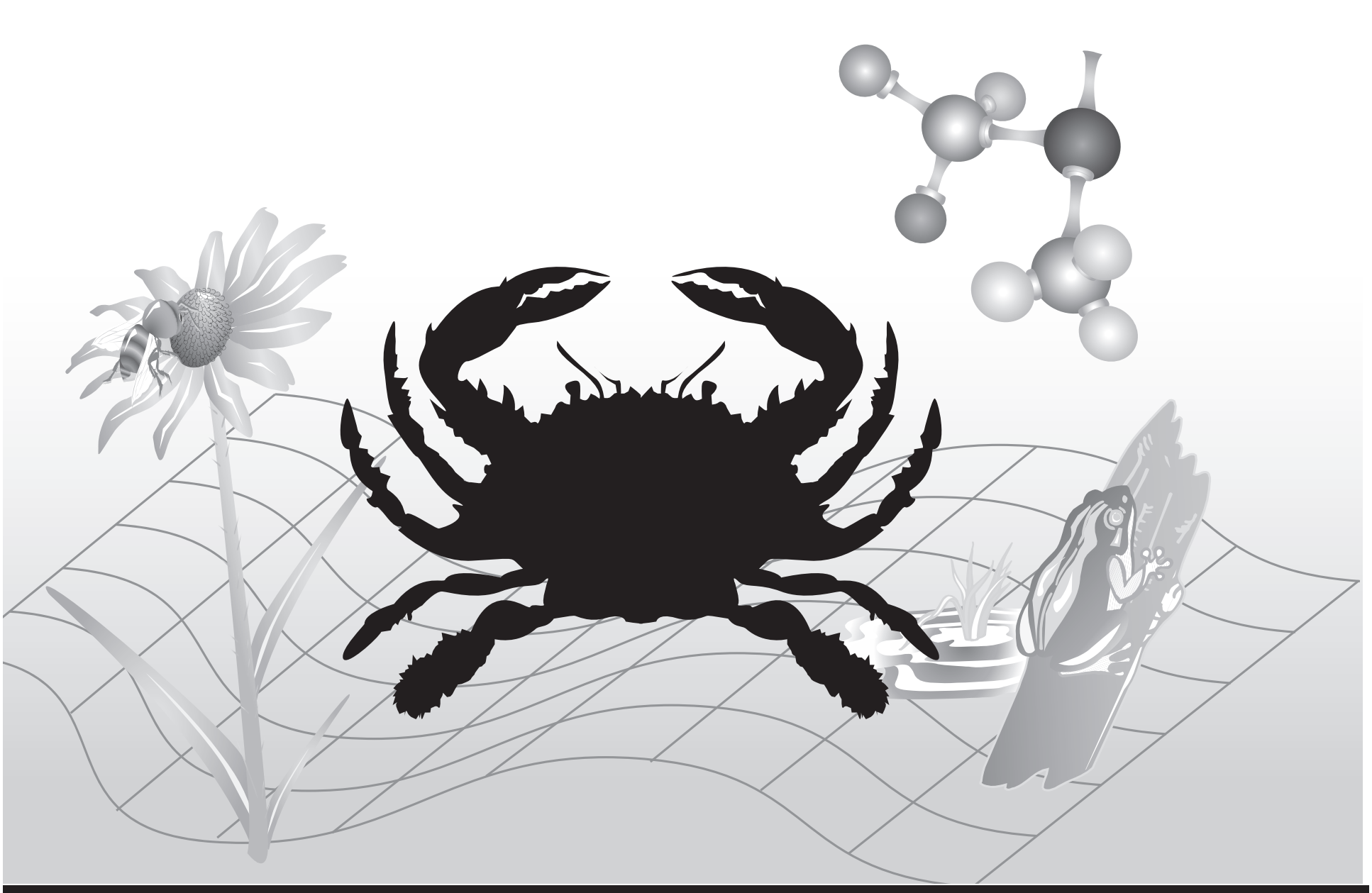
MCAP

Maryland Comprehensive Assessment Program



# LS MISA

**Life Science Maryland Integrated Science Assessment**

## Practice Test

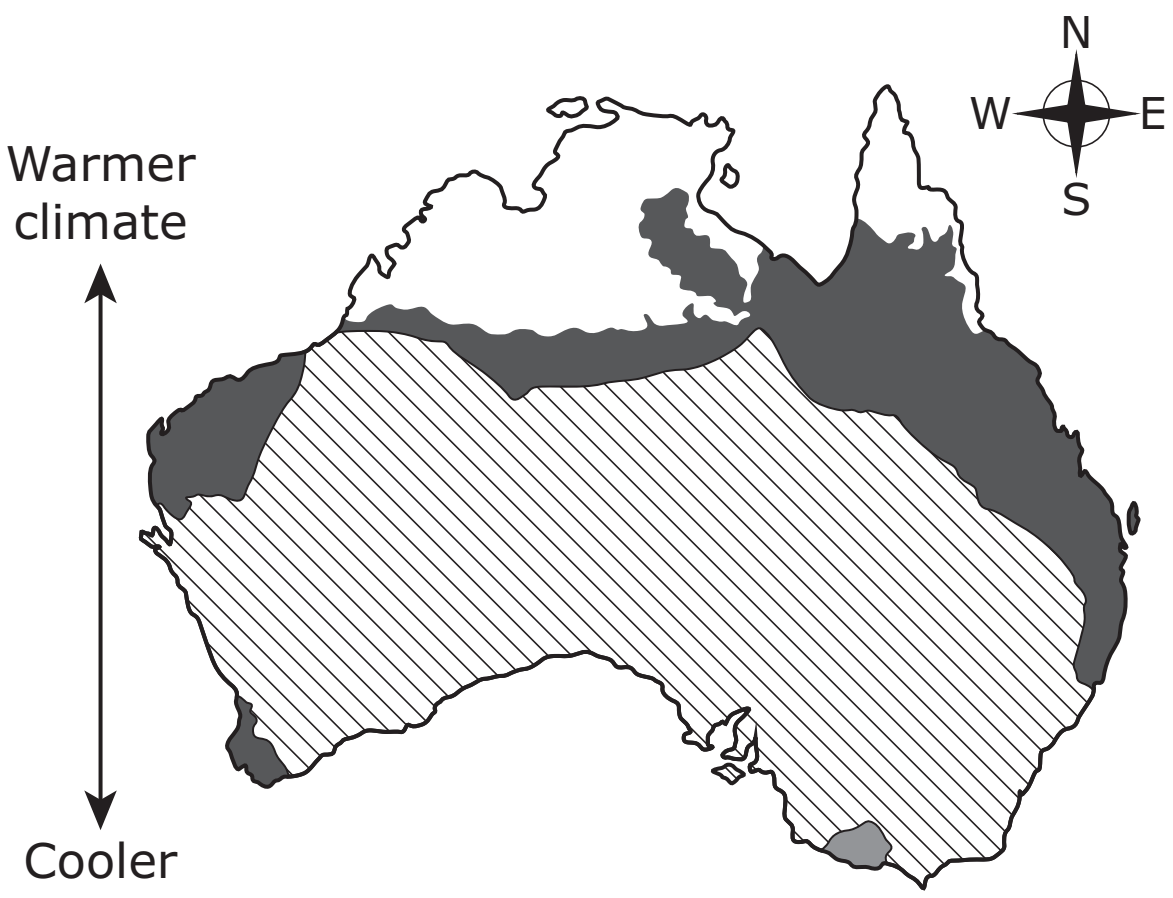

## Contents

Read the information. Use the information to answer the questions.

