Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

ADVANCED SUBSIDIARY GCE

F222/TEST

HUMAN BIOLOGY

Growth, Development and Disease

TUESDAY 8 JUNE 2010: Morning
DURATION: 1 hour 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

OCR SUPPLIED MATERIALS:

Advance Notice (inserted)

OTHER MATERIALS REQUIRED:

Electronic calculator
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (CW/SW) MEP60425 30595/3

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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.**

Answer ALL the questions.

1 This question is based on the case study 'ASTHMA ON A SCHOOL TRIP' (Case Study 1).

As part of the asthma policy in a school, teachers are informed of the symptoms that indicate that a student is having an asthma attack.

(a) Give THREE symptoms that could indicate that a student is having an asthma attack.

_____

_____

_____

_____

_____

_____ **[3]**

(b) In Case Study 1 you are told that a PEAK FLOW METER had been used to assess Faisal's asthma.

State TWO measurements that could be taken using a peak flow meter.

1 _____

2 _____ **[2]**

(c) Fig. 1.1, on the A3 sheet, shows the change in the numbers of children treated for asthma (per 1000) between 1991 and 1998.

Fig. 1.2, on the A3 sheet, shows the change in the numbers of primary care visits, such as visits to GPs, and hospital admissions for the SAME GROUP OF CHILDREN over the same period.

Explain why the TREATMENT given to children for asthma is known to be effective. In your answer you should use information from Fig. 1.1 and Fig. 1.2.

_____

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_____ **[4]**

(d) In Case Study 1, you are told that Faisal uses a 'reliever' and a 'preventer'. Relievers are usually a class of drugs called <u>BETA AGONISTS</u> which act as bronchodilators. Preventers are normally <u>CORTICOSTEROIDS</u> (steroids).

Complete the following passage, which explains the role of bronchodilators and corticosteroids in an asthma attack.

An asthma attack can be triggered by exposure to pollen, house mites or other substances, which are known as _____ . In the walls of airways such as the _____ , the _____ muscle contracts and the lumen is _____ . The lining of the airways can also become swollen and excess production of _____ can occur. Beta agonists bind to receptors on the muscle cell _____ and cause the muscle to relax and the lumen of the airway dilates. Corticosteroids act to _____ inflammation.

[7]

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

Suggest a reason, <u>OTHER THAN EASE OF USE</u>, 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.

<u>FROM THE OUTCOME OF THESE STUDIES</u>, suggest <u>ONE</u> advantage of genetically screening populations.

_____

_____

_____ **[1]**

[Total: 19]

2 This question is based on the case study '<u>APOPTOSIS – WHAT WE LEARNED FROM THE WORMS</u>' (<u>CASE STUDY 2</u>).

Fig. 2.1, opposite, 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*.

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

_____ **[1]**

(ii) Distinguish between an <u>ORGAN</u> and a <u>TISSUE</u>. Use examples from Fig. 2.1 in your answer.

