

**Directions**  
Read this article. Then answer questions 8 through 14.

## Cracking Code Purple

*by Anna Ouchchy*

1        On a warm afternoon in September 1940, a young woman sat at her desk on the second floor of the Munitions Building in Washington, D.C. Her hazel eyes peered through rimless eyeglasses at strings of letters and numbers. She had been looking at symbols like these for more than a year and they still didn't make sense.

2        All of a sudden, something jumped out at her, and she became very still. Al Small, her co-worker, noticed her concentration and walked over. The woman shared her discovery and they went to fetch their boss, Frank Rowlett. Another man joined them. All three crowded around the woman's desk as she pointed out how some symbols stood at a certain interval from one another.

3        Rowlett jumped up and down. Small dashed around the room excitedly. Their cries of "That's it!" "Whoopee!" "Hooray!" broke the silence of the room, which was usually as quiet as a library. To celebrate, the team sent out for Coca-Colas. It was the first one the woman had ever tasted.

### **The Purple Solution**

4        The woman's name was Genevieve Grotjan and she was a code breaker, or cryptanalyst, with the U.S. Army's Signal Intelligence Service (SIS). Many cryptanalysts were people who studied how languages worked. Some were mathematicians. Grotjan had wanted to be a math teacher.

5        At the time, Grotjan was one of just a few women working at the highest levels of code breaking. Her discovery involved a complicated Japanese diplomatic code nicknamed Purple. Japanese codes were often named after colors.

6        In 1940, World War II was raging in Europe, North Africa, and Asia. The United Kingdom and France were fighting against Germany and Italy. Japan had invaded China, and in September 1940 Japan signed a pact to join forces with Germany and Italy.

7        The United States had not entered the war, but relations with Japan were becoming more and more strained. To "listen to" secret Japanese communications, the United States used a complex system to intercept the communications and break the codes.

**GO ON**

### How the System Worked

- 8 Here is how the Purple code and other Japanese diplomatic codes worked. The Japanese encoded a message using a special device called a cipher machine. Then they radioed the message forward. A U.S. radio station intercepted the message and sent it to Washington. There, the cryptanalysts went to work. When they had cracked the entire code, they built a machine just like the Japanese cipher machine and used it to decode other messages. Finally, translators turned these messages into English.
- 9 A coded message consisted of a pattern of numbers and letters. It might look something like this: 78232 RSECO. Each symbol stood for a letter, but the letter it stood for changed as the machine moved forward. Each time this happened, a symbol would come to stand for something different, which made the code incredibly difficult to solve.
- 10 The cryptanalysts had to do a lot of guessing and checking their guesses. For example, they knew that many Japanese diplomatic messages began with the Japanese words “I have the honor to inform Your Excellency,” so they tried that combination of letters first.



A cipher machine similar to the one described in the article.

### **Making Magic**

- 11        Soon after Grotjan's discovery, the SIS and U.S. Navy built a Purple cipher machine just like the decoding machines used in Japanese embassies. With it, the United States could read Japan's most secret diplomatic messages and learn what the Japanese were doing and planning during the war. These translated messages soon became known as "magic" and were sent to high-ranking government officials, including President Franklin D. Roosevelt.
- 12        Grotjan was modest about her discovery. "Maybe I was just lucky in getting the right series of papers. I was elated up to a point but I didn't think 'This is it!' because there was so much more to do." Others celebrated it. A government committee said, "Magic contributed enormously to the defeat of the enemy, greatly shortened the war, and saved many thousands of lives."

**GO ON**

8

How does the author introduce the idea that the Purple code finally began to be understood?

- A by indicating that many mathematicians were working on the messages
- B by explaining how a person noticed something interesting about the symbols
- C by indicating that the messages were created by a special machine
- D by explaining how a system was used to obtain signals from other countries

9

What is the purpose for including the information in paragraphs 5 through 7 in the article?

- A to illustrate the relationship between different countries
- B to indicate a common naming method for codes
- C to indicate the importance of understanding secret messages
- D to illustrate the reasons why a global conflict occurred

10

Which claim by the author is **best** supported by evidence in the article?

- A “Many cryptanalysts were people who studied how languages worked.” (paragraph 4)
- B “. . . Grotjan was one of just a few women working at the highest levels of code breaking.” (paragraph 5)
- C “The United States had not entered the war, but relations with Japan were becoming more and more strained.” (paragraph 7)
- D “. . . the United States used a complex system to intercept the communications and break the codes.” (paragraph 7)

**11**

What does the information in paragraphs 8 and 9 **mainly** illustrate?

