

Biology
Standard level
Paper 1A

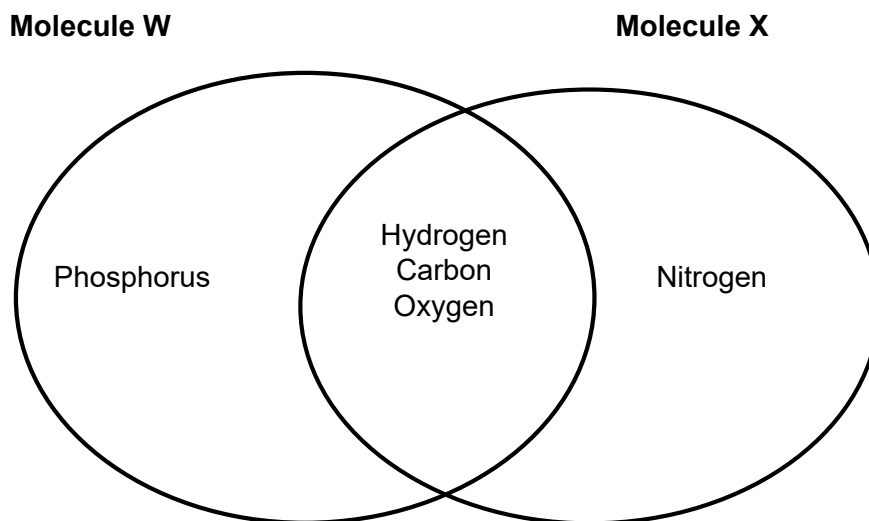
Specimen Paper

1 hour 30 minutes [Paper 1A and Paper 1B]

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- A calculator is required for this paper.
- The maximum mark for paper 1A is **[30 marks]**.
- The maximum mark for paper 1A and paper 1B is **[55 marks]**.

1. The diagram shows the elements present in two organic molecules, W and X. Which molecules could W and X be?



	Molecule W	Molecule X
A.	monosaccharide	amino acid
B.	nucleic acid	triglyceride
C.	phospholipid	protein
D.	triglyceride	fatty acid

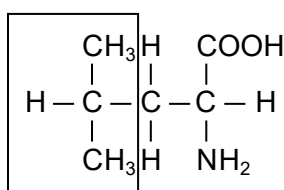
2. What is a consequence of the ability of water to form many intermolecular hydrogen bonds?
- A. Ice has a higher density than water and floats, providing habitats for fish-eating mammals.
 - B. Light can pass through water, so algae can photosynthesise.
 - C. Some small invertebrates can walk on water surfaces.
 - D. Small amounts of energy are needed to change water from one state to another, so that evaporation rates and condensation rates are rapid.

3. Which molecules are produced during the hydrolysis of a triglyceride molecule?

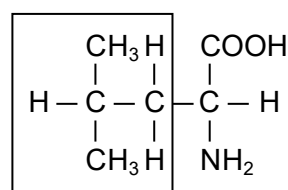
- A. Water and glycerol
- B. Fatty acids and glycerol
- C. Water and fatty acids
- D. Water and lipids

4. The diagrams show the structure of leucine, an essential amino acid. Which diagram highlights the part of leucine that distinguishes it from other amino acids?

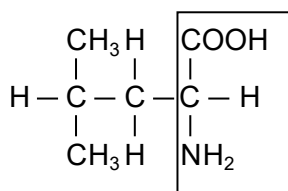
A.



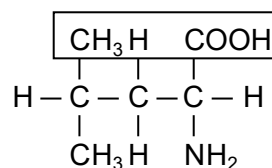
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C.



D.



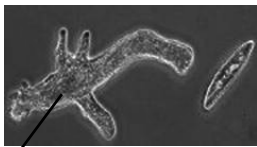
5. What is a common feature of enzymes?

- A. They all react with substrates.
- B. They all decrease the rate of reaction.
- C. They are all secreted from cells in vesicles.
- D. They all bind to the active site of their substrate.

