

1. Adult somatic cell nuclear transfer, also known as cloning, may potentially be a method to recover populations of endangered species. Recently, cloning was used on the last surviving cow of a rare breed from New Zealand.

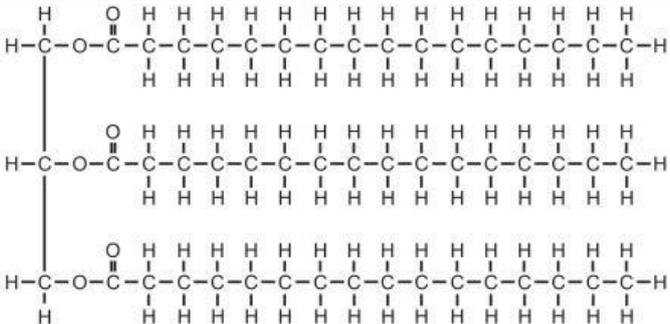
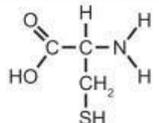
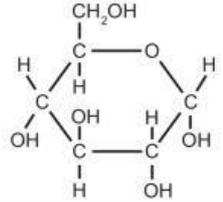
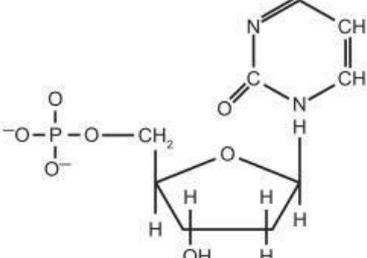
What is the strongest ethical and moral argument against continuing research and experiments in cloning endangered species?

- A. lack of mate selection for the cloned animals to reproduce
- B. likelihood that cloned organisms would introduce new diseases to native species
- C. possibilities that the process could be used on organisms for personal preference
- D. concern that it will disrupt the economic market for individuals selling uncloned animals

2. The chart shows the molecular structures of monomers associated with four common macromolecules.

Record the label of each macromolecule listed below in the box next to its monomer molecular structure.

### Macromolecules and Their Monomer Structures

Name of Macromolecule	Monomer Molecular Structure
	
	
	
	

#### Labels

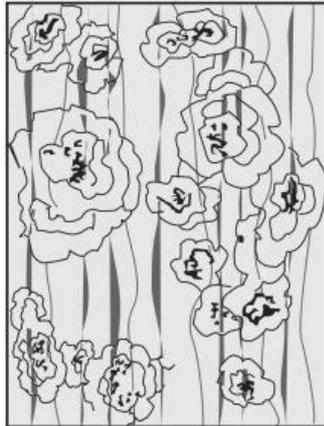
- (A) carbohydrate
- (B) lipid
- (C) nucleic acid
- (D) protein

Use the scenario to answer the next two questions.

### Peppered Moths

Before the Industrial Revolution in Great Britain, birds fed primarily on dark-colored moths. The Industrial Revolution caused environmental changes. Coal fires caused dark soot to be released into the air. This soot was then deposited on trees, grasses, and buildings. This change to the existing environment caused a change in the genetic frequencies demonstrated by moths in Great Britain.

#### Change in Peppered Moths

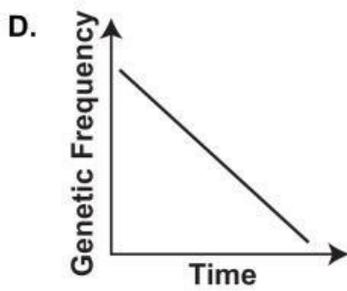
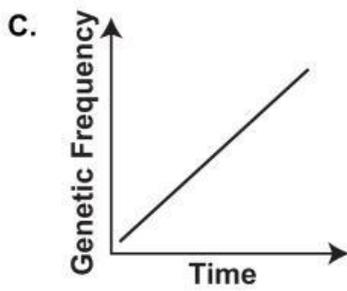
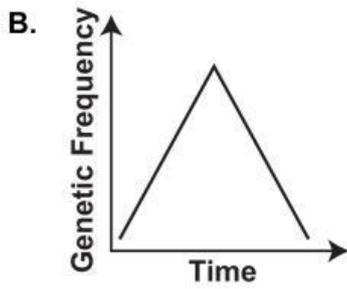
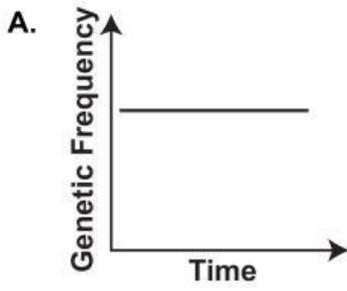


before Industrial Revolution



after Industrial Revolution

3. Which graph **best** represents the genetic frequency of the dark-colored moths during the Industrial Revolution in Great Britain?



