

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.

Hawaiian Islands

Kamalani is visiting relatives on the Hawaiian islands. First, she visits her grandmother on the island of Kaua'i. Next, she visits her sister on the island of Maui. Then, she travels to the big island of Hawai'i to explore Kīlauea, an active volcano.

While visiting her grandmother, Kamalani was told that the island of Kaua'i is one of the oldest inhabited islands in the Hawaiian island chain. This makes Kamalani wonder why the islands are not all the same age.

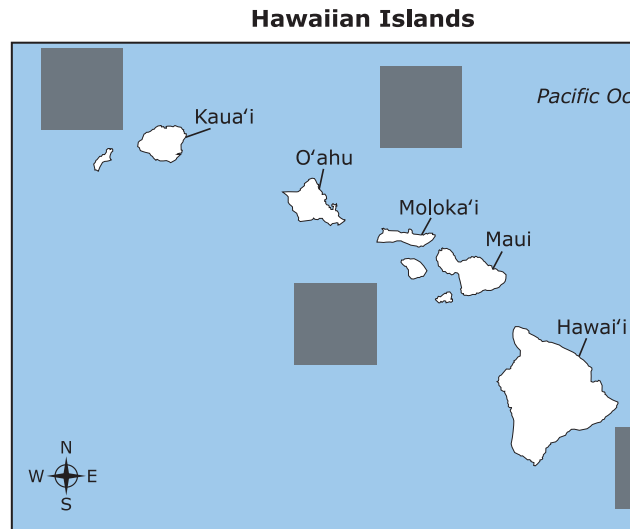
Kamalani is intrigued about the ages of the different islands. She gathers this information about when the islands were formed and writes it in her journal:

- Kaua'i — 3.8–5.6 million years
- O'ahu — 2.2–3.3 million years
- Moloka'i — 1.3–1.8 million years
- Maui — less than 1 million years
- Hawai'i — 0.7 million years – present day

She finds that the big island of Hawai'i is still being formed today.

Kamalani's grandmother tells her that there are more than 100 islands in the island chain. Kamalani wants to find the location of the oldest islands in the island chain.

Where should she look? Select the correct location.



Check Answer

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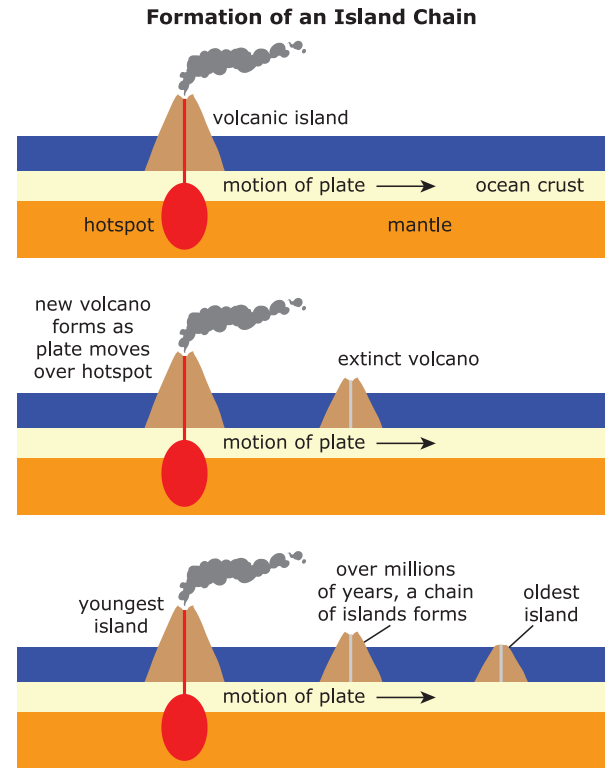
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Before Kamalani hikes in the Hawai'i Volcanos National Park, she goes to the Kīlauea Visitor Center. While there, Kamalani learns that the only active volcanoes in the state are found on the island of Hawai'i.

At the Visitor Center, she sees this diagram depicting the formation of the Hawaiian Islands.



Why is the island of Hawai'i the only island in the state of Hawaii with an active volcano?