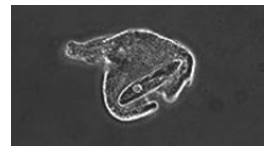
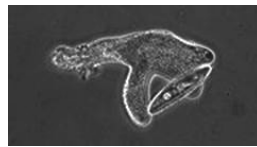
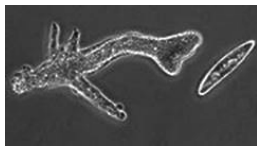
6. What distinguishes aerobic respiration from anaerobic respiration in humans?

- A. Mitochondria are only used in anaerobic respiration.
- B. Aerobic respiration yields lower quantities of ATP.
- C. Only aerobic respiration can use glucose as a starting substrate.
- D. Only aerobic respiration produces carbon dioxide.

7. What is a reason that Taq polymerase is a suitable enzyme for use in the polymerase chain reaction (PCR)?
- A. It can work at a wide range of pH.
 - B. It works at higher temperatures than most enzymes.
 - C. It can separate two strands of DNA.
 - D. It allows DNA to be replicated without the use of primers.
8. A strand of DNA containing four codons with base sequence ACT GTA CTC TAC mutates, changing the base sequence to ACT ATG CTC TAC. What type of mutation has occurred?
- A. Insertion
 - B. Substitution
 - C. Deletion
 - D. Degeneracy
9. The series of images shows two unicellular organisms found in ponds and lakes.



X



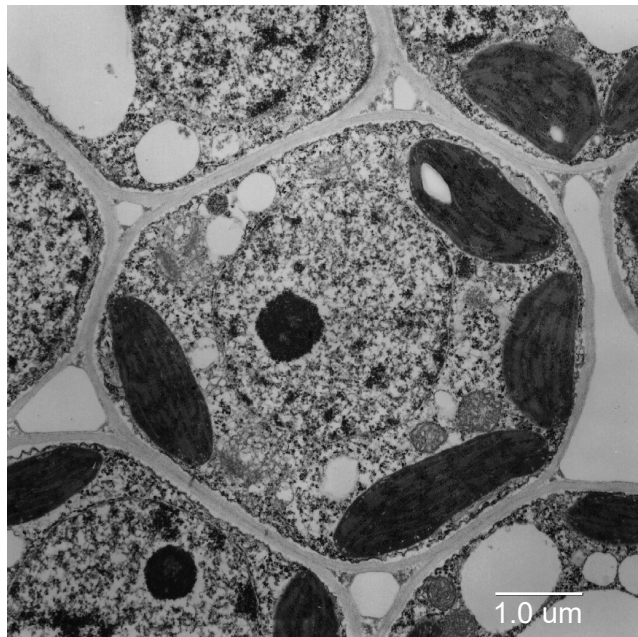
Which functions of life are being shown in these images by organism X?

- A. Metabolism and growth
- B. Excretion and reproduction
- C. Homeostasis and metabolism
- D. Response and nutrition

10. Which is a feature of phloem sieve tube cells?

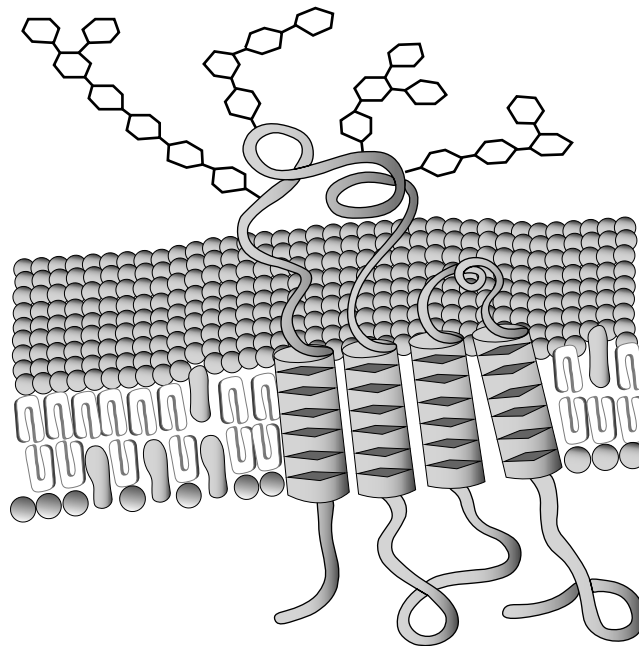
- A. Numerous chloroplasts
- B. No nucleus
- C. Lignified walls
- D. No cytoplasm