- A** how coded messages were created using a special machine
- B** why understanding coded messages was a difficult process
- C** why cryptanalysts made guesses about coded messages
- D** how coded messages were translated into a different language

**12**

How does paragraph 11 strengthen the author's central claim?

- A** by explaining the value of decoded messages to the U.S. government
- B** by referring to the places where coded messages originated
- C** by describing how U.S. agencies built a cipher machine
- D** by indicating the name given to messages obtained from cipher machines

**13**

What is the purpose of the illustration in the article?

- A** to show a device used to read coded messages
- B** to explain how messages were coded
- C** to show an example of a coded message
- D** to explain why some messages were coded

**GO ON**

Which detail from the article **best** reveals the importance of Grotjan's discovery?

- A "Their cries of 'That's it!' 'Whoopee!' 'Hooray!' broke the silence of the room, which was usually as quiet as a library." (paragraph 3)
- B "Each symbol stood for a letter, but the letter it stood for changed as the machine moved forward." (paragraph 9)
- C "... the SIS and U.S. Navy built a Purple cipher machine just like the decoding machines used in Japanese embassies." (paragraph 11)
- D "... Magic contributed enormously to the defeat of the enemy, greatly shortened the war, and saved many thousands of lives." (paragraph 12)

## ***D*irections**

**Read this article. Then answer questions 22 through 28.**

*A legacy is a place or tradition from the past that continues into the present. New York has several important legacies that help people learn about and remember the history of the state.*

# **Excerpt from *New York: Local Legacies***

*by the Library of Congress*

### **One-Room Schoolhouse: A Local Legacy**

1        Would you like to experience what going to school was like in the late 1800s? To start with, imagine everyone in school sharing only one teacher and one classroom.

2        In the 19th and early 20th centuries, most American students attended a one-room schoolhouse. A single teacher would typically have students in the first through eighth grades, and she taught them all. The number of students varied from six to 40 or more. The youngest children sat in the front, while the oldest students sat in the back. The teacher usually taught reading, writing, arithmetic, history, and geography. Students memorized and recited their lessons.

3        The classroom of a one-room schoolhouse probably looked much like your own. The teacher's desk may have been on a raised platform at the front of the room, however, and there would have been a wood-burning stove since there was no other source of heat. The bathroom would have been outside in an outhouse.

4        In Honeoye Falls, New York, there is a one-room schoolhouse where kids today can experience what it was like to be students in the late 19th century. For a week during the summer, they wear 19th century clothes and learn the way children learned more than a hundred years ago. . . .

### **Rochester, New York's Lilac Festival: A Local Legacy**

5        The Netherlands is known for its tulips. Rochester, New York, is known for another type of flower—the lilac.

**GO ON**

- 6        There are more than 500 varieties of lilacs and more than 1,200 lilac bushes at Highland Park. In 1888, the world's largest nursery, Ellwanger & Barry, owned by George Ellwanger and Patrick Barry, gave Highland Park to the people of Rochester. It was beautifully landscaped with trees and shrubs and was the first municipal arboretum in the United States. An arboretum is a place where trees, shrubs, and plants are specially grown and cultivated. The park's collection of lilacs originally started with 20 varieties in 1892. Since 1898, Rochester has held a Lilac Festival every May. The first event attracted 3,000 visitors; now more than 500,000 people come to see the lilacs and other flowering trees and shrubs. . . .

#### **Montauk Point Lighthouse Museum: A Local Legacy**

- 7        You may think that lighthouses are interesting to look at, and they are. But they also serve a very useful purpose.
- 8        Lighthouses guide ships sailing near a coast. They are built in different kinds of places: important locations on a coast, harbor entrances, islands, rocky ledges or reefs, and even in the water. They project strong beacons of light at night so ships can see them. Lighthouses help ships identify their locations, warn them of danger, and serve as a marker of nearby land.
- 9        The Montauk Point Lighthouse on Long Island, New York, is more than 200 years old. Built in 1796, it is the oldest lighthouse in the state. It has guided whaling ships, fishing boats, steamships, submarines, and sailboats for many years and continues to do so today. The tower is more than 110 feet tall, and a person has to climb 137 steps to get to the top. But the Montauk Point Lighthouse is not just a tower. Attached to it is a house in which the lighthouse keeper lived with his family and assistants. Since the light on top of the tower was automated in 1987, the lighthouse no longer needs a keeper. . . .

