M10/4/BIOLO/SPM/ENG/TZ1/XX+


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**BIOLOGY**
**STANDARD LEVEL**
**PAPER 1**

Monday 17 May 2010 (afternoon)

45 minutes

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INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

**1.** The lengths of a sample of tiger canines were measured. 68 % of the lengths fell within a range between 15 mm and 45 mm. The mean was 30 mm. What is the standard deviation of this sample?

A. 5 mm

B. 15 mm

C. 7.5 mm

D. 30 mm

**2.** Which functions of life are found in all unicellular organisms?

A. growth, response and nutrition

B. differentiation, response and nutrition

C. metabolism, meiosis and homeostasis

D. growth, metabolism and differentiation

**3.** Which statement is part of the cell theory?

A. Cells are composed of organic molecules.

B. Cells have DNA as their genetic material.

C. Cells have cytoplasm surrounded by a membrane.

D. Cells come from pre-existing cells.

**4.** Which of the following are features of prokaryotes and eukaryotes?

| | 70S ribosomes | 80S ribosomes | Naked DNA | DNA associated with proteins |
|---|---|---|---|---|
| A. | prokaryote | eukaryote | prokaryote | eukaryote |
| B. | eukaryote | prokaryote | eukaryote | prokaryote |
| C. | eukaryote | prokaryote | prokaryote | eukaryote |
| D. | prokaryote | eukaryote | eukaryote | prokaryote |

**5.** What route is used to export proteins from the cell?

A. Golgi apparatus → rough endoplasmic reticulum → plasma membrane

B. Rough endoplasmic reticulum → Golgi apparatus → plasma membrane

C. Golgi apparatus → lysosome → rough endoplasmic reticulum

D. Rough endoplasmic reticulum → lysosome → Golgi apparatus

**6.** Which events occur during the $G_1$ phase and S phase of the cell cycle?

| | $G_1$ phase | S phase |
|---|---|---|
| A. | DNA replicates | cell grows |
| B. | mitosis begins | cell divides |
| C. | cell divides | mitosis begins |
| D. | cell grows | DNA replicates |

**7.** Which substance in prokaryotes contains sulfur?

A. DNA

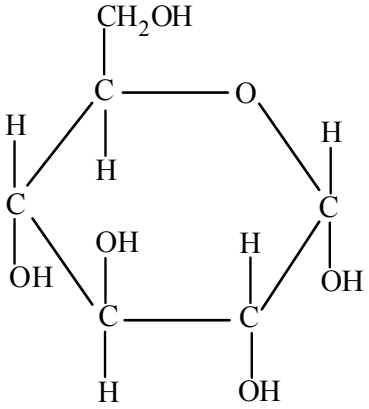
B. Phospholipids

C. Proteins

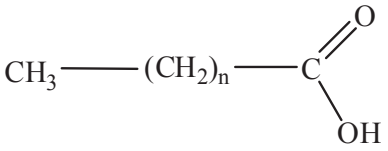
D. Antibiotics

**8.** Which describes these molecules correctly?

I.

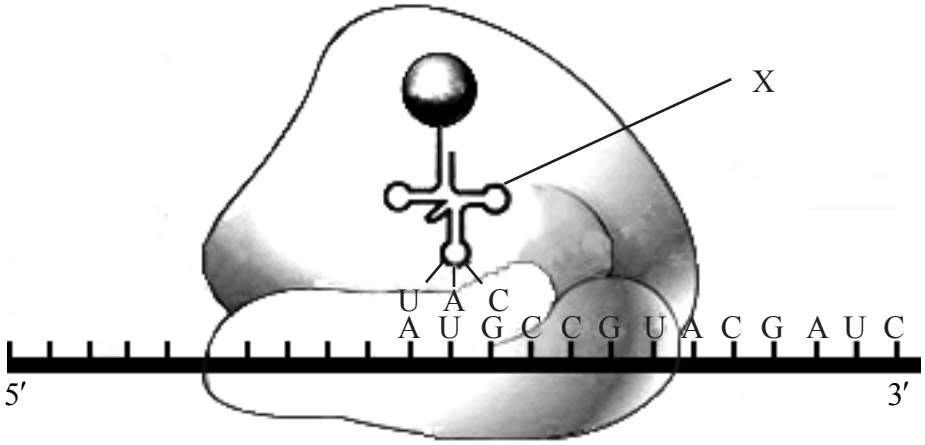



II.




