

Ocean Adventures Curriculum

Platform: Marine Protected Areas

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Ocean Adventurers Camp Curriculum

Overview

Science Discovery Focus: Explore and Wonder

Communication: Presentation

- Projection/Volume
- Speaking clearly
- Making eye contact

Ocean Discovery Unit

Next Generation Science Standards:

5-ESS3-1 Earth and Human Activity: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

DCI: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

NGSS Alignment

Overarching Responsibilities of Lead Instructor:

- Classroom management & timing of lesson
- Execution of all lesson material in this curriculum
 - Regular – content that should be covered using language of your choice
 - (Parenthesis) – Teaching notes and actions
 - Adaptation – Way curriculum can be adapted for different grade levels
- Adapting curriculum up or down for grade level audience
- Whenever transitioning from activity to activity use attention getters
- Lead discussions & ask guiding questions to get students thinking about science
- Use Belief and Science Discovery Process language during lesson
- Encourage participation from all students to create an inclusive environment
- Determine floor management with team BEFORE the start of the lesson

Overarching Responsibilities of Fellows:

- Remind students of mantra early and often:
 - Wear your Mask, Wash your Hands, Watch your Distance!
- Mentor students during and in between activities
- Participate in any kinesthetic movements and/or writing or lab activities
- Ask students questions that help them to make their own discoveries
- Sit with students and model good listening behavior
- Sit or stand near any students struggling to pay attention

Story

Students will learn about Marine Protected Areas as a way to conserve invertebrates, fish and mammal species by studying the La Jolla Marine Protected Area in San Diego.

Students will begin by exploring their pathway as science and conservation leaders. Then, using Marine Protected Areas as a platform for study, they will grow their knowledge about marine science while simultaneously seeing how they are needed to make our world a better place.

Students will dive into their study of Marine Protected Areas by handling marine invertebrates that live along the coastline in order to understand their fascinating adaptations for survival.

Students will then travel to deeper waters to learn about the variety of fish and sharks that call the Marine Protected Area home. They will explore the unique external and internal adaptations of sharks through a dissection!

Students will then study their final group of animals, marine mammals, who frequent the deepest areas of the Marine Protected Area. They will become gray whales migrating from Alaska to Baja and learn about one of the biggest dangers to marine mammals -plastic trash.

On their final day in the program, students will recognize that as science and conservation leaders, they can conserve Marine Protected Areas. They will pick up trash in a City Heights canyon and make a difference for the animals who live downstream!

Ocean Discovery Family

Day 1

Goal: Students get to know each other and staff members as well as learn about the seed to tree pathways of current students and Ocean Discovery alumni.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - If a guest speaker joins - connect a speaker, microphone, microphone stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies: (For one group of 10 students)

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
 - Made from a large piece of butcher paper
- Labels for La Jolla Marine Protected Area Poster
 - Laminated in a large font “La Jolla Marine Protected Area”
 - Laminated in a slightly smaller font “Invertebrates”, “Fish and Sharks”, and “Marine Mammals”
- Painters Tape
- Word Wall
 - A poster made from a large piece of butcher paper
 - “Word Wall” written in large letters and wrapped in cellophane
 - Laminated words in a large font:
 - A Marine Protected Area – a place in the ocean that we care for by having special rules.
 - Family – a group of people that care for you.
 - Science and Conservation Leader – a person who uses science to make our world a better place.
- Seed to Tree Ocean Discovery Alumni Video
 - Papi:/Curriculum/CI New folder
- Daily White Board

Lab Materials:

- *IF you are preparing supplies for one group of ten students – pack the yellow and blue team supplies.

- ****IF you are preparing supplies for two groups of ten students – pack the the yellow, blue, orange, and green team supplies.**

Yellow Team

- Supplies for canyon set up, place the following supplies in a small clear box:
 - Yellow ribbon ~3 yards (1)
 - Ribbon needs to tie around a native plant
 - Combination lock box (1)
 - Print and laminate “Puzzle #1 – Yellow Team Lock Box Message” ([see appendices](#)) message and tape it to the **outside** of box.
 - Print and laminate “Share Out #1” ([see appendices](#)) and place it **inside** the lock box.
 - Lockbox codes:
 - *OCEAN DISCOVERY COURTYARD LAB ONLY*
 - Yellow Team – Black sage: Code 642
 - Blue Team – Golden Bush: Code 357
 - *PLAZA DEL SOL LAB ONLY*
 - Green Team - Sycamore
 - Orange Team - Buckwheat
 - Yellow balloon (1)
 - Print and laminate “Share-Out #2” message ([see appendices](#)) and place inside the yellow balloon before blowing it up.
 - Yellow balloon weight (1)
 - Large cardboard “X” painted yellow (1)
 - Print and laminate “PUZZLE #3 – X Marks the Spot Message” (see appendices) on the back of the X.
 - Attach the Career Puzzle with a string. The career puzzle will have the photo of career with “Share Out Message #3” on the back.
 - Small canvas bag with drawstring (1)
 - Label bag “Puzzle #4 – Yellow Team” with blue tape
 - Place puzzle box (see which one below) in canvas bag (1)
 - *K – 5th GRADE* – use dragon puzzle box (easier)
 - *6th – 12th GRADE* – use puzzle case box (more difficult)
 - Supplies for Challenge Backpacks:
 - “Supplies” backpack (1)
 - Label this pack “Supplies”
 - Add these supplies to large pocket:
 - Hand sanitizer (1)
 - [Plant ID Guide](#) (1)
 - Each of the plants should have a 3-digit number and the common name below the image. The Black Sage and

Sycamore should have the combo lock for the Blue Team and the Golden Bush and Buckwheat should have the combo lock for the Yellow Team.

- Career Puzzle Pieces (3 pieces)
 - Print and laminate “Puzzle #3 Match the Careers” (see appendices) these pieces will have the names of science career and will match the puzzle piece with the career photo attached to the X.
- “Leave No Trace” backpack (1)
 - Label this pack “Leave no Trace”
 - This backpack is empty. Students will place finished clues and puzzles into this backpack as they move through the challenge.
- Supplies for Instructor Pack (a small canvas drawstring pack) (1):
 - Label this pack “Yellow Team Instructor Pack”
 - Fill with these supplies:
 - Hand sanitizer (1)
 - Yellow disposable fabric headbands (1/student)
 - Laminated clues for Yellow Team (1 set)
 - Stickers (10)
 - a mix of Ocean Discovery logo and “I am a scientist” stickers
 - *6th – 12th GRADE ONLY*: Directions to open the puzzle box

Blue Team

- Supplies for canyon set up. Place the following supplies in a small clear box:
 - Blue ribbon ~3 yards (1)
 - Ribbon needs to tie around a native plant
 - Combination lock box (1)
 - Print and laminate “Puzzle #1 – Blue Team Lock Box Message” ([see appendices](#)) message and tape to **outside** of box.
 - Print and laminate “Share Out #1” ([see appendices](#)) and place it **inside** the lock box.
 - Lockbox codes:
 - *OCEAN DISCOVERY COURTYARD LAB ONLY*
 - Yellow Team – Black sage: Code 642
 - Blue Team – Golden Bush: Code 357
 - *PLAZA DEL SOL LAB ONLY*
 - Green Team - Sycamore
 - Orange Team - Buckwheat
 - Blue balloon (1)
 - Print and laminate “Share-Out #2” message ([see appendices](#)) and place inside the blue balloon before blowing it up.

- Blue balloon weight (1)
- Large cardboard “X” painted blue (1)
 - Print and laminate “PUZZLE #3 – X Marks the Spot Message” (see appendices) on the back of the X.
 - Attach the Career Puzzle with a string. The career puzzle will have the photo of career with “Share Out Message #3” on the back.
- Small canvas bag with drawstring (1)
 - Label bag “Puzzle #4 – Blue Team” with blue tape
 - Place puzzle box (see which one below) in canvas bag (1)
 - K – 5th GRADE – use dragon puzzle box (easier)
 - 6th – 12th GRADE – use puzzle case box (more difficult)
- Supplies for Challenge Backpacks:
 - “Supplies” backpack (1)
 - Label this pack “Supplies”
 - Add these supplies to large pocket:
 - Hand sanitizer (1)
 - [Plant ID Guide](#) (1)
 - Career Puzzle Pieces (3 pieces)
 - “Leave No Trace” backpack (1)
 - Label this pack “Leave no Trace”
 - This backpack is empty. Students will place finished clues and puzzles into this backpack as they move through the challenge.
- Supplies for Instructor Pack (a small canvas drawstring pack) (1):
 - Label this pack “Blue Team Instructor Pack”
 - Fill with these supplies:
 - Hand sanitizer (1)
 - Blue disposable fabric headbands (1/student)
 - Laminated clues for Blue Team (1 set)
 - Stickers (10)
 - a mix of Ocean Discovery logo and “I am a scientist” stickers
 - 6th – 12th GRADE ONLY: Directions to open the puzzle box

Orange Team

- Supplies for canyon set up. Place the following supplies in a small clear box:
 - Orange ribbon ~3 yards (1)
 - Ribbon needs to tie around a native plant
 - Combination lock box (1)
 - Print and laminate “Puzzle #1 – Orange Team Lock Box Message” ([see appendices](#)) message and tape to **outside** of box.

- a mix of Ocean Discovery logo and “I am a scientist” stickers
- 6th – 12th *GRADE ONLY*: Directions to open the puzzle box

Green Team

- Supplies for canyon set up. Place the following supplies in a small clear box:
 - Green ribbon ~3 yards (1)
 - Ribbon needs to tie around a native plant
 - Combination lock box (1)
 - Print and laminate “Puzzle #1 – Green Team Lock Box Message” ([see appendices](#)) message and tape to **outside** of box.
 - Print and laminate “Share Out #1” ([see appendices](#)) and place it **inside** the lock box.
 - Lockbox codes:
 - *OCEAN DISCOVERY COURTYARD LAB ONLY*
 - Yellow Team – Black sage: Code 642
 - Blue Team – Golden Bush: Code 357
 - *PLAZA DEL SOL LAB ONLY*
 - Green Team - Sycamore
 - Orange Team - Buckwheat
 - Green balloon (1)
 - Print and laminate “Share-Out #2” message ([see appendices](#)) and place inside the green balloon before blowing it up.
 - Green balloon weight (1)
 - Large cardboard “X” painted green (1)
 - Print and laminate “PUZZLE #3 – X Marks the Spot Message” (see appendices) on the back of the X.
 - Attach the Career Puzzle with a string. The career puzzle will have the photo of career with “Share Out Message #3” on the back.
 - Small canvas bag with drawstring (1)
 - Label bag “Puzzle #4 – Green Team” with blue tape
 - Place puzzle box (see which one below) in canvas bag (1)
 - K – 5th *GRADE* – use dragon puzzle box (easier)
 - 6th – 12th *GRADE* – use puzzle case box (more difficult)
- Supplies for Challenge Backpacks:
 - “Supplies” backpack (1)
 - Label this pack “Supplies”
 - Add these supplies to large pocket:
 - Hand sanitizer (1)
 - [Plant ID Guide](#) (1)
 - Career Puzzle Pieces (3 pieces)
 - “Leave No Trace” backpack (1)
 - Label this pack “Leave no Trace”

- This backpack is empty. Students will place finished clues and puzzles into this backpack as they move through the challenge.
- Supplies for Instructor Pack (a small canvas drawstring pack) (1):
 - Label this pack “Green Team Instructor Pack”
 - Fill with these supplies:
 - Hand sanitizer (1)
 - Green disposable fabric headbands (1/student)
 - Laminated clues for Green Team (1 set)
 - Stickers (10)
 - a mix of Ocean Discovery logo and “I am a scientist” stickers
 - *6th – 12th GRADE ONLY:* Directions to open the puzzle box

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:30p	Ocean Discovery Challenge	Exploration & Guided Analysis
4:30p – 4:42p	Wrap Up	Reflection

Set up

- Set up technology
- Set up visual materials
 - Check sound quality of Seed to Tree Ocean Discovery Alumni video
- Confirm all program supplies are ready to go
- Set up Ocean Adventurers Challenge in the canyon
 - Bring map to identify locations of where puzzles are located
 - Bring yellow, blue, orange and green team clear boxes and set up puzzles

Fellow Teaching Notes

- Set up Ocean Adventurers Challenge in the canyon
 - See Set up notes above
- Help students to place words on the Word Wall.
- During the challenge:
 - 1 fellow will lead one of the groups
 - 1 fellow will accompany lead instructor and maintain accountability and safety
 Encourage students if they are struggling to solve puzzles.
- Participate in Share-Outs
- Ensure students are within visual proximity at all times

Introduction (10 minutes)

- Orient students to Daily White Board
- Orient students to the space.
 - Water fountain, bathrooms, mask break area
 - UPSTAIRS ONLY:
 - Highlight the Solar Trees. Be sure to cover:
 - Connection to name Plaza Del Sol
 - How sunlight is used to power the Living Lab which is a net-zero energy building.
- Introduce Ocean Discovery Family.
 - (Ask student to write “Family” on word wall)
 - Some of you may already be a part of the Ocean Discovery Family and some of you are new to the Ocean Discovery Family.
 - Today everyone is a part of the Ocean Discovery family.
 - You will be getting to know each other, staff, and other Ocean Discovery students as you learn about becoming a science and conservation leader.
- Introduce Seed to Tree pathway of an Ocean Leader.
 - Our belief that they are all science and conservation leaders.
 - Importance of science and conservation leaders who come from City Heights.
 - How they can be leaders today:
 - Share what you learn
 - Raise your hand to answer questions
 - Make good decisions
 - In the future they can mentor others, go to college, and even obtain a career in science and conservation.
- Introduce Seed to Tree Ocean Discovery Alumni video which highlights Ocean Discovery students in different places along their pathway to becoming science and conservation leaders.
- (Show Seed to Tree Ocean Discovery Alumni video.)
- Debrief Seed to Tree Ocean Discovery Alumni Video .
 - (Ask student to write “Science and Conservation Leader” on the word wall.)
 - Potential questions include:
 - How would you describe a science and conservation leader?
 - What questions do you have about becoming a science and conservation leader?
 - What did you see in the video that gets you excited?

Ocean Discovery Challenge (35 min)

- As a family, we are going to embark on the Ocean Discovery Challenge!
- Introduce Ocean Discovery Challenge.
 - During the challenge you will receive clues that will lead you to puzzles you will have to work together to solve.

- Throughout the challenge you will be asked to share things about yourself so that your team members can get to know you better.
- There are two teams: Blue Team and Yellow Team
 - PLAZA DEL SOL LAB:
 - Your two teams are: Orange Team and Green Team
- The Challenge requires your skills, speed and teamwork.
- First team to return and say “Go Awesome!” wins a prize.
- (Divide students into two teams.)
- (Before beginning the challenge, the team lead will):
 - Give colored fabric ribbons to each student to wear.
 - The ribbons make us a team!
 - Assigns roles 1) supply backpack and 2) leave-no-trace pack
 - The supply pack has the items you need to solve puzzles along the way.
 - The leave-no-trace pack will be used to pick up clues and puzzles we are finished with to ensure we don’t leave them in the canyon.
 - **BE SURE BOTH TEAMS HAVE COMPLETED THE ABOVE ACTIONS BEFORE READING THE 1ST CLUE.**
- (Team Lead read Clue #1.)
- (During challenge, the team lead will read clues after each puzzle is solved and facilitate the Share Outs after each puzzle.)
- (Complete the Challenge.)
 - (Count the number of students throughout to ensure accountability and safety.)
- (Team Lead: If you are the first team back, say Go Awesome! And hand out stickers to your team. Congrats, you won!)
- (Have students wash hands because they shared supplies.)
- Instructor in the front of the group and fellow in the back for safety. Encourage students to be competitive and have fun, but ensure that they stay together as a group for collaboration.

Wrap Up (12 min)

- (Both teams return to shared space and sit near La Jolla Marine Protected Area poster.)
- Debrief the experience using a think-pair-share:
 - What is something you learned about someone on your team?
- Debrief further (if time allows) either whole group or pair-shares:
 - Who is someone on your team that you would like to call out for being a leader?
 - What is something you learned about an Ocean Discovery student in the video?
- Introduce Marine Protected Areas.
 - Break down the phrase into each word and have students figure out what it is
 - Marine – ocean
 - Protected – rules – e.g., no fishing or taking animals
 - Area – filled with plants and animals
 - There is no fence around it so animals may swim in and out

- (Ask a student to write Marine Protected Area on word wall.)
- Add the “Invertebrates”, “Fish and Sharks”, and “Marine Mammals” labels to the poster and use this to tell the story of/preview the week.
 - Today we grew as part of the Ocean Discovery Family.
 - Tomorrow you will investigate invertebrates.
 - Wednesday and Thursday, we will travel deeper in the ocean to explore fish and sharks and learn about marine mammals.
 - Friday, we learn how we can make a difference and protect the ocean from here!

Word Wall

- Family
- Science and Conservation Leader
- Marine Protected Area

Overview of Ocean Discovery Challenge

	Clue	Puzzle	Share Out
1	Read Clue #1 from the Lab (Courtyard or Plaza del Sol). <u>Clue #1</u> Travel in the direction water will flow. When you find a ribbon, you’ll be good to go.	Identify the native plant using the “plant guide”. The code for the lock box matches the correct native plant. Inside the lock box is a share-out prompt.	Share two words that describe you.
2	Read Clue # 2 from the lock box location in canyon. <u>Clue #2:</u> Keep on walking, do not stop. Until you find something to pop.	Pop the balloon. Inside there will be a share-out prompt.	Share an outdoor place you love and what you like to do there.
3	Read Clue #3 from where balloon was popped. <u>Clue #3</u> This letter of the alphabet marks the spot. When you get there, give it all you’ve got.	The X marks the spot will prompt student to match the careers. Once they match the career photo and career name they will receive a share-out prompt.	Share about a mentor, someone who has helped you and guided you, that you have had?
4	Read Clue #4 from X Marks the spot. <u>Clue #4</u> Go back to the lab and	Open the puzzle box and inside is the share-out prompt.	Share a career or a job you would be



	find the tallest tree. Like a science and conservation leader we know you will be!		excited about doing in the future.
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Ocean Adventurers Challenge – Map of Puzzles in Canyon for Downstairs



Legend

COURTYARD LAB ONLY

- Blue Team
 1. Located a Golden Bush
 4. Located at Adventure Tree

- Yellow Team
 1. Located at Black Sage
 4. Located at Adventure Tree

PLAZA DEL SOL LAB

- Orange Team
 1. Located at Buckwheat
 4. Located at Solar Tree

- Green Team
 1. Located at Sycamore
 4. Located at Solar Tree

Invertebrate Investigators

Day 2

Goal: Students will learn what invertebrates are, how they are adapted to survive along the shore, and why Marine Protected Areas are important for protecting these organisms.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - If a guest speaker joins - connect a speaker, microphone, microphone stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies:

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
- Painters tape
- [Outlines of marine invertebrates](#) (pre-cut)
- In OS Camp PP:
 - Video of La Jolla MPA: <https://www.youtube.com/watch?v=AXIHwTyOmUI>
 - Google Map of San Diego
 - Phylum Mollusca examples
 - Phylum Echinodermata examples
- Word Wall
 - Word Wall Poster
 - Laminated words:
 - Invertebrate – an animal without a backbone
 - Adaptation – anything that helps an animal survive

Lab Materials:

- *6th-12th GRADE ONLY*: Curiosity Cards (3/student)
- Inverts (1 Mollusk and 1 Echinoderm/student)
 - Each student should have the chance to interact with two animals from a Phyla. Therefore, while there can be multiples of a species, no one species should make up more than 50% of the organisms in the Phyla and greater diversity overall is optimal.
- Small aquaria w/ lids (2/student)
- Dry rags (4)
- *OCEAN DISCOVERY COURTYARD LAB ONLY*: Coolers to transport small aquaria

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:05p	SCL Interaction	Engagement
4:05p – 4:30p	Invertebrate Investigation	Exploration and Guided Analysis
4:30p – 4:42p	Wrap Up	Process Reflection

Set Up

- Set up technology and test for Zoom call with scientist.
- Set up visual materials:
 - Open “OS Camp PP” slides and open and test links for the day.
 - Put up Word Wall Poster and set words for the day at instructor station.
 - Put up La Jolla Marine Protected Area Poster.
- Ensure there are diverse invertebrates and enough for each student station to have one.
- Place all aquaria back in the tank so that they stay chilled and aerated until they are needed for the lab.
- Place 2 pre-cut outlines of invertebrates into each student’s bin.

Fellow Teaching Notes

- Connect the zoom link(s).
 - Check sound.
 - Check that the camera shows as many students as possible.
- During animal interactions, pass out and collect animals and ask students (at assigned tables) questions to enable them to discover adaptations such as:
 - What do you see/feel?
 - What is that similar to?
 - Why do you think that might help this animal survive?
- Help students to place words on the Word Wall.
- During the Wrap Up, help students to stick their drawing to the La Jolla Marine Protected Area Poster.

Intro (10 min):

- Review the Daily White Board.
- Review Marine Protected Areas. Include:
 - Definition: A place in the ocean that we care for by having special rules.
- Introduce La Jolla Marine Protected Area.
 - Will be studying a specific marine protected area and the animals that live there all week.
 - ([Play 1-2 minutes of La Jolla MPA video.](#))
 - (Ask students for words that come to mind to describe what they see.)
 - Describe location of La Jolla Marine Protected Area.
 - (Show Google Map on OS Camp PP).
 - 30 minutes – car; 60 minutes by trolley and bus
 - You can visit with your family- free!
 - Ocean Discovery Courtyard Lab only:
 - You can see a livecam of it here at Ocean Discovery in the Ocean Alcove.
- Introduce invertebrates.
 - (Point to Invertebrates on La Jolla Marine Protected Area Poster.)
 - Today we will explore the shore where a lot of invertebrates live.
 - Define invertebrate.
 - An invertebrate is an animal with no backbone or vertebra.
 - Have students compare themselves to invertebrates.
 - (Give a student the laminated word “invertebrate” to place on the Word Wall.)

Science and Conservation Leader Interaction (10 min):

- Provide an overview of the SCL portion of the program.
 - Each day will meet virtually with a science and conservation leader.
 - Will hear about their passion for the ocean and marine protected areas.
 - Will learn about their pathway to becoming a science and conservation leader and what they do in their work.
 - You will have the opportunity to come to the microphone and ask the scientist directly any questions you have.
 - K – 5th adaptation: Brainstorm questions they could ask the scientists ahead of time.
 - 6th – 10th adaptation: Give students curiosity cards. They can ask one of these questions or their own question.
- Introduce Science and Conservation Leader.
 - Tell the students who they are about to meet (their name and what they do in sentence or two).
 - (Connect Zoom Call).
 - (Welcome the Science and Conservation Leader.)
 - (Conduct the interaction as one would an interview.)

- Interview tips:
 - You may wish to change the order or modify the questions based on the SCL's responses.
 - If an SCL is answering a question that may need to be wrapped up, you can move to the microphone which will signal them that you want to speak.
 - After the SCL answers a question, in a sentence or two, you can reaffirm the point they are making or acknowledge something about how it ties to the students' experience.
- Potential interview questions:
 - Can you start by sharing more about yourself and how you came to be the Science and Conservation Leader you are today?
 - We'd love to hear more about your work. Can you describe your work in 4-5 sentences?
 - Can you share one thing that you do or your organization does that is really cool?
 - Today we are studying invertebrates in the La Jolla Marine Protected Area. Are these topics of interest to you and if so, why?

1. Why is the student's investigation into Marine Protected Areas important to you? (2 minutes)
2. Can you tell us a little bit about your pathway (growing up, education and career)? (2 minutes)
3. I know you shared a bit about your job as a scientist, but were curious to learn 2 things you love about your job? (2 minutes)
4. Time for the students to ask some questions. (2-5 minutes depending on above)

Students can ask their own questions or ones from the curiosity cards. These are cards that have question prompts for the students to use.

- - Student questions:
 - Give one or two students the chance to ask questions.
 - If needed, remind them about the questions they came up with earlier (K – 5th) or their Curiosity Cards (6th – 12th).
 - (Have students say "Thank you!" and all clap for the SCL.)

- (Disconnect Zoom call.)

Invertebrate Interaction (25 min)

- **Introduction (5 min):**
 - Return to La Jolla Marine Protected Area.
 - Review definition of invertebrate.
 - Review the physical environment at the rocky seashore.
 - Waves, rocks, water, etc.
 - Invertebrates have to be adapted to this environment
 - Introduce adaptation.
 - Definition: An adaptation is anything that helps an animal survive.
 - Why do animals need adaptations?
 - To avoid being eaten by predators
 - To eat their prey
 - To survive waves or different temperatures, etc.
 - Have students come up with examples of adaptations for animals they are more familiar with.
 - Ex: Lion (Teeth, claws, coloration, speed, etc.)
 - Ex: Polar Bear (Teeth, coloration, size, fur, etc.)
 - (Give a student the laminated word “adaptation” to place on the Word Wall.)
 - Introduce activity:
 - Each person will get a living invertebrate to look at for a few minutes.
 - Goal: Observe the invertebrate and try to come up with some adaptations it has to survive.
 - You may hold it gently and/or touch it with two fingers.
 - Be respectful of the invertebrates. Don’t squeeze or pull them.
 - Be brave, as this your chance to learn more!
- **Phylum Mollusca Interaction (10 min):**
 - (Pass out one Mollusk for each student.)
 - (Give students 2 minutes to look at mollusk.)
 - (Ask students to place invertebrates back in water and to use their science notebooks to write or draw what adaptations they observed about this animal.)
 - (Give students 1 minute to document.)
 - (Ask students to switch animals with the person their table.)
 - You will have a couple of minutes to observe this animal and think about what adaptations it has.
 - (Give students 2 minutes to look at invert.)
 - (Ask students to place invertebrates back in water and to use their science notebooks to write or draw what adaptations they observed about this animal.)
 - (Give students 1 minute to document.)

