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

Monday 17 May 2010 (afternoon)

45 minutes

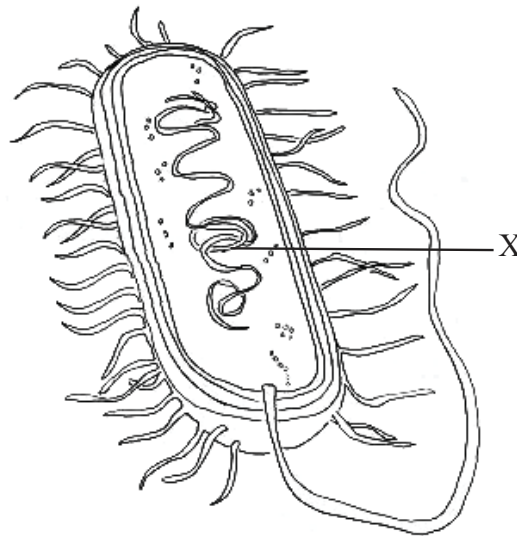
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INSTRUCTIONS TO CANDIDATES

- 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. What does a small standard deviation signify?
  - A. The data is not correlated.
  - B. The data is widely spread around the mean.
  - C. The data shows a close relationship between two variables.
  - D. The data is clustered closely to the mean value.
  
2. In a cell, what is the effect of a large surface area to volume ratio?
  - A. Slower rate of exchange of waste materials
  - B. Faster heat loss
  - C. Faster rate of mitosis
  - D. Slower intake of food
  
3. How can cells in a multicellular organism differentiate?
  - A. They express some of their genes but not others.
  - B. They all have a different genetic composition.
  - C. Different cells contain a different set of chromosomes.
  - D. Different cells do not have some of the genes.

4. The diagram below shows a bacterium.

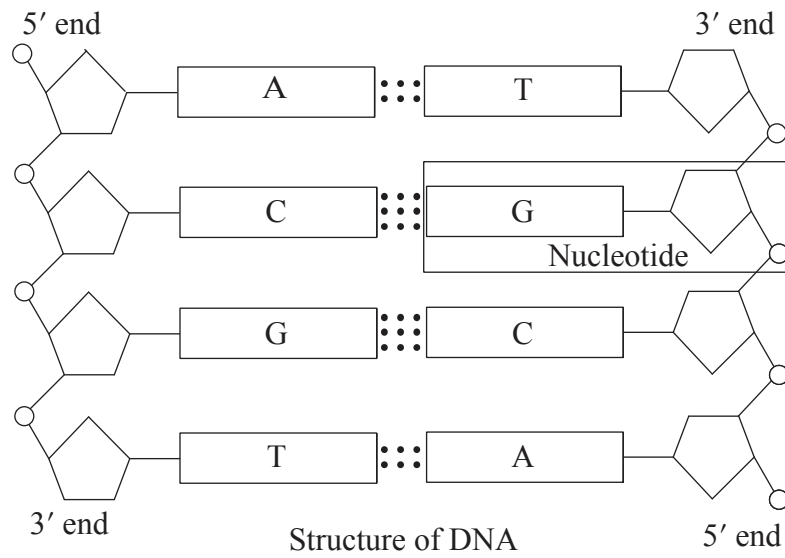


What structure does the part labelled X identify?

- A. Nucleus
  - B. Nucleoid
  - C. Nucleolus
  - D. Nuclear membrane
5. What do prokaryotic cells have that eukaryotic cells do not?
- A. Mitochondria
  - B. 70S ribosomes
  - C. Histones
  - D. Internal membranes

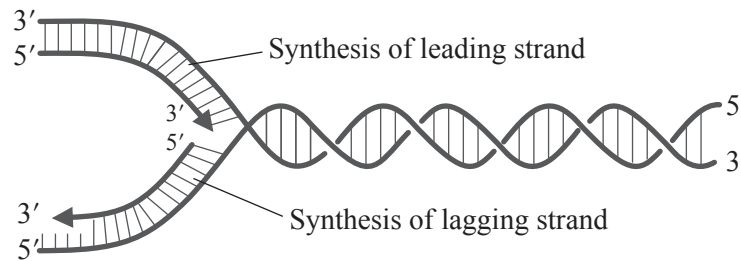
6. What happens during the G<sub>2</sub> stage of interphase?
- A. Homologous chromosomes pair
  - B. Synthesis of proteins
  - C. Homologous chromosomes separate
  - D. Replication of DNA
7. What is a role of sulfur in living organisms?
- A. Formation of proteins
  - B. Formation of carbohydrates
  - C. Formation of teeth
  - D. Transmission of nerve impulses

