Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Higher Level
Paper 1A

11 May 2026

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

2 hour [Paper 1A and Paper 1B]

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for paper 1B is **[35 marks]**.
- The maximum mark for paper 1A and paper 1B is **[75 marks]**.

1. Endothermic animals that live in cold water need better insulation than animals that live on land at similar low temperatures. Which property of water accounts for this difference?

A. Water has a lower specific heat capacity than air.

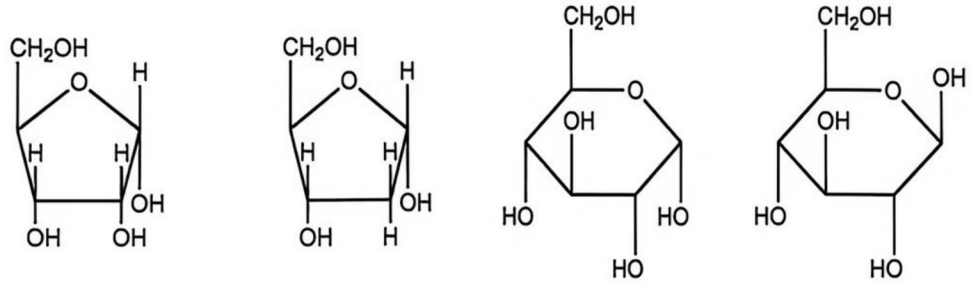
B. Water has a higher thermal conductivity than air.

C. Water is denser than air.

D. Water is more viscous than air.

2. Which sugar is found in DNA?

A. B. C. D.



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3. Oils are liquid at room temperature while fats are solid. What explains this difference?

A. Oils have a higher melting point because glycerol forms more bonds with carbon atoms.

B. Fats have a higher melting point because of stronger covalent bonds between fatty acids.

C. Fats have a lower melting point because they have shorter fatty acid chains.

D. Oils have a lower melting point because fatty acids have one or more double carbon bonds.

A007

4. A dipeptide is produced by condensation of two amino acid molecules. What else is produced?

A. ATP and two water molecules

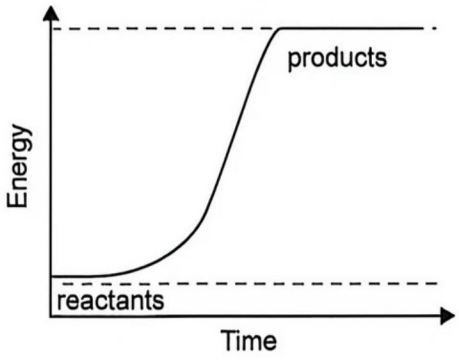
B. ATP and one water molecule

C. Two water molecules only

D. One water molecule only

5. Which graph represents changes in energy levels between reactants and products during an enzyme-catalysed anabolic reaction?

A.



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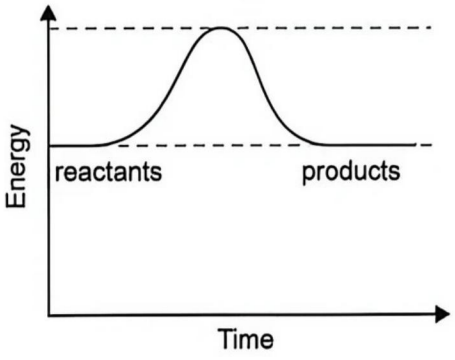

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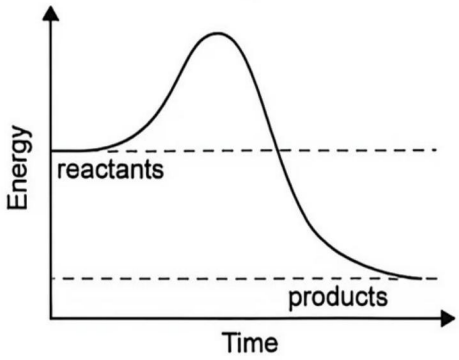

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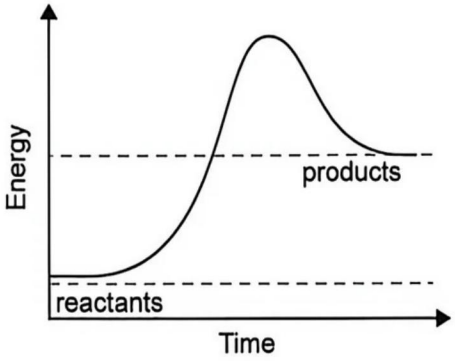

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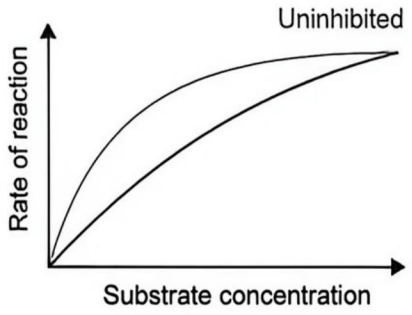
6. The grey line in each of the graphs represents the rate of reaction catalysed by an uninhibited enzyme at increasing substrate concentration. Which graph shows expected results if a non-competitive inhibitor was added?

