



GRADE SEVEN

WEEK OF MARCH 14-18 READING

Below is a passage set with questions that you can use for the Problem of the Day initiative.

Day One

Read “**What is Echolocation**” by **Elizabeth Hagen**. Answer the questions that follow.

Passage 1: **What Is Echolocation?** by **Elizabeth Hagen**

1 Echolocation is the use of sound waves and echoes to determine where objects are in space. Bats use echolocation to navigate and find food in the dark. To echolocate, bats send out sound waves from their mouth or nose. When the sound waves hit an object they produce echoes. The echo bounces off the object and returns to the bat’s ears. Bats listen to the echoes to figure out where the object is, how big it is, and its shape. Using echolocation, bats can detect objects as thin as a human hair in complete darkness. Echolocation allows bats to find insects the size of mosquitoes, which many bats like to eat. . . .

2 Did you know that other animals use echolocation too? Dolphins, whales, shrews and some birds use echolocation to navigate and find food. There are even some blind people that have learned to use echolocation to navigate within their surroundings.

3 Humans cannot hear ultrasonic sounds made by echolocating bats. But there are some insects that can hear these ultrasonic sounds. These insects include some moths, beetles, and crickets. When moths hear an echolocating bat, some will turn and fly away. Others will start flying in a zigzag, spiral, or looping pattern to avoid being eaten by the bat. Some crickets and beetles are known to make clicking sounds that startle the bat and scare it off, thus avoiding being eaten.

4 Did you know that the scientists that developed the sonar and radar navigation systems used by the military got their idea from studying bat echolocation? Just like bat echolocation, sonar uses sound waves to navigate and determine the location of objects like submarines and ships. Only sonar is used underwater, while bats echolocate in the open air. Radar uses electromagnetic waves to determine the

location of objects like planes and ships. Like bat echolocation, radar is also used on open air.

“Bats” by Elizabeth Hagen. © Arizona Board of Regents / ASU Ask A Biologist. <http://askabiologist.asu.edu/echolocation>.

1. How does paragraph 1 of Passage 1 contribute to the development of the author’s ideas?

- A. By focusing on echolocation in bats, paragraph 1 explains how humans can benefit from studying echolocation.
- B. By explaining specific uses for echolocation, paragraph 1 gives information about how bats developed the ability to echolocate.
- C. By giving examples of objects that can be detected through echolocation, paragraph 1 explains how animals can avoid detection.
- D. By giving a detailed description of how echolocation works, paragraph 1 helps the reader understand how other animals use echolocation.

2. Which TWO options best describe the influence that a bat’s echolocation has on its prey?

- A. “Humans cannot hear ultrasonic sounds made by echolocating bats.” (paragraph 3)
- B. Some insects fly away, while others start flying in a zigzag, spiral, or looping pattern to avoid being eaten by the bat. (paragraph 3)
- C. “Some crickets and beetles are known to make clicking sounds that startle the bat and scare it off. . .” (paragraph 3)
- D. Humans designed systems like sonar and radar based on the bat’s abilities. (paragraph 4)
- E. “Just like bat echolocation, sonar uses sound waves to navigate. . .” (paragraph 4)

3. How does Elizabeth Hagen’s use of rhetorical questions in the title, at the beginning of paragraph 2, and at the beginning of paragraph 4 attempt to engage the reader throughout the passage?

- A. It makes her seem like she doesn’t know what she’s talking about.
- B. Hagen tries to make herself seem superior to the reader if he/she does not know the answer.
- C. The questions are not answered in the passage, leaving the reader wanting more.
- D. The questions emphasize the point the author is about to make in the passage.

Day Two

Read “**Tiger Moths Use Sonic Defense to Trick Bats**” by Josh Chamot.

Answer the questions that follow.

Passage 2: Tiger Moths Use Sonic Defense to Trick Bats by Josh Chamot

5 As a bat zips through the night sky, it sends out high-pitched squeaks, bouncing sound waves off of objects and unsuspecting prey. While most insect victims would have trouble fighting back, many dive and loop to avoid enemies, and some have the added advantage of being poisonous. Yet, in the dark, the bright warning colors of most toxic insects are lost on predators. Now, some researchers suspect one type of moth may have a way of effectively broadcasting its toxicity—the insect produces high-pitched sounds of its own.