11. What can be identified in the electron micrograph?



- A. Plant cells with cell walls, nuclei and chloroplasts
- B. Plant cells with chloroplasts and large central vacuoles containing nuclei
- C. Several prokaryotes with cell walls and cytoplasm
- D. Animal cells with prominent mitochondria

12. The image shows a glycoprotein embedded in the phospholipid bilayer of a cell membrane.



Which features of this glycoprotein can be deduced from the image?

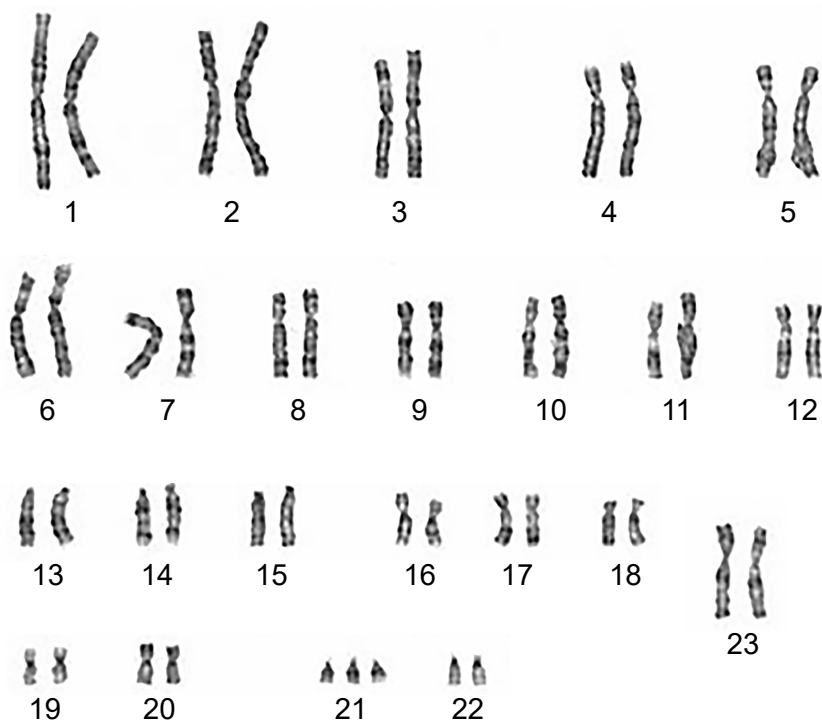
- A. It is a peripheral protein that allows attachment to neighbouring cells.
 - B. It is a channel protein that provides hydrophilic channels for carbohydrate transport.
 - C. It is an integral protein that may be involved in cell recognition.
 - D. It is a transport protein that increases the permeability of the membrane to glucose.
13. How is the Na/K ion ratio established during the resting potential phase of neuron activity?

	Na ions	K ions
A.	Actively transferred in	Actively transferred out
B.	Actively transferred out	Actively transferred in
C.	Passively diffused in	Passively diffused out
D.	Passively diffused out	Passively diffused in

14. What is a function of histones?

- A. Supercoiling of DNA during binary fission in prokaryotes
- B. Synthesis of proteins
- C. Formation of microtubules during mitosis
- D. Condensation of DNA

15. The karyogram shows a chromosome abnormality in a human female.



What could cause the abnormality to arise?

