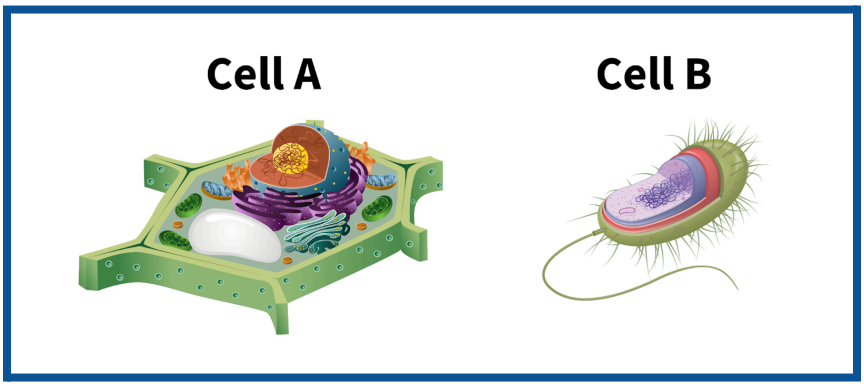
Summative #2

SB1. Cells Unit

NAME: **DATE:** **BLOCK:**

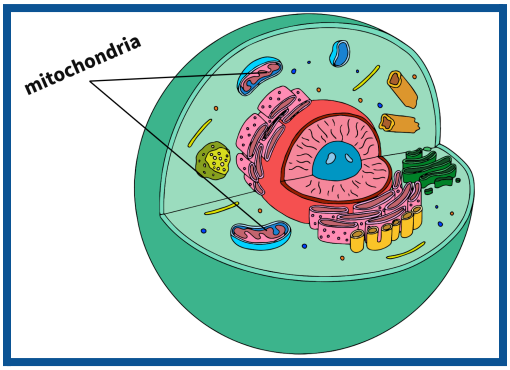
1. (SB1a) Two different types of cells are shown above, each with unique structures that help them function and survive.



Select all the characteristics that distinguish Cell A from Cell B.

A. Presence of a cell membrane
B. Presence of ribosomes
C. DNA contained within a nucleus
D. Presence of cytoplasm
E. Complex and advanced structure
F. Presence of membrane-bound organelles

2. (SB1a) The illustration presents a cross-section of a eukaryotic cell.



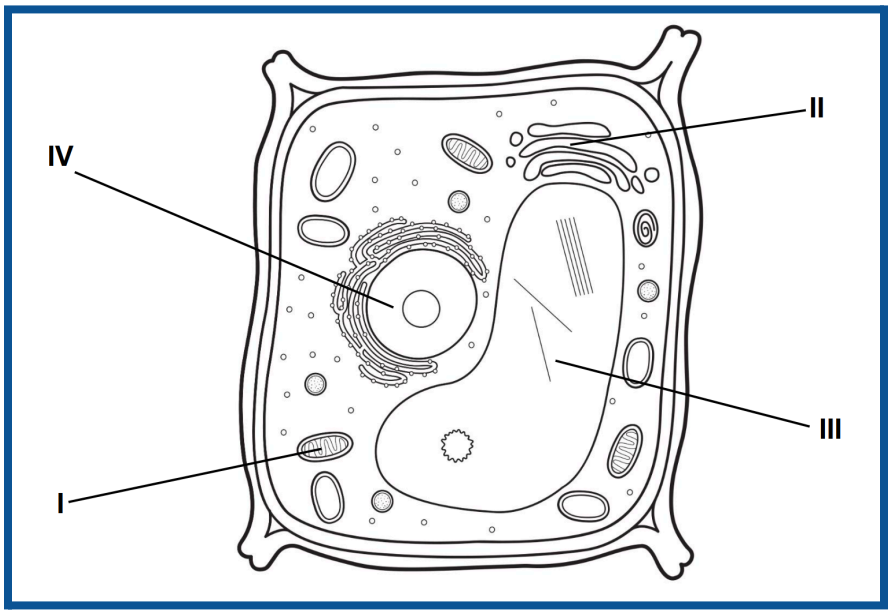
How do mitochondria function in relation to other organelles?

A. Mitochondria produce ATP, supplying energy for other organelles.
B. Mitochondria encode and assemble DNA for use in transcription by other organelles.
C. Mitochondria contain enzymes that degrade polymers received from other organelles.
D. Mitochondria manufacture proteins from other organelles and export them from the cell.

3. (SB1a) Which statement best describes the difference between the structure and function of the smooth endoplasmic reticulum and the rough endoplasmic reticulum?

A. Rough ER stores water for the cell, while smooth ER transports oxygen.
B. Rough ER lacks ribosomes and stores genetic information, while smooth ER contains ribosomes and produces proteins.
C. Rough ER produces energy for the cell, while smooth ER controls cell movement.
D. Rough ER contains ribosomes and helps produce proteins, while smooth ER lacks ribosomes and helps produce lipids and detoxify substances.

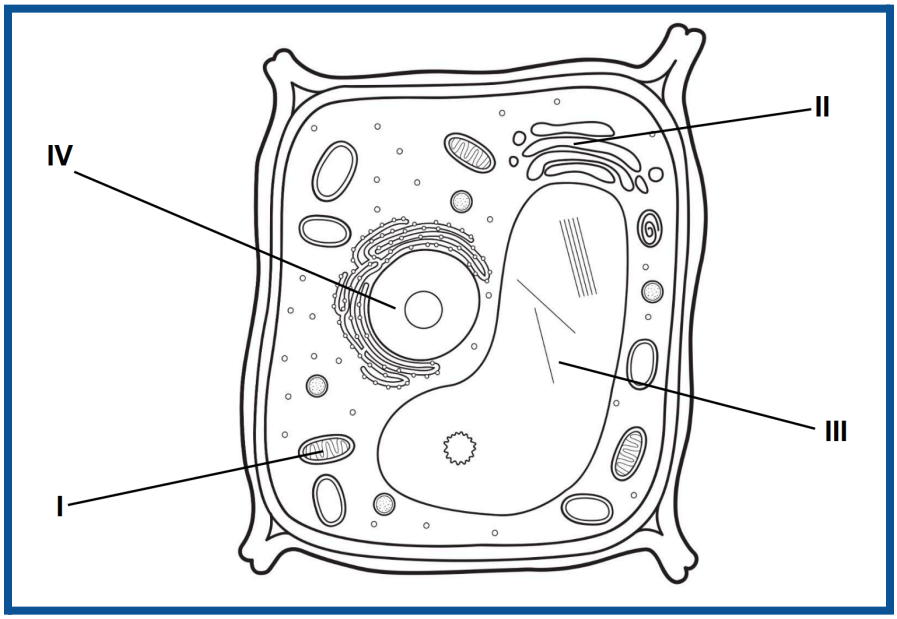
4. (SB1a) The diagram features a rectangular-shaped cell. Refer to the diagram to respond to the following questions.



