

ADVANCED LEVEL NATIONAL EXAMINATIONS 2006

SUBJECT: BIOLOGY I SECTION A ANSWER 001.

- a) The complementary RNA sequence for GA TCA A is CUAGUU
 b) i) Water molecule is the most abundant in the cells of human body.
 ii) The molecule that contains much energy is lipid.

ANSWER 002.

I copy and I complete the following table which gives the information about 3 types of mammalian blood cells .

Appearance of blood cell	Name of blood cell	Function
A	Red blood cell or erythrocyte	Transport O ₂ and CO ₂ gases in respiration.
B	Lymphocyte	Antibodies production (Make antibodies)
C	Neitrophyls or granufloctes	Phagocytosis

ANSWER 003.

- a) An example of a protein that plays a role in defense against disease in humans: immunoglobulin or antibody or fibrinogen or interferon or albumin or insulin.

b) The diagram below outlines protein synthesis of proteins in a cell.
 DNA → mRNA → polypeptide.

Stage 1

Stage 2

i) Names of stages:

-Stage 1: Transcription

-Stage 2: Translation

ii) Stage 2 take place in the cytoplasm of a cell or in ribosomes or cytosol.

iii) Role of transfer RNA (t RNA):

-To choose , select, fix an amino-acid in a polypeptide chain.

-Transport of amino-acid to the ribosomes.

-The t RNA has an anticodon pair with the complementary m RNA codon.

-Decoding m RNA

ANSWER 004.

a) The difference between absorpuon and assimilation:

• **Absorption:** passage or invergination of food particle or nutrients by the membrane / external part into the interior part or cytoplasm of a cell without any transformation.

• **assimilation:** the transformation, integration (breakdown),metabolism, anabolism. catabolism, fixation of absorbed substance or nutrients.

b) The transport of oxygen by red blood cells , their structure is suited to that function as follows:

-Absence of mitochondria used to fix oxygen to the hemoglobin.

-Absence of nucleus for metabolism command.

-No cellular organelle.

- Presence of hemoglobin.

- Biconcave form of red blood cells.

ANSWER 005.

Which blood vessel in humans has:

- The highest pressure: aorta or arteries
- The highest oxygen concentration: pulmonary vein or artery except the pulmonary artery.
- The highest concentration of CO_2 : cava vein or all veins except pulmonary vein
- The high concentration of glucose following a meal: hepatic portal vein or intestinal veins .

ANSWER 006.

a) The body gain heat by:

- Oxidation of organic molecules or increased metabolism or respiration.
- contraction of muscles
- Putting on heavy clothes like jackets, sweaters...
- Exposing yourself to sunlight or heat conduction or
- Taking hot food (tea, coffee, sauce)
- Making alcoholic beverages.
- Convection and radiation.

b) The subcutaneous fat helps control the temperature as

- isolate thermal (struggle against loss of heat)
- by being oxidized when it is cold (provide energy through respiration).

ANSWER 007

The role of the hormone FSH and LH in the control of menstrual cycle :

FSH	LH
Stimulation of oestrogen production	Stimulates ovulation
Development ovary follicle	Cause development of corpus luteum

ANSWER 008

- a) There is no blood capillary in the cornea of the eye for:
- Keeping its transparency.
 - The absorption of light.
 - To prevent it from being opaque.
 - Blood cells cause dispersion of light.
- b) Aqueous humor and choroid supply nutrients to the cornea.

ANSWER 009

- a) The plant manufactures nutrients involved in energy production, growth, restoration and reproduction. I give examples of these substances: carbohydrates, lipids, proteins, vitamins, nucleic acid and other organic substances (amino acids, glucose, starch ,...)
- b) Before testing for starch, the leaf is warmed in ethanol. Ethanol turns green because it dissolves in chlorophyll.

ANSWER 010

- a) Insulin can not effectively be taken by mouth because it can be dispersed, decomposed, denatured or digested
- b) People with diabetes can control their blood glucose level by:
- Treatment by injection of insulin.
 - Taking too much water.
 - Practice physical exercise.
 - Choice of food to be taken.

ANSWER 011

The structure of a mitochondria is adapted to its function in aerobic respiration by:

- The presence of a matrix containing enzymes (NAD, FAD ...)
- The presence of cristae and DNA.

The presence of double membrane.

ANSWER 012

a) Gene of eye of red colour: R

Gene for white eye colour : r

Gene R is dominant over r and was cross-linked.

