Maine Department of Education

HIGH SCHOOL

Maine Science Assessment

Student Practice Test

New Meridian

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 responses. These questions require you to write 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.

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Use the information from Hawaiian Islands to answer **questions 1–4**.

Hawaiian Islands

Kamalani is visiting relatives on the Hawaiian Islands. First, she visits her grandmother on the island of Kauaʻi. Next, she visits her sister on the island of Maui. Then, she travels to the big island of Hawaiʻi to explore Kīlauea, an active volcano.

While visiting her grandmother, Kamalani was told that the island of Kauaʻi 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.

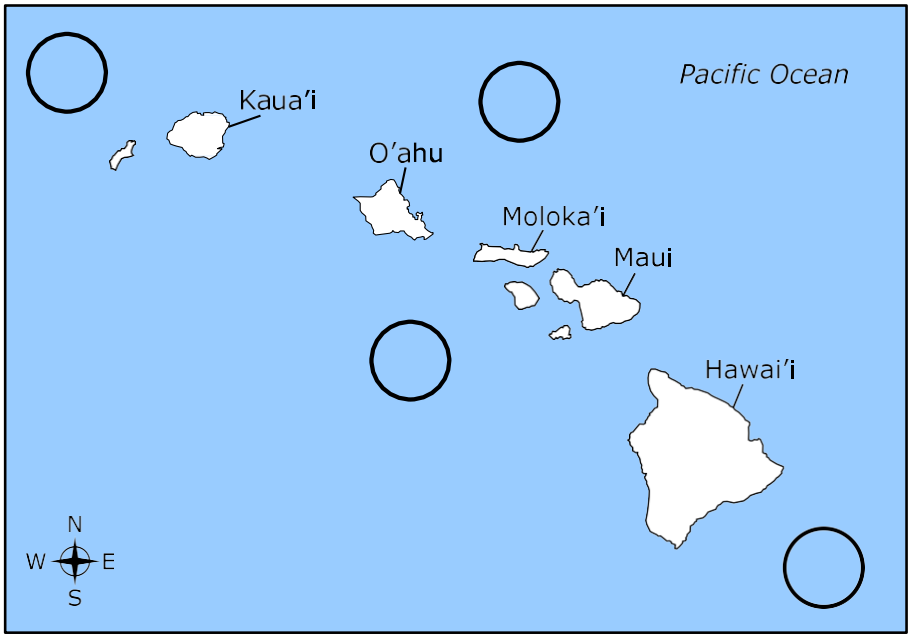
Kamalani is intrigued about the ages of the different islands. She gathers this information about when the islands were formed and writes it in her journal:

- Kauaʻi — 3.8–5.6 million years
- Oʻahu — 2.2–3.3 million years
- Molokaʻi — 1.3–1.8 million years
- Maui — less than 1 million years
- Hawaiʻi — 0.7 million years – present day

She finds that the big island of Hawaiʻi is still being formed today.

1. 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? Mark the circle that shows the correct location.