Which organelle, known as the "post office of the cell," is responsible for packaging, sorting, and distributing proteins?

A. I
B. II
C. III
D. IV

5. (SB1a) The diagram features a rectangular-shaped cell. Refer to the diagram to respond to the following questions.



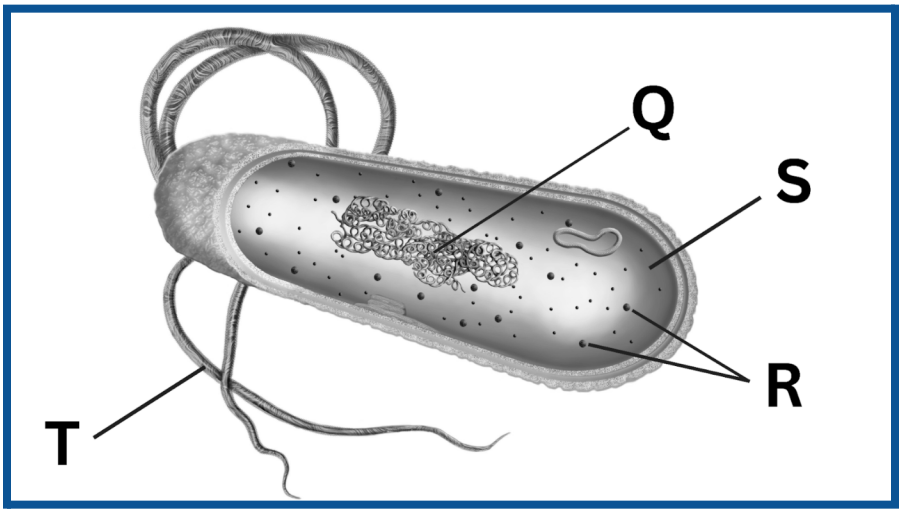
The organelle that stores genetic information such as DNA for the cell is represented by

A. I
B. II
C. III
D. IV

6. (SB1a) Unlike animal cells, plant cells have

A. Fewer nuclear pores in their nuclei.
B. A large vacuole for storing water.
C. Mitochondria.
D. Centrioles.

7. (SB1a) The image displays a type of cell with labeled parts Q, R, S, and T. Refer to the image to answer the following questions.



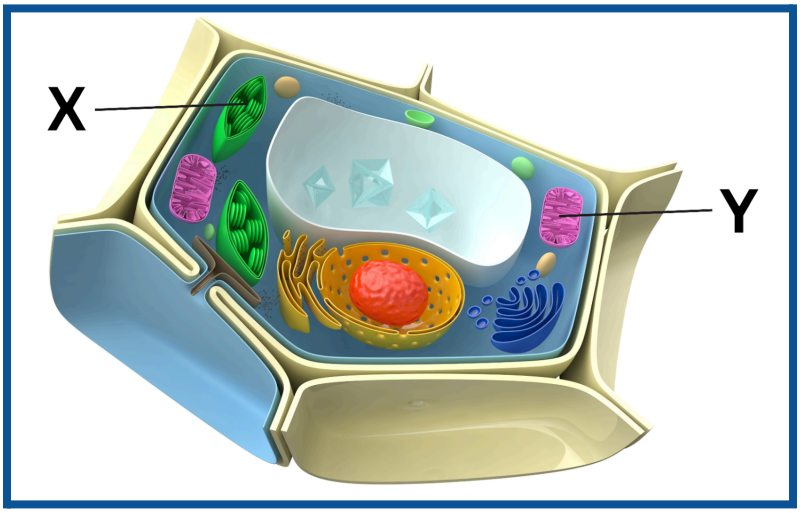
This cell can be identified based on:

A. Q, as it contains free-floating DNA, indicating it is a prokaryotic cell.
B. R, as it represents a carbon molecule, suggesting it is eukaryotic.
C. S, as it consists of cytoplasm, identifying it as prokaryotic.
D. T, as it features a tail-like structure, classifying it as eukaryotic.

8. (SB1a) What would most likely happen if a eukaryotic cell's vacuole was damaged?

A. The cell would be unable to generate ATP for energy.
B. The cell would lose its ability to store water and waste properly.
C. The cell would stop producing proteins.
D. The cell would no longer be able to transport molecules in and out of the cell.

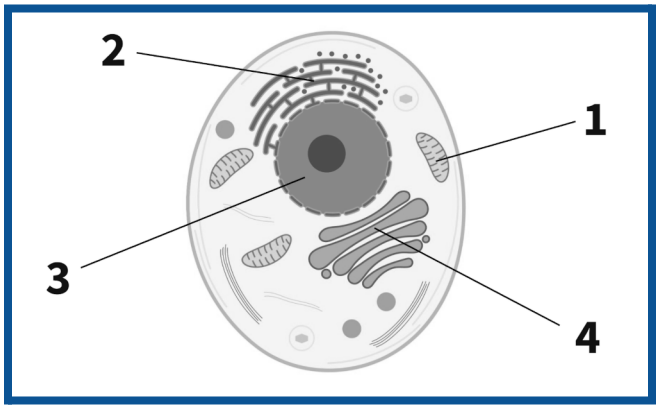
9. (SB1a) The diagram below represents a type of cell.



Which type of cell is depicted in the image?

A. An animal cell, as it contains cytoplasm and a cell membrane.
B. A plant cell, since it lacks chloroplasts and mitochondria.
C. A plant cell, as it possesses chloroplasts and a cell wall.
D. An animal cell, because it does not contain vacuoles or a nucleus.

