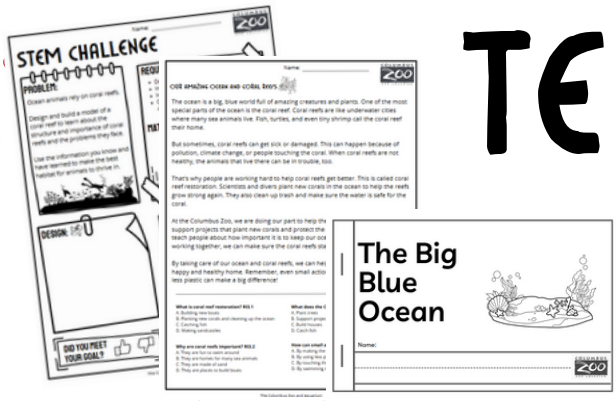
COLUMBUS ZOO AND AQUARIUM

OCEANS

K-4 LESSON PLANS

The Columbus Zoo and Aquarium

COLUMBUS ZOO AND AQUARIUM



TEACHER GUIDE

Objective: Students will explore the importance of coral reefs, understand the challenges they face, and engage in hands-on activities to discover how they can contribute to conservation efforts. Through reading, discussion, and STEM activities, students will develop empathy for ocean wildlife and recognize that anyone can participate in conservation.

E- ENGAGE	Show an image or short clip of vibrant coral reef vs. a bleached reef. Ask: • "What do you notice?" • "How do you think the animals in the reef feel?" • "What do you wonder about the ocean and coral reefs?" Use the KWL chart: • K: What do you know about coral reefs? • W: What do you wonder? What do you want to know?
E- EXPLORE	**Primary (K-1):** • Read the decodable mini book aloud. • Have students visualize how polyps build reefs using Magneatos. • Have students notice/wonder about coral reefs with Coral Reef City **Upper Elementary (2nd-4th):** • Students read their leveled passage and answer multiple-choice questions to build understanding. • Use discussion questions to talk about real-world threats to coral reefs and their importance.
E- EXPLAIN	Share quick facts about coral reefs and their role in the ocean ecosystem. Introduce an interview with the aquarist keeper: ◦ What does an aquarist do? ◦ How do they care for corals at the zoo? ◦ What can kids do to help coral reefs? **Discuss:** "How does this connect to 'Anyone can participate in conservation'?"
E- EXTEND	**STEM Challenge:** • Students design and build a model of a coral reef using classroom materials. • Optional: Use Magneatos to simulate coral polyps landing and growing. **Extension:** • Provide book & video links for further learning. • Ask students to brainstorm small actions they can take to protect coral reefs (e.g., reducing plastic use, learning about reef-safe sunscreen).
E- EVALUATE	Complete the KWL chart: • L: What did you learn about coral reefs? **Exit Question**: "What is one way you can help protect coral reefs?"

