



ADVANCED SUBSIDIARY GCE
HUMAN BIOLOGY
 Growth, Development and Disease

F222/TEST

Tuesday 8 June 2010
Morning

Duration: 1 hour 45 minutes

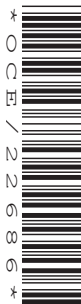
Candidates answer on the Question Paper

OCR Supplied Materials:

- Advance Notice (inserted)

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- This document consists of **24** pages. Any blank pages are indicated.

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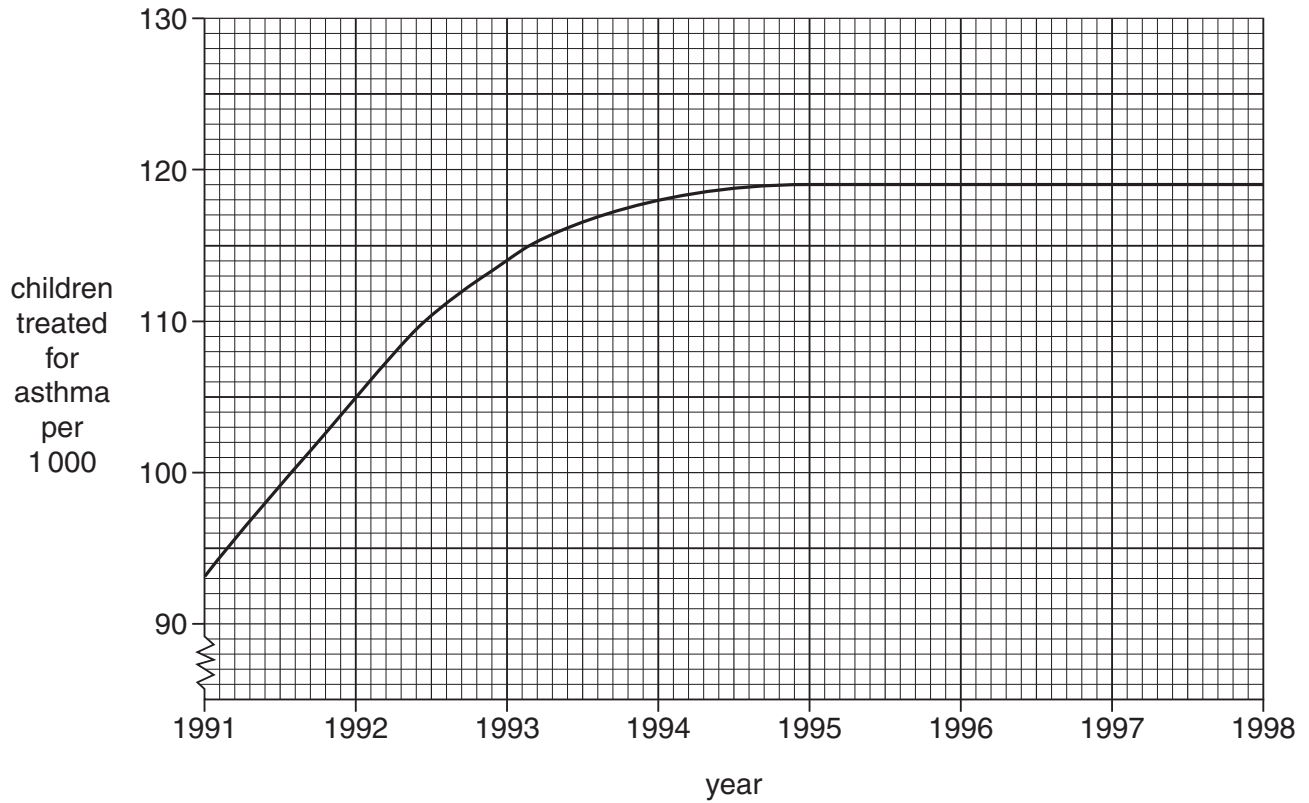


