Name:

_____

Teacher's name:

_____

Write your **student number** in the boxes above. **Letter**

Biology

Question and Answer Book

VCE Units 3&4 Trial Examination 2024

- Reading time is **15 minutes.**
- Writing time is **2 hours 30 minutes.**

Materials supplied

- Question and Answer Book of 29 pages.
- Additional space is available at the end of this book if you need extra space to complete an answer.
- Multiple-Choice Answer Sheet.

Instructions

- Follow the instructions on your Multiple-Choice Answer Sheet.
- At the end of the examination, place your Multiple-Choice Answer Sheet inside the front cover of this book.

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the examination room.

Contents page

© ACED 2024. This assessment is only licenced to the purchasing school and must not be distributed.

Section A – Multiple-choice questions

Instructions

- Answer **all** questions in pencil on the Multiple-Choice Answer Sheet.
- Choose the response that is **correct** or that **best answers** the question.
- A correct answer scores 1; an incorrect answer scores 0.
- Marks will **not** be deducted for incorrect answers.
- No marks will be given if more than one answer is completed for any question.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

Protein synthesis can be separated into two main processes: transcription and translation. During translation,

A. mRNA molecules bring amino acids to the ribosomes.
B. RNA polymerase forms a complementary mRNA molecule to the template strand of the gene.
C. codons and anticodons match up at the ribosomes.
D. amino acids join in a hydrolysis reaction to form a peptide chain.

Question 2

Biologists make use of several enzymes in the manipulation of DNA. Which option correctly matches the enzyme to its function?

A.	DNA polymerase	synthesises mRNA
B.	DNA ligase	joins strands of DNA
C.	RNA polymerase	synthesises a complementary strand of DNA
D.	endonucleases	initiates the synthesis of DNA

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Use the following information to answer Questions 3 - 5.

Some biology students wish to test the effect of temperature on rates of photosynthesis in a particular C3 plant. The rate of oxygen production is used to measure rates of photosynthesis. The following graph of results is produced.

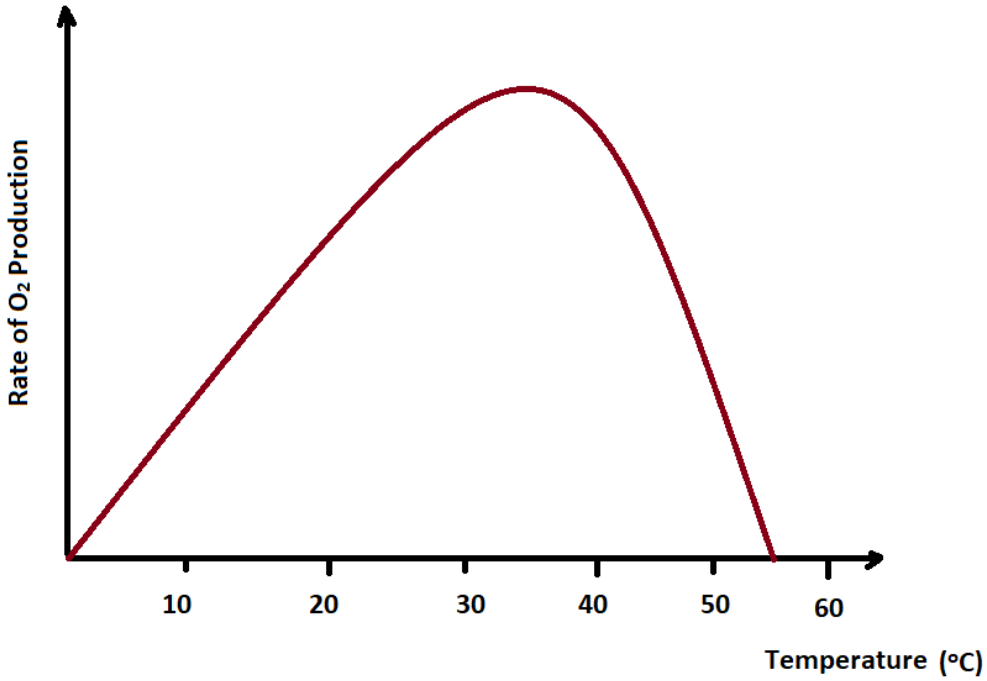


Figure 1

Question 3

What can be concluded from the information in the graph in Figure 1?

A. At temperatures higher than 45oC, the active sites of enzymes involved in photosynthesis are altered.

B. The optimum temperature for photosynthesis for this plant is 55oC.

C. At temperatures beyond 45oC, the primary structure of enzymes involved in photosynthesis begins to break down.

D. No photosynthesis will occur at temperatures below 20oC.

Question 4

If the students tested a C4 plant, rather than a C3 plant, how would the graph in Figure 1 be likely to differ?