| | I | II |
|---|---|---|
| A. | ribose | amino acid |
| B. | glucose | amino acid |
| C. | ribose | fatty acid |
| D. | glucose | fatty acid |

**9.** What sequence of processes is carried out by the structure labelled X during translation?



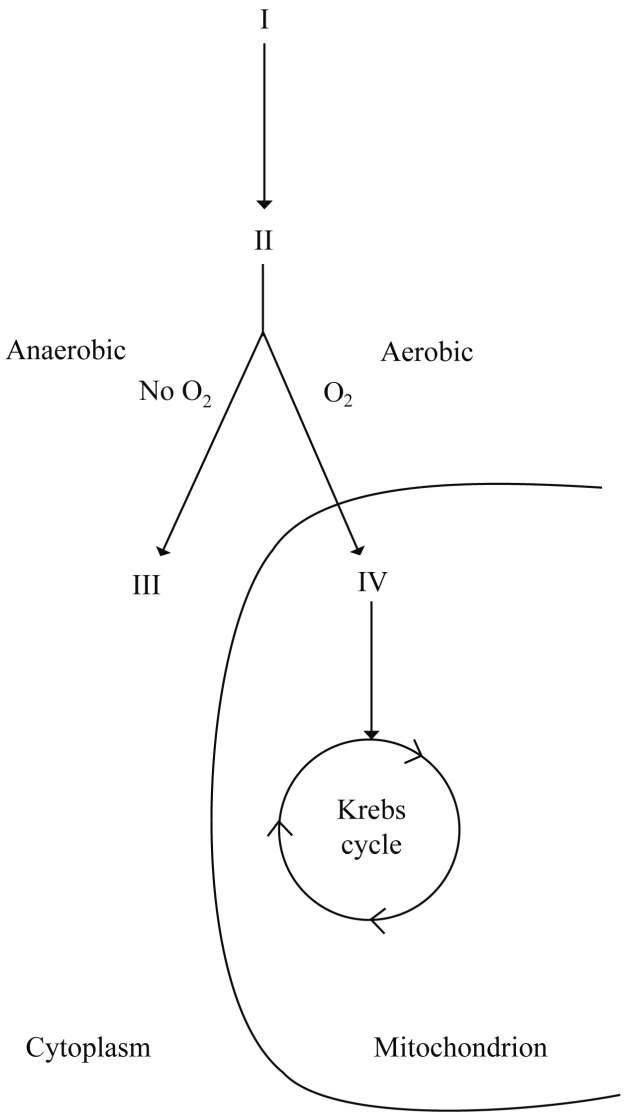

A. Combining with an amino acid and then binding to an anticodon

B. Binding to an anticodon and then combining with an amino acid

C. Binding to a codon and then combining with an amino acid

D. Combining with an amino acid and then binding to a codon

**10.** The diagram below shows a biochemical pathway in a yeast cell. Which of the following correctly identifies a compound in the diagram?