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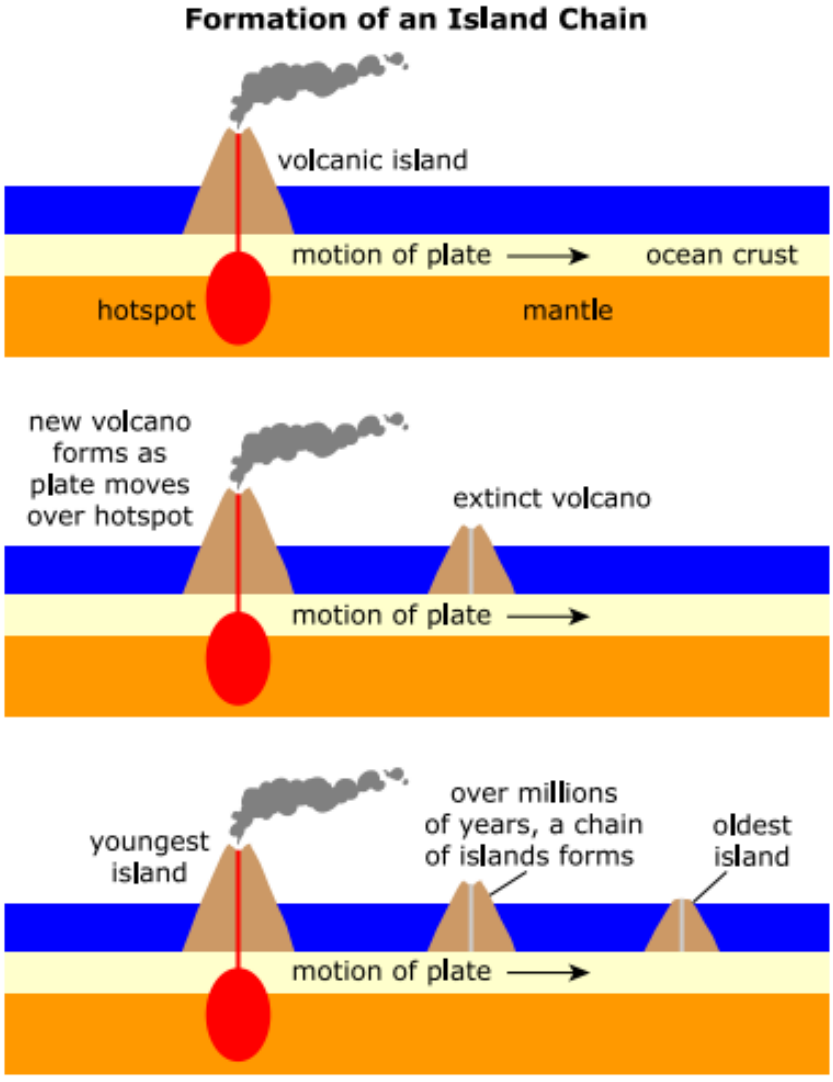
2. Before Kamalani hikes in the Hawai`i Volcanos National Park, she goes to the Kilauea Visitor Center. While there, Kamalani learns that the only active volcanoes in the state are found on the island of Hawai`i.

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.

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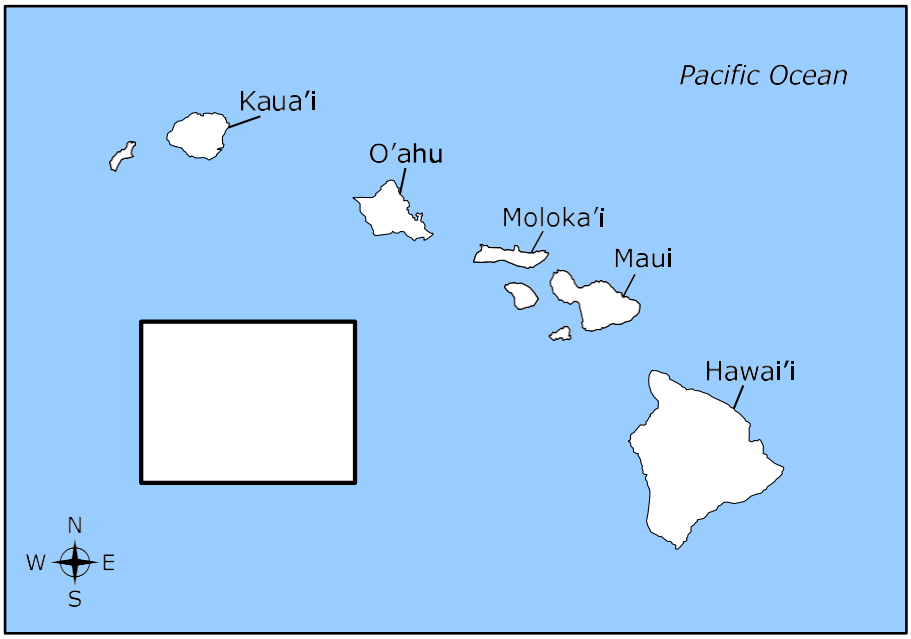
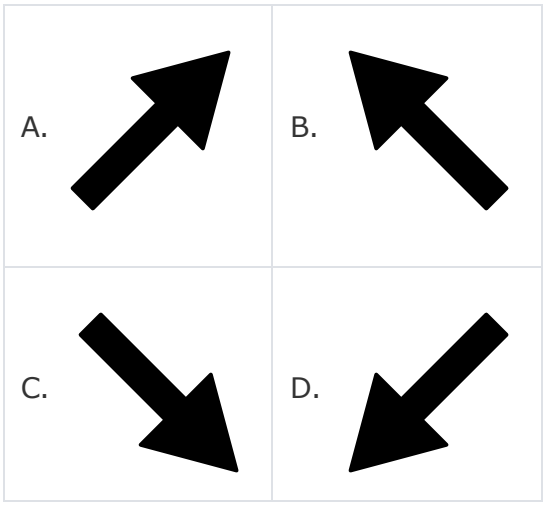
3. Based on what Kalamani learns, in which direction is the oceanic plate moving? Select from the answer bank to complete the map. Write the letter of an arrow in the space on the map.