- Debrief observations:
 - Ask students what adaptations they observed and how that helps the animal to survive.
 - Accept all responses but focus on the two below that are primary characteristics of the phylum Mollusca:
 - Shell – protection/hide from predators
 - Muscular foot – for sticking to rocks
 - (Write these two characteristics on the board.)
- Introduce Phylum:
 - Scientists put animals into groups to better understand them.
 - One of the groups is called “Phylum”
 - It’s like your extended family – your sisters, brothers, cousins, aunts, grandpa, etc.
 - There are things you have in common with you family and there are things that are different about you.
 - These invertebrates are part of Phylum Mollusca because they share similar adaptations.
 - (Pull up the Phylum Mollusca slide in the “OS Camp PP”.)
 - Ask students to match the phyla characteristics to the animals on the slide (in any order: 1) shell, 2) muscular foot).
 - All animals should be labeled with both things – characteristics of Phylum Mollusca.
 - Point out that all the animals on the slide have all the same characteristics but are not the same.
 - All mollusks share some characteristics but can still be very different.
- Teach students kinesthetic movement to remember Mollusca.
 - Use arm to cover body like a shell and whisper (as if hiding from predators) “Mollusca”.
 - Have all students repeat the word and movement a few times.
- Phylum Echinodermata Interaction (10 min):
 - (Collect Mollusks and pass out one Echinoderm for each student.)
 - (Give students 2 minutes to look at echinoderm.)
 - (Ask students to place invertebrates back in water and to use their science notebooks to write or draw what adaptations they observed about this animal.)
 - (Give students 1 minute to document.)
 - (Ask students to switch animals with the person their table.)
 - You will have a couple of minutes to observe this animal and think about what adaptations it has.
 - (Give students 2 minutes to look at invert.)

- (Ask students to place invertebrates back in water and to use their science notebooks to write or draw what adaptations they observed about this animal.)
- (Give students 1 minute to document.)
- Debrief observations:
 - Ask students what adaptations they observed and how that helps the animal to survive.
 - Accept all responses but focus on the below two that are primary characteristics of the phylum Echinodermata:
 - Spines – protection from predators
 - Echino- spiny
 - Derma - skin
 - Suction cups/tube feet – stick to rocks/help eat prey
 - (Write these two characteristics on the board.)
- Review Phyla
 - A way that scientists group animals with similar characteristics.
- These invertebrates are part of Phylum Echinodermata because they share similar adaptations.
 - (Pull up the Phylum Echinodermata slide in the “OS Camp PP”.)
 - Ask students to match the phyla characteristics to the animals on the slide (in any order: 1) spines, 2) suction cups/tube feet
 - All animals should be labeled with both things – characteristics of Phylum Echinodermata.
 - Point out that all the animals on the slide have of the same adaptations but are not exactly the same.
 - All echinoderms share some characteristics but can still be very different
- Teach students kinesthetic movement to remember Echinodermata.
 - Have students make spines with their fingers and say “Echinodermata” using the tune from “Hakuna Matata”, sing-song, “Echinodermata”
 - Have all students repeat the word and movement a few times.

Wrap-Up (12 min)

- *Good job scientists! We’ve learned so much about invertebrates.*
- Review characteristics of Mollusks and Echinoderms by asking questions. Potential questions include:
 - What was the name of one of the phyla we learned about today?
 - What was one of the adaptations that all members of that phyla share?
 - Can anyone name an invertebrate that is part of that phyla?
- Review invertebrate dances.
 - Super fun for younger students.
 - Silly and teasing for older students.

- Connect invertebrates to Marine Protected Areas. Potential questions include:
 - How do you think humans may harm marine invertebrates?
 - Answers may include: taking them home, eating them, trash, etc.
 - How do you think having Marine Protected Areas can help protect invertebrates?
 - Protects them from being hurt (pulled off rocks, stepped on, taken home, etc.)
 - Protects them from litter (litter can cover or injure invertebrate or they can ingest it.)
- Introduce La Jolla Marine Protected Area Poster.
 - Each day we will add animals to our marine protected area.
 - Today we will add invertebrates.
 - You can choose an invertebrate in your bin to color and then it will be added to the marine protected area.
 - (Give students a time limit to work.)
 - (Provide students with time reminders.)
 - (When a student is finished coloring the fellow can help them tape it to the La Jolla Marine Protected Area poster.)
- (Have students wash hands.)

Fish Explorers

Day 3

Goal: Students will learn what fish and sharks are, some of the fish and sharks that live in the La Jolla Marine Protected Area, and about internal and external anatomy of a shark.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - If a guest speaker joins - connect a speaker, microphone, microphone stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies:

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
- Painters tape
- [Outlines of fish and sharks](#) (pre-cut)
- In OS Camp PP:
 - La Jolla Marine Protected Area Fish and Shark examples
 - Shark external anatomy diagram

- Shark internal anatomy diagram
- Word Wall
 - Word Wall Poster
 - Laminated words:
 - Fish – a vertebrate with gills and fins
 - Shark – a fish with a backbone made of cartilage
 - Explore – to investigate in order to learn more

Lab Materials:

- 6th – 12th **GRADE ONLY:** Curiosity Cards (3/student)
- Shark jaw (1)
- Butcher paper or other to cover tables
- Trash bags (2)
 - To dispose of sharks
- Dogfish sharks for dissection (1/student)
 - Open and rinse the sharks
 - Smaller sizes when possible, ideally some that are male and some female
- Box gloves (1)
 - Size small for K – 5th
 - Size medium for 6th – 12th
- Dissection tools (1 of each item/student):
 - K – 2nd: Pointers
 - 3rd – 5th: Pointers, scissors
 - 6th – 12th: Pointers, scissors, scalpel
- Instructors' dissection tools (1/Instructor and Fellows)
 - Scissors, scalpel
- Set jarred fish at each jarred seat

Instructor Note: There is an Instructor Supplement: Shark Dissection found on page 85. It provides diagrams and information about internal and external shark anatomy.

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:05p	SCL Interaction	Engagement
4:05p – 4:30p	Shark Dissection	Exploration and Guided Analysis
4:30p – 4:42p	Wrap Up	Process Reflection

Set Up

- Set up technology and test for Zoom call with scientist.
- Set up visual materials:
 - Open “OS Camp PP” slides for the day.
 - Put up Word Wall Poster and set words for the day at instructor station.
 - Put up La Jolla Marine Protected Area Poster.
- Place the shark jaw at the instructor station.
- Cover all tables with butcher paper for dissection.
- Place sharks, dissection tools, and trash bags in the back of the lab.
- Place 1 pair of gloves into each students’ bin.
- Place 2 pre-cut outlines of fish/sharks into each student’s bin.

Fellow Teaching Notes

- Connect the zoom link(s).
 - Check sound.
 - Check that the camera shows as many students as possible.
- During the dissection, pass out and collect animals and ask students (at assigned tables) questions to enable them to discover anatomy and adaptations such as:
 - What do you see/feel?
 - What might that help the shark to do?
 - What do you want to know more about/what questions do you have?
- Help students to place words on the Word Wall.
- Help students place their drawing on the La Jolla Marine Protected Area Poster during Wrap Up.

Intro (10 min):

- Review the Daily White Board.
- Review previous day:
 - Review Marine Protected Areas.
 - Definition: A place in the ocean that we care for by having special rules
 - Why marine protected areas are important.
 - Review Invertebrates:
 - Definition: an animal without a backbone.
 - Invertebrate adaptations

- Phyla Mollusca characteristics: soft body, hard shell, muscular foot
- Phyla Echinodermata characteristics: spines, tube feet, regeneration
- Review kinesthetic Phyla dances
- Introduce Fish and Sharks.
 - Moving to deeper water.
 - Define fish: A vertebrate (backbone) that has gills and fins.
 - (Give a student the laminated word “fish” to place on Word Wall.)
 - When introducing the concept of fish, have them first examine the fish in front of them to help come up with a description (e.g., they have fins).
 - Define shark: A fish with a skeleton made of cartilage.
 - Reinforce that sharks are a type of fish.
 - Review the difference between cartilage and bones.
 - Have students touch their nose/earlobes for cartilage.
 - Have students touch their forearm for bone.
 - Sharks have no bones only cartilage.
 - (Give a student the laminated word “shark” to place on the Word Wall.)
 - (Pass around the shark jaws.)
 - *Note: The shark jaw has dried out so it’s similar to bone but not quite as hard.*

Science and Conservation Leader Interaction (10 min):

- Acknowledge the students who asked questions the day prior.
- Tell the students who they are meeting (their name and what they do in 1-2 sentences.)
- (Connect Zoom Call).
- (Welcome the Science and Conservation Leader.)
- (Conduct the interaction as one would an interview.)
 - Interview tips:
 - You may change the order or modify the questions based on the SCL’s responses.
 - If an SCL is answering a question that may need to be wrapped up, you can move to the microphone which will signal them that you want to speak.
 - After the SCL answers a question, in a sentence or two, reaffirm the point they are making or acknowledge how it ties to the students’ experience.
 - Potential interview questions:
 - Can you start by sharing more about yourself and how you came to be the Science and Conservation Leader you are today?
 - We’d love to hear more about your work, can you describe it in a few sentences?
 - Can you share one thing that you or your organization does that is cool?
 - Today we are studying fish and sharks in the La Jolla Marine Protected Area. Are these topics of interest to you and if so, why?
 -
 - Student questions:

- Give one or two students the chance to ask questions.
- If needed, remind them about the questions they came up with earlier (K – 5th) or their Curiosity Cards (6th – 12th).
- (Have students say “Thank you!” and all clap for the SCL.)
- (Disconnect Zoom call.)

Shark Dissection (25 min):

- **Introduction** (5 min)
 - (Show the fish and sharks slide in “OS Camp PP”.)
 - Return to the La Jolla Marine Protected Area to learn more about fish and sharks.
 - Here are some of the fish and sharks that live there.
 - Introduce dissection:
 - Take a closer look at sharks through a shark dissection.
 - When we dissect, we are really exploring or investigating to learn more.
 - (Give a student the laminated word “explore” to place on the Word Wall.)
 - Respect the shark you are dissecting as they are helping us to learn more about how the world works and to become better scientists.
 - Review potential reactions to dissection:
 - Excited, nervous, etc.
 - Whatever you feel is appropriate.
 - Students can take a quick break if they need to step away but should hurry back so they don’t miss too much exploring.
 - Review mantra:
 - We never say “gross!”, instead we say “Ooooooh science!”
 - (Pass out gloves and dissection tools.)
 - (Explain how to use dissection tools.)
 - Remind students not touch themselves after they have touched the shark even with gloves on.
- **External Anatomy** (8 min):
 - Explain external shark exploration.
 - Students will have three minutes to explore the outside of the shark.
 - They can look at it, touch it and make some observations, like what do you think each of the different parts are and what do they do?
 - (Pass out one shark for each student.)
 - (Give students 3 minutes to explore the shark.)
 - Debrief external shark exploration
 - (Show the “OS Camp PP” slide of the external anatomy of the shark.)
 - Ask students about their observations and use these to lead into discussion and stories about the following external anatomy features:
 - Senses for sensing predators and prey
 - Eyes – for seeing
 - Nostrils – for smell

- Ampullae of Lorenzini – sense electromagnetic fields
- Mouth
- Gill slits
- Fin spine
- Dermal denticles
- Tail fin
- Cloaca
- Claspers
- Internal Anatomy (12 min):
 - Explain internal shark exploration.
 - Students will have three minutes to explore the inside of the shark.
 - Look at it, touch it, and make some observations about what you think each part is and what it does?
 - Pass out dissection equipment to students now.
 - (Help students to cut open shark.)
 - K – 2nd: open for them
 - 3rd – 5th: instruct them how to use scissors
 - 6th – 12th: instruct them how to use scalpel and scissors
 - (Give students 3 minutes to explore the shark.)
 - Debrief internal shark exploration
 - (Show the “OS Camp PP” slide of the internal anatomy of the shark.)
 - Ask students about their observations and use these to lead into discussion and stories about the following internal anatomy features:
 - Heart
 - Liver
 - Stomach
 - Intestines
 - Based on the age of the students identify any pregnant females and cut open the egg to see the babies attached to their yolk sac.
 - Based on the age of the students cut open the stomach and see if there is undigested food.
 - (Remove all sharks from tables)
 - (Place the sharks in a trash bag and then add a second bag for disposal.)
 - (Have all students remove and dispose of gloves.)
 - (Have students wash hands.)

Wrap-Up (12 min):

- *Good job scientists! We’ve learned so much about fish and sharks.*
- Do a think-pair-share: What was your favorite part of the dissection and why?
- Sharks vs. Humans. Potential question include:
 - Do you think sharks are dangerous?
 - Do you think humans are a danger to sharks?
- Sharks vs. Humans. Be sure to cover:

- People are afraid of sharks but should not be!
 - Honeybees and pigs kill more people than sharks!
 - More people are struck by lightning TWICE than attacked by sharks!
- Humans are much more dangerous to sharks!
 - People killed over 100 million sharks last year.
 - People kill sharks by:
 - Intentionally fishing for them.
 - Bycatch - accidentally catching sharks when you meant to catch other fish or because a net was left in the water.
 - Catching sharks to cut off their fins for food.
 - Shark populations have declined 90% worldwide due to human actions.
- Connect sharks to Marine Protected Areas.
 - How do you think having Marine Protected Areas can help protect sharks?
 - Protect them from being fished (intentionally or unintentionally).
- Return to La Jolla Marine Protected Area Poster.
 - Today we will add sharks and fish.
 - You can choose a shark or fish in your bin to color then we will add it to the poster.
 - (Give students a time limit to work.)
 - (Provide students with time reminders.)
 - (When a student is finished coloring the fellow can help them tape it to the La Jolla Marine Protected Area poster.)
- (Have students wash hands.)

Addendum Notes:

- For Set-Up
 - Set jarred fish at each seat.
 - Open and rinse the sharks. Try to have some males and females.
- Begin the lab by having pre-set jarred fish at each students' seat. When introducing the concept of fish, have them first examine the fish in front of them to help come up with a description (e.g., they have fins).
- Mentoring Opportunity: Give each table two minutes to explore their fish in jars with their fellow/instructor
 - What do you notice?
 - Make at least 2 observations
- Then come together as a group and share 1-2 observations
 - Proceed to introduction
- For the dissection,
 - Have the instructor cue the external dissection. Give about 10 minutes for the mentors to spend about 5 for the students to explore, having help with the prompts listed in the Fellow Teaching Notes, and 5 to do more teaching of the parts with fun stories. The list of features are for the mentors to choose from, but they shouldn't go through every one. They can do a few features with fun

stories (e.g., fin spine, claspers). Instructor pull up the external diagram on screen so that the mentors can use if needed.

- Do the same thing for the internal anatomy.

COVID-19 Distancing and Facilitation for Dissection

- Dissection and distancing modifications
- Each fellow and instructor are assigned 10 1-2 tables
- 1 shark/table of two students
- Students work together and pass the shark during the dissection to share responsibilities.
- Instructors and Fellows ask questions and help facilitate the shark dissection components with the instructor bringing the group back together for discussion after external and internal anatomy.
- -Using photos of internal and external anatomy in the PPT and can be included in appendices (will send in an email).

Mammal (Whale) Watchers

Day 4

Goal: Students will learn what marine mammals are, some of the marine mammals that live in the La Jolla Marine Protected Area, and about how plastic trash can impact marine mammals.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - Virtual guest speaker - connect a speaker, microphone, mic stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies:

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
- Painters tape
- [Outlines of marine mammals](#) (pre-cut)
- In OS Camp PP:
 - La Jolla Marine Protected Area Marine Mammal examples
 - Gray whale video
 - Gray whale migration map
- Word Wall
 - Word Wall Poster
 - Laminated words:
 - Mammal – a vertebrate that makes milk for its young

- Migration –movement from one part of the world to another
- Learn – to experience or study in order to gain knowledge

Lab Materials:

- 6th-12th GRADE ONLY: Curiosity Cards (3/student)
- Baleen (1)
- Set of laminated [game cards](#) (1)
 - K – 5th version or 6th – 12th version
- Traffic cones (2 – 4/group)
 - “Baja” sign taped to cones (1-2/group)
 - “Alaska” sign taped to cones (1-2/group)

*Number of cones depends on the play area. For example, when using the rock amphitheater, only 1 cone is needed as the rocks help to show the border.
- Stopwatch (1/group)
- Whistle (1/group)
- Prizes (2 different types of prizes) (1/student)

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:05p	SCL Interaction	Engagement
4:05p – 4:30p	Gray Whale Game	Exploration and Guided Analysis
4:30p – 4:42p	Wrap Up	Process Reflection

Set Up

Fellow Teaching Notes

- Connect the zoom link(s).
 - Check sound.
 - Check that the camera shows as many students as possible.
- During the gray whale game
 - 1 Fellow is the Referee
 - Use the stopwatch to give students 30 seconds to migrate.
 - Use the whistle to signal if a whale is dead and to remind them to keep their flippers up (to help watch their distance).
 - 1 Fellow Operations
 - Places and picks up the cards for each part of the game.
 - Cards must be placed and picked up between each of the 3 rounds and between each of the 3 games.
- Help students to place words on the Word Wall.
- During the Wrap Up, help students to stick their drawing to the La Jolla Marine Protected Area Poster.

Intro (10 min):

- Review the Daily White Board.
- Review previous day:
 - Review Marine Protected Areas.
 - Definition: A place in the ocean that we care for by having special rules.
 - Why marine protected areas are important.
 - Review Sharks and Fish:
 - Definition of a fish: A vertebrate (backbone) that has gills and fins.
 - Define shark: A fish with a skeleton made of cartilage.
- Introduce marine mammals:
 - Today we are entering the deepest waters where many marine mammals live.
 - Define mammal: a vertebrate that makes milk for its young.
 - Define marine mammals: a vertebrate that makes milk for its young and lives in the ocean.
 - (Give a student the laminated word “mammal” to place on the Word Wall.)
 - (Go to “OS Camp PP” slide.)
 - Ask students to identify examples of marine mammals found in the La Jolla Marine Protected Area.
- Toothed vs. Baleen Whales
 - Toothed whales: have teeth for eating things like fish
 - Baleen whales:
 - (Pass around the baleen.)
 - What kind of food do you think these types of whales eat?
 - They have baleen to filter tiny things out of the water like plankton

Science and Conservation Leader Interaction (10 min):

- Acknowledge the students who asked questions the day prior.
- Tell the students who they are meeting (their name and what they do in 1-2 sentences.)
- (Connect Zoom Call).
- (Welcome the Science and Conservation Leader.)
- (Conduct the interaction as one would an interview.)
 - Interview tips:
 - You may change the order or modify the questions based on the SCL’s responses.
 - If an SCL is answering a question that may need to be wrapped up, you can move to the microphone which will signal them that you want to speak.
 - After the SCL answers a question, in a sentence or two, reaffirm the point they are making or acknowledge how it ties to the students’ experience.

- Potential interview questions:
 - Can you start by sharing more about yourself and how you came to be the Science and Conservation Leader you are today?
 - We'd love to hear more about your work, can you describe it in a few sentences?
 - Can you share one thing that you or your organization does that is cool?
 - Today we are studying marine mammals in the La Jolla Marine Protected Area. Are these topics of interest to you and if so, why?
- Student questions:
 - Give one or two students the chance to ask questions.
 - If needed, remind them about the questions they came up with earlier (K – 5th) or their Curiosity Cards (6th – 12th).
- (Have students say "Thank you!" and all clap for the SCL.)
- (Disconnect Zoom call.)

Gray Whale Game (25 min)

Instructor note: Game set-up diagram and activity cards can be found in Materials for Lessons appendix below.

- Introduction (5 min):
 - Introduce Gray whales.
 - Pass through the La Jolla Marine Protected Area December through April.
 - Baleen whales
 - Adults measure 40-50 feet in length or the size of a school bus
 - Gray whales migrate
 - Migration is traveling from one part of the world to another.
 - Define learn: To learn is to experience or study in order to gain knowledge.
 - (Give a student the laminated word "learn" to place on the Word Wall.)
- Game (10 min):
 - You will all be gray whales.
 - Have students hold up their "pectoral flippers".
 - This will help them to "swim" and to watch their distance.
 - (Walk students over to game area.)
 - Show them:
 - Alaska
 - The migration zone (waters off the Pacific Coast)
 - Baja
 - The waiting area for those whales who are not currently playing.
 - Introduce the referee who will blow their whistle when time is up and when whales don't survive.
 - (Divide group in half)

- Assign half the students to be Mammal Watchers they will stay in the waiting area until the second game.
 - Assign the other half to be whales. These students will go to the waiting area during the second game.
 - *The game will be played 3 times. First game, with half the students. Second game, with the other half of students. Third game, with the whales that survived (won) from the first and second game.
- *K-5th GRADE ONLY: Show the students the cards and explain that the amphipod is food, the whale card means they keep swimming, and the plastic bag card means they can't digest food well anymore so they are slowed down and have to spin around 3 times before they can keep moving.*
- *6th-12th GRADE ONLY: Tell students that in each round they need to read the card. If it tells them to do something, they need to follow the instruction before continuing.*
- **GAME 1**
- Round 1:
 - Their goal is to eat (collect 1 card) in Alaska and swim to Baja before the time is up. If they don't make it, they have to sit down where they are (they died).
- Round 2:
 - Their goal is to migrate (collect 1 card) from Baja back to Alaska. If they don't make it, they have to sit down where they are (they died). Or they may die or be hindered by the card they pick up.
- Round 3:
 - Their goal is to eat (collect 1 card) in Alaska and swim to Baja before the time is up. If they don't make it, they have to sit down where they are (they died). Or they may die or be hindered by the card they pick up.
- Debrief Game 1:
 - Have all of the students gather in a distanced circle to discuss what happened on their migrations. Questions can include:
 - How much do you think a gray whale needs to eat (1,500 pounds per day)?
 - Who lived, who died and why?
 - What else could harm whales on their journey?
- (Play GAME 2)
 - Students who were mammal watchers become whale.
 - Students who were whales become mammal watchers.
 - Play Rounds 1-3.
 - Debrief Game 2.
- (Play GAME 3)
 - Students who were whales who survived Games 1 & 2 become whales again.
 - Students who died in Games 1 & 2 become Mammal Watchers again.
 - Play Rounds 1-3.
 - Debrief Game 3.

- (Have students wash hands.)

Rotation 2: Whale Migration (10 minutes)

- Introduce migration.
 - Definition: Migration is traveling from one part of the world to another.
 - (Give a student the laminated word “migration” to place on the Word Wall.)
 - (Use the slide in the “OS Camp PP” to show migration.)
 - Gray whale migration:
 - Winter – Alaska: they need to eat a lot of food and the most food is found in Alaska (write “winter” by Alaska).
 - Summer - Baja California, Mexico: where they have their babies is safe, warm shallow lagoons (write “summer” by Baja).
 - During their migration, gray whales pass right through the La Jolla Marine Protected Area.
- Introduce gray whale video.
 - Normally whales are shy of humans but what you notice about gray whales in this video? Show the gray whale video [Video of baby gray whales approaching boat \(start 20 seconds in- 1:00\):](https://www.youtube.com/watch?v=EvjV3suS0dl)
 - <https://www.youtube.com/watch?v=EvjV3suS0dl>
 - Debrief gray whale video.
 - No one knows why baby and mother gray whales come up to humans in Baja. There is so much more to learn and that is why we need more science and conservation leaders!
- Grey whales have the longest known migration of any mammal. They travel 10,000-12,000 miles round trip every year.
- It takes them a total of 2-3 months to make the journey, traveling about 5 mph.
- Return to La Jolla Marine Protected Area Poster.
 - Today we will add marine mammals.
 - You can choose a marine mammal in your bin to color.
 - (Give students a time limit to work.)
 - (When a student is finished coloring the fellow can help them tape it to the La Jolla Marine Protected Area poster.)

Wrap-Up (12 min):

- *Good job scientists! We’ve learned so much about marine mammals.*
- Do a think-pair-share: What was something new you learned about marine mammals today?
- Connect marine mammals to Marine Protected Areas.
 - Ask students what kinds of things humans do that can harm marine mammals.

- Trash (especially plastics such as plastic bags that take ~500 years to go away).
 - Fishing nets.
- How do you think having Marine Protected Areas can help protect marine mammals?
 - More monitoring of them in Marine Protected Areas.
 - More removal of trash.
- (Have students wash hands.)
- COVID 19 Modification: Use spots on the ground for distancing to help student spacing. What is a mammal? What is migration? What are examples of marine mammals? Baleen vs toothed whale (but really focusing on baleen).
 - When the baleen is past around, I think it would also be helpful to use a big broom to show how they get small items stuck in the baleen. That way the students can come up with the idea of the size of food they eat and get a visual.
 - In the game itself.
 - Make sure to spread out the cards so that the students can spread out accordingly.
- ▪ Can reinforce vocab by saying “migrate” instead of “go” etc.