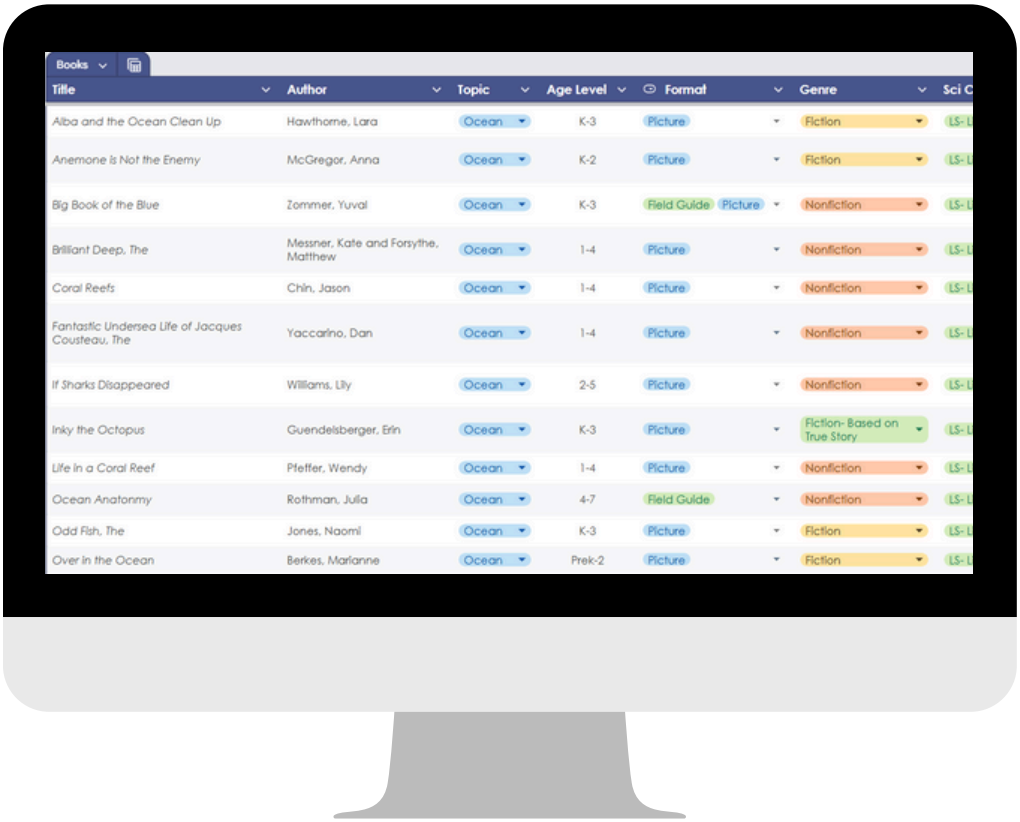
STANDARDS GUIDE

Kindergarten-1st	**ELA:** • K.RI.1, 1.RI.1: Ask and answer questions about key details in a text. • K.RI.2, 1.RI.2: Identify the main topic and retell key details. • K.RI.3, 1.RI.3: Describe connections between two pieces of information. • K.SL.2, 1.SL.2: Ask and answer questions about information presented orally. **Science**: • K.LS.1: Living things have basic needs that must be met for survival. • 1.LS.1: Living things have physical traits and behaviors that help them survive.
2nd Grade	**ELA:** • 2.RI.1: Ask and answer questions to demonstrate understanding. • 2.RI.3: Describe the connection between scientific ideas in a text. • 2.W.2: Write informative/explanatory texts. • 2.SL.2: Recount or describe key ideas from information presented orally. **Science**: • 2.LS.1: Living things cause changes in their environment. • 2.ESS.1: Water is present in many forms on Earth and is necessary for life.
3rd Grade	**ELA:** • 3.RI.1: Ask and answer questions to demonstrate understanding of a text. • 3.RI.2: Determine the main idea of a text and explain how it is supported by details. • 3.W.2: Write informative/explanatory texts to examine a topic. • 3.SL.2: Determine the main ideas and supporting details of a presentation. **Science:** • 3.LS.1: Plants and animals have life cycles. • 3.ESS.3: Some of Earth's resources are limited.
4th Grade	**ELA:** • 4.RI.1: Refer to details in a text when explaining what it says. • 4.RI.2: Determine the main idea and explain how it is supported by key details. • 4.W.2: Write informative/explanatory texts with facts and details. • 4.SL.2: Summarize a text read aloud or information presented in various formats. **Science:** • 4.LS.1: Changes in an organism's environment can affect its survival. • 4.ESS.3: Earth's surface has specific characteristics that allow for different ecosystems.

QUESTIONS & FACTS

Discussion Questions	**K-1st Grade Students:** 1. What color is the ocean? (Blue) 2. What animals live in the ocean? (Fish, turtles, crabs, etc.) 3. How do waves move in the ocean? (Up and down) 4. Why do crabs walk on the sand? (Because they live there) 5. What do turtles have on their backs? (Hard shells) 6. How can we help keep the ocean clean? (By not littering and using less plastic) **2nd-3rd Grade Students:** 1. Why are coral reefs important for sea animals? (They provide homes and shelter) 2. What are some things that can hurt coral reefs? (Pollution, climate change, people touching the coral) 3. How do scientists help coral reefs get better? (By planting new corals and cleaning up trash) 4. What does the Columbus Zoo do to help coral reefs? (Supports projects that plant new corals and protect reefs) 5. Why is it important to keep our oceans clean? (To protect marine life and their habitats) 6. What small actions can we take to help the ocean and coral reefs? (Not littering, using less plastic) **4th-5th Grade Students:** 1. What are the main threats to coral reefs mentioned in the passage? (Pollution, climate change, physical damage from human activities) 2. How does coral reef restoration help marine life? (Restores health and biodiversity of coral reefs) 3. What specific actions do scientists and divers take to restore coral reefs? (Planting new corals, removing debris) 4. How does the Columbus Zoo contribute to coral reef conservation? (Supports initiatives for coral planting and reef protection) 5. Why is it important to educate the public about ocean conservation? (To raise awareness and encourage protective actions) 6. How can individual actions, like reducing plastic use, impact the health of our oceans? (Reduces pollution and helps keep the ocean clean)
Ocean Facts	**Oceans:** 1. Oceans cover about 71% of the Earth's surface and contain 97% of the Earth's water. 2. There are five main oceans: the Pacific, Atlantic, Indian, Southern (Antarctic), and Arctic. 3. ceans are home to a vast array of marine life, including fish, mammals, invertebrates, and plants. 4. The ocean is divided into different zones based on depth and light penetration: the sunlight zone, twilight zone, and midnight zone. 5. Oceans play a crucial role in regulating the Earth's climate, producing oxygen, and supporting marine ecosystems. **Coral Reefs:** 1. Coral reefs are among the most diverse ecosystems on Earth, often referred to as the "rainforests of the sea." 2. Corals are made up of tiny animals called polyps, which build calcium carbonate skeletons that form the reef structure. 3. Corals have a symbiotic relationship with algae called zooxanthellae, which live inside the coral and provide it with energy through photosynthesis. 4. Coral reefs face threats from pollution, climate change, overfishing, and physical damage from human activities. 5. Coral reef restoration involves planting new corals, reducing pollution, and protecting reefs from further damage to help them recover.

