Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3076168250

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **February/March 2020**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

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1 **(a)** Fig. 1.1 is a diagram of the human gas exchange system.

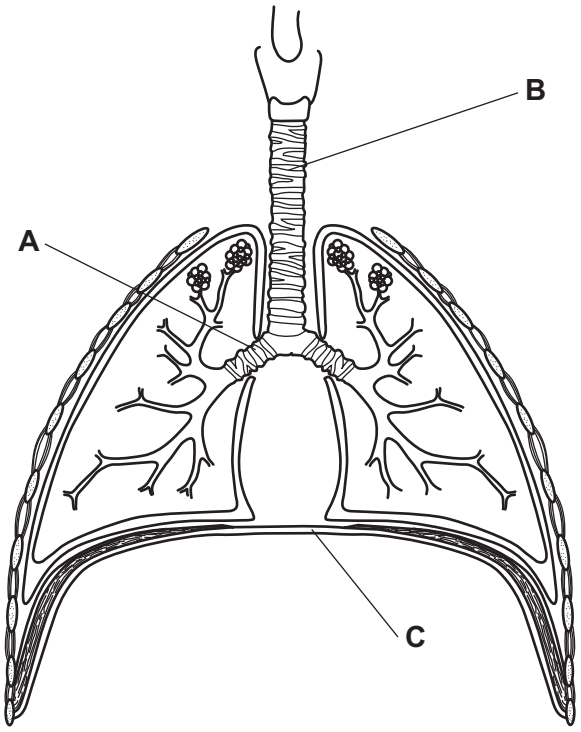


Fig. 1.1

(i) Identify the structures labelled **A**, **B** and **C** in Fig. 1.1.

A .....

B .....

C .....

[3]

(ii) Explain how the structures in the gas exchange system cause inspiration.

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..... [4]

(b) A person who does not smoke can be exposed to tobacco smoke from other people smoking.

Researchers studied the effect of exposure to tobacco smoke on the development of lung cancer in three groups of women who did not smoke:

- group 1 – no exposure to tobacco smoke
- group 2 – low level exposure to tobacco smoke
- group 3 – high level exposure to tobacco smoke.

Their results are shown in Table 1.1.

Table 1.1

group	number of women studied	number of women who died from lung cancer	percentage of women who died from lung cancer
1	21 895	32	0.15
2	44 184	86	
3	25 461	56	0.22

(i) Calculate the percentage of women in group 2 who died from lung cancer.

Write your answer, to **two** significant figures, in Table 1.1.

[2]

(ii) Many countries have laws that ban smoking in public buildings.

Discuss the evidence from Table 1.1 that supports these laws.

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..... [3]

(iii) Smoking has been found to increase the risk of developing diseases other than cancer.

State **two** other diseases that can be caused by smoking.

1 .....

2 .....
[2]

[Total: 14]

2 **(a)** Fig. 2.1 shows the transfer of materials between blood and tissues.

