Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/31**

Paper 3 Theory (Core) **May/June 2016**

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.

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

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1 Fig. 1.1 shows an animal cell.

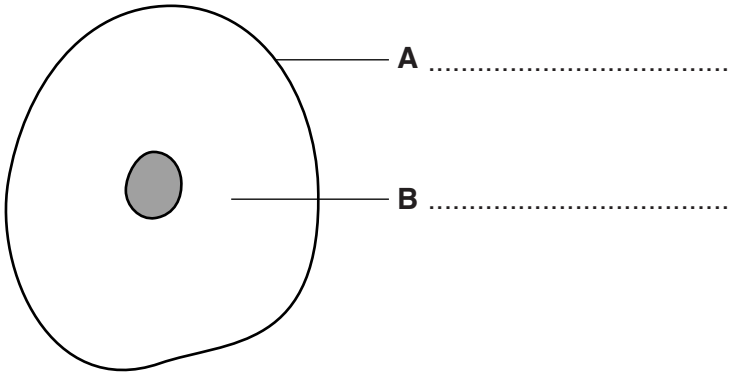

Fig. 1.1

(a) (i) Name the features labelled **A** and **B**.

Write your answers on Fig. 1.1. [2]

View solution

(ii) The nucleus of living cells contains genetic material.

Name the **chemical** that this genetic material is made from.

View solution

.....[1]

(b) The cell in Fig. 1.1 carries out aerobic respiration.

View solution

Name **one** chemical that diffuses into an animal cell **and** one chemical that diffuses out of a cell during aerobic respiration.

chemical that diffuses in .....

chemical that diffuses out .....

[2]

(c) The process of active transport occurs in some cells.

View solution

Outline **one** way in which diffusion is different to active transport.

.....

.....[1]

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Fig. 1.2 shows a cell from the palisade mesophyll layer of a leaf.

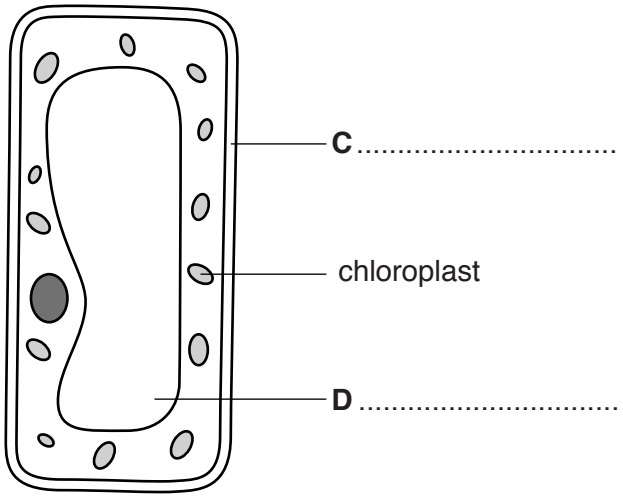

Fig. 1.2

View solution

(d) (i) Name the features labelled **C** and **D**.

Write your answers on Fig. 1.2. [2]

(ii) Name the process carried out by the chloroplasts **and** explain why all animal life depends on this process.

name of process .....

explanation .....

.....

.....

.....

.....

.....

.....

.....

.....

[5]

[Total: 13]

