

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
BIOLOGY B**
Unit 1 Modules B1 B2 B3
HIGHER TIER
THURSDAY 7 JUNE 2007

H B631/02

Morning
Time: 1 hour

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)



* C O P / T 3 0 6 2 4 *

Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.

FOR EXAMINER'S USE		
Section	Max.	Mark
A	20	
B	20	
C	20	
TOTAL	60	

This document consists of **18** printed pages and **2** blank pages.

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Answer **all** the questions.

Section A – Module B1

1 Many diseases in the body are caused by microorganisms.

These microorganisms are called pathogens.

(a) If a pathogen enters a human body, the pathogen is attacked by the immune system.

A number of chemicals are important in this response.

Draw a line from each **chemical** to its correct **meaning**.

chemical	meaning
antibody	a chemical on the surface of pathogens
antigen	a chemical released by white blood cells
toxin	a poisonous chemical that is produced by pathogens

[2]

(b) A person can take drugs containing antibiotics to destroy certain pathogens.

Write down **one** reason why an antibiotic may not be able to destroy a particular pathogen.

.....

..... [1]

(c) It is important that doctors only give patients antibiotics if they really need them.

Explain how the overuse of antibiotics can produce problems.

.....

.....

..... [2]

[Total: 5]

2 Steve eats a beef burger in a roll and drinks a glass of beer.

A
roll:
contains
carbohydrate
and fibre

B
beer:
contains water
and alcohol



D
lettuce:
contains
vitamin C and
fibre

C
beef burger:
contains protein
and iron

© OCR

(a) Which part of the meal helps to prevent the disease scurvy?
Choose from **A**, **B**, **C** or **D**.

..... [1]

(b) (i) Steve is 18 years old.

His body mass is 80 kilograms.
This meal contains 20g of protein.

How many of these meals would supply Steve with his RDA for protein?
Use this formula:

$$\text{RDA in grams} = 0.75 \times \text{body mass in kilograms}$$

number of meals [1]

(ii) Explain why the proteins in the beef burger are called 'first class proteins'.

.....
..... [2]

(iii) Although beef burgers are high in protein, vegetarians do not eat meat.

Suggest **one** reason why a person may decide to be a vegetarian.

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

(c) Drinking large quantities of beer over a long period of time can lead to liver damage.

Why is the liver, in particular, damaged by drinking alcohol?

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

[Total: 6]

3 Jack is going skiing in the snow.



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He is worried about getting too cold.

(a) What is the name given to the condition in which the body gets too cold?

..... [1]

(b) Jack is in a warm room, waiting to go skiing.

He has put on special clothes to keep him warm.

His face starts to look red.

Explain why.

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

[Total: 4]

4 This article appeared in a recent newspaper.

Scientists find first step to a new life

British scientists have found a gene that controls the first stage in making a new life.

They have found a gene called HIRA.

This gene codes for a chemical.

This chemical is needed to allow the DNA of two parents to join.

Sometimes this gene undergoes a mutation.

This explains why some eggs do not form embryos even after the egg and the sperm seem to have joined.

(a) What name is given to the joining of the DNA from an egg and a sperm?

..... [1]

(b) The gene called HIRA codes for the production of a chemical.

What type of chemical do genes code for?

..... [1]

(c) A mutation in the HIRA gene stops the joining of the DNA from the two parents.

Write about mutations.

Your answer should include

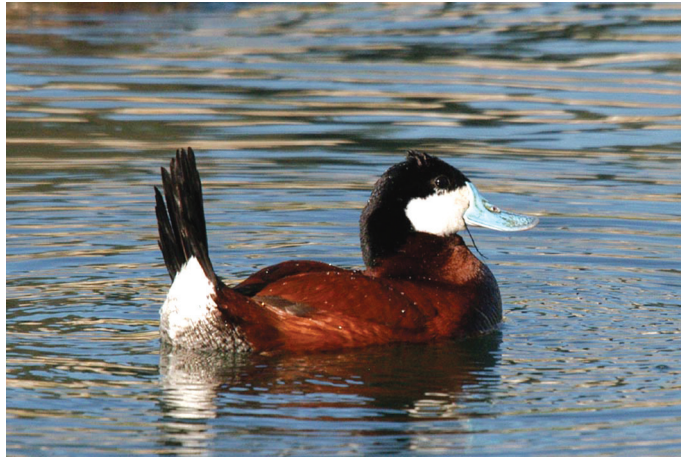
- what a mutation is
- why a mutation can alter the functioning of a cell.