BOOKS & VIDEOS

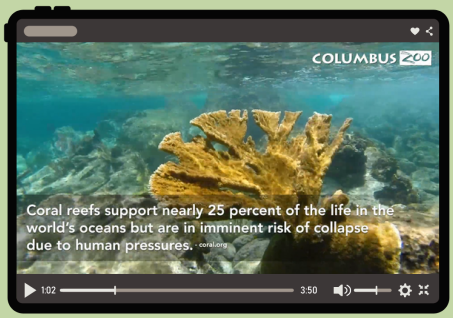


Books

Title	Author	Topic	Age Level	Format	Genre	Sci C
Alba and the Ocean Clean Up	Hawthorne, Lara	Ocean	K-3	Picture	Fiction	LS-L
Anemone Is Not the Enemy	McGregor, Anna	Ocean	K-2	Picture	Fiction	LS-L
Big Book of the Blue	Zommer, Yuval	Ocean	K-3	Field Guide Picture	Nonfiction	LS-L
Brilliant Deep, The	Messner, Kate and Forsythe, Matthew	Ocean	1-4	Picture	Nonfiction	LS-L
Coral Reefs	Chin, Jason	Ocean	1-4	Picture	Nonfiction	LS-L
Fantastic Undersea Life of Jacques Cousteau, The	Yaccarino, Dan	Ocean	1-4	Picture	Nonfiction	LS-L
If Sharks Disappeared	Williams, Lily	Ocean	2-5	Picture	Nonfiction	LS-L
Inky the Octopus	Guendelsberger, Erin	Ocean	K-3	Picture	Fiction- Based on True Story	LS-L
Life in a Coral Reef	Pfeffer, Wendy	Ocean	1-4	Picture	Nonfiction	LS-L
Ocean Anatomy	Rothman, Julia	Ocean	4-7	Field Guide	Nonfiction	LS-L
Odd Fish, The	Jones, Naomi	Ocean	K-3	Picture	Fiction	LS-L
Over in the Ocean	Berkes, Marianne	Ocean	Prek-2	Picture	Fiction	LS-L

Access our list of favorite books here!

Click the images to access the video links:



World Oceans Day
June 8th annually

Positive impact you can make at home

Florida Reef Tract Rescue Project
4:00-4:47 talks about coral reproduction, please preview

Seafood Watch
Positive impact you can make at home

ACTIVITIES

Visualize a Coral Reef	**Materials:** • Image of skeleton coral • Image of healthy coral • Magneatos (or similar magnetic building pieces) **Activity Steps:** 1. **Gather Together –** Sit in a circle on the carpet or around a table. 2. **Observe & Discuss –** Compare images of bleached and healthy coral. Encourage students to share their observations and questions. 3. **Introduce Coral Growth –** Hand out Magneato pieces to students. 4. **Start with a Polyp –** Have one student place a magnetic ball in the center space, representing a coral polyp settling on the ocean floor (or carpet/sensory bin). 5. **Build the Reef –** Take turns adding polyps and Magneato pieces, gradually constructing the coral reef upward. 6. **Continue Until Complete –** Ensure all students contribute and can observe the reef's growth. **Talking Points:** • Coral grows slowly over time. • Coral builds upward toward sunlight for energy. • Coral needs clean, warm water to thrive. • The **skeleton of coral** is white when exposed. • **Living coral** is colorful due to symbiotic algae.

Coral Reef City	**Materials:**
	• Image of a coral reef
	• Image of a city or map
	• **Optional**: Images of fish and other marine life
	
	Activity:
	1. **Observe & Discuss –** Display the coral reef image on a projector or as print-outs. Ask students to share their observations and connections:
	  ◦ What do you think different areas of the reef are for?
	  ◦ Does this remind you of where we live? How so?
	2. **Compare to a City –** Show the city image and discuss similarities between a city and a reef:
	  ◦ Both have places to eat and find food.
	  ◦ Both have safe spaces for protection.
	  ◦ Tall coral structures are like tall buildings.
	  ◦ Anemones can act like police, providing protection.
	  ◦ Fish travel in schools, just like families and communities.
	3. **Interactive Extension (if time allows) –** Let students take turns adding fish and marine life images to the reef, bringing the "coral reef city" to life.
	
	Talking Points:
	• Coral reefs are often called the "cities of the sea" because they are busy, interconnected ecosystems.
	• Many ocean animals rely on coral reefs for food and shelter.
	• Coral reefs help protect coastlines from strong waves and storms.
	• Just like cities, coral reefs need to stay healthy and clean to support life.

CORAL

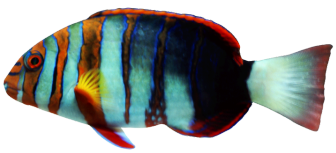
CORAL REEF CITY

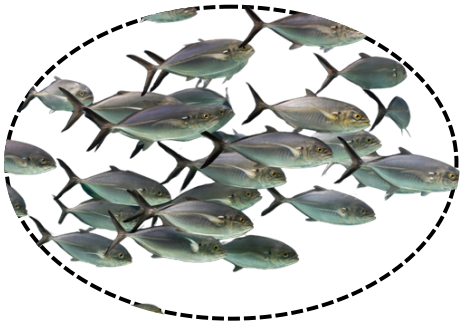
CORAL REEF CITY

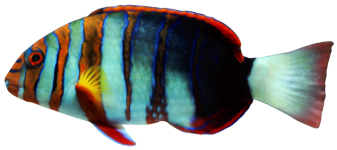
COLUMBUS ZOO AND AQUARIUM

FISH MANIPULATIVES

COLUMBUS ZOO AND AQUARIUM



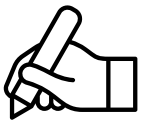




Name: _____

KWL

Record what you know, what you wonder, and then what you learn about the ocean.