View solution

2 Fig. 2.1 shows a gorilla with her baby.

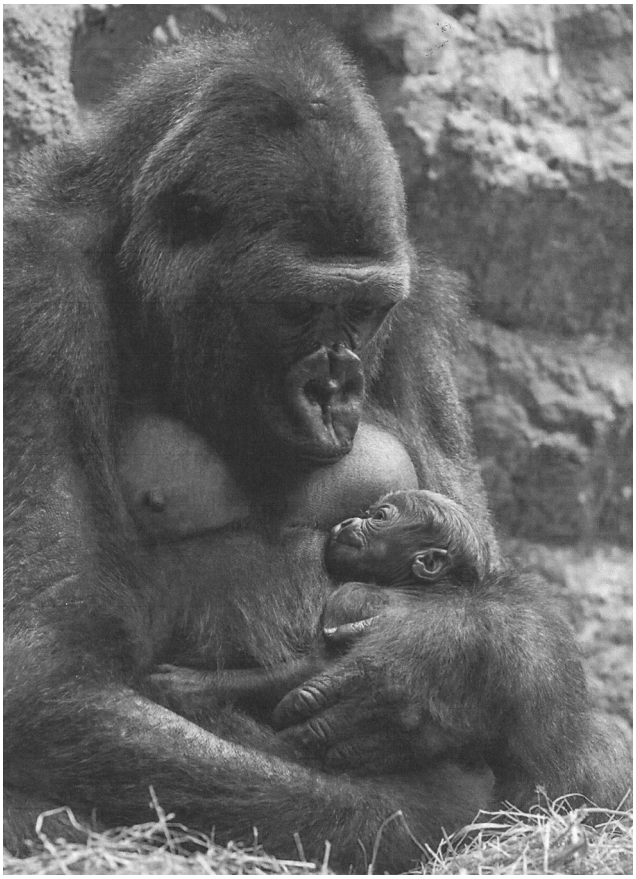

Fig. 2.1

(a) Gorillas are mammals and have characteristics that are **only** found in mammals, and not in any other vertebrate group.

View solution

State:

(i) **one** mammalian characteristic visible in Fig. 2.1

.....[1]

(ii) **two** mammalian characteristics **not** visible in Fig. 2.1

View solution

1 .....

2 .....

[2]

(b) Fig. 2.2 shows the average body mass and Table 2.1 shows the average lifespan of males in six species of mammal.

