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0610/42

February/March 2019

1 hour 15 minutes

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

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

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 **15** printed pages and **1** blank page.

1 The kidney is one of the main excretory organs of the body.

(a) Define the term *excretion*.

.....

.....

.....

.....

..... [3]

(b) One of the roles of the kidney is to filter the blood.

Fig. 1.1 shows a section of a kidney.

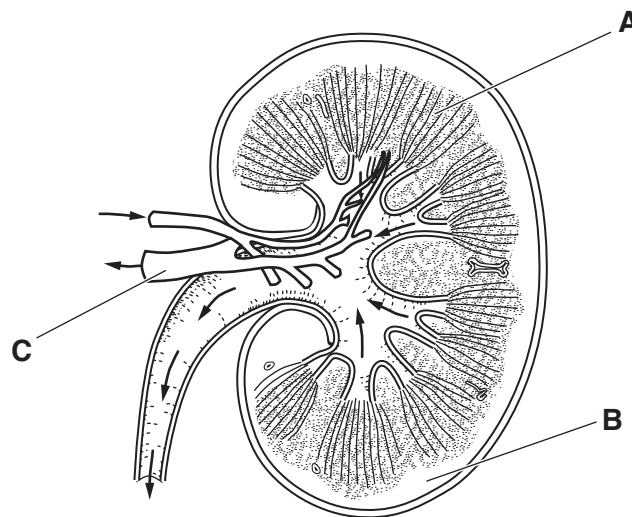


Fig. 1.1

State the name of the parts labelled **A**, **B** and **C** on Fig. 1.1.

A

B

C [3]

(c) Table 1.1 shows the concentrations of four solutes:

- in the blood in the renal artery
- in the fluid in the kidney tubule
- in the urine.

Table 1.1

solute	solute concentration / g dm ⁻³		
	blood in the renal artery	fluid in the kidney tubule	urine
glucose	0.9	0.9	0.0
protein	83.0	0.0	0.0
salts	8.0	8.0	16.5
urea	0.2	0.2	20.0

- (i) Calculate the percentage increase in the concentration of urea between the blood in the renal artery and the urine.

Show your working.

..... %
[2]

- (ii) Describe the results for the concentration of salts shown in Table 1.1.

.....

 [2]

- (iii) State the reason for the difference in the concentration of protein between the blood in the renal artery and the fluid in the kidney tubule.

.....
 [1]

- (iv) State the reason for the difference in the concentration of glucose between the fluid in the kidney tubule and the urine.

.....
..... [1]

- (d) Dialysis is a treatment used for people with kidney failure.

Some people with kidney failure are given a kidney transplant.

State the advantages of having a kidney transplant instead of dialysis.

.....
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.....
.....
.....
.....
..... [3]

[Total: 15]

- 2 (a) Fig. 2.1 shows some flowers of a snapdragon plant, *Antirrhinum majus*.

Snapdragons are insect-pollinated plants.



Fig. 2.1

- (i) State **one** feature visible in Fig. 2.1 that suggests these flowers are insect-pollinated.
 [1]
- (ii) State how self-pollination differs from cross-pollination.

 [1]
- (iii) Suggest why self-pollination might be advantageous to a population of plants.

 [3]

(b) Petal colour in the flowers of snapdragon plants shows co-dominance.

The gene for petal colour has two co-dominant alleles:

- C^R for red petals
- C^W for white petals

Table 2.1 shows the genotypes and phenotypes of snapdragon plants with different petal colours.

Table 2.1

genotype	phenotype
$C^R C^R$	red
$C^W C^W$	white
$C^R C^W$	pink

(i) Explain the term *co-dominance*.

.....

.....

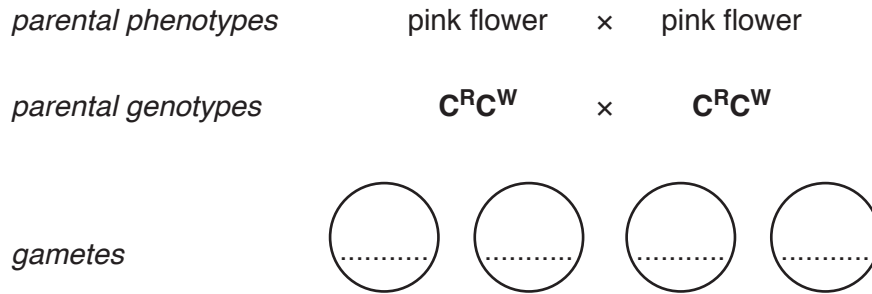
.....

.....

..... [2]

- (ii) A botanist crossed two snapdragon plants with pink flowers.

