Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2019**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **17** printed pages and **3** blank pages.

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[ ]

1 Fig. 1.1 is a diagram of a molecule of fat.

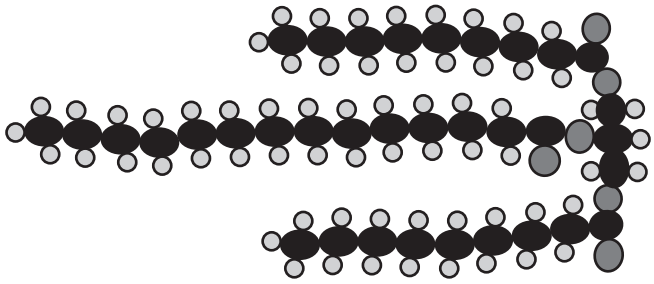

Fig. 1.1

(a) **(i)** List the chemical elements present in fat.

View solution

..... [1]

(ii) State the smaller units that fats are made from.

View solution

..... [2]

(b) Fats are an important part of a balanced diet.

View solution

State the name of **three** other components of a balanced diet.

1 .....

2 .....

3 .....

[3]

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(c) Marmots and lynx are mammals that can live in a variety of environments.

View solution

The percentage of fat in the bodies of these two species was measured. Measurements were taken from marmots and lynx living in Alaska and in Virginia. Alaska is a cold environment and Virginia is a warm environment.

The results are shown in Table 1.1.

Table 1.1

species	percentage of fat in the body		difference in the percentage of fat in the body
	in Alaska	in Virginia	
marmot	36	5	31
lynx	15	11	

(i) Complete Table 1.1 by calculating the difference in the percentage of fat in the body for the lynx.

Write your answer in Table 1.1. [1]

(ii) Describe the results shown in Table 1.1.

View solution

.....

.....

.....

.....

..... [2]

(iii) Explain the difference in the percentage of fat in the body between the mammals living in Alaska and Virginia.

.....

.....

.....

.....

..... [2]

[Total: 11]

View solution

2 **(a)** Complete the definition of the term *adaptive feature* by filling in the gaps with the correct words.

An adaptive feature is an ..... feature that helps an organism to

..... and reproduce in its ..... . [3]

(b) The flagellum is one of the adaptive features of a sperm.

View solution

A sample of sperm was taken and the length of each flagellum was recorded.

Fig. 2.1 shows a graph of the results.

