



**BIOLOGY  
HIGHER LEVEL  
PAPER 1**

Wednesday 6 May 2009 (afternoon)

1 hour

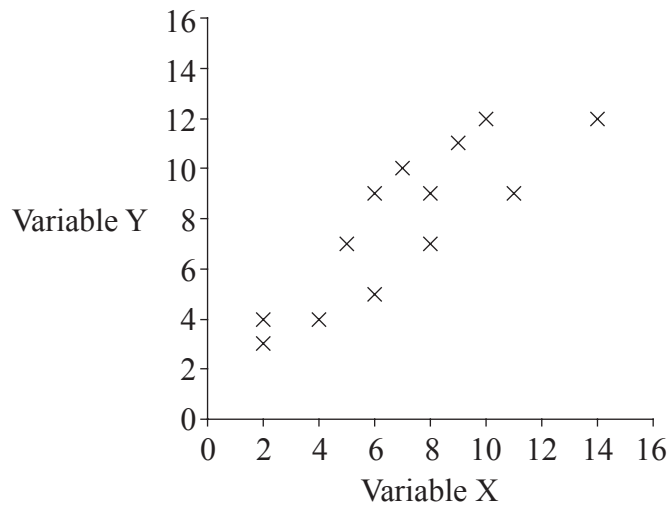
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**INSTRUCTIONS TO CANDIDATES**

- 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.



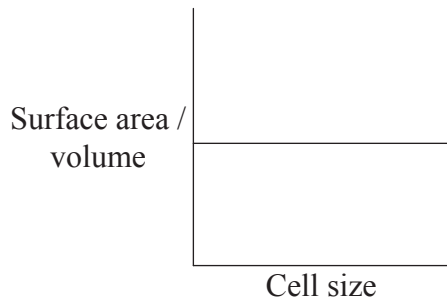
1. What does the following scatter graph show?



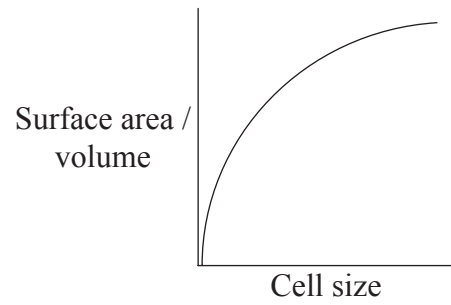
- A. No correlation between these variables
  - B. Strong positive correlation between these variables
  - C. Strong negative correlation between these variables
  - D. Weak negative correlation between these variables
2. What conditions must be met for the *t*-test to be applied?
- I. Population sampled must have a normal distribution
  - II. Variable measured is continuous
  - III. Sample size must be >30
- A. I only
  - B. II and III only
  - C. I and II only
  - D. I, II and III

3. How does the surface area to volume ratio change with an increase in cell size?

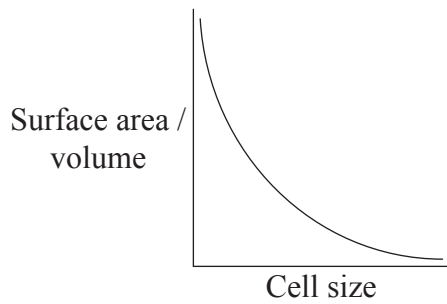
A.



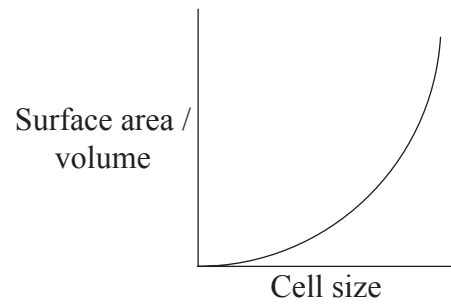
B.



C.



D.



4. How do prokaryotic cells divide?

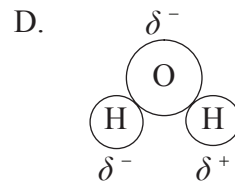
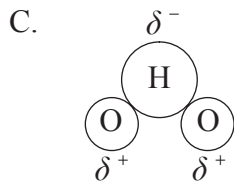
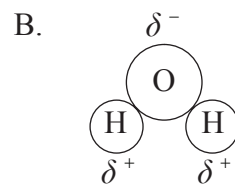
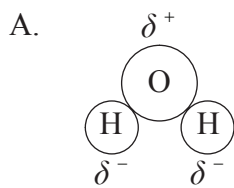
- A. By mitosis
- B. By meiosis
- C. By budding
- D. By binary fission

