

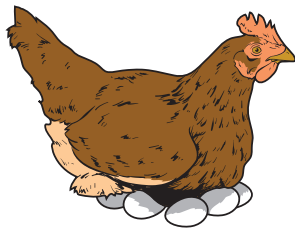
You are about to begin the Science Practice Assessment.

- There are different types of questions throughout the practice assessment. Multiple choice questions do not include any additional instructions after the question. You should mark only one answer for a multiple choice question. Other types of questions include instructions that describe how to answer those questions.
- Some questions are constructed response. These questions require you to type your answer in the space provided. You can earn points for partly correct answers to these questions, so you should try to answer them as best you can. To receive full credit, read the questions carefully to help guide you in writing your complete answers.
- Many of the questions are grouped into sets that include common background information. The background information is repeated if additional questions are part of that set. You do not need to reread the background information each time, but it is there for you if you need it.

Which Came First?

Satomi has heard the familiar question, "Which came first, the chicken or the egg?" She understands that a chicken is needed to lay an egg, and also that chickens come from eggs. So, which came first, the chicken or the egg? Satomi wants to investigate.

Chicken with Eggs



To conduct further investigation, Satomi gathers information on the following organisms:

- fish
- frogs
- turtles
- lizards
- snakes
- crocodiles
- chickens

Why would Satomi choose these specific organisms to investigate the question of whether the chicken or the egg came first?

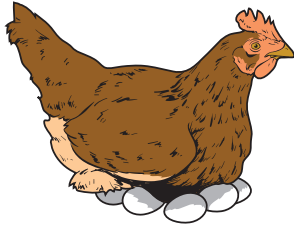
- | | |
|---|---|
| A | All use unique methods of locomotion. |
| B | All use oxygen as a primary means of respiration. |
| C | All have eyes that are adapted to their environment. |
| D | All have similarities in their embryological development. |

Check Answer

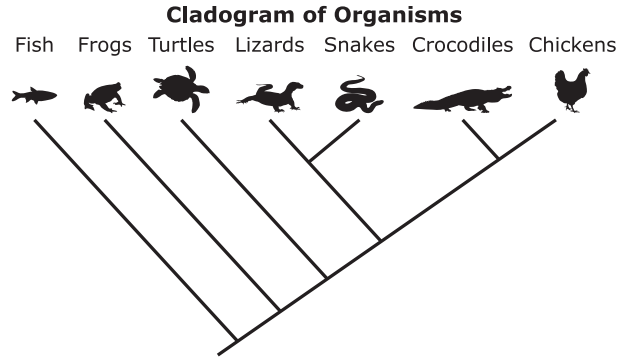
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Chicken with Eggs

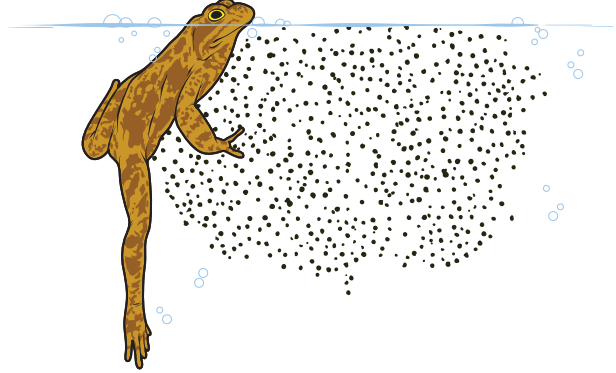


Satomi finds this diagram, called a cladogram, that includes the organisms she wants to investigate. A cladogram shows relationships among different organisms.



Satomi investigates frogs and finds this picture of a frog with its eggs.

Frog with Eggs



Based on the cladogram, what is the relationship between chickens and frogs?

- A** Chickens evolved legs from frogs.
- B** Chickens and frogs share a common ancestor.
- C** Chickens' social behavior of living in groups evolved from frogs.
- D** Chickens and frogs are closely related because neither have scales.

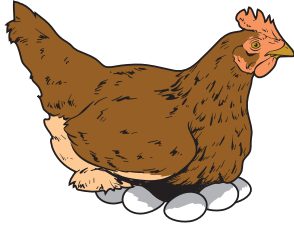
Check Answer

Key: Part A -Top Dropdown by Chicken / Part B - The organisms that branched out below that point in the cladogram are both aquatic animals. Those animals lay unshelled eggs because they lay their eggs in the water and don't have to worry about the eggs drying out.