A. The optimum temperature for photosynthesis would be much lower due to an increase in photorespiration.

B. Rates of photosynthesis would be higher at high temperatures due to an increase in photorespiration.

C. Rates of photosynthesis would be higher at some temperatures due to the separation of carbon fixation and the rest of the Calvin Cycle.

D. Photosynthesis would occur at higher temperatures because the stomata would only open at night.

Question 5

Which of the following measures would increase the validity of the students' experiment?

A. increasing the number of samples tested

B. using a range of different types of plants

C. keeping the pH conditions of the samples the same

D. using a different thermometer for each sample

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 6
In aerobic cellular respiration, which process(es) do **not** require the mitochondria?
A. the Krebs Cycle only
B. the Krebs Cycle and glycolysis
C. the electron transport chain
D. glycolysis only

Question 7
CRISPR technologies offer many more opportunities for genetic engineering. A CRISPR array occurs naturally in
A. viruses, as a means to invade cells.
B. bacteria, as a defence mechanism against bacteriophages.
C. eukaryotes, as a defence against viruses.
D. most living cells, as a defence against bacteria.

Use the following information to answer Questions 8 - 10.
An open wound, if left untreated, can lead to a potentially serious skin infection called cellulitis. This can occur through an infection by the extracellular bacterium *streptococcus*, which enters through a break in the skin.

Question 8
The human immune system includes physical, chemical and microbiota barriers to the entry of pathogens. Which option below correctly identifies the type of barrier provided by intact skin and identifies another example of this type of barrier?
A. physical; mucus membranes in airways
B. physical; lysozymes in tears
C. chemical; mucus membranes in airways
D. chemical; lysozymes in tears

Question 9
Upon infection and detection by the body of *streptococcus*, which of the following would occur first?
A. Neutrophils would be recruited to the area of infection.
B. Infected cells would release interferons.
C. Natural killer cells would destroy the bacterial cells.
D. Mast cells would release histamine.

Question 10
The production of biofuels such as ethanol requires several steps.

In no particular order, some of these steps include:
W: Fermentation of biomass.
X: Blending of natural oils with fossil fuels to create commercial biofuel.
Y: Harvesting of crops for biomass.
Z: Photosynthesis to produce glucose from carbon dioxide.

The correct order of the four steps listed is
A. Z, X, Y, W.
B. Y, W, X, Z.
C. Z, Y, W, X.
D. Y, W, Z, X.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Do not write in this area.

Question 11
Several factors contribute to the allele frequencies within a population. Gene flow is best defined as the
A. transfer of genetic material between populations.
B. changes in allele frequencies as a response to selection pressures.
C. reduction in genetic diversity after a natural disaster and subsequent population reduction.
D. loss of alleles from a population due to chance events.

Use the following information to answer Questions 12 and 13.
Figure 2 shows an artist's impression of the extinct species *Pakicetus. Pakicetus* was a species of amphibious whale that lived around 50 million years ago. Fossils of this species are notable as they show the pathway of evolution of land mammals to sea mammals.

Figure 2
Source: https://www.forbes.com/sites/shaenamontanari/2015/11/17/four-famous-transitional-fossils-that-support-evolution

Question 12
Fossils such as those of *Pakicetus*, that show the evolution between major taxonomic groups, are described as
A. index fossils.
B. transitional fossils.
C. reference fossils.
D. absolute fossils.

Question 13
The evolutionary link between today's whales and species such as *Pakicetus* is supported by the fact that whale skeletons contain small hind limbs and a pelvis, despite whales lacking hind legs. This is an example of a
A. homologous structure.
B. vestigial structure.
C. remnant structure.
D. phylogenetic structure.

Question 14
A particular gene consists of 600 base pairs. The gene is transcribed and translated to form a polypeptide chain which will consist of
A. more than 200 amino acids.
B. fewer than 200 amino acids.
C. exactly 200 amino acids.
D. exactly 300 amino acids.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 15

The human immune system consists of both immune cells and complement proteins. One method by which the complement system may attack external pathogens is by causing them to lyse. This occurs through which of the following?

A. the formation of a membrane attack complex
B. the release of interferons
C. apoptosis of the invading pathogen
D. the release of histamine

Question 16

Figure 3 shows a simplified diagram of the *trp* operon, which is found in eukaryotes such as *E. coli.*

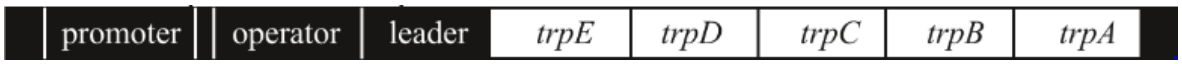


Figure 3

If levels of free tryptophan were high in the cell, which of the following would occur?