- | | |
|----------|---|
| A | The island of Hawai'i is closer to the oceanic crust, which allows magma to flow through to the surface. |
| B | The island of Hawai'i is the largest island of the Hawaiian chain, and only large islands can support active volcanoes. |
| C | The island of Hawai'i is the youngest in the island chain, and volcanoes can form only on young islands, not old islands. |
| D | The island of Hawai'i sits over a large plume of hot magma, which pushes through the oceanic crust and forms the island. |

Check Answer

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Why is the youngest island of the Hawaiian Island chain the largest island? Explain.

B *I* U | ☰ ☷

0 / 10000 Word Limit

Key: Arrow pointing to the top left.

Hawaiian Islands

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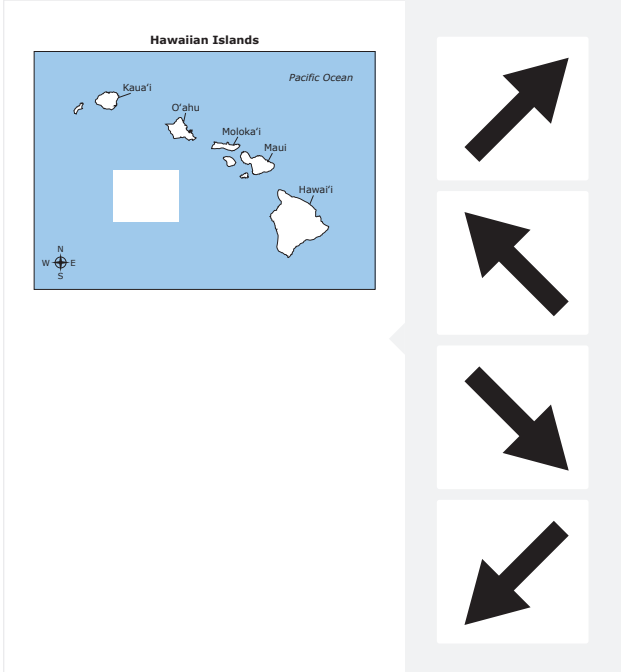
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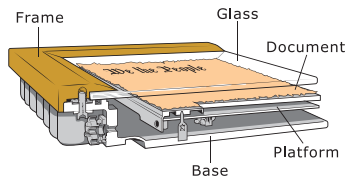
Based on what Kalamani learns, in which direction is the oceanic plate moving? Move an arrow to the space on the map.



The image shows a map of the Hawaiian Islands chain in the Pacific Ocean. The islands are labeled from northwest to southeast: Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. A compass rose in the bottom left corner indicates North (N), South (S), East (E), and West (W). A large white square is placed on the map, centered between O'ahu and Maui. To the right of the map is a vertical stack of four white boxes, each containing a black arrow pointing in a different direction: up-right, up-left, down-right, and down-left. Below the stack is a grey button labeled "Check Answer".

Check Answer

Preserving the Declaration



Shari visits the National Archives Museum in Washington, DC. Here, she studies the country's founding documents, including the Declaration of Independence which was written in 1776. She learns that the Declaration has been stored in a display case containing atmospheres such as ambient air, humidified helium, and now humidified argon. The table lists the atmospheres used in the display case over three time periods and whether oxygen gas (O₂) was present in each of the atmospheres.

Time Period	Atmosphere in Display Case	Declaration Exposed to Oxygen Gas?
1942-1952	ambient air, unsealed case	yes
1952-2001	humidified helium (He), sealed case	no
2002-2021	humidified argon (Ar), sealed case	no

Shari uses a periodic table to help her understand more about the elements in the atmospheres used inside the display case.

Periodic Table

Metal	Metalloid	Nonmetal
-------	-----------	----------

H																	He																														
Li	Be											B	C	N	O	F	Ne																														
Na	Mg											Al	Si	P	S	Cl	Ar																														
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																														
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																														
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																														
Fr	Ra	Ac																																													
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She also learns that the Declaration of Independence was written on parchment paper with ink that contains iron (Fe). The ink has begun to fade and flake away from the paper, making it difficult for the text on the

During the 1952 preservation, the Declaration was placed in a sealed case in which oxygen was removed.

Part A

How many electrons are in the outer shell of an oxygen atom? Develop a model by moving electrons to the electron shell.

Check Answer

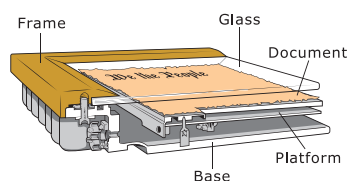
Part B

Why would a preservation committee choose to remove oxygen from the display case? Provide an explanation.