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Chicken with Eggs



To better understand the evolution of shelled eggs, such as the type chickens lay, Satomi wants to determine where in evolution shelled eggs first appeared.

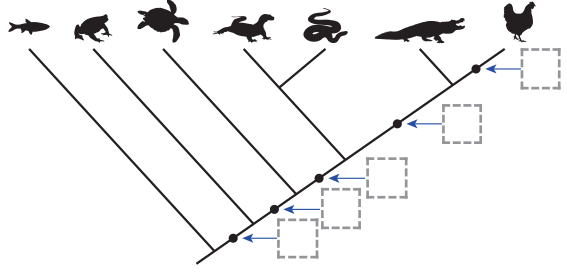
Satomi will use the cladogram to identify the point throughout the evolution of organisms that shelled eggs likely first appeared.

Part A

At which point on the cladogram did shelled eggs likely first appear? Move the egg to the appropriate position on the cladogram.

Cladogram of Organisms

Fish Frogs Turtles Lizards Snakes Crocodiles Chickens



Check Answer

Part B

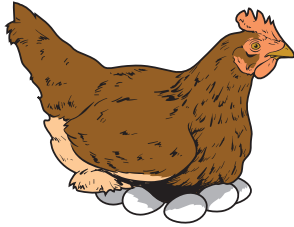
Why do the organisms below where the egg was placed in Part A produce soft, unshelled eggs? Provide an explanation.

B *I* U | ☰ ☷

Which Came First?

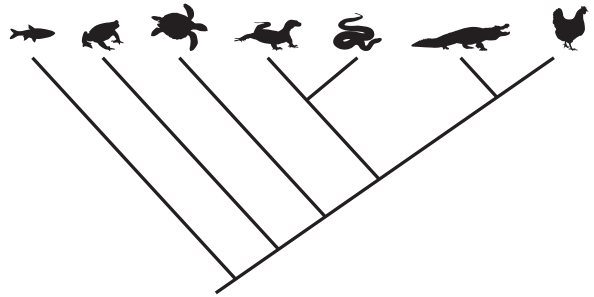
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Chicken with Eggs



Cladogram of Organisms

Fish Frogs Turtles Lizards Snakes Crocodiles Chickens



Part A

Which came first, the chicken or the egg?

A the chicken

B the egg

Check Answer

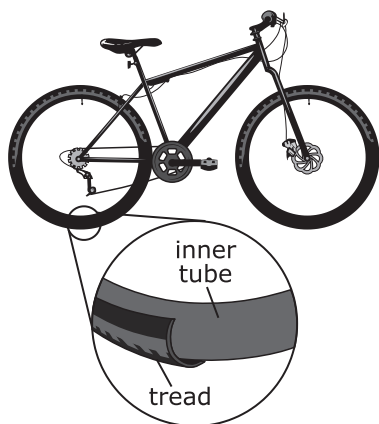
Part B

What evidence in the cladogram supports the answer to Part A? Provide an explanation.

B *I* u | ☰ ☷

Popping Bike Tire

Leo lives in the desert, where outdoor temperatures can vary greatly from morning to night. Early one morning, Leo notices that his bicycle tire is flat, so he pumps air into both tires until they feel hard when he squeezes. He then goes for a ride although it is cold outside (-3.9°C). Later that afternoon, Leo takes another ride with his friend, Juan. The day is now much warmer (38°C). Part of the way through this ride, Leo hears a loud pop and sees that one of his tires has gone flat.



Part A

What did Leo do to the tire in the morning when it was flat?

- A** He removed air molecules.
- B** He added more air molecules.
- C** He did not change the number of air molecules.

Check Answer

Part B

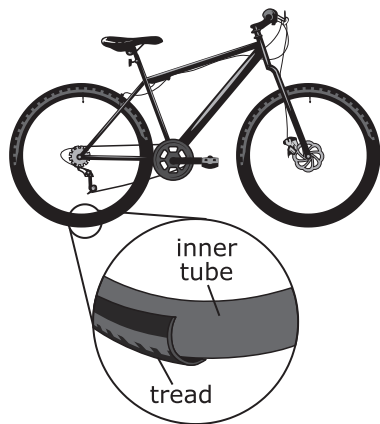
What effects did Leo's action in Part A have on the pressure and volume of the tire? Select **one** choice in each row.