A. Tryptophan would bind directly to the operator region.
B. RNA polymerase would transcribe the trp genes.
C. A repressor molecule would bind to the promotor region.
D. Tryptophan would bind to a repressor molecule.

Question 17

What is the general cause of most autoimmune diseases?

A. Histamine is released from mast cells to cause an inflammatory response.
B. T helper cells are absent.
C. Certain self-tissues are misidentified as “non-self” by the immune system.
D. IgE antibodies attach to mast cells.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Use the following information to answer Questions 18 and 19.

Figure 4 shows a bacterial plasmid. This plasmid contains recognition sites for the restriction enzymes EcoRI, HindIII and BamHI. These plasmids are mixed with the BamHI restriction enzyme and a particular gene of interest that is to be used to transform certain bacteria. These bacteria do not naturally have resistance to either ampicillin or tetracycline.

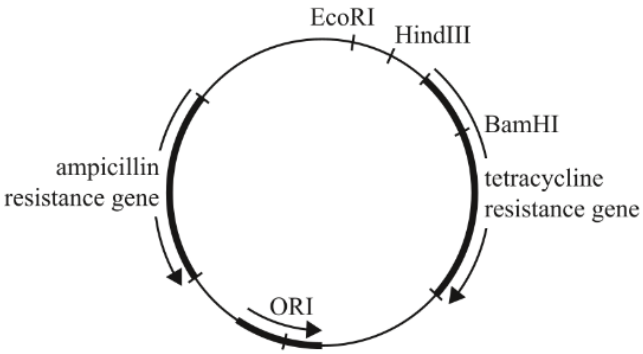


Figure 4

Question 18

What is the significance of the ampicillin resistance gene in the chosen plasmid?

A. Only bacteria that have incorporated the plasmids will be resistant to ampicillin.
B. Only bacteria that have incorporated the recombinant plasmids will be resistant to ampicillin.
C. Only bacteria that have not incorporated any plasmids will be resistant to ampicillin.
D. The ampicillin resistance gene does not affect the bacteria.

Question 19

When the plasmids are mixed with bacteria, which bacteria would be transgenic organisms?

A. the bacteria that have not incorporated any plasmids
B. the bacteria that have incorporated the recombinant plasmids
C. the bacteria that have incorporated the non-recombinant plasmids
D. both B and C

Question 20

Using CRISPR to produce genetically modified organisms (GMOs) such as crops requires consideration of several ethical concerns. Which of the following addresses the concept of non-maleficence?

A. Fair consideration should be given to the customs and beliefs of those receiving GMO crops.
B. The use of GMOs should not result in any undue harm to individuals.
C. Farmers who choose not to use GMO crops should be financially compensated.
D. Food production companies should be transparent about their use of GMO crops.

Question 21

When a gene is transcribed, the molecule of pre-mRNA produced undergoes a series of alterations before exiting the nucleus. Which of these do *not* occur as part of RNA processing?

A. exons are spliced out
B. an adenine tail is added
C. a guanine cap is added
D. introns are removed

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 22
Selective breeding programs, such as selecting crop varieties for the most desirable crop, alter the allele frequencies of a population. What is a common consequence of selective breeding?
A. increased genetic diversity
B. reduced population size
C. a reduction in genetic diversity
D. a bottleneck

Question 23
The Galapagos finches provide an example of rapid evolution through the isolation of populations. This is called
A. convergent evolution.
B. allopatric speciation.
C. sympatric speciation.
D. genetic drift.

Use the following information to answer Questions 24 and 25.
Radiocarbon dating is one technique used to measure the date of fossils. In radiocarbon dating, the ratio of carbon-14 to nitrogen-14 in the fossil is measured. Carbon-14 has a half-life of approximately 5,730 years. A particular fossil is found to have a carbon-14 to nitrogen-14 ratio of 1:3.

Question 24
What is the approximate age of the fossil?
A. 5,730 years
B. 11,460 years
C. 17,190 years
D. 22,920 years

Question 25
This fossil is used to infer the age of some other fossils found in the same layer of sediment. What type of dating is this, and what is the fossil used to date the other fossils referred to as?
A. absolute dating; transitional fossil
B. absolute dating; index fossil
C. relative dating; transitional fossil
D. relative dating; index fossil

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 26

Figure 5 shows the evolutionary relationships between a selection of species.

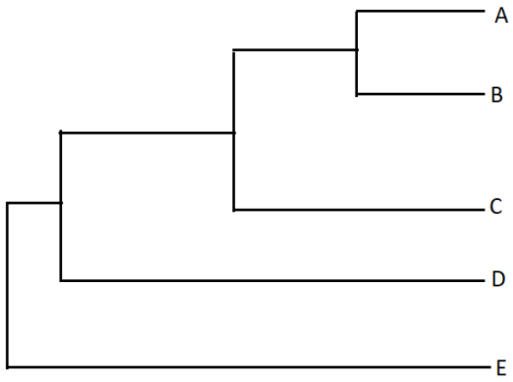


Figure 5

What can be concluded from Figure 5?