#### **Immigrant Life in New York: A Local Legacy**

- 10       From the 1850s through the early 1900s, thousands of immigrants arrived in the United States and lived in New York City. They first came from Ireland and Germany and later from Italy, Eastern Europe, and China, among other places. Because most immigrants were poor when they arrived, they often lived on the Lower East Side of Manhattan, where rents for the crowded apartment buildings, called tenements, were low.



The Lower East Side Tenement Museum is in a building that used to be a tenement and it tells the story of immigrants in the City. It was built in the 1860s and could house 20 families, four on each floor. Each apartment had only three rooms: a living or “front” room, a kitchen, and a tiny bedroom. Often seven or more people lived in each apartment. Not only was the tenement crowded, but also, until 1905, there were no bathrooms inside the building. Residents also did not have electric power until after 1918. . . .

### More New York Legacies

Legacy	What is it?	When did it start?
The Albany Tulip Festival	A celebration of Albany’s Dutch history: Albany is America’s oldest Dutch settlement, and tulips came to Albany from the Dutch.	Mayor Corning of Albany started the tradition in 1949.
The New York Walk Through History series of events throughout the state	A group of historic sites in New York State that allows people the opportunity to learn about the past, such as participating in the Harriet Tubman Walking Tour.	The governor of New York started the program in 2012.
Little Falls Canal Celebration	A celebration of the importance of the Erie Canal: The Erie Canal linked Buffalo to Albany and was a key force in the developing economies of towns like Little Falls.	This tradition began in 1987 and celebrates, among other things, the grand opening of the New York State Barge Canal System in 1917.

22

What important idea do the authors develop in paragraph 3?

- A Classrooms should continue to be updated.
- B Some modern schools have a connection to the past.
- C Older buildings often lacked necessary conveniences.
- D Methods of teaching can change over the years.

23

Read this sentence from paragraph 4.

**In Honeoye Falls, New York, there is a one-room schoolhouse where kids today can experience what it was like to be students in the late 19th century.**

Why is this detail important to the article?

- A It highlights the general popularity of historical attractions.
- B It indicates that students are often interested in the history of education.
- C It suggests the importance of preserving historical buildings.
- D It shows that a connection can be made with students from another time.

24

Traditions allow people to both honor the past and celebrate the present. Which detail from paragraph 6 **best** represents this idea?

- A “There are more than 500 varieties of lilacs and more than 1,200 lilac bushes . . .”
- B “It was beautifully landscaped with trees and shrubs . . .”
- C “The park’s collection of lilacs originally started with 20 varieties in 1892.”
- D “Since 1898, Rochester has held a Lilac Festival every May.”

**GO ON**

**25**

In paragraph 9, what is the **main** way the authors indicate the importance of the Montauk Point Lighthouse?

- A** by referring to its status as the oldest lighthouse in the state
- B** by describing how the lighthouse still provides assistance to ships
- C** by explaining that the lighthouse now uses an automatic beacon
- D** by mentioning the house attached to the lighthouse where families lived

**26**

How do the authors develop the idea of “legacy” in the article?

- A** by explaining the history that inspired traditions
- B** by providing a chronological sequence of events
- C** by contrasting various celebrations in the state
- D** by referring to the dates when festivals began

**GO ON**

27

**This question is worth 2 credits.**

According to *New York: Local Legacies*, why are lighthouses important to the history of New York? Use **two** details from the article to support your response.

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**GO ON**

28

This question is worth 2 credits.

In *New York: Local Legacies*, how does paragraph 6 help develop a central idea of the article? Use **two** details from the article to support your response.

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**STOP**

**Directions**  
Read this article. Then answer questions 29 through 35.

## Beatrix Looks at Lichens

*by Cheryl Bardoe*

1        At first glance, lichen on a tree looks like a gray-green, mossy stain. But a peek under the microscope reveals something extraordinary. It's not one living thing, but two—a partnership of very different life forms.