5. What can the extracellular matrix of cells be made of?

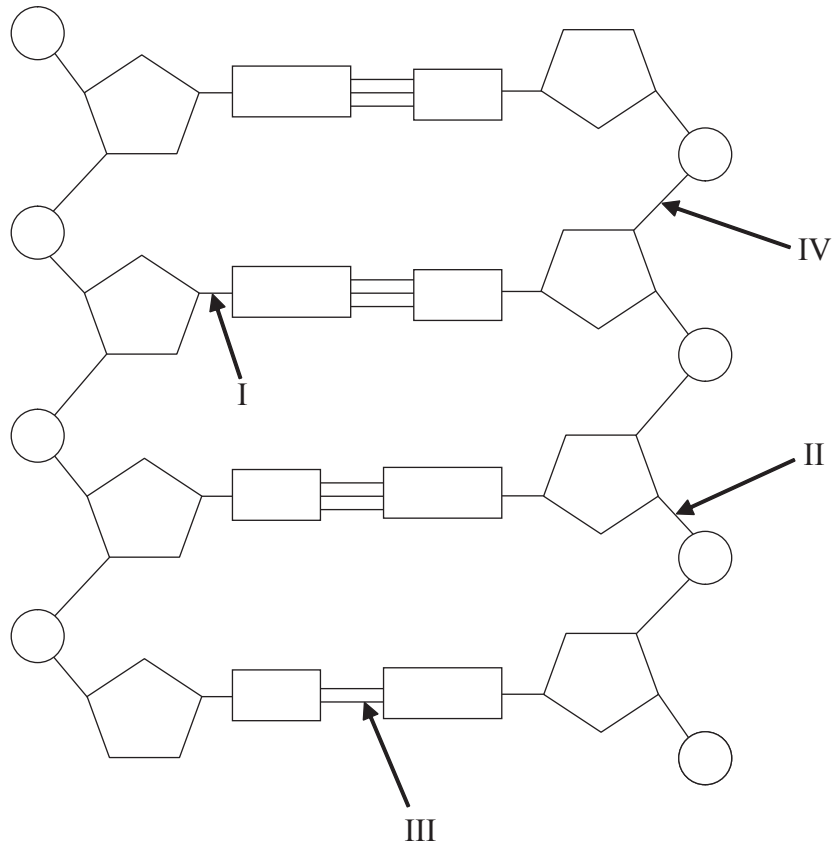
- I. Polysaccharide
  - II. Glycoprotein
  - III. Phospholipid
- A. I only
  - B. I and II only
  - C. II and III only
  - D. I, II and III

6. During which phase of the cell cycle do chromosomes duplicate?
- A.  $G_1$
  - B. S
  - C.  $G_2$
  - D. Mitosis

7. Which diagram represents the polarity of a water molecule?



8. In the model of the DNA molecule shown below, which arrows point to covalent bonds?



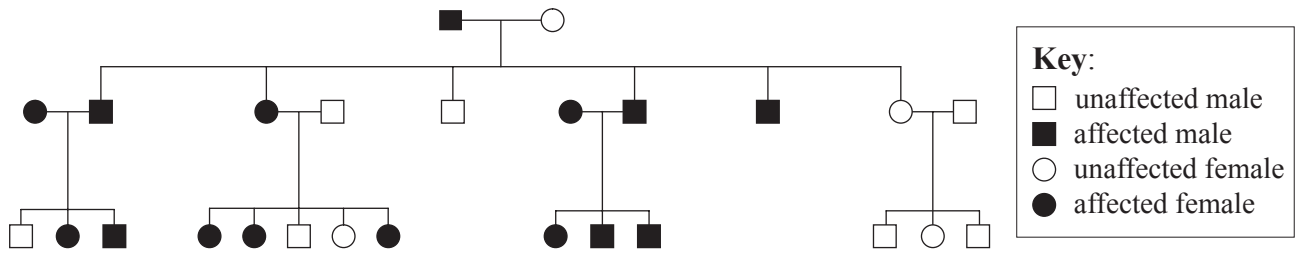
- A. I, II and III only
  - B. II, III and IV only
  - C. I, III and IV only
  - D. I, II and IV only
9. What happens during the pathway of glycolysis?
- A. Glucose is broken down into pyruvate.
  - B. Carbon dioxide is produced.
  - C. More ATP is consumed than is produced.
  - D. Lactic acid is produced.