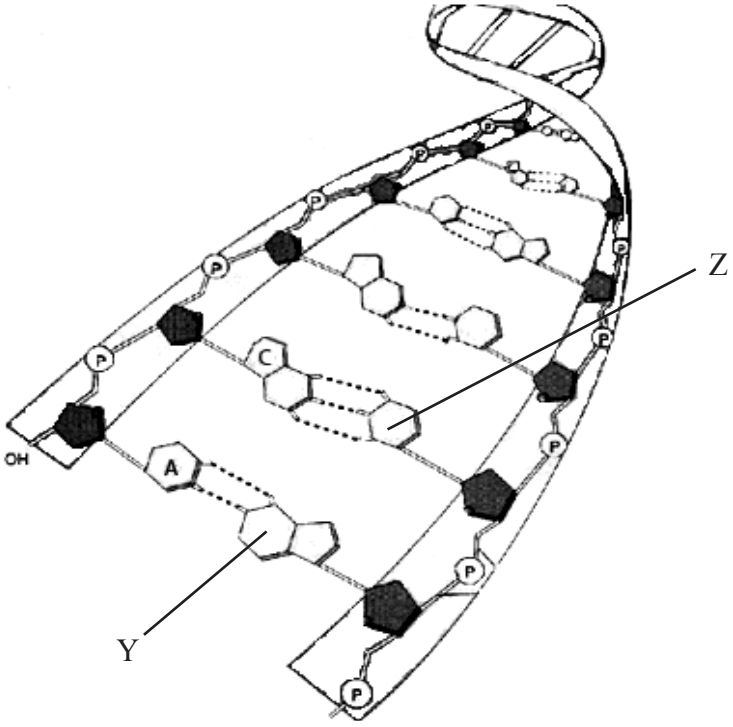

A. I is fat.

B. II is pyruvate.

C. III is lactate.

D. IV is carbon dioxide.

**11.** The following diagram shows a short stretch of DNA. What bases are indicated by labels Y and Z?




| | Y | Z |
|---|---|---|
| A. | thymine | adenine |
| B. | thymine | guanine |
| C. | uracil | guanine |
| D. | uracil | adenine |

**12.** A plant is exposed to increasing light intensity from very dim to bright light, while the carbon dioxide concentration and temperature are kept at an optimum level. What will happen to the rate of oxygen production?

A. It will increase exponentially.

B. It will remain constant.

C. It will decrease to a minimum level.

D. It will increase to a maximum level.

**13.** In some people, hemoglobin always contains the amino acid valine in place of a glutamic acid at one position in the protein. What is the cause of this?

