OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B6.3 HOW DOES OUR UNDERSTANDING OF BIOLOGY HELP US CLASSIFY THE DIVERSITY OF ORGANISMS ON EARTH? (HIGHER)

SCORE	PERCENTAGE
/12	%

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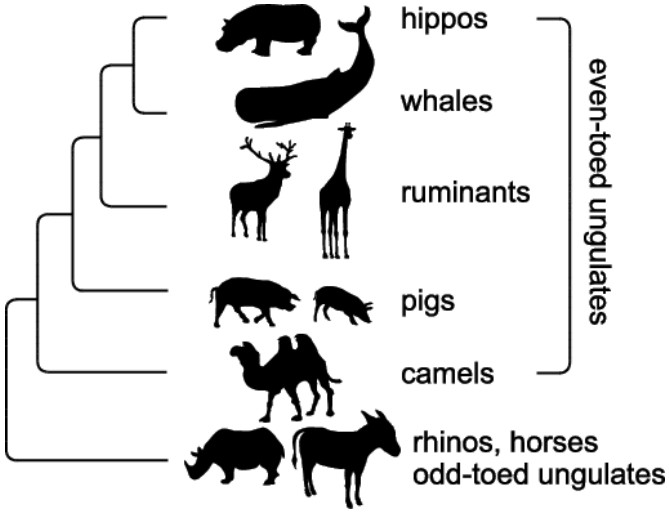
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1. Knowledge of genetics and DNA analysis has allowed scientists to group organisms based on similarities in their DNA.

Scientists can then draw conclusions about the evolutionary relationships between organisms.

An evolutionary tree can be drawn to highlight these relationships.

An example is shown below.



Are hippos more closely related to whales or to pigs?

Justify your answer using evidence from the evolutionary tree in your answer.

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[2]

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2(a). Read the article about classification.

Scientists use amino acid sequences to classify living things.

Scientists know that DNA codes for amino acids. They also know that amino acids are joined together to make proteins. By examining the sequence of amino acids in the same proteins in different animals, scientists can work out how closely related the animals are. The more similar the sequence, the more closely related organisms are. This technique is now being used to classify organisms in a completely new and more reliable way.

The table shows the sequence for eleven amino acids in humans and four other organisms.

Organism	Sequence of amino acids in a protein											Number of differences
	1	2	3	4	5	6	7	8	9	10	11	
Human	Gly	Asp	Val	Glu	Lys	Gly	Lys	Lys	Ile	Phe	Ile	
A	Gly	Asp	Ile	Glu	Lys	Gly	Lys	Lys	Val	Phe	Val	3
B	Gly	Asp	Val	Glu	Lys	Gly	Lys	Lys	Ile	Phe	Val	1
C	Gly	Asp	Ile	Glu	Lys	Gly	Lys	Lys	Ile	Phe	Val	2
D	Gly	Asn	Pro	Asp	Ala	Gly	Ala	Lys	Leu	Phe	Lys	7

Look at organisms **A, B C and D**. The shaded boxes show where the sequence of amino acids differs from that found in humans.

The column on the right shows the total number of these differences.

Describe and explain the conclusions that can be made from the data in the table.

Use the information in the article to help you.

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[3]

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(b). Suggest how the data could be improved to make scientists more confident in their conclusions.

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[2]

(c). Look at the statements about the classification and identification of different organisms.

Put a tick (✓) in the boxes next to the **two** statements that describe advantages of using DNA technology.

Can be done without specialised laboratory equipment.	☐
Can identify species from small parts of the organism.	☐
Can identify organisms from photographic evidence.	☐
Can be used to compare anatomical features.	☐
Can distinguish between species that look very similar.	☐

[2]

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3. Syed investigates the similarity between the DNA of six species, **A** to **F**.

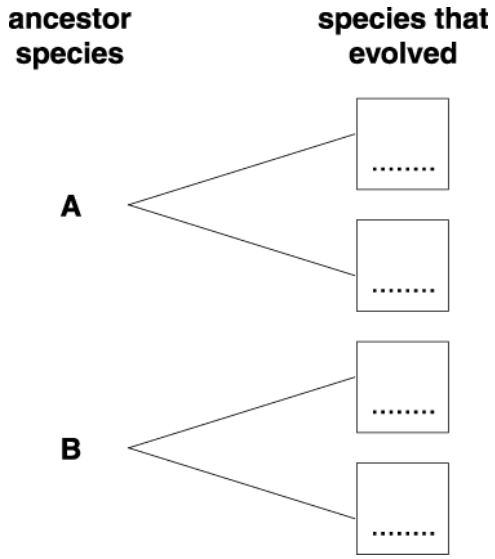
His results are shown in the table.

DNA of ancestor species	Similarity with DNA of species			
	C	D	E	F
A	Very low	Very high	Very low	Very high
B	Medium	Very low	Medium	Very low

(i) Syed's data can be used to work out the evolutionary relationships between the species.

He knows that species **A** and **B** lived before species **C**, **D**, **E** and **F** existed.

Write the letters in the correct boxes to show the **species that evolved** from each ancestor.



[1]

(ii) Syed thinks species **D** and **F** were formed most recently.

Explain why he is correct.

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[2]

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END OF QUESTION PAPER

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