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

[Total: 5]

Section B – Module B2

- 5 Look at the picture.
It is an American duck called the ruddy duck.



© Mike Yip, www.vancouverislandbirds.com

- (a) The ruddy duck belongs to the class of vertebrates called birds.

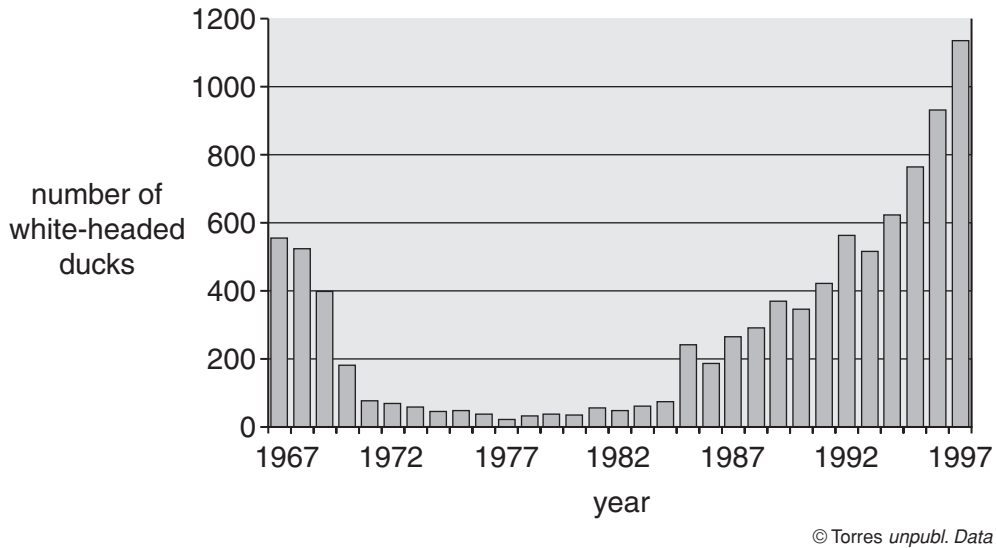
Write down **one** characteristic **only** birds have.

..... [1]

(b) The ruddy ducks escaped from captivity and settled in Spain in the 1940s.

They competed with the Spanish white-headed duck.

The graph shows the number of white-headed ducks in Spain between 1967 and 1997.



(i) Look at the graph.

Describe the change in population of the white-headed duck between 1967 and 1997.

.....

..... [2]

(ii) In 1977, there were only 22 white-headed ducks left in Spain.

To prevent the extinction of the white-headed duck, ruddy ducks were killed.

Describe **one other** way the white-headed duck might have been helped.

.....

..... [1]

[Total: 4]

6 The picture shows a fossil of a pterodactyl.



© Heather Angel / Natural Visions

(a) Describe how the pterodactyl became fossilised.

.....
.....
..... [2]

(b) The pterodactyl fossil is part of the fossil record.

The fossil record shows how organisms have changed over time.

Suggest **two** reasons why the fossil record is incomplete.

1
2 [2]

(c) Charles Darwin introduced a theory to explain how organisms change over time.

He called his theory natural selection.

Darwin based this theory on the idea that within a species there is variation and those best adapted will survive and reproduce.

Jean Baptiste de Lamarck had a different theory about evolution.

(i) Describe how Lamarck's theory was **different** from Darwin's.