Fig. 1.1

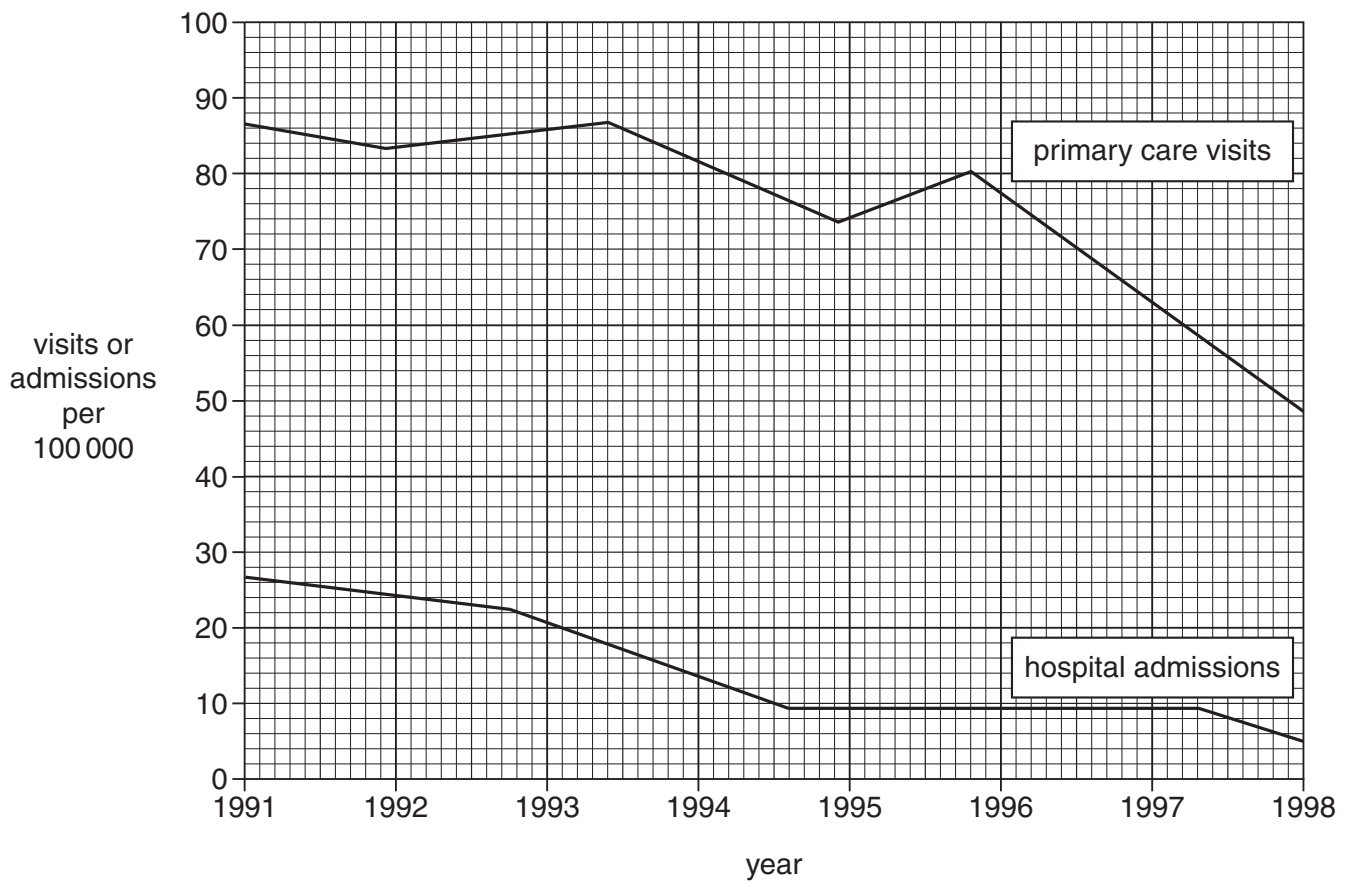


Fig. 1.2

- (e) In Case Study 1, the nurse suggests that there are several reasons for using a 'spacer' to administer an inhaler.