A. Species B has existed for longer than species C.
B. Species C is more closely related to species A than species D.
C. Species E has undergone the most evolutionary change.
D. Species B is more closely related to species C than species A.

Question 27

Monoclonal antibodies are artificial proteins that are designed to target and treat specific diseases. Which of the following is **not** a process involved in the production of monoclonal antibodies?

A. An antibody that is present on the desired target cell is identified and isolated.
B. Mice or another laboratory species are used to produce B lymphocytes.
C. Extracted B lymphocytes are fused with human myeloma cells.
D. Hybridomas are formed, screened and selected.

Question 28

Homo habilis was a species of hominin, and an ancestor of *Homo sapiens,* that lived around 2 million years ago. A more recent ancestor of *Homo sapiens* is *Homo neanderthalensis.*
Compared to *Homo habilis, Homo neanderthalensis* would have

A. a shorter stature.
B. flatter feet.
C. a more centrally positioned foramen magnum.
D. a smaller cranium.

Question 29

Much of our knowledge about hominin evolution and interactions between *Homo sapiens* and other hominin species comes from analysis of mitochondrial DNA (mtDNA). Which option below correctly compares mtDNA to nuclear DNA?

A. mtDNA is influenced by recombination whereas nuclear DNA is not.
B. Nuclear DNA has a higher mutation rate than mtDNA.
C. mtDNA can replicate independently of the cell as a whole.
D. mtDNA contains more genes than nuclear DNA.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 30

The breakdown of starch into glucose is catalysed by *amylase*. In this reaction,

A. amylase is the enzyme and glucose is the substrate.
B. amylase is the enzyme and starch is the substrate.
C. starch is the enzyme and glucose is the product.
D. amylase is the substrate and glucose is the product.

Question 31

Protein synthesis in eukaryotic cells contains many steps and involves several organelles. Which option correctly orders the organelles involved in protein synthesis?

A. nucleus, Golgi apparatus, ribosomes
B. ribosomes, nucleus, vesicle
C. Golgi apparatus, rough ER, vesicle
D. nucleus, rough ER, Golgi apparatus

Use the following information to answer Questions 32 and 33.

An experiment is set up to test the effects of light intensity on rates of photosynthesis in algal balls. The vials are placed at various distances from a lamp and algal balls and pH indicators are added to each vial. The final pH of each solution after 45 minutes is recorded and the change in pH is calculated. pH is used to infer relative rates of photosynthesis and respiration, with photosynthesis producing a more alkaline solution and respiration producing a more acidic solution. Four vials are tested for each distance. The following results are produced:

Distance of Vial from lamp (cm)	Test 1		Test 2		Test 3		Test 4		Average Change in pH
	Starting pH	pH after 45min	Starting pH	pH after 45min	Starting pH	pH after 45min	Starting pH	pH after 45min	
10	7.8	8.0	7.8	8.2	7.8	8.2	7.8	8.4	+0.40
20	7.8	9.2	7.8	8.9	7.8	9.2	7.8	9.3	+1.30
30	7.8	8.8	7.8	8.6	7.8	8.6	7.8	8.6	+0.85
40	7.8	8.4	7.8	7.8	7.8	8.2	7.8	8.0	+0.30

Question 32

What is the independent variable in this experiment?

A. the number of vials
B. the distance of the vials from the lamp
C. final pH of the solutions
D. average change in pH of each solution

Question 33

The process of photosynthesis that occurs in the algal balls contains several steps. Which of these occurs first?

A. Oxygen is released from the algal balls.
B. Carbon dioxide is fixed by enzymes.
C. Glucose is produced in the thylakoid membranes.
D. Oxygen is used in the electron transport chain.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 34
A molecule that carries energy from one stage to another in photosynthesis is
A. NADH.
B. NAD+.
C. NADPH.
D. NADP+.

Question 35
The lymphatic system consists of organs and networks that form the immune system. Which of the following would occur at the lymph nodes, and which part of the immune response does this form a part of?
A. Antigens are recognised by B and T lymphocytes as part of the innate immune response.
B. Antigens are recognised by B and T lymphocytes as part of the adaptive immune response.
C. Pathogens are engulfed by macrophages as part of the innate immune response.
D. Pathogens are engulfed by macrophages as part of the adaptive immune response.