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_____

_____

_____ **[3]**

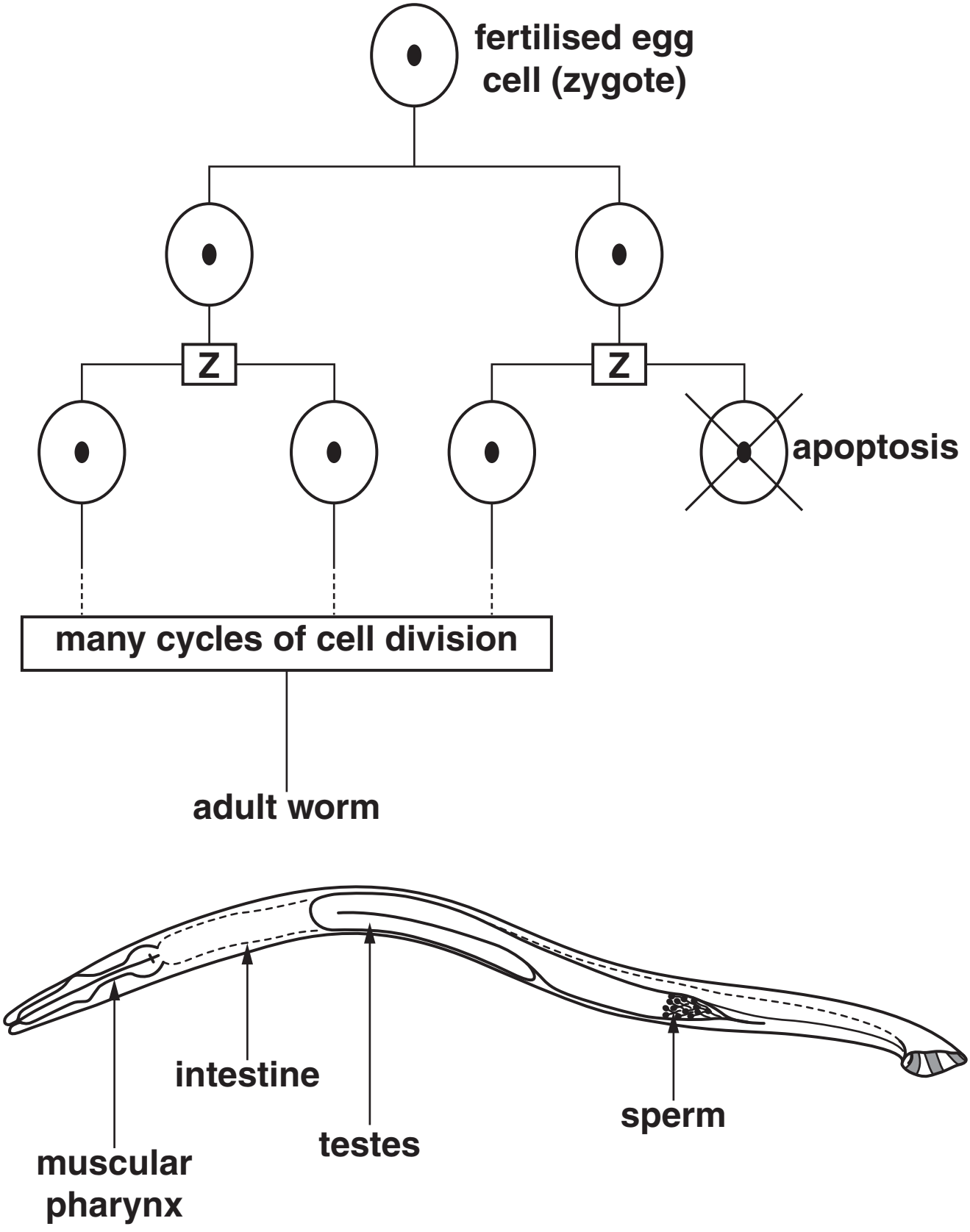
fertilised egg cell (zygote)
Z
Z
apoptosis
many cycles of cell division
adult worm
intestine
testes
sperm
muscular pharynx

Fig. 2.1

(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]**

QUESTION 2(e) STARTS ON PAGE 12

(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 <u>PREVENTS CELLS DIVIDING</u> by stopping the cell cycle at G1.

What is the name given to <u>GENES</u> 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]**

(c) Suggest why it is <u>NOT USUALLY</u> necessary to increase the recommended DRV for iron during pregnancy.

_____

_____

_____

_____ **[2]**

QUESTION 3(d) STARTS ON PAGE 16

(d) Women are advised to give up alcohol and to stop smoking during pregnancy.

Describe AND explain the possible effects on the fetus of a mother drinking alcohol AND smoking during pregnancy.

In your answer you should explain the effects of both drinking alcohol and smoking.

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_____ **[9]**

[Total: 19]

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, <u>underline</u> the word that is incorrect and write the <u>CORRECT</u> 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*.

_____

_____

_____

_____

_____ **[2]**

QUESTION 5(b)(i) STARTS ON PAGE 20

Fig. 5.1, opposite, 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.

(b) (i) <u>DESCRIBE</u> the effect of economic development on the prevalence of type 2 diabetes in a population. You should use information from Fig. 5.1 in your answer.