**Wild Rabbit Population Distribution**

Australia is home to many unique species of plants and animals. One of the leading threats to Australia's wildlife are wild rabbits. European settlers first brought rabbits to Australia in 1788 and released them into the wild in the 1850s. Despite attempts to limit the number of wild rabbits, the population has grown and spread across the continent. The map shows the wild rabbit population distribution and the data table shows the change in the rabbit population over time.

**Wild Rabbit Population Distribution**




| LEGEND | | | |
|---|---|---|---|
| | = 1860 | | = Present day |
| | = 1920 | | = Rabbits absent |



GO ON

## Wild Rabbit Population

| Year | Number of Rabbits in the Wild |
|---|---|
| 1859 | 24 |
| 1860 | 60 |
| 1864 | 2000–3000 |
| 1920 | 10 Billion |
| 2018 | 200 Million |

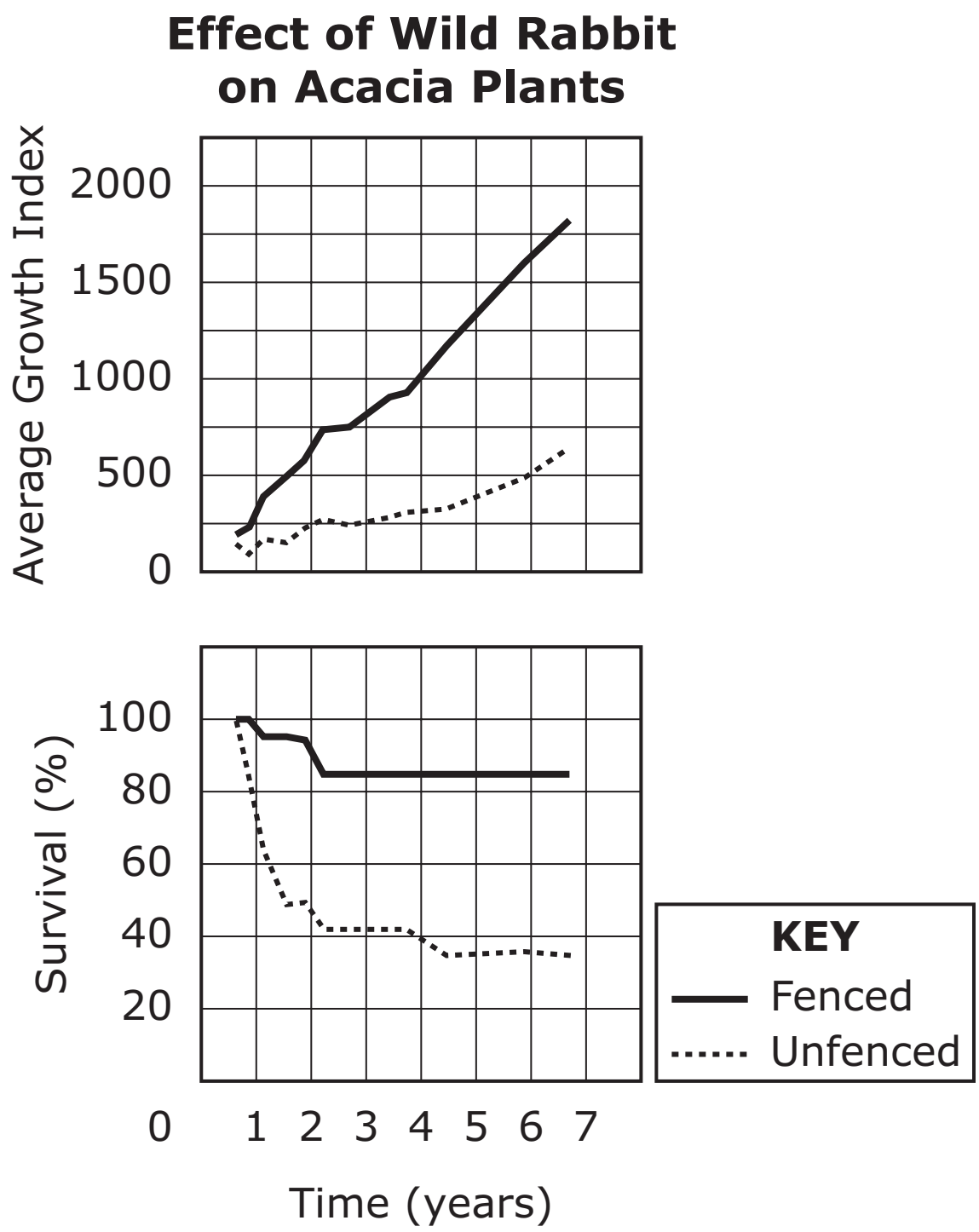
A factor contributing to the success of wild rabbits in Australia is their use of long, interconnecting burrows. The burrows protect them from harsh temperatures and predators. The sandy soil and scrub typically found in Australia makes it easy for rabbits to dig their burrows. Rabbits as a species have high reproductive rates and can survive in a wide variety of habitats. Since 1950, several control methods have been put in place to control the wild rabbit population.

## Effect on Vegetation

Damage to the environment is the leading problem caused by wild rabbits in Australia. They have a tiny mouth and teeth that allow them to graze plants very close to the ground. The wild rabbits feed on green grasses, herbs, young seedlings, and short, tender plants. They also dig below grasses to reach roots and seeds. After being overgrazed by wild rabbits, grasses respond by growing flat and low to the ground.