8. Which molecules form the nucleotide marked in the diagram?



- A. phosphate, deoxyribose and nitrogenous base
- B. phosphorus, ribose and nitrogenous base
- C. phosphorus, deoxyribose and guanosine
- D. phosphate, ribose and guanine

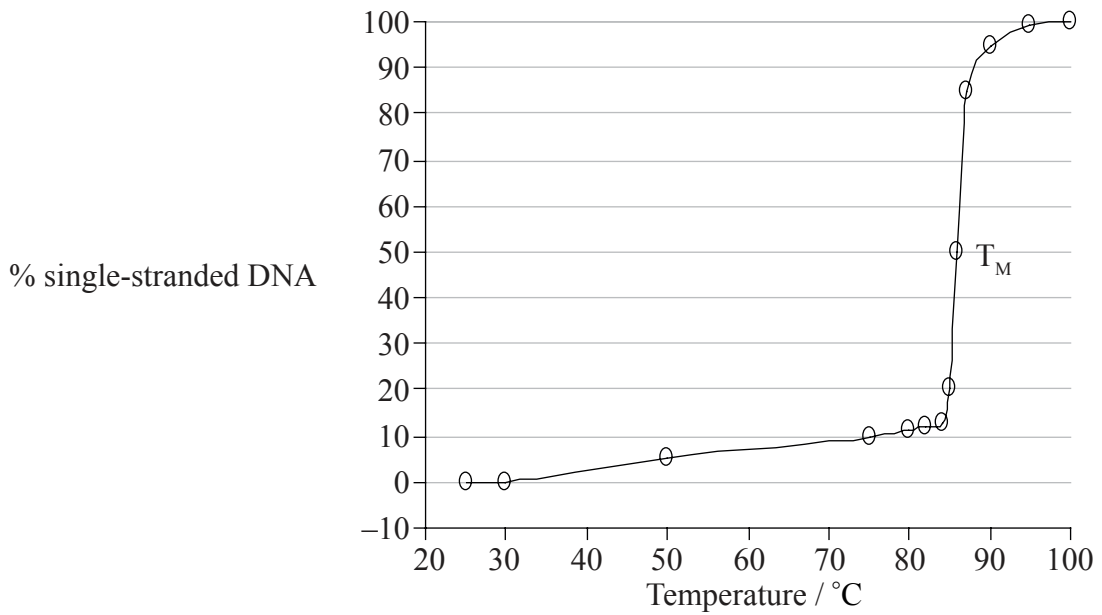
9. Which enzyme catalyzes the elongation of the leading strand?



[Source: image from WK Purves, *et al.*, (2003) *Life: The Science of Biology*, 4, Sinauer Associates ([www.sinauer.com](http://www.sinauer.com)) and WH Freeman ([www.whfreeman.com](http://www.whfreeman.com))]

- A. RNA polymerase
  - B. Helicase
  - C. DNA polymerase
  - D. Ligase
10. Which of the following is a function of cellulose in plants?
- A. Storage of fat
  - B. Formation of mitochondria
  - C. Storage of energy
  - D. Formation of cell walls
11. Which of the following is the best definition of cell respiration?
- A. A process needed to use energy, in the form of ATP, to produce organic compounds
  - B. A process used to provide oxygen to the atmosphere
  - C. A controlled release of energy, in the form of ATP, from organic compounds in cells
  - D. A controlled release of energy in the production of food from organic compounds

12. The graph below shows the effect of temperature on the separation of the strands in DNA to form single strands. The temperature at which 50% of the DNA is single-stranded is called the melting temperature ( $T_M$ ).



What do the results show?