2        Lichens may look like plants, but they're not even half plant. Every lichen is a tiny team made up of a fungus and some algae or bacteria. Back in the 1800s, most people did not believe the German scientist who first suggested this. But one person who did agree was Beatrix Potter, the writer and artist who created Peter Rabbit.<sup>1</sup>

3        Potter's interest in lichens began with her fondness for fungi, which started with art. Potter was born in 1866 into a wealthy family in England. As was the custom then, she was taught by governesses at home, and her education included drawing lessons. Potter loved studying and drawing nature. She filled notebooks with sketches of plants, trees, flowers, and the wild animals that she sneaked home as pets—birds, bats, newts, toads, mice, and of course rabbits.

4        Potter had a gift for looking closely and a keen curiosity. She tried to learn all about these creatures as she put them on paper. The famous painter John Millais, who was a family friend, once gave her a great compliment. "Plenty of people can draw," he said, "but you . . . have observation."

5        Potter found great inspiration in nature. She wrote in her journal that she had an "irresistible desire to copy any beautiful object which strikes the eye." Naturally, this included mushrooms and lichens.

### **Falling for Fungus**

6        When Potter first began painting mushrooms, she was charmed by their unusual shapes, rich colors, and mysterious habit of popping up unexpectedly. The more fungi (mushrooms, yeasts, and molds) she found, the more curious she became.

**GO ON**

7        Luckily, there was an expert handy. Charles McIntosh was the postman in the Scottish village where the Potter family spent their summer vacations. Walking through the country to deliver letters gave McIntosh the chance to pursue his true passion—collecting and cataloging fungi. When Potter showed him her mushroom paintings in 1892, McIntosh began teaching her scientific names and sending odd specimens for her to paint.

8        Over the next few years, Potter made over 350 paintings of mushrooms and lichens. When visiting London, she lingered for hours in the natural history museum or the botanic gardens. At home in the country, she rode out in her pony cart in search of fungi. On one good day, she wrote in her journal, “The fungus starred the ground apparently in thousands . . . I found upwards of twenty sorts in a few minutes . . . joy of joys.”

9        A good scientific observer, Potter often painted fungi in their natural settings, showing the loose leaves or decaying logs from which they grew. She also made notes on her drawings about how to tell one kind from another. She even experimented with growing fungi in her kitchen. Using a magnifying glass to view spores (which are like seeds for fungi) at 600 times their actual size, Potter made detailed sketches every six hours during their sprouting phase.

### **Liking the Lichens**

10       Potter also looked at lichens, which scientists grouped with the fungi. But when she looked at a reindeer lichen under a microscope, she saw not one but two sets of spores: the spores of a fungus and another that looked like an alga.<sup>2</sup>

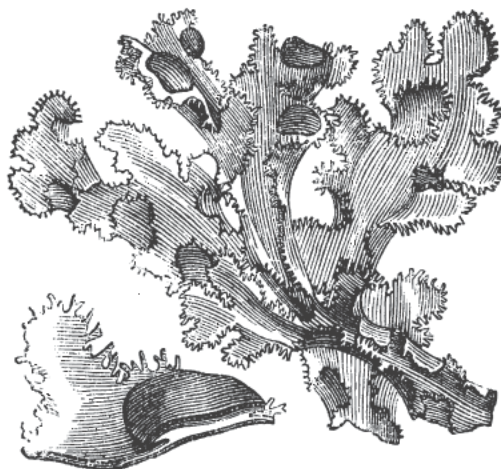
11       At the time, English scientists scorned the new idea that lichens might be two things. But Potter knew what she saw. In her journal, she laughs at how the botanists<sup>3</sup> at the museum and Royal Botanic Garden “fled” when she peppered them with questions on the topic.

12       Potter wondered how the fungus and algae found each other to form lichens. Today scientists have answered some of her questions. Some lichens send out both partners’ spores together, while others must meet up by chance before growing into a lichen.

13       Potter also wondered whether the fungus and algae were equal partners and whether each could live on its own. Scientists are still trying to figure this out. In a lichen, the algae or bacteria partner makes food for both itself and the fungus. The fungus supplies minerals and a safe home. Although the spores of many lichen-forming fungi and algae can be grown separately in a lab, scientists have not found them growing separately in nature.

