Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Standard level
Paper 1

13 May 2024

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

1 hour

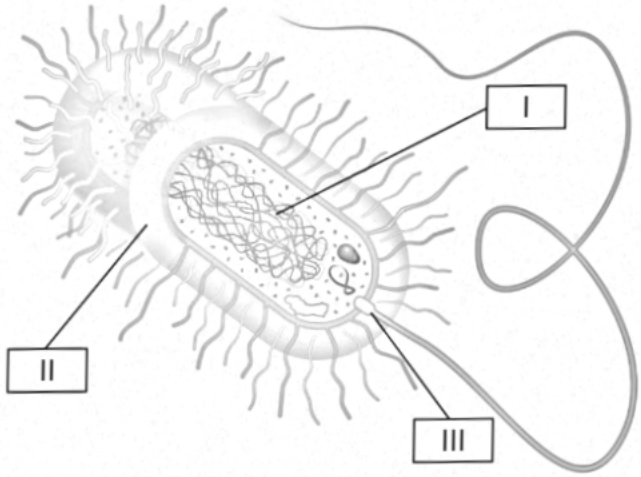
Instructions to candidates

- 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.
- The maximum mark for this examination is **[30 marks]**.

2224-6016

© International Baccalaureate Organization 2024

Question 1 and 2 *refer to the following diagram.*



1. What are the names of structures I, II, III?

	I	II	III
A.	Nucleus	Cell Membrane	Cillia
B.	Nucleoid	Cell Wall	Flagella
C.	Plasmid	Cell Wall	Pilli
D.	Nucleon	Capsule	Flagella

2. What are the functions of structures I, II, III?

	I	II	III
A.	Storing genetic information	Protection	Motility
B.	Storing genetic information	Storing carbohydrates	Conjugation
C.	Storing protein strands	Protection	Motility
D.	Storing protein strands	Storing carbohydrates	Conjugation

3. What type of ribosomes is found in prokaryotes?

A. 60s

B. 70s

C. 80s

D. 90s

4. If an amoeba has a diameter of 25 μm and a student creates a drawing of the amoeba with a diameter of 25 cm, what is the magnification of the drawing?

A. ×0.0001

B. ×0.001

C. ×1000

D. ×10000

5. Which two scientists proved that abiogenesis (spontaneous generation) of multicellular and unicellular organisms no longer occurs on earth?

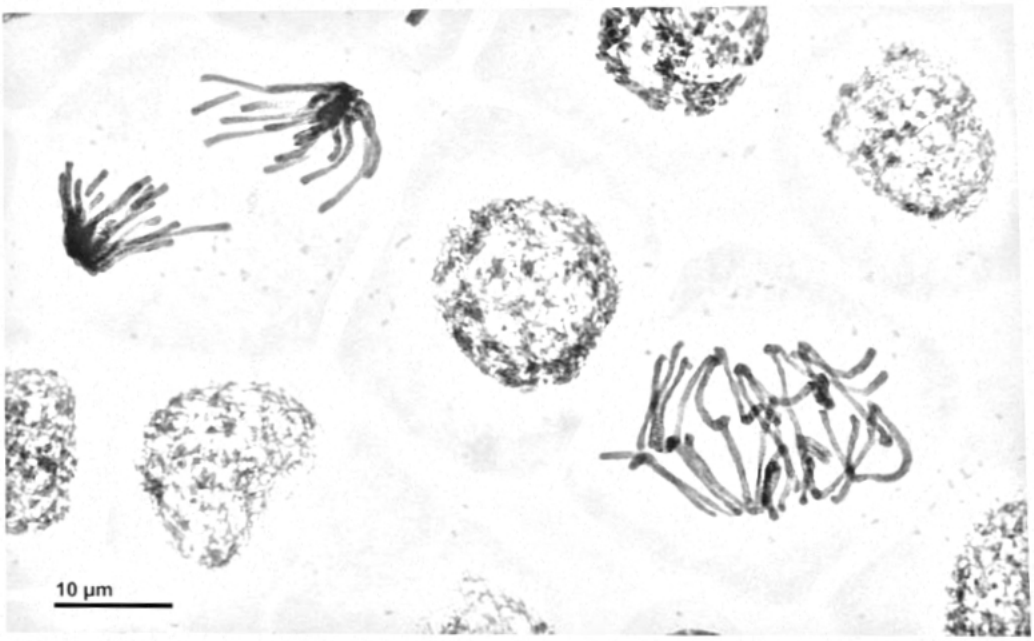
A. Watson and Crick

B. Franklin and Chargaff

C. Wilkins and Einstein

D. Redi and Pasteur

6. The micrograph shows some onion (*Allium cepa*) cells undergoing mitosis.



What is the mitotic index of the sample above?