10. What is light energy used for during photosynthesis?
- A. To produce carbon dioxide
  - B. To produce water molecules
  - C. To produce ATP
  - D. To break down sugar molecules
11. Red-green colour blindness is a sex-linked condition. Which of the following always shows normal vision?
- A. A homozygous male
  - B. A homozygous female
  - C. A heterozygous male
  - D. A heterozygous female
12. In a cross between red haired cattle and white haired cattle the offspring produced are always a colour called roan (light red). If the roan cattle are interbred they produce white, roan and red offspring.

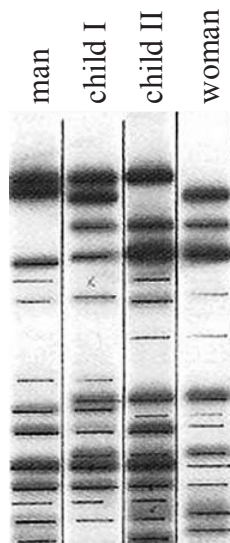
How many alleles are controlling this character?

- A. 1
- B. 2
- C. 3
- D. 4

13. What evidence is given in the pedigree chart below to establish that the condition is caused by a dominant allele?



- A. Two unaffected parents have unaffected children.
  - B. Two affected parents have affected children.
  - C. An affected parent and an unaffected parent have affected children.
  - D. Two affected parents have an unaffected child.
14. What conclusion can be made from the following evidence from an analysis of DNA fragments?



- A. Both children are related to both parents.
- B. Child I is related to the man but child II is not.
- C. Both children are unrelated to either of the parents.
- D. Child II is related to the man but child I is not.

15. Slime moulds (*Acrasiomycota*) are protocists. They feed on decaying organic matter, bacteria and protozoa.

Which of the terms describes their nutrition?

- I. Detritivore
- II. Autotroph
- III. Heterotroph

- A. I only
- B. I and II only
- C. I and III only
- D. I, II and III

16. Several greenhouse gases occur in the atmosphere. Carbon dioxide ( $\text{CO}_2$ ) is one of them but so are methane ( $\text{CH}_4$ ) and oxides of nitrogen ( $\text{NO}_x$ ).

Why are oxides of nitrogen classed as greenhouse gases?

- A. They trap some of the long-wave radiation emitted by the Earth's surface.
- B. They prevent short-wave radiation from reaching the Earth's surface.
- C. They dissolve in rainwater to produce acid rain.
- D. They are only produced by human activity whereas  $\text{CO}_2$  and  $\text{CH}_4$  are also produced naturally.

17. What is the mechanism of natural selection?

- A. Any individuals in a population can be selected entirely by chance.
- B. After a change in the environment a species will evolve adaptations to the new conditions.
- C. If an adaptation to the environment is useful, an individual will develop it and pass it on to its offspring.
- D. Variations amongst individuals of a population are selected by a changing environment.



18. Which of the organisms A–D, identified by the key below, represents an Annelid?

- |                                  |          |
|----------------------------------|----------|
| 1. Shows bilateral symmetry      | go to 2  |
| Does not show bilateral symmetry | Cnidaria |
| 2. Has a segmented body          | go to 3  |
| Does not have a segmented body   | go to 4  |
| 3. Has jointed legs              | A        |
| Does not have jointed legs       | B        |
| 4. Has a shell                   | C        |
| Does not have a shell            | D        |

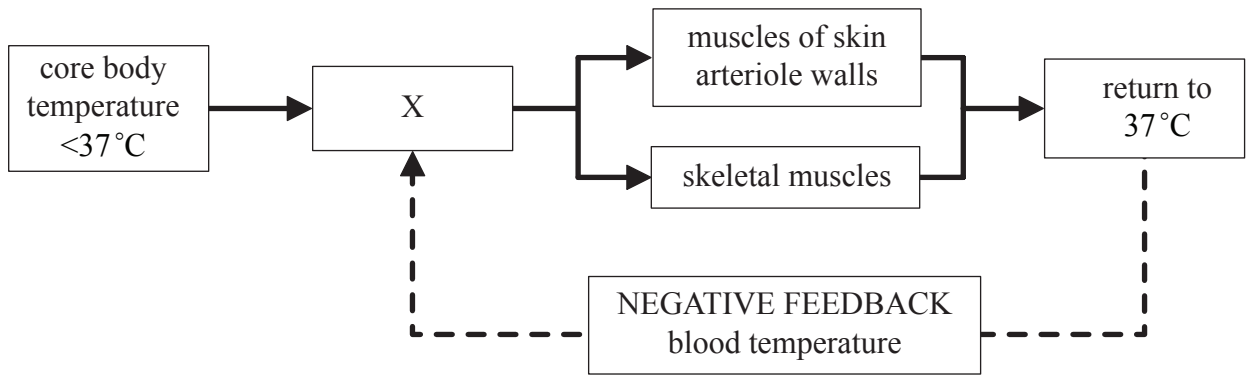
19. Which of the following parts of the digestive system secrete proteases?

