

# Deep, Deep Down



The Secret  
Underwater Poetry  
of the  
Mariana Trench

by Lydia Lukidis  
illustrated by Juan Calle

# Teacher Guide

# Table of Contents

How to Use this Guide.....	3
About the Book.....	4
Reviews.....	5
About the Author and Illustrator.....	6
Curriculum Standards.....	7
Curriculum-Based Activities.....	9
ELA Activities.....	12
Art Activities.....	18
Poetry: Haikus.....	19
Figurative language.....	20
Literacy Game.....	21
Q & A with an Expert.....	26
Word Search.....	28
Crossword Puzzle.....	29
Maze.....	30
Connect the Dots.....	31
Coloring Sheets.....	32
Answer Key.....	35



LYDIA LUKIDIS

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# How to Use This Guide

This teacher guide to *DEEP, DEEP DOWN: The Secret Underwater Poetry of the Mariana Trench* is designed to assist educators, librarians, and parents to help children learn beyond the book itself.

The guide provides dozens of curriculum standards in Common Core ELA and Math, and Next Generation Science Standards that align with the narrative. It also proposes various curriculum-based activities for students K-6.

The text of the narrative itself is layered. Younger students can focus on the main text while older students can also read the sidebars and detailed backmatter to have a more in depth understanding of the Mariana Trench and its inhabitants.

In addition to the educational components, this guide cultivates numerous valuable skills such as:

- Critical thinking
- Creative problem solving
- Memory and research skills
- Literacy: ELA texts and poetry
- Collaboration
- Analytical and cognitive skills
- Imagination

## Before you read

Before each student reads the book (or gets it read to them), have a discussion with them about what ocean trenches are. Ask them to imagine the deepest ocean trench in the world. What might the living conditions be in the trench? What kinds of creatures might live there? Would vampire squid, seadevil anglerfish, or goblin sharks roam the waters, or perhaps other sea monsters?



# About the Book

**Author:** Lydia Lukidis

**Illustrator:** Juan Calle

**Publisher:** Published by Capstone Editions, a Capstone imprint

**Copyright:** 2023

**ISBN-10:** 1684466156

**ISBN-13:** 978-1-68446-615-3

**Hardcover:** 40 pages

**Reading age:** 7 - 11 years

**Reading Level and Interest Level:** grades 3-5

**Lexile Level:** 950L

**Dewey:** 577.7/9

**Guided Reading Level:** Q

**Text type:** expository nonfiction

**Page dimensions:** 8" x 10"

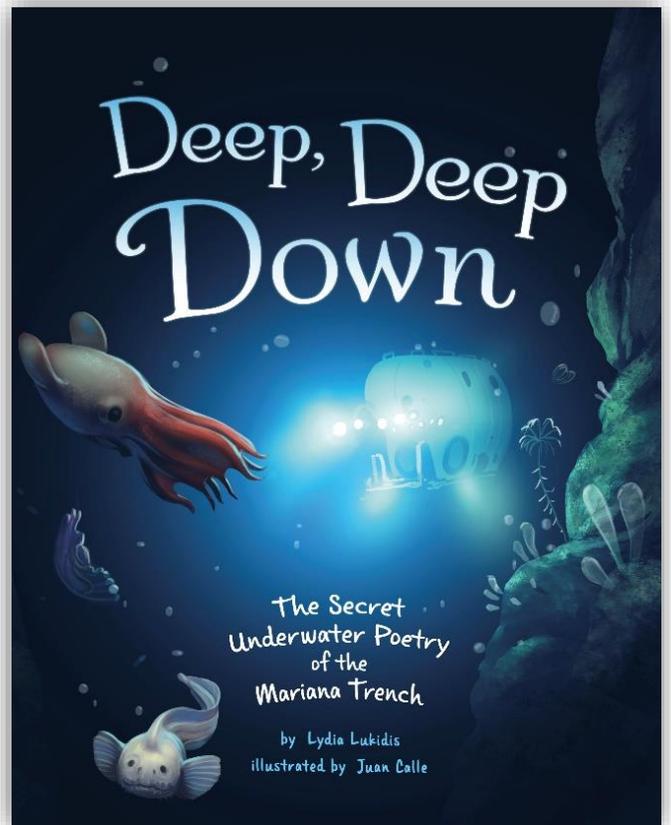
**Page count:** 40

## Thematic connections:

- Animal senses, adaptations, and communication
- Animals, plants, and their environment
- Interdependent relationships in ecosystems
- Environmental impacts on organisms
- Animal habitats
- Geology

## Synopsis

Deep, deep down, at the very bottom of the ocean, lies a secret world. Through lyrical narration, this spare-text STEM picture book takes readers on a journey to a place very few humans have ever been--the Mariana Trench. The imagined voyage debunks scary myths about this mysterious place with surprising and beautiful truths about life at Earth's deepest point. *DEEP, DEEP, DOWN: The Secret Underwater Poetry of the Mariana Trench* shows a vibrant world far below, and teaches readers how interconnected our lives are to every place on the planet. Deep Down shows a vibrant world far below, and teaches readers how interconnected our lives are to every place on the planet.



# Reviews

“This beautiful picture book celebrates both the mystery and the science of the Mariana Trench--the deepest ocean valley on earth. With lyrical, moody prose and a second-person point of view, Lukidis puts the reader into a journey into the darkest deepness in the sea. And even though the science is revealed (supported by layered text), a sense of awe pervades the entire book. The luminous illustrations are wonderful, too. And don't miss the back matter. The whole book is an enchanting journey.”

**-Award winning author Laura Purdie Salas**

“Fans of Candace Fleming will enjoy this lyrical tribute to the mysteries of the Mariana Trench, the world’s deepest oceanic trench, containing fascinating undersea creatures including snailfish, squid, and cutthroat eels. Juan Calle’s dark and realistic illustrations capture the majestic beauty of these underwater creatures, as Lydia Lukidis’ prose dances across the page. Sidebars share more details on the animals found in the trench including their size, while a chart in the back of the book compares the depths where each animal lives.”

**-Author Susan Johnston Taylor**

“As a scientist, I'm so grateful for Lydia’s commitment to crafting an engaging, accurate work that so wonderfully captures the habitat of the Mariana Trench. I'm sure *DEEP, DEEP, DOWN: The Secret Underwater Poetry of the Mariana Trench* will have a great impact on young readers.

**-Dr. Mackenzie Geringer (PhD in Marine Biology from the University of Hawaii, postdoctoral researcher at Friday Harbor Labs, University of Washington.)**

DEEP, DEEP, DOWN: The Secret Underwater Poetry of the Mariana Trench is a wonderfully unique take on what is a wonderfully unique place in the ocean.

**-Professor Alan Jamieson (Director @ Minderoo-UWA Deep Sea Research Centre)**

“With a lyricism that submerges us in the beauty of a secret place that some believed was the lair of monsters, Lydia Lukidis transforms the pitch-dark world of the deepest place in the ocean into a garden of wonder... A gorgeous book!”

**-Author Jilanne Hoffmann**

“*Deep, Deep, Down: The Secret Underwater Poetry of the Mariana Trench* is a lyrical read that I'd heartily recommend to kids and adults alike.”

**-Long and Short Reviews**

“*Deep, Deep Down* has engaging content that describes an unusual world. Lydia Lukidis's narration uses the medium of poetry. The book will arouse the curiosity of many young people wanting to learn more about our world's diversity.”