- A. Failure of homologous chromosomes to separate during gamete formation
- B. Chromosome 21 replicating after fertilization
- C. A gene mutation of the mother's chromosomes during cell division
- D. Polyploidy occurring during anaphase I of meiosis in both parents

- 16.** Which term describes the whole of the genetic information of an organism?
- A. Genome
 - B. DNA
 - C. Gene pool
 - D. Allele frequency
- 17.** What occurs at gas exchange surfaces in the lungs of mammals?
- I. Gases diffuse across a moist surface.
 - II. Concentration gradients are maintained by ventilation.
 - III. Water is lost.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
- 18.** What is always a consequence of the evaporation of water from mesophyll cells in leaves of a healthy plant?
- A. Plasmolysis occurs in mesophyll cells.
 - B. Photosynthesis stops.
 - C. Stomata close to reduce transpiration.
 - D. Water moves up the stem in the xylem.
- 19.** What conveys messages from the central nervous system to an endocrine gland?
- A. Sensory neurons
 - B. Hormones
 - C. Interneurons
 - D. Motor neurons

20. Which cell is a component of the innate immune system?

- A. T lymphocyte
- B. Phagocyte
- C. B lymphocyte
- D. B memory cell

21. How would the body respond to a rise above normal body temperature?

	Type of feedback	Response
A.	positive	increased secretion from sweat glands
B.	positive	spread limbs to increase surface area
C.	negative	vasodilation of skin blood vessels
D.	negative	shivering

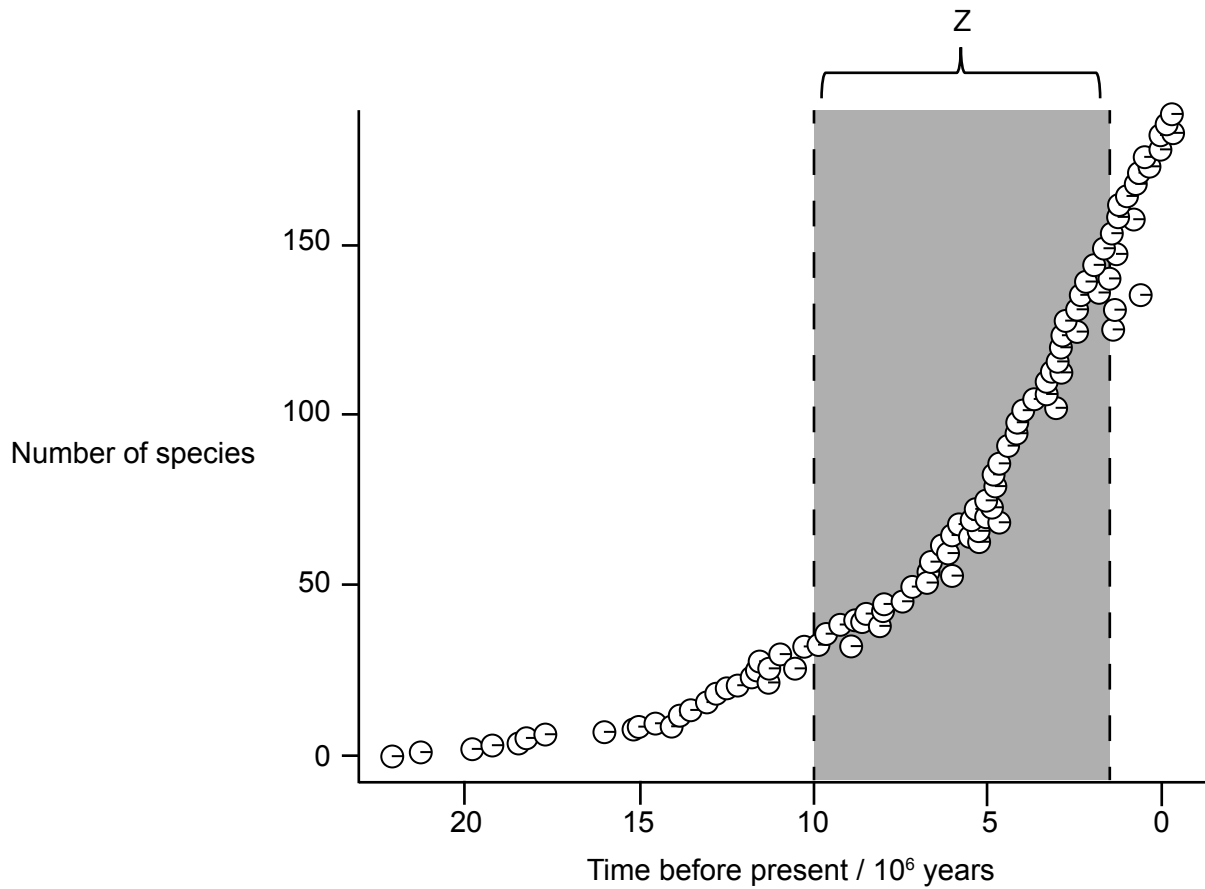
22. The first day of the menstrual cycle is when menstruation begins. What occurs around day 15 of the cycle?