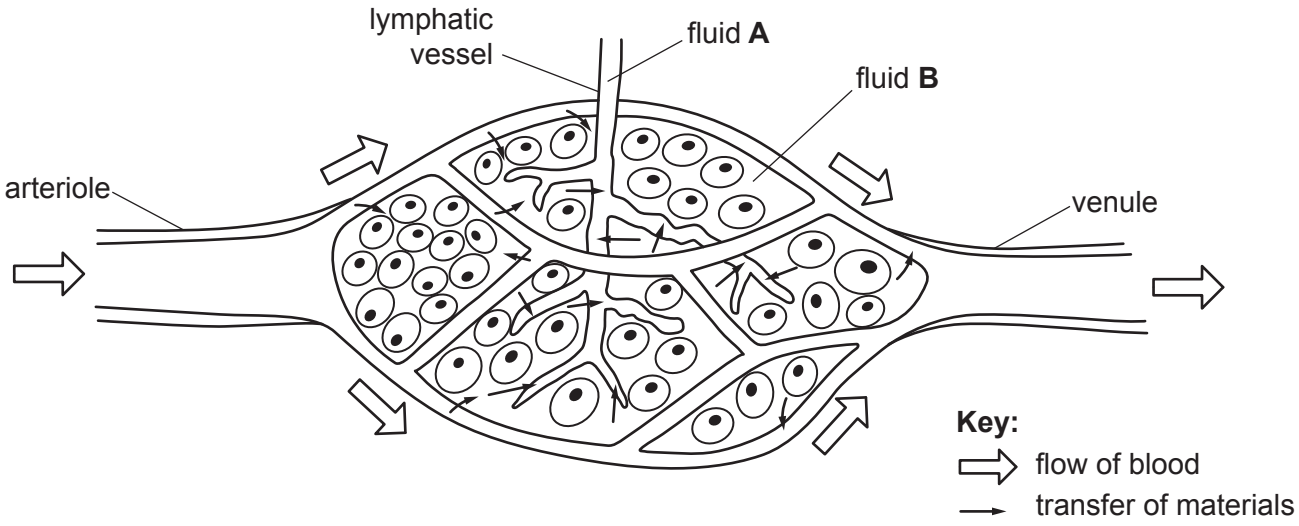


Fig. 2.1

(i) Complete Table 2.1 by:

- stating the names of the fluids
- writing **yes** if the fluid contains red blood cells or **no** if the fluid does **not** contain red blood cells.

Table 2.1

letter on Fig. 2.1	name of the fluid	contains red blood cells
A		
B		

[2]

(ii) State the name of the process by which oxygen is transferred from fluid **B** to the cells.

..... [1]

(iii) Explain why cells need oxygen.

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..... [2]

(b) Describe the functions of arterioles in the skin.

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..... [3]

(c) Describe the functions of lymph nodes in the lymphatic system.

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..... [2]

(d) Lacteals are part of the lymphatic system.

(i) State where in the body lacteals are found.

..... [1]

(ii) Describe the role of lacteals.

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..... [1]

[Total: 12]

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3 **(a)** One of the characteristics of living organisms is sensitivity.

Define the term sensitivity.

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..... [2]

(b) State the names of **two** sense organs.

1 .....

2 .....

[1]

(c) Scientists investigated the effect of adrenaline on blood glucose concentration in rats.

The rats were put into two groups:

- group **A** was given an injection of adrenaline
- group **B** was given an injection that did **not** contain adrenaline.

The blood glucose concentrations of the rats in both groups were monitored for three hours after the injections.

The rats did not eat for 12 hours before the investigation or while they were being monitored.

The results are shown in Fig. 3.1.