Question 36
T cells and B cells play important roles in the immune response. T cells and B cells differ in that
A. only T cells produce antibodies.
B. B cells target intracellular pathogens whereas T cells target extracellular pathogens.
C. only B cells have the capacity to differentiate into memory cells.
D. T cells initiate apoptosis of infected cells whereas B cells do not.

Question 37
Our understanding of human ancestry is constantly being updated as new evidence becomes available. Which option below most accurately describes our current understanding of the human evolutionary path?
A. Most of the genetic diversity in today's humans can be traced to a small group of early *Homo sapiens* who spread out of Africa 55,000 – 200,000 years ago.
B. Humans are more likely to have interbred with *Homo erectus* than *Homo neanderthalensis.*
C. The human fossil record cannot provide any reliable information on our evolutionary history.
D. Early *Homo sapiens* had much higher genetic diversity as a species compared to modern-day humans.

Question 38
During periods of intense activity, human muscle cells may switch to anaerobic respiration. This form of respiration
A. occurs in the mitochondria.
B. requires the input of carbon dioxide.
C. produces fewer net molecules of ATP.
D. does not affect the pH of cells.

Question 39
Gel electrophoresis is a technique used to separate fragments of DNA. Which of the following is correct for gel electrophoresis?
A. DNA fragments move towards the negative terminal of the electrophoresis tank.
B. Larger fragments of DNA move faster through the gel.
C. The smaller fragments of DNA will be located closer to the positive terminal of the electrophoresis tank.
D. DNA moves through the electrophoresis gel because DNA is positively charged.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 40

A small community is suffering from the spread of a disease caused by a form of bacteria. The disease is spread largely through ingestion of contaminated water. Which measure would be most effective at reducing the number of cases?

A. Providing antiviral treatments to the community.
B. Wearing facemasks.
C. Quarantining visitors to the community in case they bring the disease.
D. A vaccination program against the disease.

Do not write in this area.

End of Section A

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Section B

Instructions

- Answer **all** questions in the spaces provided.
- Write your responses in English.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (8 marks)
Figure 6 depicts a process that occurs in most eukaryotic cells.

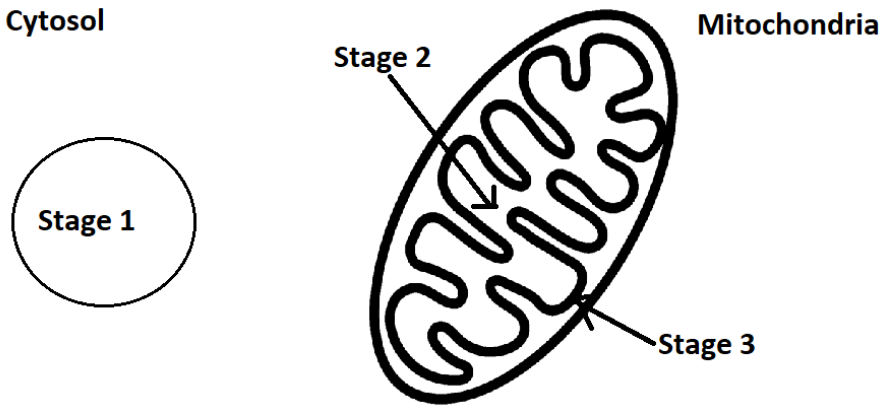


Figure 6

a. Name the process depicted in Figure 6. 1 mark

b. Several environmental factors can influence the rate at which the process in Figure 6 occurs. Describe how, and why, the rate of this reaction in mammalian cells would change as the temperature increases from 10°C to beyond 70°C. 4 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

c. Consider your answer to Question 1b. What would the effect on the rate of reaction be if the temperature were then to be reduced to 25°C following the increase beyond 70°C? Explain your answer. 2 marks

d. Identify a factor, other than temperature, that would *increase* the rate of the reaction referred to in Figure 6. 1 mark

Question 2 (10 marks)
CRISPR-Cas9 can be utilised as a genome editing tool.

a. What type of organisms is CRISPR-Cas9 sourced from? Briefly describe the role it plays in this organism. 3 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