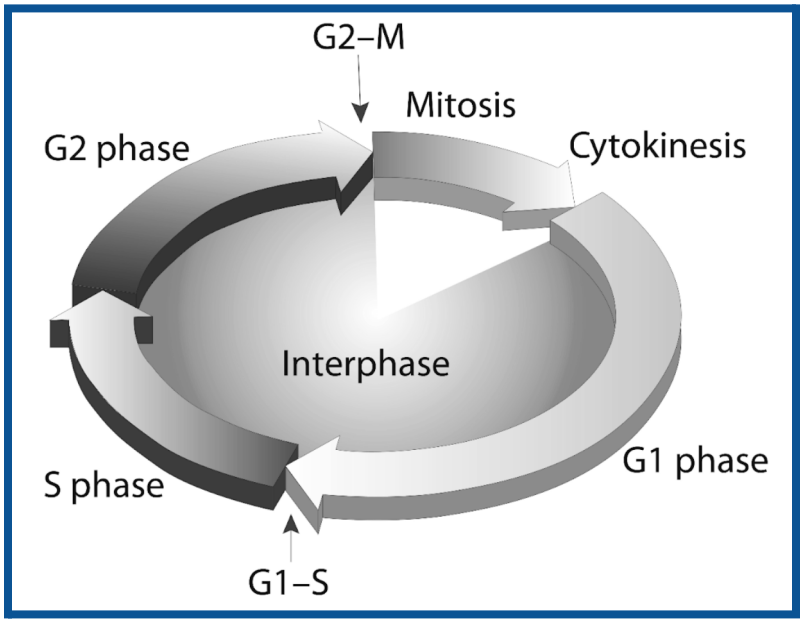
10. (SB1a) The diagram below represents a type of cell.



What type of cell is shown in the image?

A. A eukaryotic cell, because it contains cytoplasm.
B. A prokaryotic cell, since it has energy-releasing mitochondria.
C. A eukaryotic cell, as it has a nucleus.
D. A prokaryotic cell, because it contains compartmentalized organelles.

11. (SB1b) The diagram shows the stages of the cell cycle.



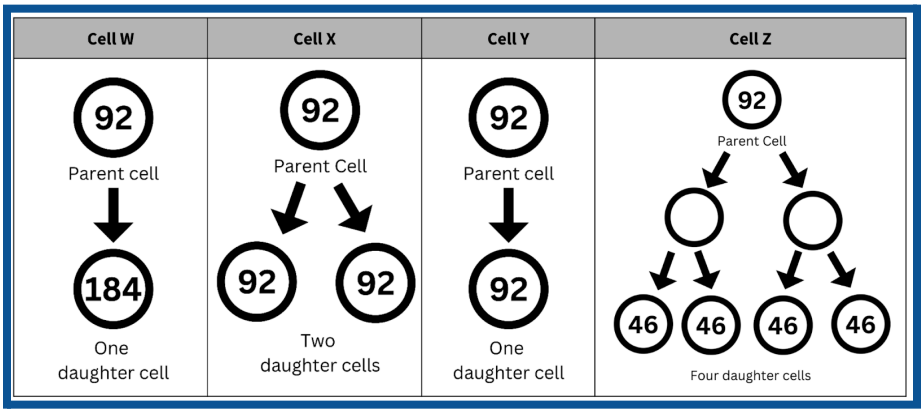
Which answer choice correctly matches each phase with its primary cellular activity?

A. G1: Cell grows and performs normal functions
   S: DNA is replicated
   G2: Cell prepares for mitosis
B. G1: DNA is replicated
   S: Cell divides
   G2: Cell grows and performs normal functions
C. G1: Cell divides into two daughter cells
   S: DNA is repaired
   G2: DNA is replicated
D. G1: Cell prepares for mitosis
   S: Cell grows
   G2: DNA is replicated

12. (SB1b) Which of the following statements accurately describe the process of mitosis? Select three that apply.

A. It is responsible for the production of gametes.
B. It leads to the formation of somatic cells.
C. It maintains the 2n chromosome number in daughter cells.
D. It reduces the chromosome number to n.
E. It produces haploid daughter cells.
F. It results in the production of diploid daughter cells.

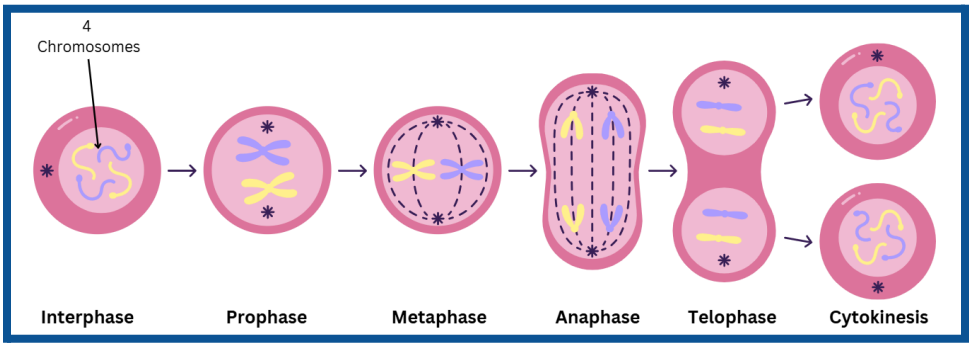
13. (SB1b) The image illustrates the cellular processes occurring in four rat cells, each containing 92 chromosomes. Refer to the image to answer the following questions.



Which rat cell underwent meiosis?

A. Cell W
B. Cell X
C. Cell Y
D. Cell Z

14. (SB1b) The diagram depicts the stages of mitotic cell division.



What is the role of anaphase in this process?

A. Anaphase ensures that each daughter cell inherits half the number of chromosomes as the parent cell.
B. Anaphase ensures that each daughter cell receives a different set of chromosomes than the parent cell.
C. Anaphase ensures that each daughter cell obtains the same number of chromosomes as the parent cell.
D. Anaphase ensures that each daughter cell ends up with twice as many chromosomes as the parent cell.