**-Reviewed by Diana Lopez for Readers' Favorite**

## About the Author

**Lydia Lukidis** is the author of 50+ trade and educational books for children. Her titles include *DEEP, DEEP, DOWN: The Secret Underwater Poetry of the Mariana Trench* (Capstone, 2023), *THE BROKEN BEES' NEST* (Kane Press, 2019) which was nominated for a Cybils Award, and *NO BEARS ALLOWED* (Clear Fork Media, 2019). A science enthusiast from a young age, she now incorporates her studies in science and her everlasting curiosity into her books.

Lydia is very involved in the kidlit community. She volunteers as a judge on Rate your Story and co-hosts the annual Fall Writing Frenzy competition. Another passion of hers is fostering a love for children's literacy through the writing workshops she regularly offers in elementary schools across Quebec with the Culture in the Schools program.

For more information, please visit [www.lydialukidis.com](http://www.lydialukidis.com).



## About the Illustrator

**Juan Calle** is a former biologist turned science illustrator, trained on the Science Illustration program at UC Monterrey Bay. He worked early on his illustrator career for field guides of plants and animals of this country of origin, Colombia, and now owns and works in his art studio, *LIBERUM DONUM* in Bogotá, Colombia, creating art, storyboarding and his passion: comic books.

For more information, please visit <https://www.advocate-art.com/juan-calle>, <https://www.instagram.com/juancalleart/?hl=en>.



# Curriculum Standards

## Aligned for Grades K-6 in Common Core ELA and Math, and Next Generation Science Standards

### Kindergarten:

CCSS

ELA: R.K.1; W.K.1; W.K.2; W.K.7; SL.K.5

Math: MP.2; MP.4; MP.5; K.CC; K.MD.A.2; MP.2; 2.MD.D.10

NGSS: K-LS1-1; K-ESS2-2; K-ESS3-1; K-ESS3-3; K-PS3-1; K-2-ETS1-1; K-2-ETS1-2; K-2-ETS1-3

### 1st Grade

CCSS

ELA: W.1.2; W.1.7; W.1.8

Math: MP.2; MP.4; MP.5; 1.MD.A.1

NGSS: 1-PS4-2; 1-PS4-3; 1-LS1-1; 1-LS1-2; K-2-ETS1-1; K-2-ETS1-2; K-2-ETS1-3

### 2nd Grade

CCSS

ELA: W.2.7; W.2.8; SL.2.2; SL.2.5; RI.2.1; RI.2.3; RI.2.9; W.2.6

Math: 2.MD.D.10; 2.MD.B.5; 2.NBT.A, 2.NBT.A.3, MP.2; MP.4; MP.5

NGSS: 2-LS4-1; 2-ESS1-1; 2-ESS2-2; 2-ESS2-3; K-2-ETS1-1; K-2-ETS1-2; K-2-ETS1-3

### 3rd Grade

CCSS

ELA RI.3.1; RI.3.2; RI.3.3; W.3.1; W.3.2; W.3.8; SL.3.4; RI.3.7; SL.3.5; SL.3.NF

Math 3.NBT; 3.MD.B.3; 3.MD.B.4

NGSS 3-LS2-1; 3-LS4-3; 3-LS4-4; 3-LS1-1; 3-LS3-1; 3-LS3-2; 3-LS4-2

### 4th Grade

CCSS

ELA RI.4.1; RI.4.7; RI.4.9; W.4.7; W.4.8; W.4.9;

Math 4.MD.A.1; 4.MD.A.2

NGSS 4-ESS2-2; 4-ESS-3-2; 4-LS1-1

# Curriculum Standards

## 5th grade

CCSS

ELA RI.5.1; RI.5.7; RI.5.9; W.5.1; W.5.8; W.5.9; SL.5.5

Math MP.2; MP.4; MP.5; 5.GA.2

NGSS 5-PS3-1; 5-LS2-1; 5-ESS2-1; 5-ESS3-1

## 6<sup>th</sup> grade

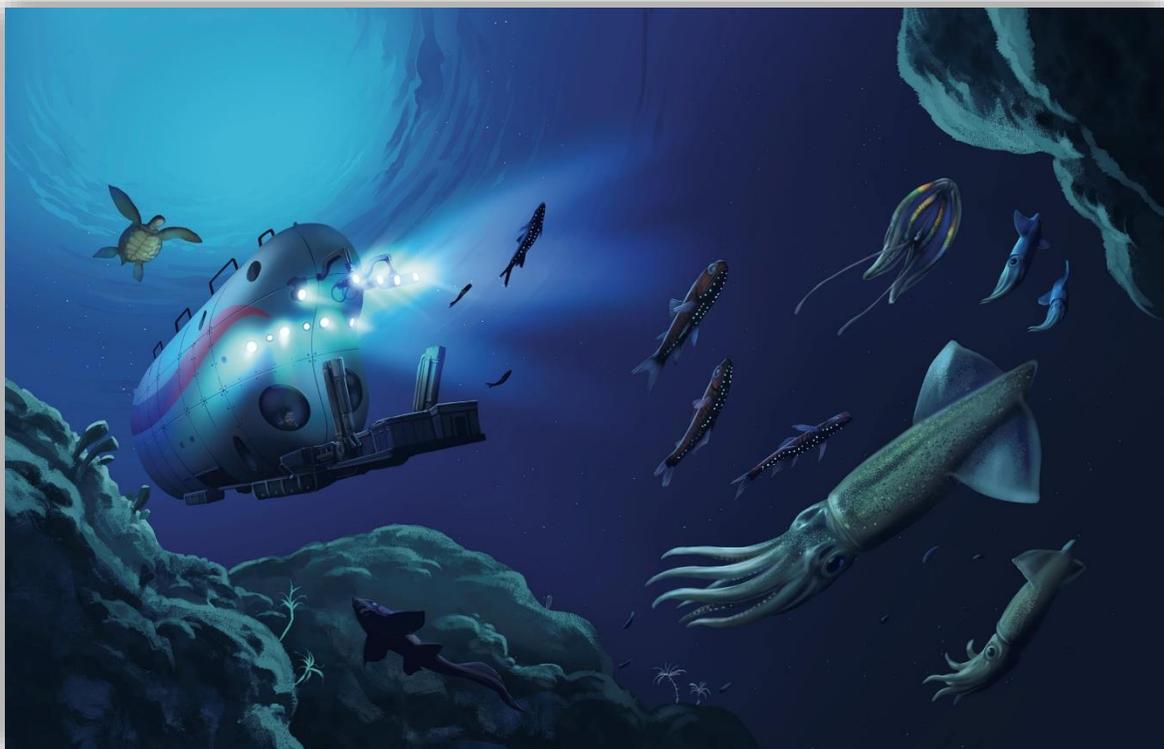
CCSS

ELA RI.6.1; RI.6.2; RI.6.3; RI.6.4; RI.6.5; RI.6.6; RI.6.10

Math MP.2; MP.4; MP.5

NGSS MS-LS1-6; MS-LS2-1; MS-LS2-3; MS-LS2-4; MS-LS2-2; MS-LS2-5;

MS-LS1-5; MS-ESS3-3; MS-ESS3-4



# Curriculum-Based Activities

## Kindergarten

K-LS1-1- From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Example activity: Read, Discuss, Draw, and Write!

