UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **May/June 2013**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

9322841128

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

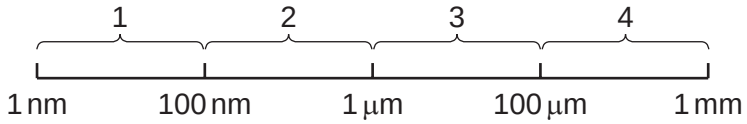
Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

This document consists of **14** printed pages and **2** blank pages.

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1 Which size ranges can be viewed using a light microscope?



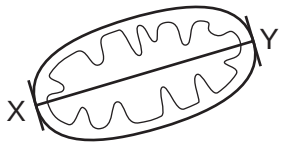
A 4 only

B 1 and 2 only

C 2 and 3 only

D 3 and 4 only

2 The diagram shows a mitochondrion drawn from an electronmicrograph.



The length of the mitochondrion from X to Y is 3000 nm.

What is the magnification of the drawing of the mitochondrion?

A ×100 **B** ×1000 **C** ×10 000 **D** ×100 000

3 What is the function of nucleoli?

A formation and breakdown of the nuclear envelope

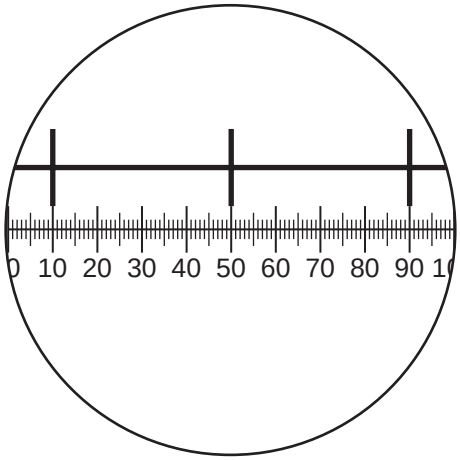
B formation of centromeres

C formation of ribosomes

D formation of the spindle during nuclear division

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4 The diagram shows a stage micrometer, with divisions 0.1 mm apart, viewed through an eyepiece containing a graticule.



What is the area of the field of view of the microscope at this magnification? (π = 3.14)

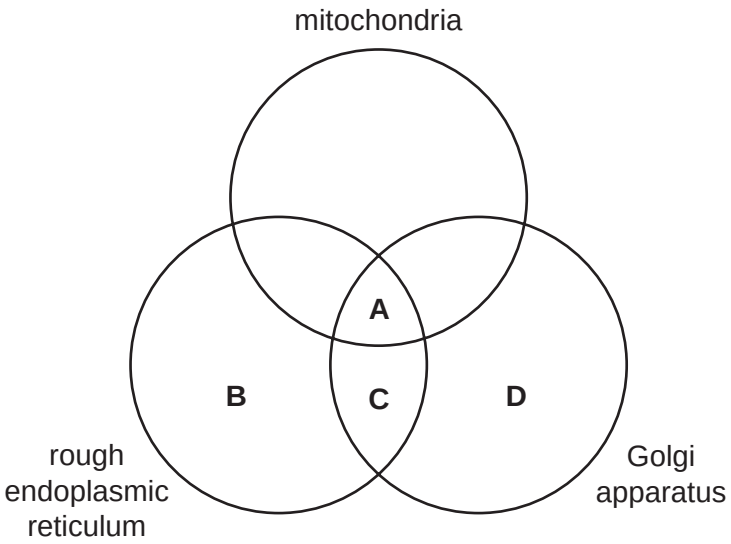
A $\pi \times 12.5 \times 12.5 = 4.9 \times 10^2\ \mu m^2$

B $\pi \times 50 \times 50 = 7.9 \times 10^3\ \mu m^2$

C $\pi \times 125 \times 125 = 4.9 \times 10^4\ \mu m^2$

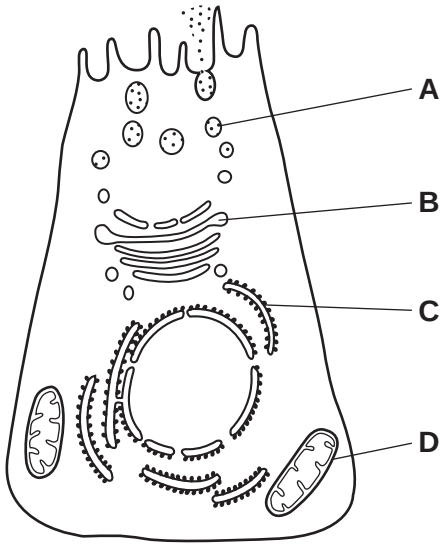
D $\pi \times 250 \times 250 = 2.0 \times 10^5\ \mu m^2$

