Cambridge International AS & A Level

**Cambridge International Examinations**
Cambridge International Advanced Subsidiary and Advanced Level

**BIOLOGY** **9700/11**

Paper 1 Multiple Choice **October/November 2017**

**1 hour**

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

*5026880790*

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.
Do not use staples, paper clips, 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.


© UCLES 2017

**1** Which row is correct for a typical plant cell?

| | cell wall | cell diameter | ribosomes |
|---|---|---|---|
| **A** | cellulose | 1-5 µm | 80S |
| **B** | cellulose | 5-40 µm | 70S and 80S |
| **C** | peptidoglycan | 1-5 µm | 70S |
| **D** | peptidoglycan | 5-40 µm | 70S and 80S |

**2** An electron micrograph of a cell shows large quantities of rough endoplasmic reticulum and many Golgi bodies.

What type of cell is being viewed?

**A** bacterium

**B** guard cell

**C** lymphocyte

**D** mesophyll

**3** Which cell structures can form vesicles?

| | cell structure | | |
|---|---|---|---|
| | cell surface membrane | endoplasmic reticulum | Golgi body |
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✓ | ✗ | ✓ |
| **D** | ✗ | ✓ | ✓ |

key

✓ = can form vesicles

✗ = cannot form vesicles

**4** Which set of measurements is correct?

| | diameter of capillary | diameter of red blood cell | thickness of cell surface membrane of red blood cell |
|---|---|---|---|
| **A** | 7 µm | 7 µm | 7 nm |
| **B** | 7 µm | 7 nm | 7 nm |
| **C** | 0.7 mm | 7 µm | 7 nm |
| **D** | 0.7 mm | 0.7 mm | 7 µm |

© UCLES 2017

**5** The size of the measles virus is approximately 150 nm.

The *Mimivirus* is approximately 4.5 times larger than the measles virus, whilst the *Pandoravirus* is approximately 1.5 times larger than the *Mimivirus*.

Which viruses can be seen using **both** a light microscope with a maximum resolution of 0.25 µm **and** an electron microscope?

| | measles virus | *Mimivirus* | *Pandoravirus* |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✗ | ✓ | ✓ |
| **C** | ✗ | ✗ | ✓ |
| **D** | ✗ | ✗ | ✗ |

key
✓ = can be seen
✗ = cannot be seen

**6** Which carbohydrate gives a brick red colour when boiled with Benedict's solution?

**A** cellulose

**B** fructose

**C** glycogen

**D** sucrose

**7** Which two polysaccharides both have 1,6 glycosidic bonds **and** are branched?

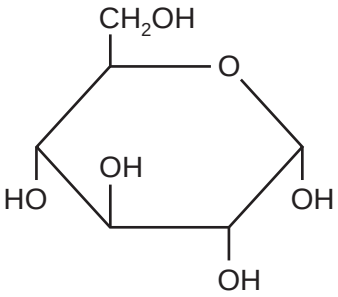
**A** amylopectin and amylose

**B** amylopectin and glycogen

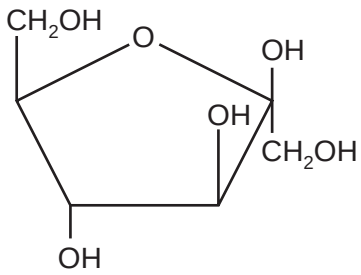
**C** amylose and glycogen

**D** glycogen and cellulose

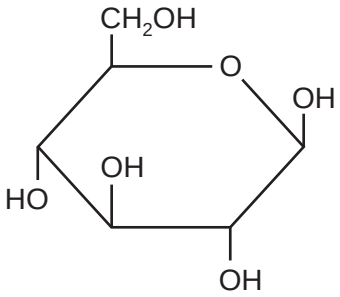
**8** Three carbohydrate molecules are shown.