A. An error in transcription of the hemoglobin gene

B. An error in translation of the mRNA

C. Lack of glutamic acid in the diet

D. A base substitution in the hemoglobin gene

**14.** What is a suspected heterozygous individual crossed with in a test cross?

A. Homozygous dominant

B. Homozygous recessive

C. Heterozygous dominant

D. Heterozygous recessive

**15.** What are homologous chromosomes?

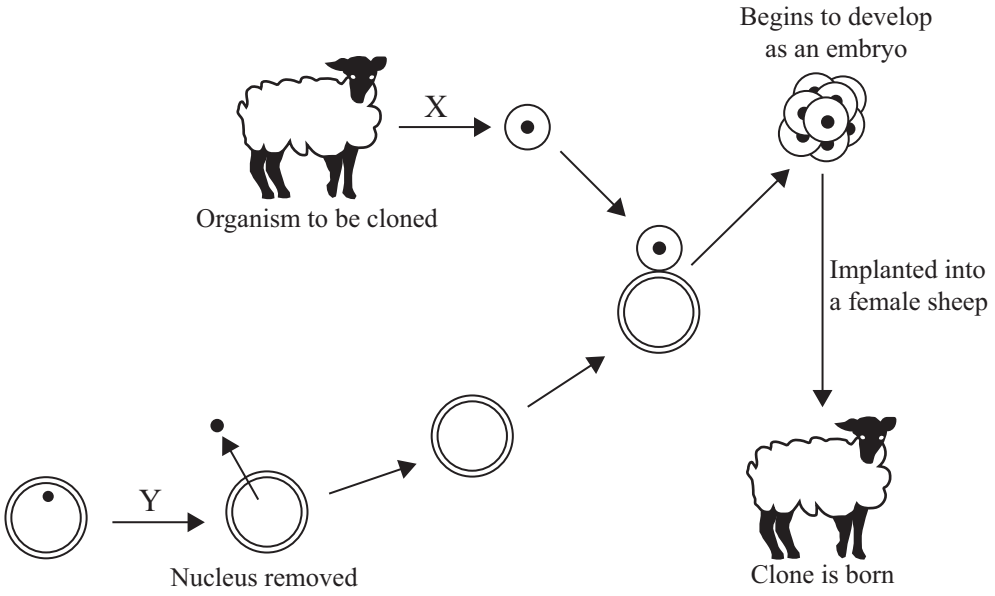
A. Identical chromosomes

B. Non-identical chromosomes with different genes

C. Non-identical chromosomes with the same genes in the same sequence but not necessarily the same alleles

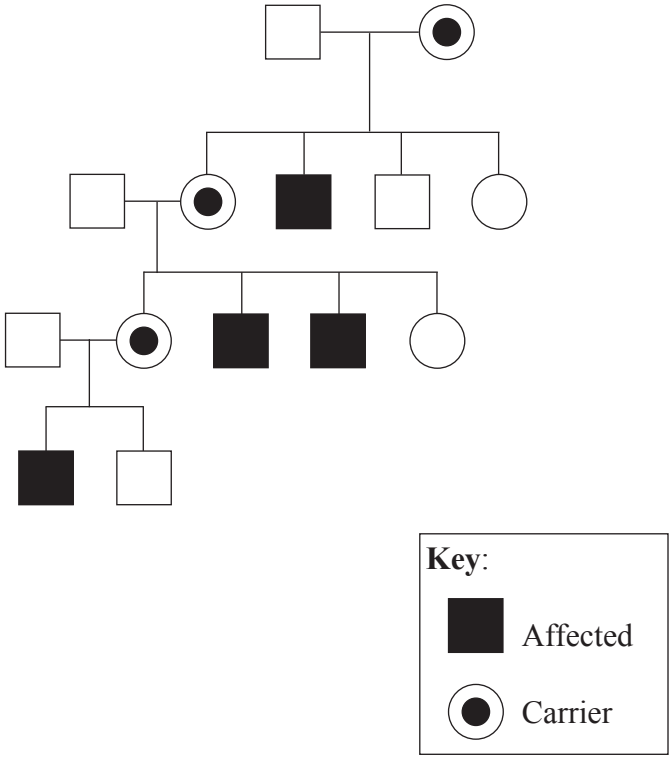
D. Non-identical chromosomes with the same genes in a different sequence and not necessarily the same alleles

**16.** Which processes involved in cloning an animal are indicated by the letters X and Y?




| | X | Y |
|---|---|---|
| A. | differentiated cell removed from animal | nucleus removed from unfertilized egg cell |
| B. | sex cell removed from animal | nucleus removed from differentiated animal cell |
| C. | sex cell removed from animal | nucleus removed from unfertilized egg cell |
| D. | differentiated cell removed from animal | nucleus removed from differentiated animal cell |