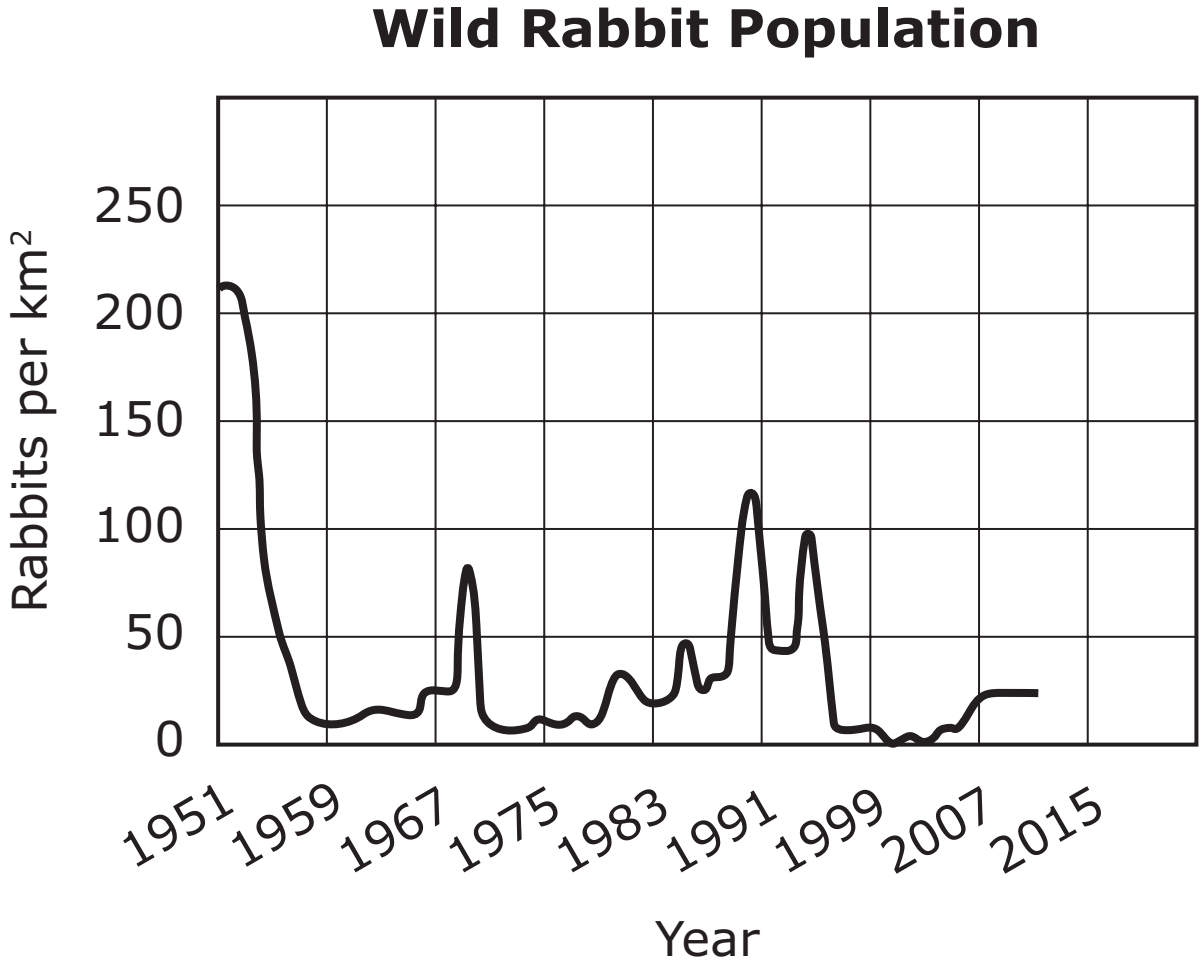
Wild rabbits prefer to feed upon young shrubs and trees within the genus Acacia. Acacias make up most of the vegetation found across much of Australia's grazing areas. Acacia seedlings take several years to grow tall enough to avoid being eaten by the wild rabbits.

Scientists studied the impact of wild rabbits on Acacia plants by documenting the growth and survival of Acacia in fenced and unfenced areas. The fence prevented animals, mostly the wild rabbits, from feeding on the Acacia. Both areas began with about the same number of Acacia seedlings. The growth index is a ratio of the width of the leaf canopy to the height of the plant. The graph shows the results of the investigation.



## Effects of Rabbit Control Measures

Scientists have tried to control the wild rabbit populations using various methods, including the introduction of fleas and viruses that infect wild rabbit populations. The graph shows the change in the wild rabbit population in response to the myxoma virus (MV) in 1952, rabbit fleas in 1969, and the rabbit hemorrhagic disease virus (RHDV) in 1994. The rabbit control measures also led to the environmental changes shown in the table.



## Changes Following Rabbit Exposure to Viruses

| Native Species | Observed Change |
|---|---|
| rodents | • population increased by more than 300% |
| small predators | • final population was 7 times higher than initial<br>• area of habitat doubled |
| fruit trees | • final population was 6 times higher than initial<br>• area of habitat was 3 times larger than initial<br>• number of species increased |
| native trees | • number of species increased<br>• tree *C. iripa* declined by 21% |

**1** Which prediction describes how the vegetation would **most likely** be affected if rabbit control measures were not implemented?

**A** A sharp decrease in the populations of Acacia plants would lead to a steady increase in other plants.

**B** A steady decrease in other vegetation would be followed by a slow decrease in the populations of Acacia plants.

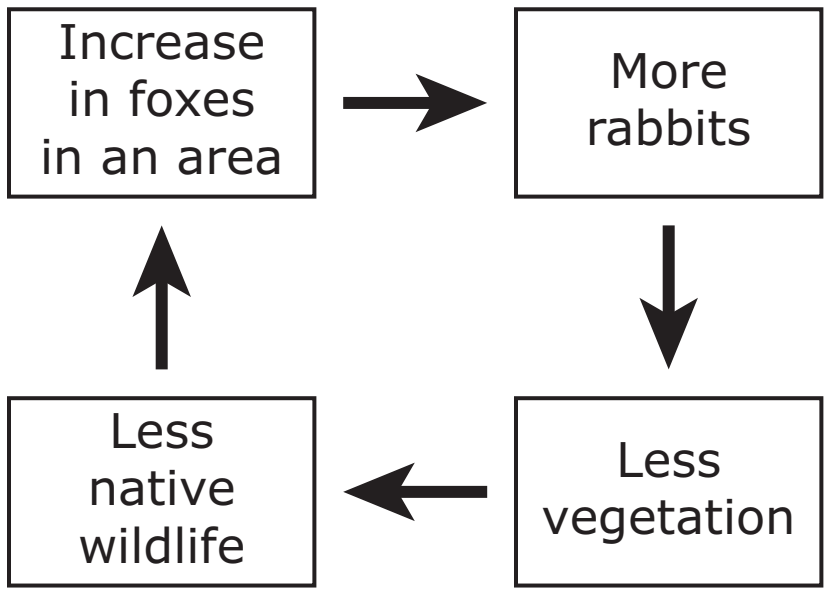
**C** A slow decrease in the populations of Acacia plants would lead to a steady increase in other vegetation.

**D** A sharp decrease in the populations of Acacia plants would be followed by a steady decrease in other vegetation.

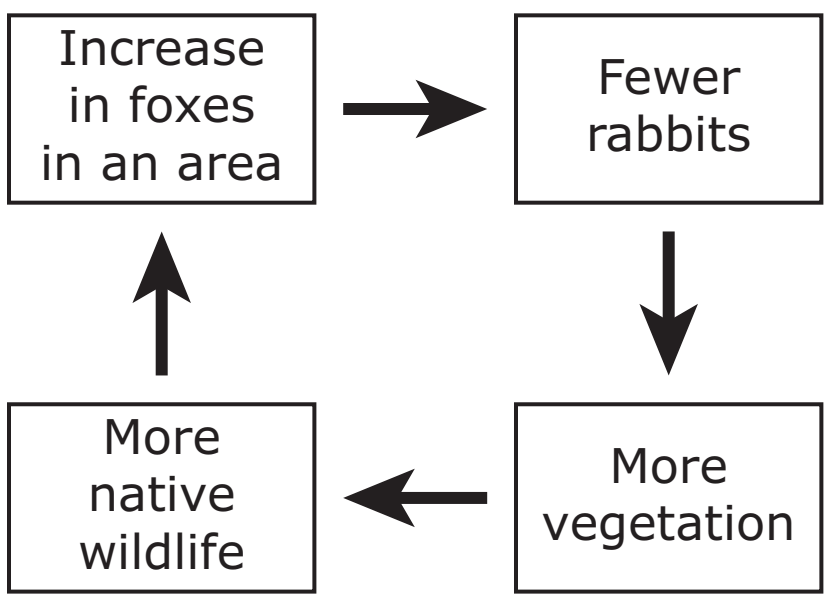
**2** Foxes are a predator of rabbits and were introduced to Australia around the same time as rabbits.