5 Which organelles are required for the formation of the hydrolytic enzymes found in lysosomes?

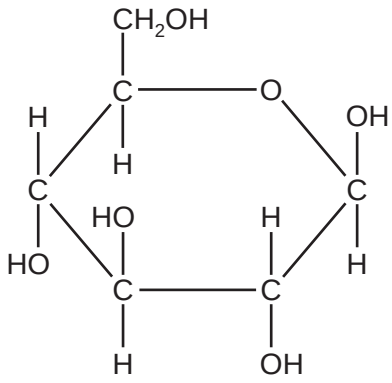


6 The diagram is taken from an electronmicrograph of a cell which secretes enzymes.

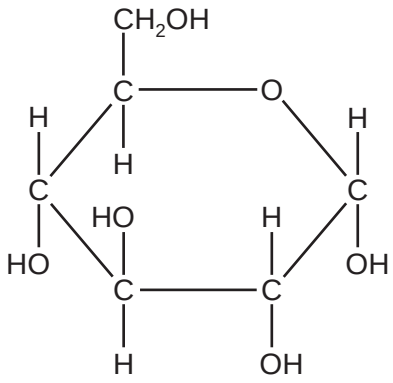
Where are these enzymes made?



7 X and Y show the structures of two hexose sugars.



X



Y

Which statement is correct?

A X is found in amylopectin.

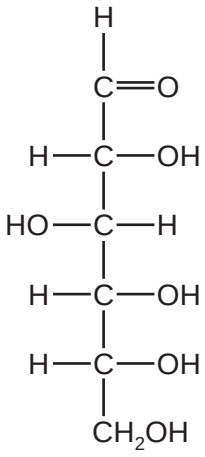
B X is found in amylose.

C Y is found in cellulose.

D Y is found in glycogen.

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8 The structural formula of a carbohydrate molecule can be shown as:



Which of the molecules could be represented by this formula?

1 α glucose

2 deoxyribose

3 ribose

A 1 only **B** 2 only **C** 2 and 3 only **D** 1, 2 and 3

9 What occurs when sucrose is broken down to monosaccharides?

A condensation of reducing sugars releasing water

B condensation of reducing sugars using water

C hydrolysis, releasing reducing sugars and releasing water

D hydrolysis, releasing reducing sugars and using water

10 One naturally occurring polysaccharide is an unbranched chain of the molecule acetylglucosamine linked by β-1, 4 glycosidic bonds. There are $-CH_2OH$ groups that alternate on each side of the polysaccharide chain.

Many hydrogen bonds form between these unbranched chains.

Which polysaccharide has a structure similar to that described?

A amylose

B amylopectin

C cellulose

D glycogen

11 Which molecules have properties that are dependent on hydrogen bonds?

1 cellulose

2 glycogen

3 haemoglobin

4 water

A 1, 2 and 3 only **B** 1, 2 and 4 only **C** 1, 3 and 4 only **D** 2, 3 and 4 only

12 Features of four proteins, W, X, Y and Z, are described below.

W consists of two polypeptides held together by disulfide bonds

X consists of three polypeptides tightly coiled together

Y consists of four polypeptides each with a prosthetic group

Z consists of four polypeptides held together by disulfide bonds

Which row correctly identifies the named proteins?

	antibody	collagen	haemoglobin
A	W	X	Y
B	W	Y	X
C	Z	X	Y
D	Z	Y	X

13 Why may fish living in ponds survive temperatures below 0 °C in winter?

A Fish body tissues produce an enzyme which prevents blood from freezing.

B The ice on the pond surface insulates the water in the pond.

C The plants in the pond help to keep the water temperature above 0 °C.

D The rocks in the pond warm up during the day and heat the water.

