal muscles relax, allowing the rib cage to move to its normal position. The diaphragm also moves upwards, resuming its domed shape. As the lungs contract, air moves out.

Systems: Digestive system  
1. Explain how the digestive system helps maintain homeostasis.

The digestive system helps maintain homeostasis by getting rid of wastes and absorbing nutrients into the body.

2. Describe the purpose and function of the digestive system.

To change large nutrient molecules into smaller molecules that can be absorbed by the tissues of the digestive system.

3. Describe the role of the following in the digestive process: salivary glands, stomach, liver, pancreas, gall bladder, small intestine, and large intestine.

Salivary glands: Three pairs of glands. They secrete saliva into the mouth. This moistens and lubricates food.

Stomach: Uses muscles to physically break down food.

Liver: Responsible for producing bile salts from cholesterol which are released into the small intestine to break up fat globules. The liver also detoxifies various poisons ingested with foods and drinks.

Pancreas: Produces and releases a basic solution that changes the pH of chyme after it leaves the duodenum.

Gall Bladder: stores bile produced in the liver.

All you need to know about biology first year