



Science
Released Test
Questions
2016

GRADE
HS

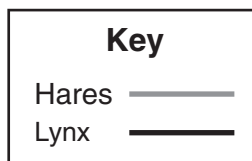
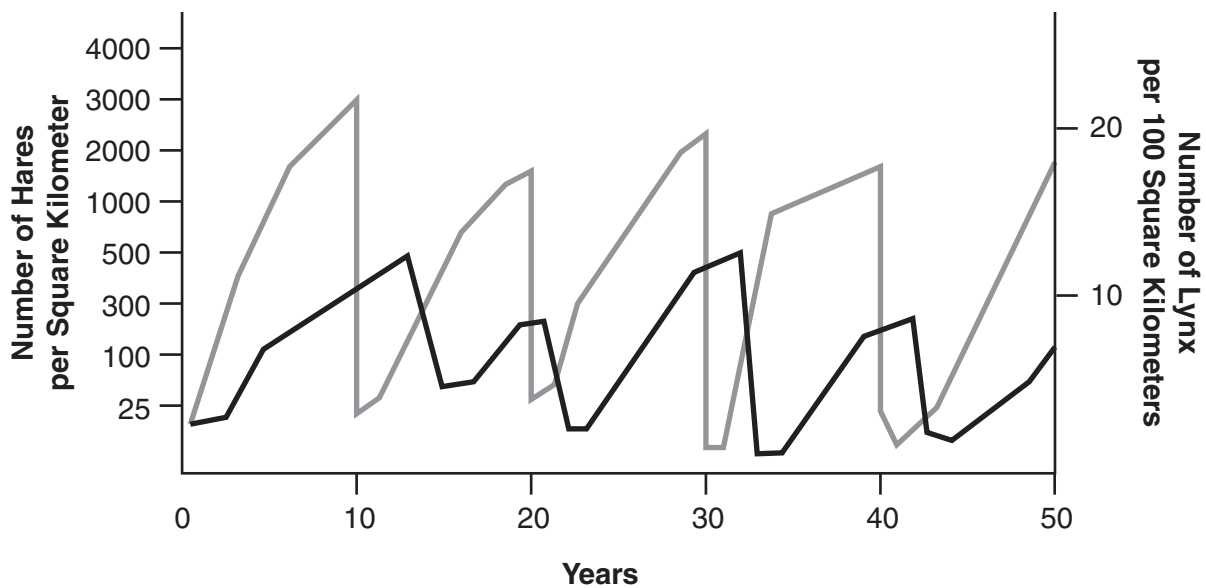
DIRECTIONS

Use the following information to answer questions 1 through 5.

The populations of animals living in the wild follow cycles. One example is the cycling of the lynx and snowshoe hare populations in the forests of Canada. The snowshoe hare is the major food source for the lynx. The numbers of hares and lynx can be estimated from records of the numbers of pelts of each species sold by fur trappers each year. The graph below shows some of this historical data.



**Snowshoe Hare and Lynx
Population Changes Over Time**



**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

9-12.I.I.I.02

Scientific Thinking and Practice: Content Standard I: Benchmark I: Performance Standard 2: Design and conduct scientific investigations that include: testable hypotheses; controls and variables; methods to collect, analyze, and interpret data; results that address hypotheses being investigated; predictions based on results; re-evaluation of hypotheses and additional experimentation as necessary; error analysis.

1. Scientists want to find out if cycles in snowshoe hare populations are a result of predator-prey relationships, or of changes in food supply caused by overgrazing. For several years, scientists supply extra food to one snowshoe hare population, and nothing to another snowshoe hare population. They record population changes in both groups.

Which result would *best* support the hypothesis that cycles in snowshoe hare populations are mainly a result of the predator-prey relationship?

- A** The population without extra food continues to cycle throughout the study.
- B** The population with extra food increases, then levels off and begins to cycle.
- C** The population without extra food decreases by the same amount each year.
- D** The population with extra food increases, then levels off and remains constant.

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

9-12.I.I.I.04	Scientific Thinking and Practice: Content Standard I: Benchmark I: Performance Standard 4: Convey results of investigations using scientific concepts, methodologies, and expressions, including: scientific language and symbols; diagrams, charts, and other data displays; mathematical expressions and processes (e.g., mean, median, slope, proportionality); clear, logical, and concise communication; reasoned arguments.
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2. Based on the graph, which statement *best* interprets the trends?

- A** Snowshoe hares and lynx both have life spans of about ten years.
- B** Prey populations would increase indefinitely if there were no predators.
- C** Predator cycles follow the same pattern as prey cycles, but with a delay.
- D** The population sizes of snowshoe hares and lynx are independent of one another.