Which model shows how an increase in foxes will **most likely** affect ecosystems in Australia?

**A**



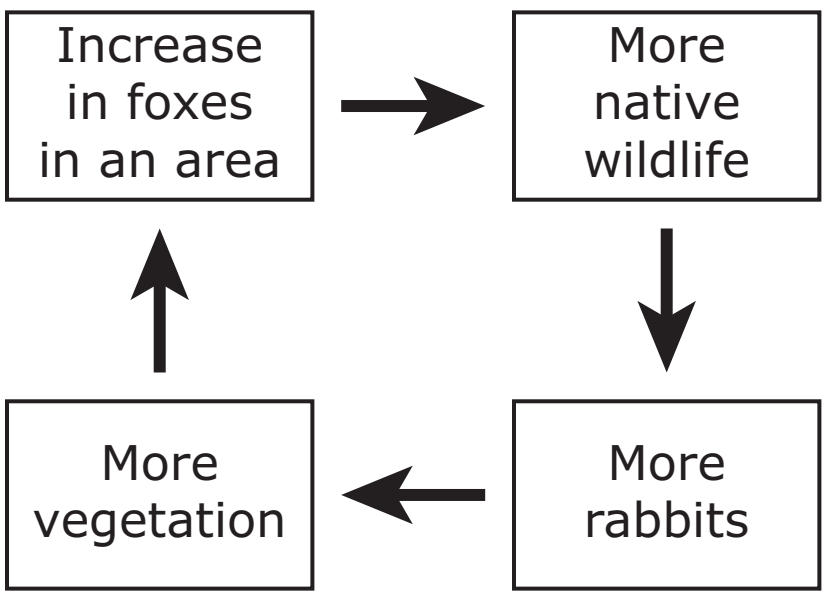

**B**



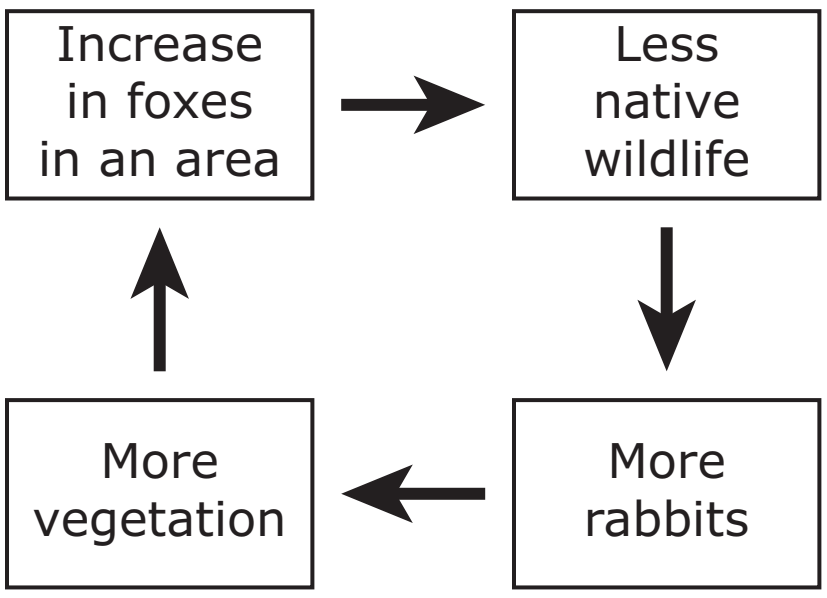



GO ON

**C**


Increase in foxes in an area
More native wildlife
More rabbits
More vegetation

**D**

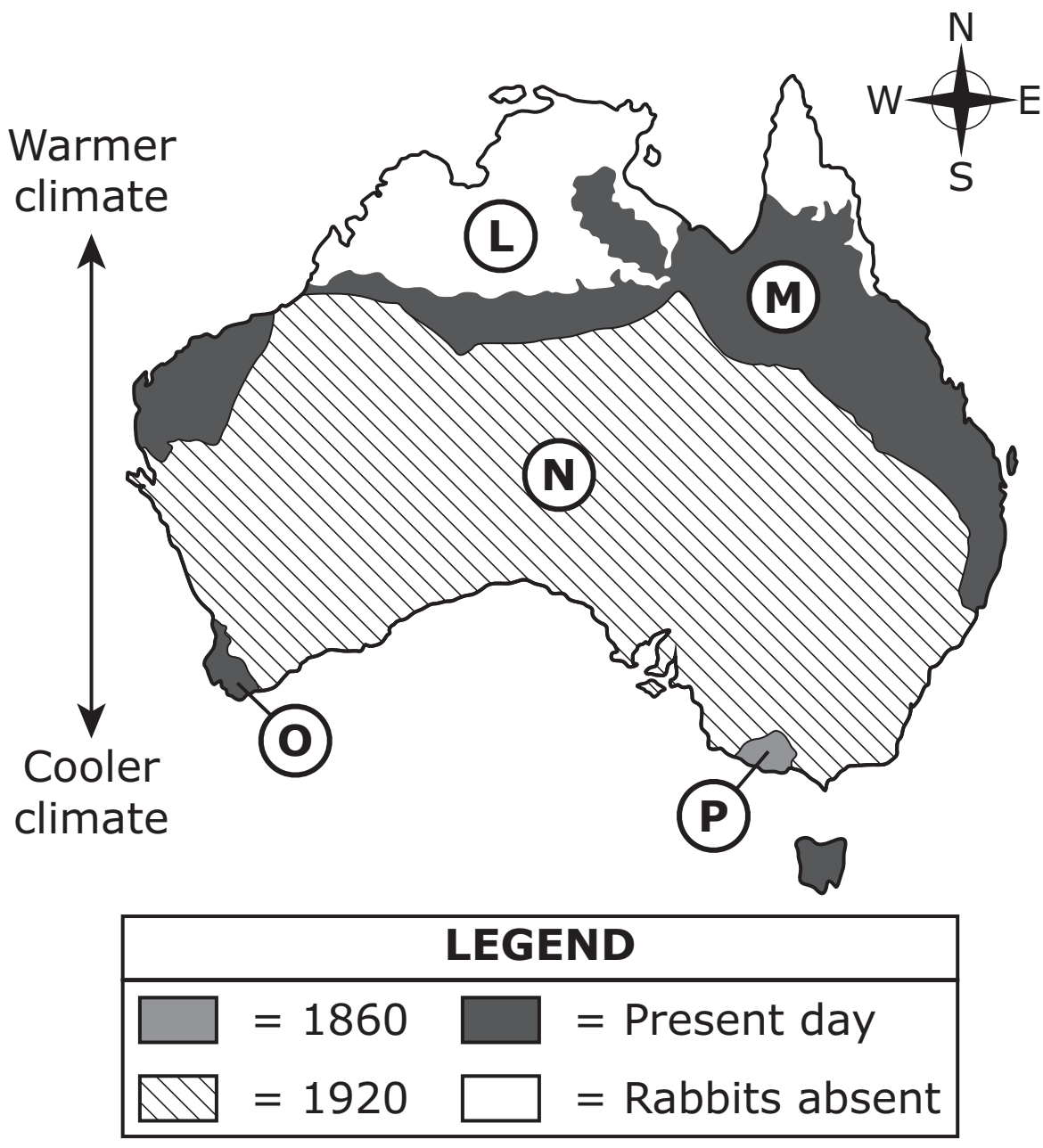

Increase in foxes in an area
Less native wildlife
More rabbits
More vegetation



GO ON

**3** Scientists have attempted various control methods to remove rabbit populations.

**Wild Rabbit Population Distribution**




Which areas on the map would have the **best** chance of recovery if rabbits were removed? Select the two that apply.

