# Classification & evolution

## Question Paper 2

| | |
|---|---|
| Level | A Level |
| Subject | Biology |
| Exam Board | OCR |
| Module | Biodiversity, evolution and disease |
| Topic | Classification & evolution |
| Booklet | Question Paper 2 |

**Time allowed:** **53 minutes**

**Score:** **/39**

**Percentage:** **/100**

**Grade Boundaries:**

| A* | A | B | C | D | E |
|---|---|---|---|---|---|
| >69% | 56% | 50% | 42% | 34% | 26% |

## Question 1

Which of the following options, **A** to **D**, lists the three domains of life?

A. Archaea, Bacteria and Eukaryota

B. Bacteria, Prokaryota and Eukaryota

C. Prokaryotae, Protoctista and Eukaryota

D. Protoctista, Plantaea and Animalia **[1]**

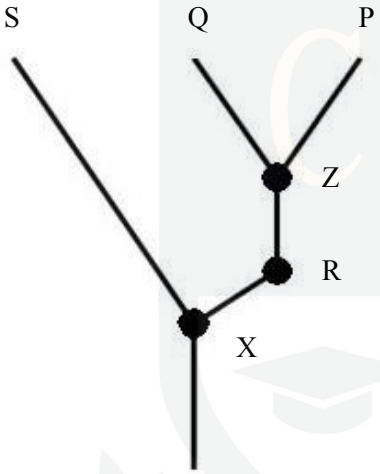
## Question 2

Q, P, R and S are related species of organisms.

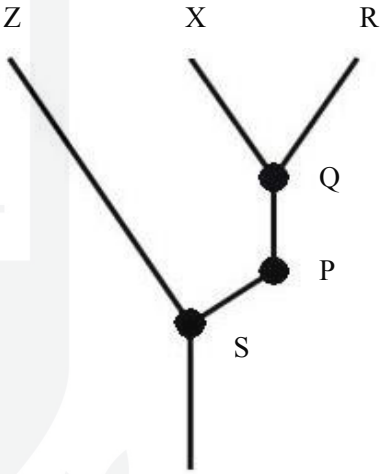
Species X is an extinct recent common ancestor of species Q and R. X,
Q and R all evolved from species P.
Species S is the least related to the others, with extinct species Z being its most recent phylogenetic link to the other species.

Which of the following phylogenetic trees correctly represents the relationships described above?

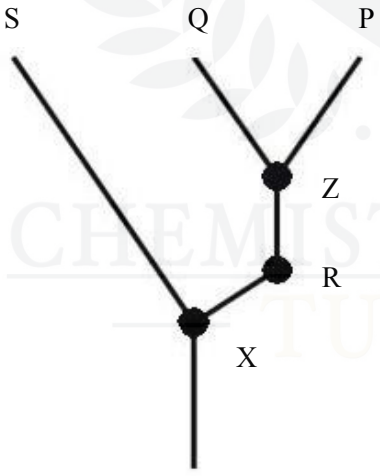
**A**



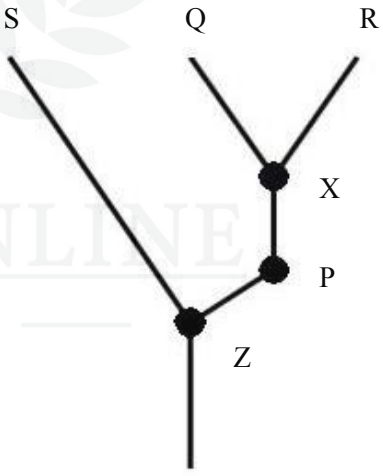

**B**




**C**




**D**




**[1]**

## Question 3

In 2006, the scientific journal, Nature, reported the discovery of a fossil from around 380 million years ago. It was given the name *Tiktaalik roseae*.

This fossil has some features in common with fish and some features in common with amphibians.

A photograph of the fossil is shown in Fig. 1.1.


**Fig. 1.1**

A diagram of the fossil viewed from above is shown in Fig. 1.2.