A.



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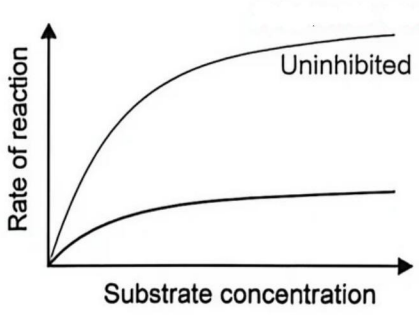

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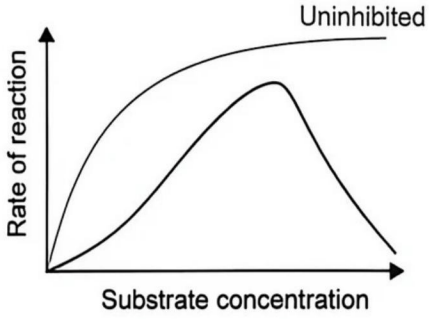
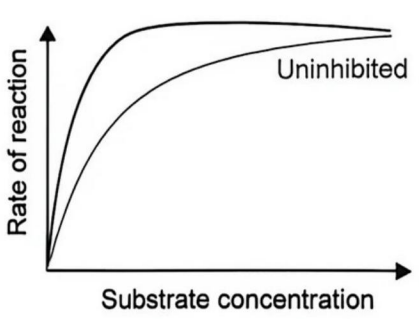


D.



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7. Aerobic and anaerobic respiration occurs in humans. How are these processes similar?

A. Both occur in mitochondria.

B. Both produce lactate.

C. Both release ATP from glucose.

D. Both use oxygen.

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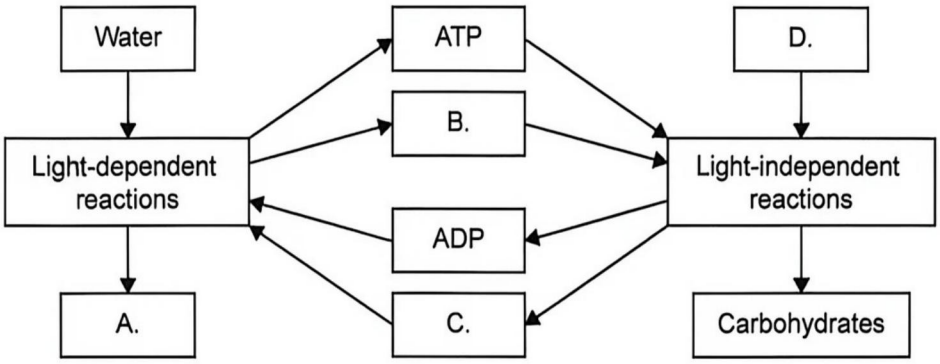
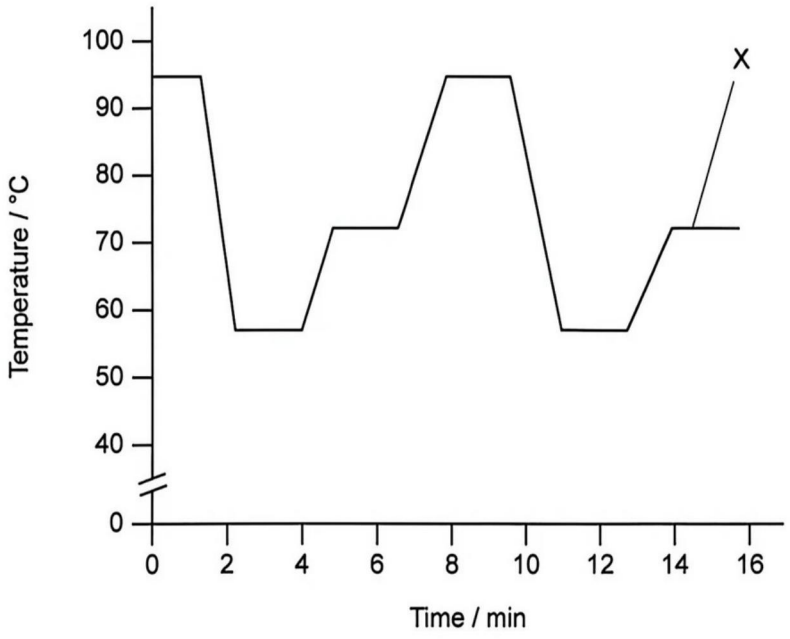
8. A summary diagram of photosynthesis is shown. Which box represents NADP (NADP')?



9. The graph shows temperature changes during two PCR (polymerase chain reaction) cycles.



What is the purpose of the temperature at stage X?