Based on what you read in *Deep, Deep Down*, what do animals need to survive in the cold, deep water of the Mariana Trench?

## First Grade

1-LS1-1- From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

[Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

Example activity:

Based on what you read in *Deep, Deep Down*, how do animals use their external parts to survive, grow, and meet their needs in the cold, dark water of the Mariana Trench?

Extension: How could humans create and use similar features or strategies?

## Second Grade

2-LS4-1- Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

Make observations of plants and animals to compare the diversity of life in different habitats.

# Curriculum-Based Activities

Example activity:

Based on what you read in *Deep, Deep Down*, how is the animal life in the Mariana Trench different from the animal life in other parts of the ocean (such as a coral reef)? Use evidence from the text in your explanation.

## Third Grade

3-LS4-3- Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

[Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

Example activity:

Based on what you read in *Deep, Deep Down*, how do you know which ocean animals could or could not survive in the Mariana Trench? Use evidence from the text in your explanation.

## Fourth Grade

4-LS1-1- From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction

Example activity:

Based on what you read in *Deep, Deep Down*, what are the unique features of the animals who live in the Mariana Trench? Explain how the animals use them to survive and grow.

# Curriculum-Based Activities

## Fifth Grade

5-LS2-1- From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Example activity:

Based on what you read in *Deep, Deep Down*, make a model of a food chain using animals living in the Mariana Trench.

## Sixth Grade

Example activity:

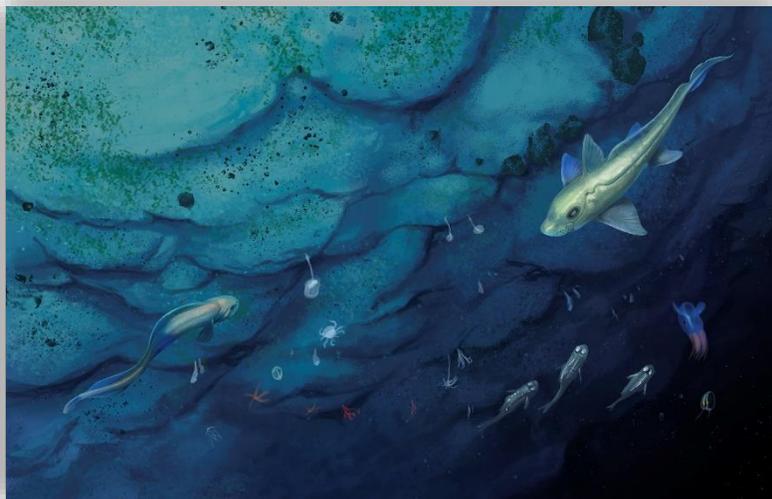
MS-LS2-3 Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Example activity:

Based on what you read in *Deep, Deep Down*, explain how living animals rely on nonliving things to survive in the trench.



# ELA Activities

Here's a list of other activities that connect with ELA and art, each one suitable for various age groups.

## Vocabulary Comprehension

Students may not be familiar with the words in the glossary. Ask them to read the definitions below and create a new sentence using each word.

**Adaptation** (a-dap-TAY-shuhn)—a change a living thing goes through to better fit in with its environment

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Aquatic** (uh-KWAH-tik)—living or growing in water

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Barren** (BA-ruhn)—not producing; unfruitful

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Biodiversity** (BIO-die-VER-city)—variety of life in genetics, species, and ecosystems

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Cell** (SEL)—the smallest unit of a living thing; most cells are so small they can't be seen without a microscope

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Current** (KUHR-uhnt)—the movement of water in a river or ocean

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Diverse** (dih-VURS)—different from each other

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Ecosystem** (EE-koh-sis-tuhm)—a system of living and nonliving things in an environment

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Hostile** (HOSS-tuhl)—unfriendly, angry, or harsh

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Microbe** (MYE-krobe)—a tiny living thing that is too small to be seen without a microscope

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Plate** (PLAYT)—a large sheet of rock that is a piece of Earth's crust

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Scarce** (skairs)—hard to find

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Submersible** (suhb-MURS-uh-buhl)—a small vessel used under water, usually for research

**New sentence:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Translucent** (trans-LOO-suhnt)—partially see-through; allowing some rays of light to pass through

**New sentence:** \_\_\_\_\_

\_\_\_\_\_

**Trench** (TRENCH)—a long, narrow steep-sided hole in the ocean floor

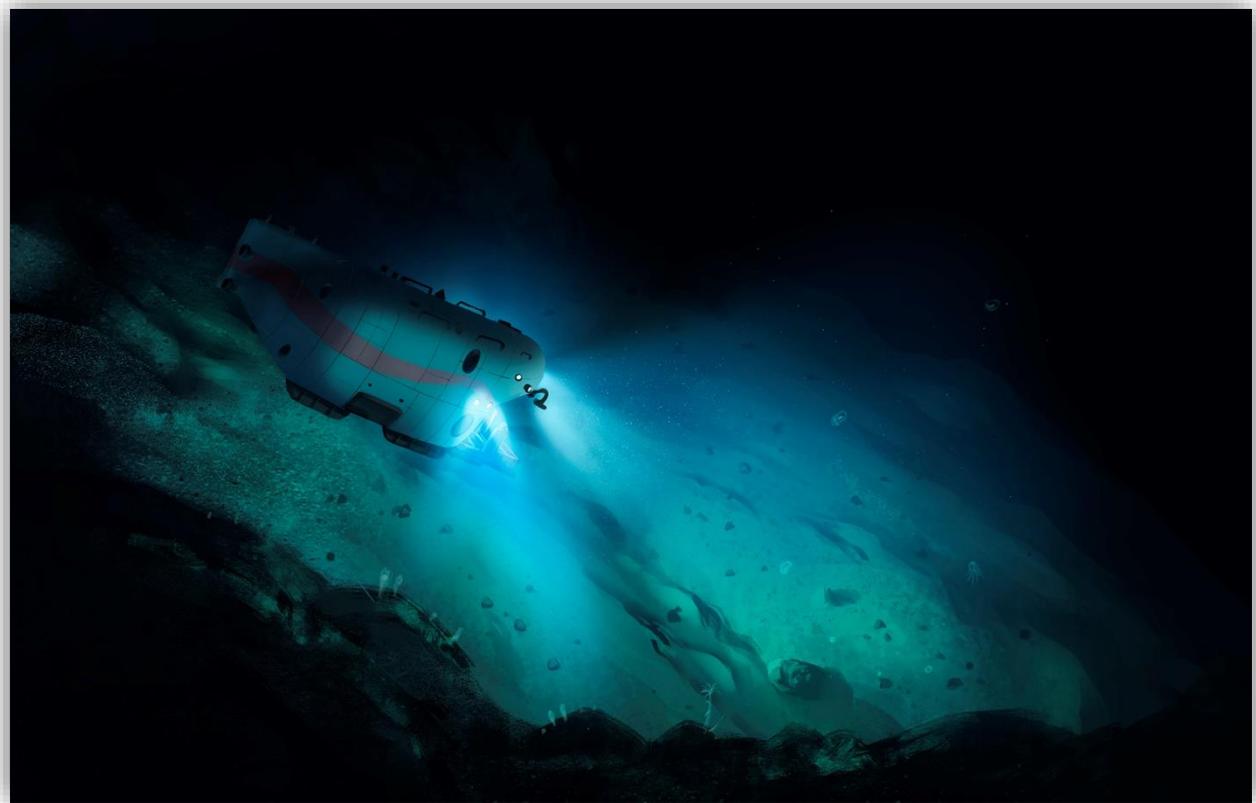
**New sentence:** \_\_\_\_\_

\_\_\_\_\_

**Water pressure** (WAT-ur PRESH-ur)—the force that water exerts; pressure increases with the depth of the ocean

**New sentence:** \_\_\_\_\_

\_\_\_\_\_



# ELA Activities

## Comprehension Questions

Ask the students to use the main text as well as the text in the sidebars to answer the following questions.