K **What I <u>Know</u> About the Ocean**		
W **What I <u>Wonder</u> About the Ocean**		
L **What I <u>Learned</u> About the Ocean**		

ANSWER KEY
SAMPLE

Name: _____

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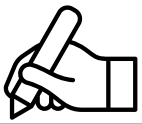
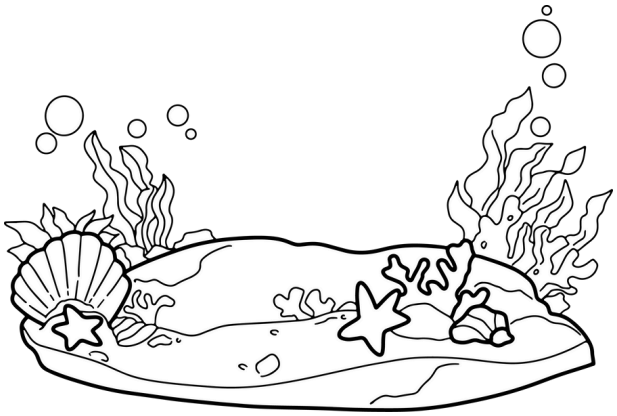
Record what you know, what you wonder, and then what you learn about the ocean.



K **What I <u>Know</u> About the Ocean**	*Fish live in the ocean* *Fish live in coral*	
W **What I <u>Wonder</u> About the Ocean**	*Why do fish need coral?* *Are coral reefs living?*	
L **What I <u>Learned</u> About the Ocean**	*Coral restoration is the work that people are doing to help coral reefs.* *We can take action to protect coral reefs.*	

The Big Blue Ocean



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COLUMBUS ZOO AND AQUARIUM

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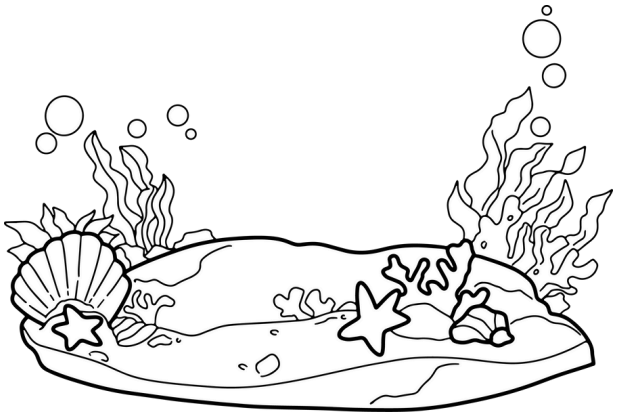

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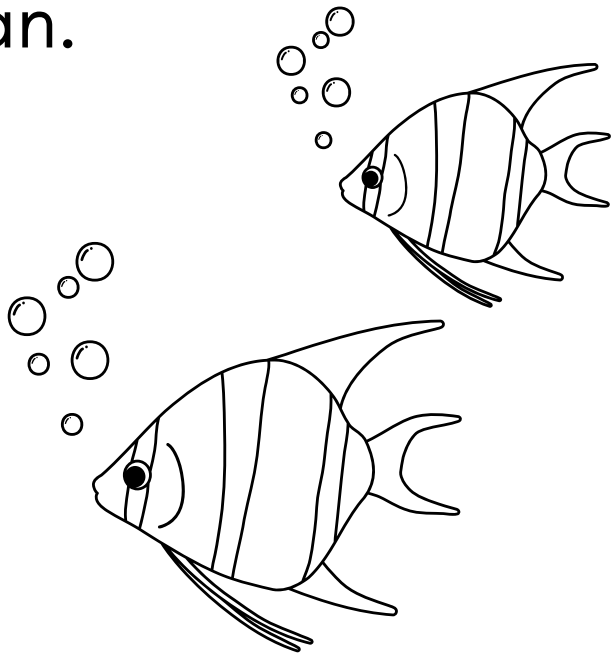
COLUMBUS ZOO AND AQUARIUM

The ocean is big and blue.

Fish swim in the ocean.



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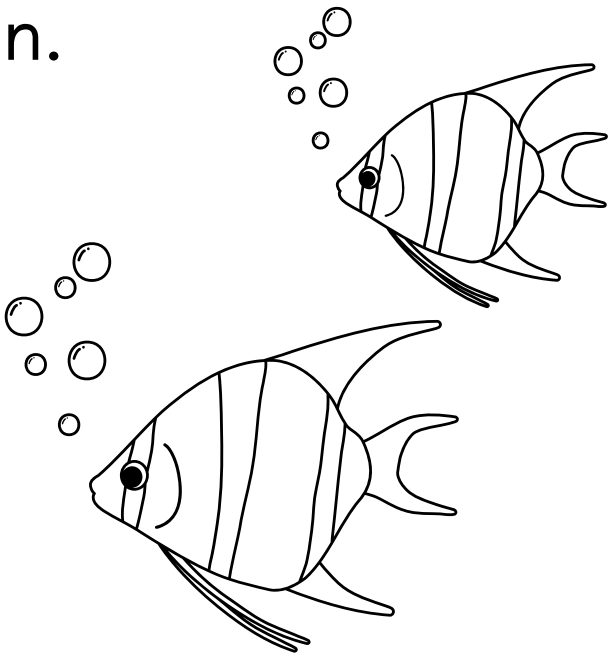

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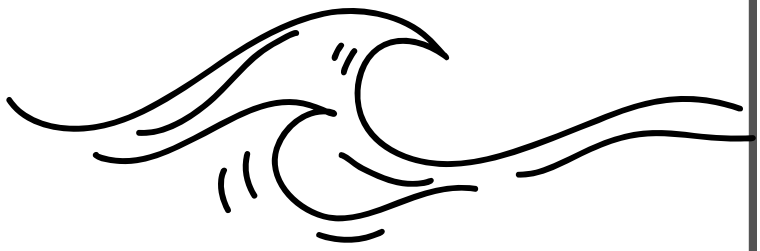
THE COLUMBUS ZOO AND AQUARIUM

The ocean has waves.