### Preoccupied with Peter Rabbit

- 14 Potter wrote a paper about her observations of lichens and met with scientists, but her work did not get much attention. Meanwhile, however, her children's stories were becoming very popular. So she decided to focus on writing and illustrating books instead, and became a famous author, beloved by children all over the world.
- 15 Her many mushroom paintings remained stacked and tied with ribbons for many years. Today they are much admired by scientists, who appreciate Potter's genius for looking closely and her artistic talent. And she is now credited with being the first person to sprout fungal spores—even though her laboratory was her kitchen.



Examples of Iceland moss lichen

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<sup>1</sup>**Peter Rabbit:** a well-known children's story

<sup>2</sup>**alga, algae:** green, non-flowering organisms that grow in water or moist places

<sup>3</sup>**botanists:** scientists who study plants



29

Read this claim from paragraph 2.

**Every lichen is a tiny team . . .**

Which detail from the article **best** supports this claim?

- A “lichen on a tree looks like a gray-green, mossy stain” (paragraph 1)
- B “the loose leaves or decaying logs from which they grew” (paragraph 9)
- C “the spores of a fungus and another that looked like an alga” (paragraph 10)
- D “makes food for both itself and the fungus” (paragraph 13)

30

Read the sentence from paragraph 4.

**“Plenty of people can draw,” he said, “but you . . . have observation.”**

Which detail from the article **best** supports this claim?

- A The author highlights Potter’s ability to grow fungi in her kitchen.
- B The author refers to Potter’s attention to detail in her drawings.
- C The author explains that Potter enjoyed drawing from nature.
- D The author provides evidence that Potter contributed to science.

31

What is the **most** important way Charles McIntosh influenced Potter’s career?

- A He provided Potter with different types of fungi to study.
- B He was familiar with the scientific names of fungi.
- C He was interested in the fungi paintings Potter made.
- D He enjoyed collecting fungi while he worked.

**GO ON**

32

In paragraph 8, what does the phrase “the fungus starred the ground” mean?

- A The fungi were bright.
- B The fungi were tall.
- C The fungi were hidden.
- D The fungi were plentiful.

33

What do the details in paragraph 9 **most** reveal about Beatrix Potter?

- A She was curious about the world.
- B She was a famous artist.
- C She enjoyed outdoor adventures.
- D She thought nature should be left alone.

34

Which statement **best** describes how Potter responded when people doubted her findings?

- A She argued with botanists until they agreed to listen to her.
- B She decided to write more papers for scientists about lichens.
- C She put her drawings of mushrooms on display for others to see.
- D She chose to spend more of her time working on stories for children.

**GO ON**

Read the sentence from paragraph 10.

**Potter also looked at lichens, which scientists grouped with the fungi.**

Which statement **best** represents the meaning of this sentence?

- A** Scientists believed lichens and fungi were related.
- B** Scientists had shown little interest in examining lichens.
- C** Scientists wondered if lichens could live separately from algae.
- D** Scientists had discovered algae makes food for itself and its partner.

## ***D*irections**

Read this article. Then answer questions 36 and 37.

# **Excerpt from *Marvels in the Muck:* *Life in the Salt Marshes***

*by Doug Wechsler*



- 1        If it weren't for geese and other birds, the New Jersey salt marsh would seem almost dead in winter. Much of the other marsh life has either gone elsewhere or is hiding. Fiddler crabs winter in burrows beneath the mud. Mummichogs, small marsh-dwelling fish, move into salt marsh pools and hide in the mud during the coldest weather. Blue crabs move into deeper water and become inactive, burrowing into the mud and sand for the winter.
- 2        Have you ever been to a salt marsh? If you have visited a beach on the East Coast or Gulf Coast of the United States, you probably passed right through or over a salt marsh. Salt marshes grow in bays and along creeks and rivers that flow into salt water. Salt marshes are wetlands with grasses and low-growing plants that are flooded by the tides. Salt marshes do best where the water is brackish—that is, less salty than the ocean, but not fresh enough to drink. . . .

**GO ON**

### Spring: Return of the Laughing Gulls

3        HA-HA-HA-HAAAAH-HAAAAH. The laughing call of a gull overhead is the first sign of spring in this New Jersey salt marsh. Laughing gulls are migrating from shores and marshes farther south. With their black heads, gray backs, white breasts, and red bills and legs, these are the most handsome gulls of the salt marsh. More than any other gulls, laughing gulls need salt marshes to survive. Follow the laughing gulls, and you will learn a great deal about their marshy home.