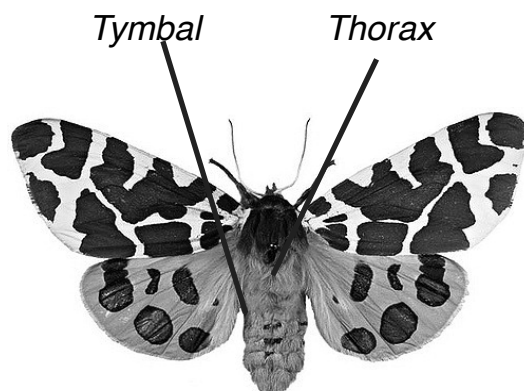


fig 1. Tiger Moth

6 Tiger moths have a special clicker called a tymbal built into their thorax.¹ When they fly, the moths click their tymbal to produce a distinct sound that seems to keep bats at bay. Scientists have proposed a few reasons for the tymbal’s success, ranging from its potential to startle a bat to its possible role as a “jammer” that garbles the bats’ hunting squeaks.

7 [National Science Foundation] researchers William Conner and Nickolay Hristov of Wake Forest University in North Carolina have found preliminary evidence that the tymbal may actually warn the bats: “I’m a tiger moth and I’m toxic.” The bat may recognize the clicks from the 11,000 tiger moth species, learning to avoid the critters after an initial bout of food poisoning.

8 Next summer², Conner’s team will take the research to the Ecology Summer Day Camp at Archbold Biological Station in Lake Placid, Florida. In addition to their summer of field activities, the kids will test out a new “Bats and Bugs” website that includes recorded bat sounds and videos of the in-flight battles.

¹ thorax: the moth’s midsection

² Next summer: The research took place during 2002.

“Tiger Moths Use Sonic Defense to Trick Bats” by Josh Chamot. Courtesy: National Science Foundation.

4. Select TWO sentences from Passage 2 that support the inference that researchers are unsure of the effect that clicking moths have on bats.

A. “As a bat zips through the night sky, it sends out high-pitched squeaks, bouncing sound waves off of objects and unsuspecting prey.”

(paragraph 5)

B. “While most insect victims would have trouble fighting back, many dive and loop to avoid enemies, and some have the added advantage of being poisonous.” (paragraph 5)

C. “Tiger moths have a special clicker called a tymbal built into their thorax.” (paragraph 6)

D. “Scientists have proposed a few reasons for the tymbal’s success, ranging from its potential to startle a bat to its possible role as a ‘jammer’ that garbles the bats’ hunting squeaks.” (paragraph 6)

E. “The bat may recognize the clicks from the 11,000 tiger moth species, learning to avoid the critters after an initial bout of food poisoning.”

(paragraph 7)

5. This question has two parts. First, answer Part A. Then, answer Part B.

Part A: What are two central ideas of Passage 2?

- A. Bats cannot see colors.
- B. Bats use echolocation to hunt.
- C. Many animals use echolocation.
- D. Scientists study echolocation in moths.
- E. One type of moth makes a clicking sound to avoid bats.

Part B: How does the author of Passage 2 develop the central ideas in Part A?

- A. by discussing science experiments on bats
- B. by explaining what people can learn from animals
- C. by specifying the similarities between tiger moths and bats
- D. by describing the relationship between bats and tiger moths

6. Read the following sentence from Passage 2. What is the effect of the word toxicity in this sentence?

“Now, some researchers suspect one type of moth may have a way of effectively broadcasting its toxicity—the insect produces high-pitched sounds of its own.” (paragraph 5)

- A. It emphasizes the tiger moths’ bright color.
- B. It highlights the tiger moths’ aggressiveness.
- C. It shows the danger that tiger moths pose to bats.
- D. It shows how bats are affected by different noises.

7. This question has two parts. First, answer Part A. Then, answer Part B.

Part A: What is the purpose of Passage 2?