4. Based on the information in the scenario, what caused the change in the genetic frequencies of the moths during the Industrial Revolution?
- A. genetic mutations due to the soot
  - B. natural selection due to predation
  - C. chemical poisoning due to poor air quality
  - D. overproduction due to excess food sources

5. Which **two** options identify contributions to cell theory that are attributed to Robert Hooke?
- A. discovered and named cells
  - B. stated all plants are made of cells
  - C. observed cork cell walls under a microscope
  - D. determined all cells come from other preexisting cells
  - E. stated all cells have the same basic chemical composition
  - F. discovered that hereditary information is passed on from cell to cell

6. All cells are either eukaryotic or prokaryotic.

**Part A:** Record the letter of an option in each box in the table to show whether the characteristic describes a eukaryotic cell, a prokaryotic cell, or both types of cell. The options may be used once, more than once, or not at all.

**Characteristics of Eukaryotic and Prokaryotic Cells**

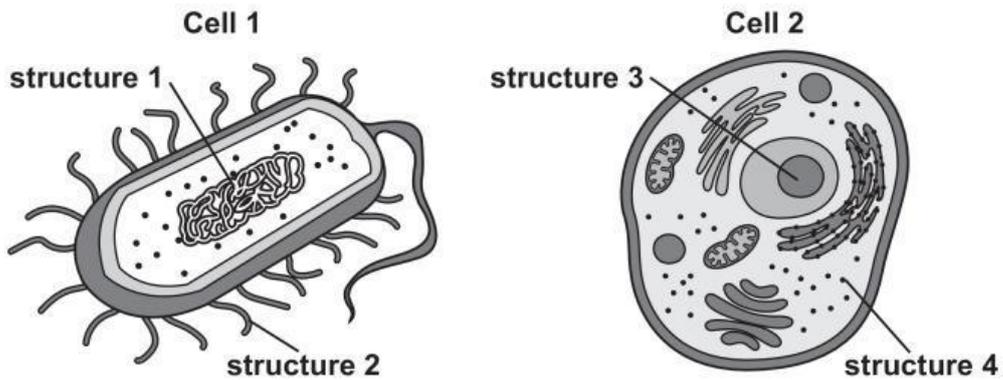
Characteristic	Type of Cell
has ribosomes	
has a cell membrane	
has DNA in the cytoplasm	
has membrane-bound organelles	

Options

- ① prokaryotic
- ② eukaryotic
- ③ both

**Part B:** The diagrams show a eukaryotic cell and a prokaryotic cell. On the diagram representing the eukaryotic cell, select the structure where the cellular DNA is stored.

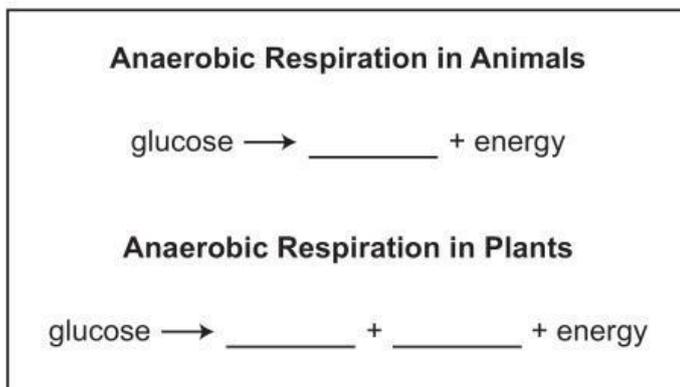
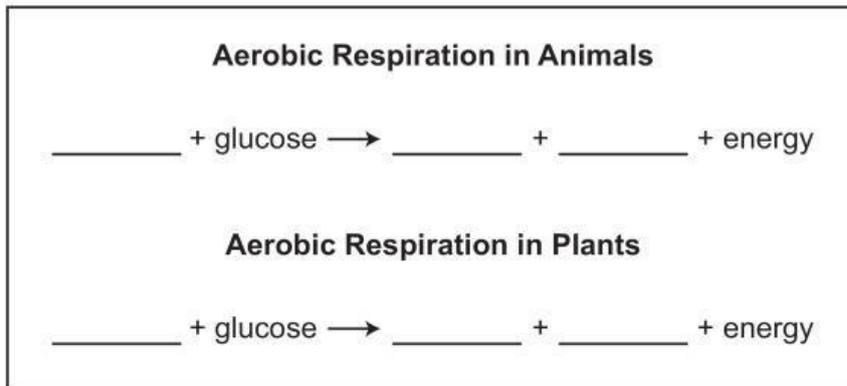
**Cellular Structures**



