Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

9827780326

BIOLOGY **0610/33**

Paper 3 Theory (Core) **May/June 2024**

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 **24** pages. Any blank pages are indicated.

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1 **(a)** Water is an important biological molecule.

The box on the left contains the word ‘Water’.

The boxes on the right contain some sentence endings.

Draw a line from the box on the left to each correct statement about water.

Draw **three** lines.

Water	breaks down to release energy.
	dissolves many substances.
	is a solute.
	is produced in photosynthesis.
	is required for digestion.
	is required for germination.

[3]

(b) Students investigated the movement of water in model animal cells using dialysis tubing.

Fig. 1.1 is a diagram of the apparatus used in the investigation.

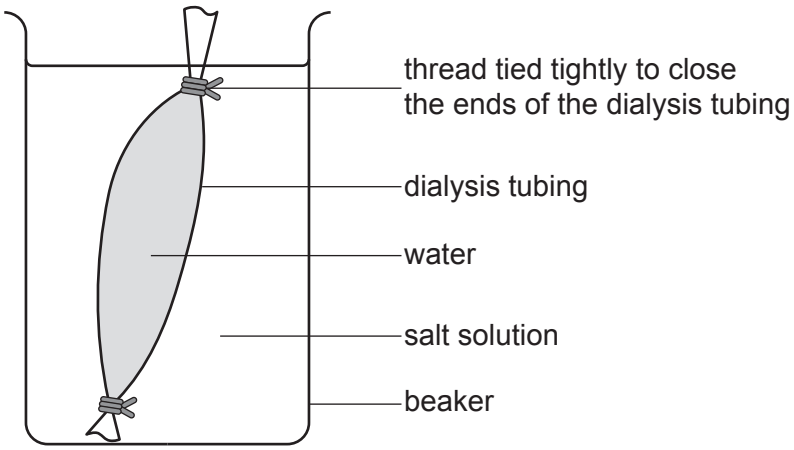


Fig. 1.1

(i) State the name of the part in Fig. 1.1 which represents:

the partially permeable membrane of an animal cell

.....

the cytoplasm of an animal cell.

.....

[2]

(ii) Draw an arrow **on Fig. 1.1** to show the direction of water movement during the investigation.

[1]

(iii) State the name of the process of water diffusing across a partially permeable membrane.

..... [1]

(c) Animal cells placed in pure water will burst.

State the structure that prevents a **plant** cell from bursting when it is placed in pure water.

..... [1]

[Total: 8]

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2 **(a)** Biological molecules are made of chemical elements.

Complete Table 2.1 by placing ticks (✓) in the boxes to show which chemical elements each biological molecule is made from.

Table 2.1

biological molecule	chemical elements in the biological molecule			
	carbon	hydrogen	nitrogen	oxygen
carbohydrate				
fat				
protein				

[3]

(b) Large molecules are made from smaller molecules.

The boxes on the left show the names of some small molecules.

The boxes on the right show the names of some large molecules.

Draw a line from each small molecule to the large molecule that it makes.

Draw **four** lines.

small molecule	**large molecule**
amino acid	glycogen
fatty acid	oil
glucose	protein
glycerol	

[4]

(c) (i) Complete the sentences about excretion.

Choose the correct words to complete the sentences.

assimilation **digestion** **faeces** **gain**

glucose **ions** **metabolism** **nitrogen**

plasma **removal** **urea**

Excretion is the ..... of the waste products of

..... and substances in excess of requirements.

A kidney excretes ..... , excess .....

and excess water.

[4]

(ii) State the name of an organ in the human body that excretes carbon dioxide.

..... [1]

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(d) Fig. 2.1 is a diagram of part of the human excretory system and associated blood vessels.