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

9-12.II.II.1.03 Content of Science: Content Standard II: LIFE SCIENCE: Benchmark I: Performance Standard 3: Ecosystems: Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients).

3. Which limiting factor most likely has the *greatest* effect on the lynx population?

- A** The availability of water
- B** The availability of space
- C** The availability of oxygen
- D** The availability of nutrients

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GRADE 11 SCIENCE**

9-12.II.II.I.05	Content of Science: Content Standard II: LIFE SCIENCE: Benchmark I: Performance Standard 5: Energy Flow in the Environment: Explain how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.
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4. The snowshoe hare gets its energy by eating willow and birch twigs.

If a snowshoe hare consumes 1,000 units of energy, <i>about</i> how much of this energy is available to a lynx?

- A** 10 units
- B** 100 units
- C** 1,000 units
- D** 10,000 units

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

9-12.II.II.II.12	Content of Science: Content Standard II: LIFE SCIENCE: Benchmark II: Performance Standard 12: Biological Evolution: Explain how natural selection favors individuals who are better able to survive, reproduce, and leave offspring.
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5. A snowshoe hare with the trait of unusually strong legs is able to run faster than other snowshoe hares in the population. This trait may cause changes in future generations of snowshoe hares because the fast snowshoe hare will —
- A** be more likely to live to reproduce and pass on the trait
 - B** seek out a mate with similar physical and behavioral traits
 - C** migrate and join another population of fast snowshoe hares
 - D** teach other snowshoe hares how to improve their running skills

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GRADE 11 SCIENCE

09-12.II.I.III.04 Content of Science: Content Standard I: PHYSICAL SCIENCE: Benchmark III: Performance Standard 4: Forces: Understand the relationship between force and pressure, and how the pressure of a volume of gas depends on the temperature and the amount of gas.

6. The picture below shows an air tank used in scuba diving.



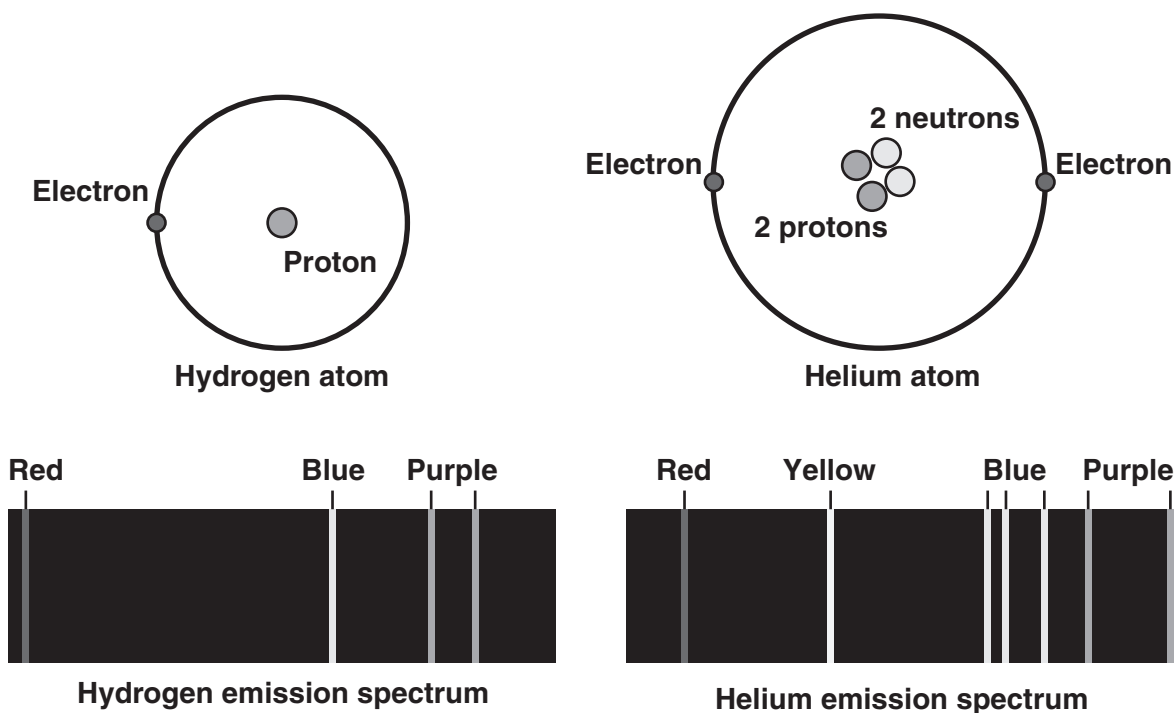
Which of these *best* describes what happens to the air in the tank when the tank is exposed to heat?