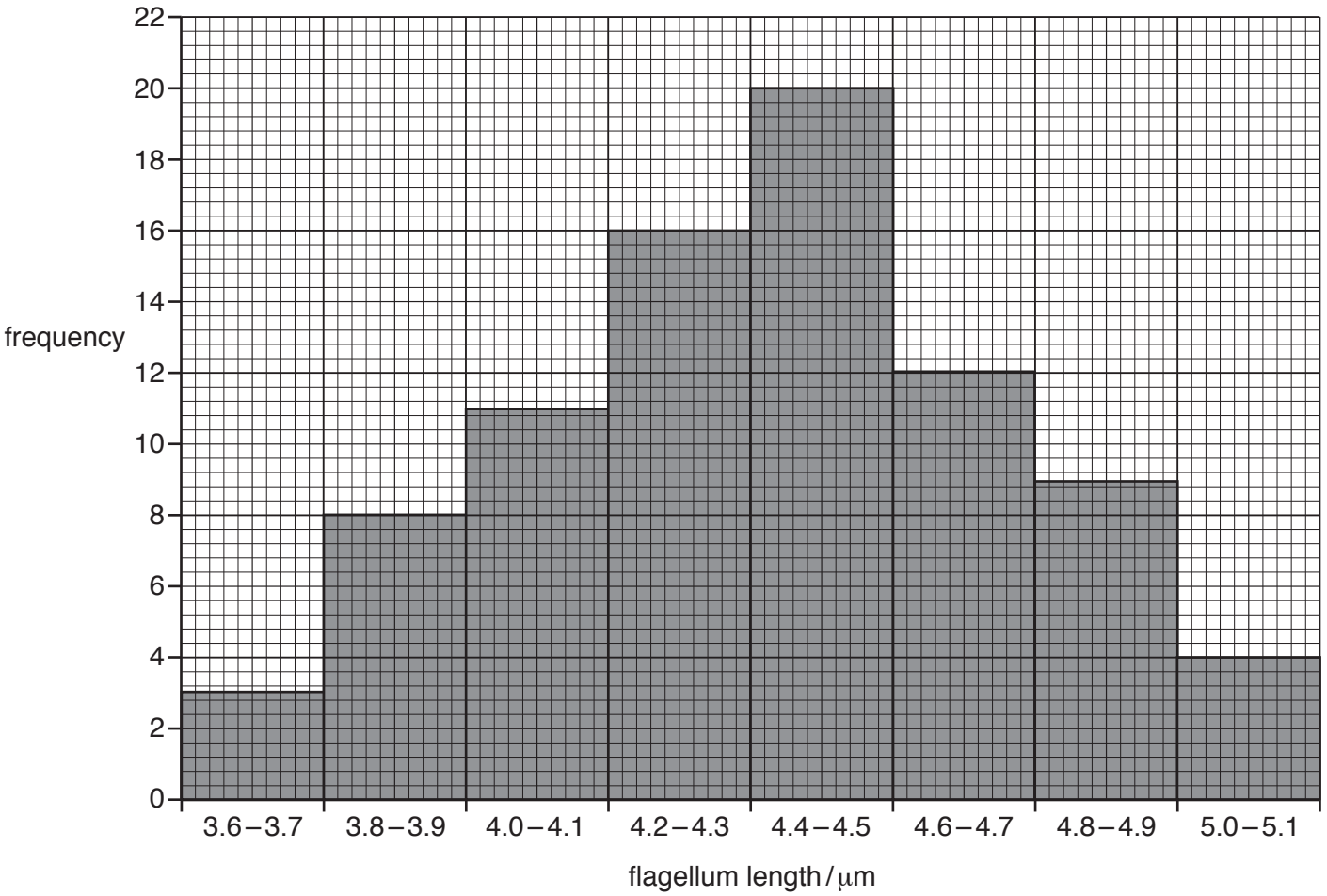

Fig. 2.1

(i) State the most frequent range for flagellum length.

..... μm [1]

(ii) State the frequency of sperm with flagellum length between 4.8 μm to 4.9 μm.

View solution

..... [1]

(iii) State the type of variation shown by flagellum length.

View solution

..... [1]

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(c) Some scientists have suggested that the longer the flagellum the more likely the sperm is to fertilise the egg cell.

View solution

Suggest a reason why.

.....

.....

..... [1]

(d) State the name of the organ that produces sperm.

..... [1]

[Total: 8]

View solution

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3 **(a)** A student investigated the conditions required for germination.

View solution

Seeds were placed on cotton wool in Petri dishes and exposed to different conditions.

The conditions used are shown in Table 3.1.

Table 3.1

Petri dish	temperature /°C	condition of cotton wool	access to light
A	20	damp	yes
B	3	damp	yes
C	20	dry	yes
D	20	damp	no

Seeds in **two** of the Petri dishes did not germinate.

Predict in which Petri dishes the seeds did not germinate.

Give reasons for your answer.

Petri dishes .....

reasons .....

.....

.....

[3]

(b) In another investigation, the germination ratio of the seeds was calculated.

View solution

60 cress seeds were used in the investigation.

20 seeds germinated and 40 seeds did not germinate.

Calculate the ratio of the seeds that germinated to the seeds that did not germinate.

ratio ..... : ..... [1]

(c) Plants need mineral ions for healthy growth.

View solution

State why a plant needs magnesium ions and nitrate ions.

magnesium ions .....

.....

nitrate ions .....

.....

[2]

[Total: 6]

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4 **(a)** Fig. 4.1 is a graph showing the changes to the thickness of the lining of the uterus during the menstrual cycle.