Alternate Mammal (Whale) Watchers

Day 4

Goal: Students will learn what marine mammals are, some of the marine mammals that live in the La Jolla Marine Protected Area, and about how plastic trash can impact marine mammals.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - Virtual guest speaker - connect a speaker, microphone, mic stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies:

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
- Painters tape
- [Outlines of marine mammals](#) (pre-cut)
- In OS Camp PP:
 - La Jolla Marine Protected Area Marine Mammal examples
 - Gray whale video
 - Gray whale migration map
 - Toothed whale photo (dolphin)
 - Baleen whale photo (grey whale)
- Word Wall
 - Word Wall Poster
 - Laminated words:
 - Mammal – a vertebrate that makes milk for its young
 - Migration –movement from one part of the world to another
 - Learn – to experience or study in order to gain knowledge

Lab Materials:

- *6th-12th GRADE ONLY:* Curiosity Cards (3/student)
- Baleen (1)
- Plastic bins (1 per student)
- Colored beads
- Sequins
- Plastic fish
- Chopsticks (1 per student)
- Brushes (1 per student)

- Cups (1 per student)
- Stopwatch
- Bucket
- 7-8 Towels

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:05p	SCL Interaction	Engagement
4:05p – 4:30p	Gray Whale vs. Dolphin Game	Exploration and Guided Analysis
4:30p – 4:42p	Wrap Up	Process Reflection

Set Up

- Set up technology and test for Zoom call with scientist.
- Set up visual materials:
 - Open “OS Camp PP” slides for the day.
 - Put up Word Wall Poster and set words for the day at instructor station.
 - Put up La Jolla Marine Protected Area Poster.
- Place the baleen at the instructor station.
- Fill tin bins, one for every two students, about ½ full with water. Add fish and sequins evenly to each of the tins.
- The bins should be laid out so that there are sets of 1 bin with sequins and fish, 1 brush, and 1 set of chopsticks.
- Place 2 pre-cut outlines of mammals into each student’s bin.
- Write the results chart on the dry-erase board:

	Teeth	Baleen
Plankton		
Fish		
Plastic		

Fellow Teaching Notes

- Connect the zoom link(s).
 - Check sound.
 - Check that the camera shows as many students as possible.
- During the whale game, fellows check-in with their assigned tables to ask questions and engage students.
- Help students to place words on the Word Wall.
- During the Wrap Up, help students to stick their drawing to the La Jolla Marine Protected Area Poster.

Intro (10 min):

- Review the Daily White Board.
- Review previous day:
 - Review Marine Protected Areas.
 - Definition: A place in the ocean that we care for by having special rules.
 - Why marine protected areas are important.
 - Review Sharks and Fish:
 - Definition of a fish: A vertebrate (backbone) that has gills and fins.
 - Define shark: A fish with a skeleton made of cartilage.
- Introduce marine mammals:
 - Today we are entering the deepest waters where many marine mammals live.
 - Define mammal: a vertebrate that makes milk for its young.
 - Define marine mammals: a vertebrate that makes milk for its young and lives in the ocean.
 - (Give a student the laminated word “mammal” to place on the Word Wall.)
 - (Go to “OS Camp PP” slide.)
 - Ask students to identify examples of marine mammals found in the La Jolla Marine Protected Area.
- Toothed vs. Baleen Whales
 - Toothed whales: have teeth for eating things like fish
 - Baleen whales:
 - (Pass around the baleen.)
 - What kind of food do you think these types of whales eat?
 - They have baleen to filter tiny things out of the water like plankton

Gray Whale vs. Dolphin Game (25 min)

Introduction (5 min):

- As scientists, the students are going to form a hypothesis about which type of adaptation is better for eating which type of food. Ask the class which they think is better for eating
 - plankton, baleen or teeth?
 - fish, baleen or teeth?
 - plastic, baleen or teeth?
- Write the class hypothesis on the board.

Game (10 min):

- The students all have a bin to represent a Marine Protected Area in front of them. There are sequins (plankton), plastic fish (fish), and beads (plastic).
- The students will become either toothed or baleen whales in the first round. Divide the class into two teams: dolphin and grey whale to represent toothed vs. baleen whales.
- Students will use either the chopsticks or brush to catch their food and put it in their stomachs (cups).
- Students must try and catch their prey as a whale or dolphin without touching the sides of the bin as the ocean does not have walls!
- A Fellow will time each feeding session of 30 seconds. After the students finish their first round, they will count the total number of fish, plankton, and plastic in their cups.
- There will be a total of 2 rounds to allow the students to be both dolphin and grey whales.
- *K-2nd GRADE ONLY: Consider modification depending on the group. Students can play only one round as toothed vs. baleen whales and compare results as a group.*

Wrap-Up (12 min):

- *Good job scientists! We've learned so much about marine mammals. Let's review our hypothesis and compare the totals of fish, plastic, and plankton.*
- Do a think-pair-share: What was something new you learned about marine mammals today?
- Connect marine mammals to Marine Protected Areas.
 - Ask students what kinds of things humans do that can harm marine mammals.
 - Trash (especially plastics such as plastic bags that take ~500 years to go away).
 - Fishing nets.
 - How do you think having Marine Protected Areas can help protect marine mammals?
 - More monitoring of them in Marine Protected Areas.
 - More removal of trash.

Making a Difference

Day 5

Goal: Students will learn how their neighborhood is connected to the ocean and they will work to reduce the amount of trash found in their local canyon to help protect the ocean and animals they have been studying.

Technology:

- Large Smart Board with “OS Camp” PPT loaded to desktop
 - If a guest speaker joins - connect a speaker, microphone, microphone stand, and camera.
 - If a video will be shown - connect the speaker.
 - *PLAZA DEL SOL LAB ONLY* - connect the lavalier to speaker for instructor.

Supplies: (For one groups of 10 students)

Visual Materials:

- Community Agreements stand
- La Jolla Marine Protected Area Poster
- Painters Tape
- Word Wall
 - Word Wall Poster
 - Laminated words
 - Plastic - a man-made material that can be molded into different shapes
 - Make a Difference
- OS Camp PPT Slides
 - Marine Protected Area World Map
 - Photo of albatross sea bird
 - Examples of Plastics Photo
 - Table to record weight of trash

Lab Supplies

- Gloves (14)
- Trash pickers (14)
- Large green bags (2)
 - Label one bag with blue tape “Plastic”
 - Label one bag with blue tape “Other”
- Sharps bucket (2)
- Trash buckets (sets of two buckets connected by a carabineer) (12)
 - One bucket labeled “Plastic” and one bucket labeled “Other”

- Spring scale (1)
- Rope – to hang the spring scale from (1)
- Calculator (1)
- [MPA flyers](#) (20)
- Thought bubble cut outs (10)
- Prize (1)
 - Could be a “going to college” t-shirt

Timing:

Fellow Teaching Notes

- Watch out for students picking up pieces of trash that are too large.
- During activity carry the plastic and sharps bucket and maintain accountability and safety.
- Help the students with the calculator add up the total amount of trash that you find.
- Hand out trash supplies.
- Carry “Other” large bag.
- Support students measuring at the spring scale.
- Record students answers as they guess the amount of plastic.
- Help students to place words on the Word Wall.
- During the Wrap Up, help students to stick their drawing to the La Jolla Marine Protected Area Poster.

the floor.

- Have a calculator readily accessible near spring scale.

Intro (15 min):

- Review what was learned this week utilizing the La Jolla Marine Protected Area poster:
 - Definition: A place in the ocean that we care for by having special rules.
 - Why they are important.
 - The types of animals live in the Marine Protected Area.
 - (Inverts, Sharks, Whales)
- Review dangers that exist for animals that live in the Marine Protected Area:
 - Marine Debris, Garbage, Plastic Trash, etc.
 - Define plastic: a man-made material that can be molded into different shapes.
 - (Give a student the laminated word “plastic” to place on the Word Wall.)
- Connection between the canyon and ocean.
 - Water moves through canyons to the ocean when it rains.
 - The rain can also carry trash from the canyon to the ocean.
 - How could this trash harm the animals that we’ve learned about?
 - Show image of albatross with plastic in their stomach.
- Science and conservation leaders work to make a difference in the world.
 - Reference the SCL’s they met throughout the week (e.g. Jair, an Ocean Leaders using fish skin to make bandages, Catalina a deep sea oceanographer discovering new animals)
 - (Give a student the laminated words “Make a Difference” to place on the Word Wall.)

Making a Difference Activity (35 min):

- Introduce Activity (5 min):
 - *Today, as science and conservation leaders, we will focus on helping protect the animals we have been studying all week by cleaning up trash in the canyon right outside of the Living Lab.*
 - Pick up trash and place it in one of your two buckets 1) Plastic and 2) Other Trash
 - If you have questions about whether or not its plastic ask the group
 - Trash pickers should never go above the waste
 - Watch your distance
 - Only pick up trash that can fit inside your buckets, if you see something bigger, the instructors will add to their bag
 - If you find a sharp piece of trash call an instructor over and they will place it in the sharps bucket.
 - (Hand each student a pair of gloves, trash pickers, and two small buckets attached by carabineer.)
- Clean- Up Trash (20 min)
 - Take students out into canyon w/ trash pickers and buckets
 - Let them spread out but maintain visual proximity.

- Collect Trash & Reflection (5 min)
 - (In amphitheater or entrance of canyon.)
 - Accountability and safety check make sure all students and staff have returned from the canyon.
 - Have students stand in a circle and do a pair-share:
 - What surprised you about the trash in the canyon?
 - Collect trash.
 - Have students dump all their “other” trash into the large “other” green bag.
 - Have students dump all “plastic” trash into the large green “plastic” bag.
- Analyze Trash (from the Lab) (10 min)
 - Create/assign student expert roles:
 - Data scribe (1): Will write trash amounts on the smartboard
 - Mathematician (1): Will use the calculator to add total amount of trash
 - Lab technician (1): Will weigh the trash and report amount to data scribe
 - Weigh Trash:
 - Have **lab technician** place the “Other” green bag and share the weight in pounds to group.
 - (Let all students hold the bag to feel how much weight feels like.)
 - (Pass around the “Plastic” green bag and ask everyone to guess how much it weighs.)
 - (**Data scribe** will record all the answers)
 - Have **lab technician** weigh the “Plastic” green bag and share the weight in pounds to group.
 - Give prize to student who guessed closest without going over.
 - **Mathematician** will add the total of trash collected and announce the total collected for the day to the group.
- *Congratulations to all you for making a difference today!*
- *Together you cleaned up xx pounds of trash from the canyon. Together OS Camp students have cleaned up xx pound of trash. That’s amazing! You are all making a real difference to the ocean and the animals that live there.*

Wrap-Up (5 min):

- *Alright scientists it’s time to get together and share what we learned.*
- Have students brainstorm ways humans can prevent trash from ending up in the canyon and then eventually the ocean.
 - Clean up trash
 - Prevent littering
 - Tell people what we know (Education)
- (Show interactive map of Marine Protected Areas around the world on “OS Camp PP”)

- We need leaders like you – that are diverse and speak different languages – because there are Marine Protected Areas around the world that need you.
- If time allows, ask students if their family is from somewhere outside the United States and to point that location out on the map.
 - Ask students if there is a marine protected area close by.
- (Give each student a thought bubble)
 - Ask each student to share how they will make a difference to protect the ocean and animals that live there and to write that in the thought bubble.
- Have each student come up and place their thought bubble on the La Jolla Marine Protected Area poster.
- (Give each student a Marine Protected Area flyer to share with their family.)
- Remind students that they can visit the marine protected area anytime with friends and family and review flyer.
- Student safety reminder- students must be in between fellows and instructor in the canyon.

Visit a Marine Protected Area with Family & Friends

A Marine Protected Area is a place where we take care of the ocean and coast and the plants and animals that live there. These unique places are great to visit on your own and with family and friends. No special permission is necessary. Anyone can visit!

What: The closest Marine Protected Area to City Heights is the Matlahuayl Marine Reserve off the coast of La Jolla.

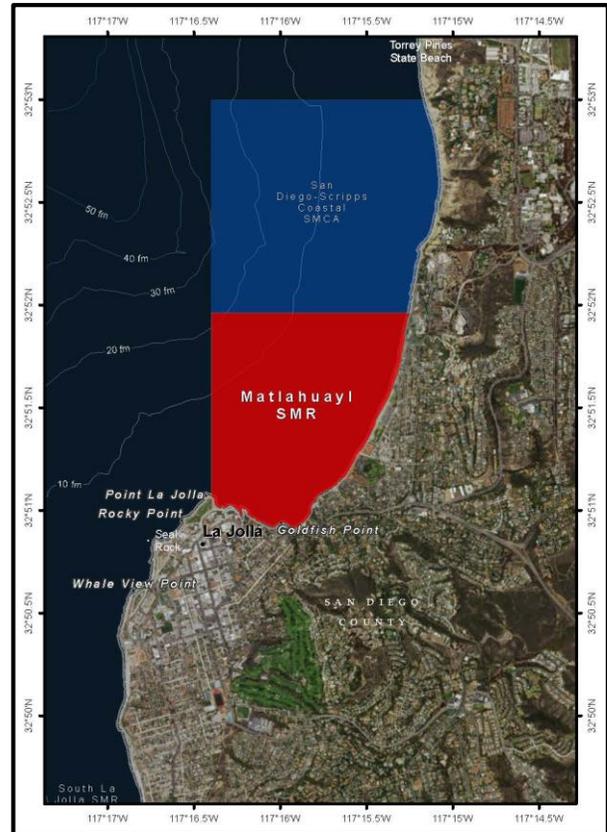
Where: Take the 805 N to CA-52 W then take the La Jolla Parkway exit, turn right on Prospect Place turn right onto Jenner Street and merge onto Coast Blvd. Park anywhere along Coast Blvd.

Cost: FREE!

Things to do: Swimming, beach, tide pooling, walks, surfing, snorkeling, etc.

Things to remember:

- Wear sunscreen and bring sunglasses and a hat.
- No collecting (don't bring home shells, rocks, or animals).
- Be careful where you step.
- Touch all animals with care!
- Only swim in designated locations with a lifeguard present.
- Have fun and explore!



Science and Conservation Leader: Virtual Meeting

Program Overview: The students you will be talking to are part of our Community Initiative, which is our most encompassing initiative, and serves all young people and their families. The Community Initiative focuses on exposing members of the community to the breadth of STEM fields as well as the process of science.

Students are participating in a week-long after school science camp to explore their pathway as science and conservation leaders. They are learning about Marine Protected Areas as a way to conserve invertebrates, fish and mammal species by studying the La Jolla Marine Protected Area in San Diego. While they are growing their knowledge about marine science they are simultaneously seeing how they are needed to make our world a better place.

Virtual Meeting Focus: Exposing our students to a diversity of local science and conservation leaders. Students want to hear about you, your career path and your current job as well as why you care about marine protected areas and the animals that live there.

Virtual Meeting Details:

- Your meeting will last 15 minutes.
- It will be conducted like an interview by one of our staff members.
- Students will have the last five minutes to ask questions of their own.

Things to Talk about with Students:

- Where did you grow up?
- Where did you go to college/graduate school?
- What did you major in?
- What got you interested in your field?
- Describe (in student friendly terms) what you do in your job.
- Something “cool” you or your company does.
- What you like best about your job
- If you were an Ocean Leader:
 - 1-2 favorite memories of Ocean Discovery Institute programs.
- Why you care about Marine Protected Areas?
 - This does not need to be a direct connection to your job, it can be of a more personal nature.



Ocean Discovery will provide:

- A list of student names + grade levels
- List of virtual teaching tips (see other side)
- Reminder email the day before Virtual Program
- Start and end to Virtual Meeting on Zoom

We are so excited to have you interact with our students! Thank you so much for your participation. If you have questions please contact Joanna Vance at 619-795-8365 ext. 123 or at jvance@oceandi.org.

Teaching Tips

Scale Your Language – The age of the students you are talking to will vary. Consider the types of words you would use for the age level you are speaking with.

Use Student Names – Ocean Discovery staff will provide student names whenever possible. Feel free to ask a student their name and then use it.

Ask Questions - Questions are a great way to engage your audience. Students love to participate.

- Example: Does anyone here know what a Chemist does?
- Example: I study plankton in the ocean. Who knows what plankton is?

Incorporate Physical Movement – Whenever possible have students get up and join you in a movement to help them understand a concept.

- Example: “I collect samples during low tide.” Have students stand up and then bend down close to the floor, extend their arms and say “low tide”! Repeat a few times.



MATERIALS FOR LESSONS

Clue #1

**Travel in the direction
water will flow
When you find a ribbon
you'll be good to go**

Clue #2

**Keep on walking,
do not stop.
Until you find
something to pop.**

Clue #3

**This letter of the alphabet
marks the spot.**

**When you get there,
give it all you've got.**

Clue #4

**Go back to the lab and
find the tallest tree.
Like a science and conservation
leader we know you will be!**

SHARE OUT #1

Share 2 words that describe you.

SHARE OUT #2

Share an outdoor place you love and what you like to do there.

SHARE OUT #3

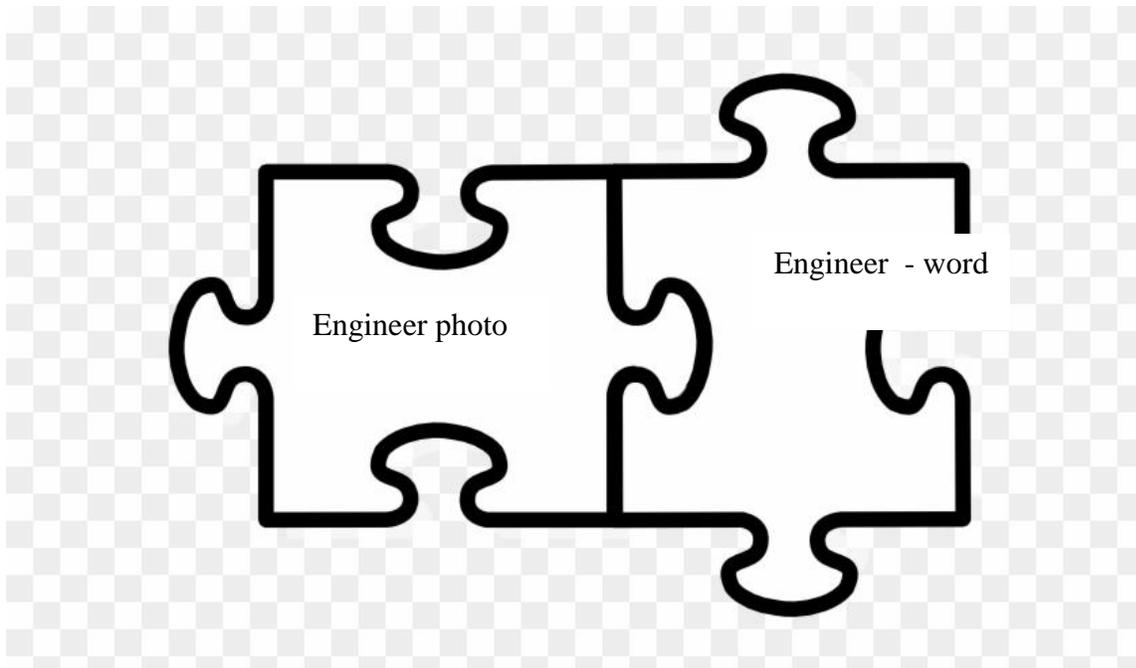
Share about a mentor, someone who has helped you and guided you, that you have had?

SHARE OUT #4

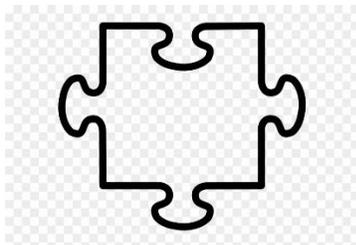
Share a career, a job, you'd be excited about doing in the future.

PUZZLE #3 – MATCH THE CAREERS

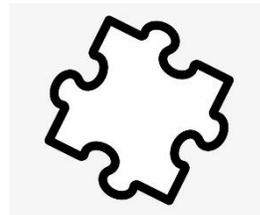
On the backside of the engineer photo puzzle piece write “Share Out Message #3”



Biologist - word

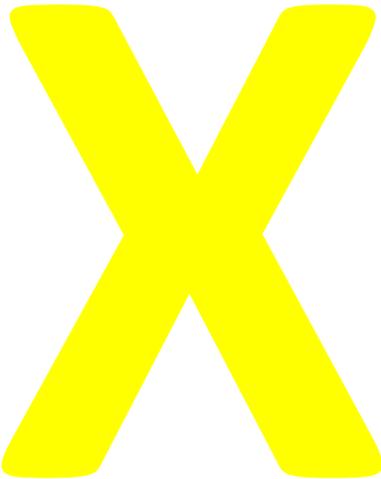


Chemist - word



PUZZLE #3 – X Marks the Spot Example

Front Side



Back Side



Message for backside of X:

Solve the puzzle and find the matching career

Puzzle #1 – Yellow Team Lock Box Message

*In order to open the box you must
discover the combo.*

*In order to learn the combo you
must identify the plant with the yellow ribbon.*

Puzzle #1 - Lockbox Message Blue Team

*In order to open the box you must
discover the combo.
In order to learn the combo you
must identify the plant with the blue ribbon.*

Puzzle #1 - Lockbox Message Orange Team

*In order to open the box you must
discover the combo.*

*In order to learn the combo you
must identify the plant with the orange ribbon.*