1. In which ocean does the Mariana Trench lie?

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2. How deep is the Mariana Trench? What is the deepest spot called?

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3. What is the name of the vehicle researchers and scientists use to explore trenches?

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4. What are some of the most hostile conditions of the Mariana Trench?

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5. Why do you think there isn't much food deep down in the trench?

---

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6. What organ helps rattails survive when they can't find enough food?

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7. What trick do cutthroat eels use to save energy and survive long periods without much food?

---

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# ELA Activities

8. How do crinoids get food into their mouth?

---

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9. What is the name of the special substance that protects snailfish from the high pressure?

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10. What do amphipods eat?

---

---

11. Would sea cucumbers like it if the ocean water suddenly got warmer? What might happen?

---

---

12. What are the shells of xenophyophores made from?

---

---

13. Do real sea “monsters” actually live in the Mariana Trench?

---

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14. Look at the diagram on the next page, how deep can human scuba divers dive?

---

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15. Look at the diagram on the next page, what two creatures live in the deepest spot of the trench?

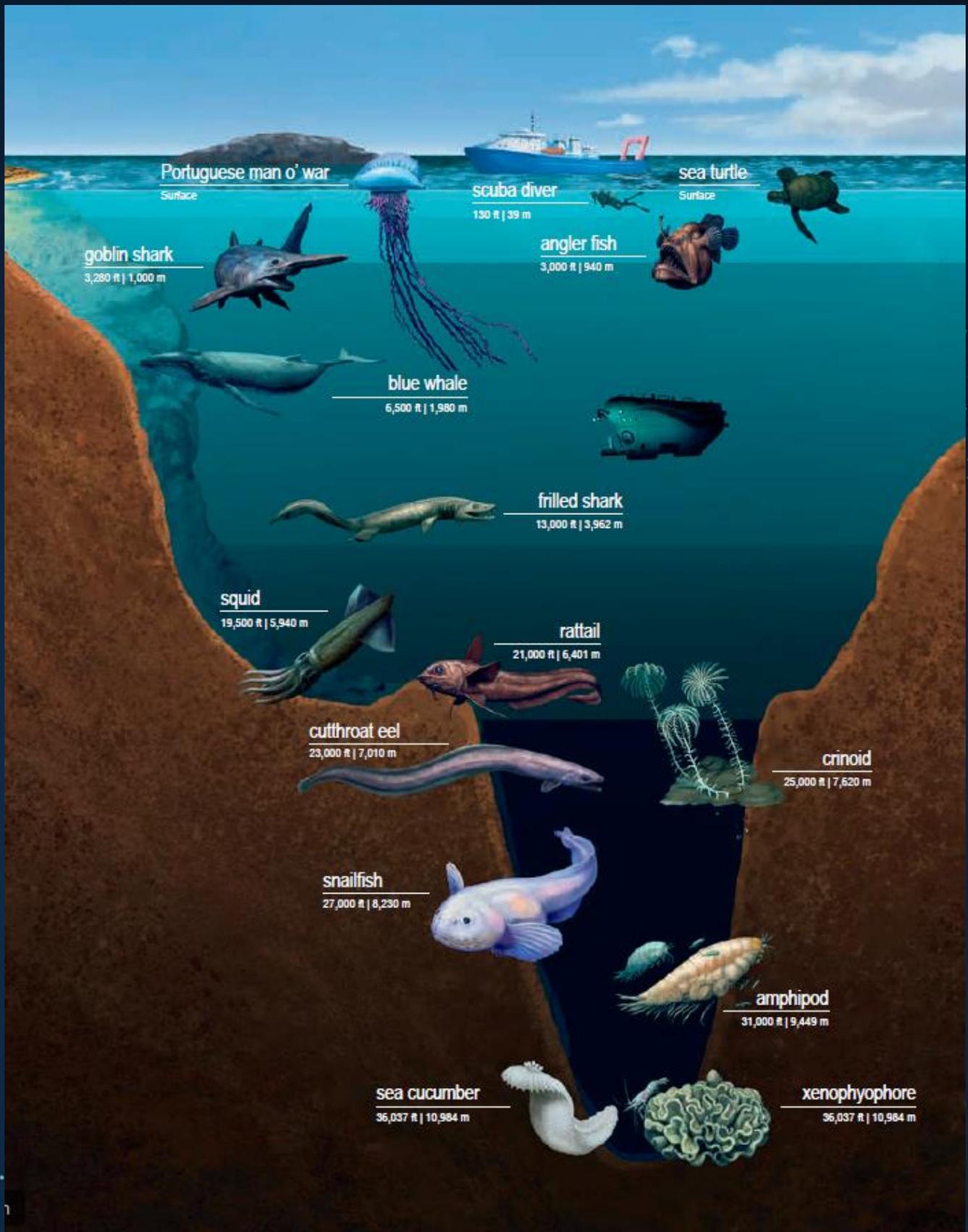
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16. Why do so few researchers and scientists journey to the bottom of the trench?

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Portuguese man o' war

Surface

scuba diver

130 ft | 39 m

sea turtle

Surface

goblin shark

3,280 ft | 1,000 m

angler fish

3,000 ft | 940 m

blue whale

6,500 ft | 1,980 m

frilled shark

13,000 ft | 3,962 m

squid

19,500 ft | 5,940 m

rattail

21,000 ft | 6,401 m

cutthroat eel

23,000 ft | 7,010 m

crinoid

25,000 ft | 7,620 m

snailfish

27,000 ft | 8,230 m

amphipod

31,000 ft | 9,449 m

sea cucumber

36,037 ft | 10,984 m

xenophyophore

36,037 ft | 10,984 m

# Art Activities

## **Activity #1:**

Ask the students to illustrate one of the sea creatures that lives in the trench. They may draw or paint, or use mixed media to make a collage.

## **Activity #2:**

Ask the students to think about the three most hostile conditions of the trench:

- a lack of sunlight
- lack of food
- intense pressure

Then ask them to imagine and make up a creature of their own that would survive such conditions. They can write and draw out their ideas.

## **Activity #3:**

Ask the students to imagine and design a vessel that could travel down to the depths of the trench.

## **Activity #4:**

Ask the students to imagine and design an invention that could prevent trash/plastic from entering the ocean trenches... or prevent it from being used in the first place.



# Poetry: Haikus

## Fun with Haikus

☞ Haikus have 3 lines, each with a specific number of syllables. They don't need to rhyme.