A. To separate DNA strands

B. To provide the optimum temperature for the synthesis of new DNA

C. To allow binding of primers to single-stranded DNA

D. To break covalent bonds between nucleotides

10. What occurs during translation?

A. Several mRNA molecules bind simultaneously to the small subunit of a ribosome.

B. One mRNA molecule at a time binds to the large subunit of a ribosome.

C. Two tRNA molecules bind simultaneously to the large subunit of a ribosome.

D. One tRNA molecule at a time binds to the small subunit of the ribosome.

11. CRISPR–Cas9 technology is used to treat genetic conditions such as phenylketonuria and sickle cell disease. What does this method consist of?

A. Replacing bases in a target gene

B. Inserting a replacement chromosome using bacteria

C. Inducing methylation in a mutated gene

D. Adding specific base sequences to mRNA

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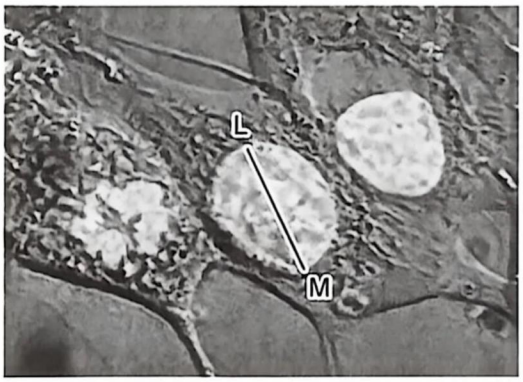
12. The micrograph shows eukaryotic cells. The actual length of the nuclear diameter measured by the line L–M is 10 µm.



A007

What is the magnification of the micrograph?

A. 200×

B. 2000×

C. 20 000×

D. 200 000×

13. What can be seen using freeze-fracture microscopy?

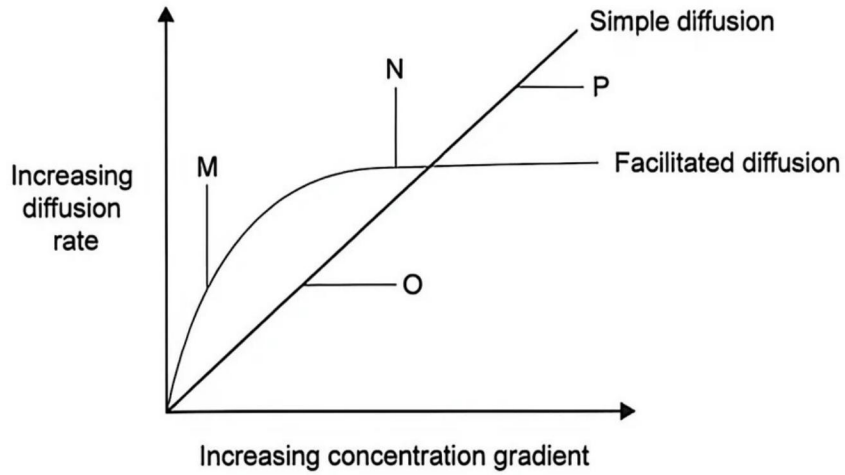
A. Single atoms within cells

B. The internal structure of membranes

C. Interactions within the nucleus

D. Fluorescent antibody markers

14. The graph shows the effect of increasing concentration gradient on the rate of simple and facilitated diffusion across a cell surface membrane at a constant temperature.



What is a valid explanation for one of the points labelled on the graph?

A. At **M**, molecules have low kinetic energy.

B. At **N**, protein channels are saturated.

C. At **O**, many protein pumps are available.

D. At **P**, molecules are moving faster.

15. Vesicles continuously form from cell membranes to move substances into, out of, or within cells. What is a role of the protein clathrin in vesicle formation?

A. It coats vesicles and facilitates detachment from cell surface membrane.

B. It enables integration of vesicles into plasma membrane during exocytosis.

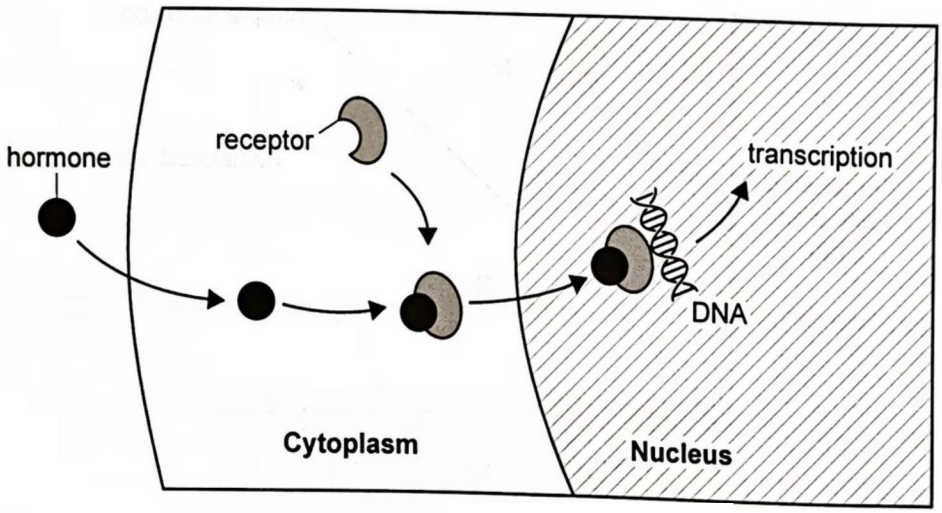
C. It surrounds vesicles and guides their movement within the cytoplasm.