	Increased	Decreased
Pressure	<input type="checkbox"/>	<input type="checkbox"/>
Volume	<input type="checkbox"/>	<input type="checkbox"/>

Check Answer

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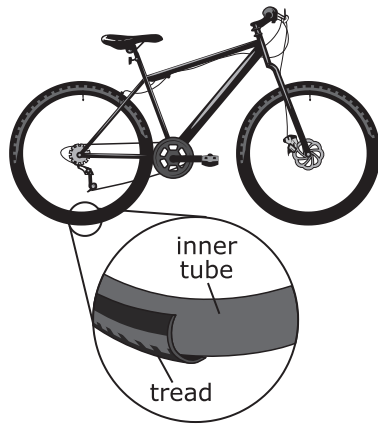
What happens to the air molecules in the atmosphere as the outdoor temperature heats up throughout the day?

- | | |
|---|---|
| A | The number of air molecules increases, which makes the air feel more humid. |
| B | The air molecules gain thermal energy and move farther apart from one another. |
| C | The chemical composition of the air molecules changes and becomes more acidic. |
| D | The air molecules move closer together, which increases the pressure in the atmosphere. |

Check Answer

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What happens to the tire as the temperature of the air in the atmosphere becomes hotter?

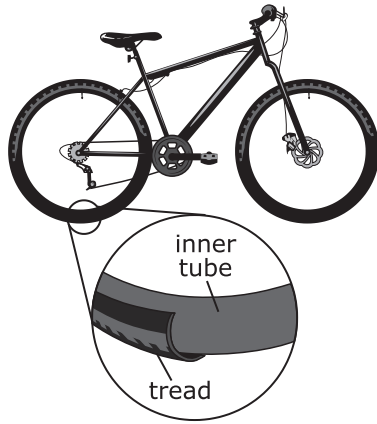
- A The tire loses energy.
- B The tire decreases in volume.
- C The tire increases in pressure.
- D The tire gains more air molecules.

Check Answer

Key: Kinetic energy of air molecules increases.+Pressure increases.|Pressure decreases.+Kinetic energy of air molecules increases.

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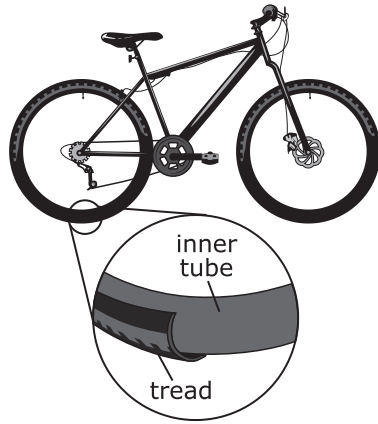
What happens inside the tire and in the atmosphere when the temperature increases? Move descriptions to the appropriate column in the chart. Not all descriptions may be used.

Inside the Tire	In the Atmosphere
<input type="checkbox"/> Kinetic energy of air molecules increases.	<input type="checkbox"/> Kinetic energy of air molecules decreases.
<input type="checkbox"/> Pressure increases.	<input type="checkbox"/> Pressure decreases.
<input type="checkbox"/> The total number of air molecules increases.	<input type="checkbox"/> The total number of air molecules decreases.

Check Answer

Popping Bike Tire

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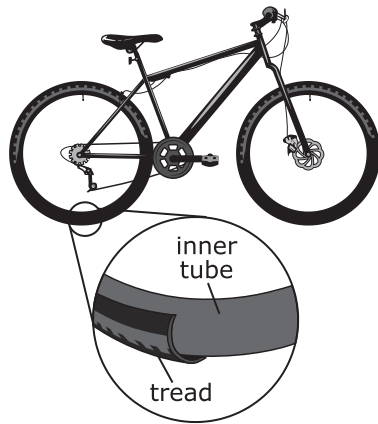


Why did the bicycle tire pop? Explain, based on the conditions both inside and outside the tire.

B *I* U | ☰ ☰

Popping Bike Tire

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What can Leo do differently next time to keep his tire from popping? Select the **two most likely** options that apply.

- A Ride the bike more slowly.
- B Avoid riding on rocky trails.
- C Put less weight on the bike.
- D Avoid filling the tire when it is cold.
- E Let air out of the tire when it gets hot.

