SENIOR BIOLOGY OLYMPIADS THEORY 2012.







**2. (a) Using a large and well labeled diagram, describe how a named metabolic waste**

**produced from the liver reaches the named excretory organ.**

 **(b) Give any one important role a named excretory organ in (a) above play apart from**

**excreting the named nitrogenous waste in (a)**

**3. (a) Define co-ordination. [1mark].**

**ANS: This is the process by which different systems of the body work effectively together to perform a certain activity.**

**(b) In most cases, neurons possess the axon and the dendrites. Differentiate axons from**

**dendrites in terms of their transmission of the impulses [2marks].**

**ANS: Axons transmit the impulses away from the cell body while**

 **Dendrites transmit the impulse towards the cell body.**

1. **Synapse is a tiny space which is found between two neurons. What is the name of the chemical substance which helps the impulse to move from one neurone to another? Give one name of the chemical substance you have mentioned.**

**ANS: Neurotransmitter [1]**

**E.g. Cholinesterase. [1]**

1. **two kinds of nerves which forms the Peripheral Nervous System**

**ANS: (i) Spinal Nerves**

 **(ii) Cranial Nerves**

1. **Name any two types of reflex action you know.**

**ANS: (i) conditioned reflex action**

**(ii) Un conditioned reflex action**

1. **(a) The steroid hormones oestrogen and progesterone are secreted by the ovary. State precisely the site of secretion for each**

**ANS: Oestrogen – Follicle (cells) granulosa**

**Progesterone – Corpus luteum**

**(b) The most effective oral contraceptives for general use are the so – called Combined**

**Oral Contraceptives (COCs) which contain oestrogen and progesterone. Explain how**

 **COCs produce their effects.**

**ANS:- The oestrogen/ progesterone affects the hypothalamus. It inhibits the**

 **- secretion of FSH/LH.**

 **- The follicles do not develop.**

 **- No ovulation takes place (eggs not produced)**

 **-Negative feedback.**

 **- prevents the implantation effect on endometrium and then endometrium**

**thickens.**

 **(c) Describe four social implications of the use of contraceptions.**

**ANS: - more STDs, Breast cancer, cervical cancer.**

* **Population decrease**
* **Greater care for children that are born**
* **Less poverty / Starvation**
1. **(i) What is respiratory quotient? [3marks]**
* **It is the ratio of the volume of carbon dioxide produced to the volume of oxygen used in respiration during the same period of time.**

**(ii) State at least two pieces of biological information that can be extracted from**

**Respiratory Quotient. [2marks]**

* **It can indicate what kind of substrate is being respired.**
* **Whether the respiration process is aerobic or anaerobic.**

**(iii) Write the formula for respiratory quotient? [1 mark]**

**ANS:**

**(iv) Using the equation in (iii) above, calculate the RQ for the complete aerobic respiration of oleic acid, a fatty acid found in olive oil. [3marks]**

**ANS:**

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1. **The diagram below shows the rate of an enzyme controlled reaction. The solid line indicates the normal relationship between the rate and substrate concentration and the dotted line indicates the relationship when a competitive inhibitor is added**

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Question 1: One of the organelles of the cell is the nucleus . The nucleus contain two most important biomolecules which are DNA and RNA.

1. What do the initials DNA AND RNA stand for?
2. Explain the importance of DNA and RNA to life
3. Explain three major difference between DNA and RNA
4. Both the DNA and RNA are made up of 3 major compounds these are a sugar, Phosphate group and Nitrogenous group .

Give the names of sugar and Nitrogenous base found in DNA only.

1. DNA and RNA are important in protein synthesis. Name the organelle of the cell in which this process occurs and the term used to describe this process.

Solutions

Question ( 1 a) DNA ----🡪 Deoxyribonucleic acid

 RNA ---🡪 Ribonucleic acid

(b) DNA and RNA act as data base or they store information important to survival of living organisms from one generation to another.

( c) DIFFERENCES

1. (a) Define ventilation

 Solution : This is the process of moving air in and out of lungs.

1(b) Give short explanation about the following terms:

1. Tidal volume [2]
2. Inspiration reserve volume [2]
3. Functional redial volume [2]
4. Vital capacity

 Solutions

1. Tidal volume –air taken in and out when the body is at rest
2. Inspirational reserve volume –This is the air that remains in lungs after breathing in.
3. Functional residual volume – This is air which keeps the air passage open to prevent lungs from collapsing
4. Vital Capacity – This is the maximum volume of air that can exchange during one breath in and out.

( C ) Respiratory system is made up of the nose, tracheas and lungs

* Nose and trachea consists of ciliated cells (Goblet cells) which contains :
* Cilia which sweeps out dust and pathogens trapped by mucus.
* Mucus –Traps dust and pathogens entering the air path ways entering the air passage
* The trachea- Is made up of rings of cartilage which keep it open all the time. The lungs end up forming air sacs also known as alveoli in which gases exchange takes place.
* Alveoli- Is richly supplied with blood capillaries for efficient transport
* Contains surfactant and cells and macrophages .
* Surfactant cells secrete surfactant fluids which makes the alveoli flex during breathing . It also lowers surface tension in times of pressure difference.
* Macrophages – Defend the air passage against infection.
*
1. Blood composed two componets , These are plasma and cellular componets.

The cellular components consists of platelets, red blood cells and white blood cells.

The white blood cells are well known for defending the body against pathogens.

1. What does the term pathogen mean ? give three examples of pathogens .
2. White blood cells are grouped into phagocytes, monocytes and lymphocytes .

Give one example for each group.

( c ) Name two types of lymphocytes and name the organs of the body in which each type is produced.

( d) Name the lymphocytes which is usually targeted by HIV and explain why it is targeted.

( e ) Explain events that take place during blood clotting in chronological order.

( f) Explain the term Atherosclerosis and the danger it posses to human life.

Solutions

( a) Anything living organism that causes a disease in a body.

Examples : bacteria, Virus and Fungi

(b ) Phagocyte : Macrophage

Monocyte : Basophols

Lymphocytes : B- cells / T cells

( c) (i) B- cells – Formed in the bone marrow

 ( ii ) T- cells Thymus

( d ) T- helper cells

Why : They are “whistle lowers” to the immune system

 ( e) ---------------------------------------------------

 ( f ) Atherosclerosis is the term used to describe the accumulation of fats or cholesterol a long the lumen of the blood vessels resulting in the vessel getting blocked.

Danger: It can cause high blood pressure resulting in damage of the organ and leading to death.

OTHER QUESTIONS

Question 1: One of the organelles of the cell is the nucleus . The nucleus contain two most important biomolecules which are DNA and RNA.

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TOPIC: GASEOUS EXCHANGE

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