	<b>Stomach</b>	<b>Small Intestine</b>	<b>Large Intestine</b>
A.	Yes	Yes	No
B.	Yes	No	Yes
C.	Yes	No	No
D.	No	No	No

20. Why are antibiotics effective against bacteria but not viruses?

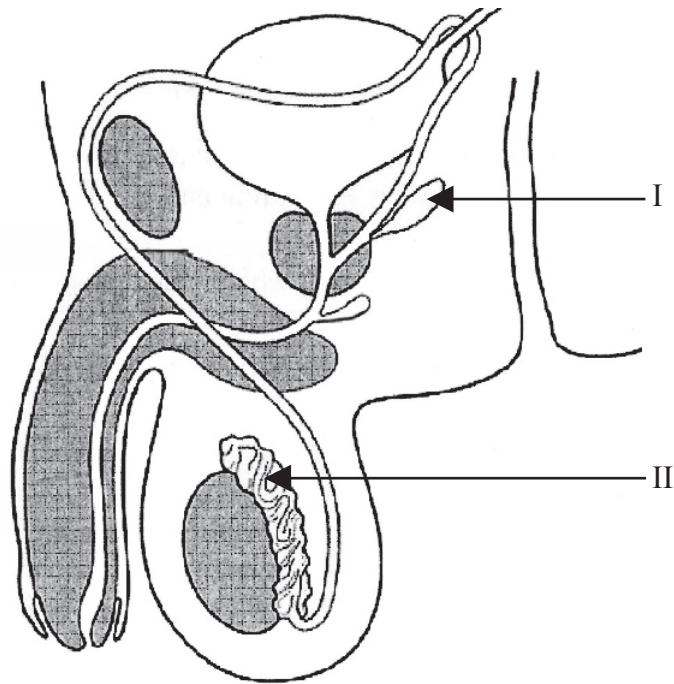
- A. Viruses can hide inside host cells.
- B. Bacteria are recognized as pathogens but viruses are not.
- C. The enzymes of bacteria can be inhibited by antibiotics.
- D. Viruses are resistant to antibiotics.

21. The diagram below represents the homeostatic control of body temperature. What does the part labelled X represent?



- A. Heart
- B. Kidney
- C. Pituitary
- D. Hypothalamus

22. What are the structures labelled I and II on the diagram of the male reproductive system?



	I	II
A.	Testis	Seminal vesicle
B.	Vas deferens	Testis
C.	Seminal vesicle	Epididymis
D.	Seminal vesicle	Prostate gland

23. What are the fundamental structural units of eukaryotic chromosomes?

- A. Nucleosomes
- B. Centromeres
- C. Histones
- D. Nucleoids

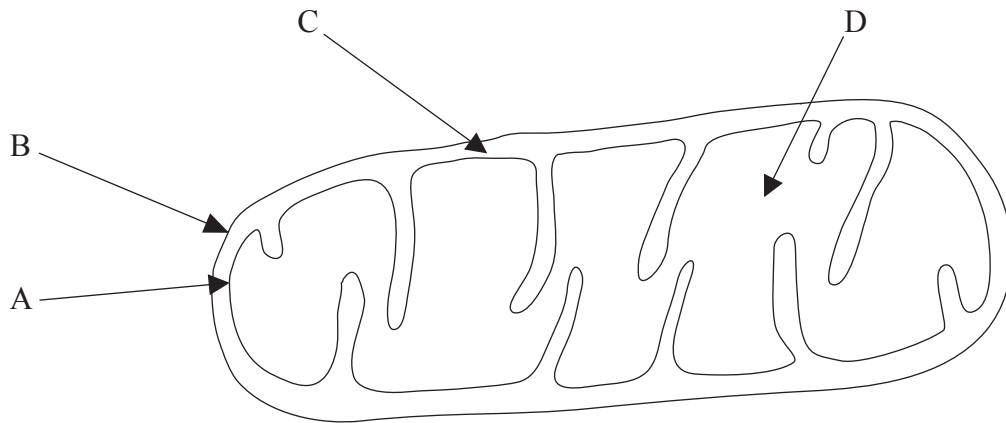
24. The antisense strand on the DNA molecule coding for three codons of a gene is

TATCGCACG

What are the anticodons of the three tRNA molecules that correspond to this sequence?