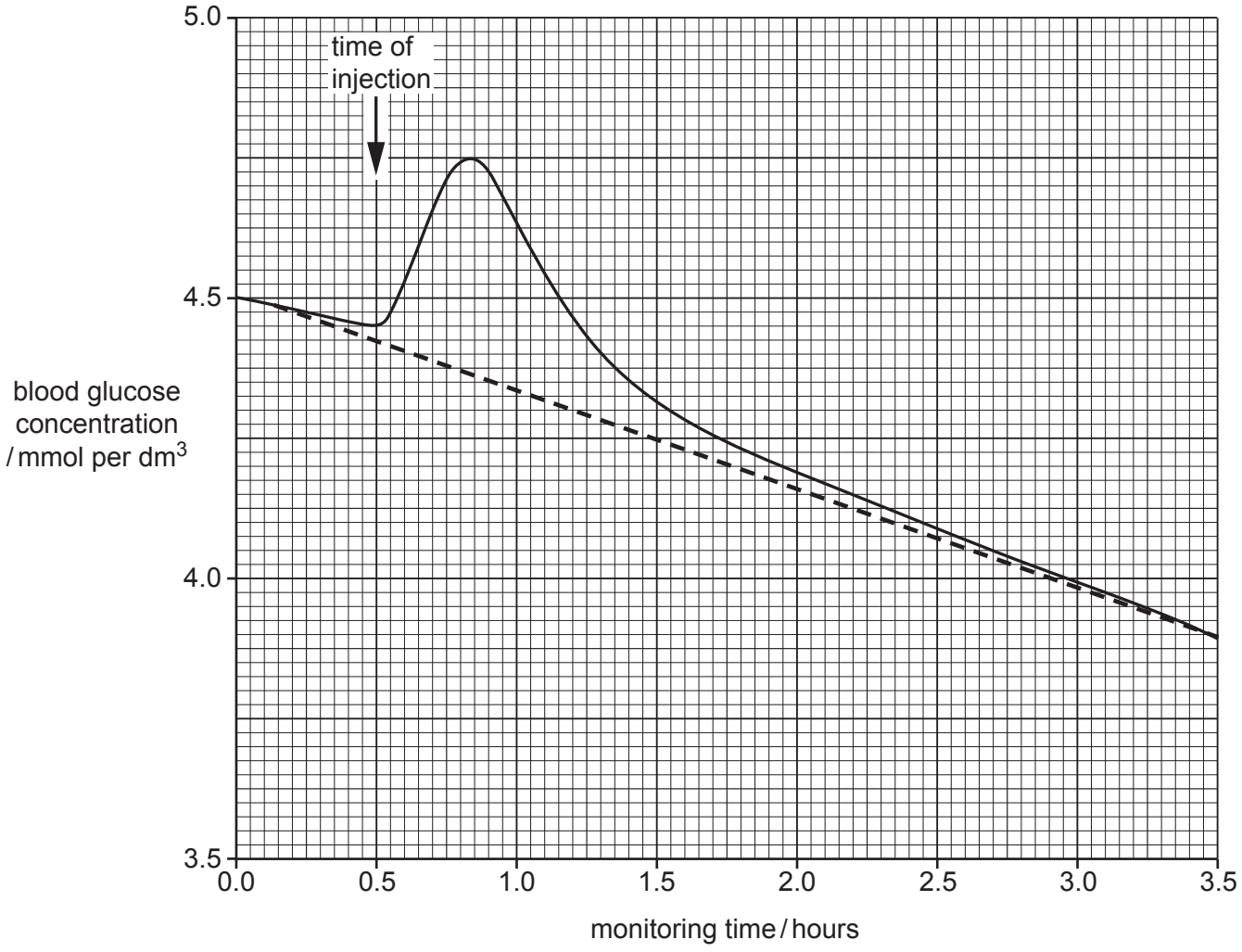


Fig. 3.1

(i) Suggest why group **B** was given an injection that did **not** contain adrenaline.

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..... [2]

(ii) Describe and explain the results shown in Fig. 3.1 for group **A**.

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..... [5]

(d) Another group of rats was given an injection that did **not** contain adrenaline.

These rats were given food after 2 hours of monitoring.

Predict the changes to blood glucose concentration in this group of rats.

Sketch a line to show your prediction on the graph in Fig. 3.1. [2]

(e) Describe **two** effects of adrenaline on the body, **other** than a change in blood glucose concentration.

1 .....

2 .....
[2]

[Total: 14]

4 **(a)** Describe the similarities and differences between marasmus and kwashiorkor.

similarities .....

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differences .....

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[4]

(b) Researchers at a hospital recorded the total number of children admitted to the hospital between 1984 and 2002.

A common reason for children being admitted to this hospital was severe diarrhoea.

Table 4.1 shows this information.

Table 4.1

year	total number of children admitted to the hospital
1984	1386
1986	1604
1988	1955
1990	2054
1992	1726
1994	1143
1996	1422
1998	1419
2000	1580
2002	1161

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(i) Calculate the percentage decrease in the total number of children admitted to the hospital between 1998 and 2002.

Give your answer to the nearest whole number.

Space for working.

..... %
[3]

(ii) Health workers in the communities near the hospital were trained in the prevention and treatment of diarrhoea. This affected the total number of children being admitted to the hospital.

Suggest the year in which the training took place.

Give a reason for your answer.

year .....

reason .....

.....

.....
[2]

(iii) The health workers provided advice to the community on ways of preventing the spread of the pathogens that cause diarrhoea.

Suggest the advice that was given to the community.

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..... [3]

[Total: 12]

5 **(a)** Mitosis is a type of nuclear division.

Fig. 5.1 is a series of photomicrographs showing a cell dividing by mitosis.