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14 Four students, 1, 2, 3 and 4, counted the number of bubbles of oxygen given off in a minute when investigating the effect of catalase from plant tissue on hydrogen peroxide.

Each student repeated the experiment five times and calculated the mean number of bubbles per minute.

Which have correctly calculated the mean?

student	raw data / number of bubbles minute^{-1}					mean / number of bubbles minute^{-1}
1	12	10	11	13	9	10.5
2	8	19	16	18	19	18
3	8	10	11	9	8	9
4	21	18	17	6	18	18.5

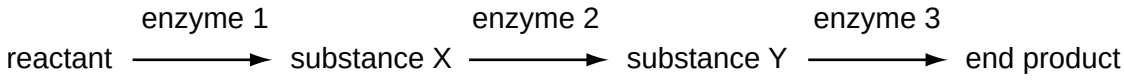
A 1 and 4 only

B 2 and 3 only

C 1, 2, 3 and 4

D 3 only

15 The diagram shows a metabolic pathway.



What would be the effect of adding a small amount of a non-competitive inhibitor of enzyme 2?

A Enzyme 2 would be partially denatured.

B Substance X would increase in concentration.

C Substance Y would no longer be formed.

D The initial reactant would no longer be metabolised.

16 Which of the following can increase the fluidity of the cell surface membrane at low temperatures?

1 double bonds between carbon atoms in the fatty acid chains

2 cholesterol

3 fatty acids having shorter chains

A 1, 2 and 3

B 1 and 3 only

C 2 and 3 only

D 1 only

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17 Which process allows the movement of molecules that are too large to **enter** through a cell surface membrane?

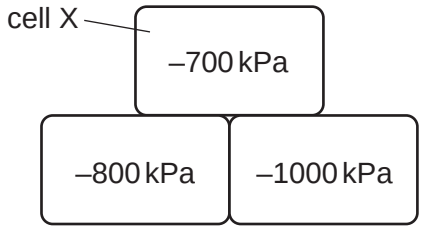
A active transport

B endocytosis

C exocytosis

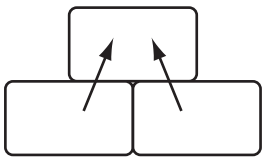
D facilitated diffusion

18 The diagram shows the water potential of three cells.

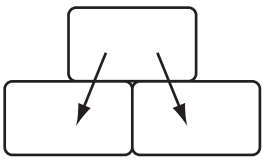


In which directions will there be net movement of water by osmosis to or from cell X?

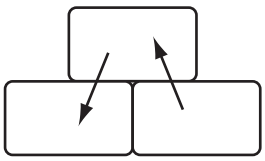
A



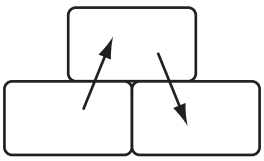
B



C



D



19 Which statement describes a cell belonging to a haploid organism that is capable of reproduction?

A It has chromosomes that contain one polynucleotide chain.

B It is capable of carrying out a reduction division to form gametes.

C It possesses two copies of each gene as a result of fertilisation.

D It will undergo cell division by mitosis during asexual reproduction.

20 Some chemicals, used to stop tumour growth, work by preventing the DNA double helix from uncoiling and separating.

During which stage of the cell cycle would they act?

A anaphase

B interphase

C metaphase

D prophase

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21 Nocodazole is a chemical used in the study of mitosis. It causes all mitotic cells to stop dividing at metaphase.

Which statements correctly identify how this chemical might work?

1 inhibits chromatin condensing in the nucleus

2 prevents replication of the centrioles

3 stops sister chromatids migrating to opposite poles

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 3 only

22 What is the **maximum** number of hydrogen bonds in a length of DNA containing 700 base pairs?

A 350 **B** 700 **C** 1400 **D** 2100

23 Which type of molecule is always the end product of transcription?

A amino acid

B functional protein

C mRNA

D polypeptide

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24 The table gives tRNA anticodons for four amino acids.

amino acid	tRNA anticodon
asparagine	UUA
glutamic acid	CUU
proline	GGA
threonine	UGG

A cell makes a polypeptide with the amino acid sequence:

glutamic acid – asparagine – threonine – proline

What was the sequence of bases on the strand of the DNA which was complementary to the mRNA from which this polypeptide was formed?