- A. Formation of a corpus luteum
- B. The placenta starts to secrete progesterone
- C. The end of menstruation
- D. Blood progesterone concentration reaches its maximum

23. What can lead to the emergence of analogous structures?

- A. Divergent evolution from a recent common ancestor
- B. Convergent evolution of unrelated species
- C. Splits in the fundamental niche of a species
- D. Splits in the realized niche of a species

24. The number of hummingbird species in South America has increased continuously as shown in the graph.



What could be a reason for the increase in the number of hummingbird species during the period labelled Z?

- A. Food and shelter are plentiful and there is little intraspecific competition.
- B. Closely related species can coexist indefinitely in the same niche.
- C. A wide range of unoccupied potential niches exists, leading to adaptive radiation.
- D. There are few limiting factors on the population size of hummingbirds.

25. The preferred temperature ranges for three species of trout that are found together in freshwater lakes in North America are shown.

		
Lake trout (<i>Salvelinus namaycush</i>)	Rainbow trout (<i>Oncorhynchus mykiss</i>)	Brown trout (<i>Salmo trutta</i>)
6–13 °C	12–18 °C	11–23 °C

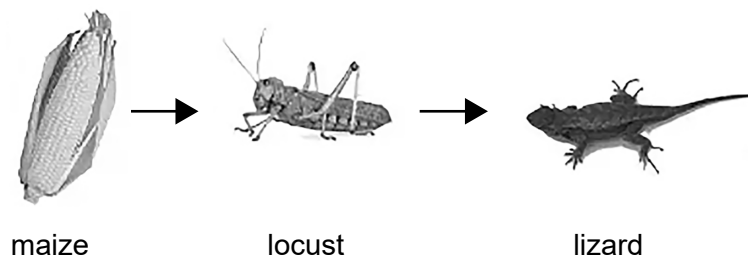
What can be deduced from this information?

- I. The niches for all three species overlap.
 - II. Brown trout have the most specialized niche.
 - III. Lake trout can avoid competition by living in colder water.
- A. I only
- B. II only
- C. I and III only
- D. I, II and III
26. Which row of the table describes a type of nutrition?

	Type of nutrition	Source of energy	Source of carbon	Method of acquiring energy
A.	Autotrophic	sunlight	organic molecules containing carbon	respiration
B.	Heterotrophic	sunlight	carbon dioxide	photosynthesis
C.	Mixotrophic	sunlight and energy-rich organic molecules	carbon dioxide and organic molecules containing carbon	photosynthesis and ingestion
D.	Consumer	energy-rich organic molecules	organic molecules containing carbon	photosynthesis and respiration

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27. With respect to the food chain shown in the image, what is the role of the locust?



- A. Secondary consumer
 - B. Parasite
 - C. Chemoautotroph
 - D. Herbivore
28. Black walnut (*Juglans nigra*) secretes the chemical juglone into the soil surrounding its roots. Juglone inhibits cell respiration in other species of plants. What does this example illustrate?
- A. Mutualism
 - B. Intraspecific competition
 - C. Allelopathy
 - D. Parasitism
29. Which is a density-independent limiting factor for a kangaroo?
- A. A forest fire
 - B. Predation
 - C. Climate change
 - D. Eutrophication
30. What is an outcome of natural selection?
- A. Evolution
 - B. Mutations
 - C. Reproductive isolation
 - D. Variation
-

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