1




2



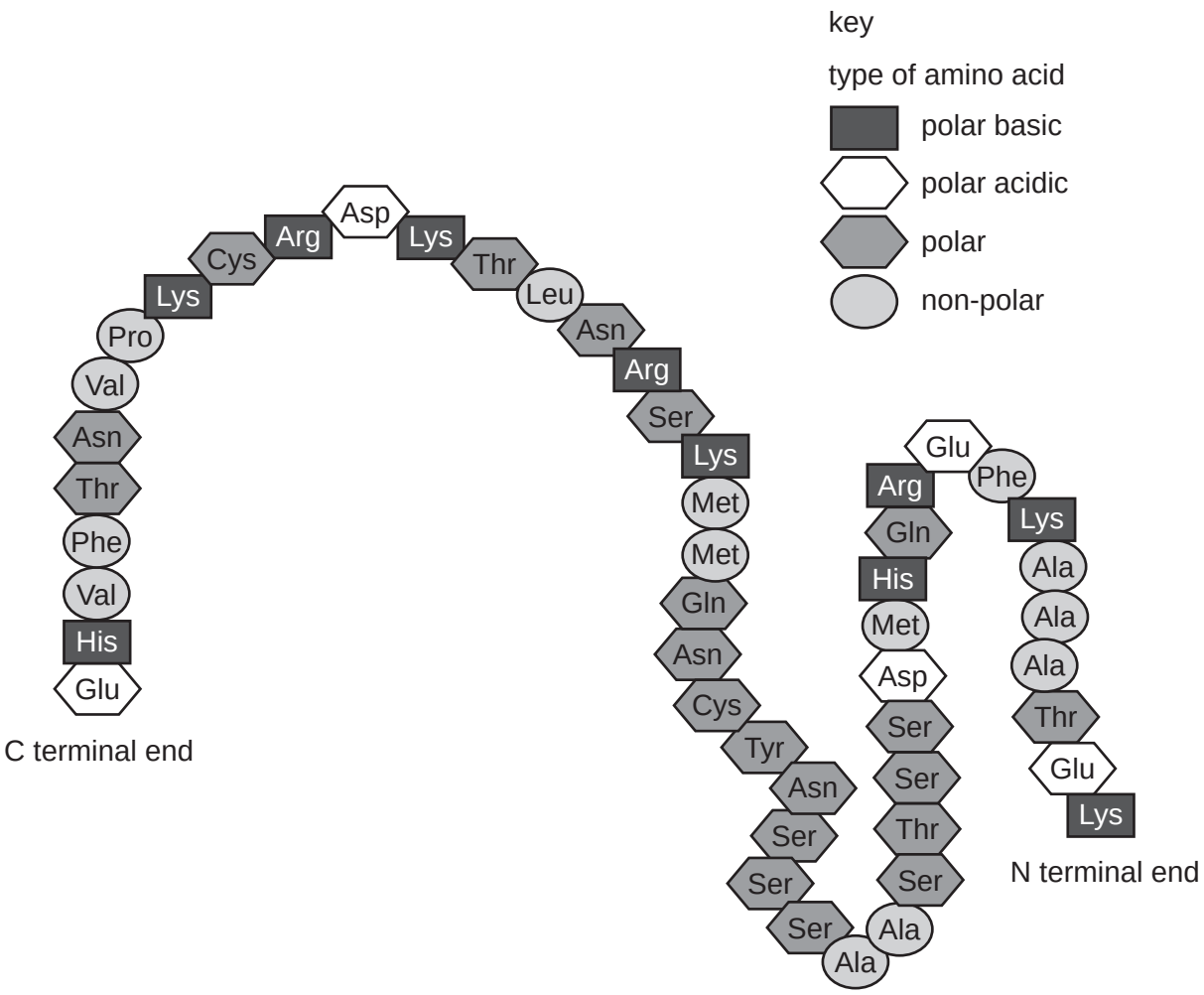

3

Which two molecules combine to form a molecule of sucrose?

**A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** two of molecule 1

© UCLES 2017

**9** The diagram shows the amino acids in a polypeptide.




An enzyme catalyses the hydrolysis of bonds between polar basic amino acids and non-polar amino acids.

How many peptides (chains of amino acids) will be formed as the result of the hydrolysis of this polypeptide?

**A** 5 **B** 6 **C** 8 **D** 13

**10** Lysozyme is an enzyme found in tears and saliva.

Which statement refers only to the tertiary structure of lysozyme?