- A. UAU, CGC and ACG
  - B. ATA, GCG and TGC
  - C. AUA, GCG and UGC
  - D. TAT, CGC and ACG
25. What is the function of the tRNA activating enzyme?
- A. It links tRNA to ribosomes.
  - B. It links tRNA to mRNA.
  - C. It links tRNA to a specific amino acid.
  - D. It links an amino acid on one tRNA to an amino acid on another tRNA.
26. Which best describes the tertiary structure of a protein?
- A. The interaction of polypeptide subunits and prosthetic groups
  - B. Interactions forming hydrogen bonds between the amino acids
  - C. The sequence of amino acids in the polypeptide chain
  - D. The structure formed from interactions between the amino acid side groups

27. Where is carbon dioxide produced in the mitochondrion?



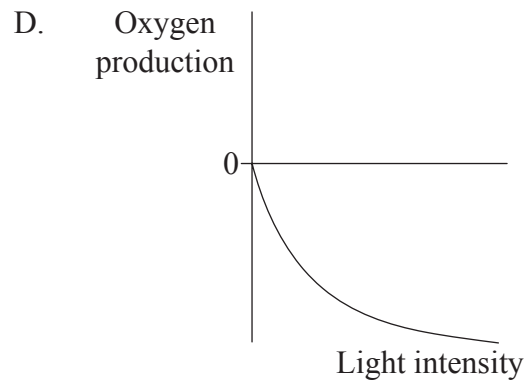
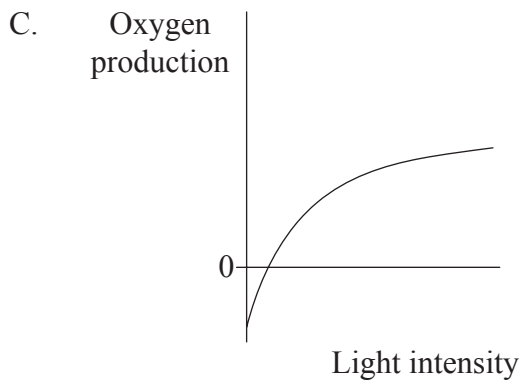
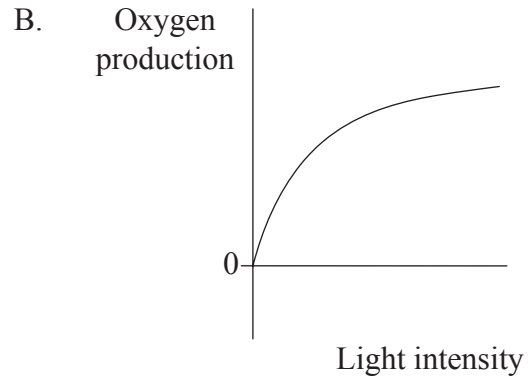
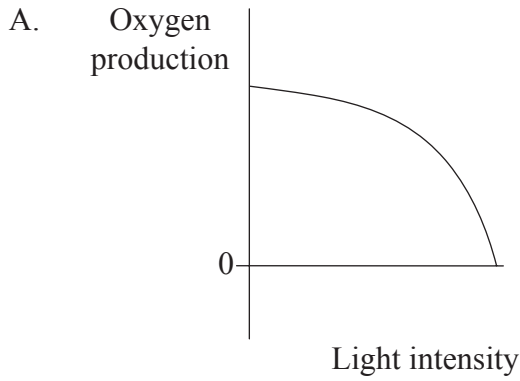
28. In the mitochondrial electron transport chain, what is the last electron acceptor?

- A.  $\text{CO}_2$
- B.  $\text{H}_2\text{O}$
- C.  $\text{O}_2$
- D. NAD

29. Where are complex carbohydrates made in the chloroplast?

- A. In the intermembrane space
- B. In the stroma
- C. On the inner membrane
- D. In the thylakoid space

30. Which of the following graphs represents the effect of changing light intensity on the rate of oxygen production by a green plant?