7. Mitosis and meiosis are two processes that can produce new cells in an organism. Which statement correctly compares and contrasts the new cells produced by each process?
- A. New cells produced by mitosis have unique genetic material, and new cells produced by meiosis have identical genetic material.
  - B. New cells produced by mitosis are responsible for reproduction, and new cells produced by meiosis are responsible for growth and repair.
  - C. New cells produced by mitosis are the result of two nuclear divisions, and new cells produced by meiosis are the result of one nuclear division.
  - D. New cells produced by mitosis maintain genetically identical offspring, and new cells produced by meiosis contribute to genetic diversity in offspring.

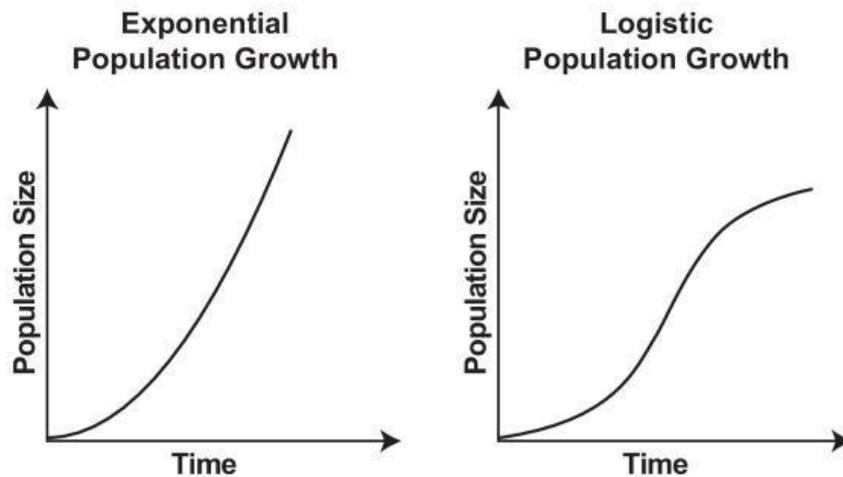
8. A student is comparing aerobic and anaerobic respiration in both animals and plants by constructing equations to represent these four general chemical reactions.

Record the letters of the missing substances from the list below into the equations where they belong. Some substances will be used more than once.



- (A) ethanol
- (B) water
- (C) oxygen
- (D) lactic acid
- (E) carbon dioxide

9. Under ideal circumstances in an environment, a population will grow exponentially. However, in studies of actual populations in various environments, scientists have found that the exponential growth rate a population may experience for a while will slow down and may eventually level off at a constant rate. This is called logistic growth.