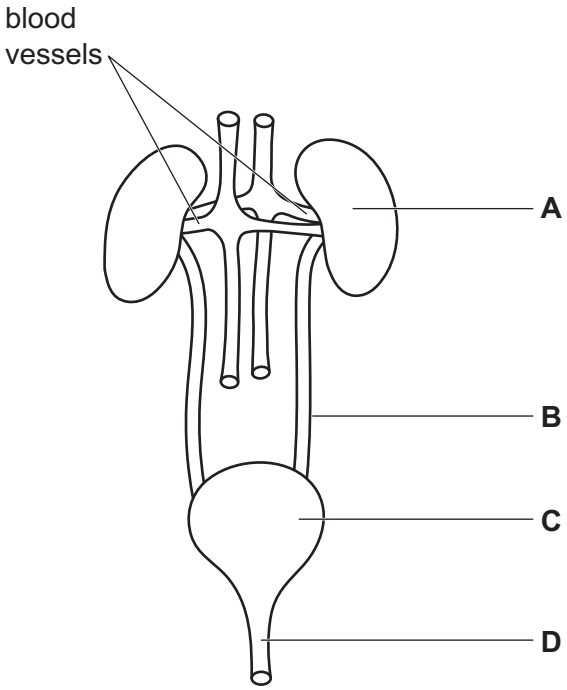


Fig. 2.1

(i) State the letter of a structure in Fig. 2.1 that excretes excess water.

..... [1]

(ii) State the letter in Fig. 2.1 that identifies the urethra.

..... [1]

(iii) State the name of the structure labelled **C** in Fig. 2.1.

..... [1]

(iv) State the name of the vein that removes blood from the kidneys.

..... [1]

(e) Excretion is one characteristic of living organisms.

State **two other** characteristics of living organisms.

1 .....

2 .....
[2]

[Total: 18]

3 Fig. 3.1 is a pedigree diagram for a plant that can have either blue flowers or purple flowers.

Blue flower colour is dominant to purple flower colour.

Key:

◇ plant with blue flowers

◆ plant with purple flowers

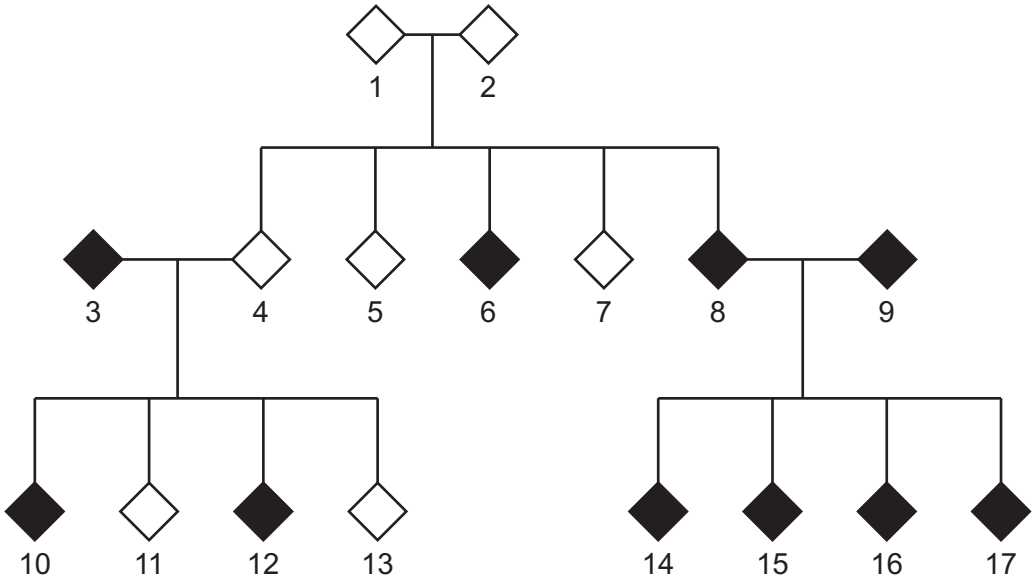


Fig. 3.1

The allele for blue flowers is represented by the letter **B**.

The allele for purple flowers is represented by the letter **b**.

The possible genotypes for these plants are **BB** or **Bb** or **bb**.

(a) (i) State the genotypes of plants **1**, **4** and **6** in Fig. 3.1.

plant **1** .....

plant **4** .....

plant **6** .....

[3]

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(ii) Describe how a gardener could use selective breeding to grow plants that only produce blue flowers.

