

Level 3 International Foundation Diploma for Higher Education Studies

Ofqual Number: 603/0080/2 Quartz ID: 1125 / 1207

Component ID: 2373

Biology for University Study

SAMPLE EXAMINATION

This specimen assessment material is devised from previous past papers to reflect the single examination assessment approach now taken for this unit in the Level 3 International Foundation Diploma for Higher Education Studies.

Time allowed: 2 hours

Instructions:

- Answer **ALL** questions.
- Clearly cross out surplus answers.
- Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

Information:

- The maximum mark for this paper is 100.
- This paper contains THREE (3) sections: A, B and C.
- Graph paper will be provided by the centre.
- **You may use a scientific calculator during this examination.**
- Note: Scientific calculators permitted in the exam should not be able to carry out algebraic manipulation, differentiation or integration, language translation or communication with other devices of the internet. They should not have a QWERTY keyboard. There should not be retrievable information stored in the calculator, for example databanks, dictionaries, mathematical formulas or text.

Section A – 24 MCQs. Total 24 Marks

Multiple Choice Question

Answer these in your answer booklet – do NOT write on this Question Paper.
Write ONE (1) correct answer from A, B, C, or D for each question in your answer booklet.

Each question is worth 1 mark.

Marks

Question 1

Which organelle is larger and more prominent in plant cells compared to animal cells? **1**

- A** Vacuole
- B** Golgi apparatus
- C** Lysosome
- D** Centriole

Question 2

In which stage of meiosis do homologous chromosomes pair up and exchange genetic material? **1**

- A** Prophase I
- B** Metaphase I
- C** Anaphase I
- D** Telophase I

Question 3

What is the function of the capsid in a virus? **1**

- A** To store energy for the virus
- B** To carry out protein synthesis
- C** To protect the viral genetic material
- D** To replicate the virus independently

Question 4

How does genetic variation arise in sexually reproducing organisms?

1

- A Through mutations in gametes
- B Through mitosis in somatic cells
- C Through asexual reproduction
- D Through random fusion of gametes

Question 5

Which of the following pairs are reducing sugars?

1

- A Glucose and sucrose
- B Fructose and maltose
- C Sucrose and maltose
- D Sucrose and fructose

Question 6

Where is the antidiuretic hormone (ADH) released from?

1

- A Adrenal gland
- B Posterior pituitary gland
- C Hypothalamus
- D Anterior pituitary

Question 7

Which of the following is **TRUE** about triglycerides?

1

- A They store less energy than carbohydrates due to higher oxygen content
- B Being hydrophilic, they increase osmotic water uptake in cells
- C Myelin sheath lipids are not primarily triglycerides
- D Their oxidation releases water, aiding desert animals' hydration

Question 8

What are effectors in the nervous system?

1

- A** Cells that detect stimuli
- B** Neurons that carry impulses
- C** Muscles and glands
- D** Parts of the spinal cord

Question 9

Why is collagen resistant to stretching or breaking under tension?

1

- A** Its triple helix contains numerous hydrogen bonds
- B** It has a large number of hydrophobic amino acids
- C** It contains sulphur bridges
- D** It is made up of alpha-helices only

Question 10

What is the name of the increase in positive charge inside the chemoreceptor cell after sodium ion entry?

1

- A** Action potential
- B** Synaptic potential
- C** Resting potential
- D** Receptor potential

Question 11

What causes cancerous cells to grow uncontrollably?

1

- A** Nutrient deficiency in cells
- B** Increase in the number of surrounding tissues
- C** Mutation in the gene controlling cell division
- D** Decrease in mitotic activity

Question 12

Which plant tissue is responsible for transporting mineral ions dissolved in water?

1

- A** Phloem
- B** Xylem
- C** Cambium
- D** Epidermis

Question 13

Which part of a DNA nucleotide differs among the four types of nucleotides?

1

- A** Base
- B** Sugar
- C** Phosphate
- D** Chain

Question 14

What property of water molecules helps maintain a continuous column of water in the xylem?

1

- A** Non-polarity
- B** Ionic bonding
- C** Hydrophobicity
- D** Hydrogen bonding

Question 15

What occurs during RNA splicing in eukaryotic cells?

1

- A** Exons are removed and introns are joined together to form mRNA
- B** Introns are removed, and exons are joined together to form mRNA
- C** RNA is translated into protein before introns are removed
- D** DNA is spliced into RNA segments before transcription

Question 16

What is the colour of the pigment xanthophyll?

1

- A** Green
- B** Yellow
- C** Red
- D** Blue

Question 17

Which of the following vessels carry blood away from the heart?

1

- A** Arteries
- B** Capillaries
- C** Veins
- D** Venules

Question 18

Which of the following is the highest level of classification in biological taxonomy?