**A** L

**B** M

**C** N

**D** O

**E** P

GO ON

**4** Scientists claim that wild rabbits in Australia have significantly impacted the Acacia populations. Which additional evidence would **best** support the scientists' claim?

**A** years in which vegetation and mammals declined significantly compared to the spread of the wild rabbits

**B** changes to rabbit populations in different types of ecosystems

**C** population data of mammals that also feed on Acacia seedlings

**D** population data of Acacia species before and after the release of wild rabbits into the habitats

**5** Which statement **best** explains the wild rabbit population between 1955 and 1994 as different control measures were implemented?

**A** The number of rabbits declined rapidly as MV and RHDV were effective in controlling the rabbit population.

**B** The number of rabbits declined slowly as MV and RHDV were somewhat effective in controlling the rabbit population.

**C** The number of rabbits declined sharply in response to MV but rose again as MV became less effective, only to decline again in response to RHDV.

**D** The number of rabbits declined slowly in response to MV but rose again as rabbits became resistant, only to decline sharply again in response to RHDV.

**6**
**CR** Describe the different efforts used to control rabbit populations. Evaluate whether the evidence supports a causal or correlational relationship between the control method and the observed changes that followed.

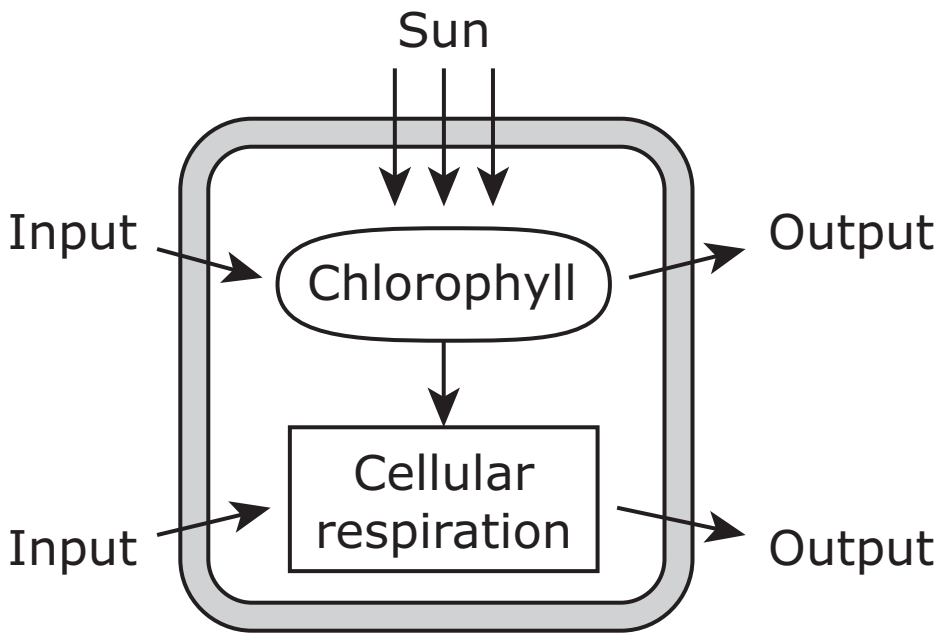
Write your answer in your Answer Sheet.

Read the information. Use the information to answer the questions.

**Cyanobacteria**

Cyanobacteria are single-celled organisms that contain chlorophyll. Scientists think that they were the first organisms to complete photosynthesis. They can exist in a wide range of aquatic habitats, including freshwater and saltwater environments. The model shows the processes that take place in the cyanobacteria.