**A** A section of the molecule consists of an $\alpha$-helix.

**B** It consists of a single polypeptide.

**C** It is 129 amino acids long.

**D** The 35th and 52nd amino acids help form the active site.

© UCLES 2017

**11** Some RNA molecules, called ribozymes, can catalyse reactions in a similar way to protein enzymes.

Most of these ribozymes have other RNA molecules as their substrates and catalyse reactions that break specific sugar phosphate bonds in the substrate molecules.

Which statements about these ribozymes are correct?

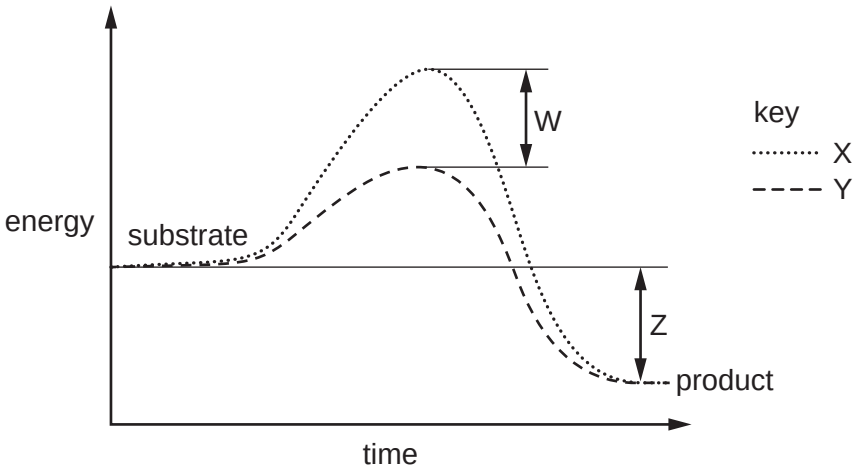
1 Hydrogen, ionic and disulfide bonds will be involved in the ribozyme structure.

2 The active site of a ribozyme is formed from a specific sequence of nucleotides.

3 Ribozymes can form because RNA can have a specific secondary and tertiary structure.

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

**12** The graph shows the effect of an enzyme on a reaction.




Which labels are correct?

**A** X is the reaction without the enzyme, W is the activation energy.

**B** X is the reaction with the enzyme, Z is the overall energy change.

**C** Y is the reaction with the enzyme, W is the difference in activation energy.

**D** Z is the energy gained by the product, W is the activation energy with the enzyme.

© UCLES 2017

**13** Which statements about non-competitive enzyme inhibitors are correct?

1 The inhibitor can bind to the enzyme whether or not the enzyme has its substrate bound in the active site.

2 The inhibitor may bind at an allosteric site.

3 The inhibitor may not prevent substrate binding at the active site, but will prevent product formation.

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

**14** The following are all processes that allow movement into cells.

1 phagocytosis

2 active transport

3 facilitated diffusion

Which processes require ATP?

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

**15** The fluidity of the cell surface membrane can be changed by a number of factors.

As the fluidity of cell surface membranes decreases, which process would be **least** affected?

**A** active transport

**B** diffusion

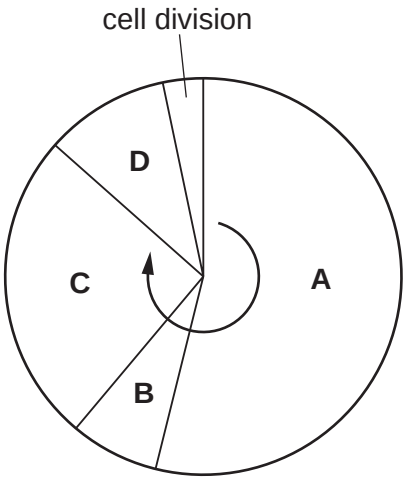
**C** endocytosis

**D** osmosis

© UCLES 2017

**16** The diagram shows the cell cycle.

During which phase do chromosomes condense and become visible?




**17** Colchicine is a chemical that stops chromatids from separating during mitosis.

A cell is treated with colchicine.

Which stage of mitosis will this cell reach but not complete?