.....

.....

.....

.....

.....

.....

..... [3]

(b) A different type of plant can produce red flowers or white flowers.

The allele for red flowers is dominant and is represented by the letter **R**.

The allele for white flowers is recessive and is represented by the letter **r**.

Two plants were crossed.

Complete the Punnett square by writing in:

- the colours of the parent plant flowers
- the offspring genotypes.

State the phenotypic ratio for this cross.

		plant with ..... flowers	
		R	**r**
plant with ..... flowers	**r**		
	r		

Phenotypic ratio …… red flowers : …….white flowers

[3]

(c) Table 3.1 contains some definitions of genetic terms.

Write the correct term next to each definition in Table 3.1.

Table 3.1

definition	term
structure made of DNA, which contains genetic information in the form of genes	
the observable features of an organism	
the transmission of genetic information from generation to generation	

[3]

[Total: 12]

4 Fig. 4.1 is a diagram of the human heart.

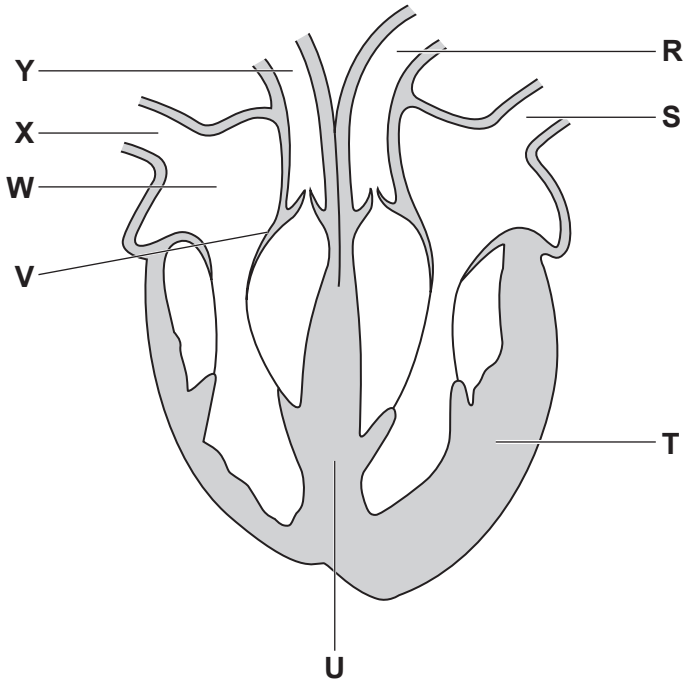


Fig. 4.1

(a) Complete Table 4.1, using Fig. 4.1. Letters may be used once, more than once or not at all.

Table 4.1

description or function	structure	letter in Fig. 4.1
transports blood from the lungs to the heart		**S**
contracts to pump blood out of the heart	ventricle	
	valve	**V**
	atrium	
separates the left and right sides of the heart		**U**

[6]

(b) Describe **two** ways the structure of an artery differs from the structure of a vein.

1 .....

.....

2 .....

.....

[2]

[Total: 8]

5 **(a)** **(i)** Describe the role of the mammalian nervous system.

.....

.....

..... [1]

(ii) State the **two** parts of the **central** nervous system.

1 .....

2 .....

[2]

(b) Fig. 5.1 is a diagram showing a reflex arc.