Suggest a reason, **other than ease of use**, why a spacer may be used with an inhaler to deliver asthma medication.

.....
.....
..... [1]

- (f) It is possible to link variations in genes to variations in the way individuals respond to drugs.

The drug albuterol is a bronchodilator. Albuterol binds to a receptor molecule. All individuals have two copies of the gene that codes for the albuterol receptor molecule.

- (i) Explain why all individuals have two copies of the receptor gene.

.....
.....
..... [1]

- (ii) There are two forms (alleles) of the gene which codes for the albuterol receptor molecule. One allele is represented as **A** and the other as **a**.

Studies suggest that albuterol is less effective in people who have the alleles **AA** than in people who have the alleles **Aa** or **aa**.

From the outcome of these studies, suggest **one** advantage of genetically screening populations.

.....
.....
..... [1]

[Total: 19]

7
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QUESTION 2 BEGINS ON PAGE 8

- 2 This question is based on the case study 'APOPTOSIS – WHAT WE LEARNED FROM THE WORMS' (Case Study 2).

Fig. 2.1 shows a simplified diagram of the development of *Caenorhabditis elegans* from a single fertilised egg cell to the mature adult worm. The diagram is labelled to show the position of some of the organs in the adult *C. elegans*.

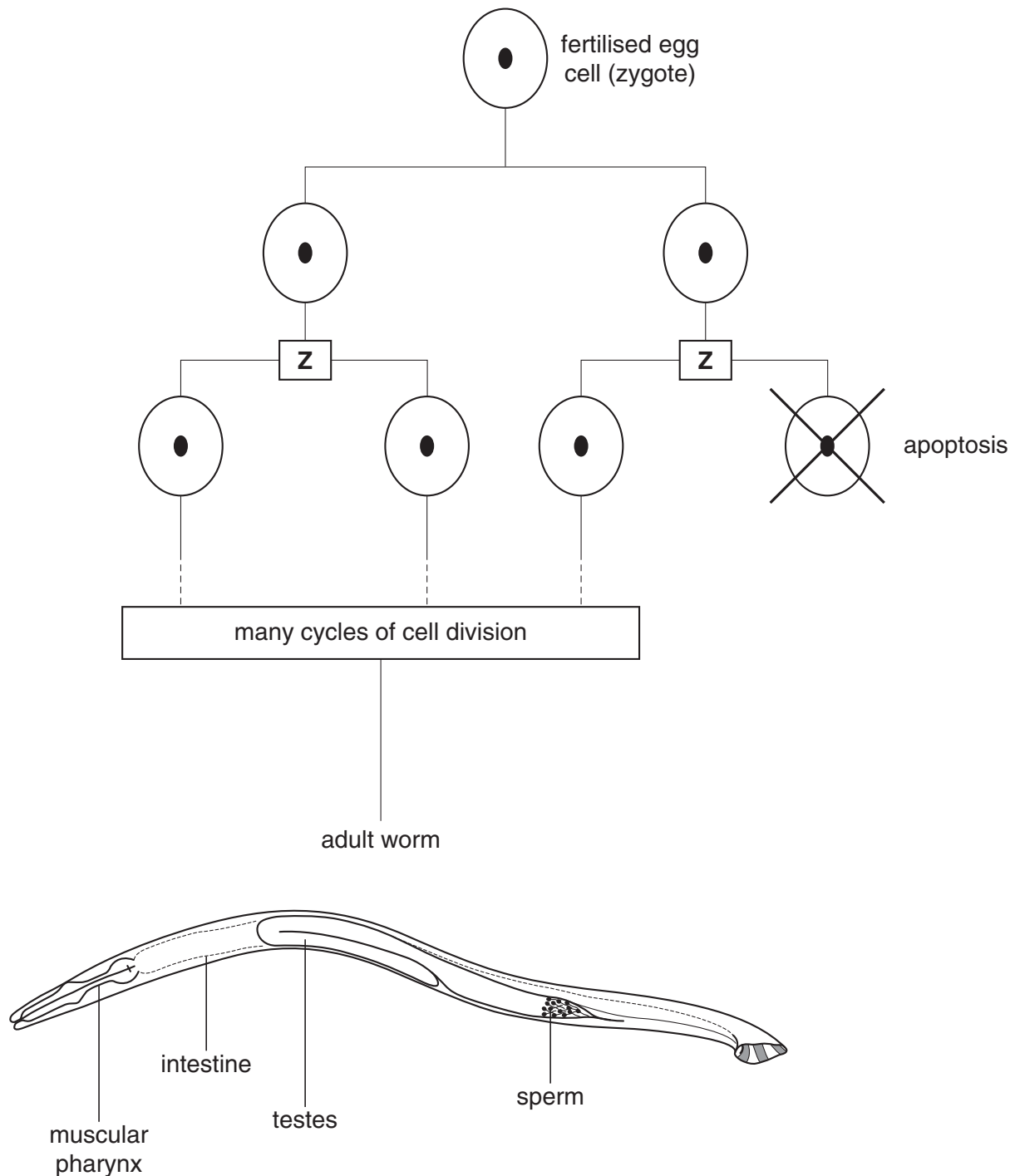


Fig. 2.1

(a) (i) State the type of cell division that occurs at the points marked **Z** on Fig. 2.1.

..... [1]

(ii) Distinguish between an **organ** and a **tissue**. Use examples from Fig. 2.1 in your answer.

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..... [3]

(b) In Case Study 2, you were told that John Sulston studied cells undergoing apoptosis.

Describe the changes that occur in cells during apoptosis.

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.....
..... [4]

(c) Suggest what happens to the remains of a cell that has undergone apoptosis.

.....
..... [1]