- A. When the temperature reaches 85°C there are no more double-stranded DNA molecules.
  - B. When the temperature reaches 85°C the DNA strands start separating rapidly.
  - C. A  $T_M$  of 85°C means that DNA is not stable at room temperature (25°C).
  - D. The separation of the DNA strands is directly proportional to the increase in temperature.
13. Which of the following is the cause of sickle-cell anemia?
- A. Tryptophan is replaced by leucine.
  - B. Leucine is replaced by valine.
  - C. Glutamic acid is replaced by valine.
  - D. Lysine is replaced by glutamic acid.

14. What does the karyotype below correspond to?

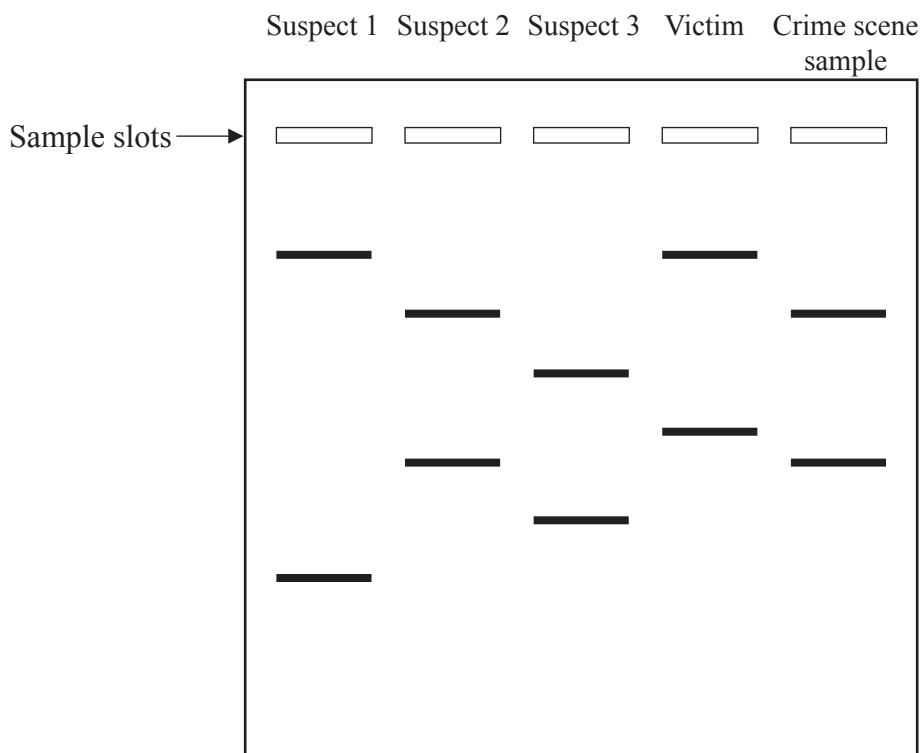


- A. A normal male
  - B. A normal female
  - C. A female with Down syndrome
  - D. A male with Down syndrome
15. A man of blood group A and a woman of blood group B have a child. If both are heterozygous for the gene, what are the chances of them having a child with blood group B?
- A. 0%
  - B. 25%
  - C. 50%
  - D. 75%



16. Which disease is an example of sex-linked (X-linked) inheritance?
- A. AIDS
  - B. Down syndrome
  - C. Sickle-cell anemia
  - D. Hemophilia

