Cambridge Assessment International Education

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CANDIDATE NAME									
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BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 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 an animal cell.

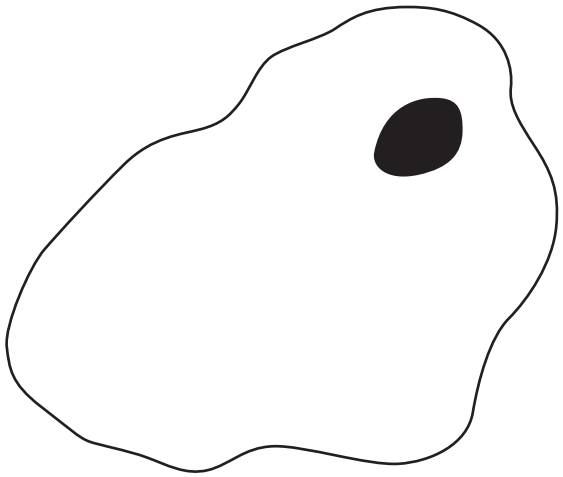

Fig. 1.1

Label **three** structures **on the cell** shown in Fig. 1.1, using label lines and the names of the structures. [3]

(b) State **two** structures that are found in plant cells but **not** in animal cells.

1 .....

2 .....
[2]

[Total: 5]

2 **(a)** Fig. 2.1 is a photograph of a lobster, which is an arthropod.

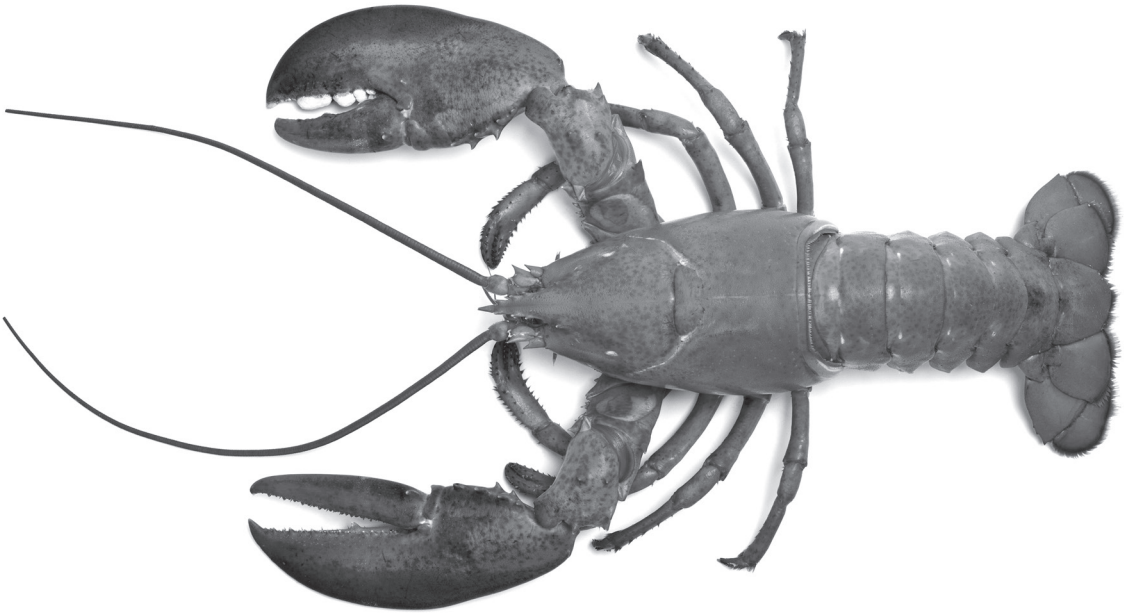

Fig. 2.1

Describe **two** pieces of evidence visible in Fig. 2.1 that identify this organism as an arthropod.

1 .....

2 .....
[2]

(b) The scientific name of the arthropod in Fig. 2.1 is *Homarus americanus*.

State the genus name.

..... [1]

(c) The arthropod shown in Fig. 2.1 is a crustacean.

State the names of **two other** groups of arthropods.