D. It fuses with phagocytic vesicles to digest their contents.

16. What are a similarity and a difference between striated muscle fibres and cardiac muscle cells?

	Similarity	Difference
A.	they are unbranched	striated muscle fibres are longer
B.	they are made of myofibrils	cardiac muscle cells are multinucleated
C.	they are cylindrical	only striated muscle fibres are made of myofibrils
D.	they have light and dark bands	only cardiac muscle cells are branched

17. The diagram shows a cell signalling pathway.



Which hormone could initiate this pathway?

A. Epinephrine (adrenaline)

B. Insulin

C. Melatonin

D. Oestradiol

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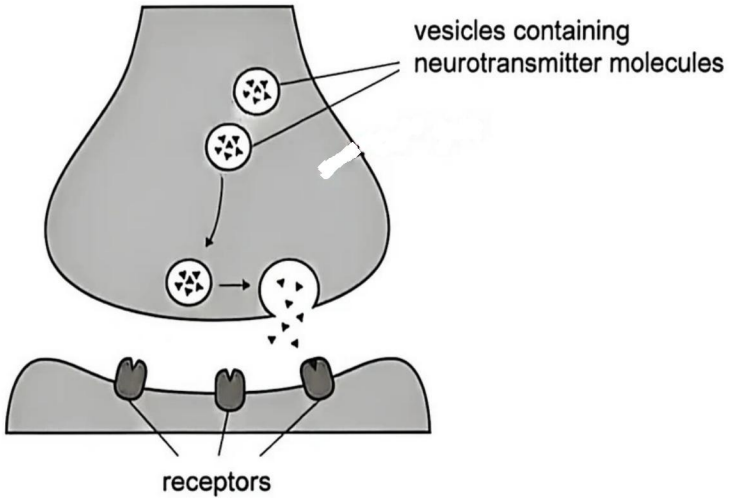
18. The diagram shows the transmission of a nerve impulse through a synapse.



What triggers the release of neurotransmitters into the synaptic cleft?

A. The uptake of calcium by the presynaptic membrane when it depolarizes

B. The release of sodium from the presynaptic membrane during an action potential

C. The binding of calcium to receptors in the postsynaptic membrane

D. The breakdown of vesicles when they bind to sodium ions

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19. Goblet cells synthesize mucin, a protein found in mucus. How is an overproduction of mucin prevented?

A. Transcription factors bind to the gene that codes for mucin and switch it off.

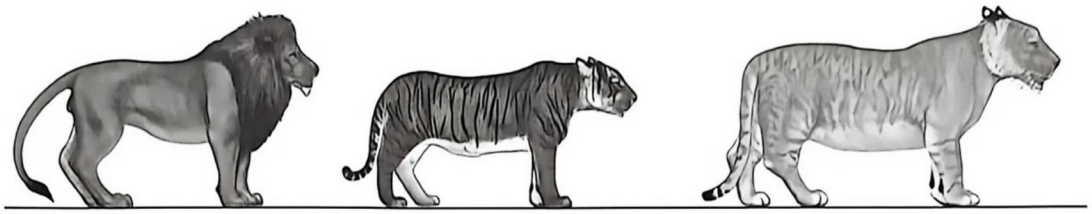
B. Nucleases bind to RNA polymerase, inhibiting mRNA synthesis.

C. An excess of mucin inhibits ribosome function.

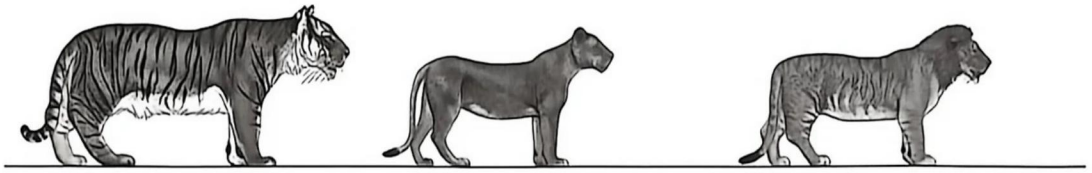
D. Nucleases break down mRNA in the cytoplasm so it cannot be translated.

A007

20. Ligers and tigons arise from the cross between lions (*Panthera leo*) and tigers (*Panthera tigris*). Differences in size between both hybrids have an epigenetic origin.



lion (male) × tiger (female) → liger (male)
bigger than parents



tiger (male) × lion (female) → tigon (male)
same size as or
smaller than parents

How does epigenetics explain their difference in size?