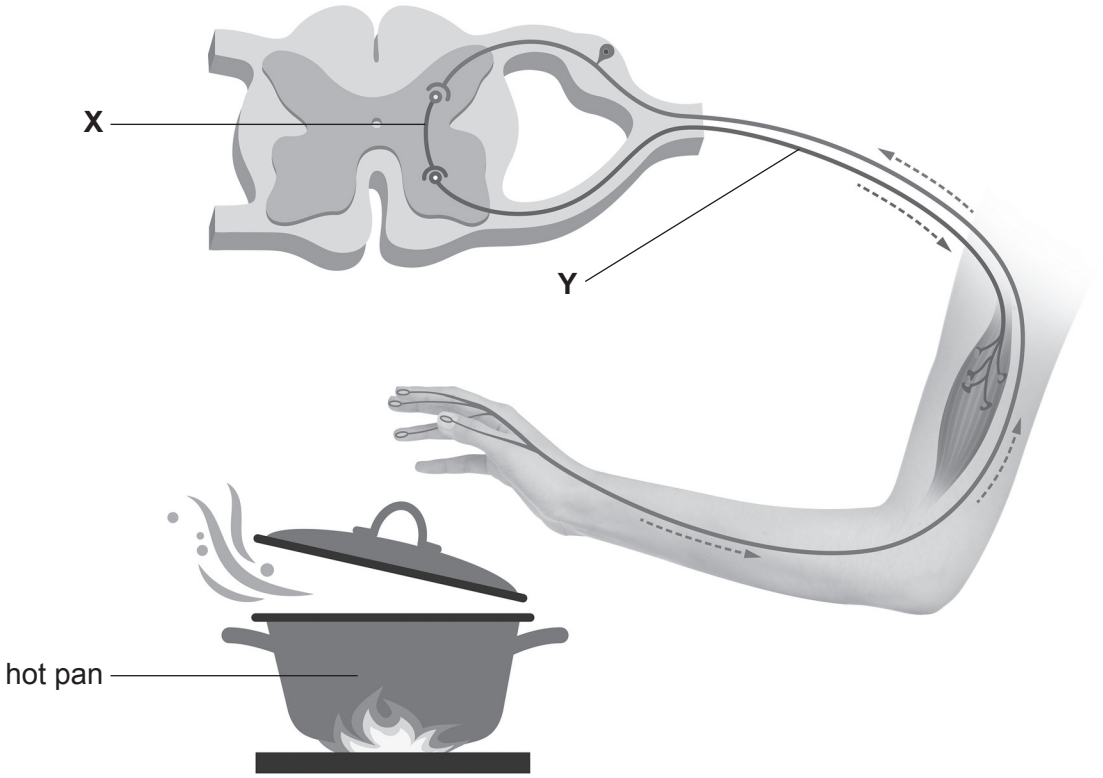


Fig. 5.1

Complete the sentences about the reflex arc.

The hot pan shown in Fig. 5.1 is the ..... in this reflex arc.

The arrows shown in Fig. 5.1 represent the movement of an electrical

..... along the neurones.

X is a ..... neurone and **Y** is a ..... neurone.

A junction between two neurones is called a ..... .

[5]

[Total: 8]

6 **(a)** Water moves from the soil to a leaf.

Using words from the list, complete the flowchart by writing the names of the structures in the correct order in the spaces provided.

The words may be used once, more than once or not at all.

ciliated cell	**cuticle**	**guard cell**	**mesophyll cells**
phloem	**root hair cell**	**stomata**	**xylem**

water in the soil

⬇

.....

⬇

root cortex cell

⬇

.....

⬇

.....

⬇

air space in the leaf

[3]

(b) Fig. 6.1 shows part of a cross-section of a leaf.