**17.** What type of inheritance is shown in this pedigree chart?




A. X-linked dominant

B. Y-linked dominant

C. X-linked recessive

D. Y-linked recessive

**18.** What is a community?

A. A group of organisms living and interacting in the same trophic level

B. A group of populations living and interacting in a food chain

C. A group of organisms of the same species living and interacting in an ecosystem

D. A group of populations living and interacting in an area

**19.** What are the units of a pyramid of energy?

A. $kJ\ m^{-2}\ yr^{-1}$

B. $kJ\ m^{-1}\ yr^{-1}$

C. $J\ m^{-2}\ s^{-1}$

D. $J\ m^{2}\ s^{-1}$

**20.** What is a potential consequence of the rise in global temperatures on the Arctic ecosystem?

A. Increased exposure to UV light

B. Increased rate of decomposition of detritus

C. Decreased success of pest species

D. Increase in the ice habitat available to polar bears

**21.** What can limit increases in population size?

I. Decrease in prey
II. Decrease in parasites
III. Increase in predators

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

**22.** Which of the following are used as evidence for evolution?

I. Homologous structures
II. Selective breeding of domesticated animals
III. Overproduction of offspring

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

**23.** A poodle and a chihuahua are both dogs and classified as *Canis familiaris*. What conclusion can be made?

A. They belong to the same genus but not the same species.

B. They are the same species but not the same genus.

C. They are different species but can interbreed.

D. They belong to the same genus and are the same species.

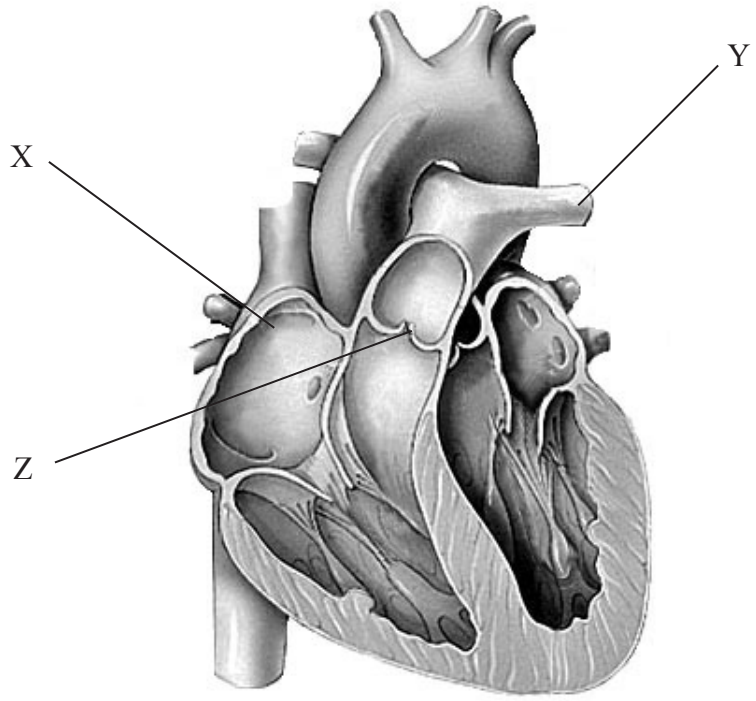
**24.** Which of the following is correct for lipase?

| | **Substrate** | **Source** | **pH optimum** |
|---|---|---|---|
| A. | triglycerides | pancreas | pH = 8 |
| B. | fatty acids | small intestine | pH = 7 |
| C. | triglycerides | small intestine | pH = 9 |
| D. | fatty acids | pancreas | pH = 9 |

**25.** What processes occur during assimilation and absorption of lipids?

| | Assimilation | Absorption |
|---|---|---|
| A. | lipids are broken down by enzymes | lipids are egested |
| B. | lipids are incorporated into new membranes | lipids pass into the lacteal |
| C. | lipids pass into the lacteal | lipids are incorporated into new membranes |
| D. | lipids are egested | lipids are broken down by enzymes |

**26.** The diagram below shows the human heart. What structures are indicated by the labels X, Y and Z?




[Source: adapted from: http://whyfiles.org/102spareparts/images/heart2.gif]

| | X | Y | Z |
|---|---|---|---|
| A. | left atrium | aorta | semi-lunar valve |
| B. | left atrium | aorta | atrio-ventricular valve |
| C. | right atrium | pulmonary artery | atrio-ventricular valve |
| D. | right atrium | pulmonary artery | semi-lunar valve |

**27.** What are two effects of HIV on the immune system?

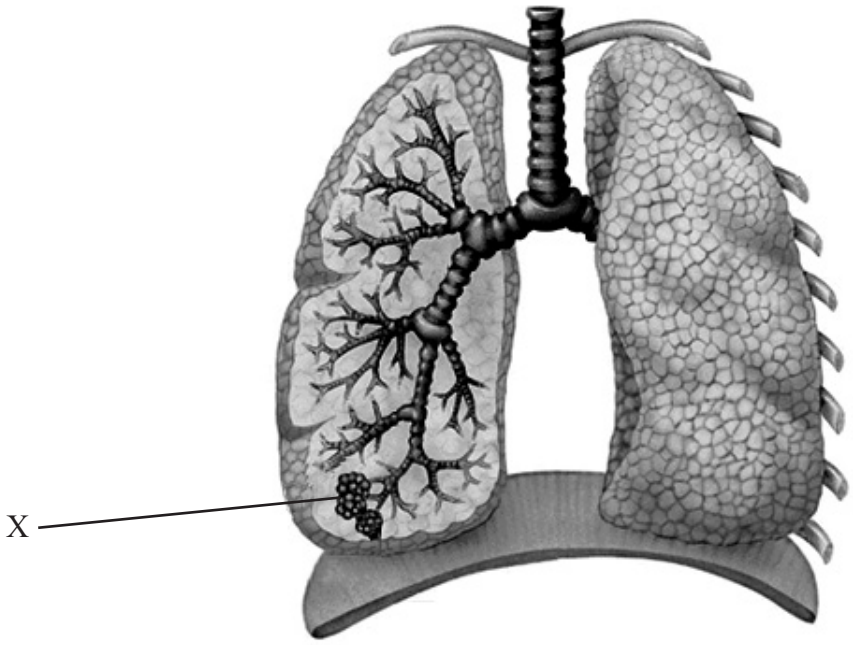
A. Reduction in antibody production and increase in active lymphocytes

