**JUNIOR BIOLOGY OLYMPIAD QUESTIONS**

1. An experiment was set up to investigate tropism as shown below:



1. Draw what is expected of the experiment after 7 days. [4]
2. State the type of tropism exhibited by (i) the root and (ii) the shoot in your diagram. [2]
3. Explain the purpose of positive hydrotropism. [2]
4. What is tropism? [2]

**ANSWERS**

1. (a)



 (b) (i) positive geotropism (ii) positive phototropism

 (C) Enables roots to absorb water.

 (d) The growth response of a plant to stimuli.

2. Write short notes on the following types of heterotrophism nutrition.

(a) phagocytosis. [2]

(b) parasitism. [2]

(c) saprophytism. [2]

(d) holozoic nutrition. [2]

**ANSWERS**

1. Phagocytosis – mode of feeding in which single celled organisms like amoeba and certain white blood cells feed on solid food materials.

 – they engulf food particles through the formation of pseudopodia which captures the food material and encloses it in a food vacuole.

 – This is digested by enzymes and soluble products are absorbed into cytoplasm.

 – The undigested are voided out.

1. Parasitism – mode of feeding where one organism, the parasite obtains food from another organism, the host.
* The host does not benefit from the association but loses.
* The parasite can live on the outside of the host e.g. tick or within the host e.g. tapeworms.
1. Saprophytism – mode of feeding where the organism feeds on decaying organic matter.
* Enzymes are secreted on the decaying matter and after digestion the soluble products are absorbed into the body of the organism.
* This type of feeding is exhibited by some bacteria and fungi.
* This digestion in this mode of feeding is called extracellular digestion.
1. Holozoic nutrition – organisms ingest, digest, absorb, assimilate and egest organic matter.
* This is exhibited in three ways namely in different animals as herbivorous, carnivorous and omnivorous mode of feeding.

3. (a) name the parts of a lipid molecule. [2]

 (b) Differentiate between:

 (i) Fats and oils. [3]

 (ii) Light independent and light dependent reaction in photosynthesis. [2]

 (c) State three functions of lipids in animals. [3]

**ANSWERS**

3. (a) – fatty acid molecules.

* Glycerol molecules.

 (b) (i) – fats are soliod at room temperature while oils are liquid at room temperature.

- Fats are found in animals while oils are found in plants.

(ii) – light independent stage takes place in the absence of light.

* Hydrogen is incorporated into carbon dioxide to form glucose using ATP.
* Hydrogen is used to reduce carbon dioxide into carbohydrate.
* This process is called carbon (iv) oxide fixation.
* It takes place in the stroma of the chloroplast.
* Light dependent reaction requires light energy from the sun trapped by chlorophyll into chemical energy.
* Energy is used to split a water molecule into hydrogen and oxygen.
* Hydrogen ion and ATP are formed.

 (c) – they form the components of cell membrane

* They are source of metabolic water
* They are a source of energy when oxidised
* They insulate the animal bodies against heat loss

4. (a) what is an enzyme? [1]

 (b) (i) state and explain briefly the three characteristics of enzymes. [3]

 (ii) How are enzymes affected by temperature and pH? [2]

(c) State the functions of the following enzymes

(i) Rennin

(ii) chymotrypsin

**ANSWERS**

4. (a) it is a biological catalyst which speeds up biochemical reactions without changing in their structure at the end of the process.

(b) (i) –they are specific in the types of reactions they catalyse.

* They act best within specific pH range
* They are affected by temperature change
* They are not used up in the reactions

(ii) – at low temperatures, enzymes are inactive, at high temperatures, enzymes are denatured.

* Therefore, enzymes have an optimum temperature.
* Some enzymes work well in acidic medium while others work well in alkaline medium.
* The enzymes that work well in acidic medium stop working when they are in alkaline medium.

(c) (i) rennin

* These are enzymes found in the stomach of young mammals whose diet is mainly milk.
* They break down proteins found in milk.
* It converts soluble milk casinogen into casein that can then be converted into peptides by the enzyme pepsin.