Puzzle #1 - Lockbox Message Green Team

*In order to open the box you must
discover the combo.*

*In order to learn the combo you
must identify the plant with the green ribbon.*

Puzzle # 1 - Native Canyon Plants



Black Sage - 642



White Sage - 962



California Buckwheat - 084



Lemonade Berry - 293



Scrub Oak - 850



Yerba Santa - 655



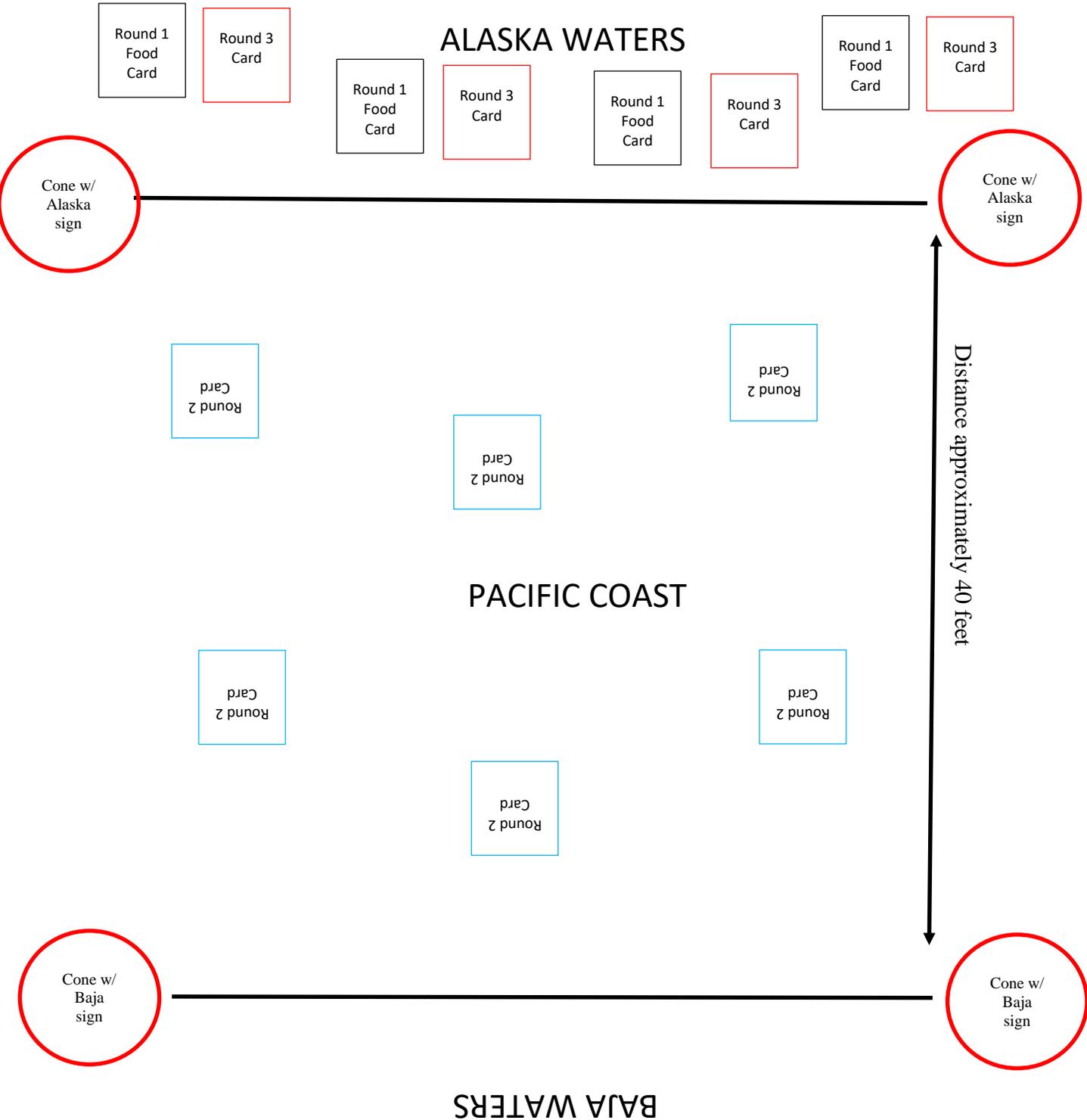
Wild Cucumber - 701



California Sunflower - 449

Mammal Watchers Lesson Materials

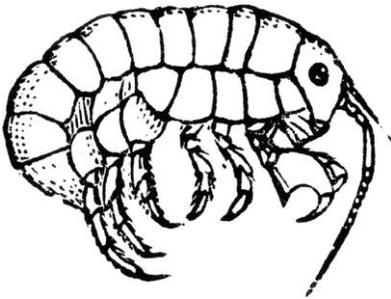
Migration Game Set-Up



Migration Game: Round 1 Cards

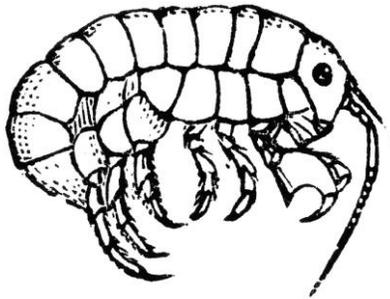
K – 5th Grade
1 card/student

ROUND 1



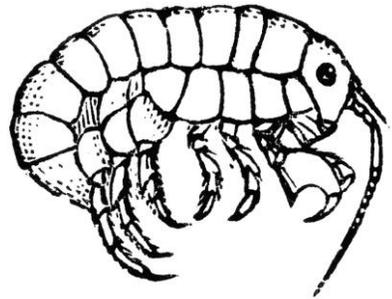
500 Pounds of Amphipods

ROUND 1



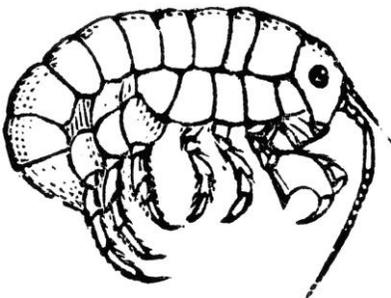
500 Pounds of Amphipods

ROUND 1



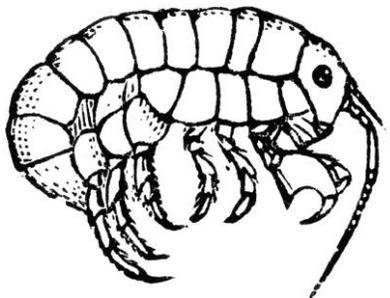
500 Pounds of Amphipods

ROUND 1



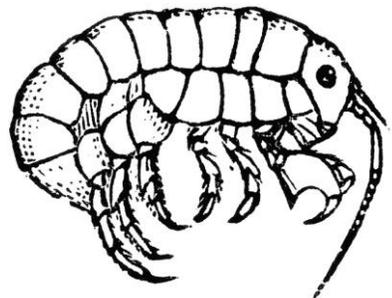
500 Pounds of Amphipods

ROUND 1



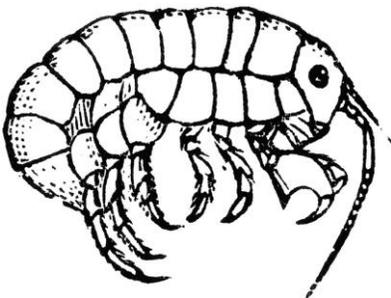
500 Pounds of Amphipods

ROUND 1



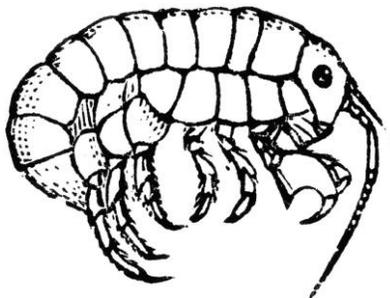
500 Pounds of Amphipods

ROUND 1



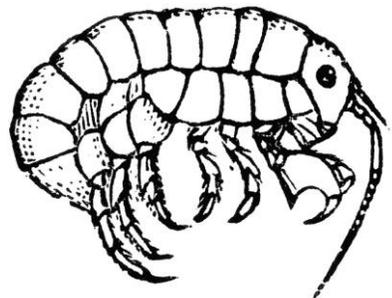
500 Pounds of Amphipods

ROUND 1



500 Pounds of Amphipods

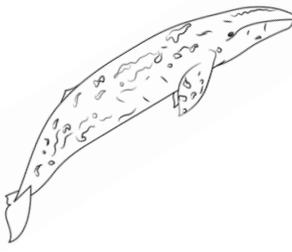
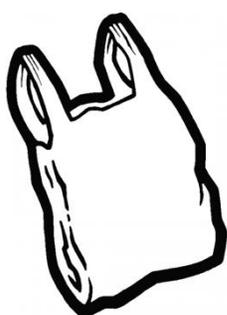
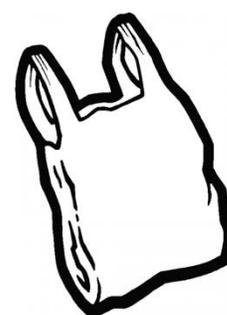
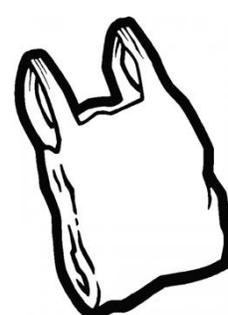
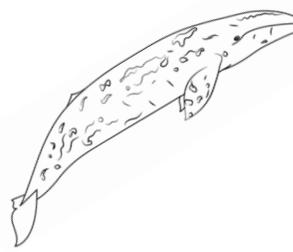
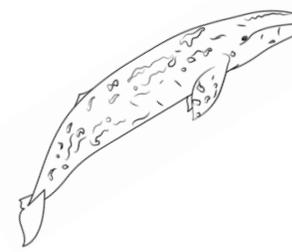
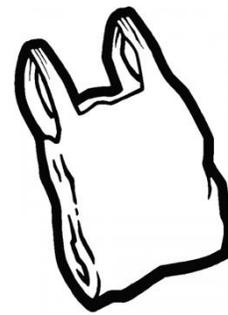
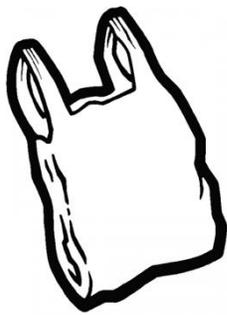
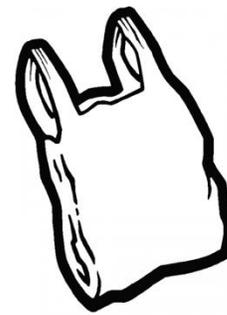
ROUND 1



500 Pounds of Amphipods

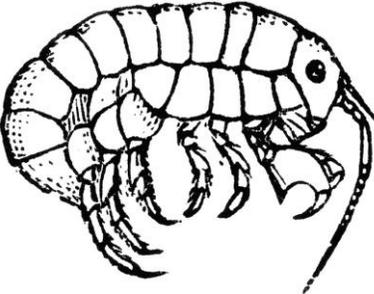
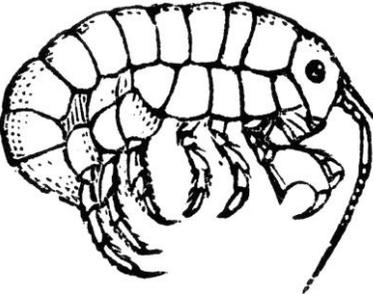
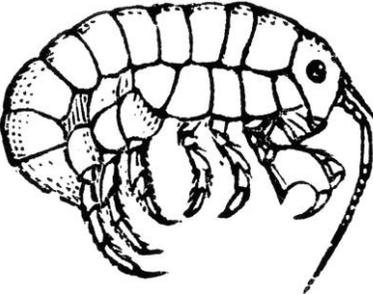
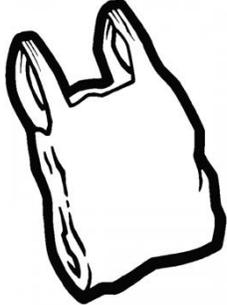
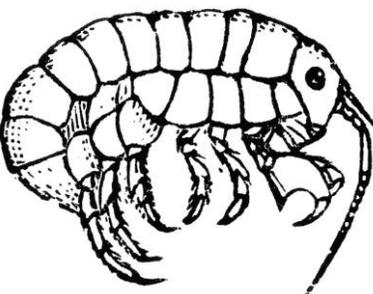
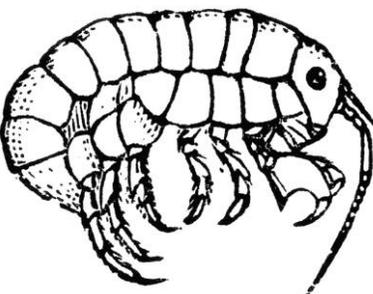
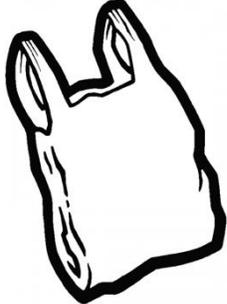
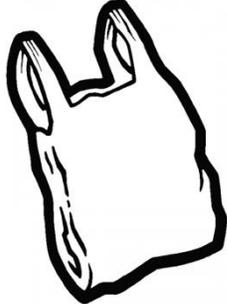
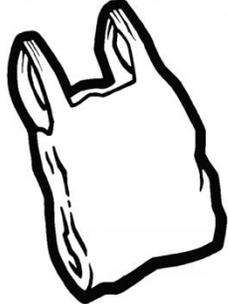
Migration Game: Round 2 Cards

K – 5th Grade
1 card/student

<p>ROUND 2</p>  <p>Keep Swimming!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>
<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Keep Swimming!</p>	<p>ROUND 2</p>  <p>Keep Swimming!</p>
<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>

Migration Game: Round 3 Cards

K – 5th Grade
1 card/student

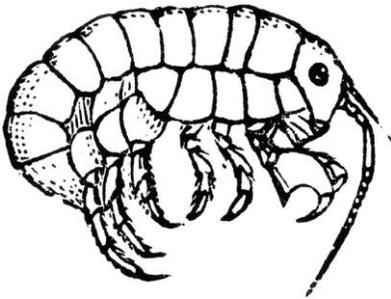
<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>
<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>
<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>	<p>ROUND 2</p>  <p>Spin Around 3 Times!</p>

Migration Game: Round 1 Cards

6th – 12th Grade

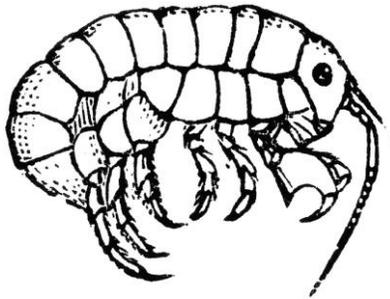
1 card/student

ROUND 1



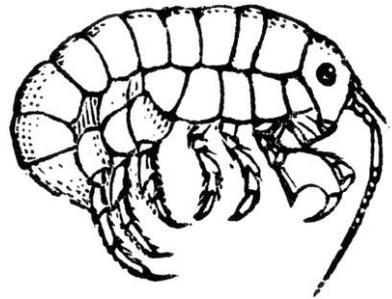
500 Pounds of Amphipods

ROUND 1



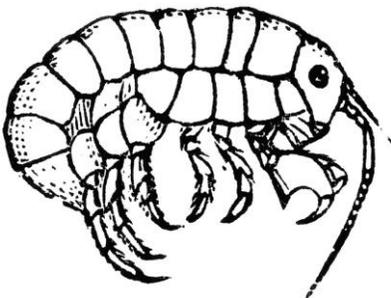
500 Pounds of Amphipods

ROUND 1



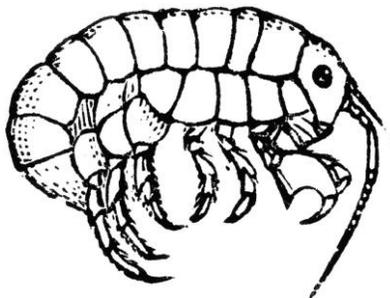
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ROUND 1



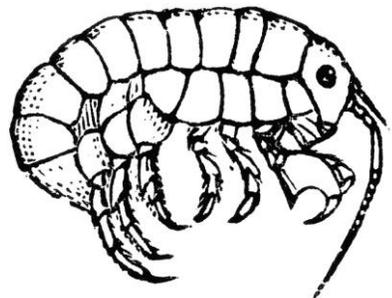
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ROUND 1



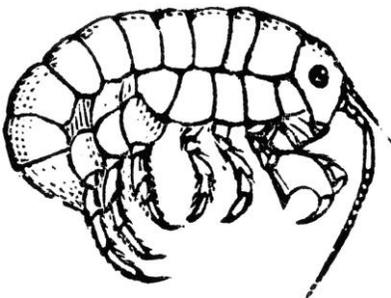
500 Pounds of Amphipods

ROUND 1



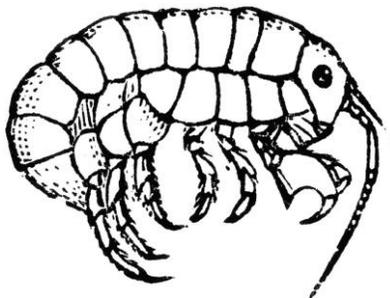
500 Pounds of Amphipods

ROUND 1



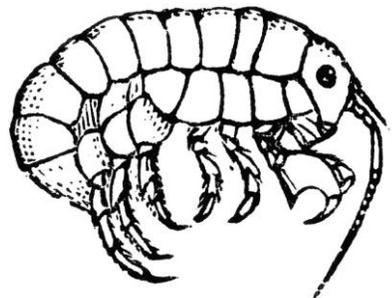
500 Pounds of Amphipods

ROUND 1



500 Pounds of Amphipods

ROUND 1



500 Pounds of Amphipods

Migration Game: Round 2 Cards

6th – 12th Grade

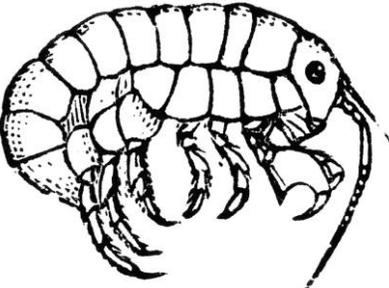
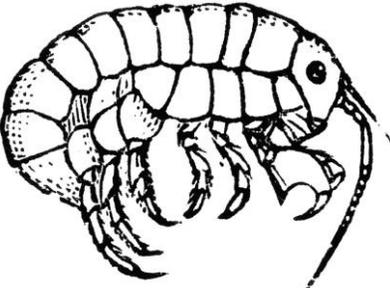
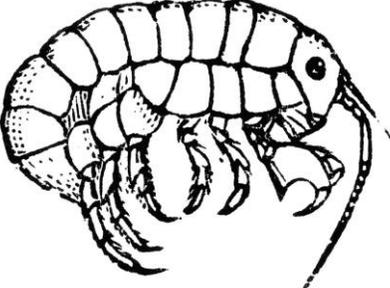
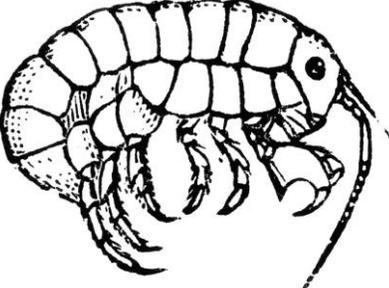
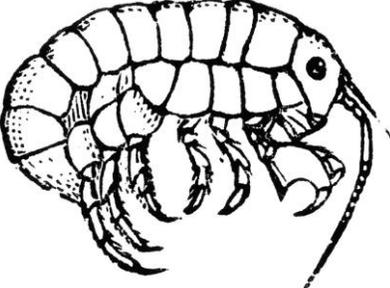
1 card/student

<p>ROUND 2</p> <p>You swam into an abandoned fishing net made of plastic and it wrapped around your mouth. You must cover your mouth with both hands and you can't eat for the rest of the game!</p>	<p>ROUND 2</p> <p>Plastic marine trash wrapped around your pectoral fin. You must keep your hands clasped together and behind your back for the rest of the game!</p>	<p>ROUND 2</p> <p>You got caught in a huge fishing net made of plastic and can't free yourself. Walk 10 steps forward and then sit down. You died! ☹️</p>
<p>ROUND 2</p> <p>You swam into an abandoned fishing net made of plastic and it wrapped around your back fin. It's hard for you to swim so you must hop on ONE FOOT the rest of the game!</p>	<p>ROUND 2</p> <p>You are swimming along and are able to avoid all marine trash! Great job! Just keep swimming!</p>	<p>ROUND 2</p> <p>You swam into a bunch of plastic marine trash. You are able to swim out of the trash eventually but you are tired and must spin in place 10 times before you can keep swimming.</p>
<p>ROUND 2</p> <p>You swam into an abandoned fishing net made of plastic and it wrapped around your back fin. It's hard for you to swim so you must hop on ONE FOOT the rest of the game!</p>	<p>ROUND 2</p> <p>You are swimming see a plastic net in front of you, you manage to swim around it. Good work! Just keep swimming!</p>	<p>ROUND 2</p> <p>You swam into a huge patch of plastic trash and it takes you a while to find your way around it. Walk backwards the rest of the game!</p>

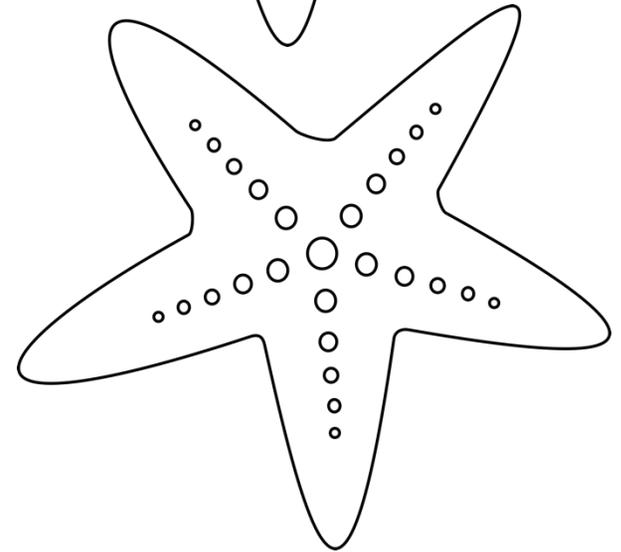
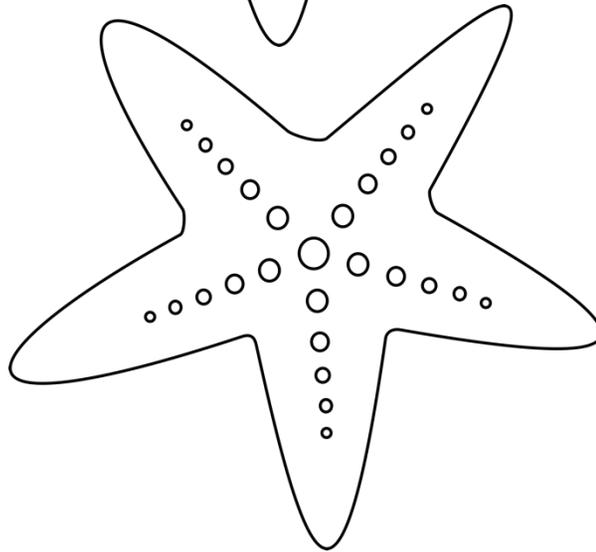
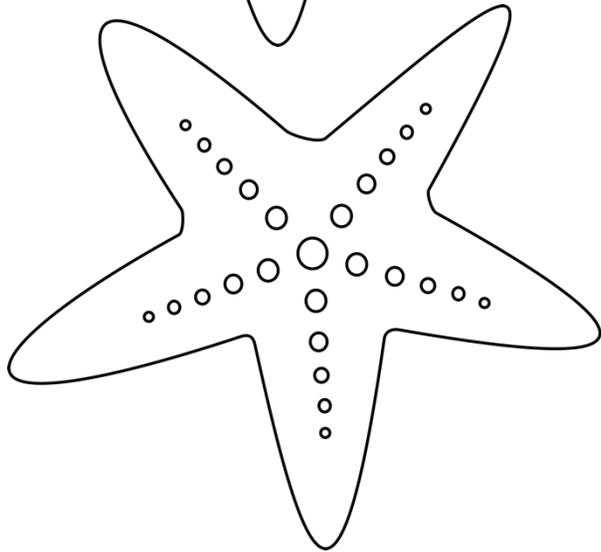
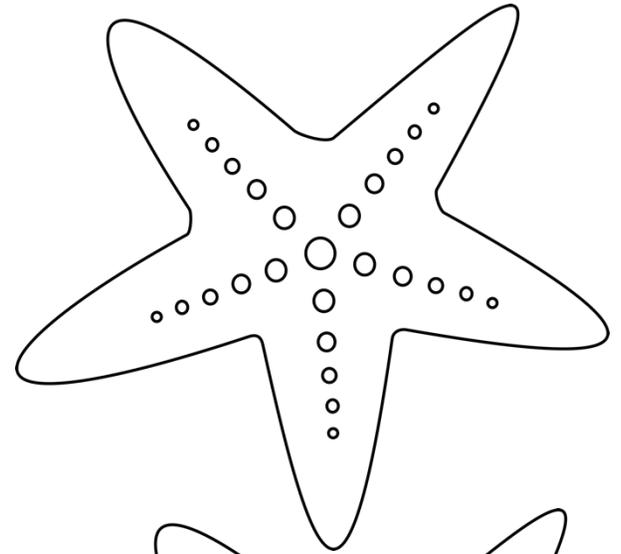
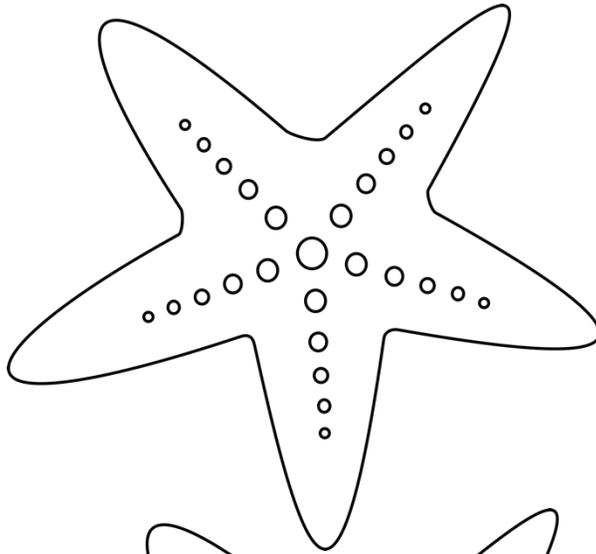
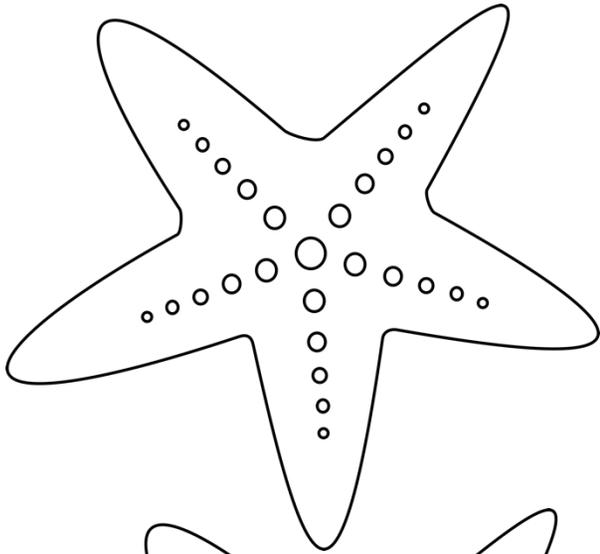
Migration Game: Round 3 Cards