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_____ **[4]**

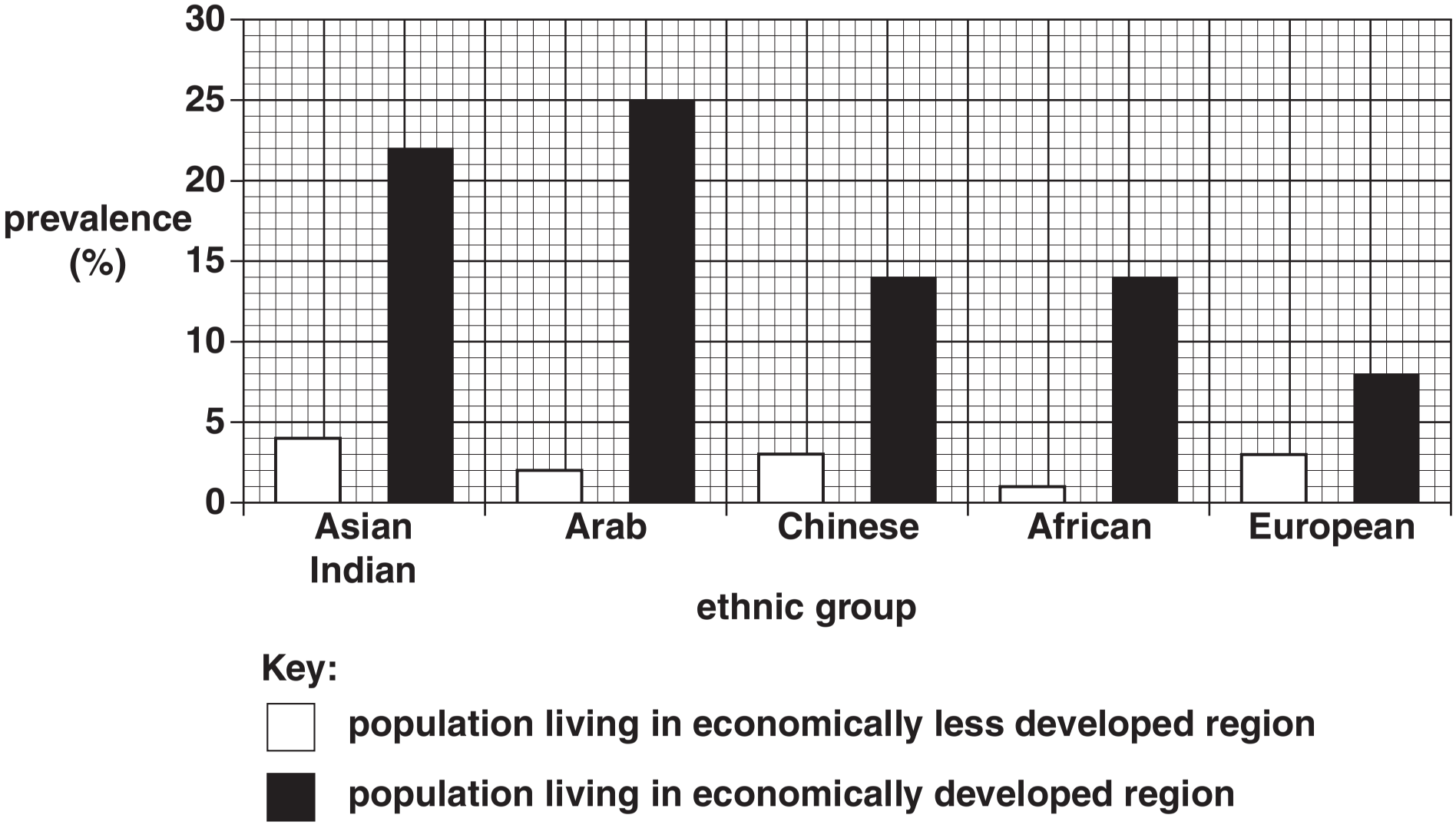
30
25
20
15
10
5
0
prevalence (%)
Asian Indian
Arab
Chinese
African
European
ethnic group
Key:
population living in economically less developed region
population living in economically developed region

Fig. 5.1

(ii) Suggest <u>REASONS</u> for the changes you have described in (i).

_____

_____

_____

_____

_____

_____

_____

_____ **[4]**

(c) Suggest how information about the prevalence of type 2 diabetes in ethnic populations could be used by health professionals in planning resources for the <u>FUTURE</u> management of type 2 diabetes.

_____

_____

_____

_____

_____

_____ **[3]**

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QUESTION 5(d) STARTS ON PAGE 24

(d) People with type 2 diabetes need to be monitored on a regular basis to manage their condition. Glucose levels in body fluids can be measured using a technique that involves the enzyme glucose oxidase.

Describe <u>AND</u> explain how the enzyme glucose oxidase is used to measure glucose levels in body fluids.

In your answer you should organise information clearly and coherently, using specialist vocabulary when appropriate.

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_____ **[7]**

[Total: 20]