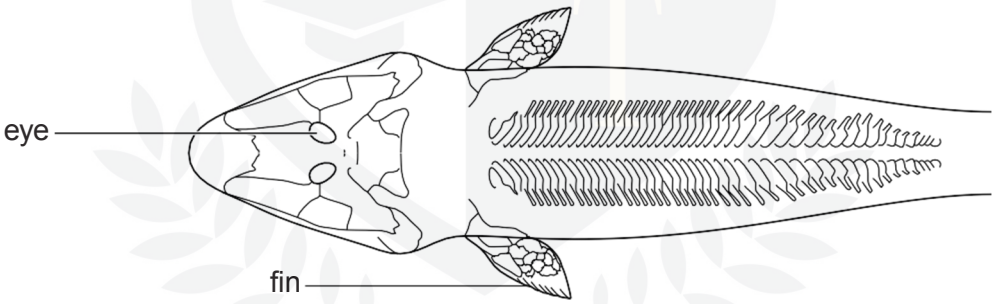



**Fig. 1.2**

**(a) (i)** Suggest **one** adaptation, **visible in Fig. 1.1 and Fig. 1.2**, which would be an advantage for life under water. **[1]**

**(ii)** Suggest **one** adaptation, **visible in Fig. 1.1 and Fig. 1.2**, which would be useful for an animal that lives on the sea bed. **[1]**

**(b)** *Tiktaalik roseae* is a member of the kingdom Animalia. The structure of its individual cells has not been preserved by fossilisation.

State **two** features of cells of an organism from the kingdom **Plantae** that would **not** have been present in the cells of *T. roseae.* **[2]**

**(c)** Fossils provide strong evidence that organisms have evolved over time.

Describe **other** types of evidence that support the theory of evolution.

**[6]**



**[Total: 10]**

## Question 4

Living organisms can be classified into five kingdoms, based on certain key characteristics.

(a) Table 2.1 shows some of the characteristics of the five kingdoms.

Complete the table.

**Table 2.1**

| kingdom | membrane-bound organelles | cell wall | type(s) of nutrition |
|---|---|---|---|
| prokaryote | absent | present – made of peptidoglycan | |
| | present | sometimes present – composition varies | heterotrophic and autotrophic |
| fungi | | present – made of chitin | heterotrophic |
| | present | | autotrophic |
| animal | | absent | heterotrophic |

**[6]**

**(b)** An unknown species is discovered. Its cells contain many nuclei scattered throughout the cytoplasm of thread-like structures.

Suggest the kingdom to which this species belongs. **[1]**

**(c)** Living organisms can also be classified into three groups called **domains**.

Outline the features of this system of classification compared with the five kingdom system. **[3]**



**[Total: 10]**

## Question 5

Bats are the only mammals that can truly fly. Many species of bat hunt flying insects at night. Bats are able to use sound waves (echolocation) in order to help them find their prey in the dark.

(a) Suggest how the ability to use echolocation may have evolved from an ancestor that did not have that ability. **[4]**

The pipistrelle is the most common species of bat in Europe. It was originally thought that all pipistrelles belonged to the same species, *Pipistrellus pipistrellus*. However, in the 1990s, it was decided that there were two species: the common pipistrelle, *Pipistrellus pipistrellus* and the soprano pipistrelle, *Pipistrellus pygmaeus*.

Data for both species are provided in Table 3.1.

**Table 3.1**

| species | mean body mass (g) | mean wingspan (m) | range of echolocation call (kHz) | colour |
|---|---|---|---|---|
| common pipistrelle | 5.5 | 0.22 | 42–47 | medium to dark brown |
| soprano pipistrelle | 5.5 | 0.21 | 52–60 | medium to dark brown |



**(b) (i)** Name the genus to which the soprano pipistrelle belongs. **[1]**

**(ii)** Using the data in Table 3.1, suggest why pipistrelles were originally classified as one species. **[1]**

**(iii)** State **two** pieces of **molecular** evidence that can be used to identify organisms as belonging to different species. **[2]**

**(iv)** Describe how it is possible to confirm, over a longer period of time, whether two organisms belong to different species or the same species. **[2]**

**(c)** The soprano pipistrelle has an echolocation call that is 'high pitched' (between 52 and 60 kHz). The common pipistrelle has an echolocation call that is 'low pitched' (between 42 and 47 kHz).

Variation within and between species can be as a result of genetic or environmental factors. Whatever the causes of variation, the type of variation displayed can occur in two different **forms**.

Using the pipistrelle as an example, describe the key features of both **forms** of variation.

*In your answer you should make it clear how genes and environment relate to each form of variation.* **[7]**

**[Total: 17]**