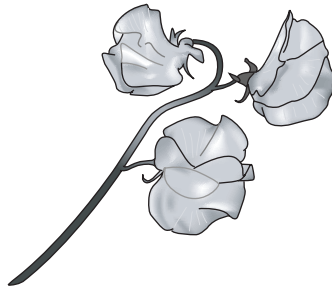
.....
.....
..... [1]

(ii) Describe how Lamarck's theory was **similar** to Darwin's.

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

[Total: 6]

7 The diagram shows the flowers of a sweet pea plant.



(a) Look at the diagram.

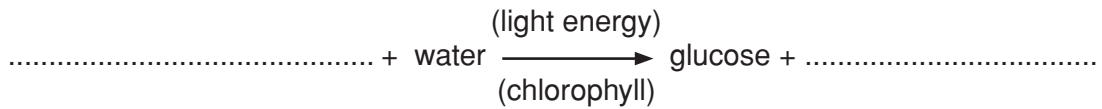
Pea plants are pollinated by insects.

Write down **two** adaptations of insect pollinated flowers.

- 1
- 2 [2]

(b) (i) Pea plants photosynthesise.

Complete the word equation for photosynthesis.



[1]

(ii) Write down **two** factors that can **increase** the rate of photosynthesis.

- 1
- 2 [2]

(c) Pea plants are legumes.

They have nitrogen-fixing bacteria in their roots.

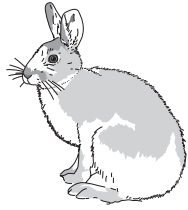
Explain how the bacteria and the pea plant **benefit** from their relationship.

Bacteria gain

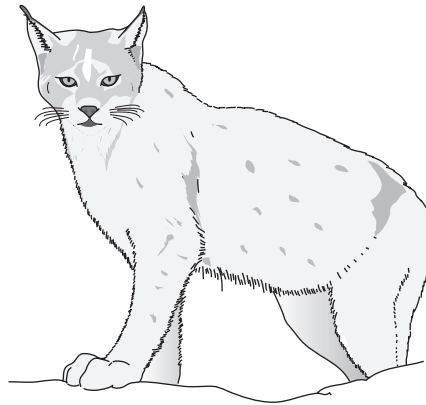
Peas gain [2]

[Total: 7]

8 In Canada, lynx hunt hares.



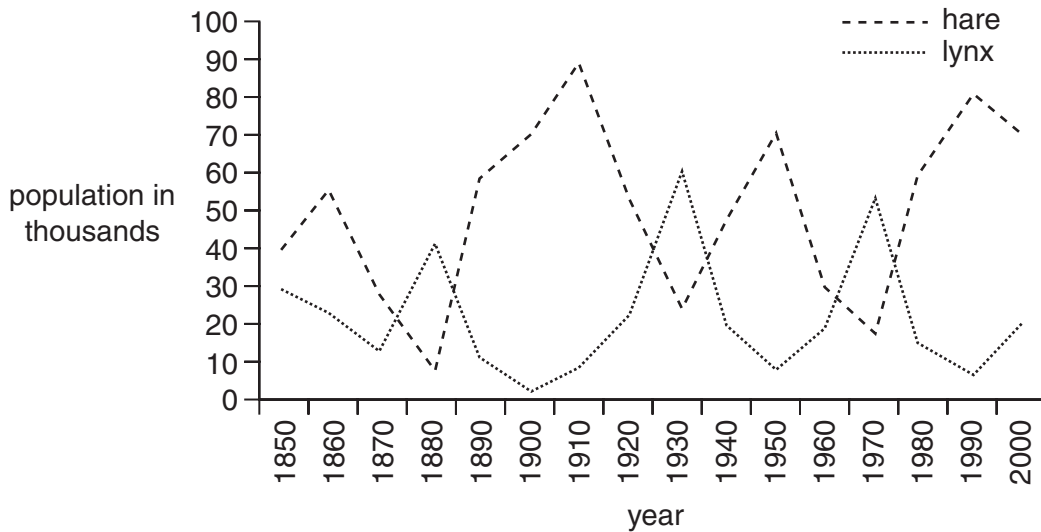
hare



lynx

Look at the graph.

It shows the change in population of the lynx and the hare.



Explain how the population of lynx and hare regulate one another.