A. 0.1

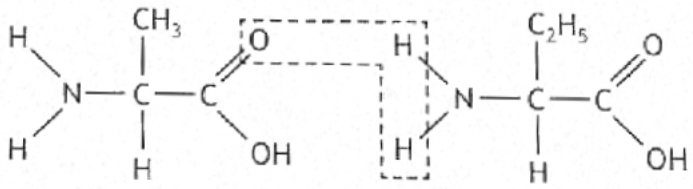
B. 0.2

C. 0.4

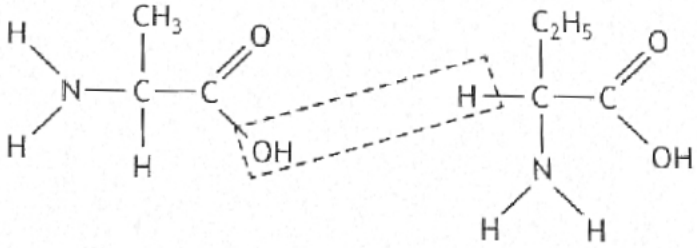
D. 0.6

7. Which of the following represents how a dipeptide is formed through dehydration synthesis?

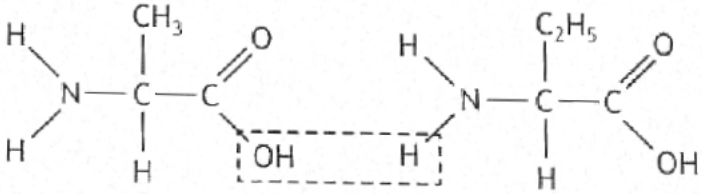
A.



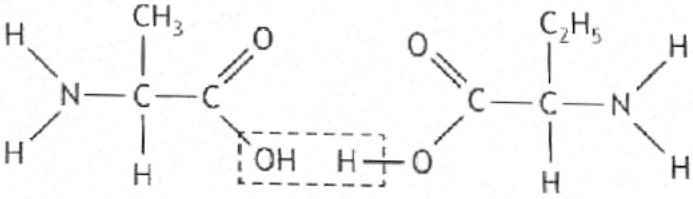
B.



C.



D.



8. Which of the following is a function of proteins in living organisms?

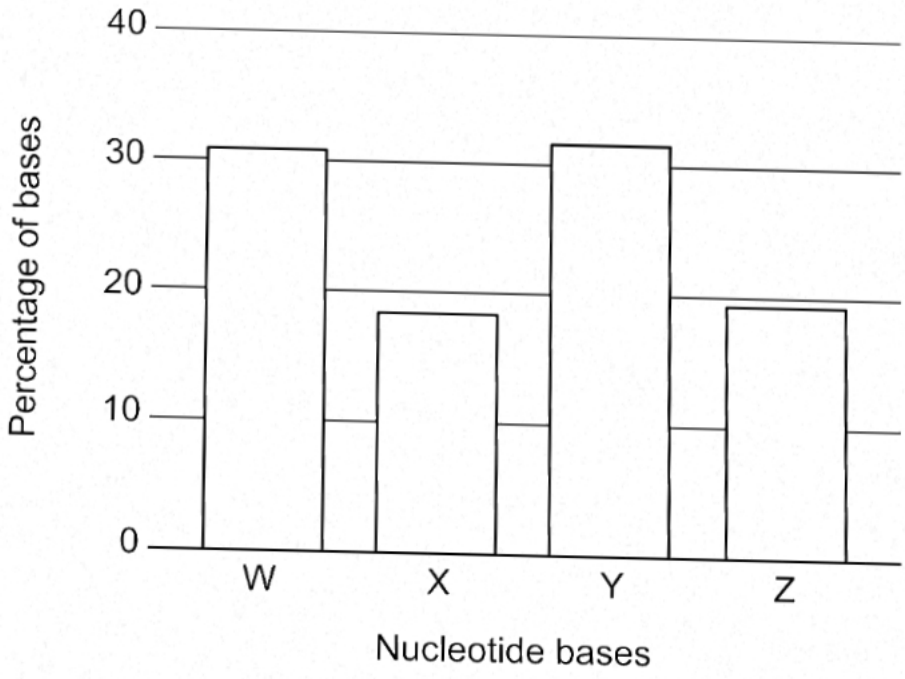
A. Storing genetic information

B. Providing quick energy for cellular activities

C. Serving as catalysts for biochemical reactions

D. Forming the main structural component of cell membranes

9. In the given sample of DNA, What bases are W, X, and Y, given that Z is guanine?



A. W-Guanine, X-Cytosine, Y-Thymine

B. W-Uracil, X-Thymine, Y-Adenine

C. W-Adenine, X-Cytosine, Y-Thymine

D W-Adenine, X-Thymine, Y, Cytosine

10. In humans, the allele for attached earlobes (E) is dominant to the allele for free earlobes (e). A man with attached earlobes marries a woman with free earlobes, and they have four children, all with attached earlobes.