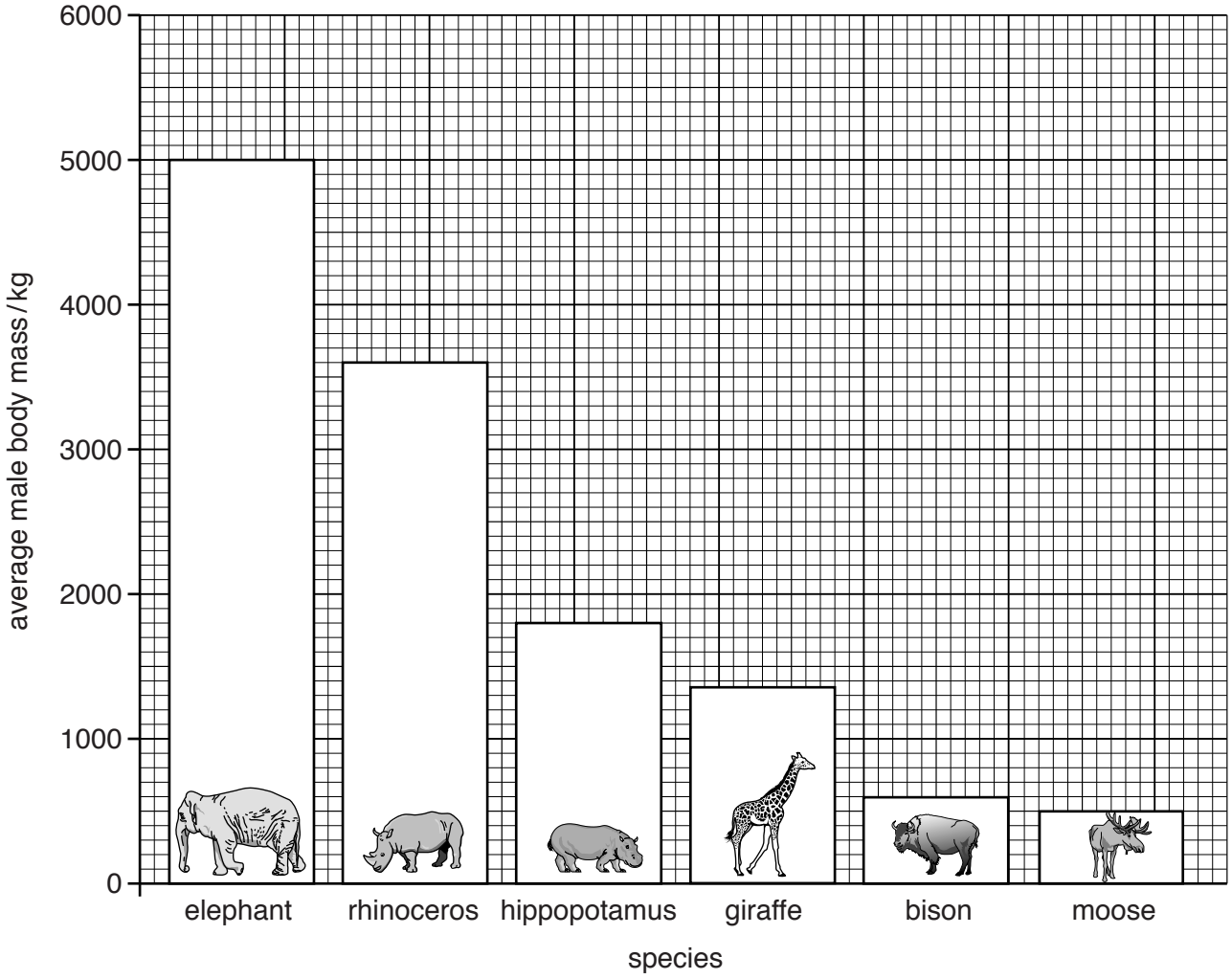

Fig. 2.2

Table 2.1

species	average male lifespan / years
elephant	70
rhinoceros	48
hippopotamus	42
giraffe	25
bison	23
moose	21

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(i) Name the mammal that has an average lifespan of 23 years.

.....[1]

(ii) State the average body mass of a male rhinoceros.

View solution

..... kg [1]

(iii) State the average body mass of the mammal that has an average lifespan of 25 years.

..... kg [1]

(iv) Describe the relationship between average body mass and average lifespan shown in Fig. 2.2 and Table 2.1.

.....

.....

.....[1]

(c) The average lifespan of a human male can vary from 40 years to 85 years.
The lifespan partly depends on the things available in the country where the man lives.
Suggest **three** things that would increase the chance of a man having a longer lifespan.

View solution

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 10]

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3 Fig. 3.1 shows a section through the skin.

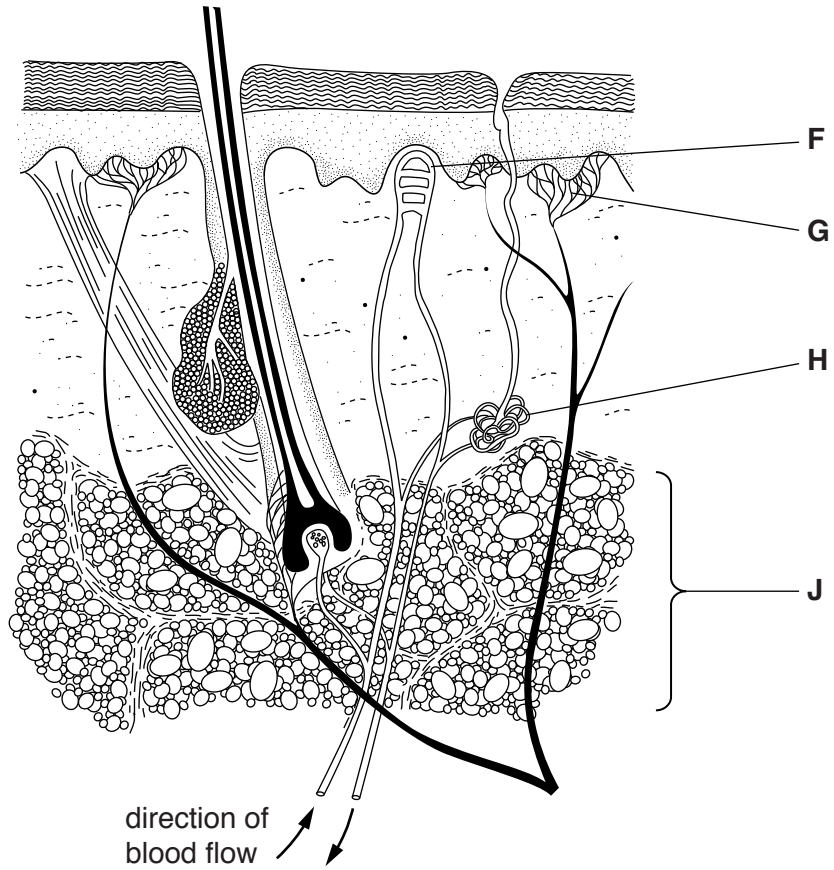

Fig. 3.1

(a) Name the structures labelled in Fig. 3.1 and outline a function in the skin for each one.

View solution

Write your answers in Table 3.1.

An example has been done for you.

Table 3.1

structure	name of structure	function in the skin
F		
G		
H	sweat gland	produces sweat for cooling the body
J		

[6]

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(b) In an investigation the volume of sweat produced by a student was measured when running while carrying different masses in a back-pack.



The results are shown in Fig. 3.2.