4        Battered brown grasses are what the laughing gull sees below. Last year's growth of grasses is slowly breaking down. New green shoots will soon pop through. In the marsh, a flock of brant<sup>1</sup> feed on algae. The water is cold. Early spring is a pleasant time to visit the salt marsh. Days are getting warmer but not yet warm enough to bring out the hordes of hungry mosquitoes and biting flies.

### King of Grasses . . .

5        Of all the plants that grow in the mud of the salt marsh, one species of cordgrass, smooth cordgrass, stands out as king. In the deepest parts of the marsh, called the low marsh, this is often the only kind of plant you can find. Smooth cordgrass is usually between two and six feet high (sixty centimeters to two meters) though it can shoot up as tall as nine feet (almost three meters). In the high marsh, closer to shore, it grows tall along the creeks and shorter on flat places that are flooded for briefer periods of time. From southern Canada to northern Florida and along many parts of the Gulf Coast of the United States, this one kind of plant makes up most of the marsh. . . .

### Rampaging Reed

6        In many places you will see dense stands of grass that you can barely walk through. The common reed, which is also known by its scientific name, *Phragmites* (frag-MY-tees), has stalks about one inch (two and a half centimeters) thick. It is often about 10 feet (3 meters) high, though it can grow as tall as 20 feet (6 meters). *Phragmites* has taken over large areas of salt marsh, eliminating and replacing cordgrasses and other marsh plants. *Phragmites* often gets a foothold in places where the marsh has been disturbed. For example, if mud and sand are dredged<sup>2</sup> from a boat channel and dumped on the marsh, *Phragmites* will grow on the dirt pile. From there it will start to take over part of the marsh. Like cordgrass, it spreads by growing underground stems called rhizomes. These can be up to 20 feet (6 meters) long. New shoots of grass grow up from rhizomes, and the colony of *Phragmites* expands in all directions.

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<sup>1</sup>**brant:** a type of small goose

<sup>2</sup>**dredged:** dug up

36

**This question is worth 2 credits.**

In *Marvels in the Muck*, how do the details in paragraph 3 develop a central idea of the article?  
Use **two** details from the article to support your response.

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**GO ON**

37

**This question is worth 2 credits.**

“Give them an inch and they’ll take a mile” is a saying that means people sometimes take more than what is offered them. In *Marvels in the Muck*, how do the details in paragraphs 5 and 6 develop this idea? Use **two** details from the article to support your response.

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**GO ON**

**Directions**  
Read this poem. Then answer questions 38 and 39.

*Slender blueflag is a plant that sprouts blue and violet flowers and tends to grow in marshes.*

## **“Blueflags” from *The Collected Poems* of William Carlos Williams**

*by William Carlos Williams*

I stopped the car  
to let the children down  
where the streets end  
in the sun  
5 at the marsh edge  
and the reeds<sup>1</sup> begin  
and there are small houses  
facing the reeds  
and the blue mist  
10 in the distance  
with grapevine trellises  
with grape clusters  
small as strawberries  
on the vines  
15 and ditches  
running springwater  
that continue the gutters  
with willows over them.

**GO ON**



The reeds begin  
20 like water at a shore  
their pointed petals waving  
dark green and light.  
But blueflags are blossoming  
in the reeds  
25 which the children pluck  
chattering in the reeds  
high over their heads  
which they part  
with bare arms to appear  
30 with fists of flowers  
till in the air  
there comes the smell  
of calamus<sup>2</sup>  
from wet, gummy stalks.

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<sup>1</sup>**reeds:** tall plants that grow in marshes

<sup>2</sup>**calamus:** marsh plant with the fragrance of cinnamon

**38**

**This question is worth 2 credits.**

How does the speaker’s word choice in lines 19 through 30 of “Blueflags” shift the tone of the poem? Use **two** details from the poem to support your response.

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**GO ON**

*Planning Page*

You may PLAN your writing for question 39 here if you wish, but do NOT write your final answer on this page. Writing on this Planning Page will NOT count toward your final score. Write your final answer on Pages 17 and 18.



**GO ON**

39

**This question is worth 4 credits.**

What is a theme that is shared by *Marvels in the Muck* and “Blueflags”? How is the shared theme developed in the article and the poem? Use details from **both** the article and the poem to support your response.

In your response, be sure to

- state a theme that is shared by both the article and the poem
- explain how the shared theme is developed in the article and the poem
- use details from **both** the article and the poem to support your response

[illegible]