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

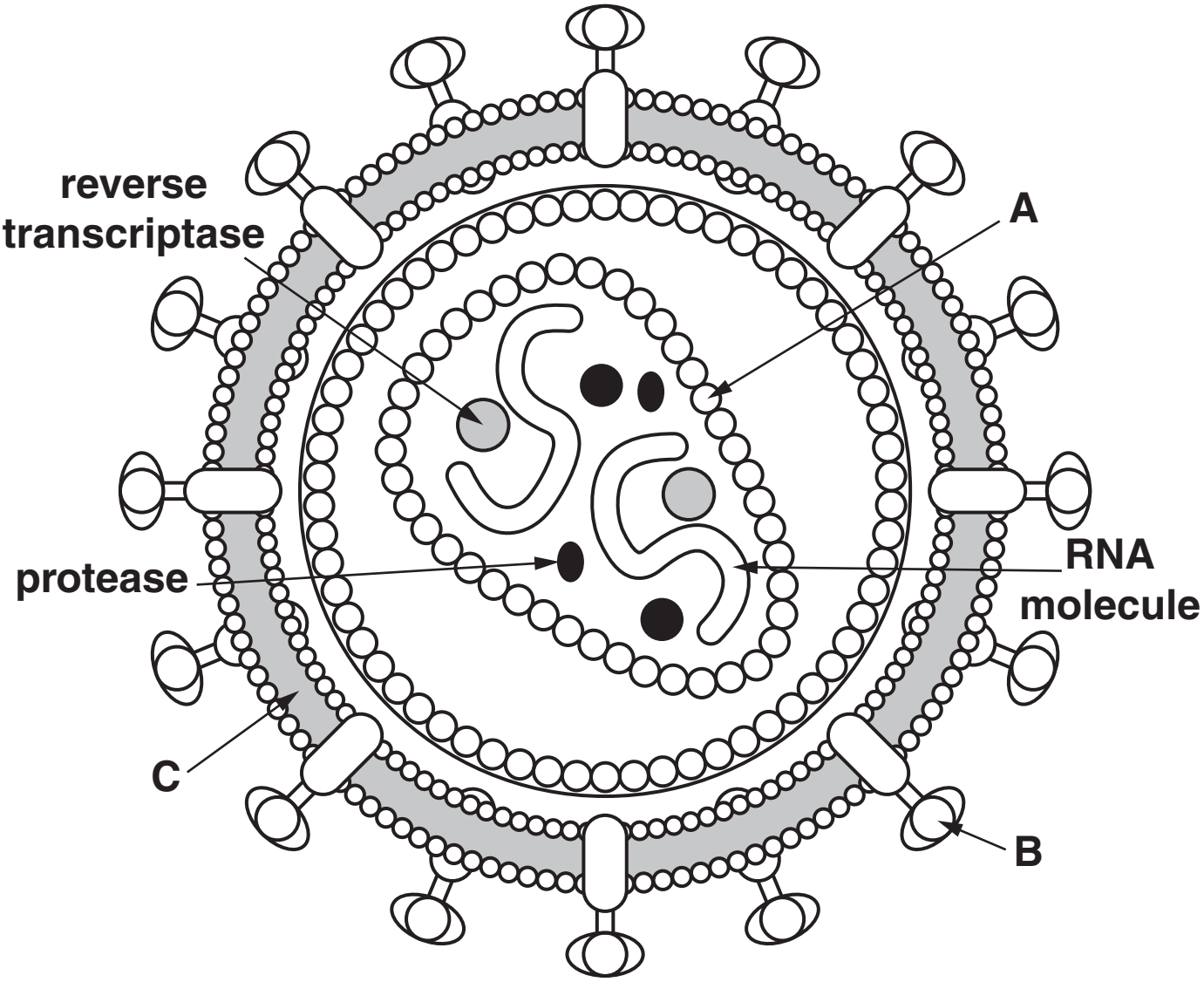

Fig. 6.1

(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]**

(c) AIDS is the acronym for acquired immunodeficiency syndrome.

Suggest what is meant by a *syndrome*. Credit will be given for the use of examples which show that AIDS is a syndrome.

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_____

_____

_____ **[3]**

(d) Some people have suggested that HIV might NOT be the cause of AIDS.

However, at the Durban AIDS conference in South Africa in 2000, the Durban Declaration was signed stating that there is clear-cut evidence that AIDS is caused by the HIV virus.

Some of this evidence is summarised in the box below.

1	**If not treated, most people with HIV infection show signs of AIDS within 5 – 10 years.**
2	**HIV infection is identified in blood by several reliable tests.**
3	**People who receive HIV-contaminated blood or blood products develop AIDS, whereas those who receive untainted or screened blood do not.**
4	**Most children who develop AIDS are born to HIV-infected mothers. The higher the virus count in the mother, the greater the risk of the child becoming infected.**
5	**In the laboratory, HIV infects the type of leucocyte that reduces in number in people with AIDS.**
6	**Drugs that block HIV replication in the laboratory also reduce virus numbers in people and delay the onset of AIDS.**
7	**Treatment, where available, has reduced AIDS mortality by more than 80%.**

Describe the transmission of the HIV virus and discuss the possible reasons for the AIDS pandemic.

In your answer you should refer to the information you have been given from the Durban Declaration.

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_____

_____ **[9]**

[Total: 17]

END OF QUESTION PAPER

ADDITIONAL PAGE

If additional space is required, you should use the lined pages below. The question number(s) must be clearly shown.

ADDITIONAL PAGE

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