A. Different reproductive strategies of tigers and lions influence the expression of the growth gene.

B. Only male lions pass on the dominant allele of the growth-promoting gene.

C. Ligers outcompete tigons for food, so they grow more.

D. Milk produced by the females may switch the offspring growth genes on or off.

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A007

21. The table shows the common and scientific names of four plants.

Common name	**Scientific name**
garden sage	*Salvia officinalis*
garden valerian	*Valeriana officinalis*
rosemary	*Rosmarinus officinalis*
longspur seablush	*Valeriana ciliosa*

What can be deduced from their scientific names?

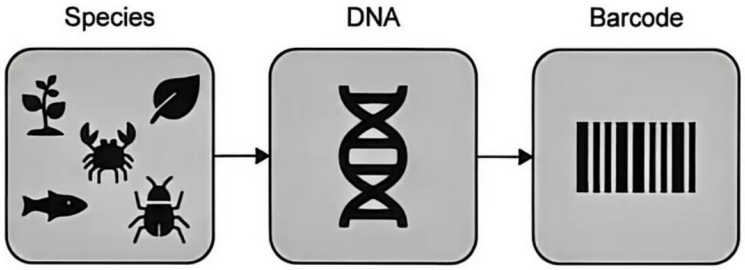
A. Garden sage, garden valerian and rosemary belong to the same family.

B. Garden sage and garden valerian are adapted to the same habitat.

C. Garden valerian and longspur seablush belong to the same genus.

D. Rosemary and garden sage are two varieties of the same species.

22. Technology has allowed the development of large DNA barcode libraries.



How would scientists use DNA barcodes and environmental DNA in ecological studies?

A. To identify species that live in specific habitats.

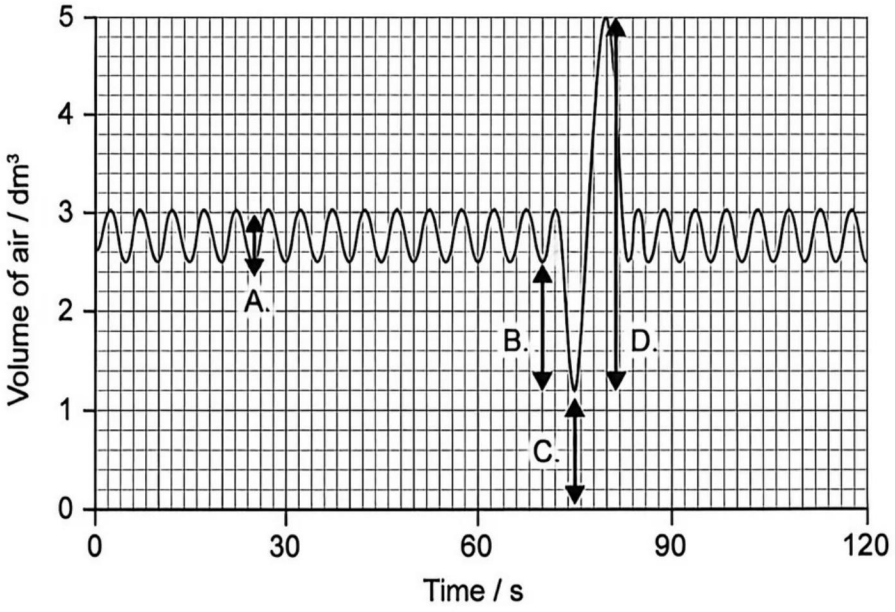
B. To calculate mutation rates in a species.

C. To calculate the population size using the Lincoln Index.

D. To identify morphological traits of a new species.

23. Lung volumes can be measured using a spirometer. The graph shows the volume of air in the lungs.

Which letter in the graph shows the volume of the expiratory reserve?



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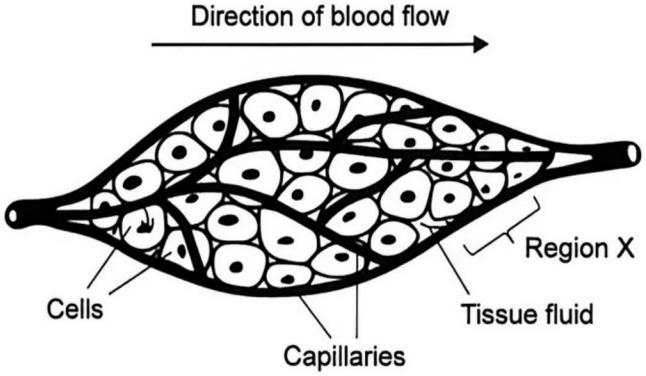
24. The diagram shows blood capillaries and cells in a tissue of a healthy individual.



A007

What might happen at region X under normal conditions?