b. Describe the steps involved in using CRISPR-Cas9 for gene editing. 4 marks

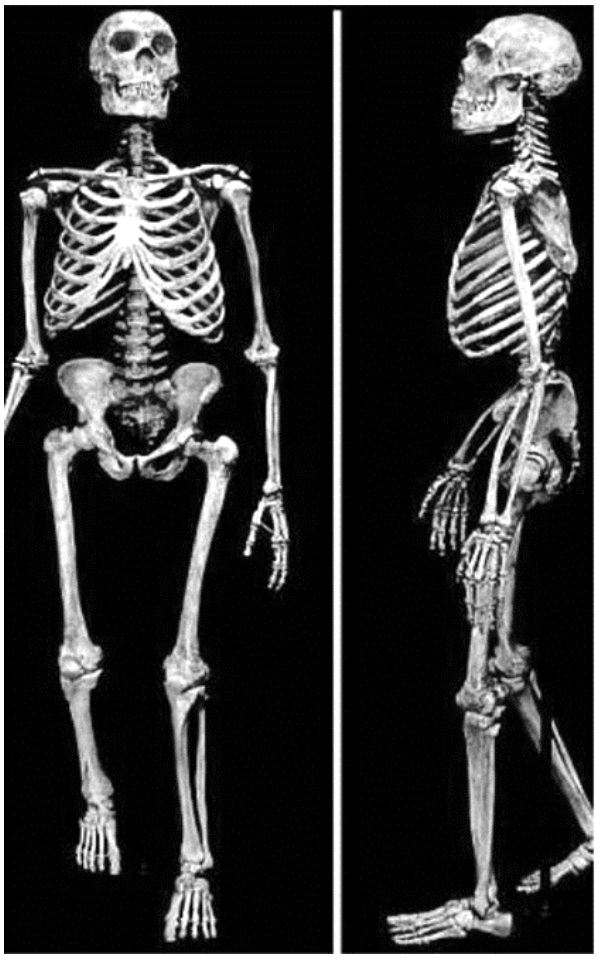
c. Outline the consequences-based approach to bioethics and describe how it might be used to argue in favour of researching CRISPR-Cas9 utilising mice rather than humans. 3 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 3 (8 marks)

Figure 8 compares the skeletons of two extinct hominin species.



Species 1

Species 2

Figure 8

Source: Adapted from www.timesofisrael.com

a. Which species (1 or 2) would you consider to be the more recent ancestor of *Homo sapiens*? Give reasons for your answer, referring to three different features and how they relate to the trends in hominin evolution. 4 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

b. As hominins evolved, there was a trend towards a diet that included meat, rather than exclusively plants. Explain how this transition would have contributed to their evolutionary success. 2 marks

c. According to genetic analysis, significant gene flow occurred between hominin populations. Describe gene flow and explain how it can increase a population's genetic diversity. 2 marks

Do not write in this area.

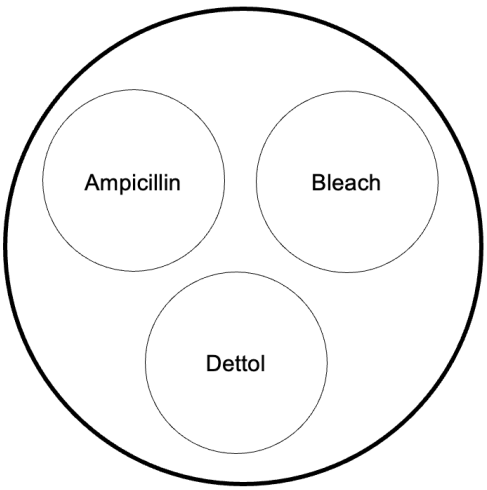
© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 4 (20 marks)
A group of biology students are interested in comparing the effectiveness of various antibacterial agents on their capacity to prevent the growth of *E. coli.* Certain strains of *E. coli* can cause gastrointestinal problems and tend to spread through contaminated food.

The students select three different antibacterial agents: ampicillin, bleach and Dettol. They set up the experiment according to the following method:

Method

1. Collect four nutrient agar plates. Label one plate as a control.
2. On the remaining three plates, draw three circles and label them with the three antibacterial agents (refer to the figure below).
3. Swab the control plate with *E. coli* broth.
4. Repeat for the remaining three plates.
5. Soak three filter paper discs in each of the three antibacterial agents.
6. In three of the plates, place one filter paper disc from each antibacterial agent in the corresponding circle. The control plate is left blank.
7. Incubate the plates at 37°C for 24 hours.
8. Remove from the incubator and measure the zone of inhibition (ZOI) around each disc (the radius of the circle in which there is no growth).



The following results were recorded:

Antibacterial Agent	Average ZOI (mm)
Ampicillin	11
Bleach	7
Dettol	6

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

a. Identify the independent and dependent variables in this experiment. 2 marks

b. What was the purpose of the control plate in this experiment? 1 mark

c. What can be concluded from the students' results? 1 mark

d. When a person suffers an infection of pathogenic bacteria, the immune system responds. The initial response is typically the inflammatory response. Outline the process of the inflammatory response. 3 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

e. When recording the ZOI of ampicillin, the experimenters decided to omit one result as an outlier. Describe what an outlier is and what a potential cause of the outlier may be in this experiment. 2 marks

f. After infection by an extracellular pathogen like bacteria, the adaptive immune response is triggered. This allows the person to acquire long-term immunity to the pathogen. Describe this process, including the relevant cells and lymphoid organs. 5 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

g. Explain why the form of immunity described in Question 4f is referred to as active immunity. Distinguish this from passive immunity and explain why passive immunity is less effective in the long term. 3 marks

h. Scientists recommend against the unnecessary or excessive use of antibiotics, as this can increase bacterial resistance. Describe the process by which a population of bacteria may become resistant to a certain antibiotic, referring to the principles of natural selection. 3 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 5 (18 marks)
Haemoglobin is a protein found in animals and consists of four globular protein sub-units. The amino acid sequences of the protein sub-units mostly form alpha helices. In the body, haemoglobin plays an important role in transporting oxygen around the body for cellular respiration.