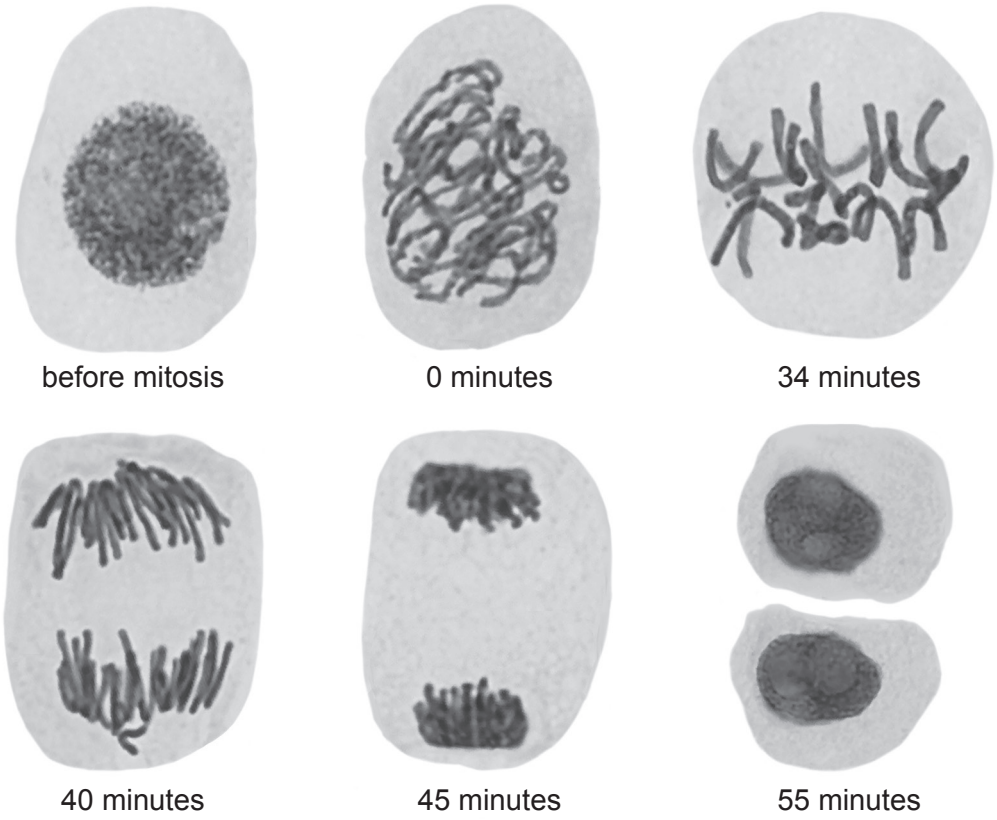


Fig. 5.1

(i) State the change that has occurred to the mass of DNA immediately before mitosis in Fig. 5.1.

..... [1]

(ii) Estimate the time when the chromosomes shown in Fig. 5.1 begin to separate.

..... [1]

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(b) Meiosis is another type of nuclear division.

Describe how the nuclei in cells produced by meiosis differ from the nuclei in cells produced by mitosis.

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..... [3]

(c) Stem cells divide by mitosis during the growth of an embryo.

Describe the role of stem cells in the growth of an embryo.

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..... [2]

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[Turn over

(d) An embryo develops into a fetus.

Outline the processes of labour and birth.

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..... [6]

[Total: 13]

6 **(a)** Atlantic cod, *Gadhus morhua,* is a type of fish that is an important resource for commercial fishing.

Fig. 6.1 shows the estimated mass of Atlantic cod over 40 years.

