**1.** In the hierarchy of taxa, what is in a family?

A. A group of classes

B. A group of genera

C. A group of orders

D. A group of phyla

(Total 1 mark)

**2.** *Pseudolarix amabilis* produces seeds but not flowers. *Physcomitrella patens* has leaves but not roots.
To which groups do they belong?

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| --- | --- | --- |
|  | ***Pseudolarix amabilis*** | ***Physcomitrella patens*** |
| A. | coniferophyta | filicinophyta |
| B. | filicinophyta | angiospermophyta |
| C. | coniferophyta | bryophyta |
| D. | angiospermophyta | coniferophyta |

(Total 1 mark)

**3.** To which group do sponges belong?

A. Cnidaria

B. Filicinophyta

C. Porifera

D. Mollusca

(Total 1 mark)

**4.** Which phylum does an animal belong to, if it has stinging tentacles and a mouth, but no anus?

A. Annelida

B. Cnidaria

C. Porifera

D. Platyhelminthes

(Total 1 mark)

**5.** Why has antibiotic resistance evolved in bacteria?

A. All bacteria reproduce very quickly.

B. Bacteria exposed to antibiotics developed a resistance to them.

C. Varieties of bacteria resistant to antibiotics reproduce faster than non-resistant varieties.

D. Bacteria showing resistance to antibiotics survive after antibiotics are used.

(Total 1 mark)

**6.** Which taxa do *Zerynthia rumina* and *Zerynthia polyxena* share?

A. They share the same class but not the same family.

B. They share the same species but not the same class.

C. They share the same class but not the same genus.

D. They share the same family but not the same species.

(Total 1 mark)

**7.** What is the mechanism of natural selection?

A. Any individuals in a population can be selected entirely by chance.

B. After a change in the environment a species will evolve adaptations to the new conditions.

C. If an adaptation to the environment is useful, an individual will develop it and pass it on to its offspring.

D. Variations amongst individuals of a population are selected by a changing environment.

(Total 1 mark)

**8.** Which of the following is a characteristic of platyhelminthes?

A. Many pairs of legs

B. Flat body

C. Hard exoskeleton

D. Presence of cnidocytes

(Total 1 mark)

**9.** Which phylum does the plant below belong to?

 

A. Angiospermophyta

B. Bryophyta

C. Coniferophyta

D. Filicinophyta

(Total 1 mark)

**10.** Two different trees have been classified as *Pinus pinea* and *Pinus nigra*. Which of the following statements is correct?

A. Both trees belong to the same class but a different genus.

B. Both trees belong to the same family and same genus.

C. The species name of both trees is *Pinus*.

D. The family names are *pinea* and *nigra*.

(Total 1 mark)

**11.** Which of the following are used as evidence for evolution?

I. Homologous structures

II. Selective breeding of domesticated animals

III. Overproduction of offspring

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

(Total 1 mark)

**12.** Which of the following will promote variation in a species?

I. Meiosis

II. Fertilization

III. Natural selection

A. I only

B. II only

C. I and II only

D. I, II and III

(Total 1 mark)

**13.** Which process tends to reduce variety within a population?

A. Natural selection

B. Random fertilization

C. Independent assortment

D. Crossing over

(Total 1 mark)

**14.** *Triarthus* was a trilobite that lived on Earth about 500 million years ago. The diagrams below show its structure, viewed from above and below. The structure was discovered by studying fossils of *Triarthus.*

 

[Source: R Fortrey, (2000), *Trilobite!*, page 62]

(a) There are many animals living on Earth today that belong to the same phylum as the trilobites, but there are no living trilobites. Deduce, with a reason, the phylum to which *Triarthus* belonged.

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(b) Outline the evidence for evolution provided by fossils.

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(c) Some trilobites swam in clear, shallow water and had very large eyes. Suggest how species with large eyes could evolve from species with smaller eyes.

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(2)

(Total 6 marks)

**15.** The cladogram below shows how closely related a group of species of spiders are on the Hawaiian island group. Two of the species have not been given a scientific name. Three pairs of the spiders spin very similar webs. These are shown on the diagram. The island on which the spider lives is also indicated.



[Source: T A Blackledge and R G Gillespie (November 2004), *Proceedings of the National Academy of Sciences*, **101**, (46),
pages 1622816233]

(a) Deduce whether spiders that spin similar webs or spiders that live on the same island are more closely related.

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(b) Mitochondrial DNA from the spiders was analysed to produce the cladogram. Outline the method of analysing the DNA to produce evidence for cladograms.

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(c) Explain the evidence in the diagram for

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(i) convergent evolution;

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(ii) adaptive radiation.

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(Total 8 marks)

**16.** (a) Outline the properties of RNA that may have allowed it to play a role in the origin of life.

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(b) Outline the evidence provided by DNA for the common ancestry of living organisms.

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(c) The cladogram below shows the classification of species A to D. Deduce how similar species A is to species B, C and D.

 

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(d) Suggest **two** reasons for using cladograms for the classification of organisms.

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(Total 8 marks)

**17.** Explain the biochemical evidence provided by DNA and protein structures for the common ancestry of living organisms.

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(Total 6 marks)

**18.** There is evidence that body size of animals tends to increase over time. In this study, fossils and living species from the genus *Poseidonamicus*, deep-sea ostracods, were used to test this hypothesis. The numbers on the dotted line represent the number of different *Poseidonamicus* species found either as fossils or living. For each time period, the average valve length of all species studied is plotted. Valve length is an indication of total body size. The continuous line is the estimated temperature of their deep-sea habitat.

 

 [Adapted from Gene Hunt and Kaustuv Roy. 2006. “Climate change, body size evolution, and Cope’s Rule in deep-sea ostracodes”. *Proceedings of the National Academy of Sciences*. Vol 103, issue 5. Pp 1347–1352 (Figure 1). Copyright 2006, National Academy of Sciences, USA.]

(a) Calculate the percentage increase in valve length between the species studied from 40 million years ago and the species from the present day.

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(b) Suggest **two** reasons for the increase in the number of species of *Poseidonamicus* over time.

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(c) Evaluate the hypothesis that changes in size of *Poseidonamicus* are caused by changes in sea temperature.

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(3)

(Total 7 marks)

**19.** *Up to two additional marks are available for the construction of your answers.*

**(2)**

 (a) Plants are a diverse group of eukaryotic organisms. Describe the different characteristics of the bryophyta, filicinophyta, coniferophyta and angiospermophyta.

(9)

(b) Plants store carbohydrate in the form of starch. Explain the reasons for starch being digested by the human digestive system.

(4)

(c) Compare the structure of prokaryotic and eukaryotic cells.

(5)

(Total 20 marks)