1 .....

2 .....
[2]

(d) Many species of crustaceans live in seas and oceans.

Some of these species have become endangered.

Describe reasons why some marine crustacean species have become endangered.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 8]

3 **(a)** HIV is a pathogen that can cause AIDS.

Table 3.1 shows the adult population size of a country and the estimated number of people infected with HIV/AIDS in that country in 2016.

Data for six countries are shown.

Table 3.1

country	adult population size	estimated number of adults infected with HIV/AIDS
A	808 824	220 000
B	248 490	8 200
C	221 000	221
D	3 250 000	130 000
E	5 111 111	46 000
F	1 333 333	48 000

(i) State which country in Table 3.1 had the greatest number of adults infected with HIV/AIDS.

..... [1]

(ii) Calculate the percentage of adults in country **B** that were infected with HIV/AIDS.

Give your answer to one decimal place.

..... %
[2]

(iii) State why antibiotics are **not** effective against HIV.

.....

.....

..... [1]

(b) The sentences describe how pathogens can be transmitted.

Complete the sentences using words from the list.

Each word may be used once, more than once or not at all.

AIDS	**blood**	**disease**
food	**HIV**	**inherited**

Pathogens for a transmissible ..... may be transmitted through direct contact, for example through ..... or other body fluids. They can also be transmitted indirectly through contaminated surfaces, ..., animals, or from the air.

[3]

(c) The human body has several defences against pathogens.

These can be mechanical barriers, chemical barriers or responses by cells.

The boxes on the left are examples of body defences.

The boxes on the right are the different types of defence.

Draw **one** line to link each example to the correct type of defence.

Draw **four** lines.

example	**type of defence**
antibody production	chemical
hairs in the nose	mechanical
phagocytosis	response by cells
stomach acid	

[4]

(d) The boxes show some examples of diseases.

(i) Place ticks (✓) in the boxes to show all the diseases that are caused by malnutrition.

cholera	
HIV	
lung cancer	
obesity	
scurvy	

[2]

(ii) State **three** risk factors for coronary heart disease (CHD).

1 .....

2 .....

3 .....

[3]

[Total: 16]

4 **(a)** A scientist investigated how the growth of plant shoots was affected by the direction of light.

A light source was placed on one side of a shoot and the scientist recorded the appearance of the shoot after a few days.

Fig. 4.1 shows his results.

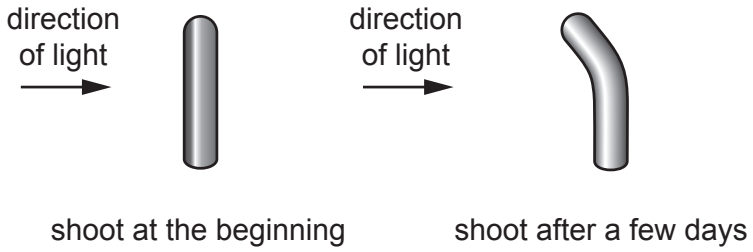

Fig. 4.1

(i) Describe the results shown in Fig. 4.1.

.....

.....

..... [1]

(ii) State the name of the response to light shown in Fig. 4.1.

..... [1]

(iii) Explain the advantage to a plant of the response shown in Fig. 4.1.

.....

.....

.....

.....

..... [2]

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(b) Plant roots absorb mineral ions by active transport.

(i) Define the term active transport.

.....

.....

.....

..... [3]

(ii) State the importance of these mineral ions in plants.

magnesium ions .....

.....

.....

nitrate ions .....

.....

.....

[2]

(c) State **two** uses of water in plants.

1 .....

2 .....

[2]

[Total: 11]

5 Recycling rates in one country were monitored every ten years.

The percentages of different types of recycled materials were recorded.

Fig. 5.1 shows the results.