Waves go up and down.



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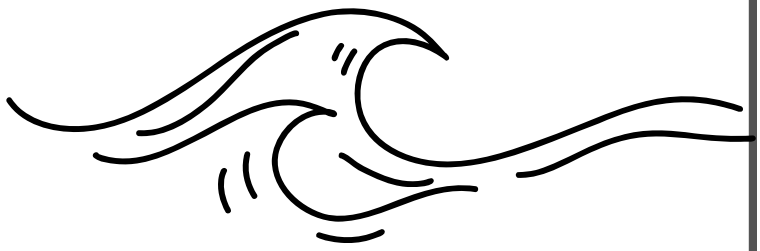


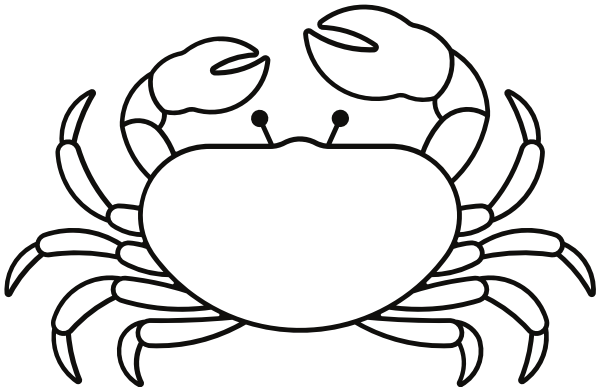
w a v e

THE COLUMBUS ZOO AND AQUARIUM

Crabs walk on the sand.

They have big claws.

c r a b



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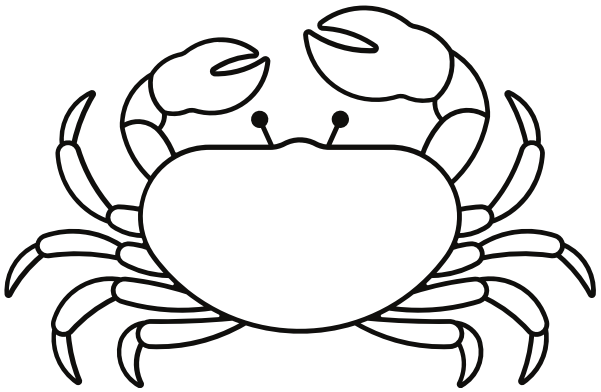

THE COLUMBUS ZOO AND AQUARIUM

Turtles swim in the ocean.

They have hard shells.

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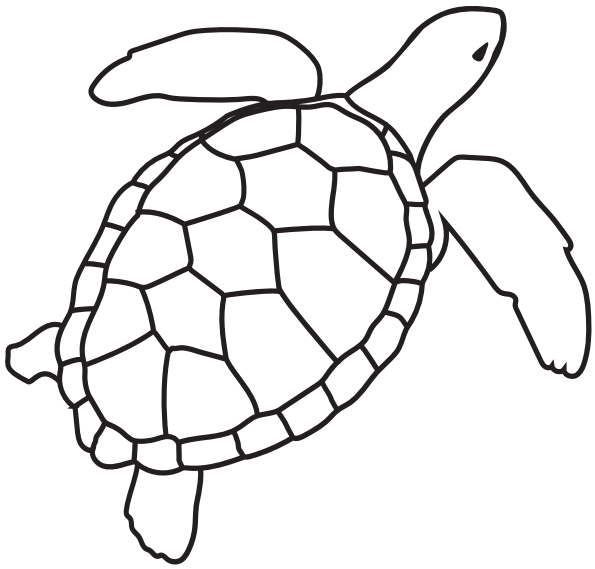

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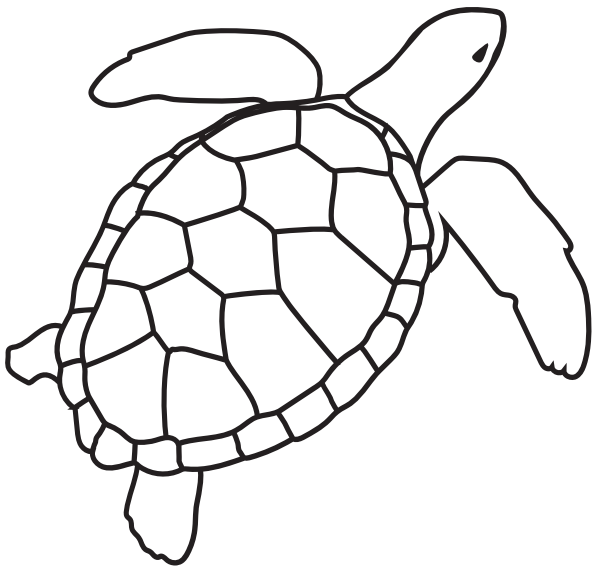