- (d) Suggest **two** advantages of choosing *C. elegans* as a model to study the development of an organism. Give reasons for your suggestions.

Advantage 1

Reason 1

.....

Advantage 2

Reason 2

..... [4]

- (e) You were told in the case study that apoptosis is responsible for some of the changes that occur during fetal development.

Describe how ultrasound is used to monitor human fetal development.

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..... [4]

- (f) In the case study, you are told that inactivation of the p53 protein by some forms of the Human Papilloma Virus (HPV) is responsible for the development of cervical cancer. p53 protein **prevents cells dividing** by stopping the cell cycle at G1.

What is the name given to **genes** such as the gene that codes for p53 protein?

..... [1]

[Total: 18]

- 3 Table 3.1 shows the Dietary Reference Values (DRV) for several nutrients for women between 19 and 50 years of age. It also shows how these values change during pregnancy.

Table 3.1

	protein (g day ⁻¹)	iron (mg day ⁻¹)	vitamin A (µg day ⁻¹)	vitamin C (µg day ⁻¹)	folic acid (µg day ⁻¹)
female aged 19 – 50 years	45	15	600	40	400
pregnant female aged 19 – 50 years	51	15	610	40	600

- (a) Using the information in Table 3.1, calculate the percentage increase in the recommended DRV for folic acid during pregnancy.

Show your working.

Answer = % [2]

- (b) Explain why women are advised to increase their intake of the following nutrients during pregnancy:

(i) folic acid;

.....

 [2]

(ii) protein;

.....

 [2]

(iii) vitamin A.

.....

 [2]

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..... [9]

[Total: 19]

QUESTION 4 STARTS ON PAGE 15

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- 4 Fig. 4.1 shows a poster produced by a student. The poster contains information about the specific and non-specific immune responses. Unfortunately, the poster contains mistakes.

In each box, underline the word that is incorrect and write the **correct** word on the answer line provided. The first one has been done for you.