6th – 12th Grade

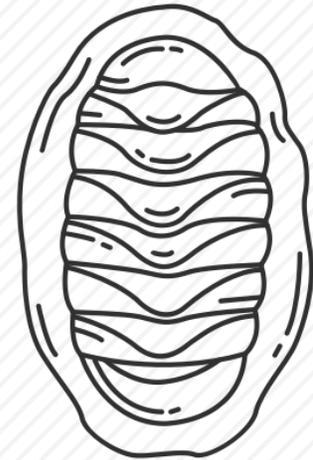
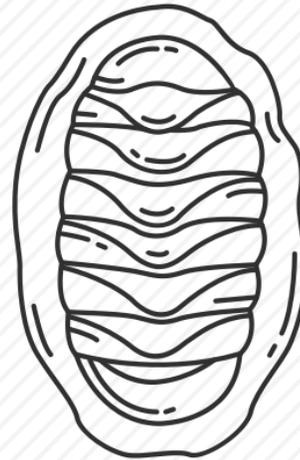
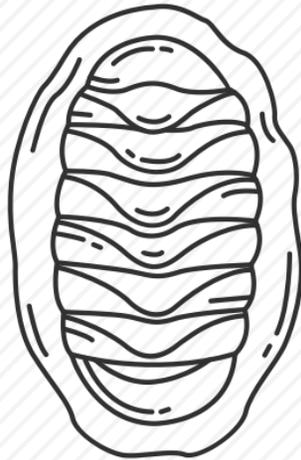
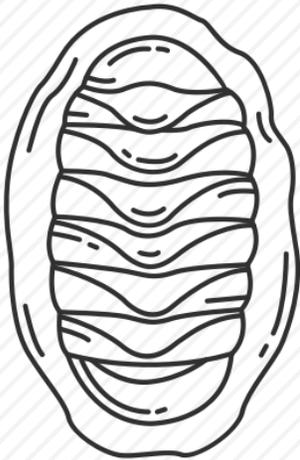
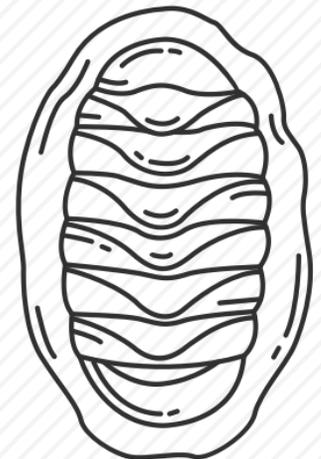
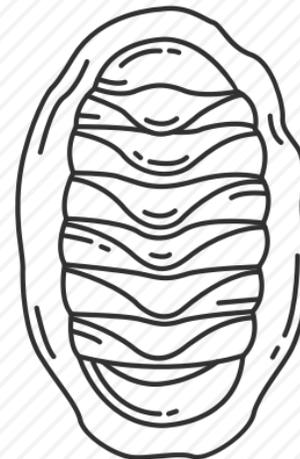
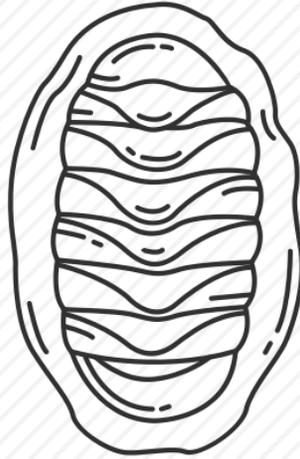
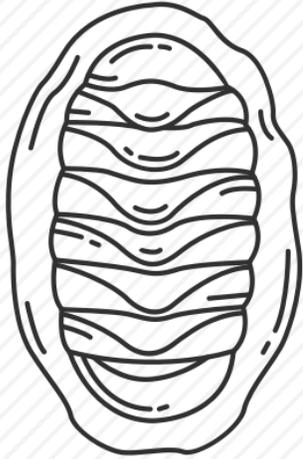
1 card/student

<p>ROUND 3</p> <p>You eat a bunch of plastic trash and your stomach feels full even though you aren't getting any food. Sit down where you are – you starve to death.</p>	<p>ROUND 3</p> <p>You see a tasty jellyfish! You eat it. Sadly, it was actually a plastic bag. It gets stuck in your stomach and blocks food from getting digested. Sit down where you are – you starve to death.</p>	<p>ROUND 3</p> <p>While you are eating amphipods you are also eating a bunch of tiny marine plastics, you don't get as much food as you normally would. Spin in place 3 times before you can keep swimming.</p>
<p>ROUND 3</p> <p>You eat some tiny plastic trash thinking it is amphipods. You feel sick for a while. Spin in a circle 10 times where you are then you may continue.</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>
<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>	<p>ROUND 3</p>  <p>500 Pounds of Amphipods</p>

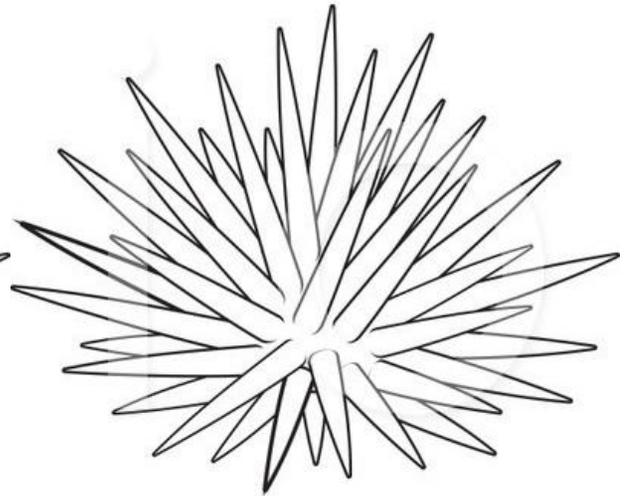
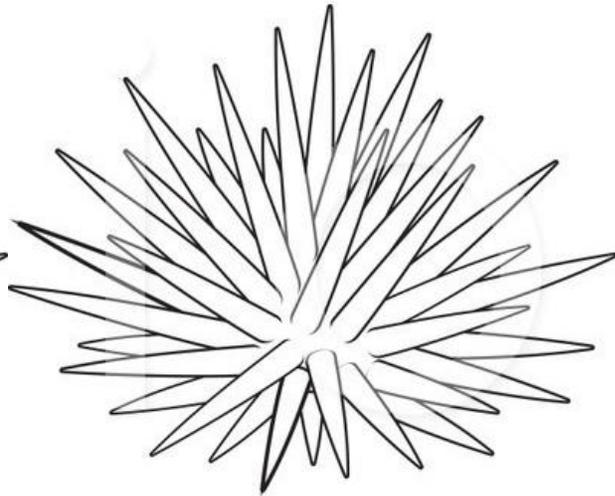
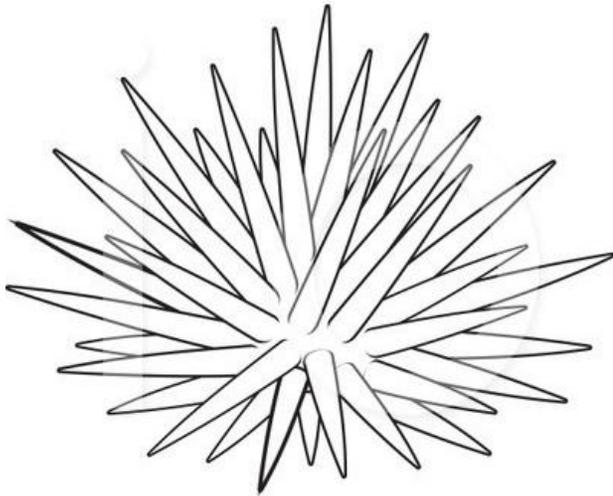
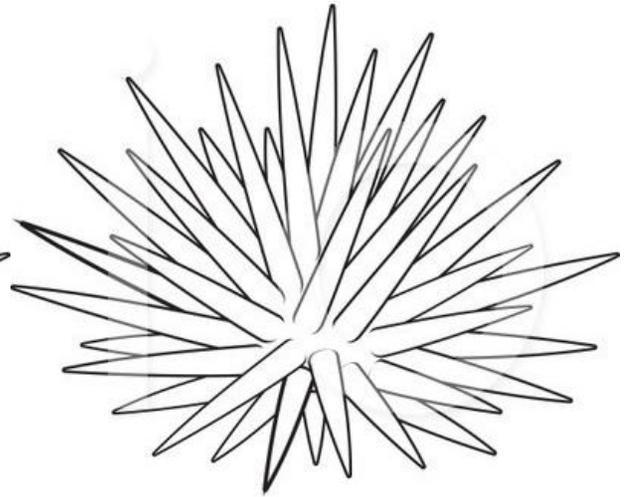
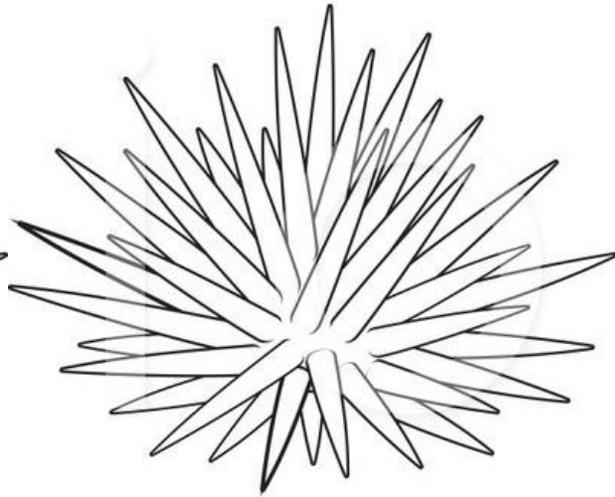
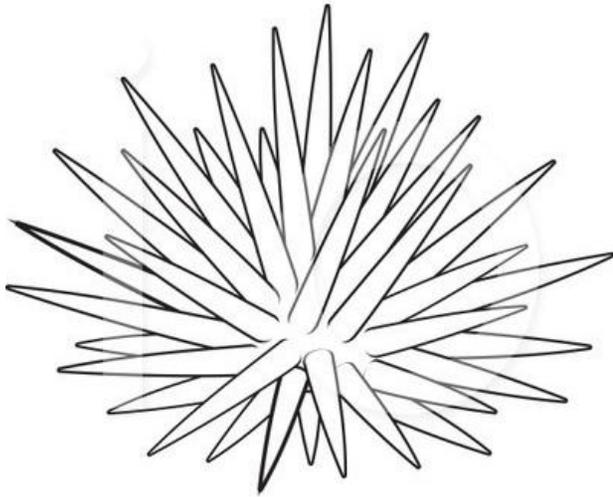
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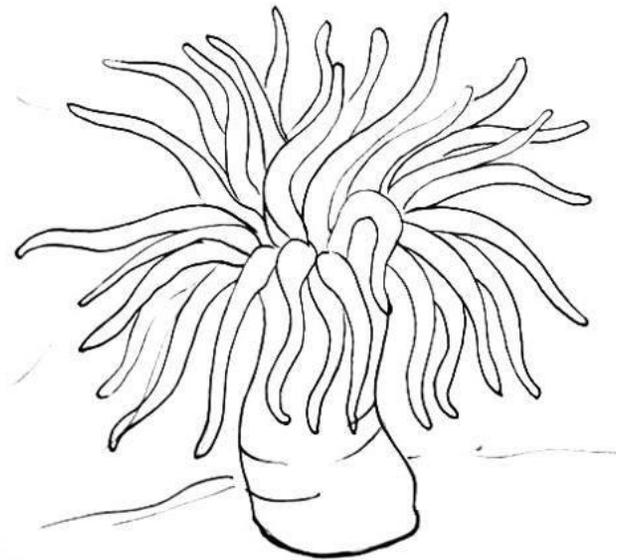
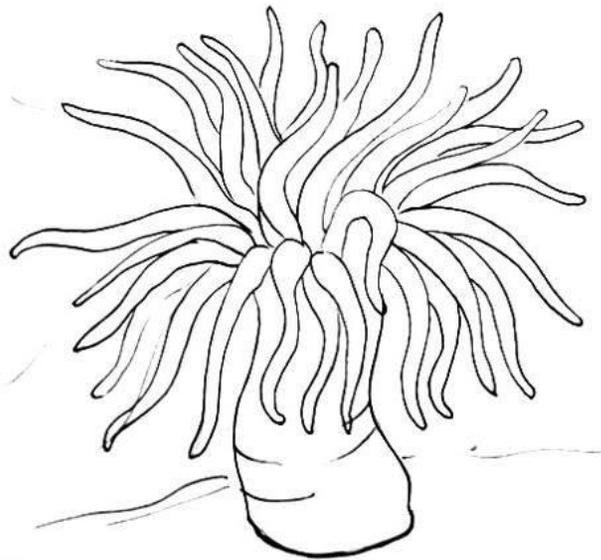
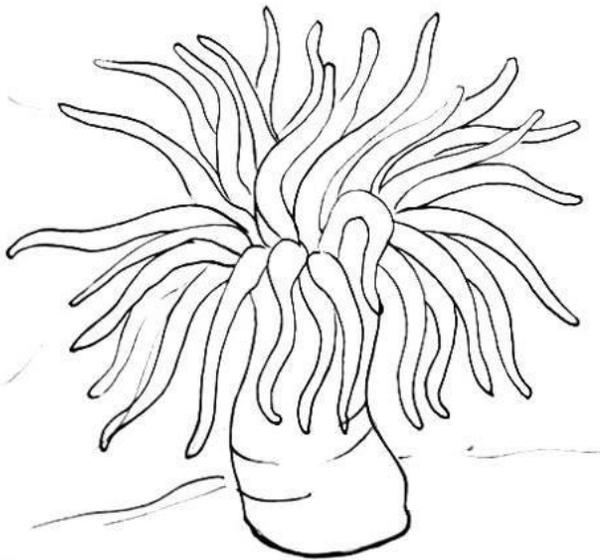
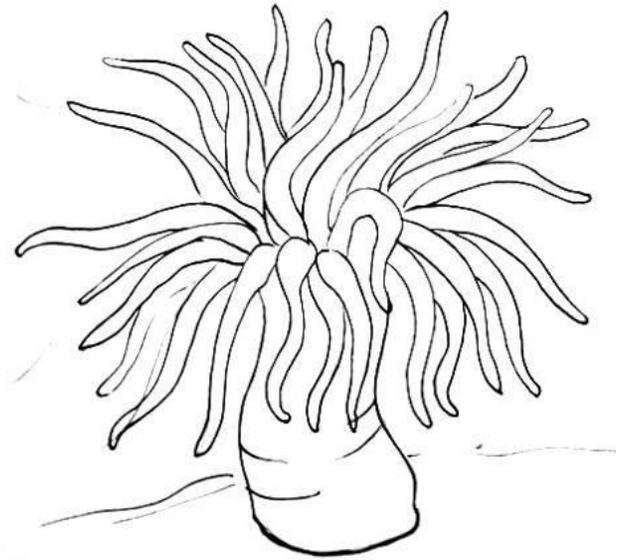
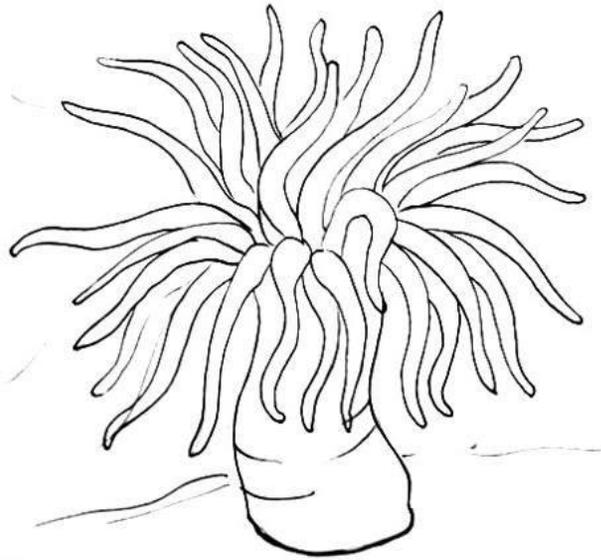
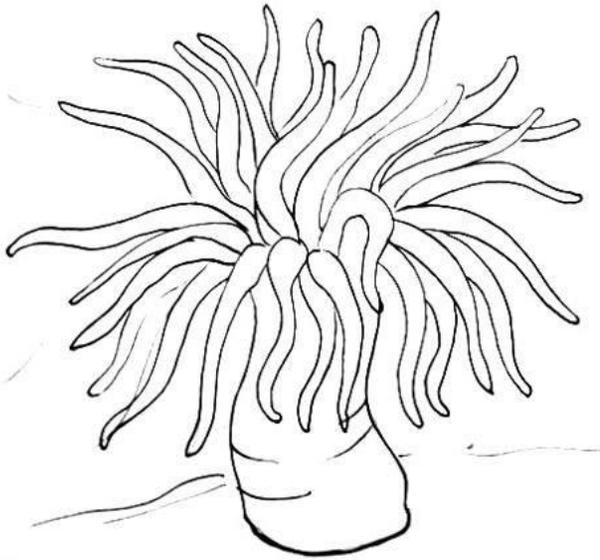


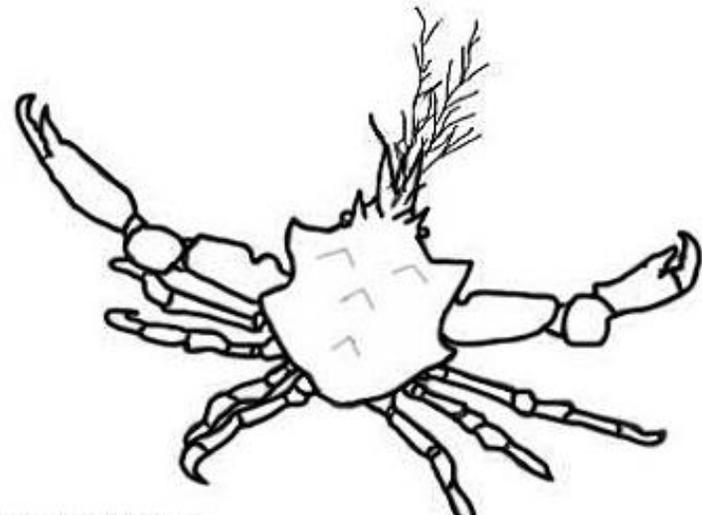
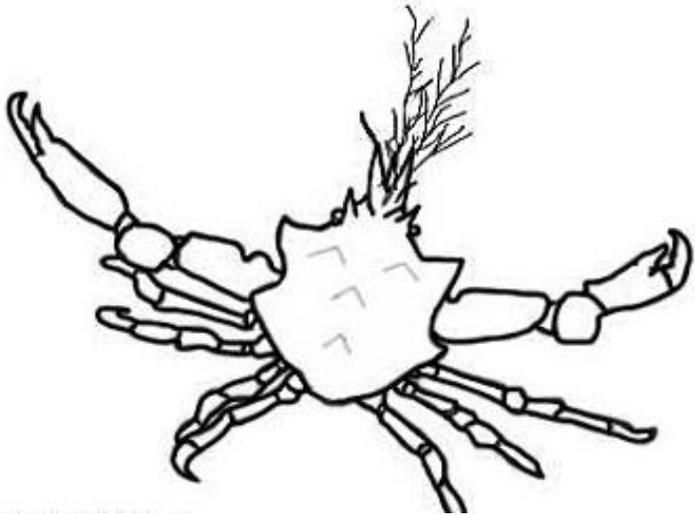
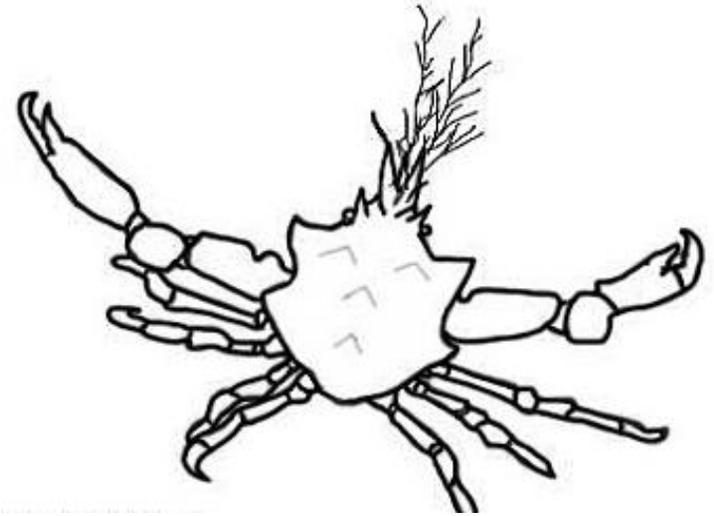
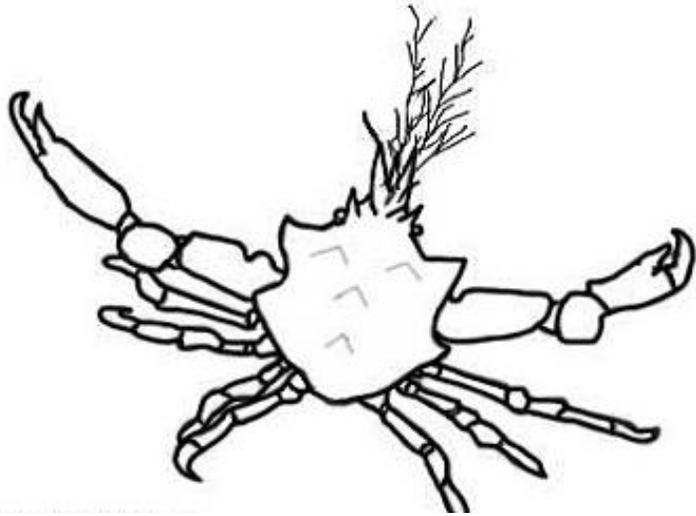


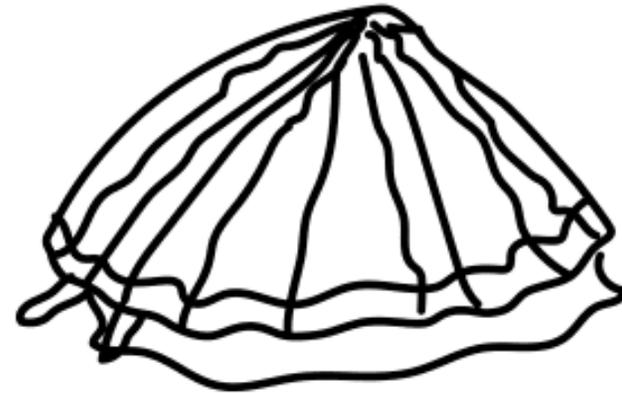
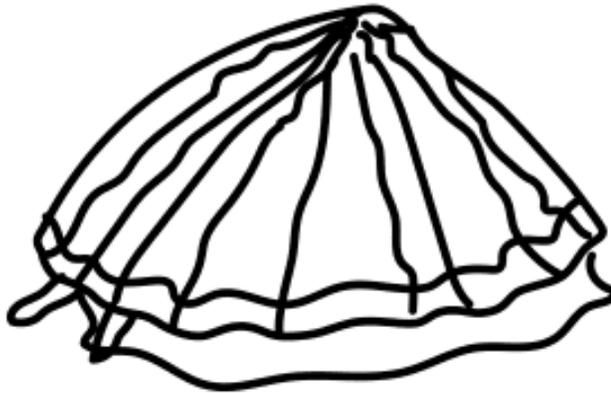
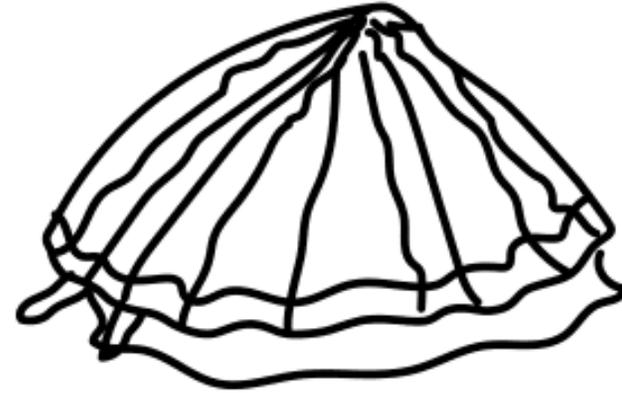
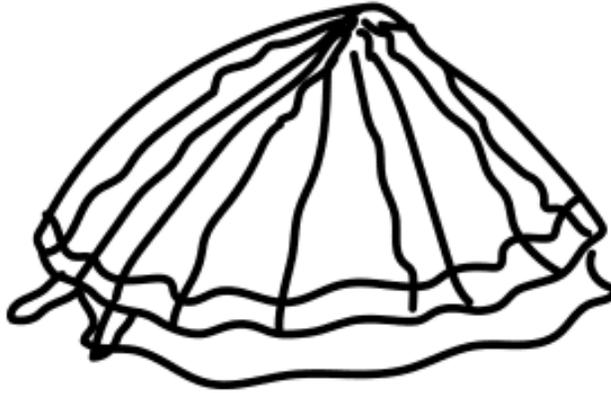
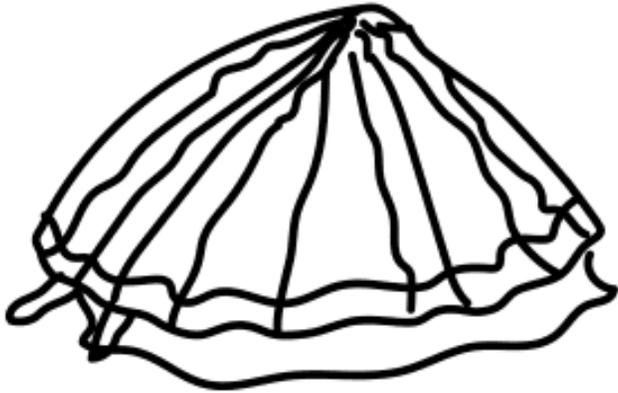