17. The diagram below represents the results obtained in a DNA profile from a crime scene.

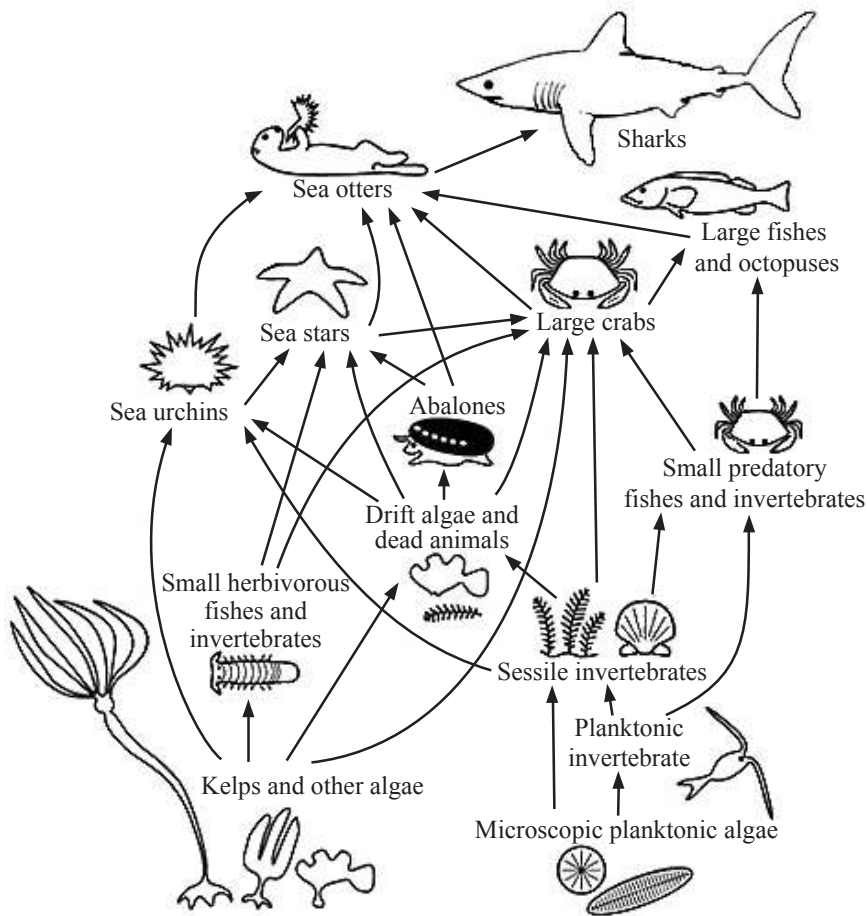


Suspect 2 is **most** likely to be the criminal because the band pattern coincides with that of the crime scene sample. What do these bands represent?

- A. DNA fragments
- B. Genes
- C. Chromosomes
- D. Chromatids

18. What is a genetic test cross?
- A. Testing a suspected homozygote by crossing it with a known heterozygote
  - B. Testing a suspected heterozygote by crossing it with a known heterozygote
  - C. Testing a suspected homozygote by crossing it with a known homozygous dominant
  - D. Testing a suspected heterozygote by crossing it with a known homozygous recessive

Questions 19 and 20 refer to the food web below.