B *I* u | ☰ ☷

document to be read. Shari wonders why the various gases in the atmospheres inside the display case were chosen and how these gases affected the preservation of the document.

Preserving the Declaration



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Periodic Table

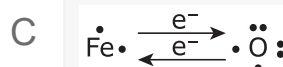
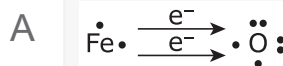
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She also learns that the Declaration of Independence was written on parchment paper with ink that contains iron (Fe). The ink has begun to fade and flake away from the paper, making it difficult for the text on the document to be read. Shari wonders why the various gases in the atmospheres inside the display case were chosen and how these gases affected the preservation of the document.

By the late 1990s, the glass inside the 1952-2001 display case had begun to turn cloudy, indicating that a chemical reaction was taking place inside the case. Scientists determined that an excessive amount of humidity in the atmosphere of the case could accelerate the reaction between two of the substances inside the case.

Part A

Which diagram **best** represents the transfer of electrons during the reaction between these two substances?



Check Answer

Part B

Why did the ink on the Declaration of Independence document fade over time?

A The oxygen in the display case replaced the iron ink.

B The iron ink removed the oxygen from the display case.

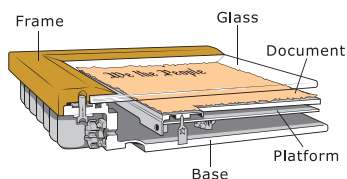
C The iron ink evaporated into the oxygen in the display case.

D The oxygen in the display case chemically altered the iron ink.

Check Answer

Key: total of 18 electrons|full outer shell+nonreactive+noble gas|total of 2 electrons

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Shari researches the gases used in the display case atmospheres from 1952-2001 and from 2002-2021.

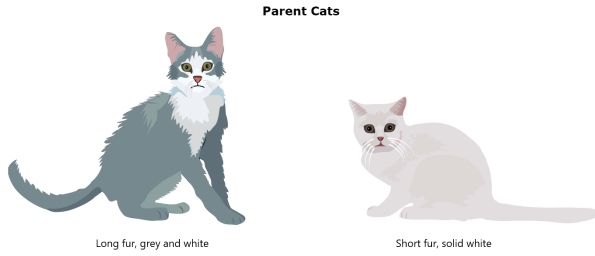
What are the similarities and differences between argon atoms and helium atoms? Use information from the periodic table to move answers to the chart. Not all boxes need to be filled.

Only Argon	Both	Only Helium
full outer shell	nonreactive	noble gas
total of 2 electrons		total of 18 electrons

Check Answer

Breeding Cats

Joshua breeds cats. He has a male cat with long fur (ff) and a grey-and-white colored coat (gg). He also has a female cat that has short fur (Ff) and a solid white coat (Gg). He knows that there is a demand for cats with long fur and a solid white coat.



He thinks about fur length and wonders about the probability of offspring with long fur.

What is the probability of offspring with long fur? Move the alleles to complete the Punnett square. Then, move the probability of offspring with long fur into the box labeled **Probability**.

Fur Length Punnett Square		
	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Probability:

Alleles

F f

Ff FF

ff

Probability

0%

25%

50%

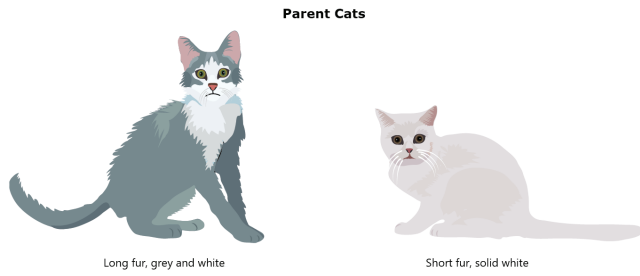
75%

100%

Check Answer

Breeding Cats

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Now that he knows the probability of offspring with long fur, he wonders about the probability of offspring with a solid white coat.

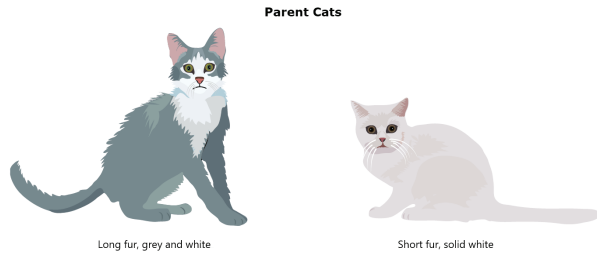
What is the probability of the parent cats having offspring with solid white coats? In the box, type just the number without the percentage sign.