 (ii) chymotrypsin

* This is secreted in an inactive form chymotrypsinogen.
* It converts the remaining proteins into smaller peptides.
1. Using you knowledge in science answer the following questions
	1. Blood is part of the circulatory Complete the following statements using the correct word(s) from the following lists

Plasma

Red blood cells

white blood cells

Platelets

1. The Liquid part of blood is known as

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [1]

1. Oxygen gas is carried around the body by the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [1]

1. Complete the question of respiration below

Glucose + \_\_\_\_\_\_\_\_\_ ----------------> Energy + Carbon dioxide \_\_\_\_\_\_\_\_\_[2]

1. Explain how each of the following changes in the environment might affect the rate

of photosynthesis.

1. An increase in temperature from 10 °C to 20 °C

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[3]

1. An increase in light intensity

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[2]

1. What is the name the substance that traps light for photosynthesis

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[1]

**ANSWERS**

|  |  |  |
| --- | --- | --- |
| Question Number | Answer | Mark |
| 5 a (¡) | Plasma | 1  |
| 5 a (¡¡) | Red blood cells | 1 |
| 5b | * + Reactants ……..Oxygen
	+ Products ………. Water
 | 11 |
| 5 (c)(¡) | * + Increase rate of photosynthesis
	+ Increase enzyme active
	+ energy for molecule to have more collisions for reaction
 | 111 |
| 5 (c) (ii) | * + Increase rate of photosynthesis
	+ more light is tapped/absorbed
 | 11 |
| 5 (c)(ii) | * + Chlorophyll
 | 1 |

1. The following diagram shows the flow of blood through the lungs, heart and the

rest of the body.



1. Name the blood vessels labelled A and B

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Describe two changes in the Composition of blood after it has passed through the capillaries of the lungs
2. Name the chamber of the heart that pumps blood to the lungs

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name a vein that Carries oxygenated blood

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ANSWERS**

Scheme

|  |  |  |
| --- | --- | --- |
|  Question Number | Answer | Marks |
| 6(i) | * 1. Aorta
	2. Vena Cara
 | 11 |
| 6 (ii)  | * 1. Carbon dioxide removed resulting less CO2
	2. Oxygen added resulting move O2
	3. Water vapor removed

  | 222 |
| 6 (iii)  | Right ventricle | 1 |
| 6 (iv) | Pulmonary Vein | 1 |

1. The diagram below shows the human lungs and related structures.



1. Name the parts labelled X and Y

X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The table below shows the concentration of oxygen and of carbon dioxide in blood entering and leaving the Lungs.



1. How many cm3 of oxygen per 100 cm3 of blood are collected in the lungs?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name the cells in blood that collect oxygen in the lungs.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name the blood vessel that takes blood to the lungs from the heart.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Describe and explain how a carbon dioxide molecule passes from the blood into the lungs and how it is then breathed out.

**ANSWERS**

Scheme

|  |  |  |
| --- | --- | --- |
| Question Number | Answer | Marks |
| 7 (a) | X = tracheaY = diagram | 11 |
| 7 (b) (i) | 8.4 | 1 |
| 7 (b) (ii) | red blood Cells or erythrocytes | 1 |
| 7 (b) (ii) | Pulmonary artery | 1 |
| 7 (c) | 1 Mark for each pointMaximum 5 Marks * Process of diffusion
* Oxygen dissolve in film of moisture
* the concentration gradient causes diffusion
* the diaphragm relays
* Rib Cage lowers
* Air passes in the trachea to the bronchi to the bronchioles to air sacs
 | 5 |

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1. (a) Explain the effect of the following hormones on leaves and fruits. [4]
	1. Cytokinins
	2. Abscisic acid
	3. What is the effect of gibberellins on meristems, stem, fruit and seed? [4]

(b) Give one economic importance of ethylene (ethane). [2]

**ANSWERS**

1. (i)
* it delays ageing of leaves
* promotes fruit development.