Answer Bank:



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

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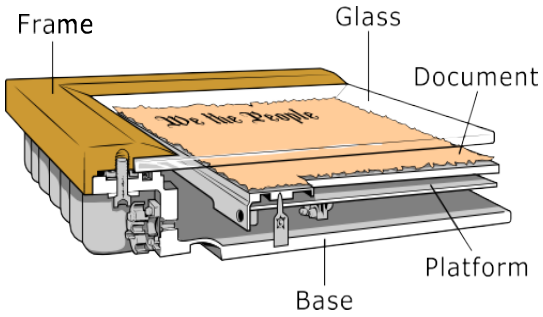
Use the information from Preserving the Declaration to answer **questions 5–7**.

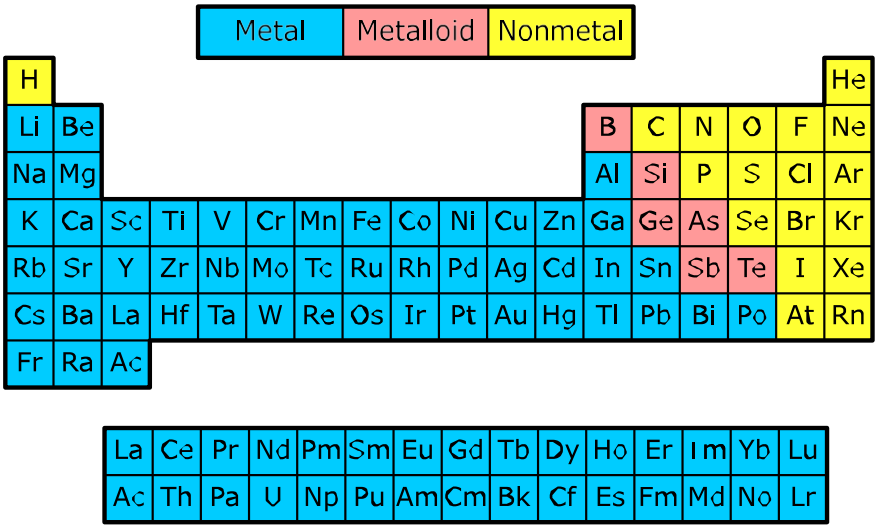
Preserving the Declaration



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.