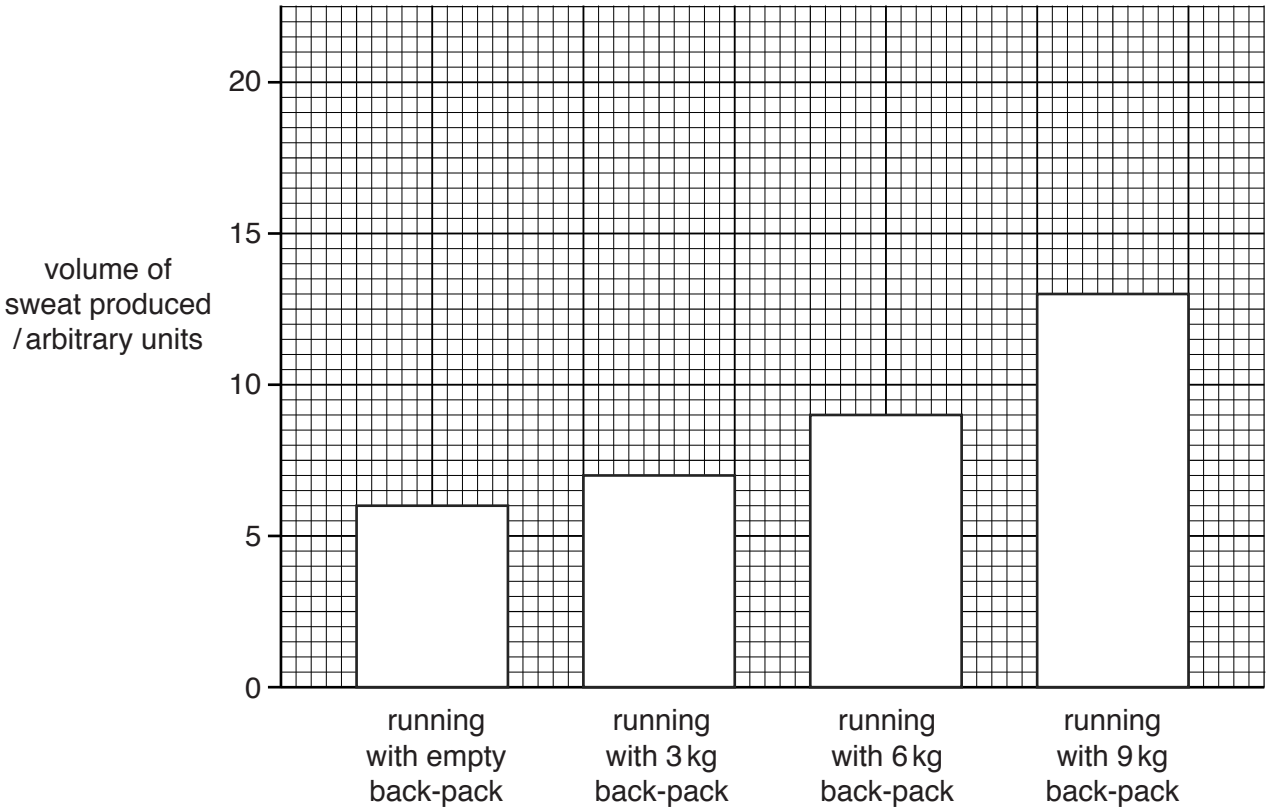

Fig. 3.2

(i) Use Fig. 3.2 to state:

View solution

the volume of sweat produced when running with an empty back-pack

..... arbitrary units

the volume of sweat produced when running with a 9 kg back-pack

..... arbitrary units

Use these two volumes to calculate the percentage increase in sweat production when running with a 9 kg back-pack.

Give your answer to the nearest whole number.

Show your working.

..... %
[3]

(ii) This investigation was carried out when the air temperature was 10 °C.

Predict the effect of carrying out the same investigation if the air temperature was 15 °C.

.....

.....[1]

(c) When the student was at rest the volume of sweat produced was 2 arbitrary units.

View solution

The volume increases during exercise as the body needs to keep cool.

Explain how this cooling takes place.

.....

.....

.....

.....

.....

.....[3]

[Total: 13]

4 Choose words from the list to complete the sentences about hormones.

View solution

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

adrenaline	**blood**	**decrease**	**glands**
increase	**insulin**	**nerves**	**main**
saliva	**system**	**target**	**urine**

Hormones are chemicals produced by ..... .

Hormones are carried round the body by the ..... .

A hormone affects the activity of one part of the body called the ..... organ.

After a person has eaten a meal the pancreas releases the hormone ..... .

One of the effects of this hormone is to lower the glucose level in the ..... . [5]

[Total: 5]

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5 Fig. 5.1 shows some apparatus used to investigate transpiration.

