Extinction

1 According to the fossil record, which statement is accurate?
(1) Most of the species that have lived on Earth no longer exist.
(2) Most of the species that have lived on Earth still exist today.
(3) Fossils of species that never existed can be found.
(4) Fossils of species that never existed, but will exist in the future, can be found.

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2 A photograph of a polar bear in its environment is shown below.

Source: http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/environment/3_adapt_to_fit1.shtml

One possible reason why polar bears might not be able to survive if the environment they live in changes is because
(1) the species will experience decreased competition for mates
(2) the new environment will cause greater variation in the species
(3) there will be a larger variety of food sources available
(4) they are adapted to the specific environment in which they now live

Base your answers to questions 3 on the information below and on your knowledge of biology.

The Galapagos pink land iguana, Conolophus marthae (C. marthae), is native to only one of the Galapagos Islands. Its entire range is currently limited to Wolf Volcano on Isabella Island. The iguana was first discovered on this island in 1986. Genetic studies of the animal began sometime later, and it was identified as a species separate from other iguana populations on the Galapagos in 2009. Its population might have been as high as 100 in 1986, but now there might be as few as 10 of the animals left alive.

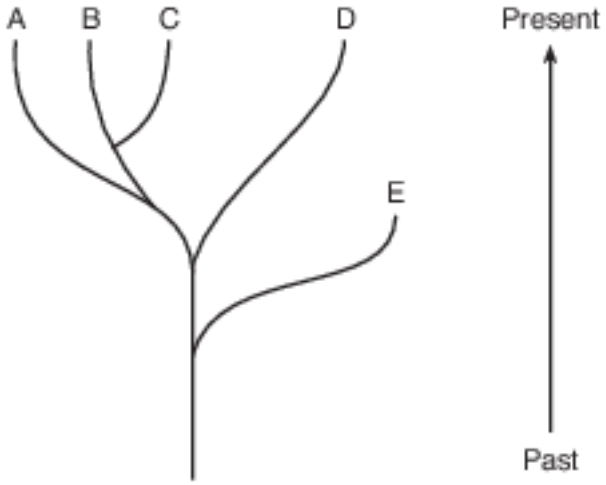
Other evidence indicates that this species could have diverged from another line of iguanas about 5.7 million years ago. After that, the other line of iguanas diverged into two other species, C. pallidus and C. subcristatus.

3 In the future, the current population of about ten pink land iguanas will probably
(1) migrate to new islands in the Galapagos in order to survive
(2) soon become extinct, because they have little genetic diversity
(3) undergo evolution by natural selection and survive
(4) soon become extinct, because they have too much genetic diversity

4 Ecologists are concerned that the golden-winged warbler population is at a dangerously low level. One reason this could lead to extinction of this warbler is that
(1) after a species becomes extinct, it won't be able to carry out its role in the ecosystem
(2) there may not be enough diversity among the birds for the species to be able to survive an environmental change
(3) extinction always occurs when populations begin to decrease in number
(4) an increase in biodiversity within a population often causes the population to be classified as threatened or endangered

5 Examination of ancient rock layers at a certain location reveals many different fossils. Which conclusion can be drawn concerning the species that formed these fossils?
(1) Only the predators are still present.
(2) Many of them are now extinct.
(3) They produced offspring that were all genetically identical.
(4) They had no variations due to mutations.

6 The diagram below represents an evolutionary tree.



Which statement best describes species E?
(1) Species D is an ancestor of species E.
(2) Through natural selection, species E produced increased survival mechanisms.
(3) Species E had greater success due to patterns of behavior.
(4) Species E had insufficient adaptive characteristics for survival in a changing environment.

7 Extinction occurs when the environment changes and
(1) a species can reproduce successfully
(2) an individual has adaptive characteristics insufficient to allow survival
(3) all members of a species are no longer living
(4) one individual produces some offspring that evolve into a new species

8 A scientist at a large natural history museum has a collection of fossils that were found throughout the world. Only a few of the fossils represent species that are still alive on Earth today. One reason for this is that
(1) most of the species that have ever lived on Earth are alive today
(2) most of the species that have ever lived on Earth are extinct
(3) fossils of only extinct species have been found
(4) species alive today will not form any fossils for future discovery by scientists

9 Fossils provide evidence that
(1) life on Earth millions of years ago was more complex than life is today
(2) the changes that will occur in species in the future are easy to predict
(3) many species of organisms that lived long ago are now extinct
(4) most species of organisms that lived long ago are exactly the same today

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10 As the rate of environmental change has increased over the last 50-100 years, there has been an increase in extinction rates. Lower reproductive rates seem to have also contributed to this increase in extinctions.
Describe one possible reason for an increased extinction rate in populations of species with a lower rate of reproduction. [1]

Base your answers to questions 11 on the information and data table below and on your knowledge of biology.

Moose-killing Winter Ticks

Moose habitat is determined by temperature. Moose prefer areas where the average summer temperature is around 15°C and does not exceed 27°C for too long. The reason for this temperature dependency: Moose cannot sweat.