- A. to discuss the various animals that use echolocation
- B. to explain how a certain type of animal can counteract bat echolocation
- C. to explain that humans have developed military equipment by copying echolocation in bats
- D. to give examples of the experiments that researchers have conducted to observe bat echolocation

Part B: How does the author of Passage 2 develop the purpose?

- A. by listing other ways that animals use echolocation
- B. by explaining a theory for why tiger moths make certain sounds
- C. by discussing several strategies used by tiger moths to avoid bats
- D. by giving examples of specific bat behaviors related to echolocation

Day Three

Read “**Bat Sonar and Naval Technology**” by The Office of Naval Research.

Answer the questions that follow.

Passage 3: Bat Sonar and Naval Technology by The Office of Naval Research

This article describes a research program by the Office of Naval Research (ONR). ONR's Bio-Sonar program studies the ability of bats and other creatures to echolocate.

9. Dolphins do it. Big brown bats do it. And sometime soon, the Office of Naval Research hopes its researchers will be able to do it too. Echolocation, that is, and turning the processing of such signals into a system that will enable us to mimic a flying bat's ability to detect and classify a flying beetle in three dimensions at thirty feet.

10. ONR's Bio-Sonar program supports the bat research of Brown University neuroscientist¹, Jim Simmons. Bats use sonar to find food and avoid obstacles much the way our military sonar systems would like to find and detect submarines and mines. "Bats make sounds, listen to echoes, and then see objects," notes Simmons. "We want to know what the neurons in the bat's auditory system are doing to process the echoes that allows their brains to 'see' an image. We now know that bats have a method of doing synthetic aperture sonar while flying that not only determines the distance and direction of all the objects in a scene, but also reconstructs one specific object's shape. What's really incredible is that they can do both simultaneously."

¹ neuroscientist: a scientist who studies the functions of the brain

11. In Simmons' experiments, the bats are trained to differentiate sounds with the time separation of those sounds shortened to test the bats' response. "The bats humor us," says Simmons. "They get mealworms if they behave."

12. A major goal of ONR's bio-sonar research program is to duplicate the ability to differentiate between two echoes that arrive at almost the same time. Today's electronic sonar processing can differentiate between echoes about 12 millionths of a second apart. Bats have it down to 2 to 3 millionths of a second. Being able to separate such sounds means that bats can tell the difference between objects and shapes that are separated by only about the width of a human hair.

13. "ONR would like to get naval sonars, both in listening and in processing the return information, a bit more, well, bat-like," notes ONR's Harold Hawkins.

Excerpt from "Bat Sonar and Anti-Submarine Warfare" by the Office of Naval Research. In the public domain.

8. This question has two parts. First, answer Part A. Then, answer Part B.

Part A: How does Passage 3 support the claim that the U.S. military would like to improve its sonar technology?

- A. It illustrates how existing technology was developed through specific examples.
- B. It gives statistical evidence that explains how technology has improved in the past.
- C. It explains how bats echolocate and gives examples of situations where echolocation might occur.
- D. It describes how scientists train bats and observe specific behaviors to learn how echolocation works.

Part B: Select TWO sentences from Passage 3 that provide relevant support for the answer in Part A.

- A. “Bats make sounds, listen to echoes, and then see objects,” notes Simmons.” (paragraph 10)
- B. “We now know that bats have a method of doing synthetic aperture sonar while flying that not only determines the distance and direction of all the objects in a scene, but also reconstructs one specific object’s shape.” (paragraph 10)
- C. “In Simmons’ experiments, the bats are trained to differentiate sounds with the time separation of those sounds shortened to test the bats’ response.” (paragraph 11)
- D. “Today’s electronic sonar processing can differentiate between echoes about 12 millionths of a second apart.” (paragraph 12)
- E. “Bats have it down to 2 to 3 millionths of a second.” (paragraph 12)

9. In passage 3, why does the Office of Naval Research most likely support the bat research of Brown University neuroscientist, Jim Simmons?

- A. Simmons' experiments specifically relate to the speed of bats' responses, which relates to what the Navy wants to improve in their sonars.
- B. The Navy really wants him to study dolphins because both the Navy and dolphins operate in the water.
- C. The Navy doesn't have any imaging equipment and want Simmons to make some for them.
- D. Simmons' used to be in the Navy and enjoys his work making sonar equipment.