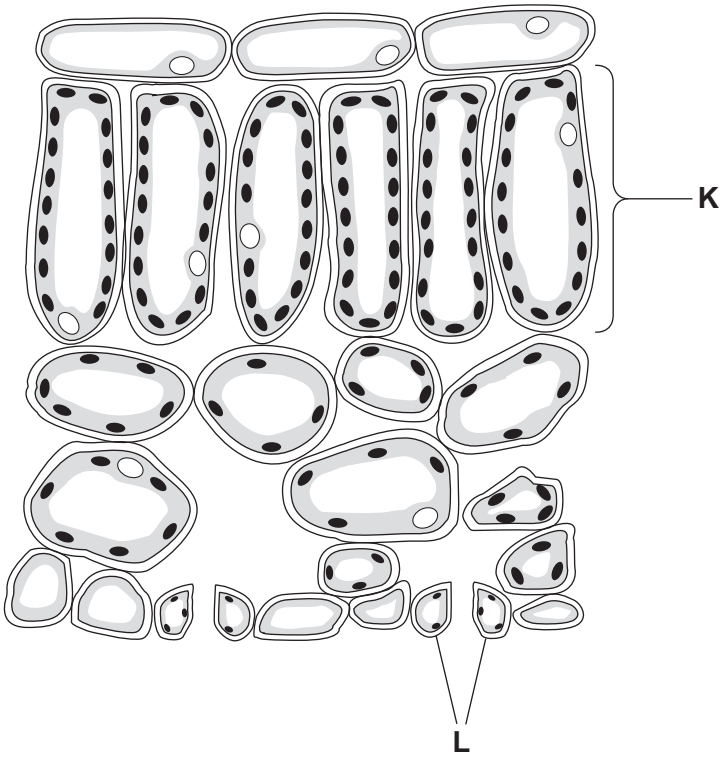


Fig. 6.1

(i) State the function of the parts labelled **L** on Fig. 6.1.

.....

.....

..... [1]

(ii) Describe how layer **K** in Fig. 6.1 is adapted for photosynthesis.

.....

.....

.....

.....

.....

.....

..... [3]

(c) A scientist investigated the effect of temperature on the rate of transpiration from leaves.

Fig. 6.2 shows the apparatus used.

The mass of the leafy shoot and test-tube of water was measured at 0 minutes and at 60 minutes.

The apparatus was used at a range of temperatures.

All variables apart from temperature were kept the same.

There was no air movement during this investigation.

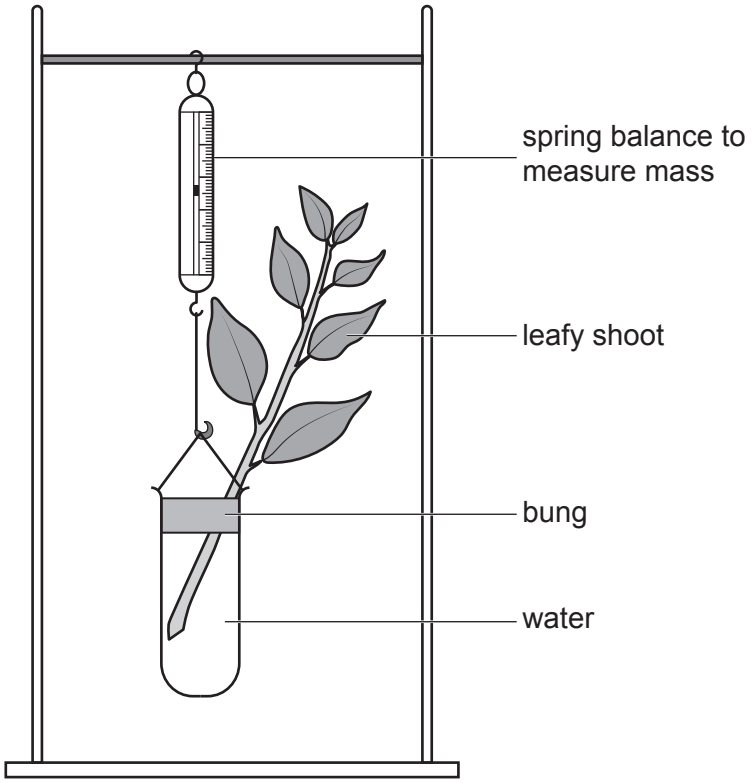


Fig. 6.2

Table 6.1 shows the results.

Table 6.1

temperature / °C	mass at 0 minutes / g	mass at 60 minutes / g	mass lost / g
5	25.0	24.5	0.5
10	25.0	24.0	1.0
15	25.0	23.0	2.0
20	25.0	20.5	
25	25.0	16.7	8.3
30	25.0	8.0	17.0

(i) Calculate the mass lost at 20 °C. Write your answer **in Table 6.1**. [1]

(ii) Calculate the percentage decrease in mass at 25 °C.

Give your answer to the nearest whole number.

Space for working.

.....%
[3]

(d) Describe the effect of temperature on the rate of transpiration for the data shown in Table 6.1.

.....

.....