.....

.....

.....

.....

..... [3]

[Total: 3]

Section C – Module B3

9 This question is about cells.

(a) (i) Kangaroos have 12 chromosomes in each **skin** cell.

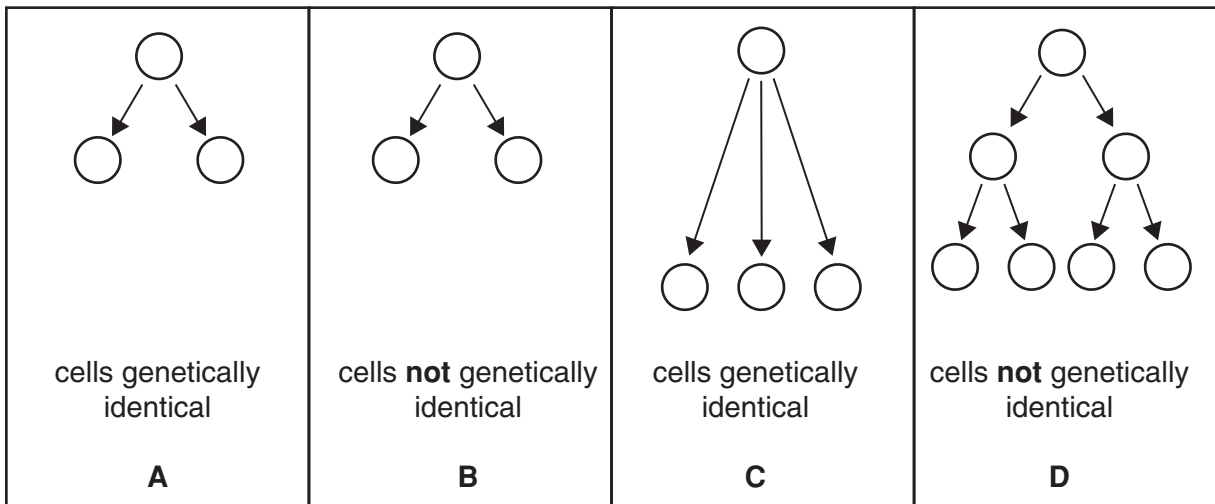
How many chromosomes are in a **sperm** cell from a kangaroo?

.....[1]

(ii) How many chromosomes are in a **kidney** cell from a kangaroo?

.....[1]

(b) Look at the diagrams of cell division.



(i) Which diagram describes **meiosis**?

Choose **A, B, C** or **D**.

.....[1]

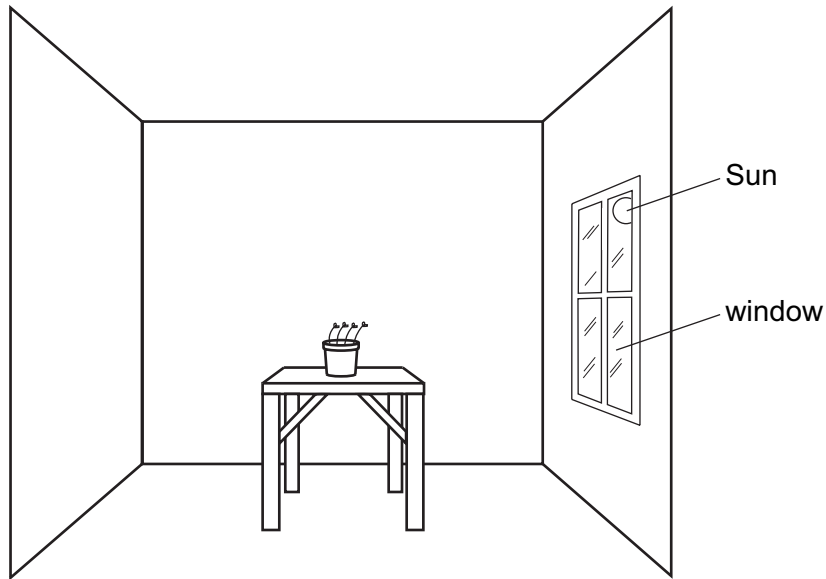
(ii) Which diagram describes **mitosis**?