**A** anaphase

**B** metaphase

**C** prophase

**D** telophase

**18** The following statements describe the process of translation.

1 A peptide bond forms between adjacent amino acids.

2 Hydrogen bonds form between the anticodon and the codon.

3 mRNA binds to the ribosome.

4 tRNA enters the ribosome carrying a specific amino acid.

In which order does this process take place?

**A** $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

**B** $3 \rightarrow 4 \rightarrow 2 \rightarrow 1$

**C** $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

**D** $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

© UCLES 2017

**19** Which row represents the correct features of the nitrogenous base adenine?

| | has a single ring structure | is a purine | joins its complementary base by three hydrogen bonds | pairs with thymine |
|---|---|---|---|---|
| **A** | ✓ | ✓ | ✗ | ✗ |
| **B** | ✓ | ✗ | ✓ | ✗ |
| **C** | ✗ | ✓ | ✗ | ✓ |
| **D** | ✗ | ✗ | ✗ | ✓ |

key
✓ = true
✗ = false

**20** The codons UGU and UGC code for the amino acid cysteine, which can form disulfide bonds in a polypeptide.

The codon UGG codes for the amino acid tryptophan, which does not contain a sulfur atom.

The codon UGA is a stop signal.

The DNA triplet code for the 10th amino acid in a particular polypeptide is ACA.

Which single base substitutions in this triplet code will result in **no** disulfide bond being formed with the 10th amino acid in the polypeptide?

**A** ACC and ACG

**B** ACG and ACT

**C** ACT and ACC

**D** ACT only

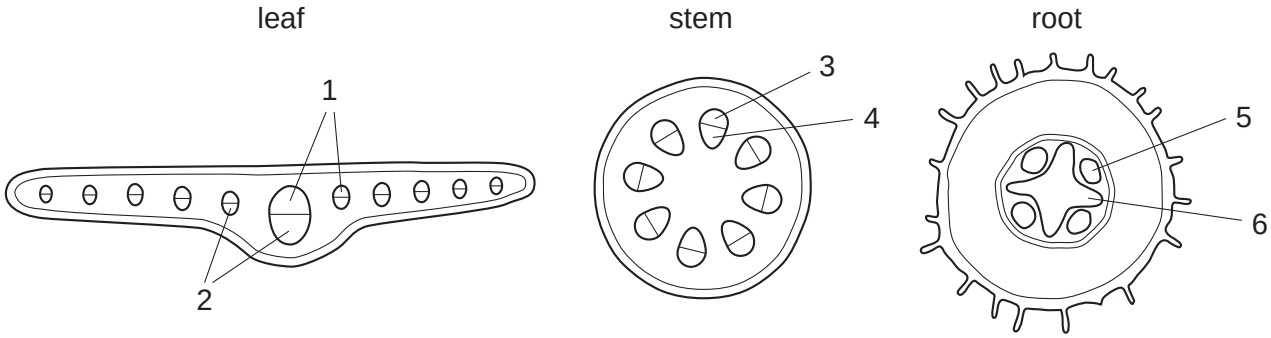
**21** A student produced a table of differences between RNA and DNA. The table contains one mistake.

Which row has the mistake?

| | RNA | DNA |
|---|---|---|
| **A** | contains ribose | contains deoxyribose |
| **B** | contains uracil | contains thymine |
| **C** | found throughout cell | found only in nucleus |
| **D** | single polynucleotide per molecule | two polynucleotides per molecule |

© UCLES 2017

**22** The diagrams show transverse sections of parts of a plant with some transport tissues labelled 1–6.




Which tissues mainly transport water and which tissues mainly transport sucrose?