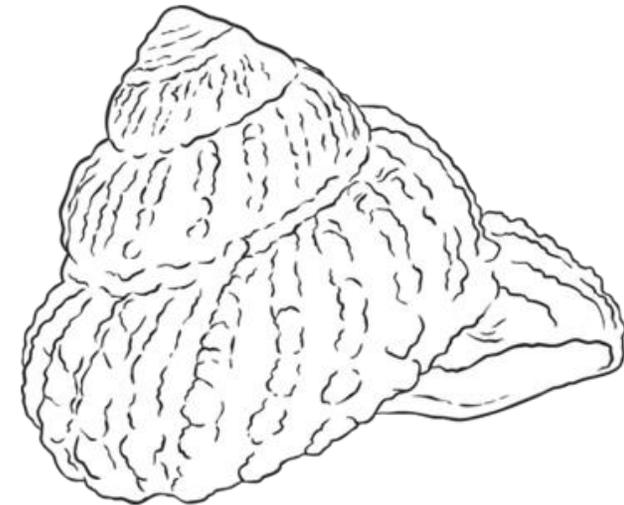
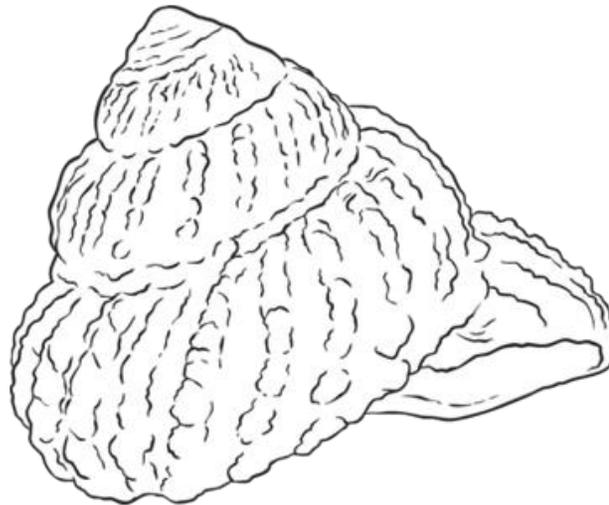
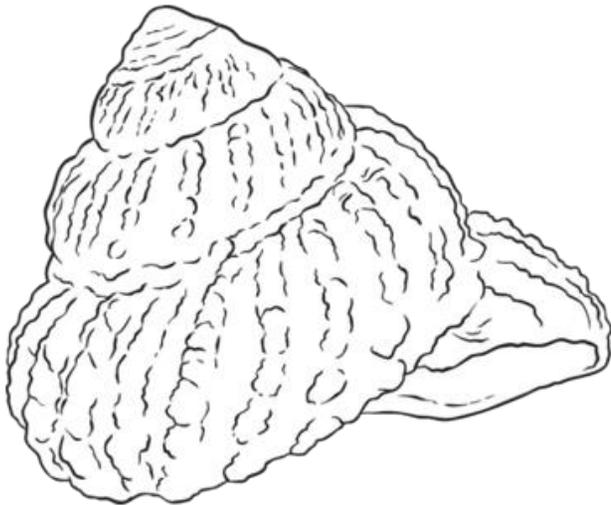
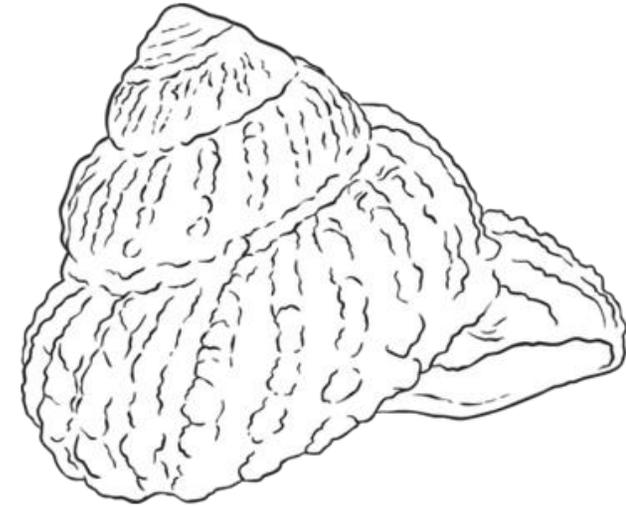
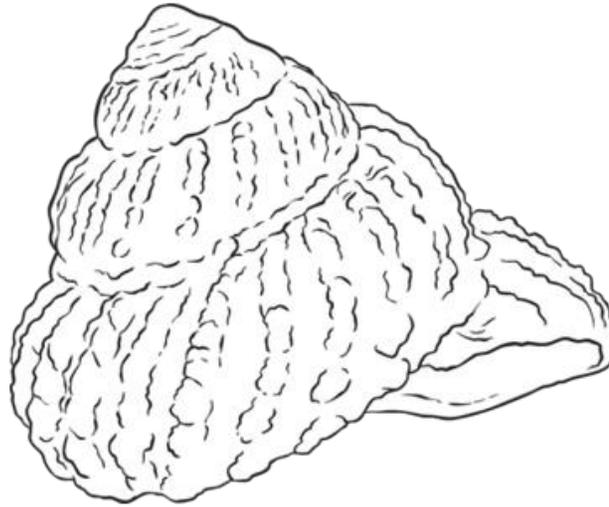
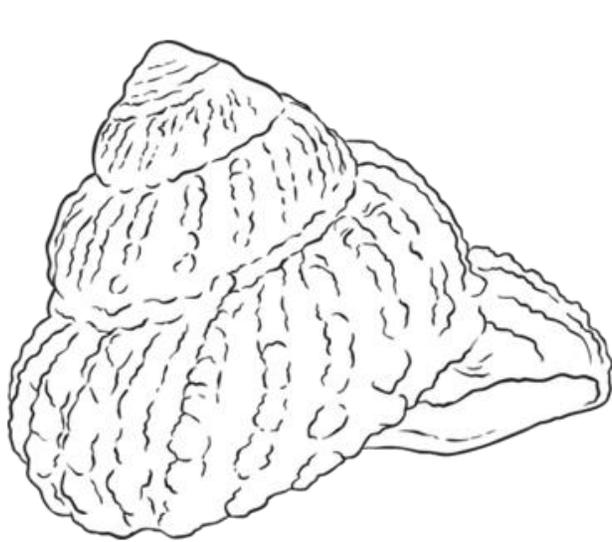


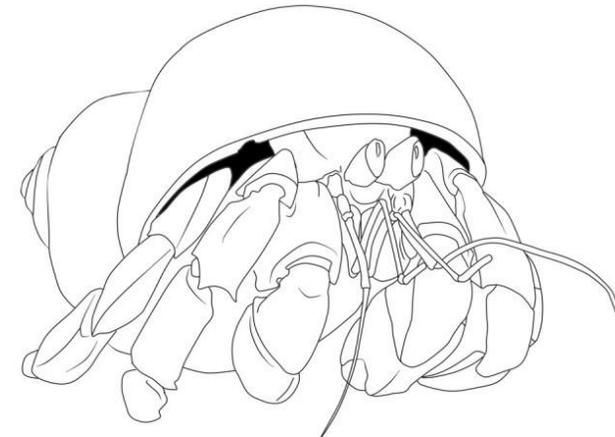
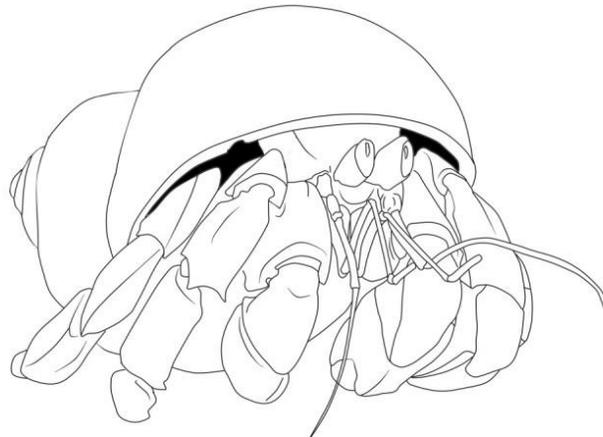
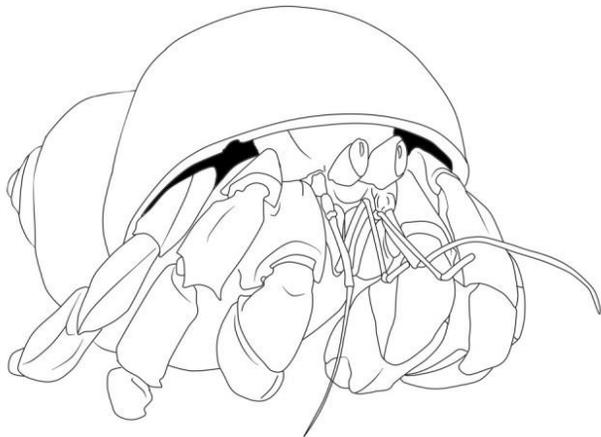
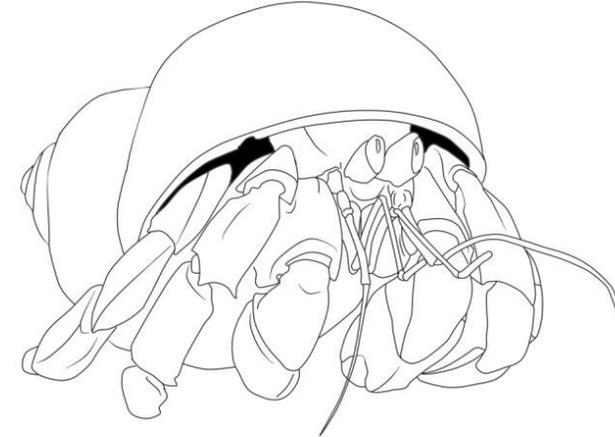
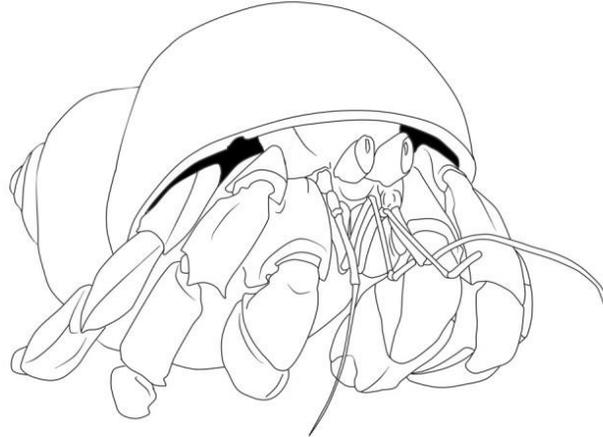
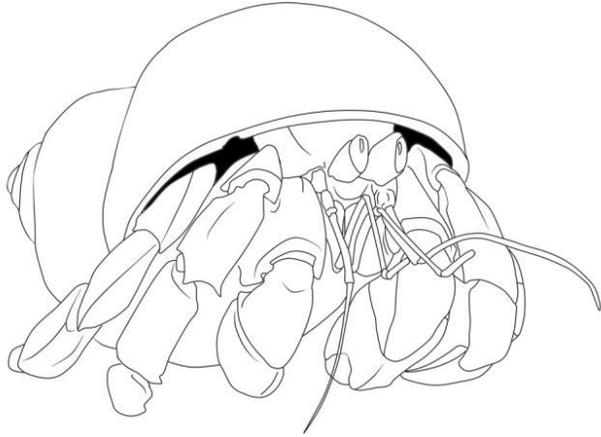


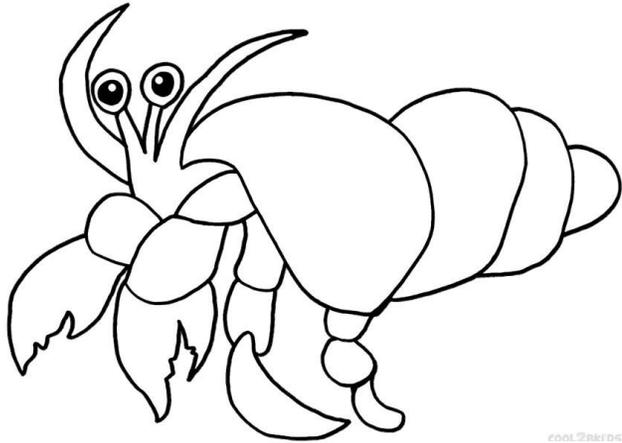




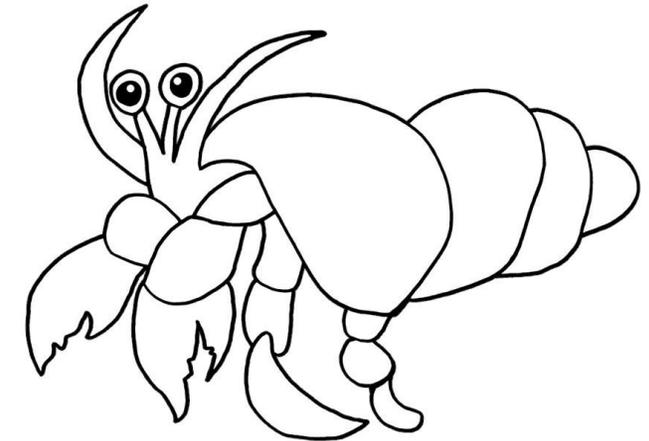
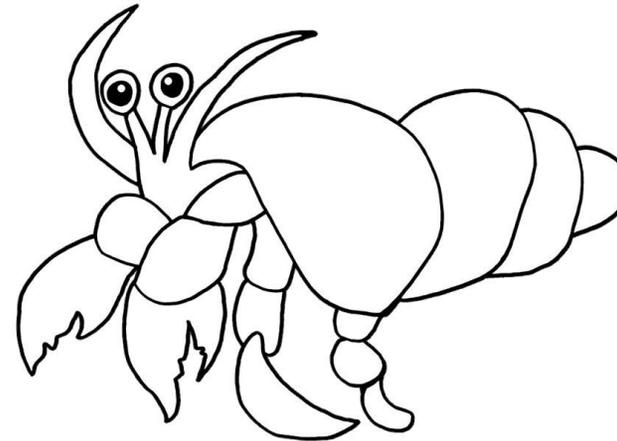
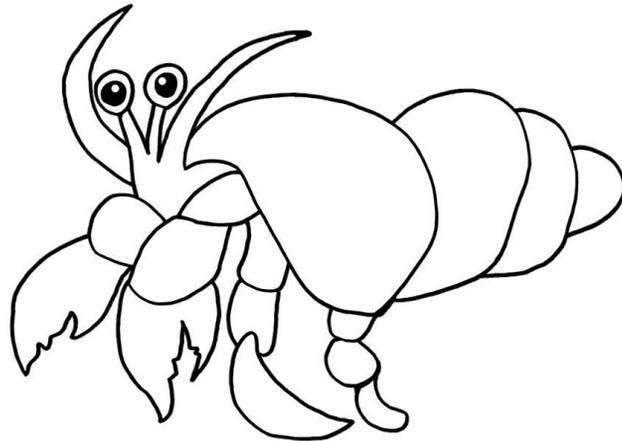
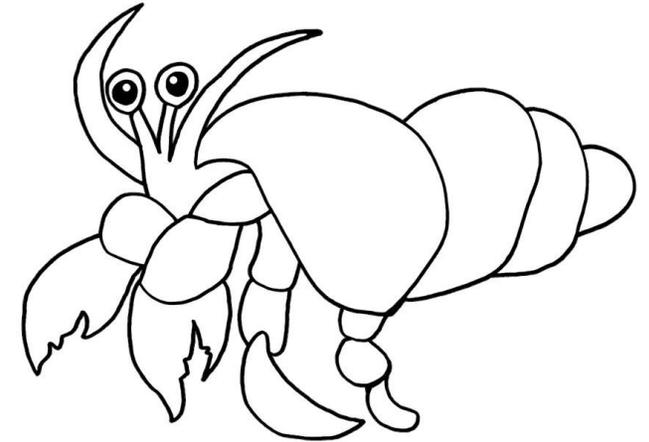
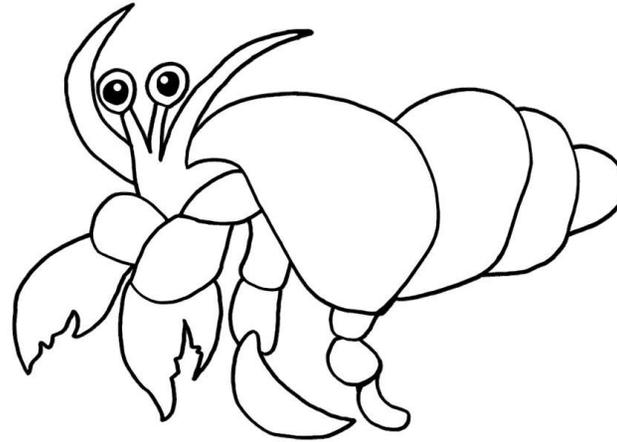




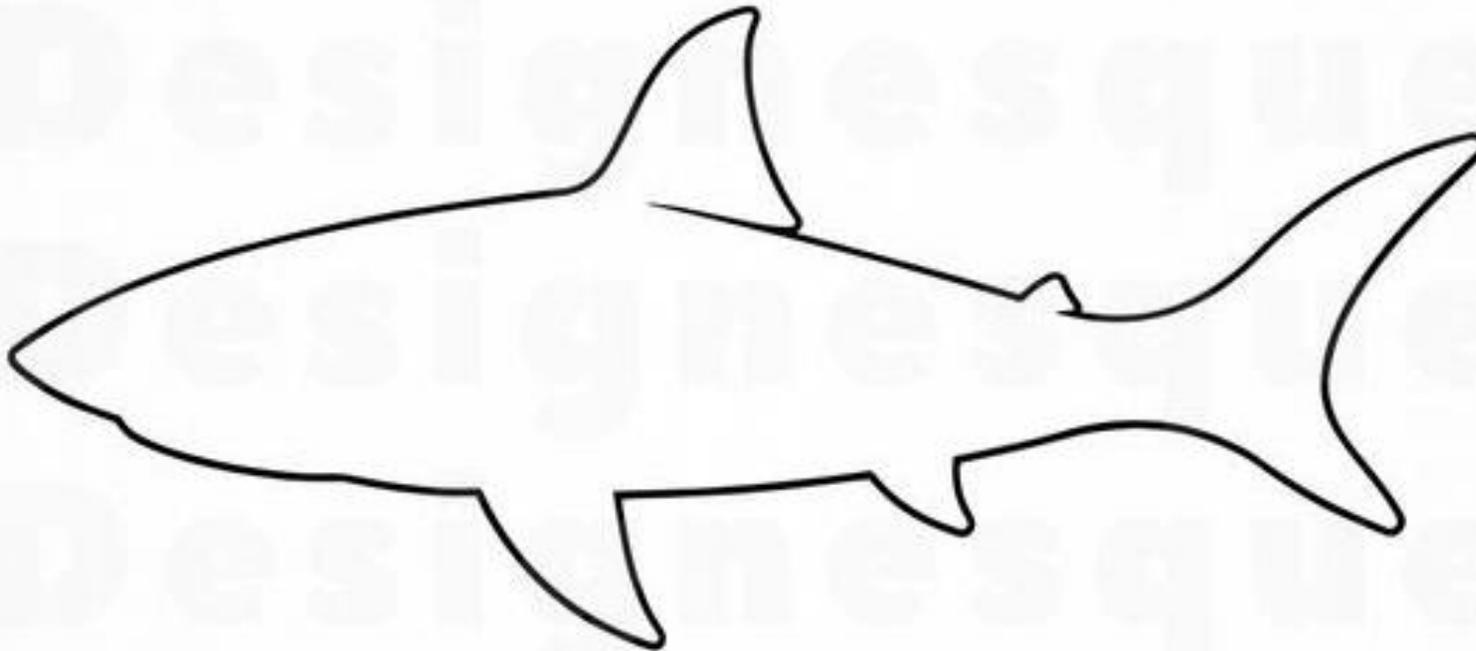
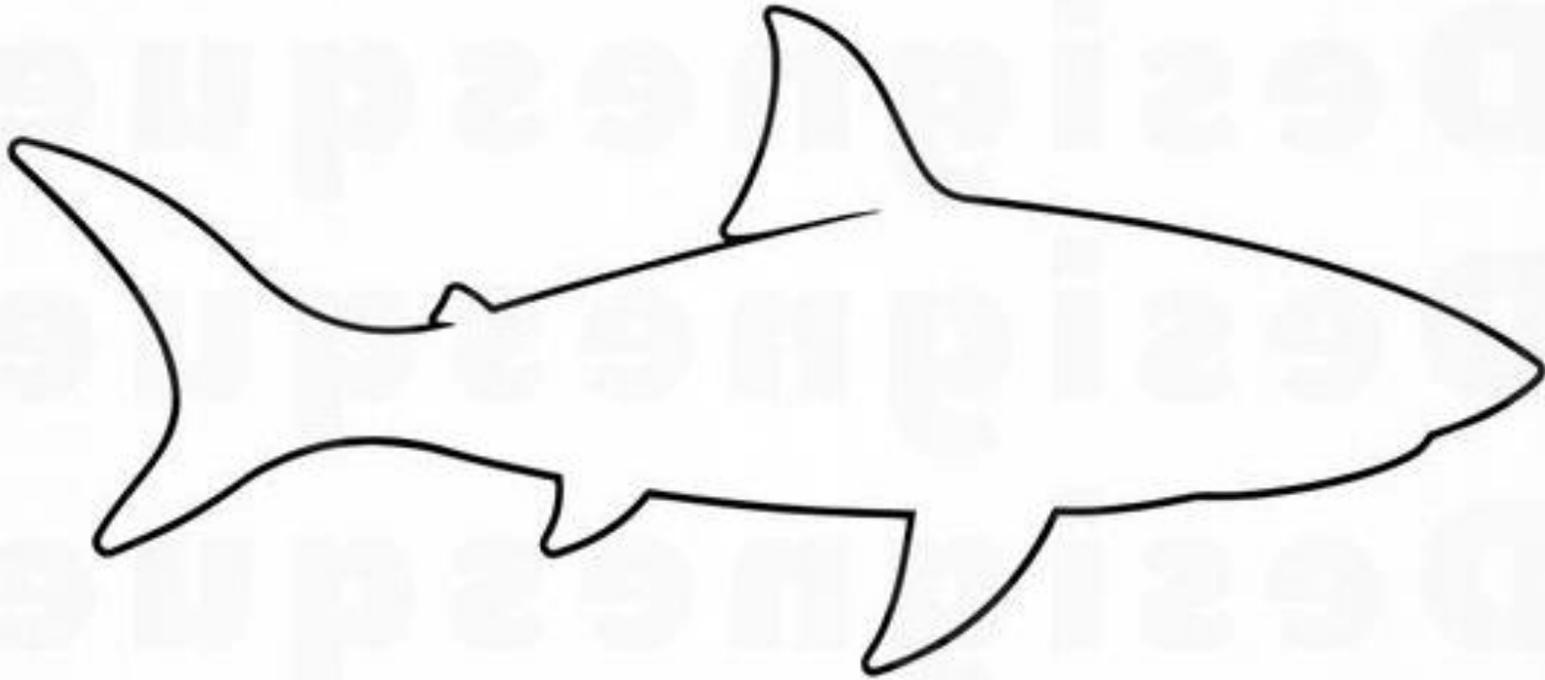