Choose **A, B, C** or **D**.

.....[1]

[Total: 4]

10 Mary is investigating how cress seedlings grow.



(a) She finds out that cress seedlings grow towards light.

Look at the list.

positive geotropism

negative geotropism

positive phototropism

negative phototropism

Which term describes the response of cress seedlings growing towards light?

Choose your answer from the list.

.....[1]

(b) What causes cress seedlings to grow towards light?

In your answer, include

- the plant hormone involved
- what the hormone does.

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

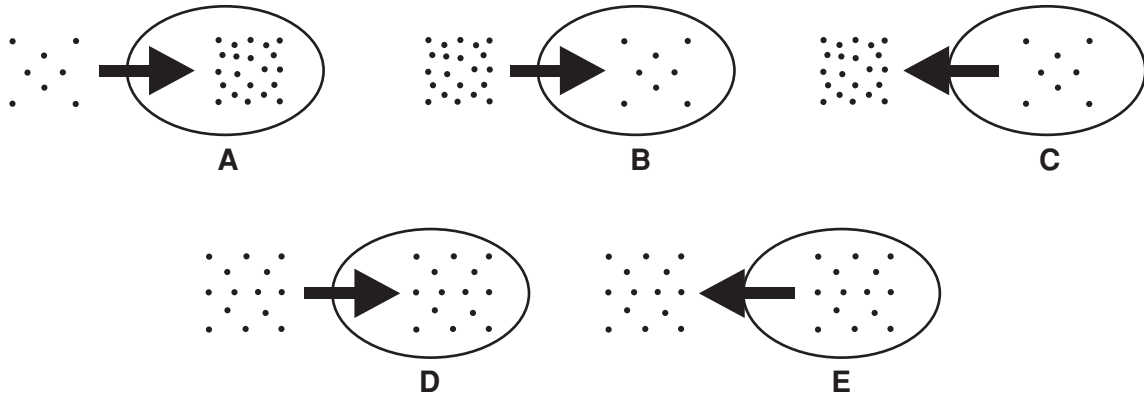
[Total: 4]

[Turn over

11 (a) Substances such as oxygen can enter and leave cells by diffusion.

Look at the diagrams of five cells.

The dots show the concentration of oxygen.

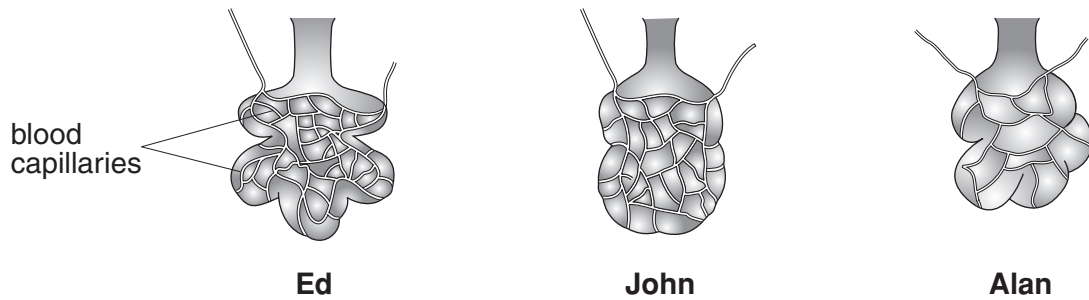


Which diagram shows the diffusion of oxygen?

Choose **A**, **B**, **C**, **D** or **E**.

.....[1]

(b) The diagrams show air sacs from the lungs of three different people.



(i) What is the scientific name for the air sacs in lungs?

.....[1]

(ii) Look at the diagrams.

Ed has the greatest rate of diffusion of oxygen into his blood.

Describe **two** reasons why.

1

.....

2

.....[2]

[Total: 4]

12 (a) Many chemical reactions in cells are controlled by enzymes.