A. Proteins move into tissue fluid down their concentration gradient.

B. There is net movement of water into tissue fluid, as it is constantly used by cells.

C. Tissue fluid drains into capillaries due to the lower blood pressure in venules.

D. Due to higher blood pressure in arterioles, tissue fluid is formed.

25. How does the protein titin contribute to the correct functioning of skeletal muscle?

A. It binds muscles to tendons for more efficient movement of limbs.

B. It allows simultaneous contraction of antagonistic muscles.

C. It prevents overstretching during muscle relaxation.

D. It increases the hydrolysis of ATP for more vigorous contraction.

26. Which structures can be found in nerves?

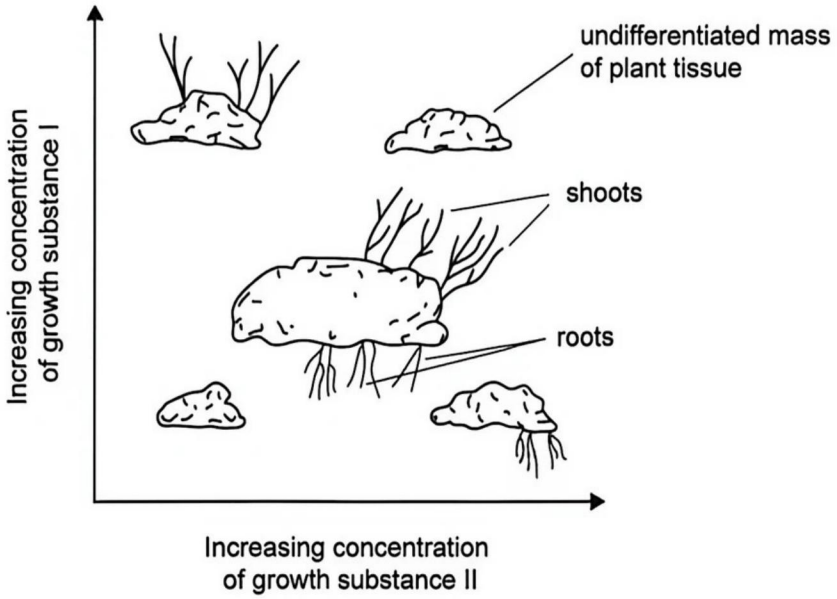
A. Myelinated and unmyelinated fibres of motor neurons

B. Dendrites of interneurons and motor neurons

C. Interneurons and nerve fibres of sensory neurons

D. Synapses between sensory fibres and motor fibres

27. Skoog and Miller investigated the growth and development of undifferentiated masses of plant tissue by applying different proportions of two substances naturally produced by plants.
The diagram shows the results of the experiment.



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What can these substances be?

A. Cytokinin and ethylene

B. Ethylene and nitrogen

C. Nitrogen and auxin

D. Auxin and cytokinin

28. What are features of the innate immune system?

A007

I. It remains unchanged.

II. It responds to a broad range of pathogens.

III. It produces memory cells.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

29. Fertilization results in the formation of a zygote which contains the chromosomes from both male and female gametes. Which other component of the male gamete is present in the zygote?

A. Mitochondria

B. Acrosome

C. Flagellum (tail)

D. Cell membrane

30. A plant shows incomplete dominance for flower colour. One homozygous for blue flowers and another homozygous for red flowers were crossed. What could be the phenotypes for flower colour of the offspring produced by this cross?

A. 50 % purple flowers and 50 % flowers with blue and red stripes

B. 50 % purple flowers, 25 % blue flowers and 25 % red flowers

C. 100 % purple flowers

D. 100 % flowers with blue and red stripes

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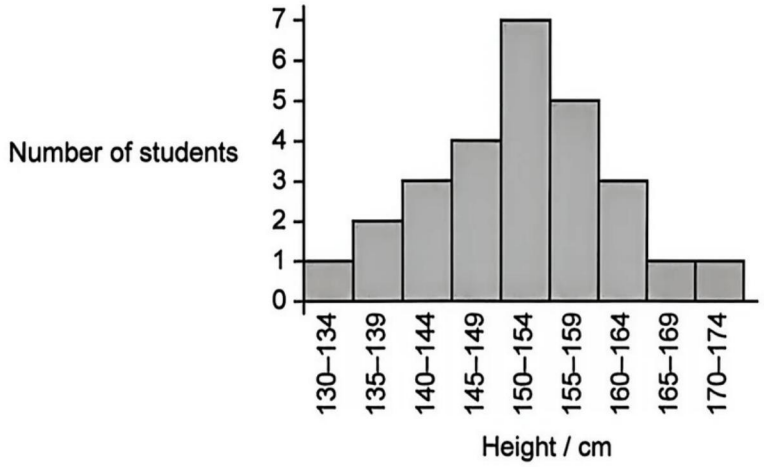
31. The histogram shows the height distribution of a group of 14-year-old male students.



A007

What contributes to variation in the height of the students?