Complete the genetic diagram to show the ratio of expected phenotypes in the offspring.



offspring genotypes

offspring phenotypes

phenotypic ratio [4]

- (iii) The botanist wanted to produce a generation of snapdragons that all had pink flowers.

State the phenotypes of the parent plants that the botanist would need to cross.

Explain your answer.

parent phenotypes

explanation

.....

..... [2]

[Total: 13]

3 Reflexes are simple responses that protect the body.

(a) The letters **A** to **G** show the components involved in a reflex action.

- A** stimulus
- B** motor neurone
- C** sensory neurone
- D** receptor cell
- E** response
- F** relay neurone
- G** effector

Put the letters into the correct sequence involved in a reflex action. Two have been done for you.

A						E
----------	--	--	--	--	--	----------

[1]

(b) Impulses travel along neurones.

Describe how impulses pass from one neurone to another neurone across a synapse.

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..... [4]

(c) Drugs such as heroin affect the nervous system. When users stop taking heroin they may experience withdrawal symptoms.

(i) Outline the short-term effects of heroin on the body.

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.....

.....

.....

.....

..... [3]

(ii) State **two** withdrawal symptoms that heroin users may experience.

.....

..... [2]

(iii) Suggest why heroin abuse may increase criminal activity.

.....

..... [1]

[Total: 11]

Table 4.1

pollutant	source	effect on environment
		acid rain
carbon dioxide		enhanced greenhouse effect
	cattle and rice farming	enhanced greenhouse effect
fertilisers	crop farming	eutrophication

- (a) Complete Table 4.1. [4]
- (b) When fertiliser is applied to fields, it can lead to eutrophication in lakes and rivers.
- (i) Describe **and** explain what happens in lakes when eutrophication occurs.

..... [6

- (ii) Suggest ways in which a farmer could reduce the chances of eutrophication occurring when applying fertiliser to crops.

.....

.....

.....

.....

..... [2]

[Total: 12]

- 5 Scientists investigated the effect of cuticle thickness on water loss from the leaves of the balsam fir tree, *Abies balsamea*.

The leaves were divided into three groups:

- A** – thick cuticle
- B** – medium cuticle
- C** – thin cuticle

Samples of leaves from each group were weighed. The leaves were placed on a tray in dry air at 20 °C. The samples of leaves were reweighed, at intervals, over 15 hours.

The scientists calculated the mass of each sample of leaves as a percentage of the initial mass.

Fig. 5.1 shows the results.