15. (SB1b) During metaphase, a phase of the cell cycle, a cell

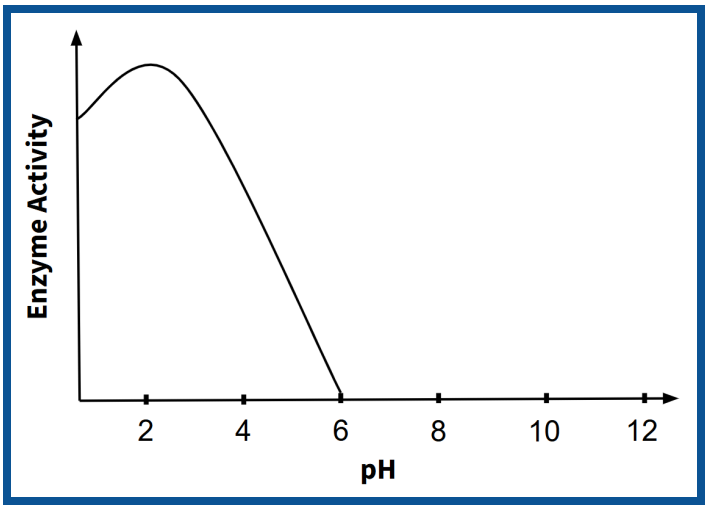
A. Moves its chromosomes toward opposite poles.
B. Triggers chromatin to condense into chromosomes.
C. Develops two new nuclear envelopes around the chromosomes.
D. Positions its chromosomes along the center of the cell.

16. (SB1c) Jovon is observing a diagram in biology class that shows a long molecule made of repeating units called nucleotides. Each nucleotide contains a phosphate group, a 5-carbon sugar, and a nitrogenous base. The diagram shows the sugar of one nucleotide bonded to the phosphate of the next, forming a repeating backbone. Some of the bases are labeled A, T, C, and G, and his teacher explains that the order of these bases stores genetic information used by cells.

Based on the structure and function described, which macromolecule is Jovon observing?

A. a protein
B. a lipid
C. a carbohydrate
D. a nucleic acid

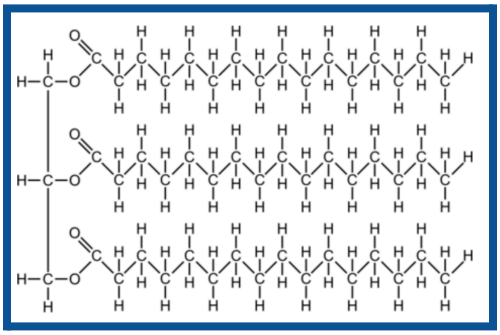
17. (SB1c) Pepsin is an enzyme that aids in protein digestion. The graph illustrates how pH affects pepsin activity.



Which statement best describes the trend shown in the graph?

A. Pepsin functions most effectively in acidic (low pH) conditions.
B. Pepsin is least effective in acidic (low pH) conditions.
C. Pepsin maintains high activity across a wide pH range.
D. Pepsin is more active in alkaline (high pH) environments.

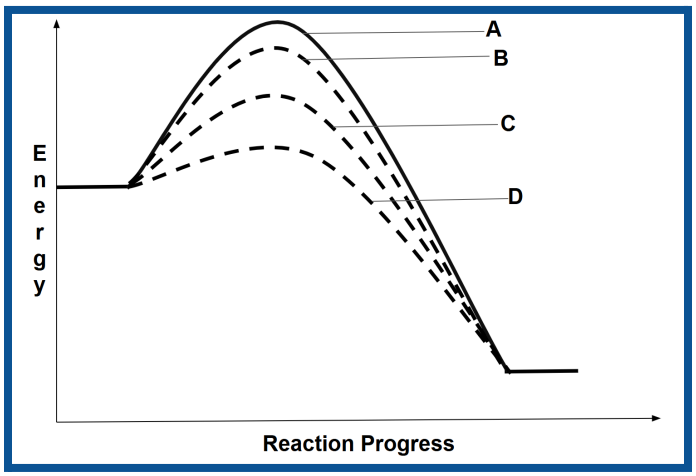
18. (SB1c) Observe the structure of the substance shown below.



If this substance were added to water, would it dissolve?

A. No, because the substance is a protein.
B. No, because the substance is a lipid.
C. Yes, because the substance is a carbohydrate.
D. Yes, because the substance is a nucleic acid.

19. (SB1c) The graph represents the activation energies of four different chemical reactions, labeled A, B, C, and D. Activation energy, which can be affected by enzymes, is the minimum energy required for a reaction to begin.



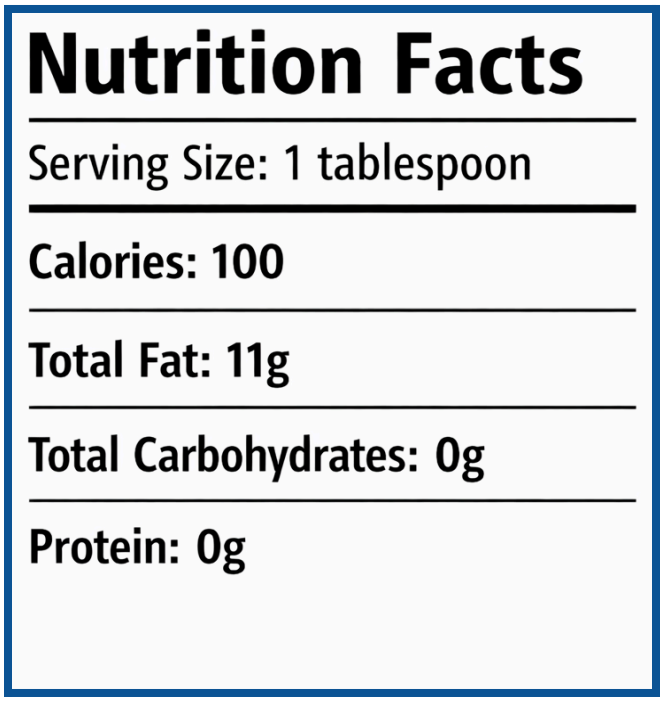
Based on the graph, which reaction has the fastest reaction rate because it is most likely catalyzed by an enzyme?

A. Reaction A, because it has the highest activation energy.
B. Reaction B, because it has a lower activation energy than A.
C. Reaction C, because it shows a moderate activation energy.
D. Reaction D, because it has the lowest activation energy.

20. (SB1c) All living organisms contain certain essential elements that form the basis of organic compounds. One specific element is present in all organic molecules and is responsible for making compounds "organic". Which element is fundamental to all organic compounds?