31. What is a difference between the features of monocotyledons and dicotyledons?

	<b>Monocotyledons</b>	<b>Dicotyledons</b>
A.	Tap roots	Fibrous roots
B.	Two seed-leaves	One seed-leaf
C.	Vascular tissue in rings in the stem	Vascular tissue scattered through the stem
D.	Parallel-veined leaves	Net-veined leaves

32. What causes stomata to close?

- A. Increase in the turgor of the guard cells
- B. A high level of CO<sub>2</sub> in the leaf tissues
- C. The presence of abscisic acid
- D. Movement of K<sup>+</sup> into the guard cells

33. What is the correct sequence of events in the germination of a starch seed?

- A. gibberellin produced → water absorbed → hydrolysis of food reserves → protein synthesis → enzymes produced
- B. water absorbed → hydrolysis of food reserves → protein synthesis → gibberellin produced → enzymes produced
- C. water absorbed → gibberellin produced → protein synthesis → enzymes produced → hydrolysis of food reserves
- D. gibberellin produced → water absorbed → protein synthesis → enzymes produced → hydrolysis of food reserves

34. When do chiasmata form in meiosis?

- A. During prophase I
- B. During metaphase I
- C. During anaphase I
- D. During prophase II

**35.** Which of the following processes result in the production of recombinants?

- I. Crossing over between linked genes
- II. Reassortment of non-linked genes
- III. Mutation

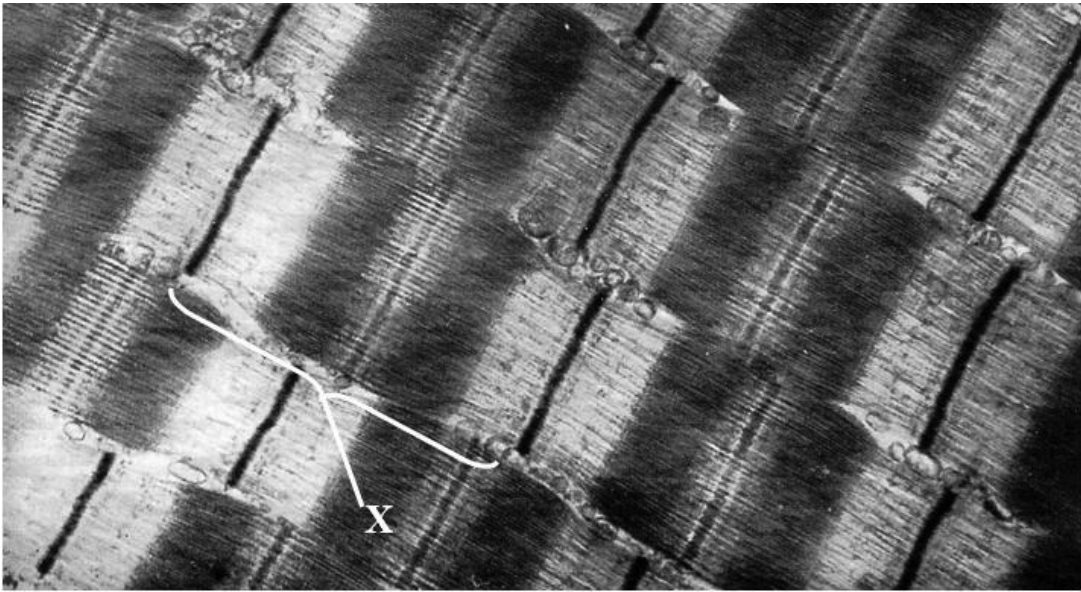
- A. I only
- B. I and II only
- C. I and III only
- D. I, II and III

**36.** What is required to produce monoclonal antibodies?

- A. T-lymphocytes and oocytes
- B. T-lymphocytes and early embryo cells
- C. B-lymphocytes and tumour cells
- D. B-lymphocytes and stem cells



37. What does label X indicate?



- A. Sarcolemma
- B. Sarcomere
- C. Sarcoplasmic reticulum
- D. Endoplasmic reticulum

- 38.** Which processes are required for the reabsorption of glucose in the kidney tubules?
- I. Simple diffusion
  - II. Facilitated diffusion
  - III. Active transport
- A. I and II only
  - B. II and III only
  - C. I and III only
  - D. I, II and III
- 39.** What is the role of testosterone in spermatogenesis?
- A. It stimulates interstitial cells.
  - B. It stimulates Sertoli cells.
  - C. It inhibits the germinal epithelium.
  - D. It inhibits the prostate gland.
- 40.** What is the role of HCG in early pregnancy?
- A. HCG stimulates FSH secretions.
  - B. HCG stimulates the degeneration of the corpus luteum.
  - C. HCG stimulates ovarian estrogen and progesterone secretion.
  - D. HCG stimulates uterine contractions.
-