- A** There is a decrease in mass.
- B** There is an increase in air volume.
- C** There is an increase in air pressure.
- D** There is a decrease in molecular motion.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

09-12.II.I.II.10 Content of Science: Content Standard I: PHYSICAL SCIENCE: Benchmark II: Performance Standard 10: Interactions of Energy and Matter: Explain how wavelengths of electromagnetic radiation can be used to identify atoms, molecules, and the composition of stars.

7. The atomic structures and emission spectra of hydrogen and helium are shown below.



In the answer space provided,

- A. Explain why helium has more emission spectral lines than hydrogen.
- B. Explain how emission spectra can be used to distinguish between hydrogen and helium.
- C. Explain why there are distinct bands of color on the emission spectra for each element.

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GRADE 11 SCIENCE**

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of how electromagnetic radiation can identify atoms. The student correctly explains why helium has more emission spectral lines than hydrogen, clearly explains how emission spectra can be used to distinguish between hydrogen and helium, and clearly explains why there are distinct bands of color on the emission spectra for each element.
3	The student demonstrates an understanding of how electromagnetic radiation can identify atoms. The student adequately explains why helium has more emission spectral lines than hydrogen, adequately explains how emission spectra can be used to distinguish between hydrogen and helium, and adequately explains why there are distinct bands of color on the emission spectra for each element. The response may contain minor errors or misconceptions.
2	The student demonstrates a partial understanding of how electromagnetic radiation can identify atoms. The student partially explains why helium has more emission spectral lines than hydrogen, and partially explains how emission spectra can be used to distinguish between hydrogen and helium, but does not explain why there are distinct bands of color on the emission spectra for each element. The response may contain errors and/or omissions.
1	The student demonstrates a minimal understanding of how electromagnetic radiation can identify atoms. The student explains in a minimal way why helium has more emission spectral lines than hydrogen, but does not explain how emission spectra can be used to distinguish between hydrogen and helium, or explain why there are distinct bands of color on the emission spectra for each element.
0	The response is incorrect or irrelevant.
Blank	No response.

Scoring Information:

Part A

Helium has more spectral lines because it has more electrons, and therefore more possibilities for changes in energy levels.

Part B

- Each atom has its own unique emission spectrum, like each person has unique fingerprints.
- The greatest difference between the spectra is the yellow line in the helium spectrum that is not in the hydrogen spectrum.

Part C

- Each emission spectral line represents the difference between two electron energy levels. Since each electron level is unique, as electrons rise and fall between orbitals, photons of specific wavelengths are emitted.
- Electrons can only get excited to certain levels.
- Each electron level is unique.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 4

7. Be sure to answer the entire question.
- A. Helium has more emission spectral lines than hydrogen because it has more electrons to put out different frequencies of light.
- B. Emission spectra can be used to distinguish between H and He because the patterns of light the elements give out are unique.
- C. The distinct bands of light result from the fact that the electrons, when returning to their ground state, emit a specific frequency of light.

The response demonstrates a thorough understanding of how electromagnetic radiation can identify atoms. In part A, the response mentions that helium has more spectral lines because it has more electrons. The response also explains how emission spectra can be used to distinguish between hydrogen and helium ("because the patterns of light the elements give out are unique"). And for part C, the student explains why there are distinct bands of color on the emission spectra for each element ("electrons, when returning to their ground state, emit a specific frequency of light").

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 3

7.

Be sure to answer the entire question.

- A) because it has more electrons
B) if a current is run through both elements
and one glows yellow that it can be concluded
that it is Helium
C) because when an electron becomes excited
it emits a color.

The response demonstrates an understanding of how electromagnetic radiation can identify atoms. In part A, the response mentions that Helium has more spectral lines because it has more electrons. The response also explains how emission spectra can be used to distinguish between hydrogen and helium (yellow line). Part C is not fully explained, but mentions an excited state of emission. The response needs to discuss that electrons are excited to different states of energy levels for full credit.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 2 – FIRST EXAMPLE

7.

Be sure to answer the entire question.

A. Helium has more electrons than hydrogen.

B. Each of their emission spectrums have their own pattern.

C.

The response demonstrates a partial understanding of how electromagnetic radiation can identify atoms. In part A, the response mentions that helium has more spectral lines because it has more electrons. The response also explains how emission spectra can be used to distinguish between hydrogen and helium (own pattern = unique). Part C was not attempted.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 2 – SECOND EXAMPLE

7.