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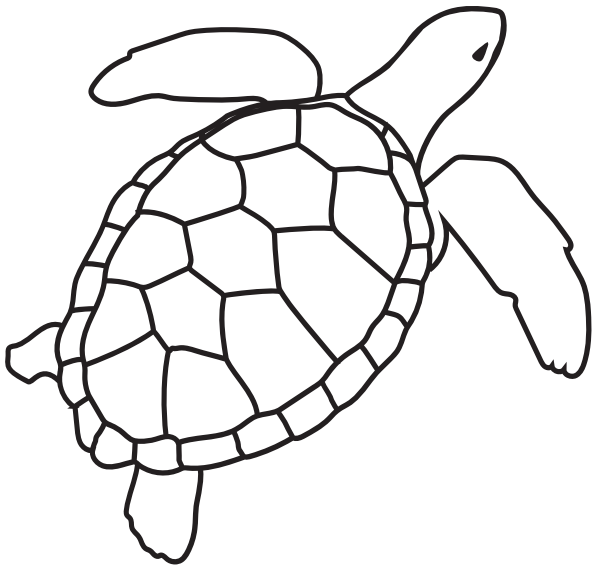

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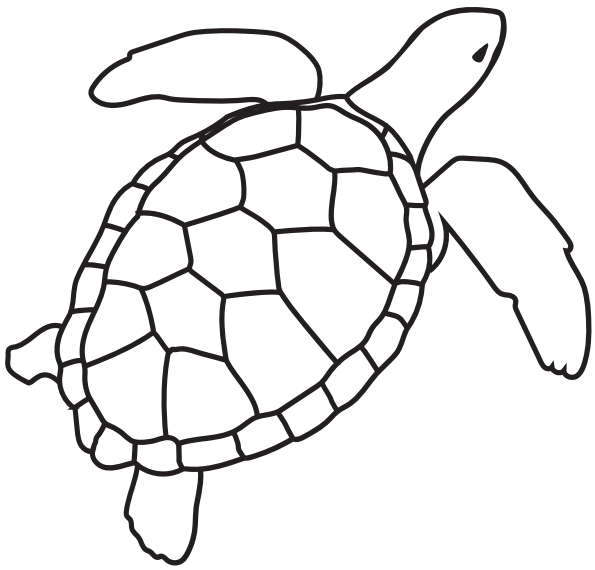

THE COLUMBUS ZOO AND AQUARIUM

The ocean is home to many animals.

We must keep it clean.

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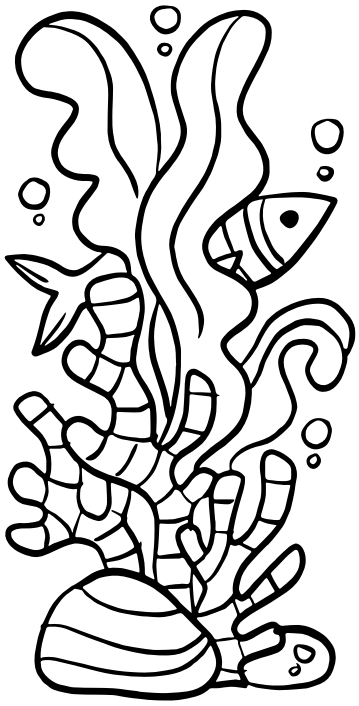

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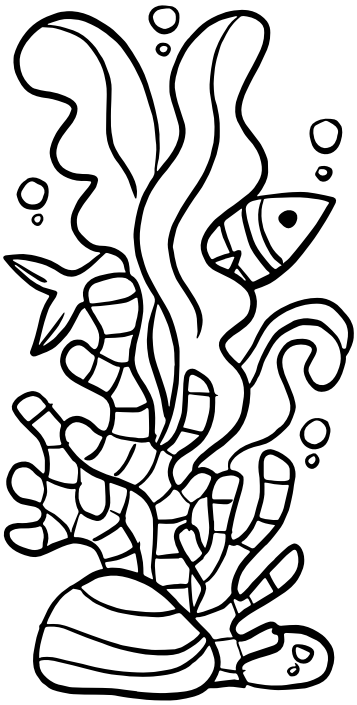

THE COLUMBUS ZOO AND AQUARIUM

We can help the ocean.

Do not litter. Use less plastic.

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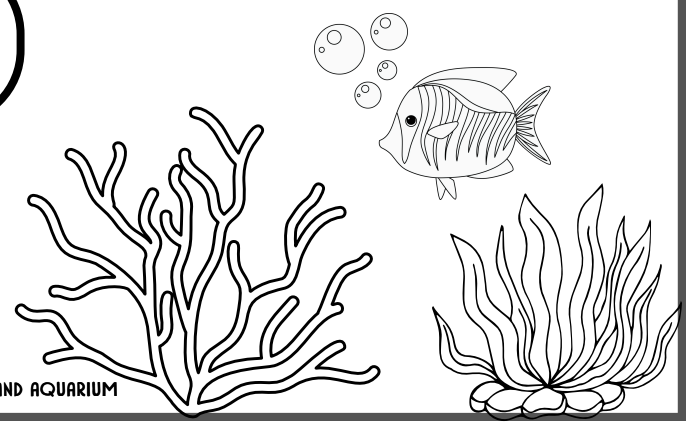

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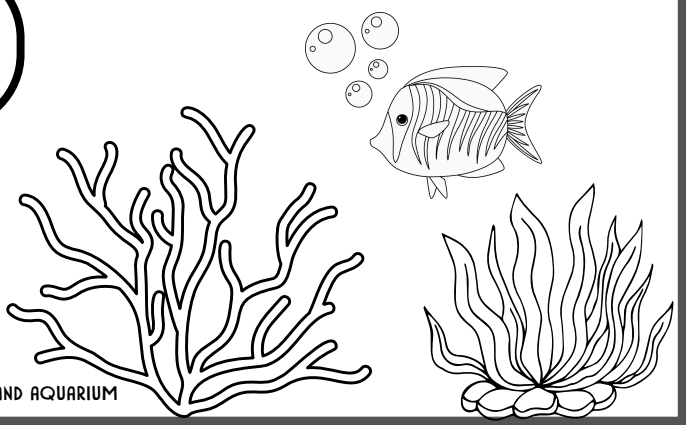


THE COLUMBUS ZOO AND AQUARIUM

Name: _____

OUR OCEAN AND CORAL REEF 

The ocean is a big, blue place with lots of animals and plants. Coral reefs are special parts of the ocean. Many fish, turtles, and other sea animals live in coral reefs.