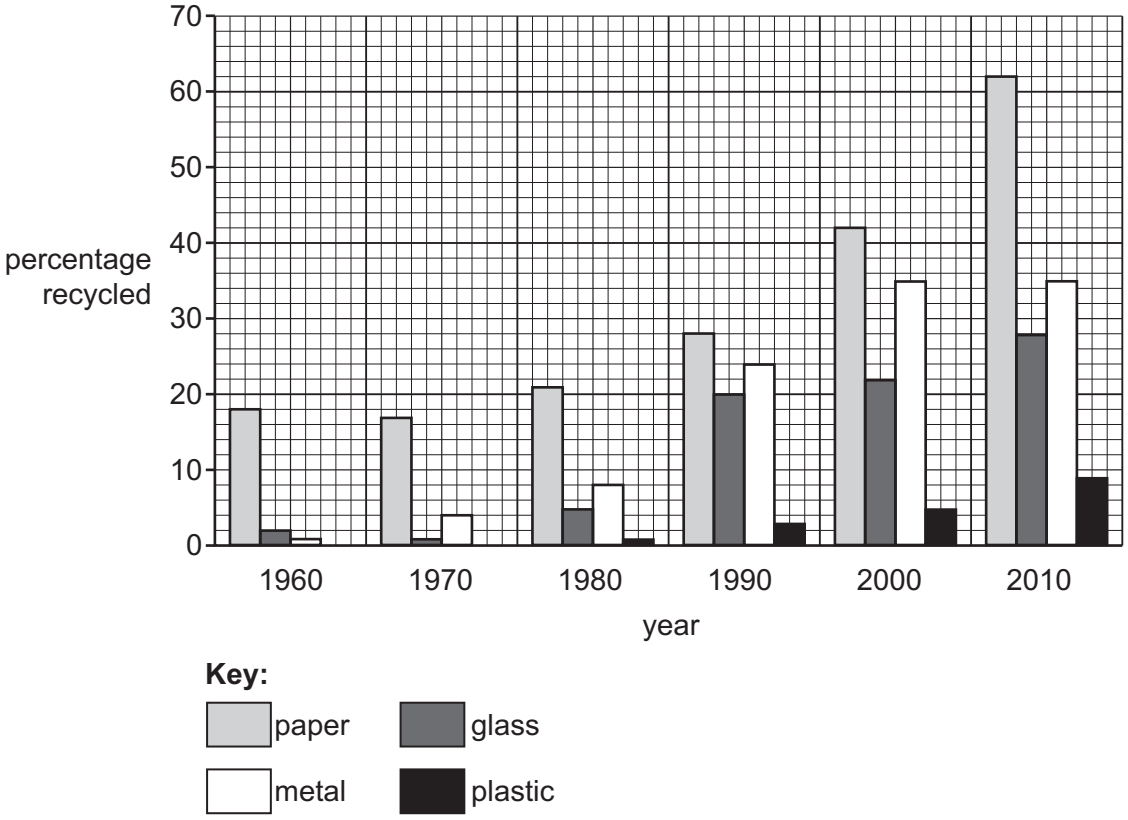

Fig. 5.1

(a) Complete the sentences using the data shown in Fig. 5.1.

The general trend shows that between 1970 and 2000 the percentage of materials recycled has ..... . The most commonly recycled material is ..... .

In 1970 ..... was **not** recycled.

The percentage of ..... recycled did not change between 2000 and 2010.

[4]

(b) Calculate the increase in the percentage of glass recycled between 1960 and 1990.

..... % [1]

[Total: 5]

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6 **(a)** Pectinase is an enzyme that is used in the production of apple juice.

A student investigated how pH affected the volume of apple juice produced when using pectinase.

The student chopped an apple into small pieces.

The pieces of apple were put into solutions with different pH values.

Pectinase was added to each solution.

After two hours the mixture was filtered and the volume of apple juice obtained was recorded.

Table 6.1 shows the results.

Table 6.1

pH	volume of apple juice obtained / cm^3
1.0	23.2
2.0	24.2
3.0	23.5
4.0	25.7
5.0	27.6
6.0	27.4
7.0	24.0
8.0	22.0

(i) State the pH at which pectinase is most active.

Give a reason for your answer.

pH .....

reason .....

.....

.....

[2]

(ii) State **one** factor, other than pH, that would affect the activity of pectinase.

..... [1]

(b) Pectinase is an enzyme.