View solution

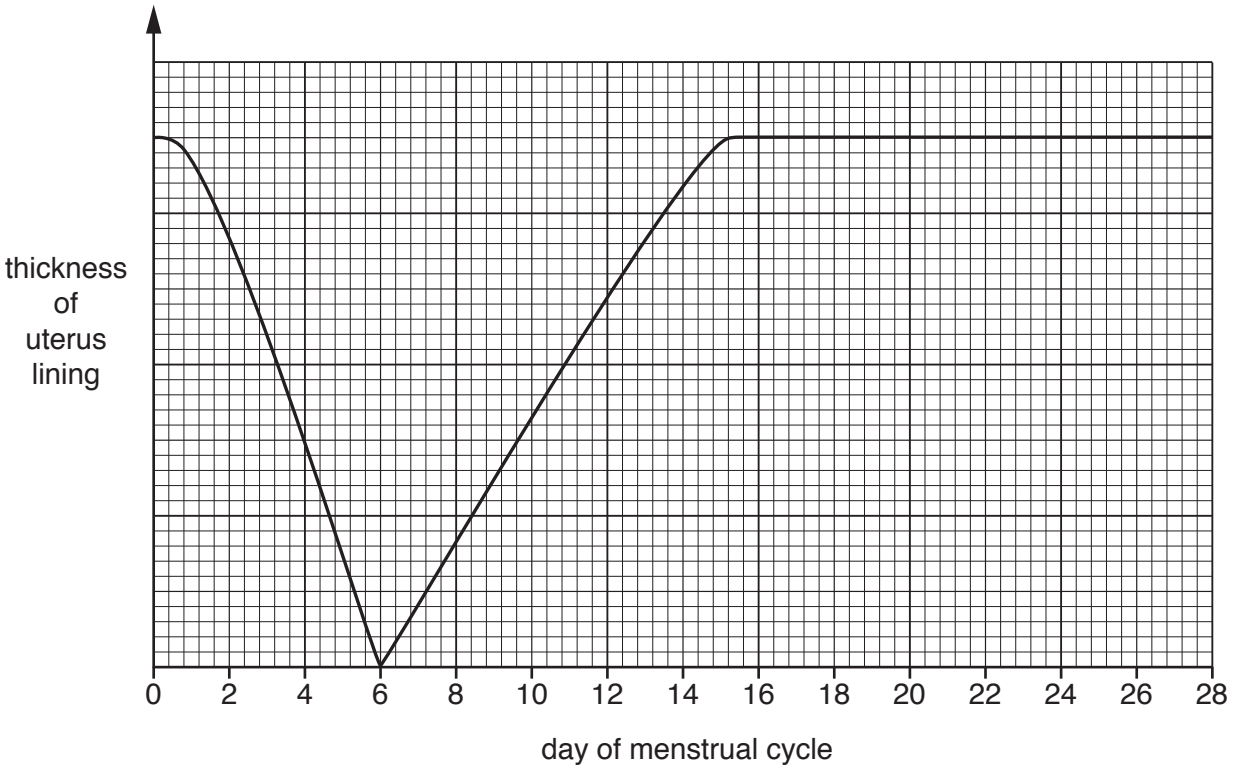

Fig. 4.1

(i) Describe the changes to the thickness of the lining of the uterus during the menstrual cycle as shown in Fig. 4.1.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State the days, shown on Fig. 4.1, on which the lining of the uterus is broken down and lost.

..... [1]

(iii) Draw an **X** on Fig. 4.1 to show when ovulation occurs. [1]

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(b) The menstrual cycle is controlled by hormones.

View solution

(i) Complete the sentence to define the term *hormone*.

A ..... substance produced by a ..... , carried by the ..... , which alters the activity of one or more specific target organs. [3]

View solution

(ii) Adrenaline is a hormone involved in 'fight or flight' situations.

Describe **two** effects of adrenaline on the body.

1 .....

.....

2 .....

..... [2]

(iii) State the name of the organ that produces adrenaline.

..... [1]

[Total: 11]

View solution

5 **(a)** Aerobic and anaerobic respiration both release energy.

Describe the **other** similarities **and** differences between aerobic and anaerobic respiration in muscles.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Place ticks (✓) in the boxes to show **two** uses of the energy released by respiration in humans.

View solution

active transport	
diffusion	
osmosis	
protein synthesis	
transpiration	

[2]

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(c) Anaerobic respiration in yeast produces alcohol.

View solution

The boxes on the right show some sentence endings.

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

Alcohol	abuse decreases instances of crime.
	can be addictive.
	causes lung cancer.
	increases levels of self-control.
	increases reaction times.
	is a depressant.

[3]

(d) State the name of an organ damaged by long-term alcohol abuse.

..... [1]

[Total: 10]

View solution

6 (a) (i) State the names of **three** structures that are found in a mammalian heart.

View solution

1 .....

2 .....

3 .....

[3]

(ii) Describe how the structure of a vein differs from the structure of an artery.

View solution

.....

.....

.....

.....

.....

.....

..... [3]

(iii) State the function of arteries in the human circulatory system.

View solution

.....

.....

..... [1]

(b) Fig. 6.1 is a photomicrograph of blood.