Because haemoglobin is found in such a wide variety of organisms, it is useful for comparing relatedness between species. The differences in amino acid sequences of the protein between different organisms can be used to infer evolutionary relationships.

The amino acid sequence of a highly conserved region of the haemoglobin protein was compared for three hypothetical species. The table below shows the sequence comparison for 20 amino acids.

Species A	phe val phe ser arg thr gly val asp cys pro arg thr trp gly ser thr val gly phe
Species B	phe thr phe ser arg thr gly phe asp cys pro arg thr trp gly ser thr val ser phe
Species C	phe val ala ser arg thr ser val gly cys pro ser thr trp gly ser thr val gly pro

a. Using the information provided, describe the structure of haemoglobin in reference to the four hierarchical levels of protein structure. 4 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

b. Like all proteins, the instructions for the synthesis of haemoglobin are encoded in the organism's DNA. Describe the process in which a copy of the relevant gene is taken to the ribosomes. 3 marks

c. Describe the role of transfer RNA (tRNA) in the synthesis of haemoglobin. 2 marks

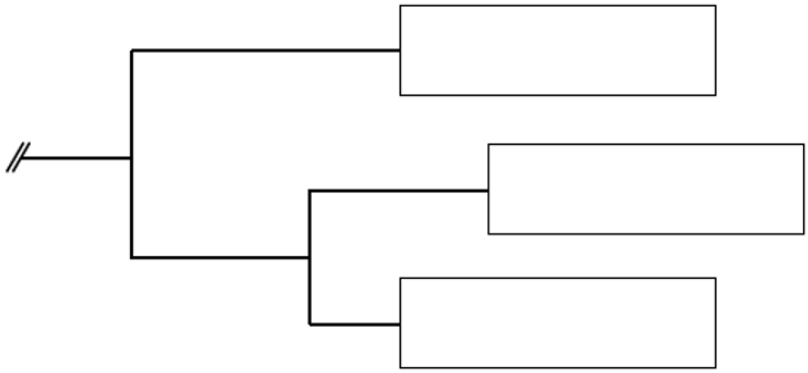
d. Name the reaction that occurs to join the amino acids of the haemoglobin proteins together. 1 mark

e. The DNA code can be described as both universal and degenerate. How do these terms apply to the synthesis of haemoglobin? 2 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

f. Use the information in the amino acid sequence comparison table above to place the three species on a phylogenetic tree. 1 mark



g. DNA sequencing of genes can also be used to create phylogenetic trees. These are usually "highly conserved" genes. Outline what a highly conserved gene is. 1 mark

h. Before a gene is sequenced for comparison, it is usually necessary to "amplify" the gene by making several copies of it. Name and describe the process used to achieve this. 4 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 6 (8 marks)

The Galapagos finches, which evolved on the Galapagos Islands after the migration of a single species to the islands, provide an excellent case study for speciation. Figure 8 illustrates some of the species that now exist on these islands, along with descriptions of their beaks and diets.