What are the genotypes of the parents?

A. Both are Ee

B. Both are EE

C. The man is ee, and the woman is ee

D. The man is ee, and the woman is EE

11. Which of the following statements accurately describes the structural difference between DNA and RNA?

A. DNA contains ribose sugar, while RNA contains deoxyribose sugar.

B. DNA is single-stranded, while RNA is double-stranded.

C. DNA has a double helix structure, while RNA has a single helix structure.

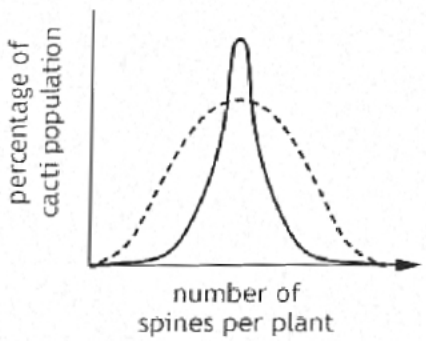
D. DNA uses uracil as one of its bases, while RNA uses thymine.

12. Cacti are equipped with spines and utilize them as a defense mechanism against herbivores.

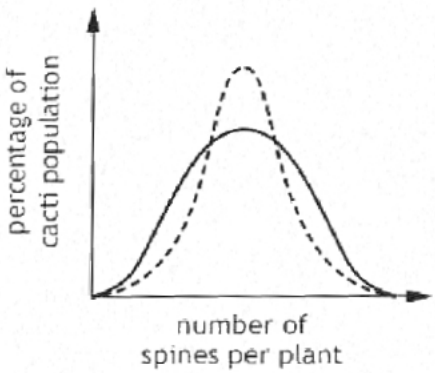
Those with a higher density of spines experience reduced predation risk. However, these spines also serve as breeding sites for parasitic insects, whose larvae subsequently feed on the plant. Consequently, cacti with a higher density of spines harbor larger populations of larvae.

Which graphical representation best illustrates these selection pressures?

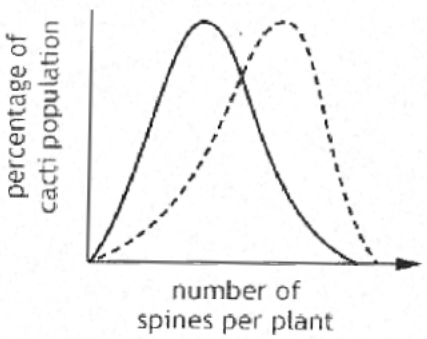
A.



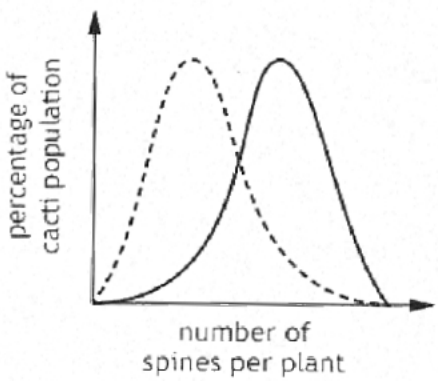
B.



C.



D.



13. Which of the following is an example of an abiotic factor influencing an ecosystem?

A. Predator-prey interactions.

B. Temperature fluctuations.

C. Competition between species.

D. Parasitic relationships.

14. In a community, what role do decomposers play in nutrient cycling?

A. They fix atmospheric nitrogen for plant use.

B. They convert organic matter into inorganic nutrients.

C. They produce organic compounds through photosynthesis.

D. They regulate predator-prey relationships within the community.

15. Which statement accurately describes the concept of natural selection?

A. It involves the intentional breeding of organisms to produce desired traits.

B. It results in the elimination of genetic variation within an individual.

C. It favors individuals with traits that enhance their survival.

D. It occurs only in artificial environments, such as laboratories or farms.

16. In the context of ecological succession, which type of succession occurs in an area where there was no previous life or soil?

A. Primary succession.

B. Secondary succession.

C. Climax succession.

D. Facilitated succession.

17. Ferns and cacti are considered autotrophs due to their ability to:

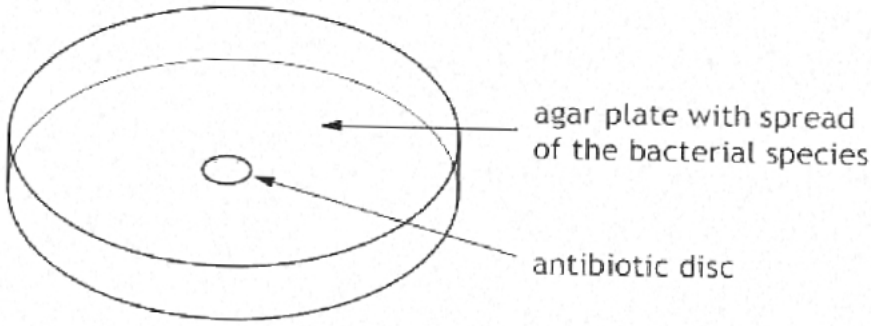
A. Reproduce by generating gametes through mitosis.