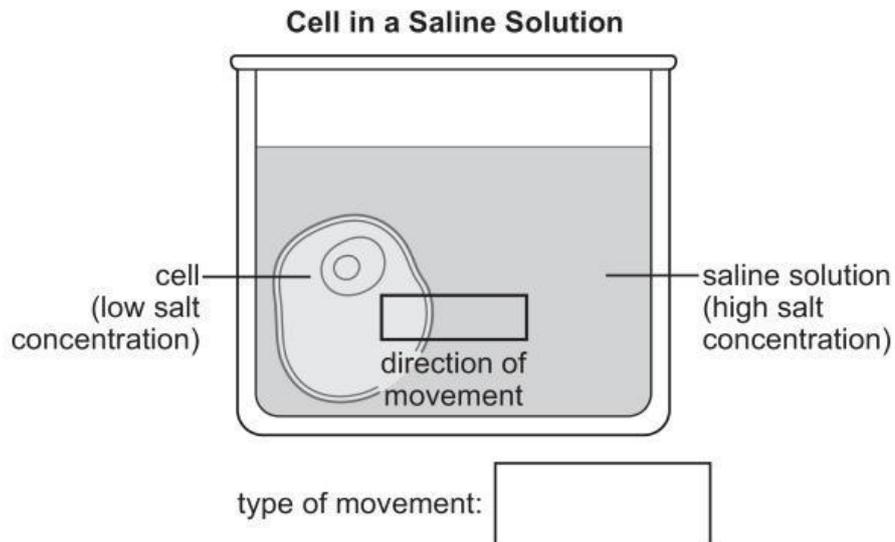


Which factor would **most likely** cause the growth rate of a population to shift from exponential to logistic growth?

- A. Predators that hunt the population are eliminated due to disease.
- B. The birth rate in the population exceeds the death rate in the population.
- C. The population consumes food resources as fast as they can be produced.
- D. A competing population migrates to another area, leaving an excess of food and space.

10. An incomplete diagram of a cell in a saline solution is shown. The concentrations of salt within the cell and the solution are given.

Draw an arrow in the box inside the beaker to show the **most likely** direction of water flow and record a label in the box below the beaker to **best** identify the type of movement occurring.



Direction of Movement



Type of Movement

① **active transport**

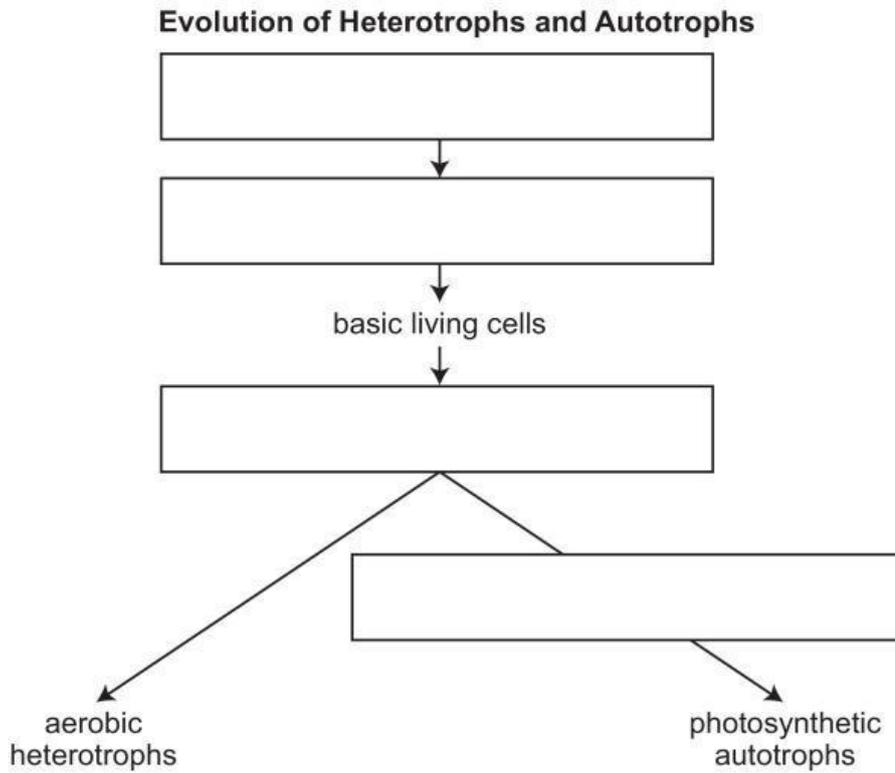
② **endocytosis**

③ **diffusion**

④ **osmosis**

11. The diagram shows an incomplete model of the evolution of heterotrophs and autotrophs.

Record the letter of a description in each box to correctly complete the model.