A. Oxygen, O
B. Nitrogen, N
C. Carbon, C
D. Hydrogen, H

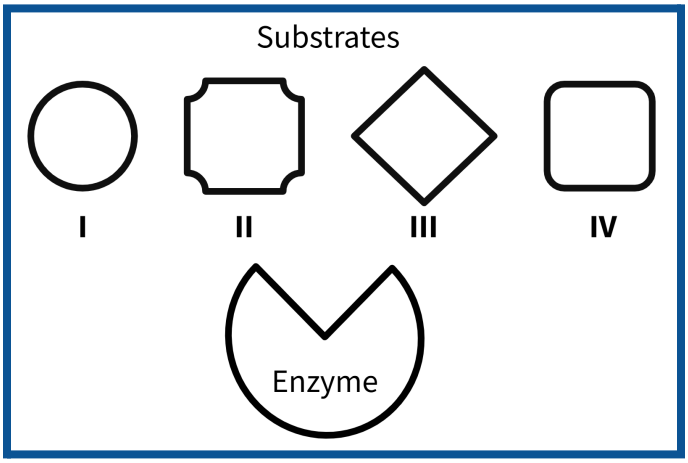
21. (SB1c) Use the nutrition label shown in the image.



Based on the information provided, which macromolecule is the primary nutrient found in this food?

A. Amino acids
B. Lipids
C. Nucleic acids
D. Complex sugars

22. (SB1c) The diagram below displays an enzyme and four potential substrates.



According to the lock-and-key model and the principles of complementary binding, which substrate is most likely to bind to the enzyme and initiate a chemical reaction?

A. Substrate I, because it is the simplest shape and can fit into any enzyme.
B. Substrate II, because it has a unique shape that allows flexibility in binding.
C. Substrate III, because its shape is complementary to the enzyme's active site.
D. Substrate IV, because enzymes can adjust to fit any substrate.

23. (SB1c) The table below shows different foods, the macromolecules they contain, and the smaller molecules they break down into. Some details are missing, represented by W, X, Y, and Z.

Food	Made Of	Digests Into:
Bread	Complex Carb	W
Oil	X	Y
Steak	Z	Amino Acids

Based on the table, which macromolecule does Z most likely represent?

A. A lipid that provides long-term energy storage and breaks down into amino acids.
B. A lipid that consists of enzymes that speed up chemical reactions and breaks down into amino acids.
C. A protein responsible for building and repairing tissues and breaks down into amino acids.
D. A protein that stores genetic information and breaks down into amino acids.

24. (SB1c) Macromolecules have distinct roles in living organisms. Select four correct macromolecule-function pairs from the choices below.

A. Carbohydrates – Speed up chemical reactions
B. Lipids – Transmit genetic information
C. Proteins – Speed up chemical reactions
D. Nucleic Acids – Transmit genetic information
E. Lipids – Store long-term energy
F. Proteins – Store long-term energy
G. Carbohydrates – Provide quick energy
H. Nucleic Acids – Provide quick energy

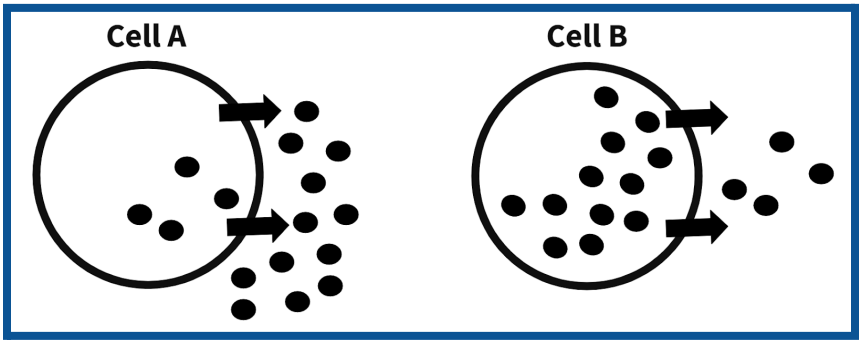
25. (SB1c) Both carbohydrates and lipids serve as energy sources.

Carbohydrates	Lipids
Used quickly for immediate energy needs	Stored for long-term energy reserves
Stored as glycogen for short-term energy storage	Stored as fat for extended energy availability
Made of polysaccharides, which are sugar chains	Composed of triglycerides, which contain fatty acids and glycerol
Easily broken down into glucose for cellular energy	Requires more time and enzymes to break down into usable energy
Provides a rapid energy source but less energy per unit	Releases over twice as much energy per unit compared to carbohydrates

Based on the information provided, which argument BEST explains why one macromolecule is the primary energy source for living organisms?

A. Carbohydrates are the main energy source because sugar polymers break down quickly into glucose monomers, which generate cellular energy more rapidly.
B. Lipids are the main energy source because they are stored more easily for long periods, allowing organisms to survive during food shortages.
C. Carbohydrates are the main energy source because they can be used immediately or stored as glycogen for long-term breakdown into glycerol molecules.
D. Lipids are the main energy source because their covalent bonds store more energy than carbohydrates, helping organisms sustain themselves longer on less food.

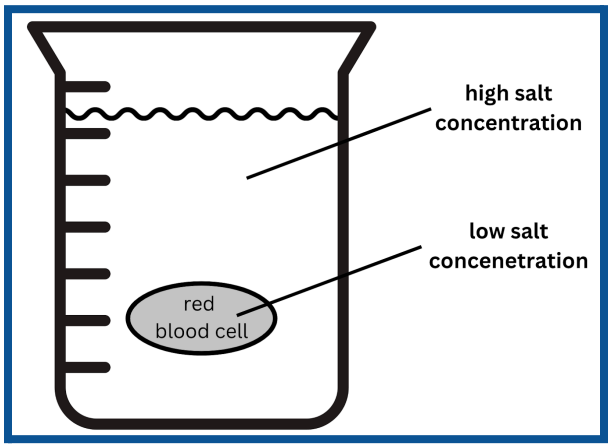
26. (SB1d) The diagram shows small molecules, represented by dark dots, moving out of the cells as indicated by the arrows. The number of dots inside and outside each cell illustrates the relative concentration of molecules in both environments.



Which cell will require ATP to actively transport molecules out of the cell?