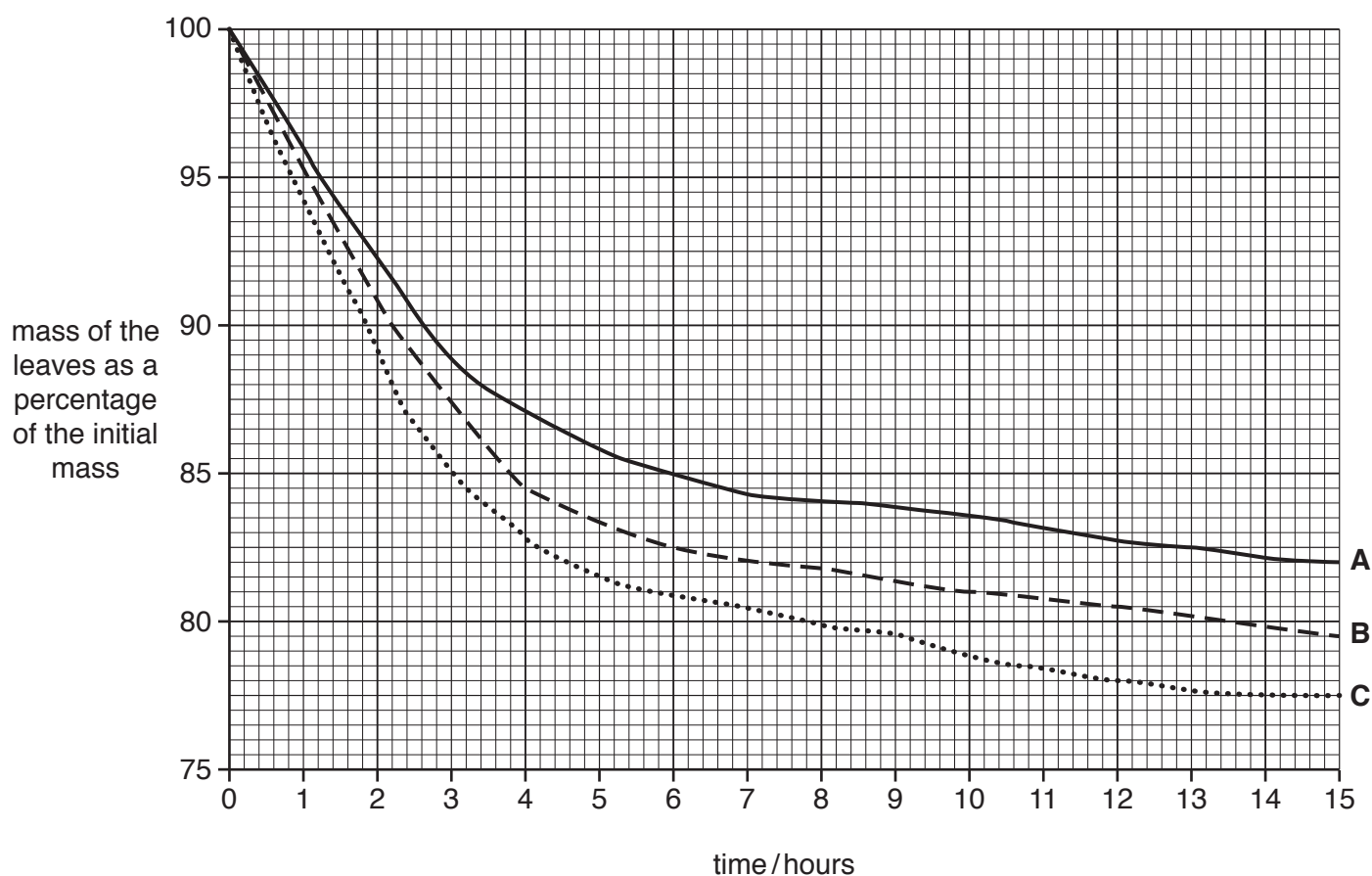


Fig. 5.1

- (a) (i) Describe **and** explain the results shown in Fig. 5.1.

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..... [5]

- (ii) The investigation was repeated on a day when the air humidity was higher.

Suggest **and** explain the effect that this would have on the results.

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..... [3]

- (b) The leaves of pine trees show xerophytic features. Stems and roots also show xerophytic adaptations.

State **one** adaptation of the stem and **one** adaptation of the root in xerophytes.

stem

root

[2]

(c) Water is one of the raw materials needed for the production of sugars in photosynthesis.

(i) State the name of the other raw material needed for photosynthesis.

..... [1]

(ii) State **three** ways a plant uses the sugars produced in photosynthesis.

1

2

3

[3]

[Total: 14]

6 Fig. 6.1 is a diagram of the virus that causes measles.

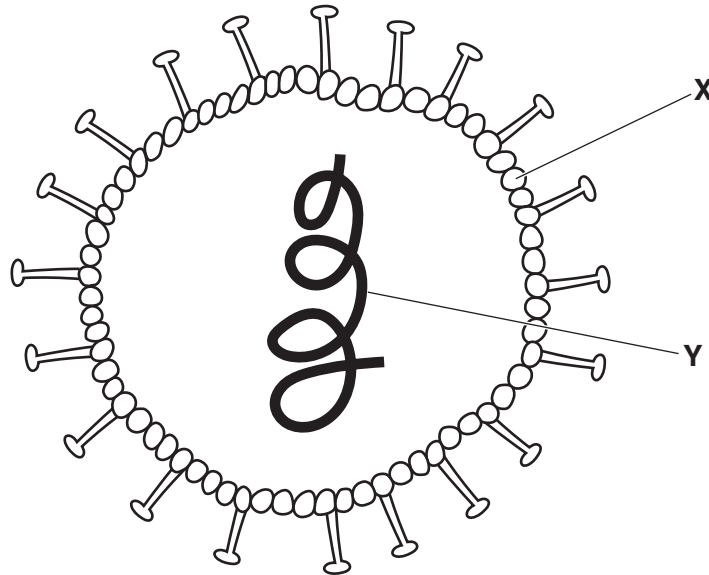


Fig. 6.1

(a) (i) State the name of the parts of the virus shown in Fig. 6.1 labelled **X** and **Y**.

X

Y

[2]

(ii) Bacteria belong to the Prokaryote kingdom.

State **two** ways in which the structure of bacteria differs from the structure of viruses.

1

2

[2]

(b) Viruses and some bacteria are pathogenic. Diseases caused by pathogens are transmissible.

(i) State **two** ways that a pathogen can be transmitted **indirectly**.

1

2 [2]

(ii) The body has barriers to defend itself against pathogens.

State **two** mechanical barriers of the body.

1

2 [2]

(c) Some white blood cells produce antibodies as part of the body's defence against pathogens.

Describe the role of antibodies in defence of the body.

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..... [4]

(d) The immunity gained after infection by a pathogen is active immunity.

Explain how active immunity differs from passive immunity.

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..... [3]

[Total: 15]

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