(ii) – promotes leaf abscission

* Promotes fruit abscission

 (iii) – increases cell division in meristems

* Increases cell elongation in stem
* Promotes fruit development
* Initiates seed germination.
1. – It is used in ripening and harvesting fruit.
2. (a) Define a disease. [2]

(b) What is meant by the following terms in diseases: [8]

(i) Signs

(ii) Symptoms

(iii) Incubation period

* 1. Pandemic

**ANSWERS**

9. (a) A condition which changes the normal functioning of a living organism.

(b)

1. Signs – visible expression of the disease which can be found by examining a patient e.g. rash or high temperature.
2. Symptoms – an indication of a disease which is not detectable by examination and can only be reported by the patient e.g. headache, nausea.
3. Incubation period – the period of time between the original infection and the appearance of signs and symptoms.
4. Pandemic – an epidemic which spreads across whole continents.
5. (a)cholera is a common bacterial disease.
	1. Name the bacterium that causes it. [1]
	2. How is the disease transmitted? [2]
	3. How is the disease prevented? [2]

(b) the Aquired Immune Deficiency Syndrome (AIDS) is a viral disease.

(i) Name the virus that causes the disease. [1]

(ii) How is the disease transmitted? [2]

(iii) How can the disease be prevented? [2]

**ANSWERS**

10. (a) (i) vibro cholera

(ii) – the bacterium is passed in stools or vomit of patients with a disease.

* Transmission is normally through infected drinking water and contaminated food.

 (iii) – strict personal hygiene.

* Drinking water should come from an uncontaminated piped supply or be boiled.
* Flies must not be allowed to contaminate food.

(b) (i) Human Immunodeficiency Virus (HIV)

(ii) – mainly through close sexual intercourse.

* Unscreened blood for transfusion and injection by unsterilized needles and cuts by contaminated razor blades also transmits the disease.

 (iii) – avoid unsafe sex and the use of condoms during sexual intercourse reduce the risk of catching AIDS.

1. (a) state three functions of a skeleton. [3]

(b) describe the following bone tissues:

(i) solid bone

(ii) spongy bone

(iii) ligaments

1. What is a hinge joint? [1]

**ANSWERS**

11. (a) – supports the body

* Protects the body organs
* Helps with movement.

(b) (i) solid bone – the compact or very hard part of the bone usually found along the outer edges of bones.

(ii) spongy bone – part of the bone with many empty spaces and usually found towards end of the bones.

(iii) Ligaments – tough fibres that hold one bone to another. They are usually found at bone joints where two bones come together.

(c) A joint that allows bones to move only back and forth.

1. (a) distinguish between producer and primary consumer. [2]

(b) name four density-dependent factors in an ecosystem. [4]

(c) distinguish between commensalism and mutualism and give an example for each. [4]

**ANSWERS**

12. (a) producer – the organism at the first trophic level in an ecological pyramid which carries out photosynthesis.

- Primary consumers - are the organisms at the second trophic level in an ecosystem pyramid usually a herbivore.

(b) (i) competition (ii) emigration (iii) predation (iv) paratism

(c) Commensalism – is an association between organisms of two or more different species in which one of the commercial benefits and the other neither benefits nor is harmed.

Mutualism – is an association between two or more organisms of different species both derive mutual benefits.

1. (a) using a well labelled diagram, illustrate the three pathways in which water passes; [5]
	1. Apoplast pathway
	2. Symplast pathway
	3. Vacuolar pathways

(b) what is main purpose of the following to a plant:

(i) water[1]

(ii) magnesium ions[1]

(iii) Phosphate ions [1]

(c)define the process by which water moves from the soil into the roots. [2]

**ANSWERS**

 13. (a)



(b) (i) water- used in photosynthesis

(ii) magnesium ions – formation of chlorophyll

(iii) phosphate ions – development of roots

(c)osmosis – diffusion of water molecules across a selectively permeable membrane.