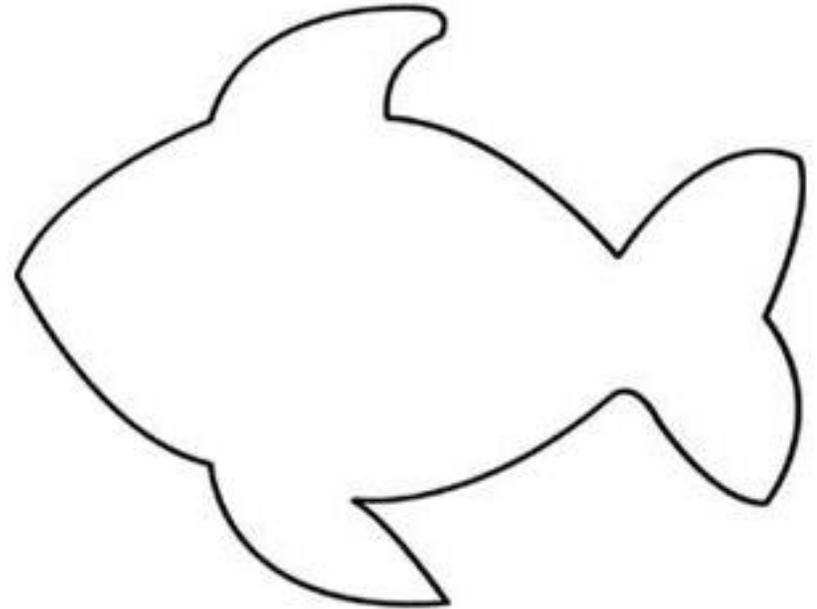
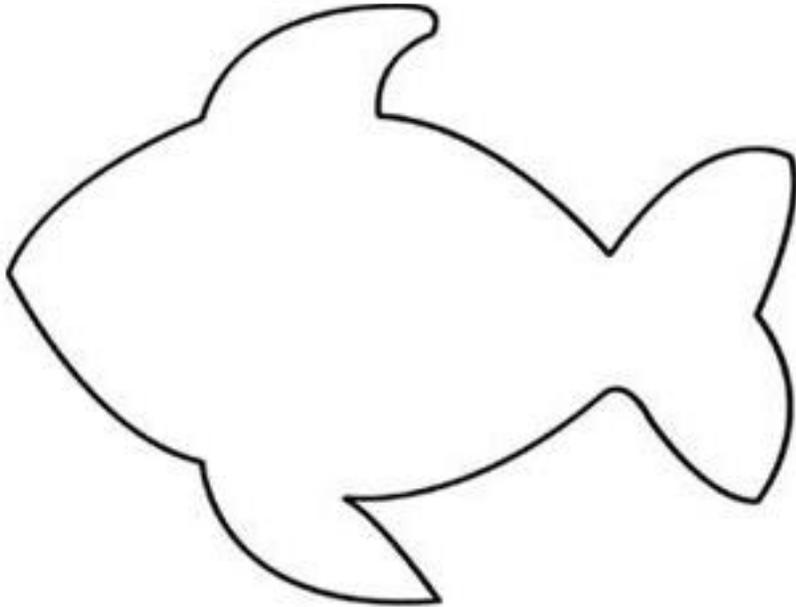
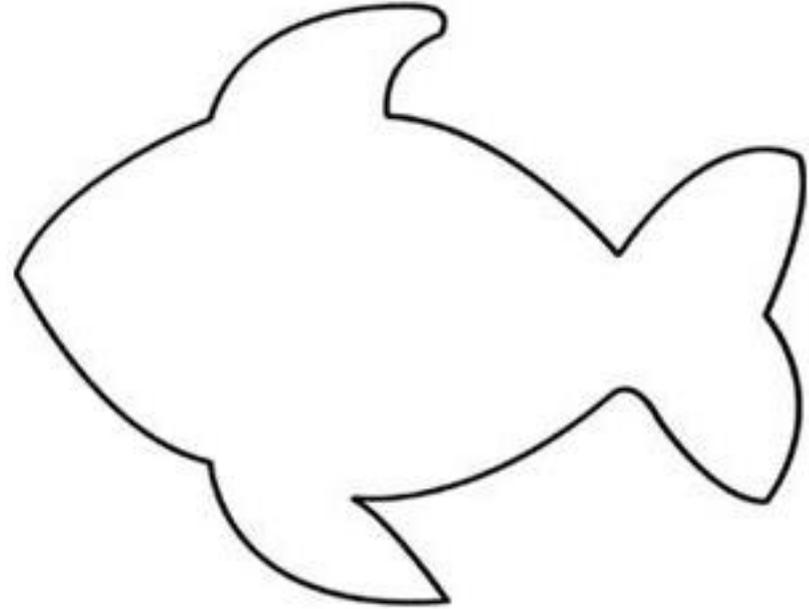
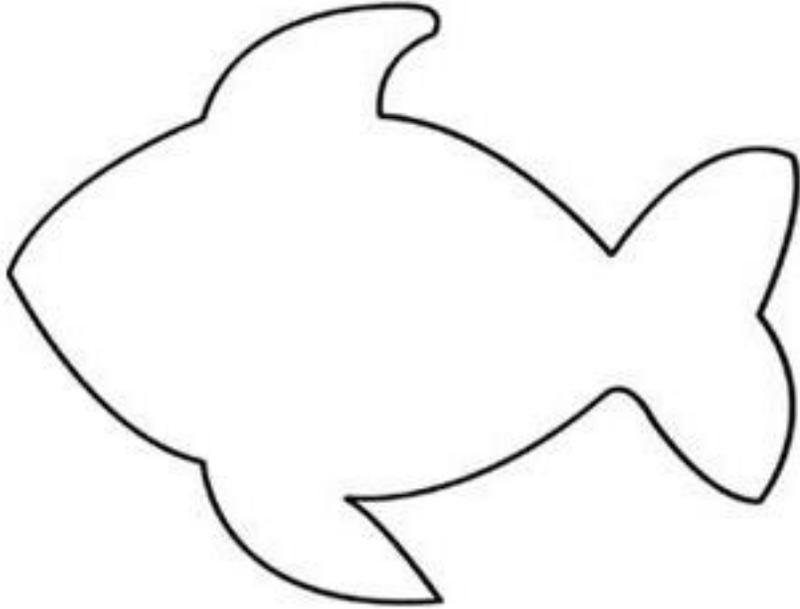


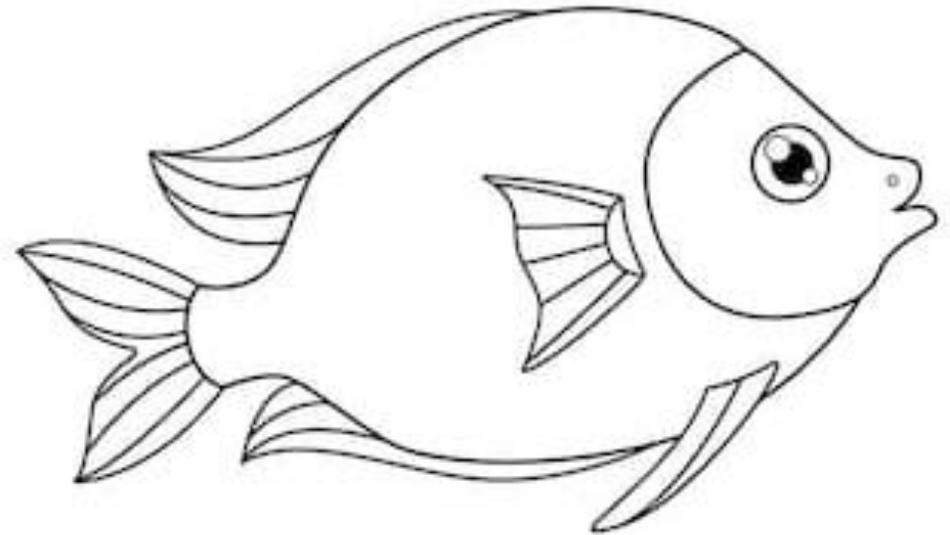
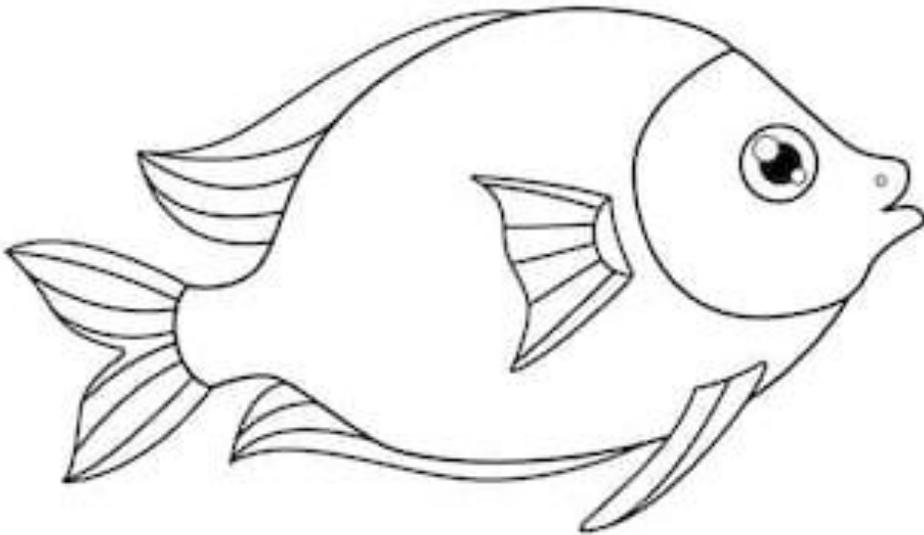
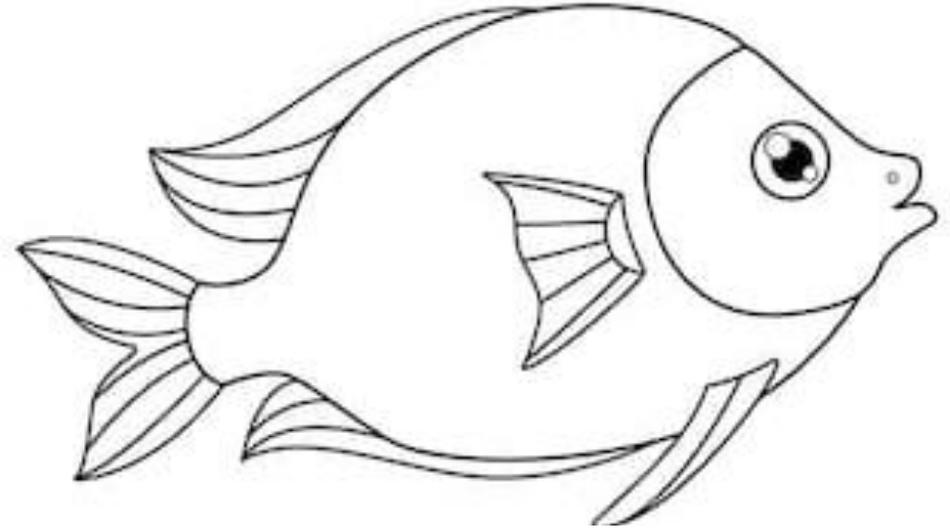
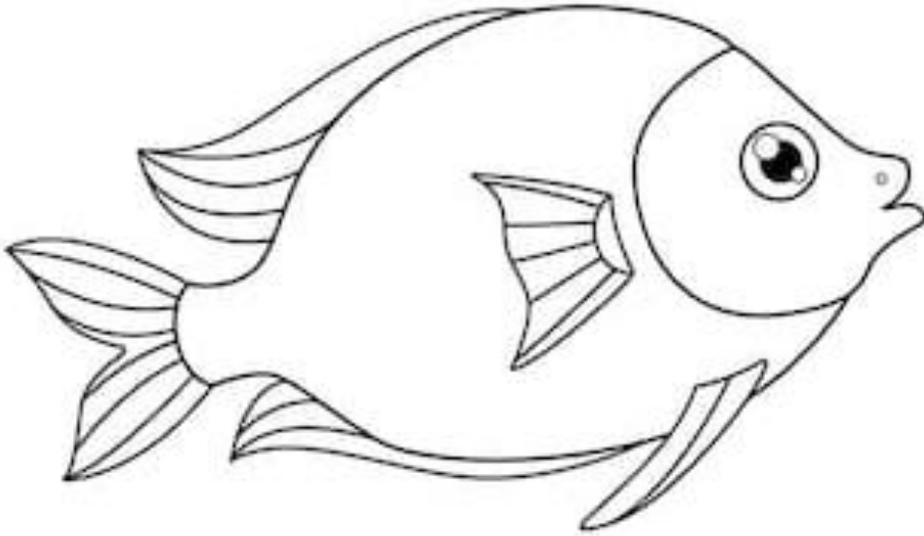
cool2kids

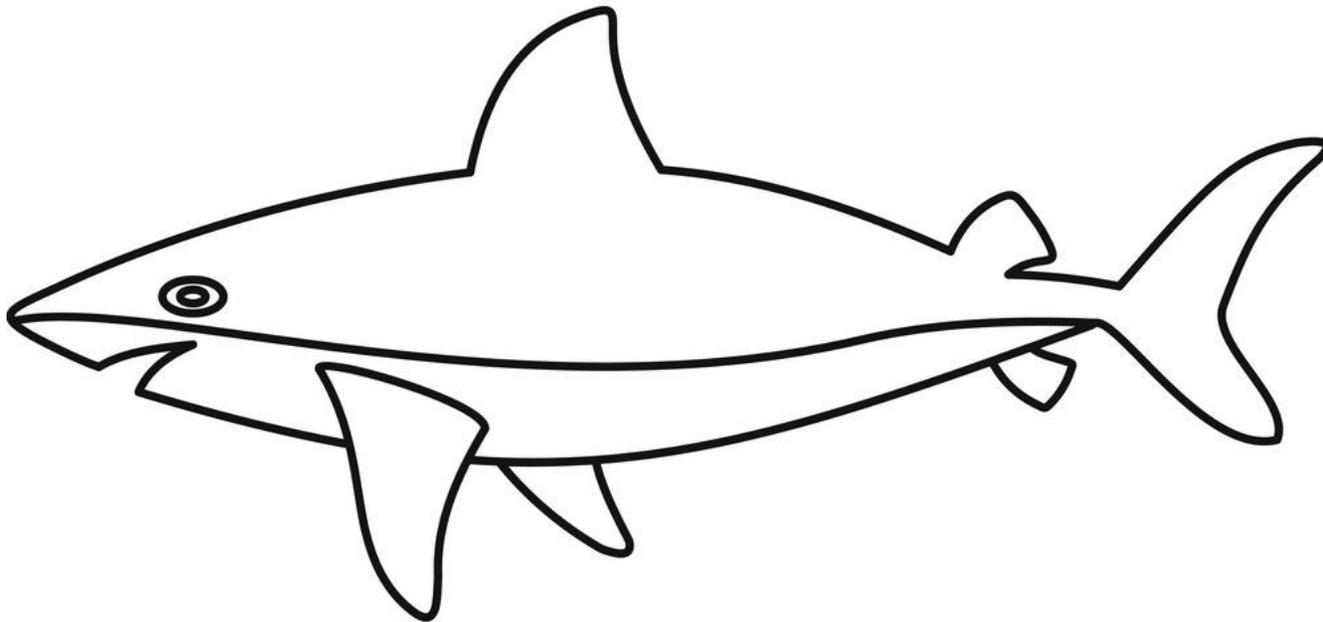
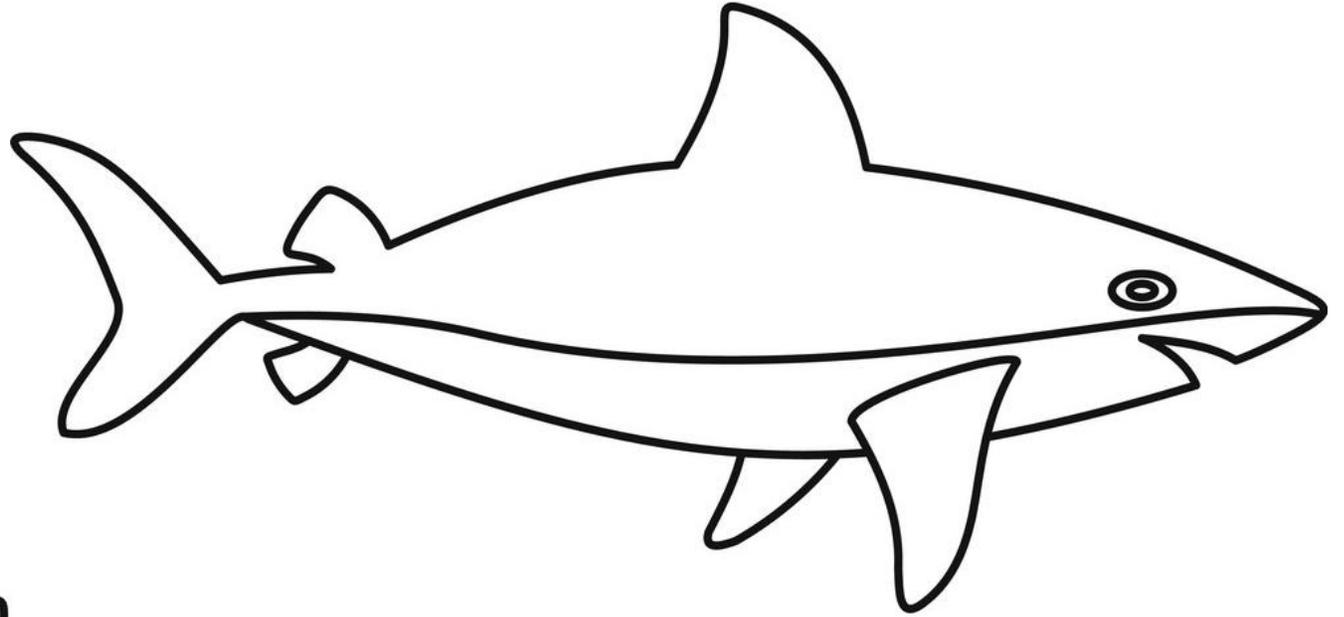


OUTLINES FISH AND SHARKS

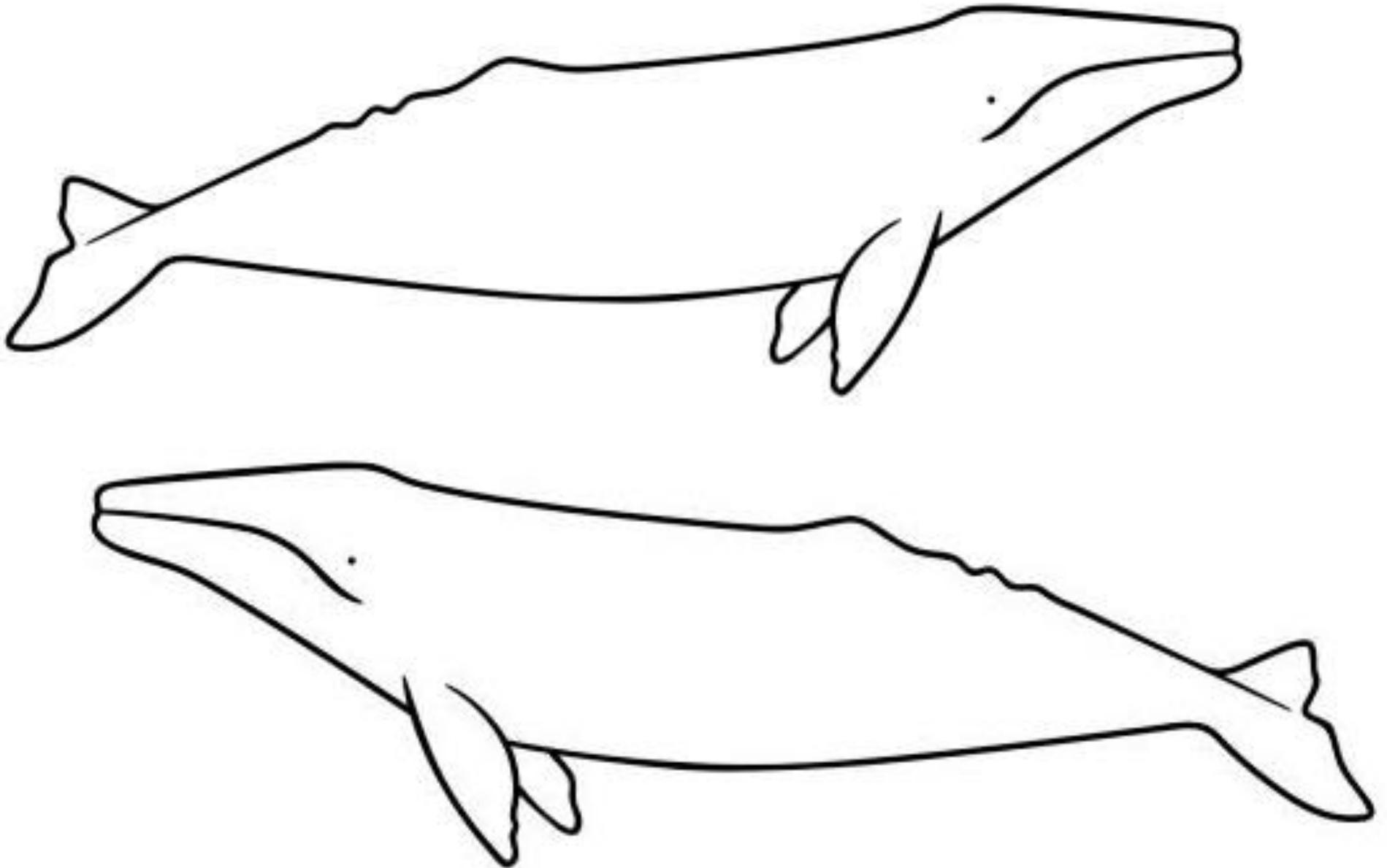


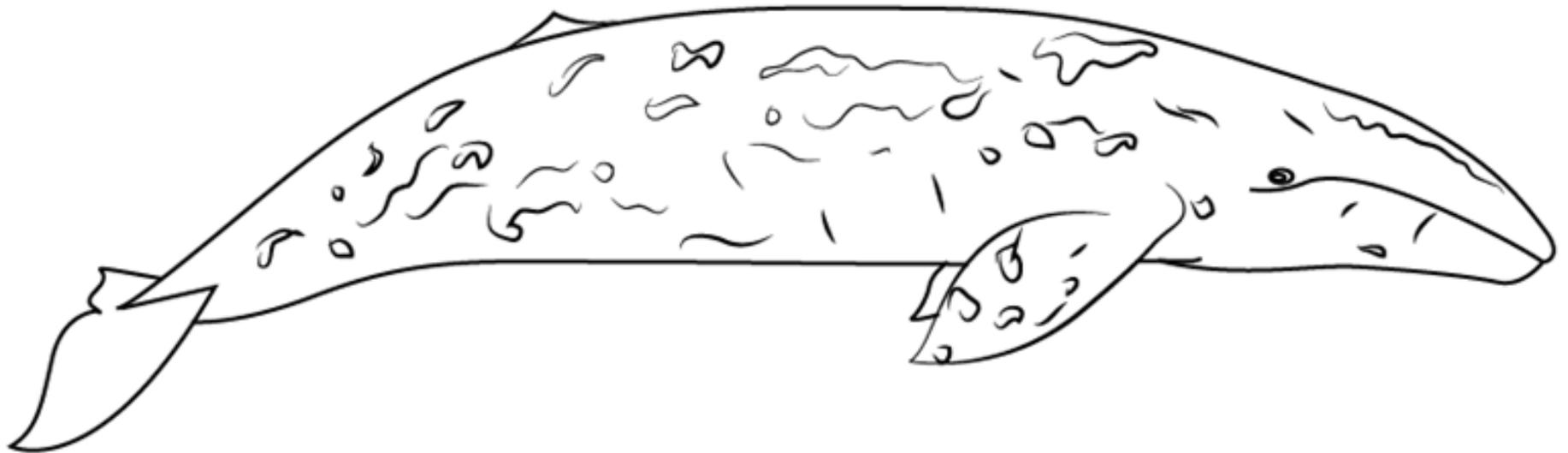
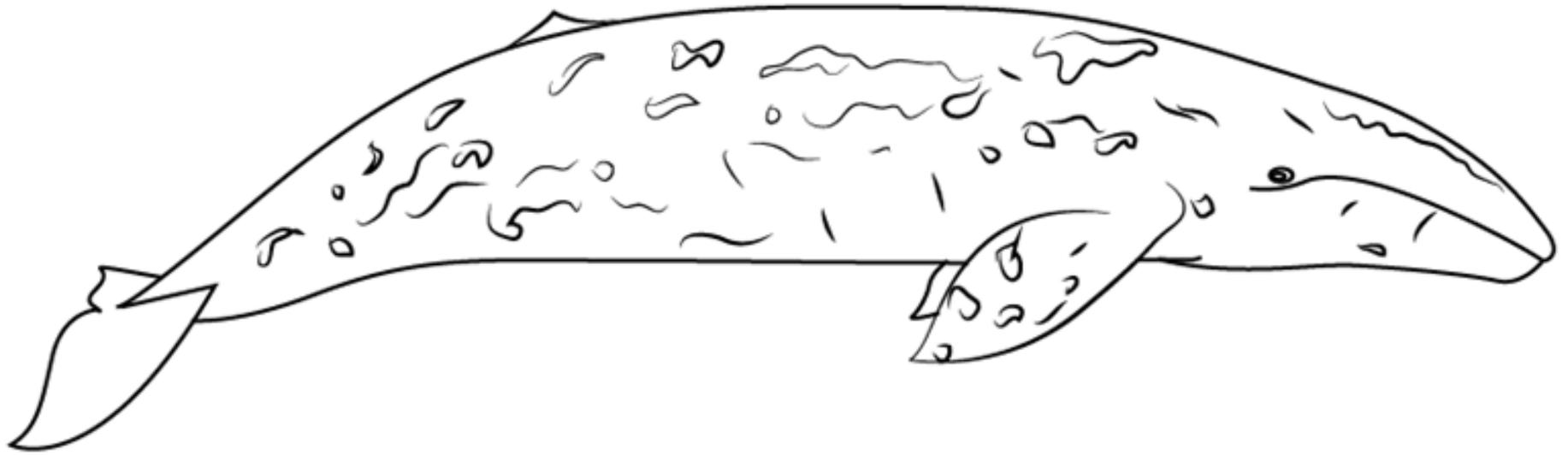