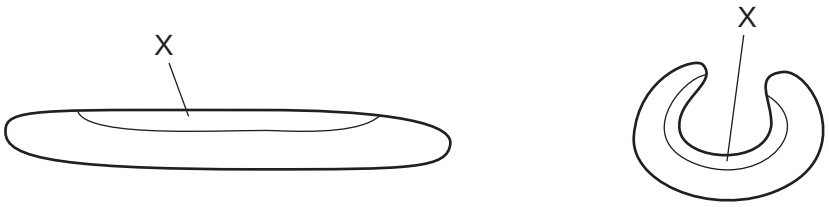
A CTTTTATGGGGA

B CUUUUAUGGGGA

C GAAAATACCCCT

D GAAAAUACCCCU

25 The diagram shows a xerophytic leaf in different conditions, P and Q.



Which statements about the cells in layer X of the leaf in each of the conditions P and Q are correct?

1 less negative water potential in P than Q

2 cells may be turgid in P and plasmolysed in Q

3 cells less turgid in P than Q

4 no net diffusion of water into X in either P or Q

A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 4 only

D 2 and 3 only

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26 The loading of sucrose into companion cells involves a number of processes listed below.

Which is an active process?

A the movement of H^+ ions from companion cells

B the movement of H^+ ions into companion cells

C the movement of sucrose from companion cells

D the movement of sucrose into companion cells

27 Which statement concerning transpiration is correct?

A On a humid day, the water potential gradient between the intercellular air space and the external atmosphere increases to stimulate water loss by evaporation.

B Water arriving at the spongy mesophyll cells via the symplast pathway must move by osmosis through the cell surface membrane before evaporation from the surface of the cells.

C Water diffuses down the water potential gradient from the saturated air space through the guard cells before evaporating from the surface of the cells into the atmosphere.

D Water moves up the xylem in the apoplast pathway and can continue on this pathway by osmosis to reach the spongy mesophyll cells before evaporating into the intercellular air space.

28 Halophytes are plants that can survive in regions where they are regularly exposed to sea water. Sea water has a water potential of approximately –2500 kPa.

What adaptations would you expect halophytes to show?

1 root hair cells that maintain a more negative water potential than sea water

2 root hair cells that accumulate salts and other solutes

3 stomata that are open most of the time

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

29 Which features enable the aorta to withstand ventricular systole?

A collagen fibres and elastin fibres

B collagen fibres and smooth muscle

C elastin fibres and endothelium

D endothelium and smooth muscle

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30 Haemoglobin can bind to carbon dioxide, carbon monoxide and oxygen.

Which statement about the binding sites of haemoglobin is correct?

A Carbon dioxide and carbon monoxide bind to one site, oxygen binds to a different site.

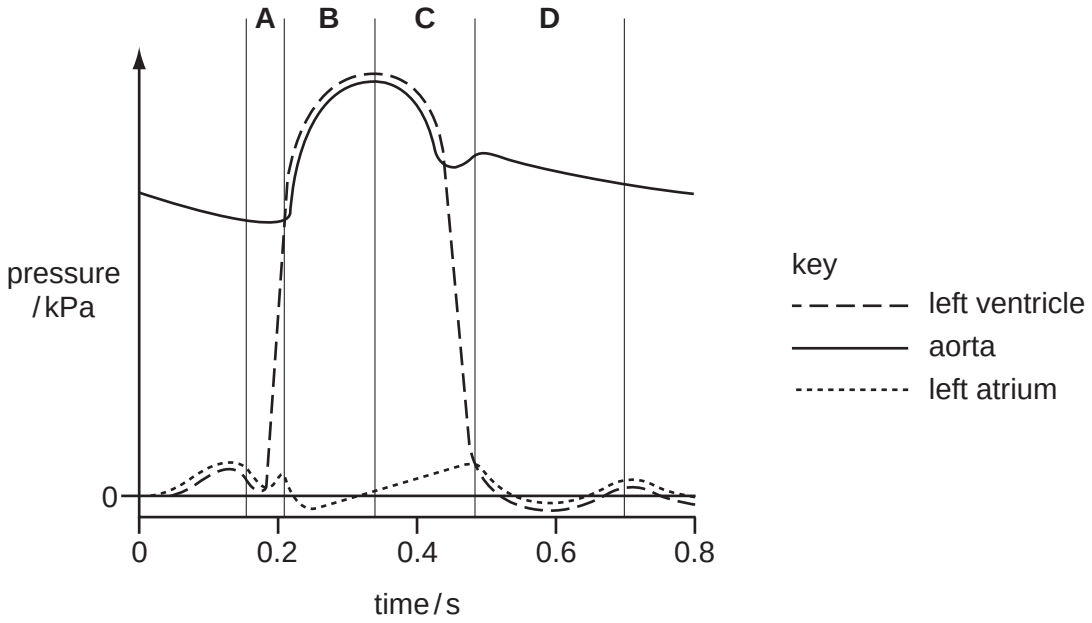
B Carbon dioxide and oxygen bind to one site, carbon monoxide binds to a different site.

