Use the diagram below to answer question 1.



1. Which event most likely occurs next in mitosis?
2. The chromatin condenses.
3. The nuclear envelope dissolves.
4. The chromosomes double in number.
5. The cell membrane pinches inward to divide the cytoplasm.
6. Mitosis and meiosis are processes by which animal and plant cells divide. Which statement best describes a difference between mitosis and meiosis?

A. Meiosis is a multi-step process.

B. Mitosis occurs only in eukaryotic cells.

C. Meiosis is used in the repair of an organism.

D. Mitosis produces genetically identical daughter cells.

1. A scientist observes that a certain trait is determined by a single allele. An organism inherited one version of the trait from one parent and another version from the other parent. Both versions of the trait are expressed in the phenotype of the offspring. Which pattern of inheritance best classifies the observed trait?
2. dominance
3. sex-linkage
4. co-dominance
5. incomplete dominance
6. The bacterium Acetobacter aceti is found in acidic environments and has an acidic cytoplasm. For this reason, most of its proteins are able to function in acidic conditions. This property distinguishes Acetobacter aceti proteins from those of most other organisms. Which characteristic does Acetobacter aceti most likely share with other organisms?

A. the method that the organism uses to reproduce itself

B. the physical and chemical responses to environmental changes

C. the type of organelle used to produce energy for cellular functions

D. the process used to form proteins by transcription and translation

1. A mutation occurs at the midpoint of a gene, altering all amino acids encoded after the point of mutation. Which mutation could have produced this change?

A. deletion of two nucleotides

B. deletion of three nucleotides

C. insertion of six nucleotides

D. insertion of twelve nucleotides

1. The frequency of an allele in a fly population changes from 89% to 20% after three generations. Which other events most likely occurred during the same time period?

A. an environmental change and a fly population increase

B. an environmental change and a fly population decrease

C. interbreeding of flies with an invasive species and fly population speciation

D. interbreeding of flies with an established local species and fly population speciation

**Use the graph below to answer question 7.**

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1. Tail length in mice varies within a population. Scientists observed change in the distribution of tail lengths in a mouse population over time. At the genetic level, what has most likely happened to the allele for the shortest tail lengths?

A. The allele changed from being dominant to being recessive.

B. The allele changed from being autosomal to being sex-linked.

C. The allele became less frequent than the alleles for longer tail lengths.

D. The allele began to code for long tail lengths instead of the shortest ones.

Use the table below to answer question 8.

**Students’ Observations of a Pond Ecosystem**

|  |  |
| --- | --- |
| Quantitative | Qualitative |
| 37 fish and 3 frogs | Leaves lie on the bottom of the pond. |
| 2 types of aquatic grass | Water insects move along the water’s surface. |
| 12 small rocks and 1 medium rock | All 3 frogs are sitting on a pond bank. |
| sand |  |

1. A group of students measured a ten-square-meter section of a pond ecosystem and recorded observations. Which statement is a testable hypothesis?

A. The frogs living in the pond represent a population.

B. Water is an abiotic component in the pond ecosystem.

C. If the fi sh are given more food, then they will be happier.

D. If the frogs are startled, then they will jump into the water.

1. A researcher observing an ecosystem describes the amount of sunlight, precipitation, and type of soil present. Which factors is the researcher most likely describing?

A. biotic factors in a forest

B. biotic factors in a tundra

C. abiotic factors in a prairie

D. abiotic factors in an ocean

1. Scientists observed that the populations of top-level consumers in a particular ecosystem were rapidly decreasing. Further studies revealed that there was also a decline in producer productivity. Which other changes did the scientists most likely observe in the ecosystem?

A. increased producer diversity

B. decreased population size at all levels

C. decreased primary consumer populations only

D. increased primary and secondary consumer diversity

CONSTRUCTED-RESPONSE QUESTION

Use the graph below to answer question 11.



1. Isle Royale is located in Lake Superior. Isle Royale is home to populations of wolves and moose. The interactions between the wolves and moose, as well as the individual population sizes, have been studied since 1958. The graph shows the population sizes over time for both wolves and moose.

**Part A:** Describe one limiting factor for the moose population.

**Part B:** Explain one likely reason why the wolf population rapidly increased between 1975 and 1980.

**Part C:** Predict what will happen to the moose population’s size after 1994 by describing the shape of the curve. In your answer, be sure to explain the reasoning behind your prediction.