Be sure to answer the entire question.

(A) Because helium has more electrons, protons, and neutrons.

(B) helium has yellow in its spectrum, and hydrogen doesn't.

(C) To distinguish between them.

The response demonstrates a partial understanding of how electromagnetic radiation can identify atoms. In part A, the response mentions that helium has more spectral lines because it has more electrons. The response also explains how emission spectra can be used to distinguish between hydrogen and helium (yellow line). Part C was not attempted.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 1 – FIRST EXAMPLE

7.

Be sure to answer the entire question.

A) Helium has more emission spectral lines than hydrogen because it has more protons, neutrons, and electrons.

B) If you were just studying the emission spectrum you would be able to tell which was hydrogen and which was helium.

C) There are distinct bands of color for each element on the emission spectra because if there wasn't we would be able to tell the difference between elements.

The response demonstrates a minimal understanding of how electromagnetic radiation can identify atoms. In part A, the response mentions that Helium has more spectral lines because it has more electrons, nothing relevant in parts B and C.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 1 – SECOND EXAMPLE

7.

Be sure to answer the entire question.

A. it has 2 Neutrons the Hydrogen.
B. Hydrogen dont have a yellow.
C. IDK

The response demonstrates a minimal understanding of how electromagnetic radiation can identify atoms. There is nothing relevant in part A and C, in part B the response gives some indication of the use of color to ID elements. Minimal credit awarded.

SCORE POINT 0 – FIRST EXAMPLE

7.

Be sure to answer the entire question.

A.) Helium has more moving
particle
B. They both have red, blue, and purple.
C. They all stand for something.

The response demonstrates no understanding of how electromagnetic radiation can identify atoms. In Part B, the response alludes to colors but does not mention the color yellow, so no credit was awarded.

NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE

SCORE POINT 0 – SECOND EXAMPLE

7.

Be sure to answer the entire question.

A - lighter gas and losses momentum

B - they can be distinguished by colliding together


C - they are not the same they have different reactions

The response demonstrates no understanding of how electromagnetic radiation can identify atoms.

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

09-12.II.III.II.01 Content of Science: Content Standard III: EARTH AND SPACE SCIENCE: Benchmark II: Performance Standard 1: Characteristics and Evolution of Earth: Describe the characteristics and the evolution of Earth in terms of the geosphere, the hydrosphere, the atmosphere, and the biosphere.

8. Earth's early atmosphere contained little oxygen.

Which process *increased* the amount of oxygen in Earth's atmosphere?

- A** Decay
- B** Denitrification
- C** Photosynthesis
- D** Cellular respiration

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

09-12.II.III.I.03 Content of Science: Content Standard III: EARTH AND SPACE SCIENCE: Benchmark I: Performance Standard 3: Understand how knowledge about the universe comes from evidence collected from advanced technology (e.g., telescopes, satellites, images, computer models).

9. Which technology *best* allows scientists to study the contents of Martian soil?

- A** Orbiting satellites
- B** Computer models
- C** Space telescopes
- D** Planetary spacecraft

**NEW MEXICO 2016 RELEASED ITEMS
GRADE 11 SCIENCE**

09-12.III.I.I.07	Science and Society: Content Standard I: Benchmark I: Performance Standard 7: Science and Technology: Describe how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.
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10. Human activities can reduce the ozone layer.

Which of these will <i>most</i> likely happen if the ozone layer is reduced by 40%?

- A** An increase in UV radiation reaching Earth's surface, resulting in lower surface temperatures
- B** A decrease in UV radiation reaching Earth's surface, resulting in greater photosynthesis rates
- C** An increase in UV radiation reaching Earth's surface, resulting in greater risks of some types of cancer
- D** A decrease in UV radiation reaching Earth's surface, resulting in less stress to the human immune system

Grade 11 Science Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10
Strand ¹	I	I	II	II	II	II	II	II	II	III
Benchmark	I	I	I	I	II	III	II	II	I	I
Performance Standard	2	4	3	5	12	4	10	1	3	7
Depth of Knowledge	3	2	2	2	2	2	3	2	2	2
Item Type ²	MC	MC	MC	MC	MC	MC	OE	MC	MC	MC
Answer Key	B	C	D	B	A	C		C	D	C
Total Possible Points	1	1	1	1	1	1	4	1	1	1

¹Strand: I = Scientific Thinking and Practice; II = Content of Science; III = Science and Society

²Item Type: MC = Multiple Choice, SA = Short Answer, OE = Open Ended