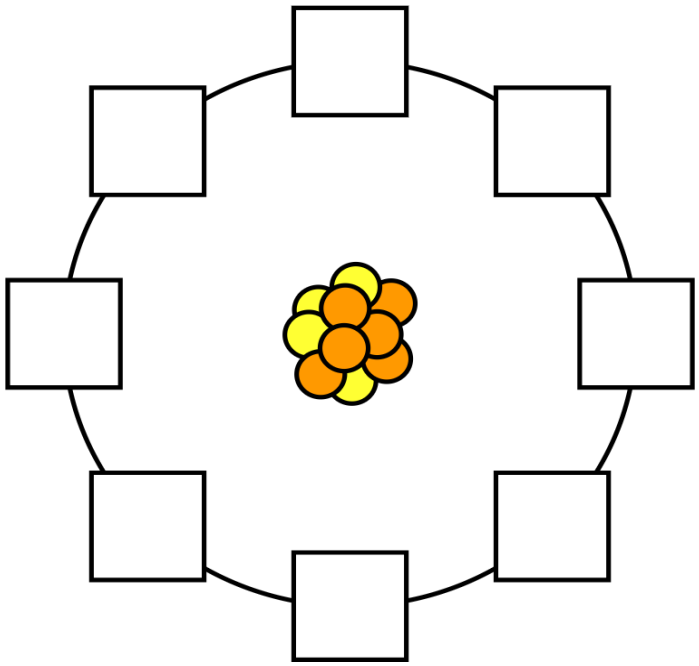


She also learns that the Declaration of Independence was written on parchment paper with ink that contains iron (Fe). The ink has begun to fade and flake away from the paper, making it difficult for the text on the document to be read. Shari wonders why the various gases in the atmospheres inside the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

5. 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 drawing electrons in the electron shell.



Part B

Why would a preservation committee choose to remove oxygen from the display case?

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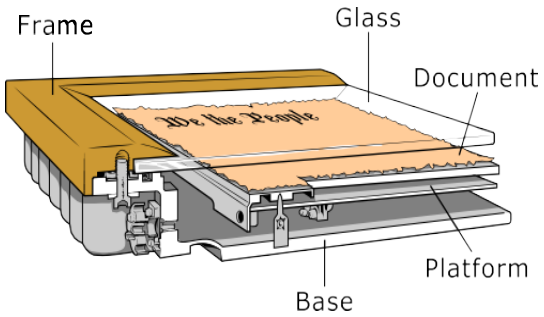
Preserving the Declaration



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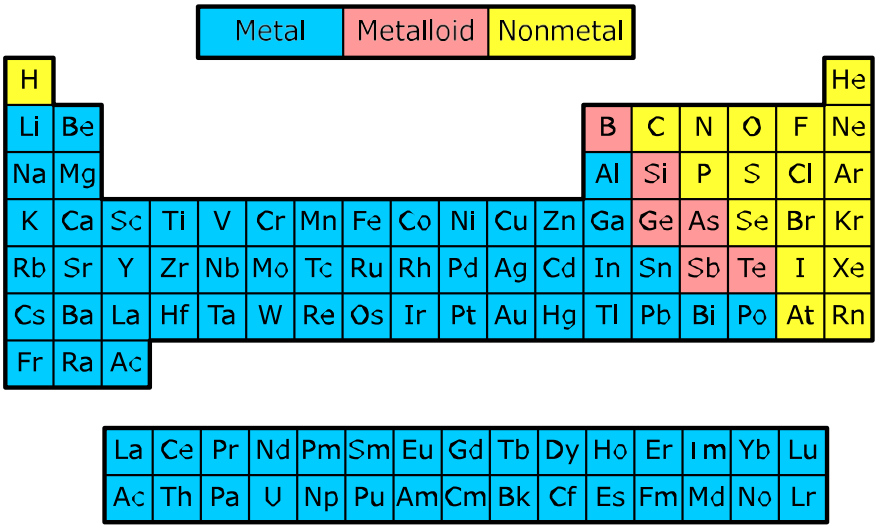

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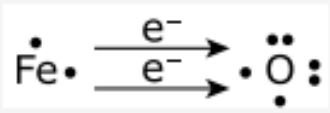
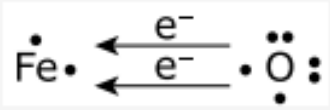
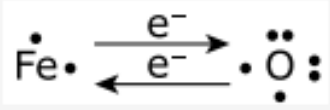
6. By the late 1990s, the glass inside the 1952-2001 display case had begun to turn cloudy, indicating that a chemical reaction was taking place inside the case. Scientists determined that an excessive amount of humidity in the atmosphere of the case could accelerate the reaction between two of the substances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