The female genotype for white eye colour is $XrXr$ or Xr .

b) Man of group B can have a genotype BO or BB

Woman of blood group AB can have a group AB.

Possible crossings:

First case: Parents: BO X AB

Gametes: B, O A, B

Offsprings

	B	O
A	AB	AO
B	BB	BO

Possible blood groups /offsprings are : AB, B, A.

Second case: Parents : BB x AB

Gametes :B, B A, B

	B	B
A	AB	AB
B	BB	BB

Possible blood groups /offsprings are AB and B.

The blood group their children will not have is blood group O.

ANSWER 013

a) Many organisms require glucose as respiratory substrate. How each of the following glucose is obtained:

For the saprobiotic fungus:

- by degradation of dead organic matter (waste)
- secretion of external digestive enzymes

ANSWER 016

The table below shows the cell composition of 3 samples of blood.

Cell count NO per mm ³	Peter	Jöhn	Joseph
Red blood cells	6.000.000	5.000.000	2.000.000
White blood cells	500	6.000	5.000
Platelets	200.000	220.000	500

a) The person most likely to be experienced in a region recently altitude high is Peter because he has a large number of red blood cells to attach a lot of oxygen.

b) The person most likely to become sick if exposed to a virus is Peter because he has little white blood cells.

c) A person whose blood is unlikely to coagulate effectively if it is Joseph was injured.

d) The mechanism of blood clotting:

- agglomeration of platelets, thrombocytes, globulins (platelet) WHERE IT BELONGS of the injury.
- formation of the clotting enzyme. Be thrombogenic (prothrombin more thrombokinese - thromboplastin)
- Ca²⁺ for to thrombin.
- Ia merges thrombin with fibrinogen to yield fibrin or fibrin filament
- the filament of fibrin entraps blood cells for the formation of a clot or coagulation.

ANSWER 017

a) The graph showing the concentration of oxygen and carbon dioxide in the tissues of banana (fruit) depending on maturity.

i) The fabric of a plant or spend the carbohydrates produced by photosynthesis in leaves and transported to cells in the fruit is the phloem, phloem, sieve tube

ii) The oxygen of the atmosphere enters the cells of a fruit through stomata, lenticels, and then diffusing into the tissues of the fruit

iii) Explanation of the relationship between the concentration and carbon dioxide over the period shown on the graph:

From 0 to 30 days, the photosynthesis predominates after 30 days and is breathing predominates.

b) i) The cause of the variation in respiratory quotient: it is the transformation of organic substances (lipids, proteins, amino acids, starch into glucose, ...). This glucose is degraded to raise up to respiratory quotient causing this increase is that the variation of the metabolite used or gluconeogenesis.

- It crushes a banana in pure water.
- It takes a small amount of solution that is obtained in a test tube.
- It adds or Fehling's solution or Benedict and heated:
- emergence of red brick color or a precipitate red brick
- The amount of reducing sugar is determined by the amount of the precipitate.

ANSWER 018

a) What is the meaning:

i) density dependent factor: factor that leaves directly affected by the number of individuals in space, based on density, based on the size of population change

ii) density independent factor: who does not let itself directly affected by the number of individuals per unit area and is not based on the density or population size or that do not depend on density.

iii) intraspecific competition: competition between individuals of the same species.

iv) Interspecific competition: competition between individuals of different species.

ANSWER 019.

a) Sources of variation:

- **Random variation:** Key to the creation of new alleles.
- **Sexual reproduction / crossing over:** independent assortment of homologues, and the random joining of gametes.
- **Diploidy:** Presence of two copies of each chromosome in a cell.
- **Out breeding or mating with unrelated partners:** increases possibility of different combinations of alleles.
- **Balanced polymorphism:** encourages the existence of more than one allele for a certain gene because of the survival benefits of both alleles.
- **Hybrid vigor:** Describes the superior quality of offspring between two inbred strains of plants.

b)

- **Point mutation/ single base substitution:** It is a type of mutation that causes the replacement of a single base nucleotide with another nucleotide of the genetic material DNA or RNA.
- **Insertion or deletion of a single base pair**

ANSWER 020.

Similarities: Both are reproductive cellsⁿ with nucleus.

Differences:

- Egg is larger than sperm.
- Egg has large food store while sperm has no food store.
- Egg has a spherical shape while sperm has head, middle piece and tail.
- Egg is immobile while sperm is mobile cell with tail/ flagella.
- Sperm has acrosome which release enzymes while egg does not have.