The non-specific immune response ..	The specific immune response ..
includes barriers such as <u>lactic acid</u> in the stomach. hydrochloric acid	involves antigens released into the blood plasma.
involves enzymes that digest bacterial cell walls, such as lysosome, which is found in tears. 	is stimulated by pathogens or by vaccines (passive immunity).
uses phagocytic cells, such as thrombocytes, which engulf pathogens. 	uses cells, such as T-cells, which are processed in the thyroid gland.
also involves mast cells, which produce anti-histamine. 	also uses B-leucocytes, which are processed in the bone marrow.

Fig. 4.1

[7]

[Total: 7]

5 There has been a global rise in the number of people diagnosed with type 2 diabetes.

(a) Explain what is meant by *type 2 diabetes*.

.....

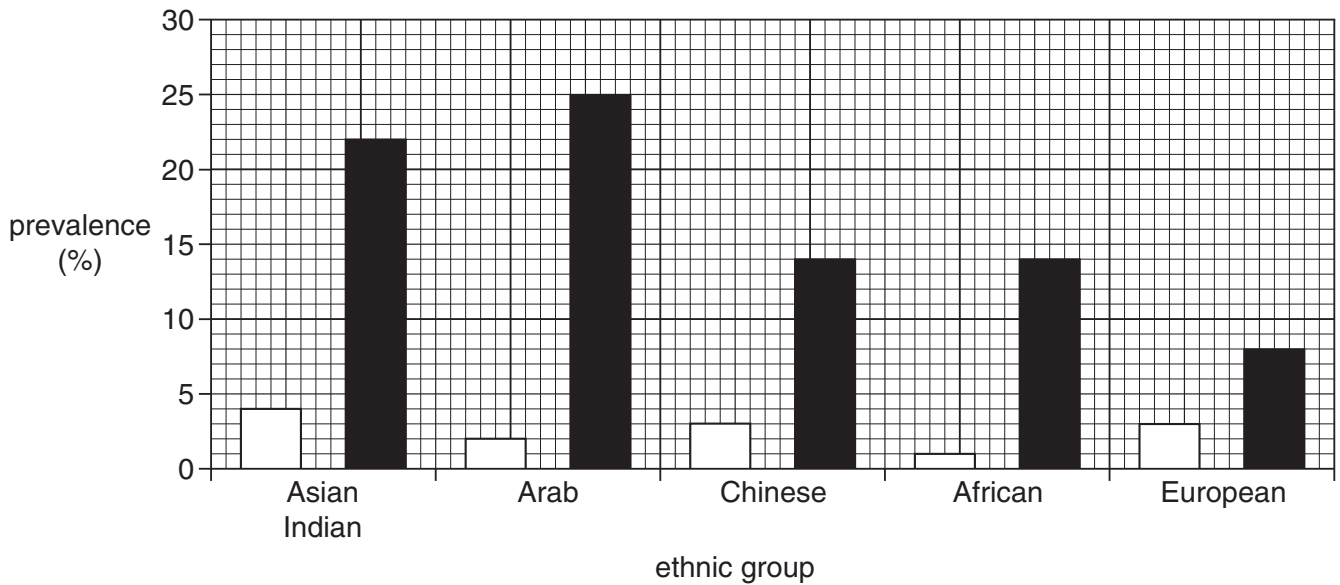
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..... [2]

Fig. 5.1 shows the prevalence of type 2 diabetes in different ethnic groups. For each ethnic group, data are shown for populations living in economically developed regions and in economically less developed regions.