Part A

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

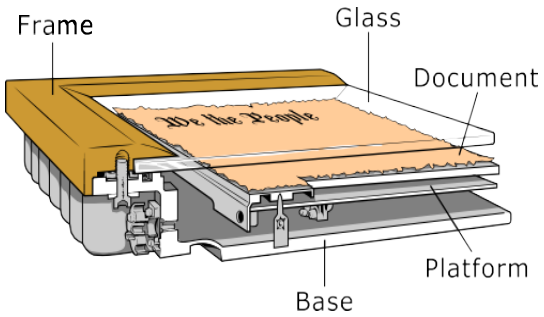
A	
B	
C	

Part B

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

A	The document 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.

Preserving the Declaration



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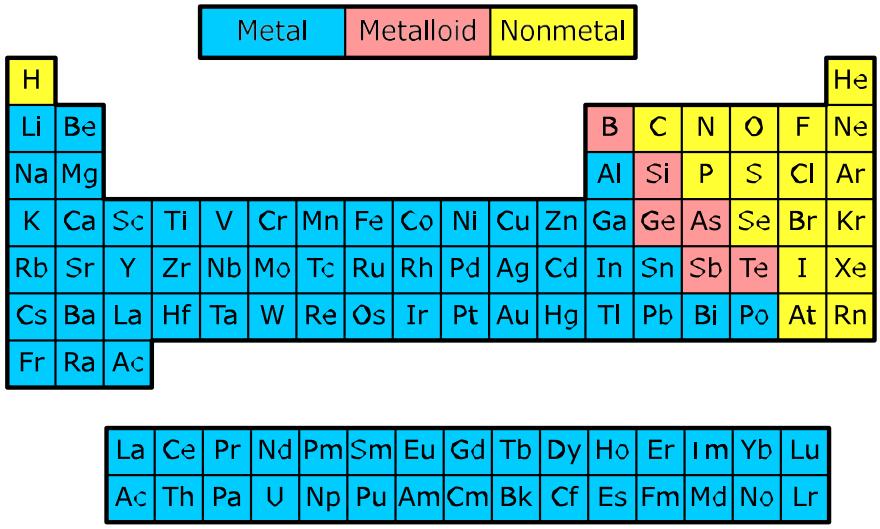

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7. Shari researches the gases used in the display case atmospheres from 1952–2001 and from 2002–2021.

What are characteristics of argon atoms and helium atoms? Use information from the periodic table to write the letter of the answers from the answer bank in the chart.

Argon	Both	Helium

Answer Bank:

A. full outer shell
B. nonreactive
C. noble gas
D. total of 2 electrons
E. total of 18 electrons

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Use the information from Breeding Cats to answer **questions 8–13**.

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.