**Cyanobacteria Processes**



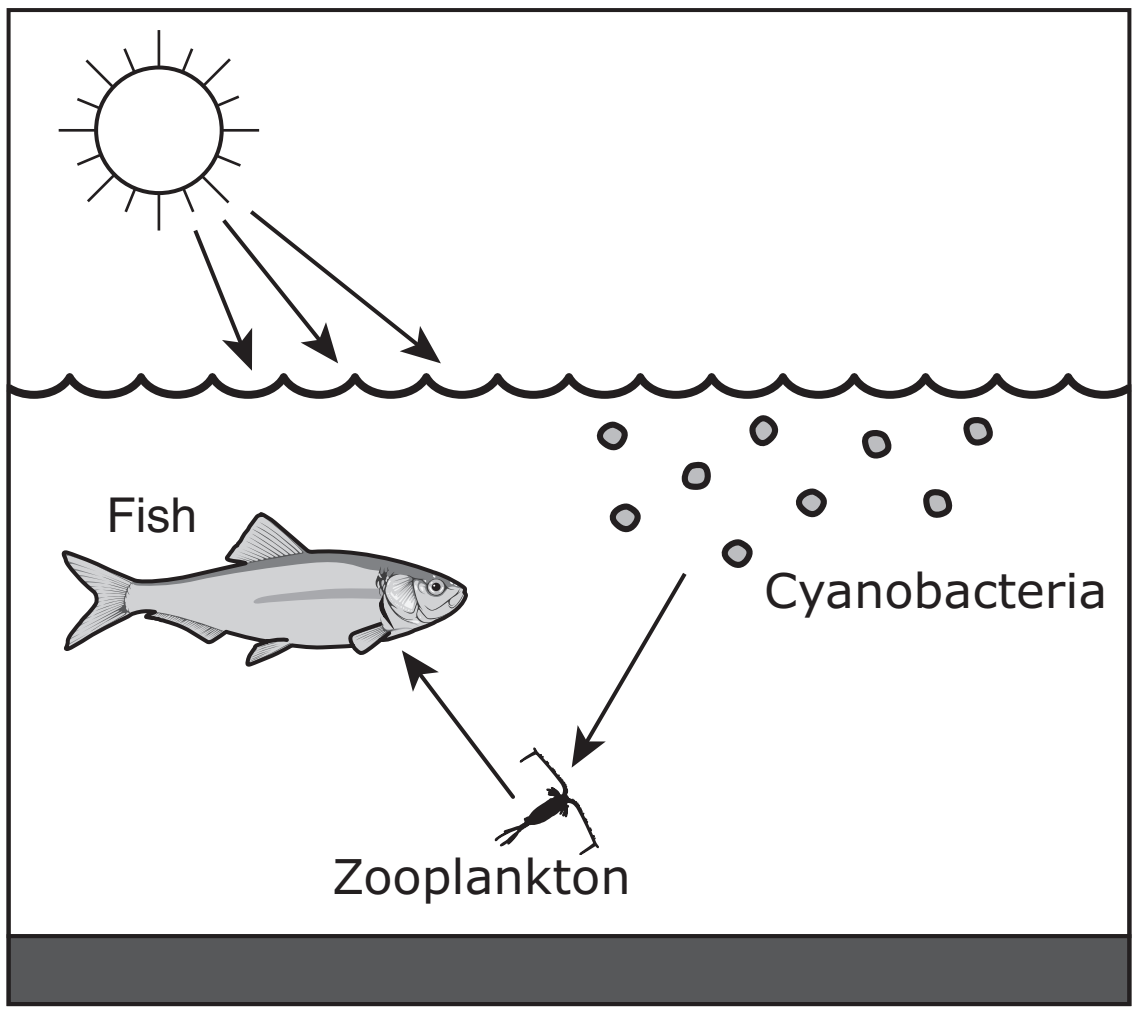



GO ON

## Carbon Cycling

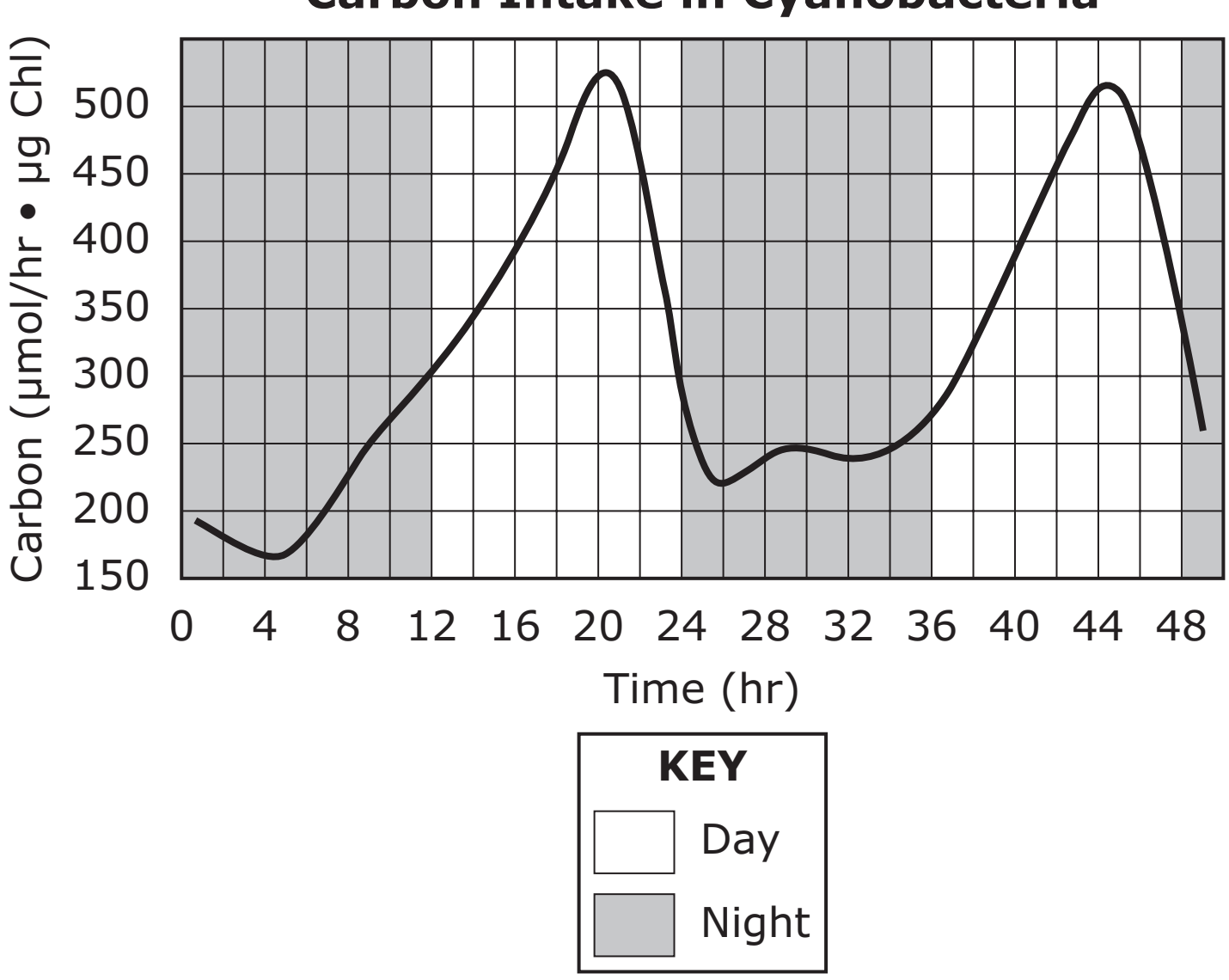
In aquatic ecosystems the cyanobacteria are part of the plankton. Plankton include plant-like organisms and animals that float along at the mercy of the tides and currents. The plant-like plankton, or phytoplankton, are the base of most food webs. They are the producers of most aquatic ecosystems. The animal plankton, or zooplankton, feed on them. The model shows the flow of energy from the Sun through the organisms in an aquatic ecosystem.

**Flow of Energy**



Another important role of cyanobacteria in the aquatic ecosystem is carbon cycling. Scientists measured the intake of carbon by cyanobacteria over a 48-hour period. The graph shows the data collected and the periods of day and night when light was or was not present. The scientists measured the carbon intake in micromoles per hour in a microgram of chlorophyll (μmol/hr · μg Chl).