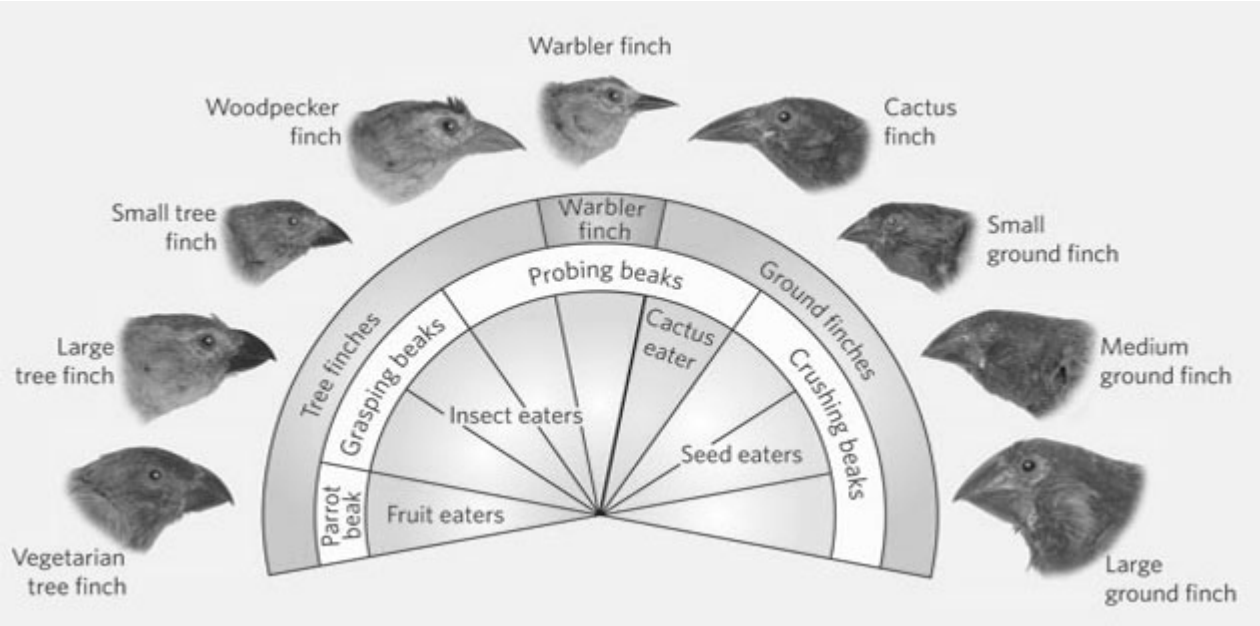


Figure 8

Source: https://cruise-tour.com/finches-galapagos/

a. Consider the evolution of the Woodpecker finch and the Medium ground finch from a common ancestor. 4 marks

Describe the process that would have led to the evolution of two separate species from this common ancestor.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

b. Explain the significance of genetic mutations to the evolution of the Galapagos finches. 2 marks

c. Distinguish between the type of speciation displayed by the Galapagos finches and the type of speciation displayed by the Howe palms on Lord Howe Island. 2 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Question 7 (8 marks)
Seedlings of three different plant species were exposed to three different environments to compare their growth in each environment. One of the three plant species was classified as a C3 plant, another as a C4 plant and the third as a CAM plant. The three environmental conditions were as follows:

Environment 1: 22°C with daily watering, exposed to natural light conditions.
Environment 2: 30^0C with minimal water, exposed to natural light conditions.
Environment 3: 30°C with minimal water, exposed to 24-hour light.

The following results were observed after two weeks under these conditions.

Environment	Observations after two weeks		
	Plant A	**Plant B**	**Plant C**
1	Plant has grown and appears to be healthy	Plant has grown and appears to be healthy	Plant has grown and appears to be healthy
2	Plant has grown and appears to be healthy	Plant has only grown a little and appears wilted and unhealthy	Plant has grown and appears to be healthy
3	Plant has only grown a little	Plant has only grown a little and appears wilted and unhealthy	Plant has grown and appears to be healthy

a. From the table of observations, identify each of the plants A, B and C as either the C3 plant, C4 plant or CAM plant. Give reasons for your answers, referring to their adaptations to different environments. 4 marks

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

b. Describe the role of Rubisco in photosynthesis and describe the effects of high temperatures on this process. 2 marks

c. Describe a limitation of the type of data collected in this experiment and suggest a modification of the investigation that may address this. 2 marks

End of examination questions

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

Do not write in this area.

Extra space for responses

Clearly **number** all responses in this space.

- If you need extra space to complete an answer, ask the supervisor for an Answer Book.
- Write your student number in the space provided on the front cover of the Answer Book.
- At the end of the examination, place the Answer Book inside the front cover of this book.

Do not write in this area.

© ACED 2024. This assessment is only licenced to the purchasing school. Go to acedvce.com for more great revision resources.

VCE UNITS 3&4 BIOLOGY

Written Examination

ANSWER SHEET – 2024

Student name:	

Use a **PENCIL** for **ALL** entries. For each question, shade the box which indicates your answer.

Marks will **NOT** be deducted for incorrect answers.

NO MARK will be given if more than **ONE** answer is completed for any question.

If you make a mistake, **ERASE** the incorrect answer – **DO NOT** cross it out.

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D

15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D
21	A	B	C	D
22	A	B	C	D
23	A	B	C	D
24	A	B	C	D
25	A	B	C	D
26	A	B	C	D
27	A	B	C	D
28	A	B	C	D

29	A	B	C	D
30	A	B	C	D
31	A	B	C	D
32	A	B	C	D
33	A	B	C	D
34	A	B	C	D
35	A	B	C	D
36	A	B	C	D
37	A	B	C	D
38	A	B	C	D
39	A	B	C	D
40	A	B	C	D

© ACED 2024. This assessment is only licenced to the purchasing school and must not be distributed.