View solution

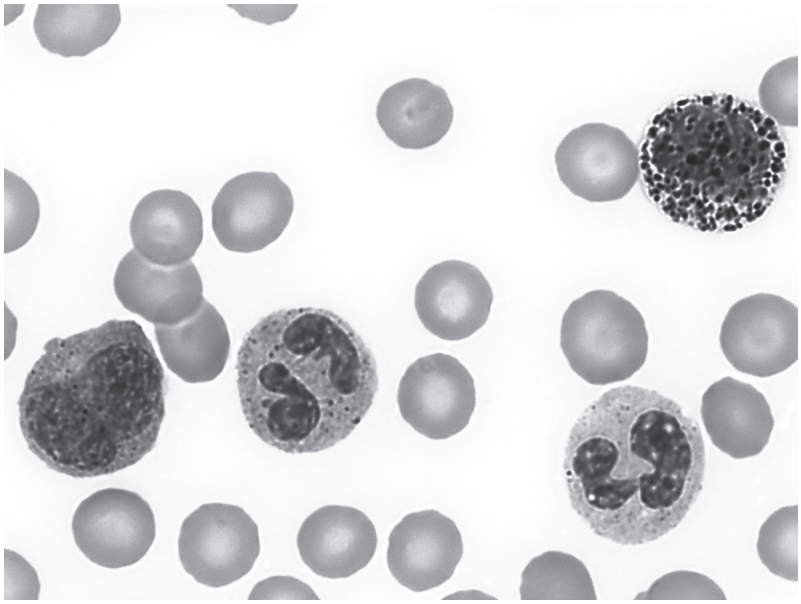

Fig. 6.1

(i) Label **one** red blood cell on Fig. 6.1 with a label line and the letter **X**. [1]

(ii) State the name of **one** other type of blood cell in Fig. 6.1.

View solution

..... [1]

(iii) State the names of **two** other components of blood.

View solution

1 .....

2 .....

[2]

(c) Coronary heart disease (CHD) is a disease of the circulatory system.

View solution

(i) State **three** risk factors for developing CHD.

1 .....

2 .....

3 .....

[3]

(ii) State the name of the blood vessel that becomes blocked in CHD.

View solution

..... [1]

[Total: 15]

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7 Fig. 7.1 is a photograph of a large-scale monoculture of soybeans which are a crop plant.



Fig. 7.1

(a) Describe the disadvantages of large-scale monocultures.

View solution

.....

.....

.....

.....

.....

.....

..... [3]

(b) Some crop plants have been selectively bred to be drought resistant.

View solution

The sentences show stages in the process of selective breeding.

They are not in the correct order.

1 A farmer identifies crop plants that survive in drought conditions.

2 Offspring that survive drought conditions are selected and bred again.

3 The drought resistant plants are bred together and seeds collected.

4 The farmer repeats the process over many generations.

5 The seeds are germinated and grown in drought conditions.

Write the statement numbers in the boxes to show the correct order of the stages in selective breeding.

[3]

[Total: 6]

8 **(a)** The government of a country introduced a law called the Endangered Species Act. It was hoped that the Act would help to conserve species that were at risk from extinction.

Table 8.1 shows the numbers of birds from different species before and after the Act was introduced.

View solution

Table 8.1

species	number of birds	
	before the Act	after the Act
bald eagle	416	9789
Kirtland's warbler	210	1415
nene goose	400	1275
peregrine falcon	324	1700
whooping crane	54	513

(i) State which species was the most at risk from extinction in Table 8.1.

..... [1]

(ii) Calculate the percentage increase in the number of Kirtland's warblers.

View solution

Give your answer to the nearest whole number.

..... %
[3]

(b) **(i)** List **three** reasons why species become endangered or extinct.

View solution

1 .....

2 .....

3 .....
[3]

(ii) Describe **one** method of conserving endangered plant species.

View solution

.....

.....

..... [1]

[Total: 8]

9 Sewage contains water and other substances.

Sewage should be treated before it goes into a river.

(a) Describe **two** reasons why sewage should be treated before it goes into a river.

View solution

1 .....

.....

2 .....

.....

[2]

(b) Treatment of sewage has several stages.

View solution

One of the stages is filtration.

State the name of **one** other stage in the treatment of sewage.

..... [1]

(c) Fig. 9.1 shows a trickling filter in a sewage treatment plant.

View solution



Fig. 9.1

The untreated sewage trickles through gravel. There are organisms on the surface of the gravel.

(i) State the name of the type of organism on the surface of the gravel.

..... [1]

(ii) Describe the function of these organisms.

View solution

.....

.....

..... [1]

[Total: 5]

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