Check Answer



Breeding Cats

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Joshua breeds the female and male cats and they have a litter of five offspring, all with long fur and grey and white coats. This surprises Joshua since these are both recessive traits.

Long Fur, Grey and White Coats



How can all of the offspring express the recessive traits?

- | | |
|----------|---|
| A | The offspring only receive dominant genes from their mother. |
| B | The offspring randomly receive half their genes from each parent. |
| C | The offspring receive the genes that both parents choose to give them. |
| D | The offspring receive the genes that express the most desirable traits from both parents. |

Check Answer



Breeding Cats

Joshua breeds cats. He has a male cat with long fur (ff) and a grey-and-white colored coat (gg). He also has a female cat that has short fur (Ff) and a solid white coat (Gg). He knows that there is a demand for cats with long fur and a solid white coat.

Parent Cats



Long fur, grey and white



Short fur, solid white

Joshua breeds the same male and female again and the resulting litter produces four different combinations of fur length and fur color.



Long fur, solid white



Long fur, grey and white



Short fur, grey and white

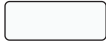


Short fur, solid white

How can all four offspring have different combinations of fur length and fur color?

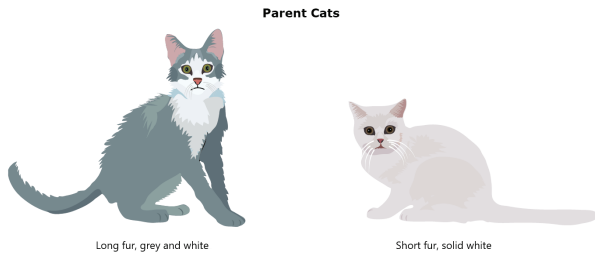
B *I* U | ☰ ☰

Key: (short fur, grey and white), (short fur, solid white)




Breeding Cats

Joshua breeds cats. He has a male cat with long fur (ff) and a grey-and-white colored coat (gg). He also has a female cat that has short fur (Ff) and a solid white coat (Gg). He knows that there is a demand for cats with long fur and a solid white coat.

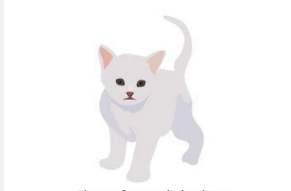


Joshua has another male cat with short fur (FF) and a white coat (Gg) and wants to breed it with the female cat.


Which combinations of traits would Joshua expect to find in the offspring of these two cats? Move the possible traits into the box below.




Short fur, grey and white



Short fur, solid white



Long fur, grey and white



Long fur, solid white

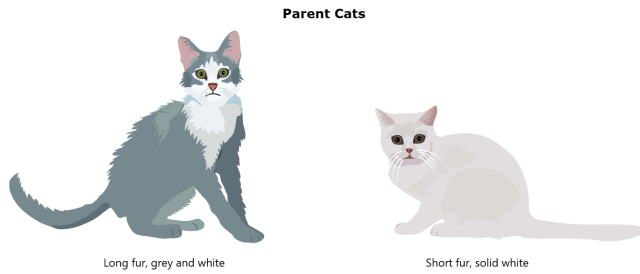
Possible Combinations of Traits in Offspring

Check Answer



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Joshua has another male cat that has short fur (FF) and a white coat (Gg) and wants to breed it with the female cat. He wonders if the two cats can produce an offspring with the desired traits of long fur and a grey and white coat.

Part A

Can Joshua expect offspring with the desired traits?

- | | |
|----------|-----|
| A | Yes |
| B | No |

Check Answer

Part B

Which statement explains whether Joshua can expect offspring with all of the desired traits?

- | | |
|----------|---|
| A | The female can contribute F and f to its offspring, and therefore some of its offspring can have long fur. |
| B | The female can contribute G and g to its offspring, and therefore some of its offspring can have a grey and white coat. |
| C | The male can only contribute F to its offspring, and therefore all of its offspring will have short fur. |
| D | The male can contribute G and g to its offspring, and therefore some of its offspring can have a grey and white coat. |

Check Answer