☞ This is the structure:

**Line 1: 5 syllables**

**Line 2: 7 syllables**

**Line 3: 5 syllables**

☞ Here's an example:

My homework is gone. (5 syllables)

It seems my dog ate it all. (7 syllables)

I sure like my dog! (5 syllables)

Ask students to pick one of the trench creatures and write a haiku about it:

**Title:** \_\_\_\_\_

**Line 1 (5 syllables)**

\_\_\_\_\_  
\_\_\_\_\_

**Line 2 (7 syllables)**

\_\_\_\_\_  
\_\_\_\_\_

**Line 3 (5 syllables)**

\_\_\_\_\_

# Figurative Language

Ask the students to read these definitions and make up a new way to use these poetic devices.

☞ **Onomatopoeia:** When you use a word that makes a sound close to the action it refers to.

**SWISH!**

Something shimmers.

Not a monster,  
but a fish.

A rattail  
drifts through the darkness,  
in search of food.

**Student example:** \_\_\_\_\_  
\_\_\_\_\_

☞ **Alliteration:** When you repeat the first letter or sound of several words near one another.

Diving deeper,  
a long, thin body  
slinks and sways,  
ever so slowly.

**Student example:** \_\_\_\_\_  
\_\_\_\_\_

☞ **Simile:** When you compare two unlikely things, usually using the words “like,” “as,” or “than.”

Glide forward,  
past rows and rows of xenophyophores,  
clustered like cabbages.

**Student example:** \_\_\_\_\_  
\_\_\_\_\_

# Literacy Game

## ELA Vocabulary Memory Match Game

- Common Core State Standards:
- CCSS.ELA-LITERACY.L.3.4
- CCSS.ELA-LITERACY.L.4.4
- CCSS.ELA-LITERACY.L.5.4
- CCSS.ELA-LITERACY.L.6.4

### What You'll Need:

- white paper
- scissors
- pencils
- access to a printer
- laminating supplies (optional)



### Instructions:

- Make photocopies of the vocabulary and definition cards on the following pages
- Cut the vocabulary and definition cards on the dotted lines (laminates them if you would like to make them sturdier)
- Ask the students to face all cards down at first
- Ask them to choose a partner and then take turns flipping the cards to find a match between a word and its definition
- If a student draws two of the same type of card, they may redraw
- The partner with the most matches at the end wins!

# CARDS

**PRINT & CUT  
APART  
THESE  
VOCABULARY  
CARDS**

WATER  
PRESSURE  
(WAT-ur PRESH-  
ur)

AQUATIC  
(uh-KWAH-tik)

CURRENT  
(KUHR-uhnt)

DIVERSE  
(dih-VURS)

SUBMERSIBLE  
(suhb-MURS-uh-  
buhl)

ECOSYSTEM  
(EE-koh-sis-  
tuhm)

TRENCH  
(TRENCH)

**PRINT & CUT  
APART  
THESE  
DEFINITION  
CARDS**

The force that water exerts; pressure increases with the depth of the ocean

A small vessel used under water, usually for research

The movement of water in a river or ocean

Living or  
growing in  
water

A system of  
living and  
nonliving things  
in an  
environment

A long, narrow  
steep-sided  
hole in the  
ocean floor

Different from  
each other

# Q & A with an Expert

This book couldn't have been written without the help of **Dr. Mackenzie Gerringer**! Check out what she has to say:

**1. What do you love about science? Did you like science when you were younger?**

There are a lot of things I love about science and about my job in science. One is that it's my job to be curious. I get to ask questions of the world around me and work in a team to figure out how things work. I also really love the habitats I get to study and explore. The organisms that live in the deep ocean are beautiful and amazing and it's a lot of fun to learn about their lives. I did like science as a kid, and specifically wanted to be a marine biologist—I'm very lucky to get to live that dream!



**2. What draws you to the deep sea, and to the Mariana Trench, specifically?**

I'm fascinated by deep-sea habitats and the animals that live in the deep sea. The diversity of adaptations and body forms that we see in the deep oceans is amazing – animals have evolved interesting solutions to living in different habitats and the deep sea is a great place to look for examples of that. The Mariana Trench is captivating because it is so deep, so deep that it's even hard for us to picture. That depth of nearly 11,000 m is 36,000 feet, a common cruising altitude for commercial aircraft. Yet, the trench is full of life, including some of my favorite species.

**3. What are your research methods and how do you learn more about the trench creatures?**

We use a lot of different tools to study deep-sea trenches, including cameras and traps. We also use submarines and underwater robots called “remotely operated vehicles” to study trench habitats. Back in the lab, we use another wide range of tools, sometimes just looking closely at organisms under a microscope and even using 3-D x-ray technology to actually look inside a fish. Each of these tools tells us something different, and it's important to use a variety of methods to understand trench creatures.

**4. What's it like spending weeks on a research ship?**

Being at sea is amazing and challenging and exhausting and invigorating, sometimes all at the same time. Collaboration and teamwork are vitally important at sea and having the opportunity to work together as a group to accomplish big goals is incredible. In addition to the science, I enjoy the opportunity to be on the water and to have amazing views of sunsets and stars.

**5. If you had the opportunity, would you journey to the depths of the Mariana Trench in a submersible?**

Yes! We don't often travel into the deep sea ourselves. Usually, we send cameras and other equipment to study these habitats and bring back information. But there are submarines that can study deep-sea systems like the Mariana Trench and they can help give us a better idea of what it's like for these organisms who live in trenches and allow us to better understand their habitat and biology. I have been lucky enough to dive in a few submarines, including to over 6,000 m with the *HOV Alvin 6500*. It's an incredible experience; quiet, peaceful, and very humbling.

**6. What's your favorite marine creature and why?**

My favorite animals live in trenches like the Mariana Trench. They are small, pink fish called hadal snailfishes that are incredibly well adapted to living in the trenches. In addition to their amazing adaptations, they're also pretty cute!

**7. What's the weirdest marine creature you ever saw / came into contact with?**

There are so many delightfully strange marine animals, I never get tired of learning about them. One that comes to mind is a stalked tunicate, which looks like a transparent balloon. It's an animal that is actually predatory, sitting and waiting for prey to swim up. Shallow water relatives of this animal are called "sea squirts" because if they are gently pressed, they shoot water out of a siphon that they're normally using to feed.

I'm also a big fan of sea lilies, known as crinoids, which look like a flower, but are actually animals that filter feed in the water. They're a relative of sea urchins and seastars. Although they look stationary and even plant-like, if they get spooked, they'll swim away in a lovely many-armed freestyle stroke.

**8. And just for fun, if you had to be any animal, what would it be and why?**

This is a tough one, I think it would be interesting to experience what it's like to be most types of animals. Maybe something that swims well and can dive deep to explore, like a whale or a seal.

**BIO:** Mackenzie Gerringer (she/her/hers) is an Assistant Professor at the [State University of New York at Geneseo](#). Her research centers on the physiology and ecology of deep-sea animals, including the planet's deepest-living fishes. She earned her PhD in Marine Biology from the University of Hawaii in 2017 before working as a postdoctoral researcher at Friday Harbor Labs, University of Washington.

Her research explores how fishes are adapted to life in the amazing pressures, cold temperatures, and eternal darkness of the deep-sea using comparative techniques in taxonomy, functional morphology, cellular physiology, energetics, age and growth studies, and diet analysis. She has spent over 200 days at sea exploring the ocean's depths with free-vehicle landers, ROVs, and submersibles. Her work has been covered by Science Magazine, National Geographic, Atlas Obscura, and a David Attenborough-narrated documentary by Japan's national broadcasting company, NHK. Dr. Gerringer is committed to education and science outreach, including through experience teaching as a Fulbright Fellow in Bremen, Germany and serving as an onboard scientist on NOAA's OKEANOS EXPLORER, narrating telepresence-enabled exploration of the deep sea. At SUNY Geneseo, she teaches Animal Physiology, Marine Biology, and Science Communication.