A. Cell A, only
B. Cell B, only
C. Both Cell A and Cell B
D. Neither Cell A nor Cell B

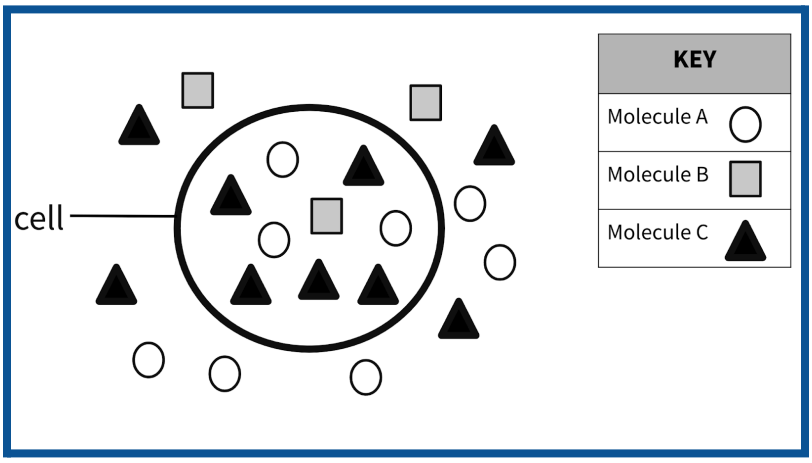
27. (SB1d) The image depicts a red blood cell placed in a beaker containing a solution with a higher salt concentration than the interior of the cell.



What is the most likely outcome for the red blood cell in this environment? Select all that apply.

A. Water will move into the cell
B. The cell will shrink.
C. Water will move out of the cell
D. The cell will swell.
E. The cell will not change.

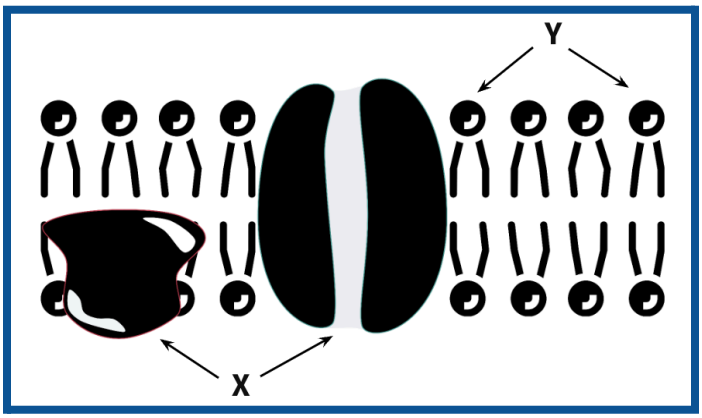
28. (SB1d) The diagram represents the distribution of molecules A, B, and C inside and outside of a cell.



If all three molecules are small enough to passively diffuse across the cell membrane, which statement is true?

A. Molecule A will move into the cell because its concentration is higher outside than inside.
B. Molecule B will move out of the cell because it is more concentrated inside.
C. Molecule C will move into the cell because there are fewer of these molecules inside.
D. No diffusion will occur because the cell membrane blocks the movement of all molecules.

29. (SB1d) The diagram models the fluid mosaic model of the cell membrane.



According to the diagram, structures X and Y are essential parts of the membrane, each with a different function. Structure Y represents...

A. Proteins
B. Phospholipids
C. Cholesterol molecules
D. Nucleic acids

30. (SB1d) Osmosis is a type of passive transport that involves the movement of _____ molecules across a selectively permeable membrane.

A. Oxygen
B. Water
C. Glucose
D. Protein

31. (SB5a) The table provides three symbiotic relationship scenarios labeled A, B, and C.

Scenario
A: In a dense forest, orchids grow high on the branches of tall oak trees. The orchids use the trees for support, allowing them to reach sunlight that wouldn't be available on the forest floor. However, the oak trees are neither harmed nor benefited by the presence of the orchids.
B: In a coral reef, clownfish live among the tentacles of sea anemones. The clownfish receive protection from predators by hiding within the anemone's stinging tentacles, which they are immune to. In return, the clownfish help the anemone by luring in prey and keeping it clean from parasites.
C: In a forest, a tick attaches itself to a deer and feeds on its blood. The tick benefits by gaining nutrients needed for survival, while the deer suffers from blood loss and potential disease transmission.

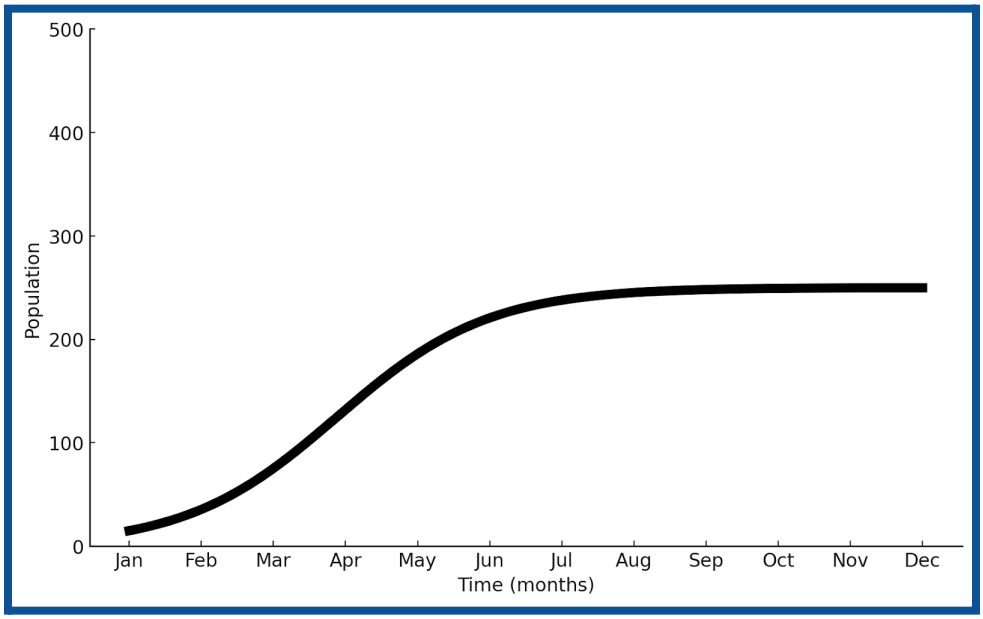
Which of the following correctly matches each scenario to the type of symbiotic relationship it represents?