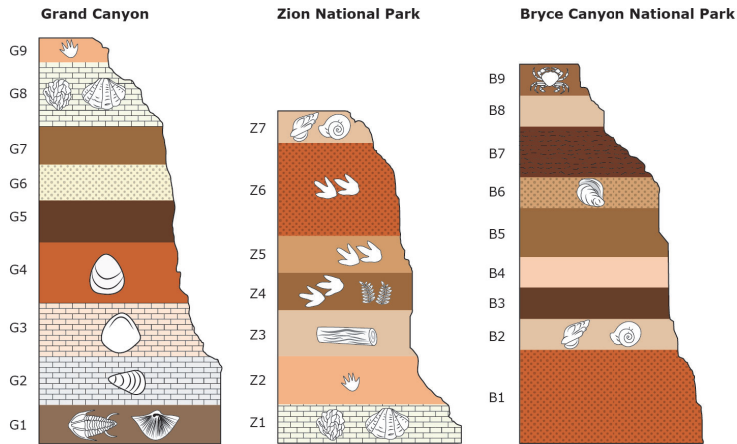
Check Answer



Colorado Plateau

While on a field trip of national parks in Utah and Arizona, Veronica notices similarities in exposed sections of rock at three locations: the Grand Canyon National Park, Zion National Park, and Bryce Canyon National Park. Upon further examination, she discovers layers of rock made of the same rock type and containing the same fossils across the different locations, despite being many miles apart. Veronica wonders whether these similarities can be used to determine the relative age of each location.

The diagram below shows the different rock layers for exposed sections of the Grand Canyon, Zion National Park, and Bryce Canyon National Park, and some of the fossils found in each layer.



Veronica studies the diagram and discovers similarities in the rock layers of the Grand Canyon and Zion National Park.

Part A

How are the rock layers in the two parks similar? Move a rock layer to each box to complete the statement.

Grand Canyon rock layers G8 and G9 have the same fossils as Zion National Park rock layers and .



- Z1 Z2 Z3 Z4 Z5 Z6 Z7

Check Answer

Part B

What can Veronica **best** infer about the two identified rock layers in the Grand Canyon and Zion National Park?

- A** The two rock layers in the Grand Canyon were formed later than the two rock layers in Zion National Park.
- B** The two rock layers in the Grand Canyon were formed at the same time as the two rock layers in Zion National Park.
- C** The two rock layers in the Grand Canyon were formed at the same location as the two rock layers in Zion National Park.
- D** The two rock layers in the Grand Canyon were formed in different environments than the two rock layers in Zion National Park.

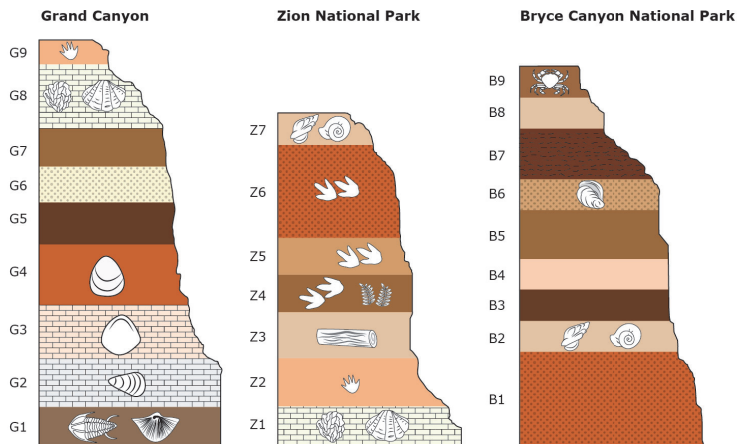
Check Answer



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Veronica examines rock layer G4 and rock layer Z4.

What can Veronica **best** infer about the two rock layers?

- A Rock layer G4 is older than rock layer Z4 because G4 is below a common rock layer found in both locations.
- B Rock layer G4 is younger than rock layer Z4 because rock layer Z4 contains more fossils than rock layer G4.
- C Rock layer G4 is the same relative age as rock layer Z4 because each has the same number of rock layers underneath.
- D Rock layer G4 and rock layer Z4 cannot be compared to one another because each rock layer formed in a different location.