Key:

- population living in economically less developed region
- population living in economically developed region

Fig. 5.1

6 Fig. 6.1 is a diagram of the HIV virus.

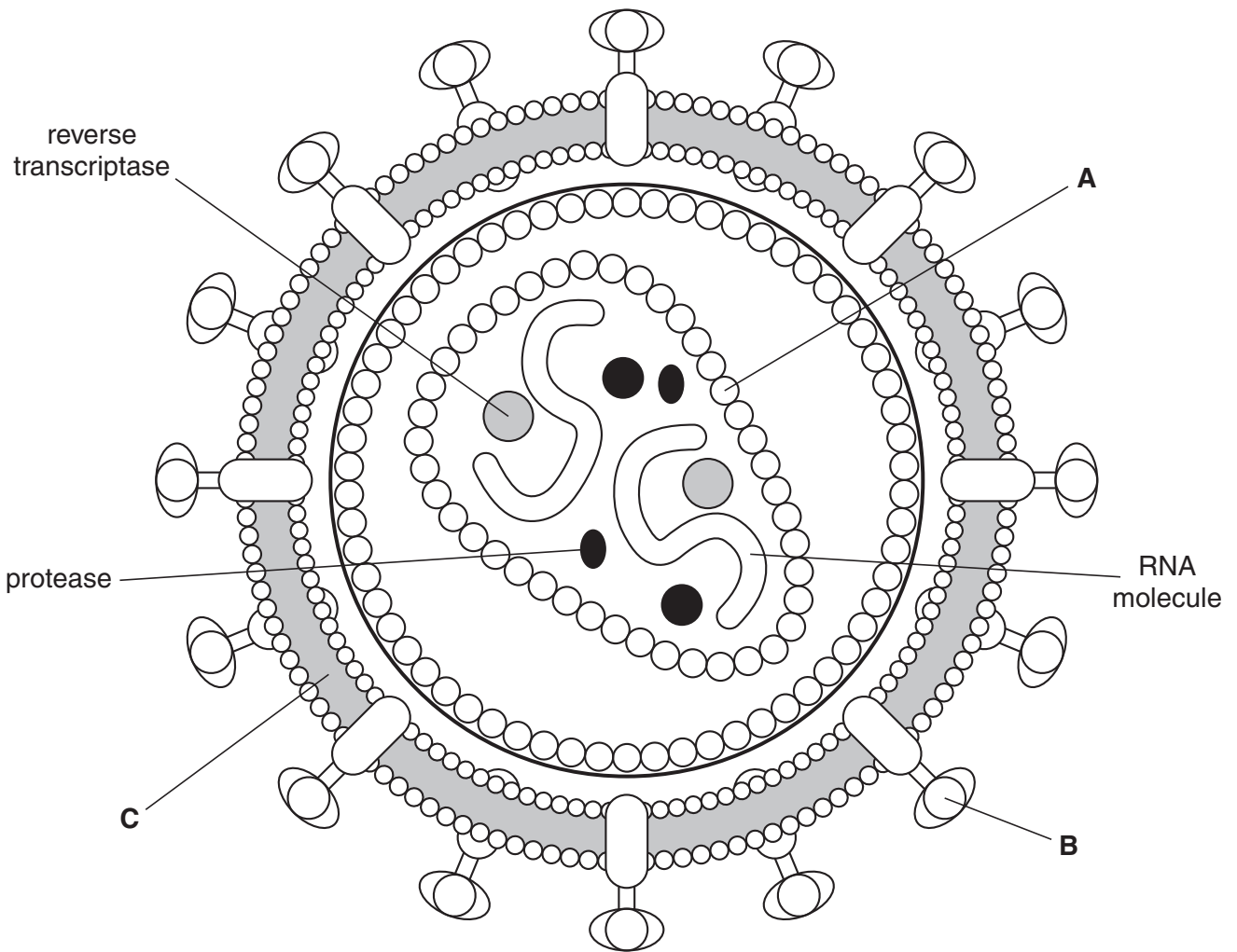


Fig. 6.1

(a) Identify the structures labelled **A**, **B** and **C** in Fig. 6.1.

A

B

C [3]

(b) Name **two** features **visible in Fig. 6.1** that identify HIV as a **retrovirus**.

1

2 [2]

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