# Word Search



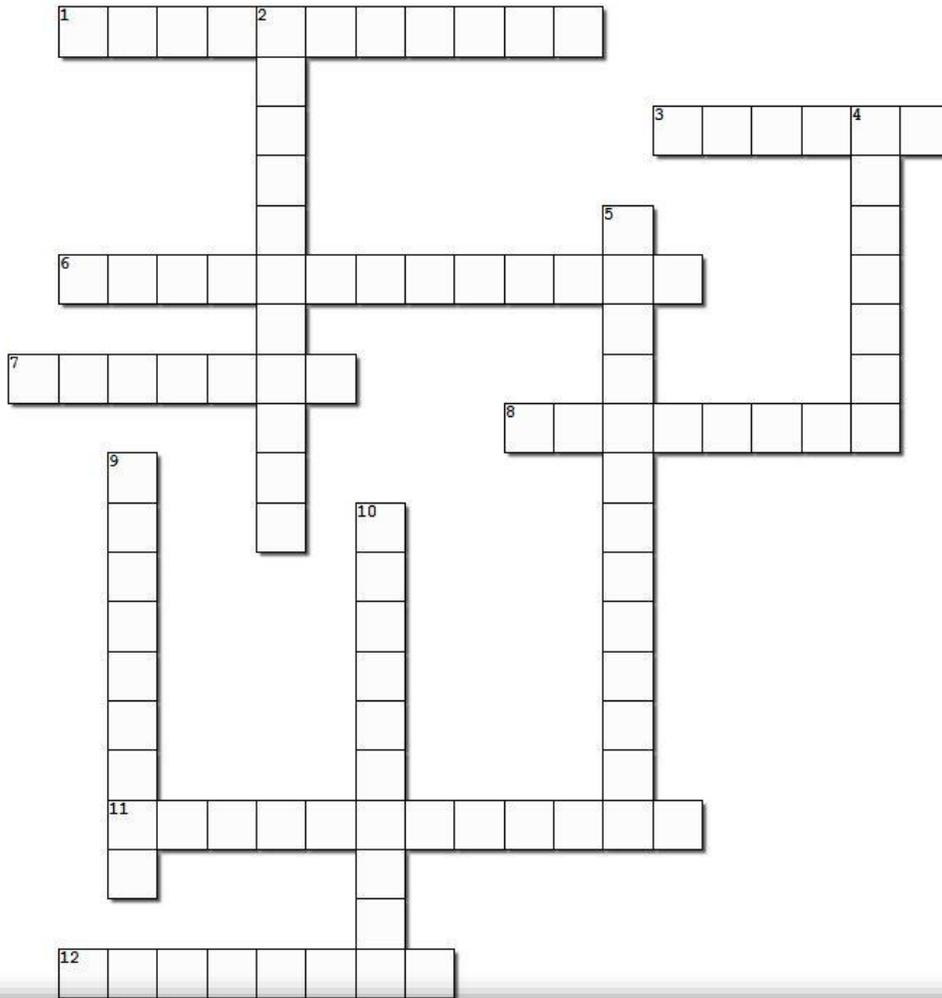
Find the following words in the puzzle.  
Words are hidden → and ↓ .

AMPHIPOD  
CRINOID  
RATTAIL

ROCKS  
SAND  
SEA CUCUMBER

SNAILFISH

# Crossword Puzzle



## Across

1. What color is a snailfish?
3. A long, narrow steep-sided hole in the ocean floor.
6. This creature has a long, thin body that sways slowly.
7. This creature can smell food from far away with a whisker-like organ that hangs on its chin.
8. This creature has seven pairs of legs.
11. This creature has no eyes, no head, no heart, or lungs.
12. In which ocean does the Mariana Trench lie?

## Down

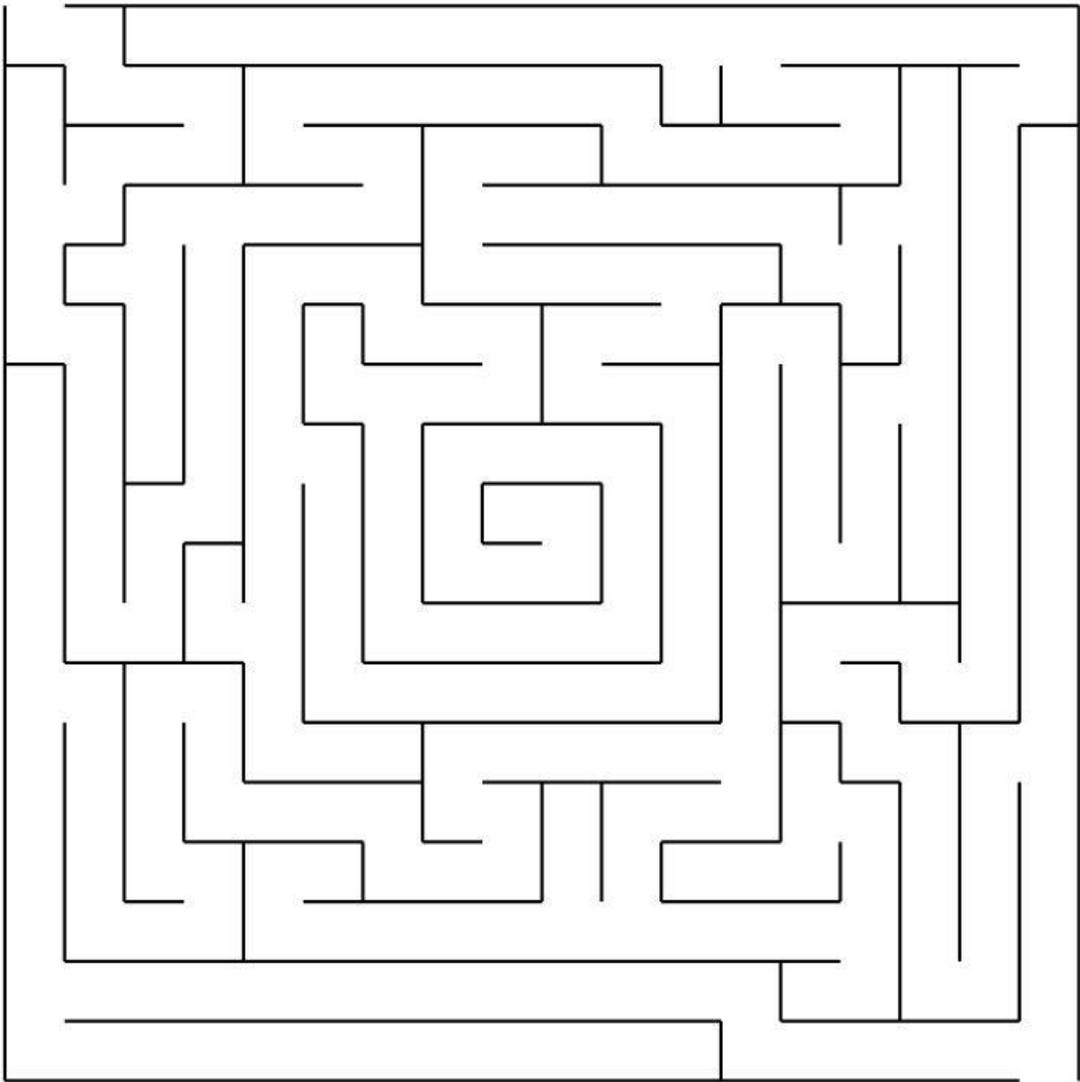
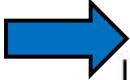
2. A natural disaster that can shake the Earth's plates.
4. This creature looks like a tiny tree.
5. Not an animal or a plant, it's a single-celled organism.
9. This fish can swim deeper than any other fish.
10. These stick out from an amphipod's head.