The box on the left shows the beginning of a sentence.

The boxes on the right show some endings of sentences.

Draw **three** lines from the word 'Enzymes' to make three correct sentences.

Enzymes	are living organisms.
	are proteins.
	can only be used once.
	have a complementary shape to their substrate.
	increase the rate of chemical reactions.
	in the stomach are most active at pH 8.

[3]

(c) State **one** use of enzymes in biotechnology other than fruit juice production.

..... [1]

(d) Many types of enzymes are involved in digestion.

State the names of **two** digestive enzymes in the human alimentary canal.

1 .....

2 .....

[2]

[Total: 9]

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7 **(a)** Pollination occurs when pollen is transferred from one flower to another.

Fig. 7.1 is a diagram of part of a flower.

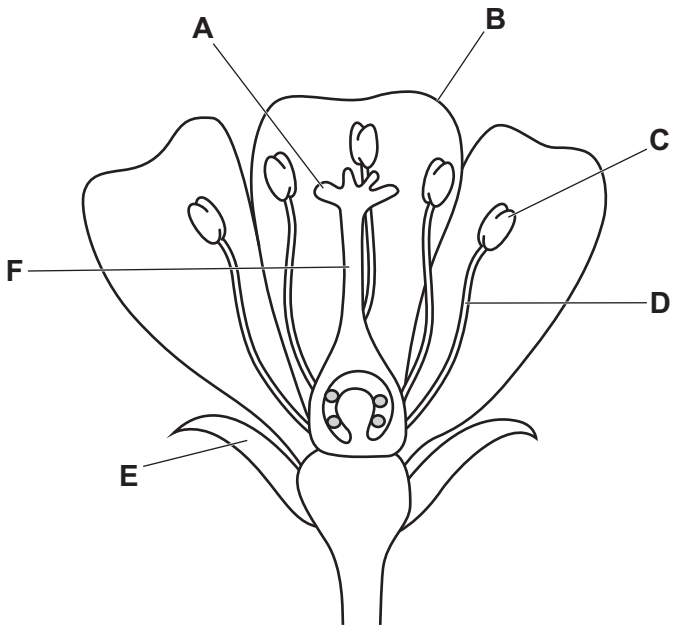

Fig. 7.1

(i) State the letter from Fig. 7.1 that identifies the structure which:

attracts insect pollinators .....

produces pollen .....

receives the pollen during pollination .....

[3]

(ii) Draw a label line and the letter **X on** the flower in Fig. 7.1 to show where fertilisation occurs. [1]

(iii) State the name of the part labelled **E** in Fig. 7.1.

..... [1]

(b) The flower shown in Fig. 7.1 represents an insect-pollinated flower.

Describe **two** ways the pollen from an insect-pollinated flower differs from the pollen from a wind-pollinated flower.

1 .....

.....

2 .....

.....

[2]

(c) A student wrote an **incorrect** statement about fertilisation in plants.

Fertilisation is the fusion of zygote nuclei.

Circle the incorrect word. [1]

(d) Plants can reproduce asexually or sexually.

Table 7.1 compares asexual and sexual reproduction.

Place ticks (✓) in the boxes to show the correct features of asexual and sexual reproduction.

Table 7.1

features of reproduction	asexual reproduction	sexual reproduction
involves gametes		
makes more of the same kind of organism		
produces genetically identical offspring		
involves fertilisation		

[4]

[Total: 12]

8 **(a)** Fig. 8.1 is a Punnett square used to show the inheritance of sex in humans.

Complete the Punnett square in Fig. 8.1.

		male parent chromosomes	
		X	**Y**
female parent chromosomes	**X**	.....	.....
	.....	.....	.....

Fig. 8.1

[2]

(b) **Circle** the percentage chance of a baby being male.

0 **25** **50** **75** **100** [1]

(c) State the name of the structure, in a gamete, that contains chromosomes.

..... [1]

(d) Sea turtles are reptiles which lay eggs.

The sex of the sea turtle offspring is affected by the temperature at which the eggs are kept.

Scientists investigated the effect of temperature on the sex of sea turtle offspring.