A. Scenario A = Mutualism, Scenario B = Parasitism, Scenario C = Commensalism
B. Scenario A = Parasitism, Scenario B = Commensalism, Scenario C = Mutualism
C. Scenario A = Commensalism, Scenario B = Parasitism, Scenario C = Mutualism
D. Scenario A = Commensalism, Scenario B = Mutualism, Scenario C = Parasitism

32. (SB5a) Biodiversity in ecosystems refers to

A. The study of how organisms interact with their environment.
B. The total variety of life in a particular area.
C. The process by which organisms adapt to their environment.
D. The movement of energy through an ecosystem.

33. (SB5a) Saniyah and her class are investigating a squirrel population within a forest ecosystem. They have created a graph based on their population data, which is displayed.



Select three statements that are true about the squirrels population growth.

A. The population grows exponentially between January and May.
B. The graph represents logistic growth because the population is affected by limiting factors.
C. The squirrel population will continue growing indefinitely without reaching a limit.
D. The carrying capacity of the ecosystem has been reached at around 250.
E. The population is decreasing over time due to a lack of resources.
F. The growth rate remains constant throughout the entire year.

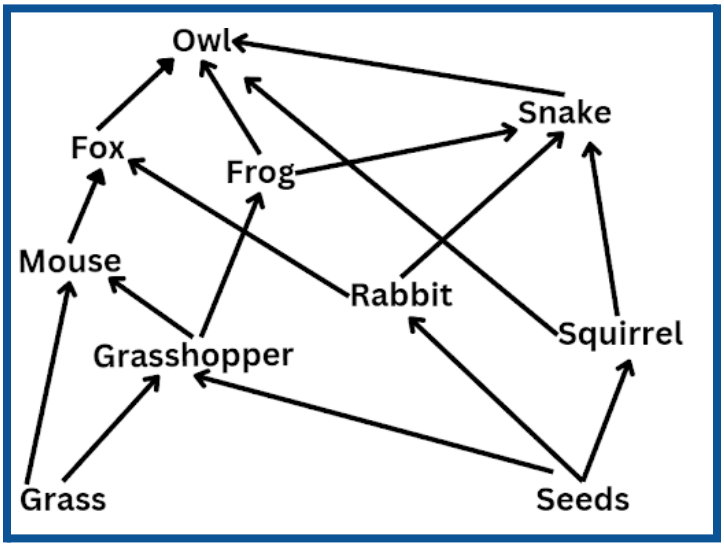
34. (SB5a) Which of the following scenarios represents a density-independent limiting factor that affects a population?

A. A wildfire destroys a forest habitat, killing most organisms in the area.
B. As the deer population increases, individuals compete more intensely for limited food resources.
C. A bacterial infection spreads more rapidly as the population becomes crowded.
D. As the rabbit population grows, predators have more prey available to hunt.

35. (SB5b) Why are primary producers considered autotrophs?

A. They consume other organisms for energy.
B. They obtain energy by breaking down dead organisms.
C. They produce their own food using light energy.
D. They rely on other organisms to provide nutrients.

36. (SB5b) The diagram represents a food web.



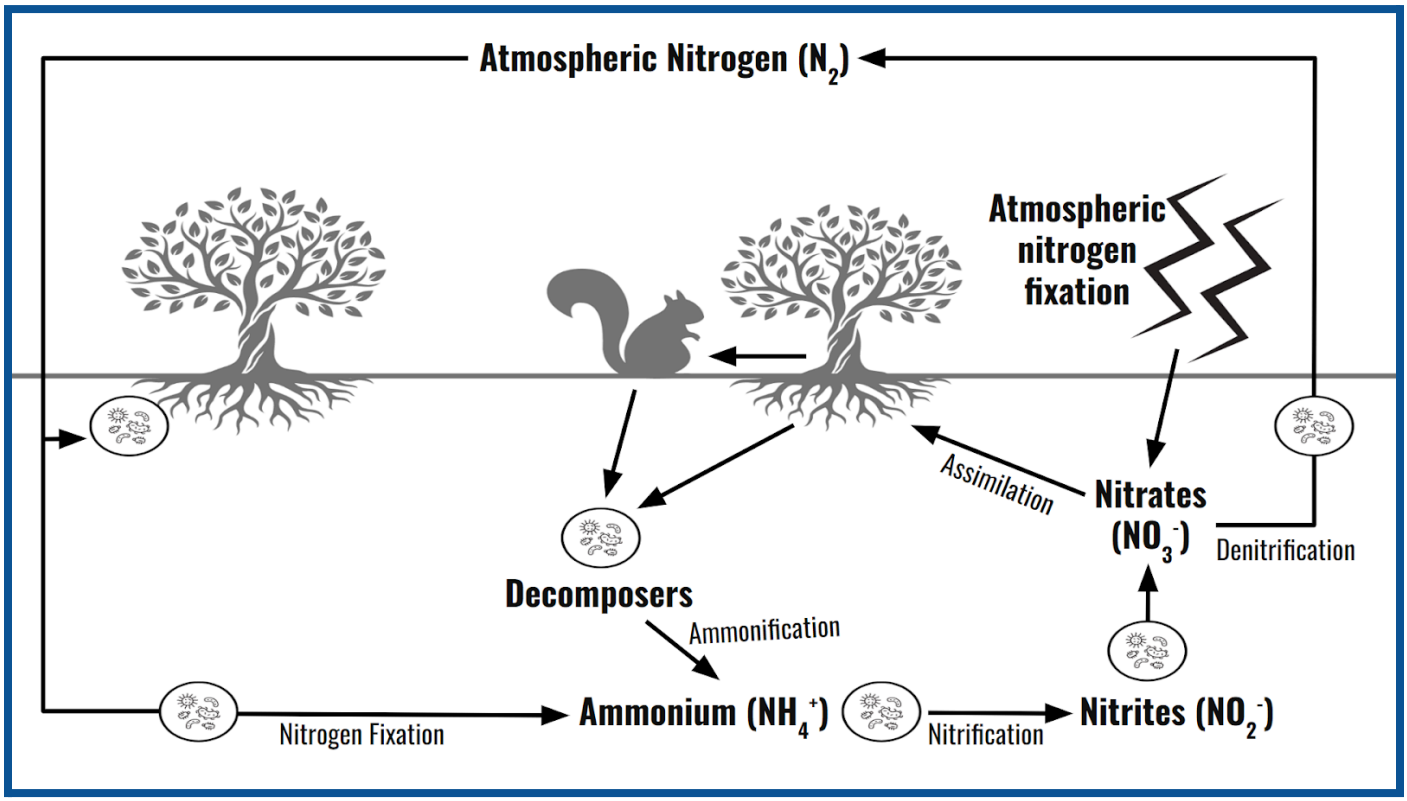
Select all the terms that accurately describe the squirrel based on its role in the ecosystem.