10. Which of the following best describes the ONR's purpose behind publishing this paper?

- A. To inform their audience about a process they are using to try to improve their sonar equipment.
- B. To show bats are better than dolphins.
- C. To entertain the reader.
- D. To persuade the government to fund more research.

Day Four

Using the Day One reading **“What is Echolocation”** by Elizabeth Hagen and the Day Three reading **“Bat Sonar and Naval Technology”** by The Office of Naval Research, answer the following question.

11. Show how each author addresses both of the following questions. Why is it important for scientists to study bats? How are humans using what scientists are learning from research on bats.

Write your answer here.

Day Five

Read the poem “A Red Palm” by Gary Soto and answer the questions that follow.

A Red Palm by Gary Soto

You're in this dream of cotton plants.
You raise a hoe, swing, and the first weeds
Fall with a sigh. You take another step,
Chop, and the sigh comes again,
Until you yourself are breathing that way **5**
With each step, a sigh that will follow you into town.

That's hours later. The sun is a red blister
Coming up in your palm. Your back is strong,
Young, not yet the broken chair
In an abandoned school of dry spiders. **10**

Dust settles on your forehead, dirt
Smiles under each fingernail.
You chop, step, and by the end of the first row,
You can buy one splendid fish for wife
And three sons. Another row, another fish, **15**
Until you have enough and move on to milk,
Bread, meat. Ten hours and the cupboards creak.

You can rest in the back yard under a tree.
Your hands twitch on your lap,
Not unlike the fish on a pier or the bottom **20**
Of a boat. You drink iced tea. The minutes jerk
Like flies.

It's dusk, now night,
And the lights in your home are on.
That costs money, yellow light **25**
In the kitchen. That's thirty steps,

You say to your hands,
Now shaped into binoculars.
You could raise them to your eyes:
You were a fool in school, now look at you. **30**

You're a giant among cotton plants.
Now you see your oldest boy, also running.
Papa, he says, it's time to come in.
You pull him into your lap
And ask, What's forty times nine? **35**

He knows as well as you, and you smile.
The wind makes peace with the trees,
The stars strike themselves in the dark.
You get up and walk with the sigh of cotton plants.
You go to sleep with a red sun on your palm,
The sore light you see when you first stir in bed.

40

12. Which sentence best explains the description, “Smiles under each fingernail,”?

- A. The line describes the lines of dirt above the speaker’s brow.
- B. The line describes the shape of the soil on the speaker’s hands.
- C. The line describes the happiness of the speaker because he is providing the food.
- D. The line describes the happiness of the speaker’s family when they receive the food.

13. Select TWO answers that show examples of personification.

- A. “the first weeds / Fall with a sigh.” (lines 2 & 3)
- B. “the sun is a red blister” (line 7)
- C. “the cupboards creak” (line 17)
- D. “Your hands twitch on your lap, / Not unlike the fish on a pie” (line 19 & 20)
- E. “You were a fool in school” (line 30)
- F. “You go to sleep with a red sun on your palm” (line 40)

14. The poem’s theme centers on which of the following topics?

- A. Loss and Intellect
- B. Work and Play
- C. Love and Nature
- D. Regret and Hope



GRADE SEVEN

ANSWERS FOR WEEK OF MARCH 14-18 READING

1. **D** (RI.7.2)
2. **B and C** (RI.7.3)
3. **D** (RI.7.5)
4. **D and E** (RI.7.1)
5. Part A: **B and E** (RI.7.2)
Part B: **D** (RI.7.2)
6. **C** (RI.7.4)
7. Part A: **B** (RI.7.6)
Part B: **B** (RI.7.6)
8. Part A: **D** (RI.7.8)
Part B: **B and C** (RI.7.8; RI.7.1)
9. **A** (RI.7.3)
10. **A** (RI.7.6)
11. **Answers may vary but should include at least one reason to study bats and one application for humans from Hagan (passage 1) and at least one reason to study bats and one application for humans from the NRO (passage 3). (RI.7.9)**
12. **B** (RL.7.4)
13. **A and C** (RL.7.4)
14. **D** (RL.7.2)