Fig. 8.2 shows the results.

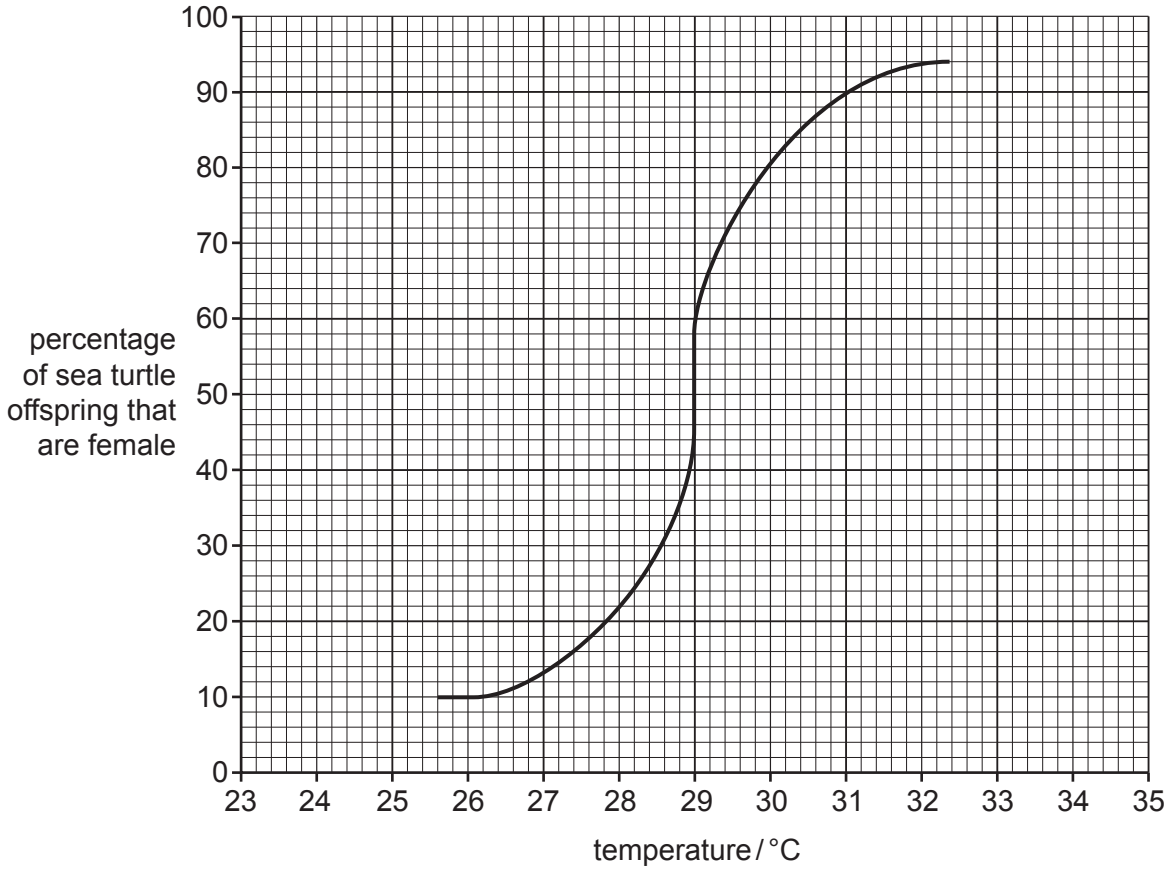

Fig. 8.2

(i) State the temperature at which 22% of the sea turtle offspring are female.

..... °C [1]

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(ii) Describe the data shown in Fig. 8.2.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 8]

9 Fig. 9.1 is a photograph of a fish farm. Fish are kept in small cages in the sea and are fed.

This is an example of intensive livestock production.

Fig. 9.1

(a) Describe the negative impacts of intensive livestock production.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Define the term sustainable resource.

.....

.....

..... [2]

(c) Circle **two** examples of sustainable resources from the list.

coal **fish stocks** **natural gas** **crude oil** **forests** [1]

[Total: 6]

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