B. Increase in antibody production and decrease in red blood cells

C. Reduction in antibody production and decrease in active lymphocytes

D. Increase in antibody production and increase in red blood cells

**28.** What is the function of the structure labelled X?




[Source: adapted from http://www.medicalook.com/systems_images/lungs.gif]

A. Gas exchange

B. Ventilation

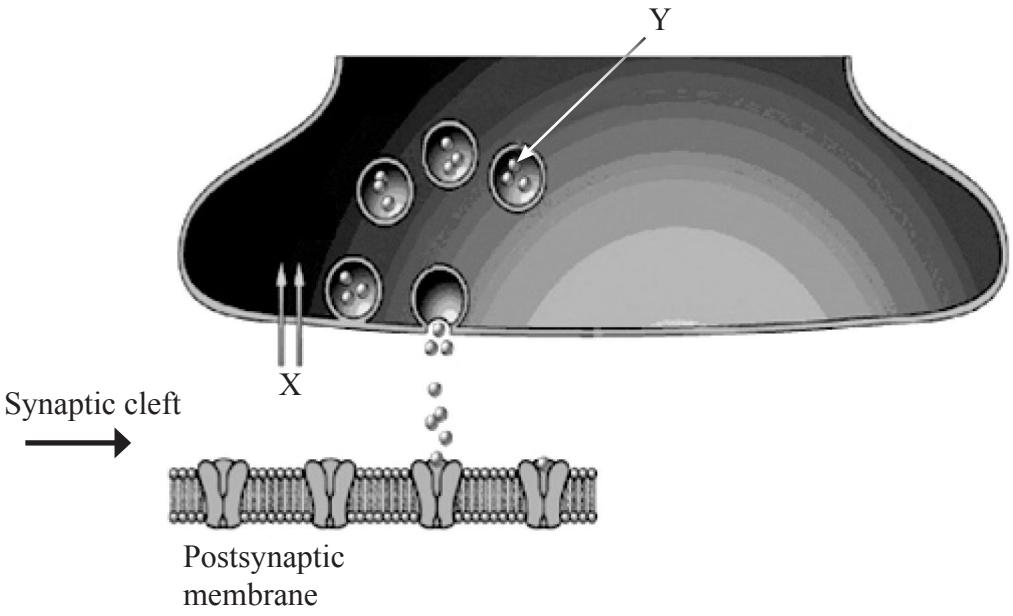
C. Respiration

D. Inspiration

**29.** What are causes of type I and type II diabetes?

| | Type I | Type II |
|---|---|---|
| A. | autoimmune disease leading to reduced insulin secretion | decreased responsiveness of the body to insulin |
| B. | decreased responsiveness of the body to insulin | autoimmune disease leading to reduced insulin secretion |
| C. | increased responsiveness of the body to insulin | autoimmune disease leading to increased insulin secretion |
| D. | autoimmune disease leading to increased insulin secretion | increased responsiveness of the body to insulin |

**30.** In the diagram of synaptic transmission below, what is indicated by the letters X and Y?




| | X | Y |
|---|---|---|
| A. | neurotransmitter enters synaptic knob | $Ca^{2+}$ ions |
| B. | $Ca^{2+}$ ions diffuse into the synaptic knob | neurotransmitter |
| C. | $K^{+}$ ions diffuse into the synaptic knob | neurotransmitter |
| D. | $Na^{+}$ ions diffuse into the synaptic knob | $Ca^{2+}$ ions |