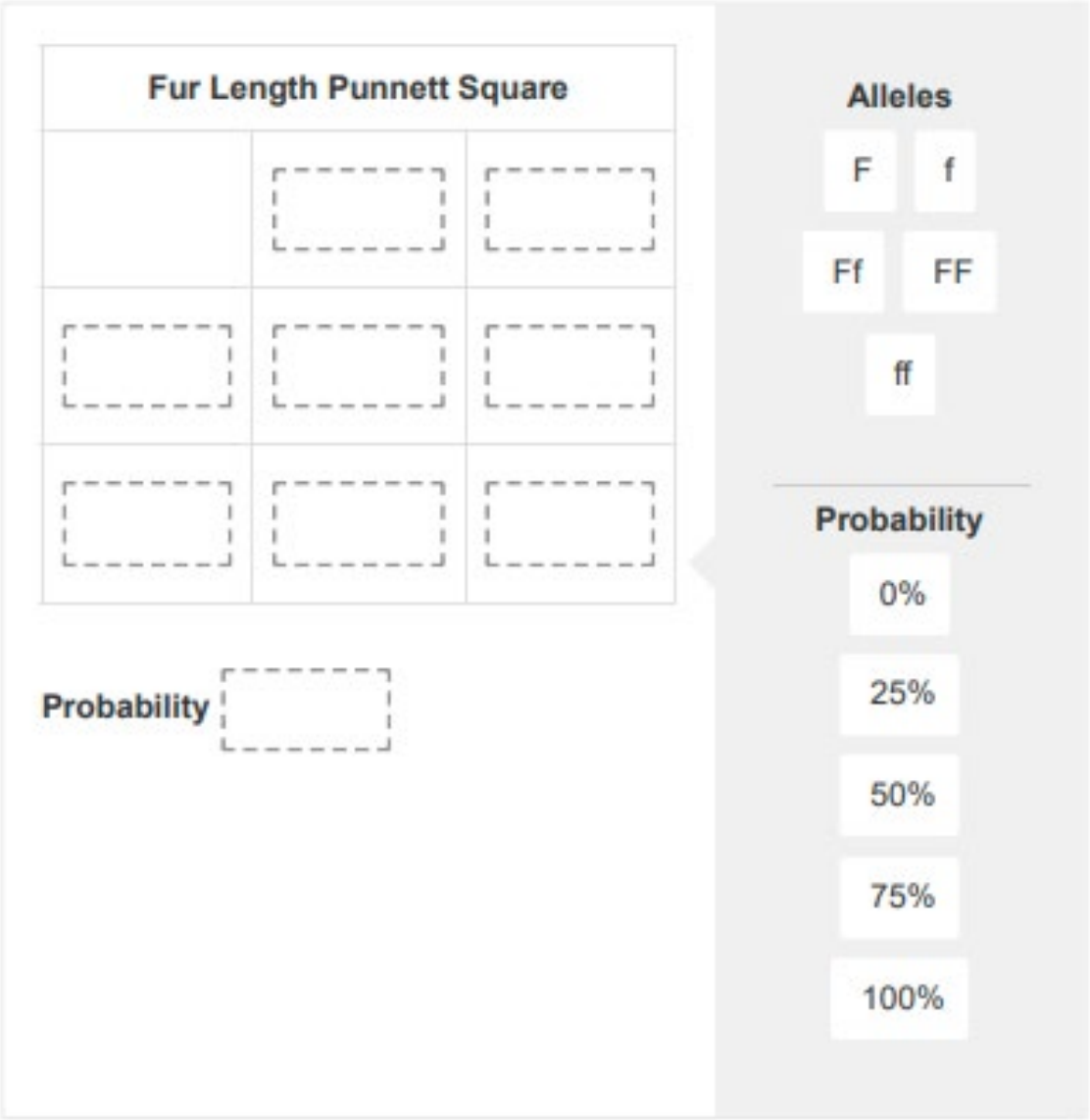
Parent Cats

Long fur, grey and white

Short fur, solid white

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

What is the probability of offspring with long fur? Write the correct allele in each section to complete the Punnett square. Then, write the probability of offspring with long fur into the box labeled **Probability**.



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Parent Cats

Long fur, grey and white

Short fur, solid white

9. 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 parent cats having offspring with solid white coats? Write the probability on the line.

_____

Breeding Cats

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Parent Cats

Long fur, grey and white

Short fur, solid white

10. Joshua breeds the female and male cats, and they have a little 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 receive only 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.

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

11. 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?

_____

_____

_____

_____

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

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

Which combinations of traits would Joshua expect to find in the offspring of these two cats? Mark **all** that apply.

- 
  Long fur, solid white
- 
  Short fur, grey and white
- 
  Short fur, solid white
- 
  Long fur, grey and white

Breeding Cats

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Parent Cats

Long fur, grey and white

Short fur, solid white

13. Joshua has another male cat that has short fur (FF) and a white coat (Gg), and he 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

Part B

Which statement explains whether Joshua can expect offspring with all 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 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.

STOP - END OF TEST