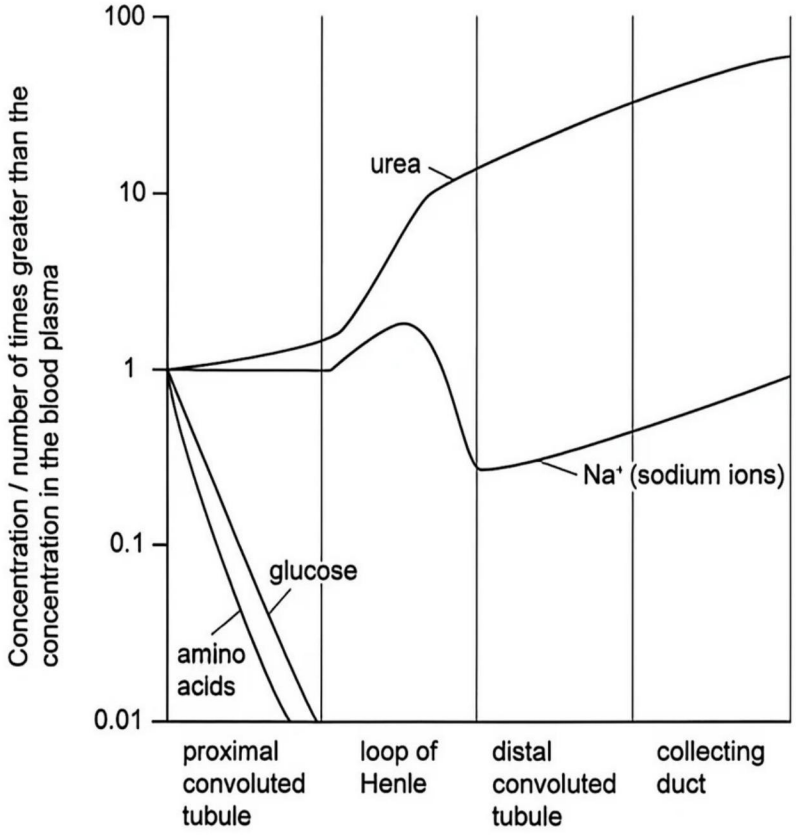
A. One gene with multiple alleles

B. Sex-linked inheritance and physical activity

C. Polygenic inheritance and environmental factors

D. Autosomal inheritance and age

32. The concentration of solutes in the glomerular filtrate changes as it moves along the kidney tubules (nephrons).



What explains the change in glucose concentration as the filtrate moves along the proximal convoluted tubule?

A. It is used for respiration in tubule cells to provide ATP.

B. It is reabsorbed into blood capillaries.

C. The filtrate becomes more diluted as water is filtered out of blood.

D. Excess glucose is converted to glycogen for storage in tubule cells.

33. Which feature of sympatric speciation distinguishes it from allopatric speciation?

A. It occurs over longer periods of time.

B. Interbreeding is prevented by changes in behaviour.

C. Reproductive isolation occurs.

D. It results in convergent evolution.

34. The mahogany glider (*Petaurus gracilis*) is an endangered tree-dwelling marsupial species native to coastal forests of Australia.

What is a possible in situ conservation strategy for this species?

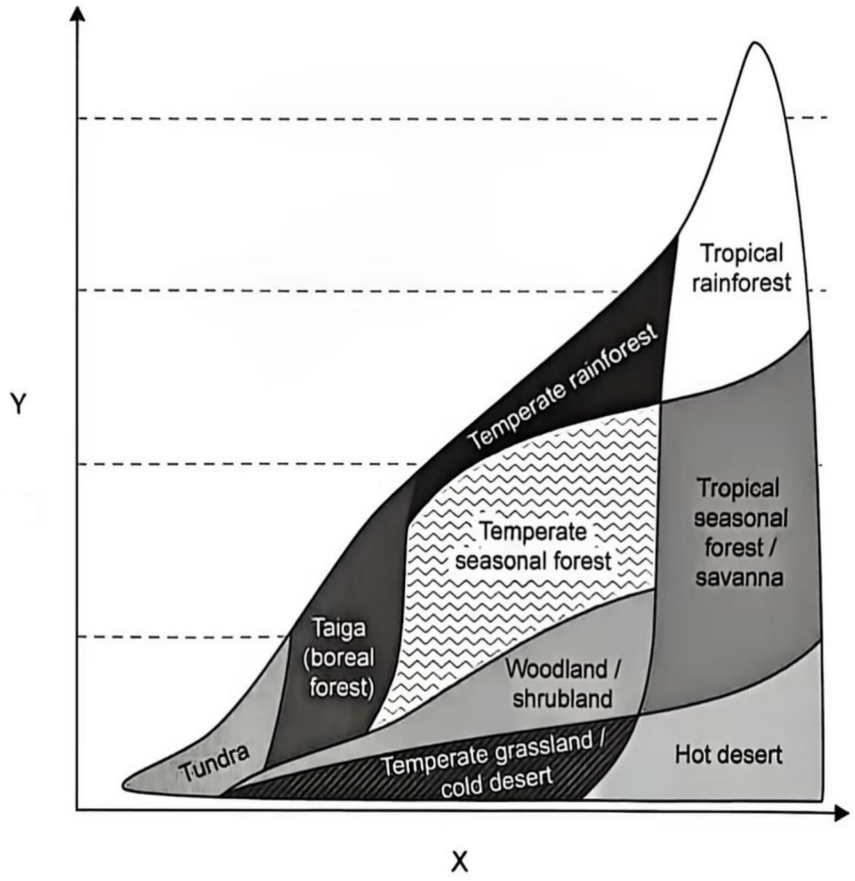
A. Protecting coastal areas to reduce forest fires

B. Treating injured individuals in zoos

C. Storing mahogany glider germ plasm in a gene bank

D. Breeding individuals in captivity to increase their numbers

35 The graph shows the distribution of some terrestrial biomes.



What do the X and Y axes represent?