..... [1]

(e) The apparatus was used for a new investigation to determine the effect of wind speed on transpiration.

The temperature was maintained at 25 °C.

A fan was used to move air past the leafy shoot.

Predict the effect of increased wind speed on the rate of transpiration **and** on the mass of the leafy shoot.

.....

.....

.....

.....

..... [2]

[Total: 14]

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7 **(a)** The mineral ion iron is a component of a balanced diet.

People who do **not** get enough iron from their diet can develop anaemia.

Fig. 7.1 shows the percentage of children with anaemia in four countries in the year 2000 and in the year 2015.

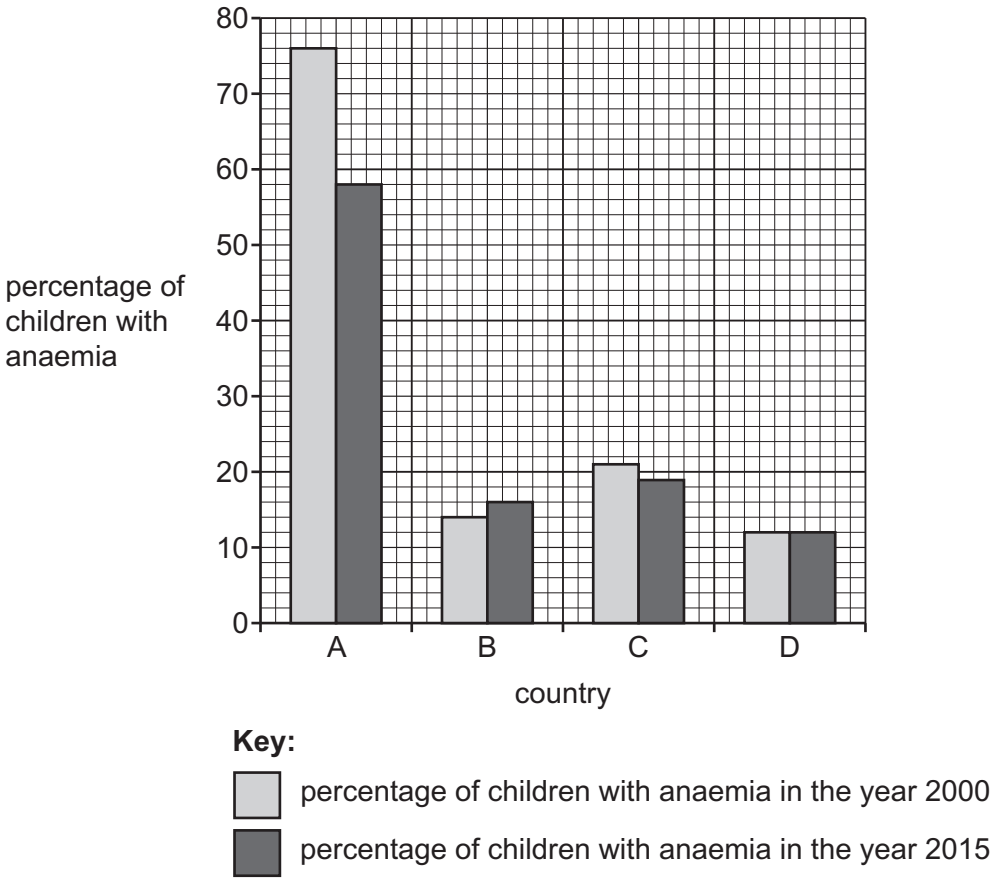


Fig. 7.1

Describe the data shown in Fig. 7.1.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Mineral ions are part of a balanced diet.

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

1 .....

2 .....

3 .....

[3]

(c) Some crop plants have been genetically modified to improve their nutritional value.

(i) State the meaning of the term genetic modification.

.....

.....

.....

.....

..... [2]

(ii) Describe **two** examples of genetic modification in crop plants, **other than** improving their nutritional value.

1 .....

.....

.....

2 .....

.....

.....

[2]

(iii) State **two** reasons why bacteria are often used for genetic modification.

1 .....

2 .....

[2]

[Total: 12]

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