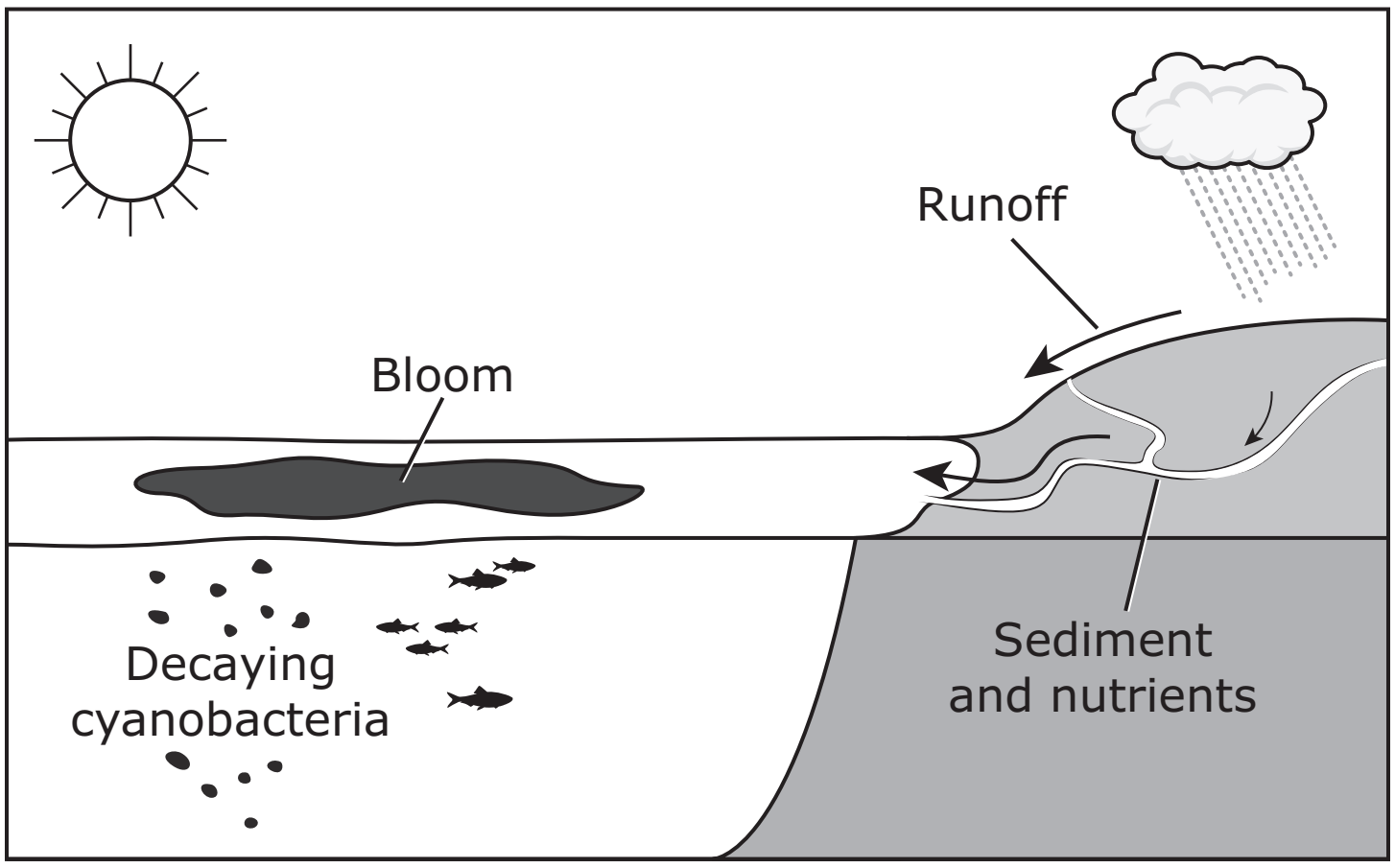
**Carbon Intake in Cyanobacteria**



## Cyanobacteria Blooms

Cyanobacteria can also cause problems in some ecosystems. When they multiply quickly, they can form large groups called blooms. Blooms are caused when nutrients run off into the water from cities, industries, and agricultural fields. The excess nutrients provide additional resources to help in the process of creating food. Warmer water temperatures will also encourage blooms to form. Blooms cover the water's surface and block the sunlight that other organisms need. Some blooms are toxic and can harm or kill other organisms. When the bloom uses up the extra nutrients, the cyanobacteria die and decompose. The model shows a bloom.

**Cyanobacteria Bloom**



**7** Which statement describes the role of the Sun in photosynthesis in the cyanobacteria?

**A** Energy from light is used to break the bonds in water and carbon dioxide.

**B** Light energy is transformed into heat energy, which causes carbon dioxide and water molecules to break.

**C** Energy in the form of light is absorbed by the breaking of chemical bonds in carbon dioxide.

**D** Light energy reacts with carbon dioxide and water molecules to directly form sugar.

**8** Use the Cyanobacteria Processes model to answer the questions.

**Part A**

Which phrase identifies the inputs of photosynthesis?

**A** sugar, $CO_2$, and $O_2$

**B** light energy, $CO_2$, and $O_2$

**C** sugar, $CO_2$, and $H_2O$

**D** light energy, $CO_2$, and $H_2O$

**Part B**

Which phrase identifies the outputs of photosynthesis?

**A** $CO_2$ and sugar

**B** $O_2$ and $H_2O$

**C** $O_2$ and sugar

**D** $CO_2$ and $H_2O$

**9** Which statements identify transfers of matter and energy that occur with in the cyanobacteria? Select the two that apply.

**A** Sugars from photosynthesis are used to perform cellular respiration in order to release energy.

**B** Photosynthetic organisms use the product $CO_2$ to support life functions and to build and maintain cells.

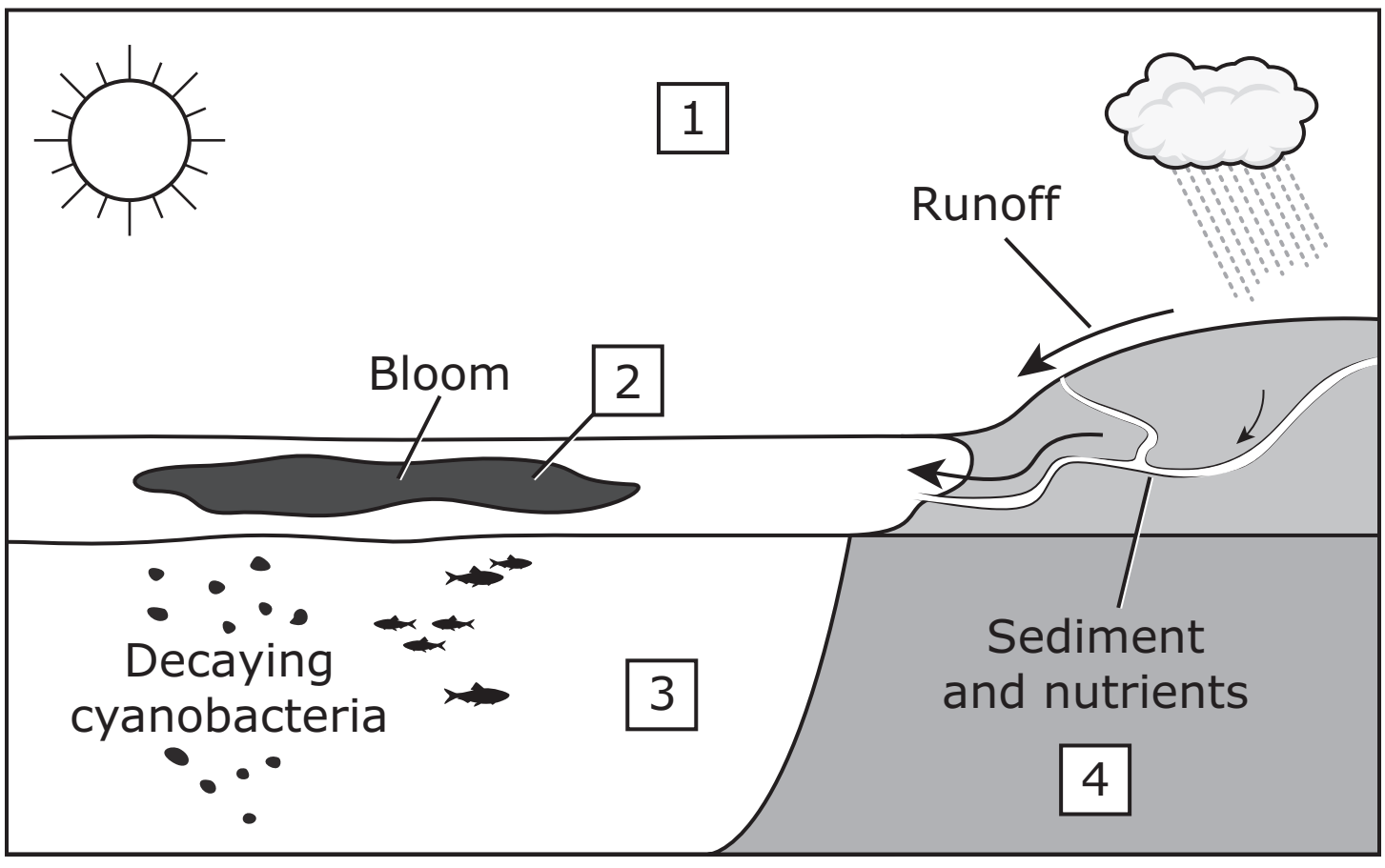
**C** Non-photosynthetic organisms use the additional energy left over from photosynthesis to build and maintain cells.