C Carbon monoxide and oxygen bind to one site, carbon dioxide binds to a different site.

D Carbon monoxide, oxygen and carbon dioxide all bind to different sites.

31 The diagram shows the pressure changes in various structures of the left side of the heart during the cardiac cycle.

At the end of which period, **A**, **B**, **C** or **D**, is the ventricle full of blood?



32 Which substances will displace oxygen from oxyhaemoglobin?

1 carbon dioxide

2 carbon monoxide

3 hydrogen carbonate ions

4 hydrogen ions

A 1 and 2 only **B** 1 and 4 only **C** 2 and 3 only **D** 2 and 4 only

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33 Which statement about chronic obstructive pulmonary disease is **not** correct?

A The disease can often be reversed by treatment.

B The patient coughs a lot, bringing up mucus.

C The patients are normally over 30 years old.

D The patient's symptoms normally do not change.

34 Which statement about coronary by-pass surgery is correct?

A It is carried out to reduce the effects of atherosclerosis, improving the delivery of oxygen and dissolved glucose to the cardiac muscle of the heart.

B It is the surgical removal of one or more coronary arteries to reduce the strain on the heart of a person with coronary heart disease.

C Surgeons are able to divert blood around the diseased sections of the coronary arteries so that more oxygenated blood can be pumped round the systemic circulation.

D The diseased parts of the aorta are replaced by using a section of a main artery from elsewhere in the body of the same person, to avoid rejection.

35 How does smoking increase the risk of developing atherosclerosis?

A by damaging artery walls

B by decreasing blood pressure

C by increasing the risk of blood clotting

D by reducing the oxygen supply to cardiac muscle

36 Which development in vaccine production would be most important in the fight to eradicate measles in **developing** countries?

A a combined vaccine to combat it and other diseases

B a single vaccine, without the need for boosters

C a vaccine containing only live measles viruses

D a vaccine produced by genetic engineering techniques

37 What could cause an outbreak of malaria in a country where it had been eliminated?

1 mosquitoes became resistant to insecticides

2 migration of population due to war

3 malarial parasites became resistant to quinine

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

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38 Termites are insects that build large nests that contain millions of termites of the same species.

These nests are common in tropical savanna, which typically consists of grasses with widely spaced trees. Here, the termites feed on wood and other dead plant material.

Which statement is correct?

A The termites in the nest form a community, the savanna is the ecosystem and they feed as decomposers.

B The termites in the nest form a community, the savanna is the ecosystem and they feed as primary consumers.

C The termites in the nest form a population, the savanna is both the ecosystem and the habitat and they feed as primary consumers.

D The termites in the nest form a population, the savanna is their habitat and they feed as decomposers.

39 During the nitrogen cycle, microorganisms are involved in nitrogen fixation, nitrification and denitrification.

What are the correct soil conditions for each process?

	nitrogen fixation	nitrification	denitrification
A	aerobic	aerobic	anaerobic
B	aerobic	anaerobic	aerobic
C	anaerobic	anaerobic	aerobic
D	anaerobic	aerobic	anaerobic

40 Which processes are essential in making nitrogen in dead plant material available to growing plants?

1 ammonification

2 deamination

3 nitrification

4 nitrogen fixation

A 1, 2 and 3 only **B** 1, 2 and 4 only **C** 1, 3 and 4 only **D** 2, 3 and 4 only

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