Sometimes, coral reefs get hurt. This can happen because of pollution, climate change, or people touching the coral. When coral reefs are not healthy, the animals that live there can be in trouble too.

People are helping coral reefs get better. This is called coral reef restoration. Scientists and divers plant new corals in the ocean. They also clean up trash and make the water safe for the coral.

At the Columbus Zoo, we help the ocean and coral reefs. We support projects that plant new corals and protect the reefs. We also teach people how to keep our oceans clean and healthy.

By taking care of our ocean and coral reefs, we can help all the sea animals have a happy home. Even small actions like not littering and using less plastic can help!

What is a coral reef? RI2.1
A. A type of fish
B. A special part of the ocean where many sea animals live
C. A kind of plant
D. A type of boat

What do scientists and divers do to help coral reefs? RI2.3
A. Plant new corals
B. Catch fish
C. Build boats
D. Make sandcastles

Why do coral reefs get hurt? RI2.3
A. Because of pollution
B. Because of climate change
C. Because people touch the coral
D. All of the above

How can we help the ocean and coral reefs? RI2.8
A. By littering
B. By using less plastic
C. By touching the coral
D. By swimming in the ocean

Name: _____

OUR AMAZING OCEAN AND CORAL REEFS

The ocean is a big, blue world full of amazing creatures and plants. One of the most special parts of the ocean is the coral reef. Coral reefs are like underwater cities where many sea animals live. Fish, turtles, and even tiny shrimp call the coral reef their home.

But sometimes, coral reefs can get sick or damaged. This can happen because of pollution, climate change, or people touching the coral. When coral reefs are not healthy, the animals that live there can be in trouble, too.

That's why people are working hard to help coral reefs get better. This is called coral reef restoration. Scientists and divers plant new corals in the ocean to help the reefs grow strong again. They also clean up trash and make sure the water is safe for the coral.

At the Columbus Zoo, we are doing our part to help the ocean and coral reefs. We support projects that plant new corals and protect the reefs from damage. We also teach people about how important it is to keep our oceans clean and healthy. By working together, we can make sure the coral reefs stay beautiful and full of life.

By taking care of our ocean and coral reefs, we can help all the sea creatures have a happy and healthy home. Remember, even small actions like not littering and using less plastic can make a big difference!

What is coral reef restoration? RI3.1
A. Building new boats
B. Planting new corals and cleaning up the ocean
C. Catching fish
D. Making sandcastles

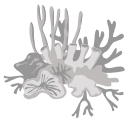
What does the Columbus Zoo do to help coral reefs? RI3.3
A. Plant trees
B. Support projects that plant new corals and protect reefs
C. Build houses
D. Catch fish

Why are coral reefs important? RI3.2
A. They are fun to swim around
B. They are homes for many sea animals
C. They are made of sand
D. They are places to build boats

How can small actions help the ocean? RI3.8
A. By making the water dirty
B. By using less plastic and not littering
C. By touching the coral
D. By swimming in the ocean

Name: _____

THE IMPORTANCE OF OUR OCEAN AND CORAL REEF RESTORATION



The ocean is a vast, blue expanse teeming with diverse marine life and ecosystems. Among the most remarkable ecosystems are coral reefs, which serve as underwater metropolises for a myriad of sea creatures, including fish, turtles, and shrimp.

However, coral reefs face numerous threats, such as pollution, climate change, and physical damage from human activities. When coral reefs are compromised, the intricate balance of marine life they support is also jeopardized.

To combat this, efforts in coral reef restoration have become crucial. Scientists and divers engage in activities such as planting new corals and removing debris to ensure the reefs can thrive once more. These efforts help restore the health and biodiversity of these vital ecosystems.

At the Columbus Zoo, we are committed to contributing to ocean and coral reef conservation. We support initiatives that focus on coral planting and reef protection. Additionally, we educate the public about the significance of maintaining clean and healthy oceans.

By safeguarding our ocean and coral reefs, we ensure a sustainable and vibrant habitat for marine life. Even small actions, like reducing plastic use and preventing litter, can have a profound impact on the health of our oceans.