For answers that have two words, please add a space between the first and second word.

# Maze



Help the submersible get to the bottom of the trench!





# Coloring Sheets

## Deep, Deep Down

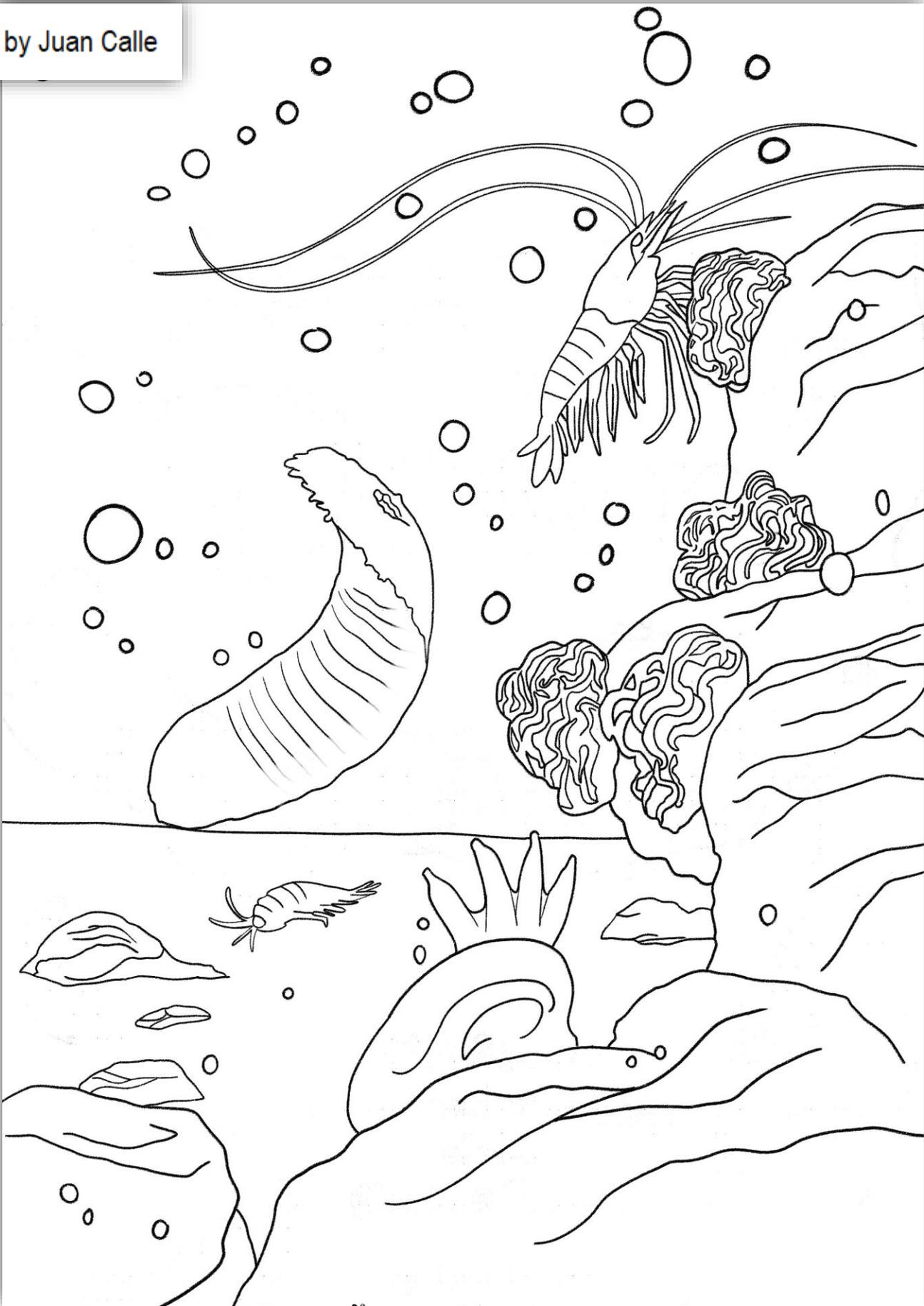


The Secret ..  
Underwater Poetry  
of the  
Mariana Trench

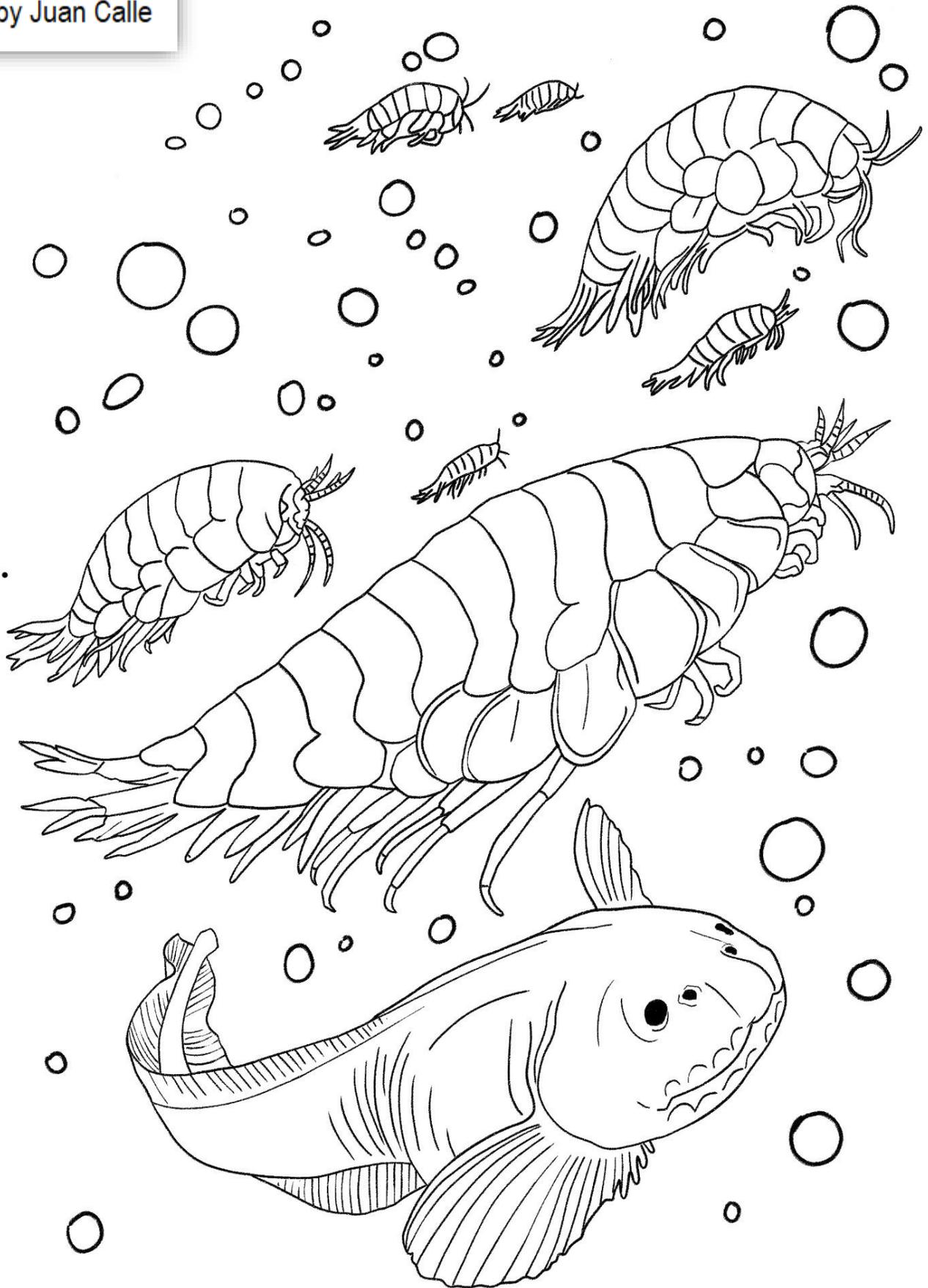
by Lydia Lukidis  
illustrated by Juan Calle