**D** Energy stored in the sugar is transferred to consumers when they eat the cyanobacteria.

**E** Energy created during photosynthesis in non-photosynthetic organisms is transferred to photosynthetic organisms as they are consumed.

**10** The Cyanobacteria Bloom model shows the cycling of carbon through the Earth spheres by the process of photosynthesis and cellular respiration. Use the model to answer the questions.

**Cyanobacteria Bloom**




**Part A**

Which box represents the sphere that is gaining carbon through the photosynthesis of the cyanobacteria?

**A** Box 1

**B** Box 2

**C** Box 3

**D** Box 4

**Part B**

Which box represents the sphere that is directly gaining carbon when cellular respiration occurs in the cyanobacteria?

**A** Box 1

**B** Box 2

**C** Box 3

**D** Box 4

GO ON

**11** Which statements describe the cyanobacteria blooms' impact on the cycling of carbon in the biosphere? Select the two that apply.

**A** Blooms release carbon dioxide from the biosphere.

**B** Cyanobacteria remove nitrogen from the water to grow.

**C** Blooms in warm water increase more quickly.

**D** Cyanobacteria are eaten by other organisms in the biosphere.

**E** Blooms remove oxygen from the hydrosphere and use it in the biosphere.

**12** **CR** Scientists use models but these models have limitations. Describe the limitation of using the Carbon Intake in Cyanobacteria graph when trying to determine the amount of carbon cycling through the cyanobacteria.

Write your answer in your Answer Sheet.

STOP

# No test material on this page

# Periodic Table of the Elements

atomic number — 14
**Symbol** — **Si**
Name — Silicon
atomic weight — 28.085

| Group 1 | | | | | | | | | | | | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 **H** Hydrogen 1.008 | 2 | | | | | | | | | | | | | | | 2 **He** Helium 4.0026 |
| 2 | 3 **Li** Lithium 6.94 | 4 **Be** Beryllium 9.0122 | | | | | | | | | | 5 **B** Boron 10.81 | 6 **C** Carbon 12.011 | 7 **N** Nitrogen 14.007 | 8 **O** Oxygen 15.999 | 9 **F** Fluorine 18.998 | 10 **Ne** Neon 20.180 |
| 3 | 11 **Na** Sodium 22.990 | 12 **Mg** Magnesium 24.305 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 **Al** Aluminum 26.982 | 14 **Si** Silicon 28.085 | 15 **P** Phosphorus 30.974 | 16 **S** Sulfur 32.06 | 17 **Cl** Chlorine 35.45 | 18 **Ar** Argon 39.948 |
| 4 | 19 **K** Potassium 39.098 | 20 **Ca** Calcium 40.078 | 21 **Sc** Scandium 44.956 | 22 **Ti** Titanium 47.867 | 23 **V** Vanadium 50.942 | 24 **Cr** Chromium 51.996 | 25 **Mn** Manganese 54.938 | 26 **Fe** Iron 55.845 | 27 **Co** Cobalt 58.933 | 28 **Ni** Nickel 58.693 | 29 **Cu** Copper 63.546 | 30 **Zn** Zinc 65.38 | 31 **Ga** Gallium 69.723 | 32 **Ge** Germanium 72.630 | 33 **As** Arsenic 74.922 | 34 **Se** Selenium 78.97 | 35 **Br** Bromine 79.904 | 36 **Kr** Krypton 83.798 |
| 5 | 37 **Rb** Rubidium 85.468 | 38 **Sr** Strontium 87.62 | 39 **Y** Yttrium 88.906 | 40 **Zr** Zirconium 91.224 | 41 **Nb** Niobium 92.906 | 42 **Mo** Molybdenum 95.95 | 43 **Tc** Technetium (98) | 44 **Ru** Ruthenium 101.07 | 45 **Rh** Rhodium 102.91 | 46 **Pd** Palladium 106.42 | 47 **Ag** Silver 107.87 | 48 **Cd** Cadmium 112.41 | 49 **In** Indium 114.82 | 50 **Sn** Tin 118.71 | 51 **Sb** Antimony 121.76 | 52 **Te** Tellurium 127.60 | 53 **I** Iodine 126.90 | 54 **Xe** Xenon 131.29 |
| 6 | 55 **Cs** Cesium 132.91 | 56 **Ba** Barium 137.33 | 57-71 lanthanoids | 72 **Hf** Hafnium 178.49 | 73 **Ta** Tantalum 180.95 | 74 **W** Tungsten 183.84 | 75 **Re** Rhenium 186.207 | 76 **Os** Osmium 190.23 | 77 **Ir** Iridium 192.22 | 78 **Pt** Platinum 195.08 | 79 **Au** Gold 196.97 | 80 **Hg** Mercury 200.59 | 81 **Tl** Thallium 204.38 | 82 **Pb** Lead 207.2 | 83 **Bi** Bismuth 208.98 | 84 **Po** Polonium (209) | 85 **At** Astatine (210) | 86 **Rn** Radon (222) |
| 7 | 87 **Fr** Francium (223) | 88 **Ra** Radium (226) | 89-103 actinoids | 104 **Rf** Rutherfordium (267) | 105 **Db** Dubnium (270) | 106 **Sg** Seabergium (269) | 107 **Bh** Bohrium (270) | 108 **Hs** Hassium (270) | 109 **Mt** Meitnerium (278) | 110 **Ds** Darmstadium (281) | 111 **Rg** Roentgenium (281) | 112 **Cn** Copernicium (285) | 113 **Nh** Nihonium (286) | 114 **Fl** Flerovium (289) | 115 **Mc** Moscovium (289) | 116 **Lv** Livermorium (293) | 117 **Ts** Tennessine (293) | 118 **Og** Oganesson (294) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 **La** Lanthanum 138.91 | 58 **Ce** Cerium 140.12 | 59 **Pr** Praseodymium 140.91 | 60 **Nd** Neodymium 144.24 | 61 **Pm** Promethium (145) | 62 **Sm** Samarium 150.36 | 63 **Eu** Europium 151.96 | 64 **Gd** Gadolinium 157.25 | 65 **Tb** Terbium 158.93 | 66 **Dy** Dysprosium 162.50 | 67 **Ho** Holmium 164.93 | 68 **Er** Erbium 167.26 | 69 **Tm** Thulium 168.93 | 70 **Yb** Ytterbium 173.05 | 71 **Lu** Lutetium 174.97 |
| 89 **Ac** Actinium (227) | 90 **Th** Thorium 232.04 | 91 **Pa** Protactinium 231.04 | 92 **U** Uranium 238.03 | 93 **Np** Neptunium (237) | 94 **Pu** Plutonium (244) | 95 **Am** Americium (243) | 96 **Cm** Curium (247) | 97 **Bk** Berkelium (247) | 98 **Cf** Californium (249) | 99 **Es** Einsteinium (252) | 100 **Fm** Fermium (257) | 101 **Md** Mendelevium (258) | 102 **No** Nobelium (259) | 103 **Lr** Lawrencium (262) |

If the atomic weight number is in parentheses, then it refers to the atomic mass of the most stable isotope.
*Based on the IUPAC Periodic Table of Elements 2018*

cognia™

# LS MISA
# PRACTICE TEST

1 2 3 4 5 A B C D E

Printed in the USA