A. Herbivore
B. Carnivore
C. Autotroph
D. Primary Consumer
E. Primary Producer
F. Heterotroph
G. Apex Predator

37. (SB5b) During the spring, a forest experiences rapid plant growth. Scientists measure a decrease in atmospheric carbon dioxide levels in the area. Which explanation best describes the role of plants in this change?

A. Plants increase photosynthesis, removing more carbon dioxide from the atmosphere.
B. Plants increase cellular respiration, which removes carbon dioxide from the atmosphere.
C. Plants release more carbon dioxide into the atmosphere as they grow larger.
D. Plants stop using carbon dioxide once they begin producing oxygen.

38. (SB5b) The diagram models the nitrogen cycle.



According to the diagram, nitrogen returns to the atmosphere through the process known as

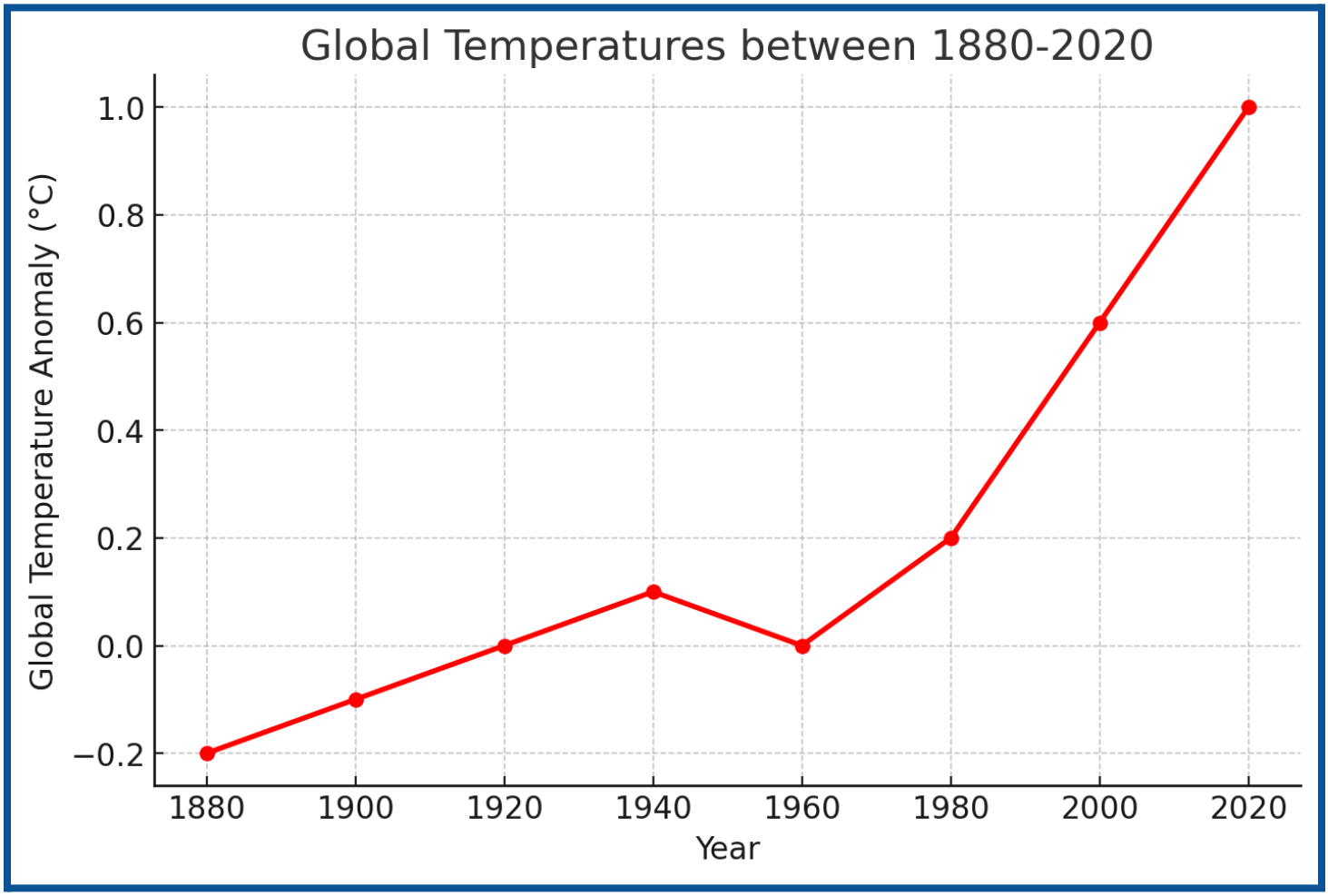
A. Nitrogen fixation
B. Nitrification
C. Assimilation
D. Denitrification

39. (SB5d) Raquel is learning about invasive species and their impact on ecosystems. She wants to help prevent the spread of invasive species in her community.

Select three actions that would help reduce the spread of invasive species.

A. Cleaning mud and plant material from her shoes and equipment after hiking.
B. Moving firewood from one region to another for camping trips.
C. Planting native species instead of non-native ornamental plants in his yard.
D. Reporting sightings of invasive insects or plants to local environmental agencies.
E. Releasing unwanted pets into nearby parks or natural areas.

40. (SB5d) The graph shows global temperatures between 1880 and 2020.



Which of the following human activities has most contributed to the trend shown in the graph?

A. Deforestation, which reduces the number of trees that absorb carbon dioxide.
B. Burning fossil fuels, which releases greenhouse gases into the atmosphere.
C. Overfishing, which significantly decreases marine biodiversity.
D. Agricultural irrigation, which increases water use and soil erosion.