	X axis	Y axis
A.	soil fertility	mean annual temperature
B.	annual rainfall	soil fertility
C.	mean annual temperature	annual rainfall
D.	annual rainfall	mean annual temperature

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A007

36. Several allelopathic plant species are being investigated due to their potential use in agriculture. What could be an application of allelopathy in agriculture?

A. Allelopathic chemicals can be synthesized and used as fertilizers.

B. Salt-tolerant alleles can be inserted in crop plants to improve yields in salty soils.

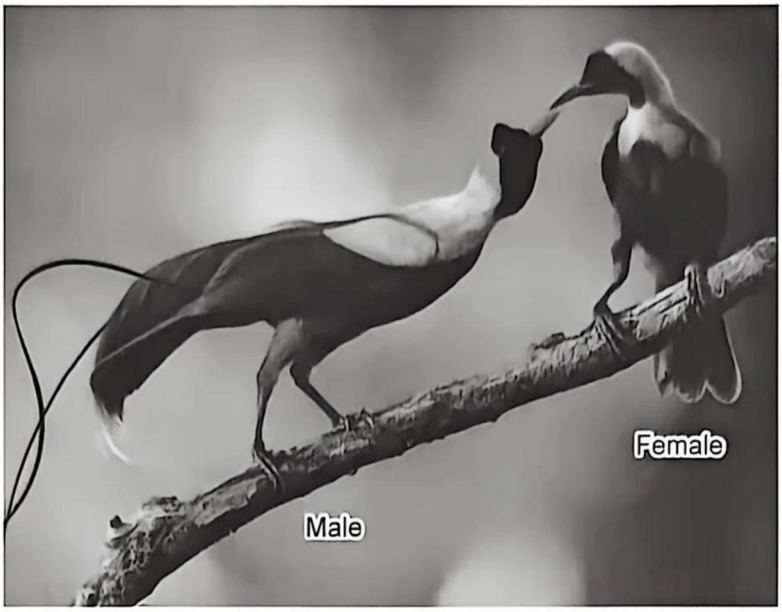
C. Substances produced by allelopathic plants can be used to control weeds.

D. New antibiotics can be extracted from plants to fight viral infections in cattle.

37. What distinguishes primary production from secondary production in an ecosystem?

	Primary production	**Secondary production**
A.	higher than secondary production	lower than primary production
B.	uses chemical energy	uses light energy
C.	occurs in primary consumers	occurs in secondary consumers
D.	uses ATP	produces ATP

38. The image shows male and female birds of paradise.



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How do sexual selection pressures explain differences in plumage between male and female birds?

A. Dull-coloured females are less seen by predators during egg incubation period.

B. Only male birds with the most colourful feathers can scare predators.

C. Density-dependent factors positively select bright-coloured males only.

D. Females prefer to mate with bright-coloured males only.

39. Which conditions must be maintained in a population so that its genotype frequencies fit the Hardy–Weinberg equation?

A007

I. Large population size

II. Varying survival rates between genotypes

III. Random mating

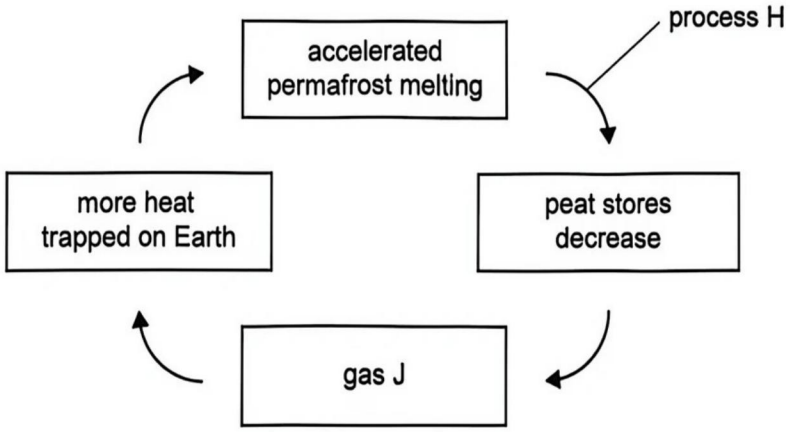
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

40. The diagram shows a positive feedback cycle in global warming.



What are process H and gas J?

	Process H	Gas J
A.	decomposition	methane
B.	fossilization	carbon dioxide
C.	combustion	carbon dioxide
D.	evaporation	methane

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