1

- A** Kingdom
- B** Phylum
- C** Genus
- D** Domain

Question 19

Which of the following best describes the role of plasma in blood transport?

1

- A** It carries oxygen using haemoglobin
- B** It produces antibodies to fight infections
- C** It transports carbon dioxide, urea, and hormones
- D** It helps in the clotting of blood

Question 20

How are viruses primarily classified?

1

- A** By their shape and size
- B** By the type of host they infect
- C** By their genetic material
- D** By their reproductive cycle

Question 21

Where does oxygen go after it diffuses out of the alveoli?

1

- A** Into the airways
- B** Into the muscle cells directly
- C** Into the alveolar walls only
- D** Into red blood cells

Question 22

What are the probes on a microarray composed of?

1

- A** Double-stranded DNA molecules that are stable and non-reactive
- B** Single-stranded DNA or RNA sequences that bind to target DNA
- C** Protein chains that fold into specific shapes for interaction
- D** Enzymes that catalyse reactions and cut specific DNA sequences

Question 23

What distinguishes a self-antigen from a non-self-antigen?

1

- A** Self-antigen causes an immune response
- B** Self-antigen is produced by the body's own cells
- C** Non-self-antigen is made by body cells
- D** Non-self-antigen is ignored by the immune system

Question 24

What is Factor VIII used for?

1

- A** Treating diabetes
- B** Treating infections
- C** Blood clotting in haemophiliacs
- D** Enzyme replacement in Severe Combined Immunodeficiency (SCID)

Total 24 Marks

SECTION B – 15 questions. Total 45 marks Answer ALL questions
--

Marks

Question 25

Differentiate between a tissue and an organ. Give ONE (1) example of each from the human body. **3**

Question 26

Explain how co-dominance and sex-linked inheritance differ in terms of how alleles are expressed in offspring. Use examples to support your answer. **3**

Question 27

Explain in THREE (3) points how the quaternary structure of haemoglobin enables it to bind and transport multiple oxygen molecules efficiently? **3**

Question 28

List the main sections of a nephron in the order that fluid passes through them, starting from Bowman's capsule. **3**

Question 29

Describe the THREE (3) main ways in which carbon dioxide is transported in the blood. **3**

Question 30

Explain how negative feedback controls blood glucose concentration when it becomes too high or too low. **3**

Question 31

Explain how the structure of DNA allows it to carry genetic information. **3**

Question 32

Explain why a specialised transport system is essential in multicellular organisms and describe the main components of the vascular bundle in herbaceous dicotyledonous plants. **3**

Question 33

Explain the process of gas exchange in the alveoli. **3**

Question 34

Explain how the absorption of light by different pigments relates to the rate of photosynthesis and describe how chromatography can be used to identify these pigments. **3**

Question 35

Explain why lipids release more energy than carbohydrates during aerobic respiration. **3**

Question 36

Explain how selective breeding is used to improve crop yield and give one example each from wheat, rice, and maize. **3**

Question 37

What are the main processes involved in mitochondrial energy production and which enzymes are involved in it? **3**

Question 38

Explain the role of the following enzymes in genetic engineering:

3

- a) Restriction endonuclease
- b) Reverse transcriptase
- c) DNA ligase

Question 39

Explain the role of promoter and marker genes in genetic engineering and briefly differentiate gene editing from genetic engineering.

3

Total 45 Marks

SECTION C – 8 questions. Total 31 marks Answer ALL questions

Marks

Question 40

Place the following cellular events in the correct sequential order during meiosis and identify the specific stage of meiosis each event belongs to. Justify your answers.

4

Events:

- A. Homologous chromosomes are pulled apart toward opposite poles.
- B. Chromosomes align singly along the centre of the spindle.
- C. Chromatids are separated to opposite poles.
- D. Homologous chromosomes pair up side-by-side.

Question 41

Describe how a glycosidic bond is formed and broken, using maltose and sucrose as examples.

4

Question 42

Describe how negative feedback helps maintain a constant body temperature in mammals and explain the role of effectors in both hot and cold conditions.

4

Question 43

Describe the key events that occur during each stage of mitosis and explain how these events ensure that each daughter cell receives identical genetic material.

4

Question 44

Explain how the active loading of sucrose into the phloem sieve tubes at the source creates a hydrostatic pressure gradient that drives the mass flow of organic solutes to the sink. Include the role of companion cells and water movement in your answer.

4

Question 45

Describe how bicarbonate ions are formed in red blood cells and explain the role of the chloride shift.

3

Question 46

Explain how natural selection and the bottleneck effect can lead to changes in the allele frequency of a population over time.

4**Question 47**

Describe the sequence of biochemical events during glycolysis that lead from glucose to pyruvate, including the roles of ATP and NAD. In your answer, explain how energy is both invested and produced during this process.

4**Total 31 Marks****End of paper**