Art by Juan Calle

Art by Juan Calle



Art by Juan Calle

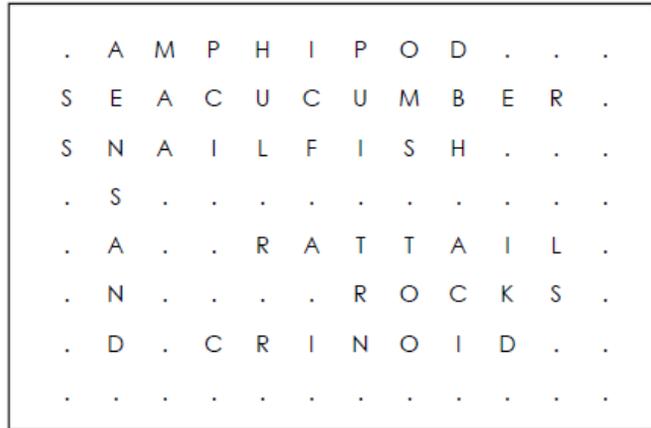


# Answer Key

## Comprehension Questions

1. In which ocean does the Mariana Trench lie? **The Pacific Ocean.**
2. How deep is the Mariana Trench? What is the deepest spot called? **The deepest spot is called The Challenger Deep and it measures 36,037 feet deep.**
3. What is the name of the vehicle researchers and scientists use to explore trenches? **A submersible.**
4. What are some of the most hostile conditions of the Mariana Trench? **The lack of sunlight and food, and the intense pressure.**
5. Why do you think there isn't much food deep down in the trench? **The food chain in the ocean begins with phytoplankton, or plant plankton. But these organisms require sunlight, so a large part of the food in the deep sea can be found at its surface. The sea creatures living above the trench eat most of it and there's not much left that sinks down to the trench.**
6. What organ helps rattails survive when they can't find enough food? **A whisker-like organ that hangs from their chin.**
7. What trick do cutthroat eels use to save energy and survive long periods without much food? **They move their bodies slowly. This takes up less energy and enables them to survive with less food.**
8. How do crinoids get food into their mouth? **They have a sticky mucus on their arms that traps small particles from the seawater. They use their feathery arms to slide the food into their mouth.**
9. What is the name of the special substance that protects snailfish from the high pressure? **TMAO.**
10. What do amphipods eat? **Marine snow.**
11. Would sea cucumbers like it if the ocean water suddenly got warmer? What might happen? **Their bodies adapted to the icy cold so they may die if the water got warmer.**
12. What are the shells of xenophyophores made from? **Their shells are made up of bits of dirt, dead animals, rocks, and minerals stuck together with a cement-like glue that contains their poop.**
13. Do real sea "monsters" actually live in the Mariana Trench? **No!**
14. Look at the diagram on the next page, how deep can human scuba divers dive? **130 feet**
15. Look at the diagram on the next page, what two creatures live in the deepest spot of the trench? **Sea cucumbers and xenophyophores.**
16. Why do so few researchers and scientists journey to the bottom of the trench? **It's very deep down and hard to get to, not to mention, expensive and dangerous.**

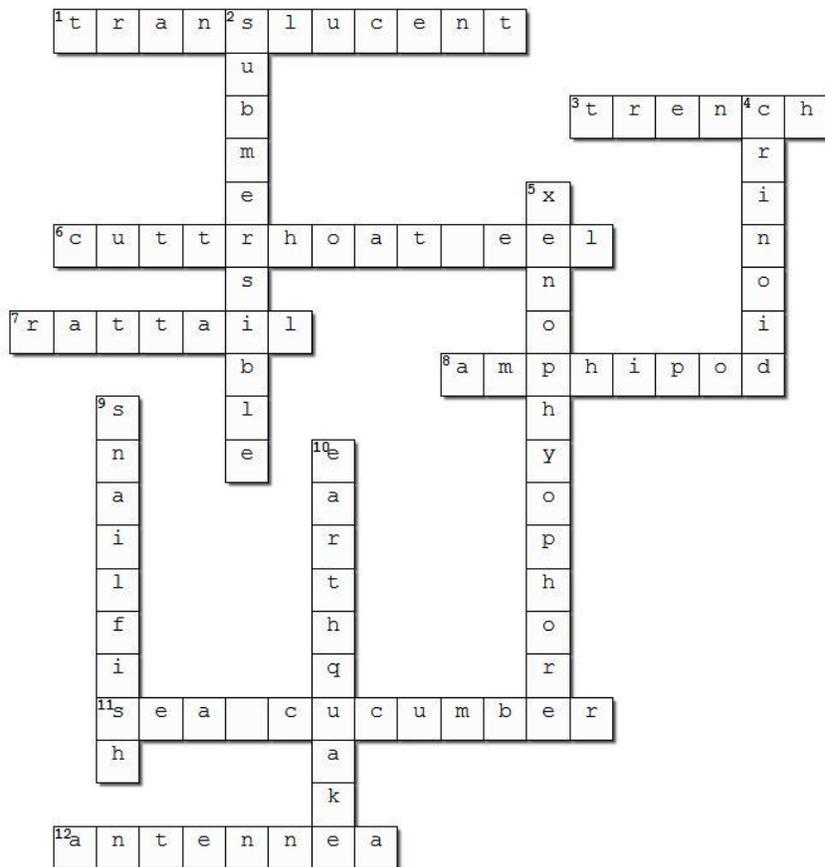
# Word Search



Word directions and start points are formatted: (Direction, X, Y)

- AMPHIPOD (E,2,1)
- CRINOID (E,4,7)
- RATTAIL (E,5,5)
- ROCKS (E,7,6)
- SAND (S,2,4)
- SEA CUCUMBER (E,1,2)
- SNAILFISH (E,1,3)

# Crossword Puzzle



Created using the Crossword Maker on TheTeachersCorner.net