What are the main threats to coral reefs mentioned in the passage? RI4.1
A. Overfishing and boat traffic
B. Pollution, climate change, and physical damage from human activities
C. Lack of sunlight and cold water
D. Too many sea animals living in the reefs

How does the Columbus Zoo contribute to coral reef conservation? RI4.3
A. By building new coral reefs
B. By supporting initiatives for coral planting and reef protection
C. By catching fish and releasing them into the ocean
D. By creating artificial reefs from plastic

What is the purpose of coral reef restoration? RI4.2
A. To build new boats
B. To restore the health and biodiversity of coral reefs
C. To catch more fish
D. To make the ocean deeper

What small actions can individuals take to help the ocean and coral reefs? RI4.8
A. Reducing plastic use and preventing litter
B. Swimming in the ocean more often
C. Feeding fish in the coral reefs
D. Collecting shells from the reefs

ANSWER KEY

Our Ocean and Coral Reefs (CCSS 2nd)

What is a coral reef? RI2.1
A. A type of fish
B. A special part of the ocean where many sea animals live
C. A kind of plant
D. A type of boat

Why do coral reefs get hurt? RI2.3
A. Because of pollution
B. Because of climate change
C. Because people touch the coral
D. All of the above

What do scientists and divers do to help coral reefs? RI2.3
A. Plant new corals
B. Catch fish
C. Build boats
D. Make sandcastles

How can we help the ocean and coral reefs? RI2.8
A. By littering
B. By using less plastic
C. By touching the coral
D. By swimming in the ocean

Our Amazing Ocean and Coral Reefs (CCSS 3rd)

What is coral reef restoration? RI3.1
A. Building new boats
B. Planting new corals and cleaning up the ocean
C. Catching fish
D. Making sandcastles

Why are coral reefs important? RI3.2
A. They are fun to swim around
B. They are homes for many sea animals
C. They are made of sand
D. They are places to build boats

What does the Columbus Zoo do to help coral reefs? RI3.3
A. Plant trees
B. Support projects that plant new corals and protect reefs
C. Build houses
D. Catch fish

How can small actions help the ocean? RI3.8
A. By making the water dirty
B. By using less plastic and not littering
C. By touching the coral
D. By swimming in the ocean

The Importance of Our Ocean and Coral Reef Restoration (CCSS 4th)

What are the main threats to coral reefs mentioned in the passage? RI4.1
A. Overfishing and boat traffic
B. Pollution, climate change, and physical damage from human activities
C. Lack of sunlight and cold water
D. Too many sea animals living in the reefs

What is the purpose of coral reef restoration? RI4.2
A. To build new boats
B. To restore the health and biodiversity of coral reefs
C. To catch more fish
D. To make the ocean deeper

How does the Columbus Zoo contribute to coral reef conservation? RI4.3
A. By building new coral reefs
B. By supporting initiatives for coral planting and reef protection
C. By catching fish and releasing them into the ocean
D. By creating artificial reefs from plastic

What small actions can individuals take to help the ocean and coral reefs? RI4.8
A. Reducing plastic use and preventing litter
B. Swimming in the ocean more often
C. Feeding fish in the coral reefs
D. Collecting shells from the reefs

Name: _____

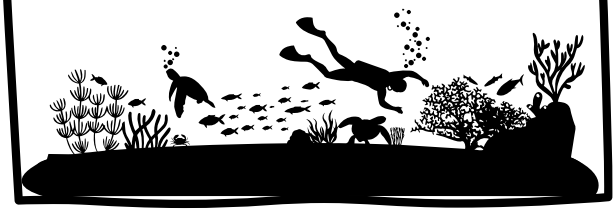
STEM CHALLENGE

PROBLEM:

Ocean animals rely on coral reefs.

Design and build a model of a coral reef to learn about the structure and importance of coral reefs and the problems they face.

Use the information you know and have learned to make the best habitat for animals to thrive in.



REQUIREMENTS:

- Design and build a model of a coral reef
- Include coral
- Include fish/marine animals
- Can you add anything to protect the coral or support the fish?

MATERIALS:

- Cardboard or foam board
- Clay or playdough
- Pipe cleaners, beads, and small craft items
- Blue cellophane or tissue paper
- Markers, paint, or crayons
- Glue and scissors
- Anything else available

DESIGN:

REFLECTION:

What worked well? What didn't work? How could you improve your design?

DID YOU MEET YOUR GOAL?

RAMON VILLAVERDE
AQUATIC PROJECTS KEEPER AND DIVE SAFETY OFFICER

1. **When did you begin working at the Columbus Zoo?** I began working at the Columbus Zoo in July 2003.

2. **What education and animal experiences helped you become a zookeeper?** I graduated with a Bachelor of Science degree, specializing in Zoology and Ecology. I received my Open Water Scuba Certification in 1997 and my Scuba Diving International (SDI) Instructor Certification in 2009. I also volunteered as a Docent at the Cleveland Zoo while in college.

3. **What skills are the most important in your job?** Aquatic husbandry skills, observation, and creative thinking are very important in my role.

4. **What is a typical day for your current position?** My day consists of maintaining coral holding systems, aquaculture systems, and live foods (phytoplankton and zooplankton); computer work for dive operations; record keeping; and collaboration with colleagues at other facilities for conservation projects.

5. **What advice would you give me to help me become a zookeeper?** I would try to get different experiences through shadowing, volunteering, and working in seasonal jobs, and then focus on what sparked an interest and passion.

6. **How does this career impact your personal and lifestyle choices?** This career impacts my personal and lifestyle choices by making me aware of how we affect the environment and what impact I can contribute to my field.

7. **What is the hardest part of your job?** It can be challenging to stay on top of all the different responsibilities to keep them at the highest standards I set for myself.

8. **What is the best part of your job?** Working with aquatic animals on a daily basis is the best part of my job.

9. **Does the work you do at the Zoo impact the animals around the world?** Yes! My work impacts coral reefs, as well as marine ornamental fish and invertebrates.

10. **What is the most important thing you do for the well-being of the animals in your care?** The most important thing I do on a daily basis is monitoring all aspects of these animals' aquatic habitats at our Zoo. There are many variables that need to be considered to keep aquatic life alive and healthy.