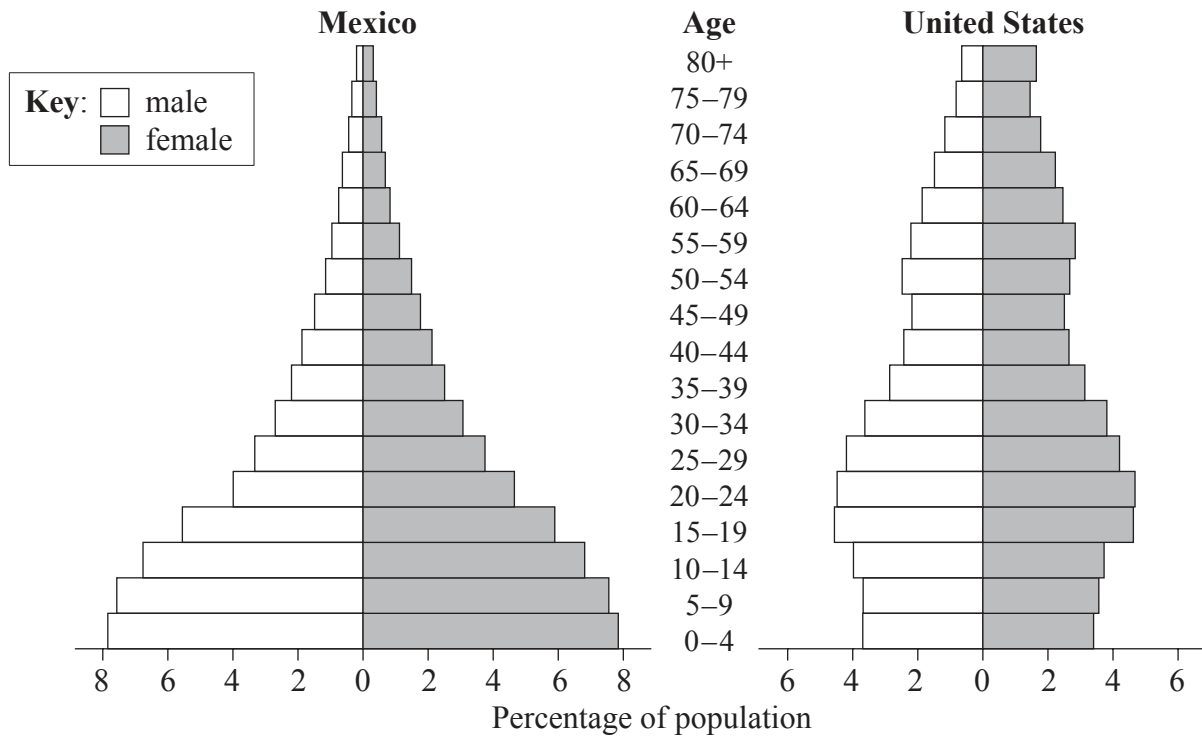


[Source: <http://cbc.amnh.org/crisis/foodweb.html>]

19. What will happen to the sizes of the populations in the food web above if the sea otter disappears?
- A. Large fish increase and sea urchins decrease.
  - B. Abalones increase and sharks increase.
  - C. Sea urchins increase and kelps decrease.
  - D. Sea stars decrease and sharks increase.

20. Which organism in this food web is both a secondary and tertiary consumer?
- A. Large crab
  - B. Small herbivorous fish
  - C. Shark
  - D. Microscopic planktonic algae
21. Which gas will enhance the greenhouse effect if released into the atmosphere?
- A. Hydrogen
  - B. Oxide of nitrogen
  - C. Oxygen
  - D. Nitrogen

22. What do the graphs below show?



- A. Population in the United States is increasing at a higher rate.
- B. Infant death rate is high in both countries.
- C. Males live longer than females in both countries.
- D. Birth rate is higher in Mexico than in the United States.

23. Which phylum does the plant below belong to?



- A. Angiospermophyta
  - B. Bryophyta
  - C. Coniferophyta
  - D. Filicinophyta
24. Which feature increases the absorption of glucose in the small intestine?
- A. Villi
  - B. Lacteal
  - C. Cilia
  - D. Goblet cells
25. What is a correct pathway for blood flowing through the heart?
- A. right atrium, right ventricle, aorta
  - B. left atrium, left ventricle, pulmonary artery
  - C. right atrium, right ventricle, pulmonary artery
  - D. left atrium, left ventricle, pulmonary vein

- 26.** Why are antibiotics effective against bacteria?
- A. They can produce specific antibodies.
  - B. They can engulf foreign matter.
  - C. They can block specific metabolic pathways.
  - D. They can act as a vaccine.
- 27.** Which of the following features of the alveoli adapt them to gaseous exchange?
- I. Single layer of cells
  - II. Film of moisture
  - III. Dense network of capillaries
- A. I and II only
  - B. II only
  - C. II and III only
  - D. I, II and III
- 28.** What is an effect of the HIV virus on the immune system?
- A. Reduction of the number of phagocytes
  - B. Reduction of the number of lymphocytes
  - C. Increase in the ability to form antibodies
  - D. Decrease in the ability to produce antigens

29. What happens to the external and internal intercostal muscles and diaphragm when inhaling?

	<b>External intercostal muscles</b>	<b>Internal intercostal muscles</b>	<b>Diaphragm</b>
A.	relax	relax	relaxes
B.	contract	relax	relaxes
C.	relax	contract	contracts
D.	contract	relax	contracts

30. Which of the following is/are a role of testosterone in males?

- I. Pre-natal development of male genitalia
  - II. Maintenance of sex drive
  - III. Increase in mental development
- A. II only
  - B. I and II only
  - C. II and III only
  - D. I, II and III