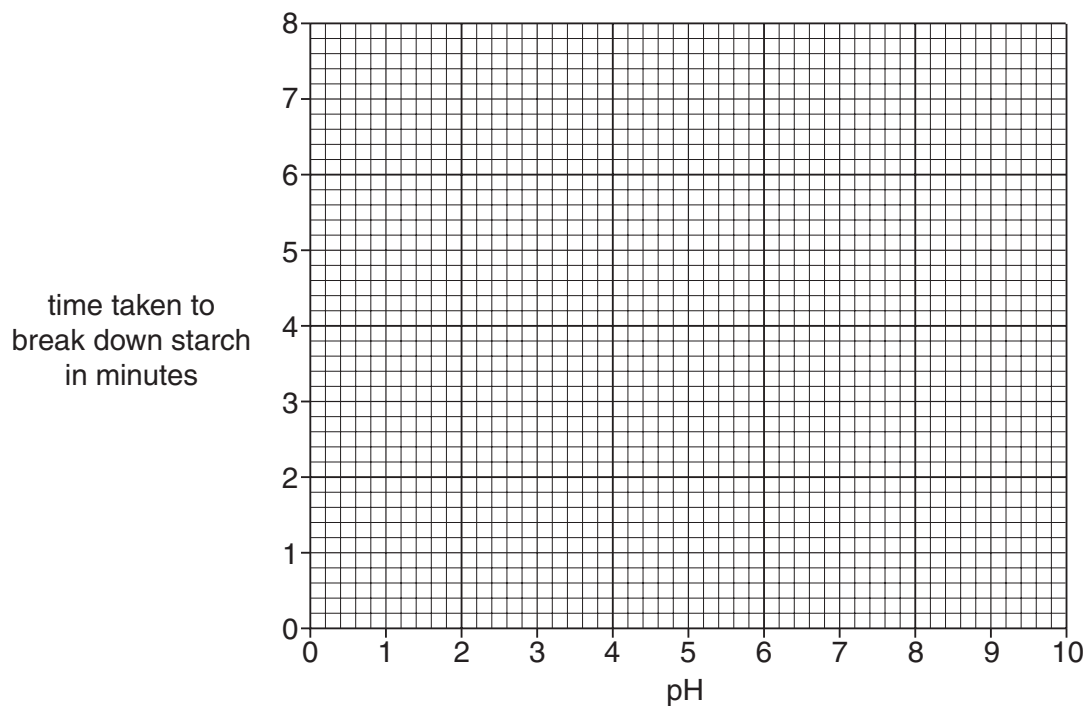
Amylase is an enzyme that breaks down starch.

Clare is investigating how pH affects the time it takes for amylase to break down starch.

The table shows her results.

pH	time taken to break down starch in minutes
2	8.0
4	6.0
6	4.2
8	3.5
10	4.0

(i) Plot the results on the grid below. Finish the graph by drawing the best line.



[2]

(ii) Look at the graph. What is the **optimum** pH of amylase?

.....[1]

(b) Amylase takes much longer to break down starch at pH 12.

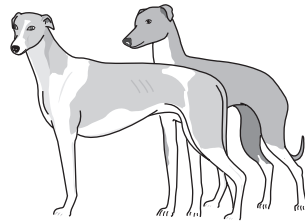
Suggest why.

.....[1]

[Total: 4]

[Turn over

13 (a) Natasha is a dog breeder. She breeds racing dogs called greyhounds.



Over the next few years, she wants to produce better racing dogs by selective breeding.

The first stage is to breed her fastest female dog with a fast male dog.

Describe the next stages.

.....
.....
.....
.....[2]

(b) Natasha makes sure that the dogs she breeds together do **not** have the same parents.

Explain why.

.....
.....
.....[2]

[Total: 4]

END OF QUESTION PAPER

19
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Q.5b graph Torres *unpubl. Data*. Source: Hughes et al, *The status of the North American ruddy duck oxyura jamaicensis in the western palearctic: towards an action plan for eradication*, 1999. The Wildfowl and Wetlands Trust (WWT), www.wwt.org.uk
Q.6 photo © Heather Angel / Natural Visions

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