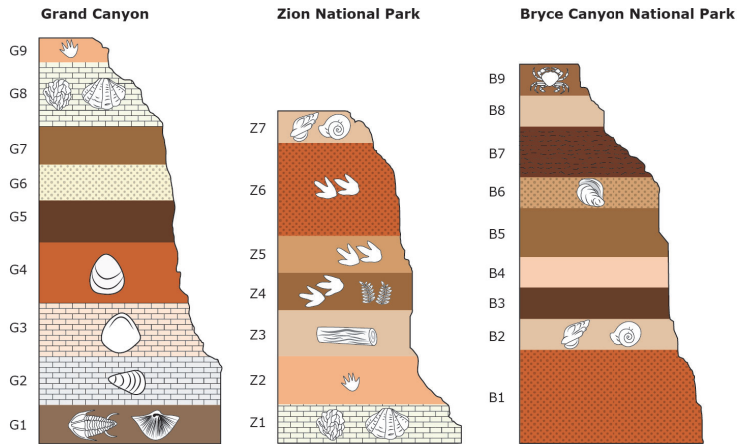
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The diagram below shows the different rock layers for exposed sections of the Grand Canyon, Zion National Park, and Bryce Canyon National Park, and some of the fossils found in each layer.



Veronica examines relationships between the three parks by using the diagram to compare the rock layers in each.

Which inference can she make about the relationship between the three parks?

- A The rock layers of all three parks were deposited and formed at the same time because they contain common fossils.
- B Grand Canyon and Bryce Canyon National Park may have experienced similar climates during their formations because similar fossils were found in the rock layers.
- C The rock layers of Zion National Park are the link in the geologic timeline between the Grand Canyon and Bryce Canyon National Park because there are rock layers common to all three parks.
- D The rock layers of Bryce Canyon National Park were formed much earlier than the rock layers in Zion National Park or the Grand Canyon because many of the fossils and rock layers do not match.

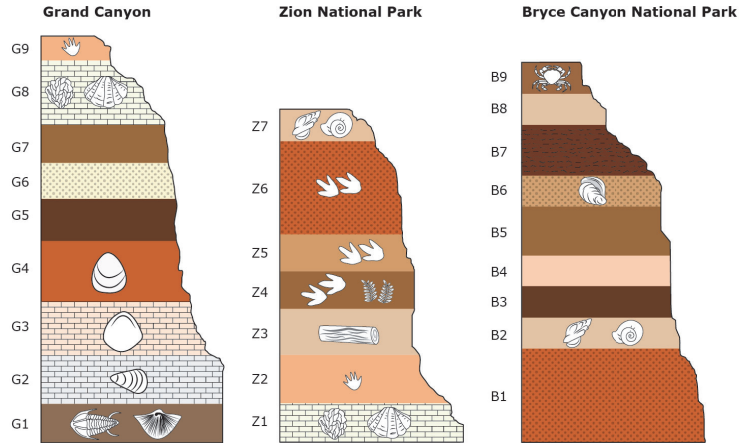
Check Answer

Key: From top to bottom TFFT

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Which statement about the rock layers at Zion National Park and Bryce Canyon National Park are **true**, and which are **false**? Select **True** or **False** for each statement.

	True	False
Rock layer B9 contains the youngest fossil.	<input type="radio"/>	<input type="radio"/>
Rock layer Z4 is younger than rock layer B4.	<input type="radio"/>	<input type="radio"/>
There is some overlap in the age of rock layers found at both locations.	<input type="radio"/>	<input type="radio"/>
There are similar fossils found in common rock layers at both locations.	<input type="radio"/>	<input type="radio"/>

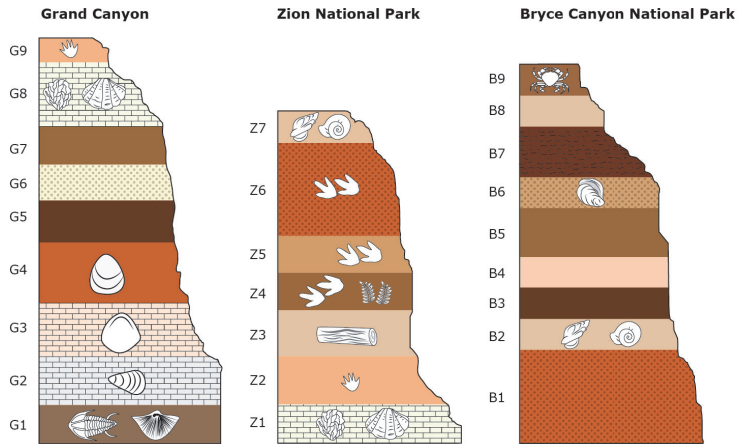
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Veronica wants to determine the relative age of each national park.

Which order shows the relative ages of the three parks from youngest (top) to oldest (bottom)? Move the national parks to show the correct order by age.

- Bryce Canyon National Park
- Grand Canyon
- Zion National Park

Check Answer