**A** 1 water 5 — 4 sucrose 6

**B** 2 water 3 — 4 sucrose 5

**C** 3 water 5 — 2 sucrose 6

**D** 1 water 6 — 2 sucrose 3

**23** Transpiration is the consequence of which feature of plants?

**A** the presence of symplast and apoplast pathways

**B** the requirement for a transport system in plants

**C** the requirement for leaves to exchange gases

**D** the thin waxy cuticle on the lower epidermis of leaves

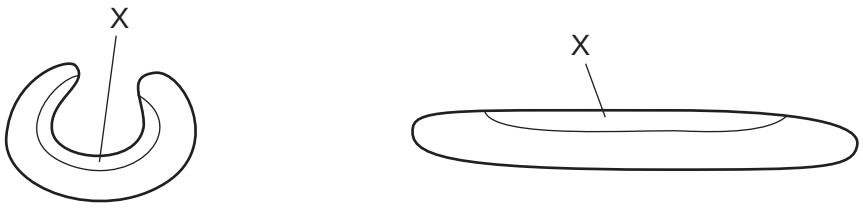
**24** Mass flow is the bulk movement of materials from one place to another.

How many of the vessels listed carry fluids by mass flow?

- artery
- phloem sieve tube
- vein
- xylem vessel

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

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




P Q

Which statements describe the difference between the cells in layer X in conditions P and Q?

1 more negative water potential in P than Q

2 more cells plasmolysed in P

3 cells less turgid in Q

4 water potential becomes zero in Q

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

© UCLES 2017

**26** What could increase the rate of transpiration?

**A** increasing the humidity

**B** increasing the light intensity

**C** decreasing the temperature

**D** decreasing the wind speed

**27** What happens during ventricular systole in a mammalian heart?

**A** aortic pressure increases

**B** atrioventricular valves open

**C** semilunar valves close

**D** ventricular pressure decreases

**28** Which substances could displace oxygen from oxyhaemoglobin?

1 carbon dioxide

2 carbon monoxide

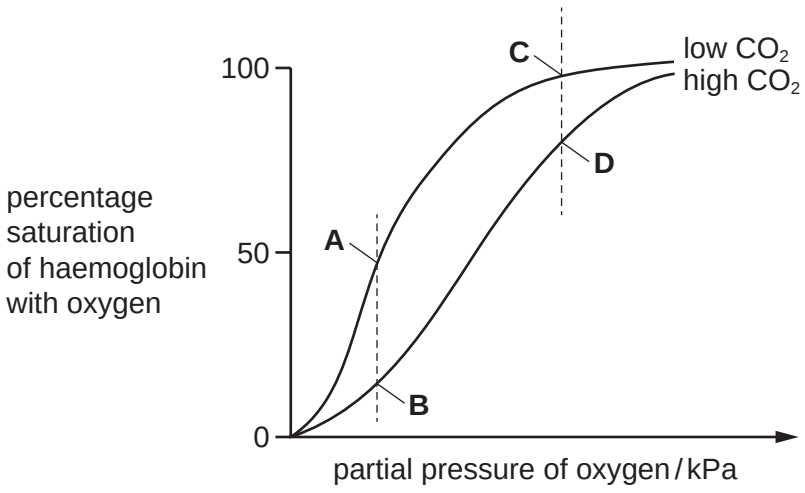
3 hydrogencarbonate ions

4 hydrogen ions

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

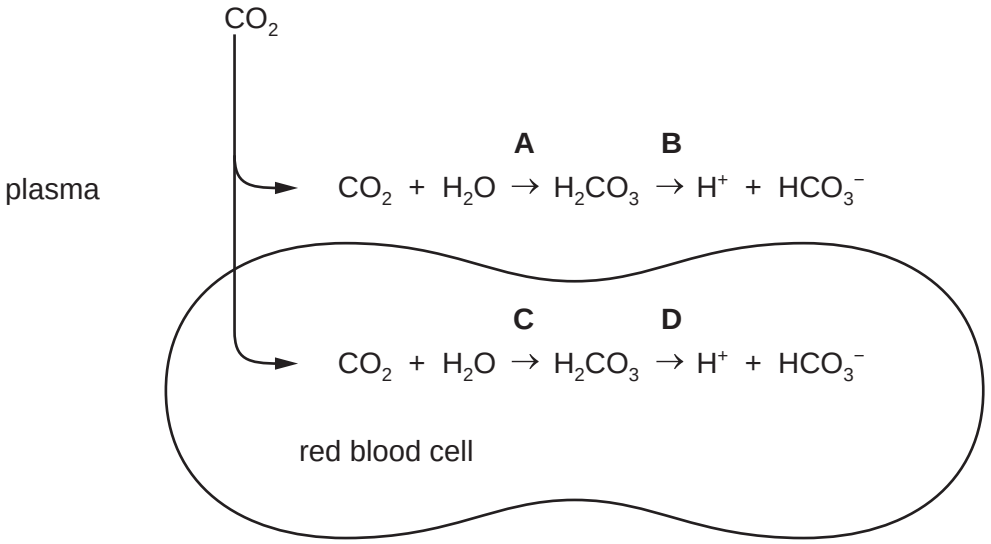
**29** The graph shows the affinity of haemoglobin for oxygen at two different concentrations of carbon dioxide.