Besides the cooling effect of water, which moose are almost always near, aquatic environments provide them with a good supply of food, and in the past, have protected them against biting insects. However, the North American moose population is facing a new threat: a parasite called the winter tick. These ticks lodge themselves in the animal's fur and hold on through the winter, sucking the animal's blood. Many infected moose end up dying of exhaustion and weakness as a result of the large number of ticks feeding on them.

Ticks are most active during dry days in the fall. Adult ticks that drop off moose in the spring and land on snow cover have a poorer survival rate. Climate change can be predicted to improve conditions for winter ticks due to longer and warmer falls, and earlier snowmelt in the spring.

Surveys of the moose population in northeastern Minnesota have recorded the change shown below in the moose population between 2005 and 2013.

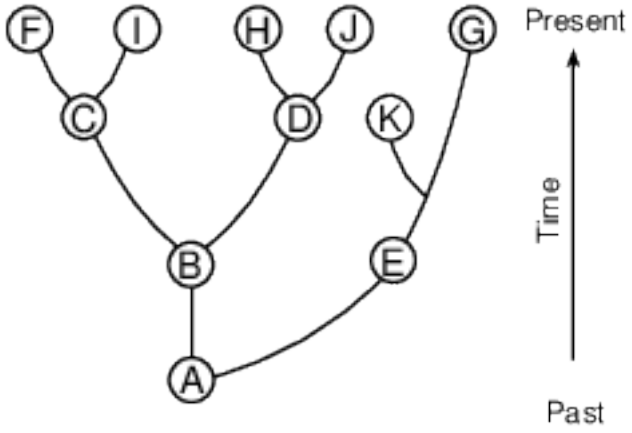
Estimated Moose Population In Northeastern Minnesota

Survey Year	Estimated Moose Population
2005	8160
2006	8840
2007	6860
2008	7890
2009	7840
2010	5700
2011	4900
2012	4230
2013	2760

Directions: Using the information in the data table, construct a line graph on the grid below, following the directions below.

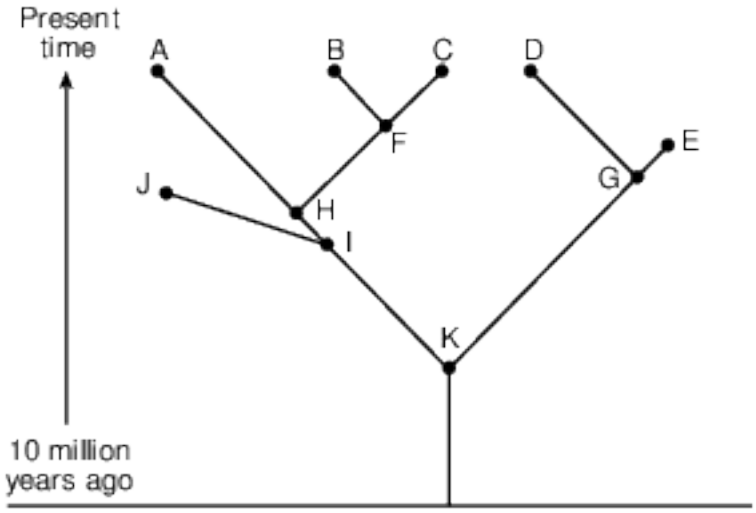
11 Explain how climate change could result in an increased number of moose infested with winter ticks. [1]

Base your answers to questions 12 on the information and diagram below and on your knowledge of biology. The diagram represents the evolutionary relationships among many organisms.



12 An environmental change severely affected the organism represented by species K. What was the result?
Support your answer. [1]

Base your answers to questions 13 on the diagram below and on your knowledge of biology. The diagram represents an evolutionary tree.



13 State one possible cause for the extinction of species E. [1]

14 Explain why changes in climate can result in the extinction of a species. [1]

Answer Keys

1 1

2 4

3 2

4 2

5 2

6 4

7 3

8 2

9 3

10 Allow 1 credit. Acceptable responses include, but are not limited to:
- — A lower rate of reproduction may not produce enough variation for this species to be able
- to survive an environmental change.
- — The reproductive rate may be too low to maintain survival of these organisms in a changing
- environment.

11 Allow 1 credit. Acceptable responses include, but are not limited to:
- — Falls are longer and warmer, increasing the chances of ticks surviving and infesting moose.
- — Climate change can be predicted to improve conditions for winter ticks through earlier
- snowmelt in the spring.
- — Ticks that fall off the moose onto soil instead of snow will survive.

12 Allow 1 credit for stating the result and supporting the answer.
- — Species K did not survive. They were not able to adapt to their new environment.
- — Species K became extinct because they could not survive in the changed environment.
- — They became extinct. The diagram shows that they did not survive to the present.

13 Allow 1 credit. Acceptable responses include, but are not limited to:
- — Species E was not fit for its environment.
- — Species E could not successfully compete in the environment.
- — The environment changed, and species E was not adapted to this change.
- — lack of food/resources

14 Allow 1 credit. Acceptable responses include, but are not limited to:
- — These changes could result in an environment not suitable for some species.
- — Extinction can result when a species lacks sufficient variation to survive in a changing
- environment.
- — A change could result in less food for the species.