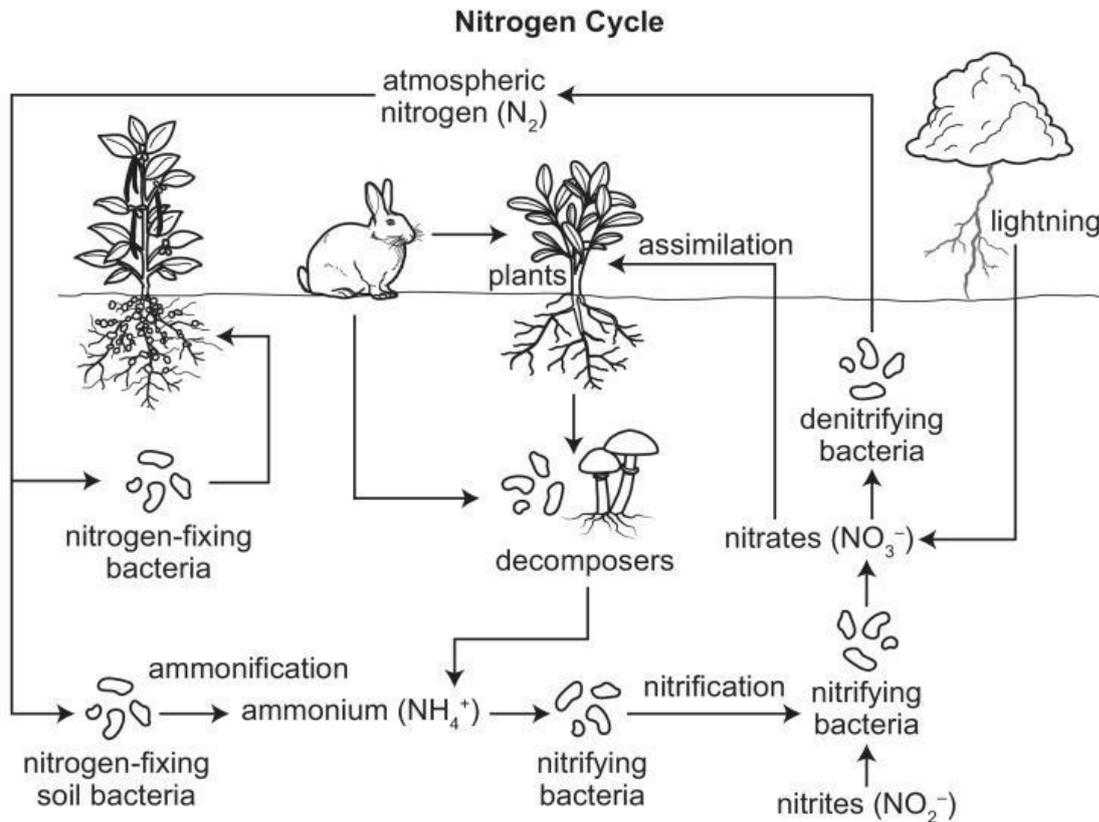
- ⒲ evolution of structures that use oxygen to break down sugars
- ⒫ evolution of structures that use light energy to form sugars
- Ⓐ formation of inorganic molecules
- Ⓒ formation of organic molecules

12. Which statement correctly compares viruses to bacteria?

- A. Viruses are larger than bacteria, but both have a nucleus that contains genetic material.
- B. Viruses are smaller than bacteria, but both have a nucleus that contains genetic material.
- C. Viruses have a cell wall for protection, while bacteria are not surrounded by a cell wall.
- D. Viruses have a protein capsule for protection, while bacteria are surrounded by a cell wall and a cell membrane.

13. Which step in cell division must occur first so that a young animal can grow into an adult?
- A. The chromosomes must duplicate.
  - B. The chromosomes must separate.
  - C. The cells must divide the cytoplasm.
  - D. The cells must produce spindle fibers.

14. The diagram models the flow of nitrogen through an ecosystem.



**Part A:** Based on the diagram, which component is a direct product of abiotic and biotic activities in this cycle?

- A. nitrates
- B. nitrites
- C. ammonium
- D. atmospheric nitrogen

**Part B:** What is the role of nitrogen-fixing bacteria in this cycle?

- A. making atmospheric nitrogen available for plants
- B. transforming sunlight energy into usable energy for plants
- C. breaking down dead plant matter and releasing it as nitrogen into the atmosphere
- D. increasing the amount of plant matter that decomposers can convert to ammonium