B. Release carbon dioxide and water as metabolic waste products.

C. Procure complex organic materials from their surroundings.

D. Synthesize organic compounds from inorganic resources.

18. The following lab was done to assess the impact of an antibiotic on a bacterial strain, the experiment involved inoculating agar plates with cultures of the bacteria and placing an antibiotic-soaked paper disc on each plate, as shown in the diagram below.



After 24 hours of incubation at 30°C, the growth was observed.

Which of the following describes a suitable test for the control?

A. Reproduce by generating gametes through mitosis.

B. Release carbon dioxide and water as metabolic waste products.

C. Procure complex organic materials from their surroundings.

D. Synthesize organic compounds from inorganic resources.

19. Which enzyme is responsible for the breakdown of carbohydrates in the mouth?

A. Amylase

B. Lipase

C. Trypsin

D. Pepsin

20. Which organ is responsible for the production of bile?

A. Pancreas

B. Liver

C. Gallbladder

D. Stomach

21. Which of the following blood vessels carries oxygenated blood away from the heart?

A. Pulmonary artery

B. Pulmonary vein

C. Vena cava

D. Aorta

22. What is the function of platelets in the blood?

A. Transport of oxygen

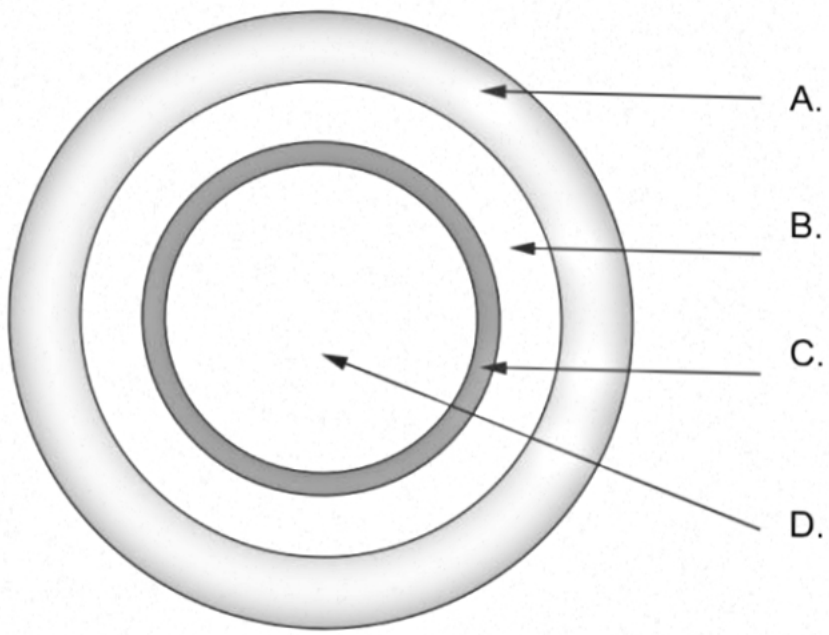
B. Formation of blood clots

C. Defense against pathogens

D. Regulation of blood pressure

23. The diagram below represents a section through an artery.

Which label correctly identifies a region containing smooth muscle tissue?



24. Which of the following is an example of passive immunity?

A. Vaccination

B. Antibiotic treatment

C. Breastfeeding

D. Memory cell production

25. In which phase of the menstrual cycle does ovulation occur?

A. Menstrual phase

B. Proliferative phase

C. Secretory phase

D. Ovulatory phase

26. Which hormone is primarily responsible for the development of secondary sexual characteristics in females?

A. Estrogen

B. Progesterone

C. Testosterone

D. FSH

27. Which part of the neuron receives signals from other neurons or sensory receptors?

A. Axon

B. Dendrite

C. Synapse

D. Cell body

28. Which hormone stimulates the release of digestive enzymes and bicarbonate from the pancreas?

A. Insulin

B. Glucagon

C. Gastrin

D. Secretin

29. At what membrane potential do voltage-gated sodium channels open?

A. -30 mV

B. -70 mV

C. -50 mV

D. +50mV

30. What is not a function of the myelin sheath?

A. To increase the rate at which impulses propagate themselves

B. To insulate the axon

C. To prevent depolarisation

D. To transfer neurotransmitters