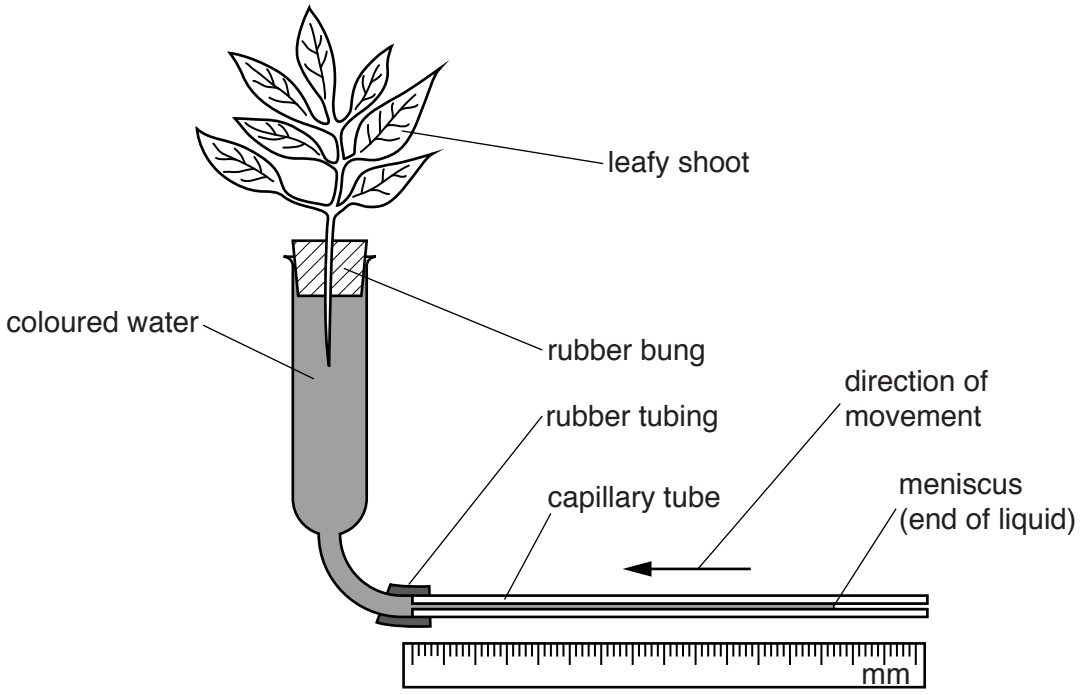

Fig. 5.1

The rate of transpiration can be calculated by measuring how far the meniscus moves in five minutes.

(a) Name the tissue that transports water from the roots to the leaves in a plant.

View solution

.....[1]

(b) The investigation was carried out at five different temperatures.
All other conditions were kept constant.

View solution

Table 5.1 shows the results recorded using the apparatus shown in Fig. 5.1.

Table 5.1

temperature / °C	distance moved by meniscus in five minutes / mm
10	28
20	32
30	37
40	44
50	53

(i) State **one** conclusion that can be drawn from the results in Table 5.1 about the effect of temperature on the rate of transpiration.

.....

.....[1]

(ii) Suggest why the investigation was not continued at temperatures above 50 °C.

View solution

.....

.....

.....

.....[2]

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(c) The investigation was repeated using the leafy shoot shown in Fig. 5.2.

View solution

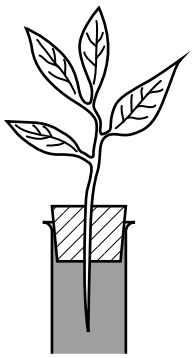

Fig. 5.2

(i) Predict how these results would be different to the results shown in Table 5.1.

.....

.....[1]

(ii) Give **two** reasons why the results would be different.

View solution

.....

.....

.....

.....[2]

(d) State **one** factor, other than temperature, that can affect the rate of transpiration.

View solution

.....

.....[1]

[Total: 8]

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6 **(a)** Define the term *genetic engineering*.

View solution

.....

.....

.....

.....[2]

(b) State **two** examples of genetic engineering.

View solution

For each example, outline how it benefits humans.

Write your answers in Table 6.1.

Table 6.1

example	benefit to humans

[4]

[Total: 6]

7 The boxes on the left contain the names of some processes taking place in living organisms.

View solution

The boxes on the right contain descriptions of these processes.

Draw **one** straight line from each box on the left to a box on the right to link the name of the process with its description.