Which point on the graph shows the percentage saturation of haemoglobin entering the pulmonary artery?



**30** The diagram shows some of the reactions of carbon dioxide when it enters the blood from cells in a metabolically active tissue.

Which reaction is catalysed by the enzyme carbonic anhydrase?




**31** How many phospholipid bilayers does oxygen pass through in diffusing from an alveolar air space to form oxyhaemoglobin in a red blood cell in a mammalian lung?

**A** 3 **B** 5 **C** 6 **D** 9

**32** Which statements about the human gas exchange system are correct?

1 The absence of cartilage in small bronchioles allows them to expand.

2 The walls of the alveoli are made of cuboidal epithelium.

3 Alveoli secrete surfactant which reduces surface tension in the lungs.

4 The trachea and bronchi are supported by circles of cartilage.

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

**33** A disease damages alveoli walls, causing the alveoli to burst.

What effect does this have on the gas exchange system?

| | surface area for gas exchange | maximum volume of air breathed out |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | decreases | no change |
| **D** | no change | no change |

© UCLES 2017

**34** What are short-term effects of nicotine on the cardiovascular system?

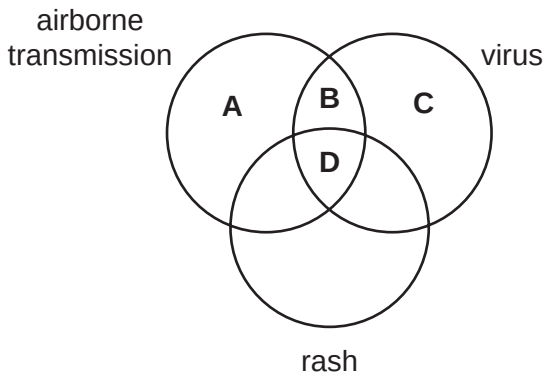
1 constriction of small arteries

2 increase in heart rate

3 increase in blood pressure

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

**35** What is correct for tuberculosis (TB)?




**36** Which factors contribute to outbreaks of measles after natural disasters?

1 contamination of drinking water with untreated sewage

2 lack of effective vaccination coverage in the population before the disaster

3 people living in overcrowded accommodation

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

**37** Which of these statements explain why some vaccines can be taken by mouth but tuberculosis (TB) vaccine has to be injected?

1 Macrophages present antigens in vaccines to stimulate an immune response.

2 The TB antigens necessary to produce an immune response are proteins which would be digested in the stomach and small intestine.

3 There are no B-lymphocytes and T-lymphocytes in the stomach.

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

© UCLES 2017

**38** Which method of gaining immunity can be described as natural active immunity?

**A** feeding on colostrum

**B** inhaling the chicken pox virus

**C** injection with antibodies

**D** through the placenta

**39** Which statements about endocytosis are correct?

1 It is part of phagocytosis.

2 It is a passive process.

3 Materials are taken into the cell.

4 Vesicles form within the cytoplasm.

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

**40** The statements refer to vaccination programmes for each of the diseases cholera, measles, smallpox and tuberculosis (TB).

Which statement is correct for TB?

**A** Most children are vaccinated before their first birthday.

**B** The pathogen has not mutated or changed its antigens.

**C** The pathogen lives in the intestine where antibodies cannot get to it.

**D** The vaccine is not effective against some strains of the pathogen.

© UCLES 2017

**BLANK PAGE**

**BLANK PAGE**

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.