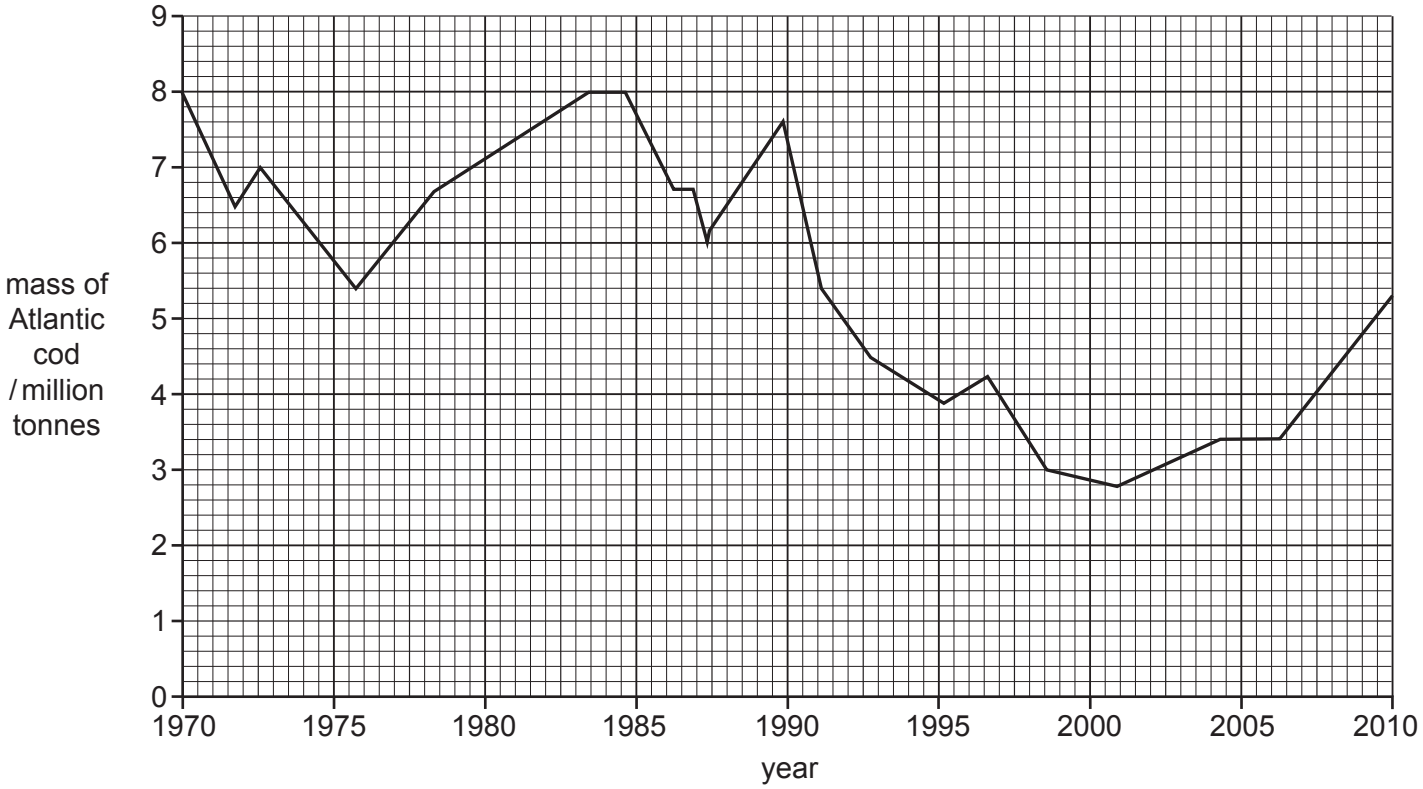


Fig. 6.1

(i) In 1970, the mass of Atlantic cod was 8 000 000 tonnes.

State **one** year when the mass of Atlantic cod was half this value.

..... [1]

(ii) State the years when there was a continuous increase in the mass of Atlantic cod for at least five years.

..... [1]

(iii) Suggest reasons for the trend shown between 1990 and 1995.

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..... [3]

(iv) Explain how fish stocks can be conserved by restocking.

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..... [3]

(b) Fish have adaptive features that enable them to live successfully in their environment.

Fig. 6.2 is a photograph of a great white shark, *Carcharodon carcharias*.

Great white sharks are efficient predators and have very good eyesight to see in poor light conditions underwater.



Fig. 6.2

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(i) Describe **two** features, other than eyesight, visible in Fig. 6.2 that suggest that great white sharks are efficient predators.

1 .....

2 .....
[2]

(ii) Describe how the ancestors of the great white shark developed adaptive features such as good eyesight.

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..... [5]

[Total: 15]

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