An example has been done for you.

name of process	**description of process**
pollination	the diffusion of water through a partially permeable membrane
osmosis	a response in which parts of a plant grow towards or away from gravity
gravitropism	transfer of pollen grains from the anther to the stigma
phagocytosis	the maintenance of a constant internal environment
assimilation	the movement of digested food molecules into the cells of the body where they are used, becoming part of the cells
homeostasis	the engulfing and killing of pathogens by white blood cells

[4]

[Total: 4]

8 Fig. 8.1 shows the structures that produce urine and excrete it from the body.

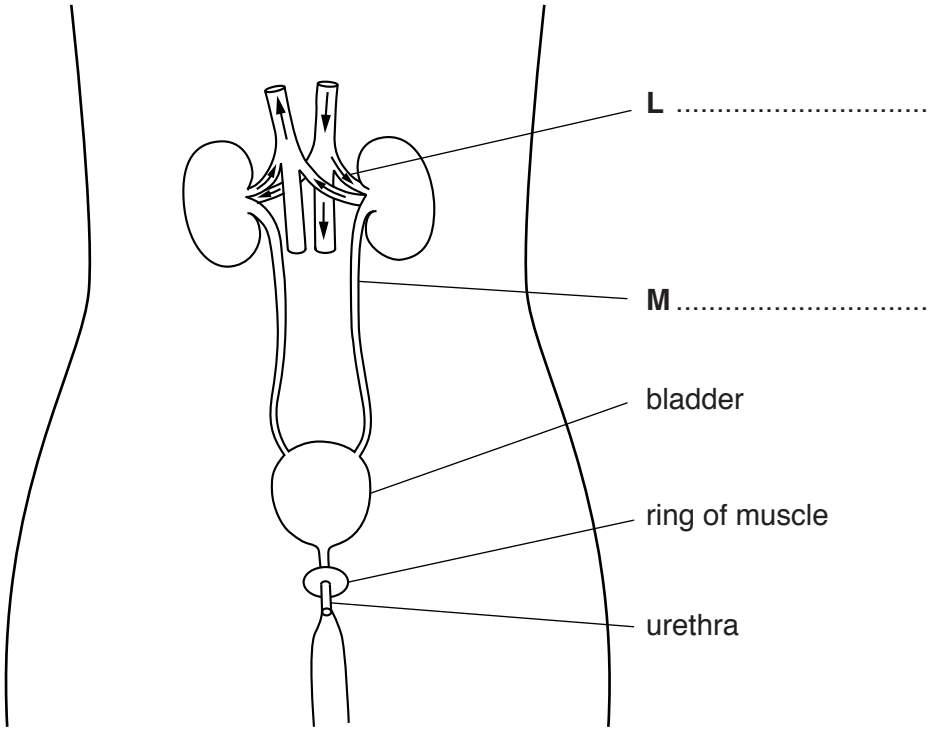

Fig. 8.1

View solution

(a) (i) Name the structures labelled **L** and **M**.

Write your answers on Fig. 8.1. [2]

(ii) Urea is excreted in the urine.

Name the organ that produces urea and suggest how urea is transferred to the kidneys.

.....

.....

.....[2]

View solution

(b) In an investigation, the volume of urine produced by a student each day is measured.

View solution

The results are shown in Table 8.1.

Table 8.1

day	volume of urine / cm^3 per day
1	1440
2	1510
3	1410
4	1445
5	910
6	1445
7	1500

Suggest **three** possible reasons for the lower volume of urine produced by the student on day 5.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Outline **three** processes used in the treatment of sewage to make the water it contains safe for human use.

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

[3]

[Total: 10]

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9 (a) (i) Table 9.1 contains examples of components of a balanced diet and foods that contain a high proportion of the component.

Complete Table 9.1 by filling in the blank spaces.

View solution

Table 9.1

component of balanced diet	food containing a high proportion of the component
fat	olive oil
	meat
	pasta
fibre (roughage)	

[3]

(ii) Name **two** other components of a balanced diet that are not listed in Table 9.1.

View solution

.....

.....[2]

(b) Fig. 9.1 shows a picture of food production on a modern farm.

View solution



Fig. 9.1

The use of modern technology has increased the amount of food produced.

State **two** examples of modern technology **and** explain how each has contributed to the amount of **plants** grown for food.

example	explanation of technology

[4]

(c) On modern farms crop plants can be grown as large-scale monocultures.

View solution

Suggest **two** negative impacts on an ecosystem for this method of food production.

1 .....

.....

2 .....

.....

[2]

[Total: 11]

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