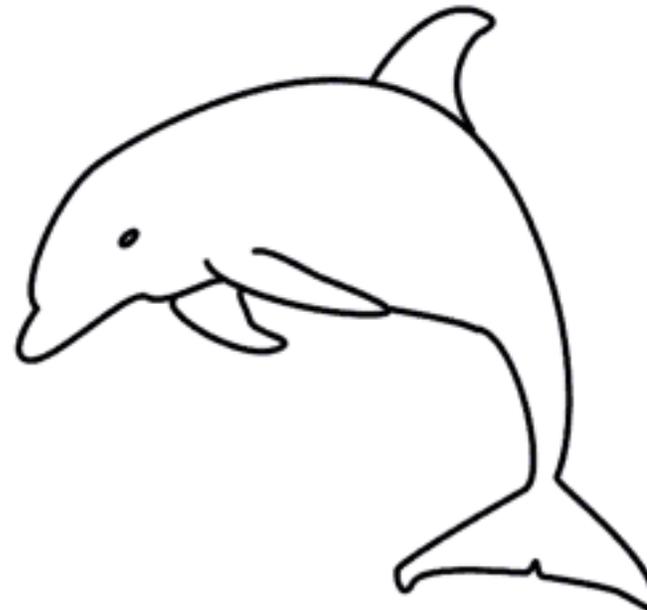
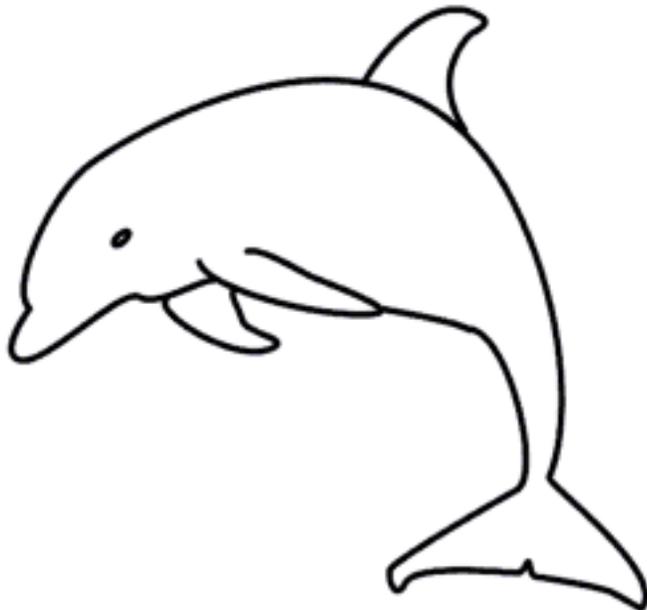
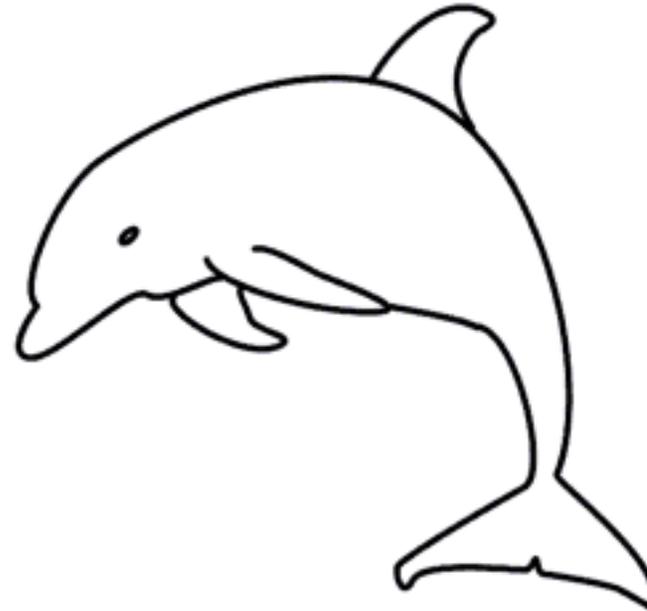
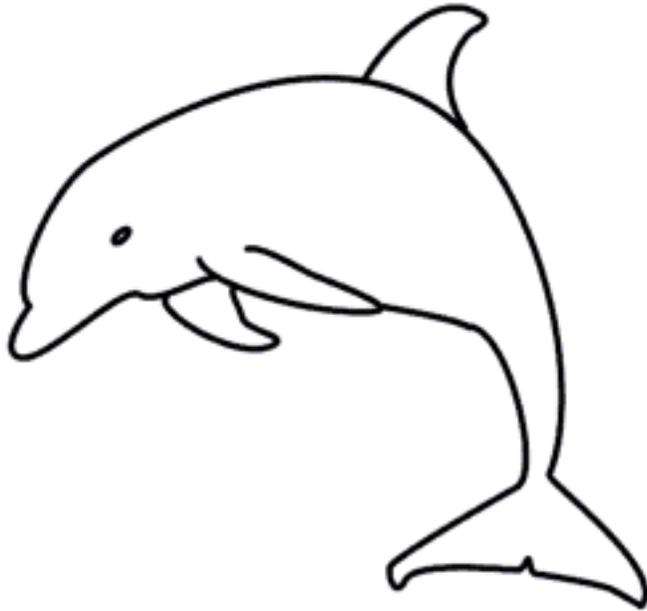


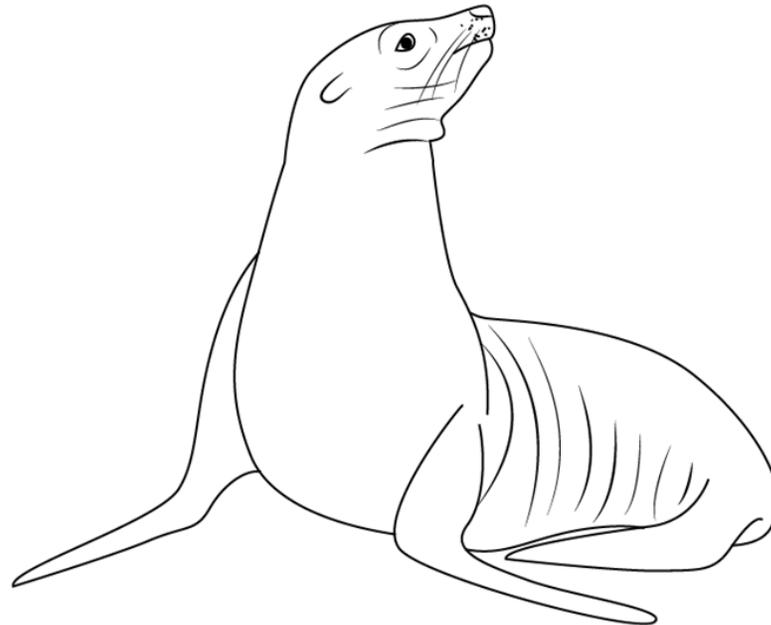
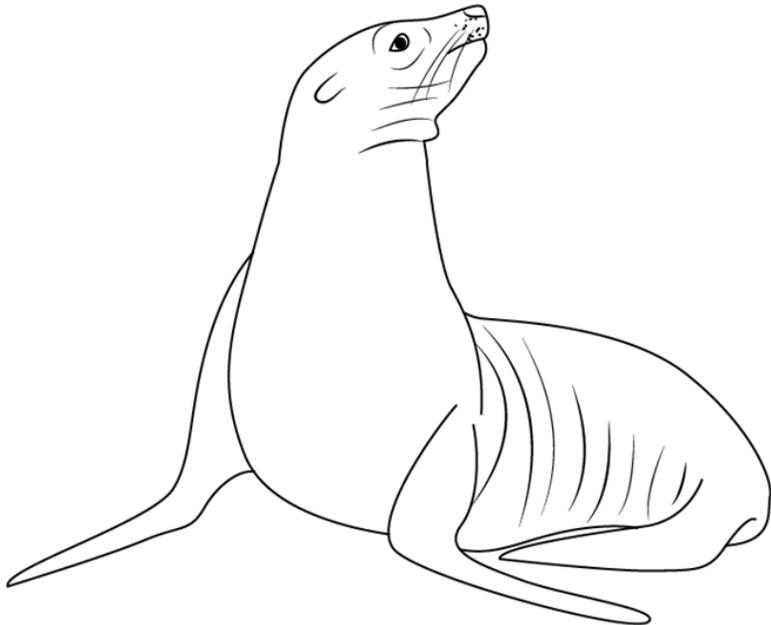
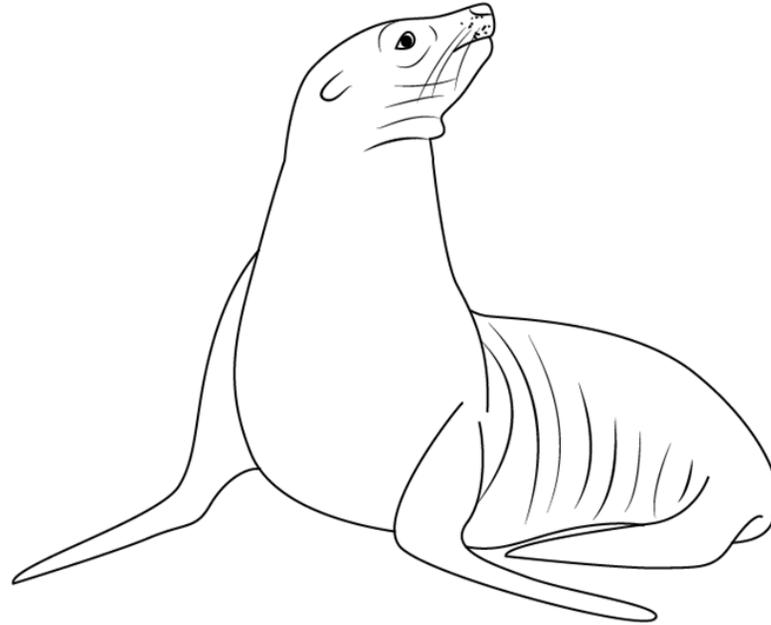
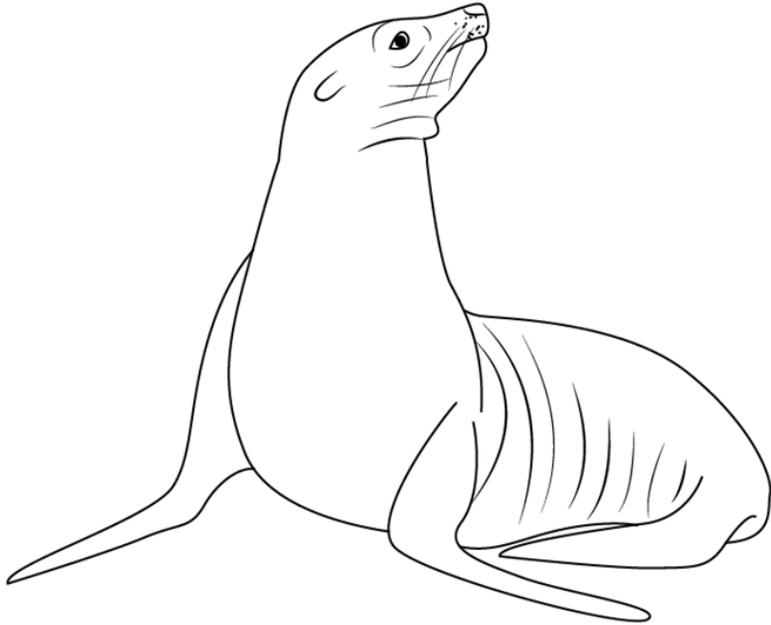


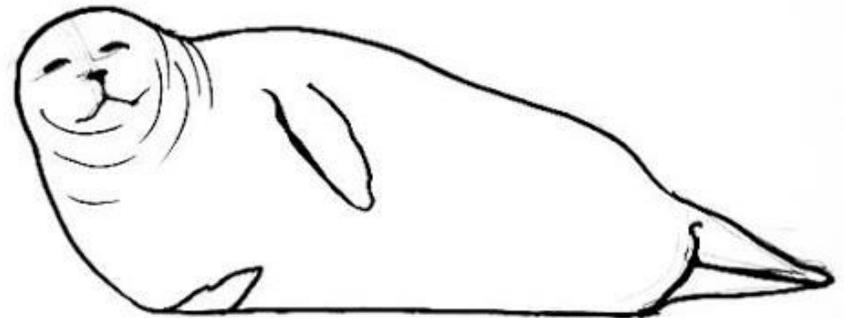
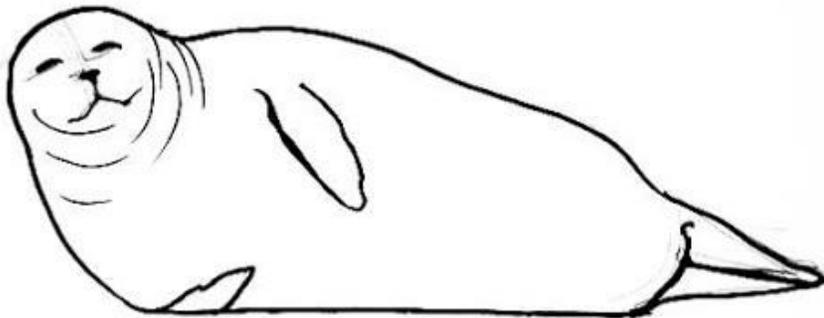
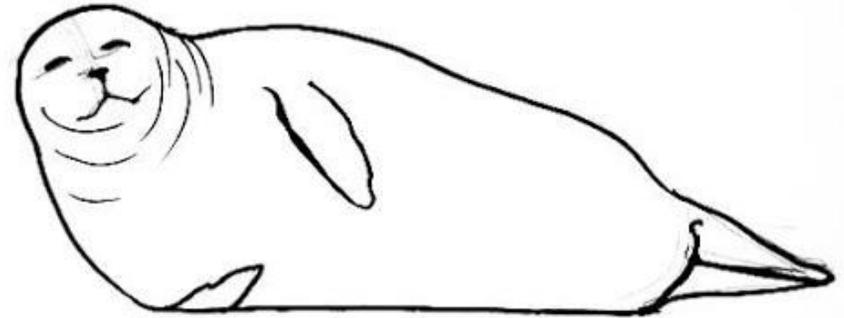
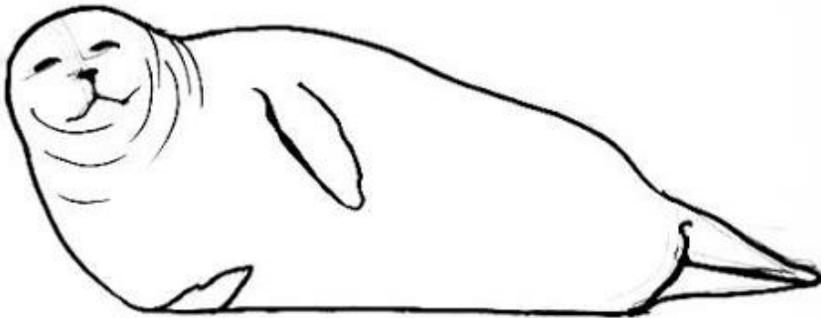
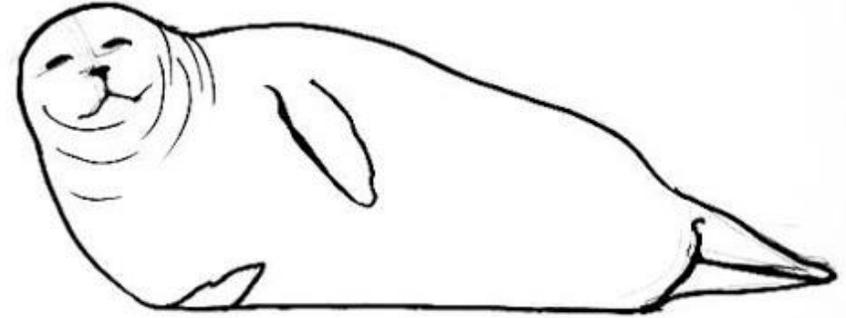
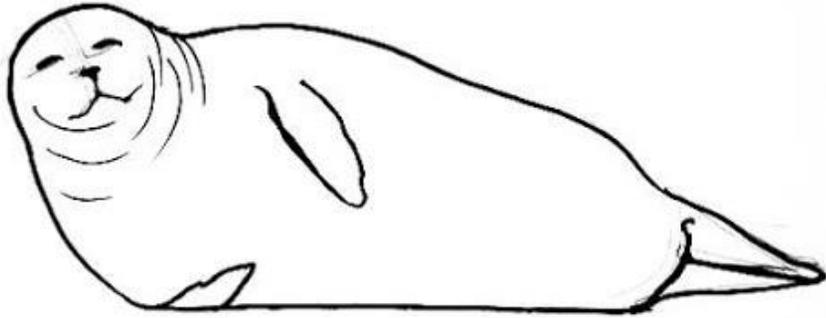
OUTLINES MARINE MAMMALS











Invertebrate Fact Sheet

Hermit Crabs

- Predator or Prey: Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation: Round body
- They eat: Mussels, plankton, or dead plants/animals (scavengers)
- Eaten by: Birds and larger crabs
- Other information:
 - Have to find a shell to live in because they do not make their own. These shells are left behind from other animals like snails.
 - They do not stay in the same shell their entire lives. When a hermit crab grows too big, it needs to find a bigger shell (like when you grow and need to buy bigger clothes).
 - Sometimes hermit crabs fight over the best available shell available.
- Potential questions:
 - Who do you think makes the shells that the hermit crabs live in? (snails, other invertebrates!)
 - What do you think a hermit crab uses its big claws for?



Sea Stars

- Predator or prey? Both
- Living organism adaptation:
 - They can regenerate their legs as long as enough of their central disc is intact.
 - Spiny skin to protect themselves against predators.
- Physical environment adaptation: Tube feet
- They eat: Other invertebrates like barnacles, mussels, snails, clams or urchins
- Eaten by: Fish, snails, crabs, shrimp, otters, birds and even other sea stars
- Other information:
 - Commonly referred to as starfish but they are not fish.
 - Can evert their stomach to digest prey.
- Potential questions:
 - Why is it helpful that the sea star can regenerate its legs?
 - What part of their body do you think they use to move around the rocky seashore?



Shore Crabs

- Predator or Prey? Both
- Living organism adaptation:
 - Claws (helps as predator)
 - Exoskeleton (helps as prey)
- Physical environment adaptation: Flat body
- They eat: Other invertebrates (like limpets), algae, or dead plants/animals
- Eaten by: Sea otters, fish, larger crabs, octopus, turtles
- Other information:
 - Hard exterior, called exoskeleton, is not made of bone (because they are invertebrates!). When the crab grows too big, it will shed its exoskeleton, like a snake sheds its skin, and grow a new one.
 - Crabs only move sideways and can squeeze into cracks in rocks.
- Potential questions:
 - What do you notice about the color/pattern of this crab? Do you think this an adaptation?
 - What is it an adaptation for?



Wavy Top Snails

- Predator or Prey? Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation: Muscular foot
- They eat: Algae
- Eaten by: Sea stars, octopus, lobsters, and fish
- Other information:
 - Shell helps protect themselves from predators and also helps them keep from drying out in the sun, like a hat or sunscreen.
 - They can close their entire body into their shell and close a “trap door” (operculum) to protect their soft bodies.
 - They can live up to 12 years and are the largest snails in California.
- Guiding questions:
 - What do you notice about the shape of their shell? How is this an adaptation?



Keyhole Limpets

- Predator or Prey? Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation:
 - Muscular foot (for sticking)
 - Round body (for waves)
- They eat: Algae
- Eaten by: Birds, sea stars, lobsters, crabs
- Other information:
 - Muscular foot can also help limpet hold on to rocks so predators cannot remove them.
 - The hole on top is where waste is expelled, some people think it is an eye.
 - Eyespots are located near tentacles.
- Guiding questions:
 - What adaptations would an animal need to eat this keyhole limpet?



Sea hares

- Predator or Prey? Prey
- Living organism adaptation: Spits out ink
- Physical environment adaptation:
 - Muscular foot
 - Camouflage
- They eat: Algae
- Eaten by: Sea stars, lobsters, and even some sea slugs (Navanax)
- Other information:
 - This is a type of sea slug. They are related to snails.
 - Have muscular foot to help them move and hold onto rocks.
 - They protect themselves by spitting out purple ink/mucus to confuse their predators, since they don't have a hard shell to protect themselves.
- Guiding questions:
 - Why would a sea hare need to spit out its intestines or shoot out ink?
 - Why do you think the sea hare is slimy and covered in mucous?



Sea Urchins

- Predator or prey? Prey
- Living organism adaptation:
 - Spines
 - Shell (internal)
- Physical environment adaptation: Tube feet
- They eat: Algae
- Eaten by: Crabs, snails, otters, birds, fish, and even some sea stars (Sunflower star)
- Other information:
 - This is a sea otter's favorite food. Without otters, or other predators like fish and humans, the sea urchins can take over a kelp forest!
 - Urchins will often cover themselves with pieces of shell and algae for camouflage.
- Guiding questions:
 - Why do you think it has spines?
 - What other animals have tube feet? Do you think they are related?



Sea Cucumbers

- Predator or prey? Prey
- Physical environment adaptation: Tube feet
- Living organism adaptation:
 - Releases toxins through skin
 - Eversion and regeneration of guts, sticky and confusing to predators
- They eat: Algae and organic waste on the seafloor (decomposers!)
- Eaten by: Crabs, fish, and sea stars
- Other information:
 - Their false spines to seem scary to predators.
 - They poop out clean sand after they have extracted all the nutrients!
 - Related to sea stars and sea urchins.
 - Can expel some internal organs (gut) to scare off predators. They then regrow these insides!
- Guiding question:
 - What does this animal have in common with its cousins the sea star and urchins?
Tube feet!



Chitons

- Predator or prey? Prey
- Physical environment adaptation: Muscular plate to stick to rocks with their armor-like shells to protect them from predators.
- Living organism adaptation:
 - Hard shell (plates)
 - Rolls up in a ball when dislodged from rocks
- They eat: Algae, barnacles, and tiny invertebrates like microscopic plankton
- Eaten by: Sea stars, crabs, fish, sea anemones and seagulls
- Guiding questions:
 - Do you think it is easy for a predator to eat a chiton? Why or why not?



Anemones

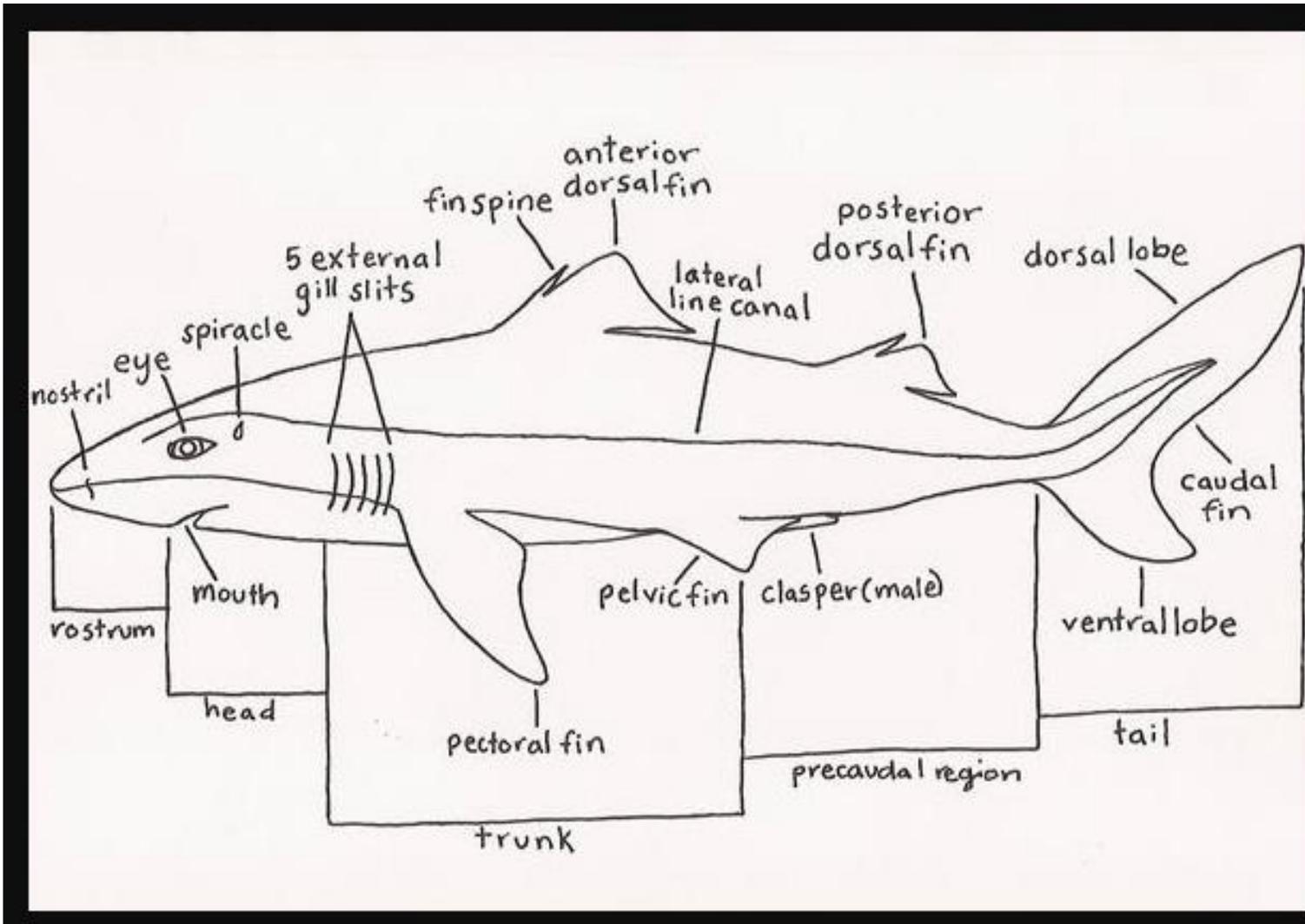
- Predator or prey? Predator
- Physical environment adaptation: They grab shells from the environment. These shells act like sunscreen to protect their soft, squishy body from drying out from the sun.
- Living organism adaptation: Stinging cells to eat prey
- They eat: Small fish, plankton and algae
- Eaten by: Sea stars, sea slugs, crabs and larger fish
- Guiding questions:
 - What do you think the anemone uses the shells for?
 - What does the anemone feel like?
 - Why do you think the anemone is moving around your finger?
 - Why do you think the anemone has stinging cells?



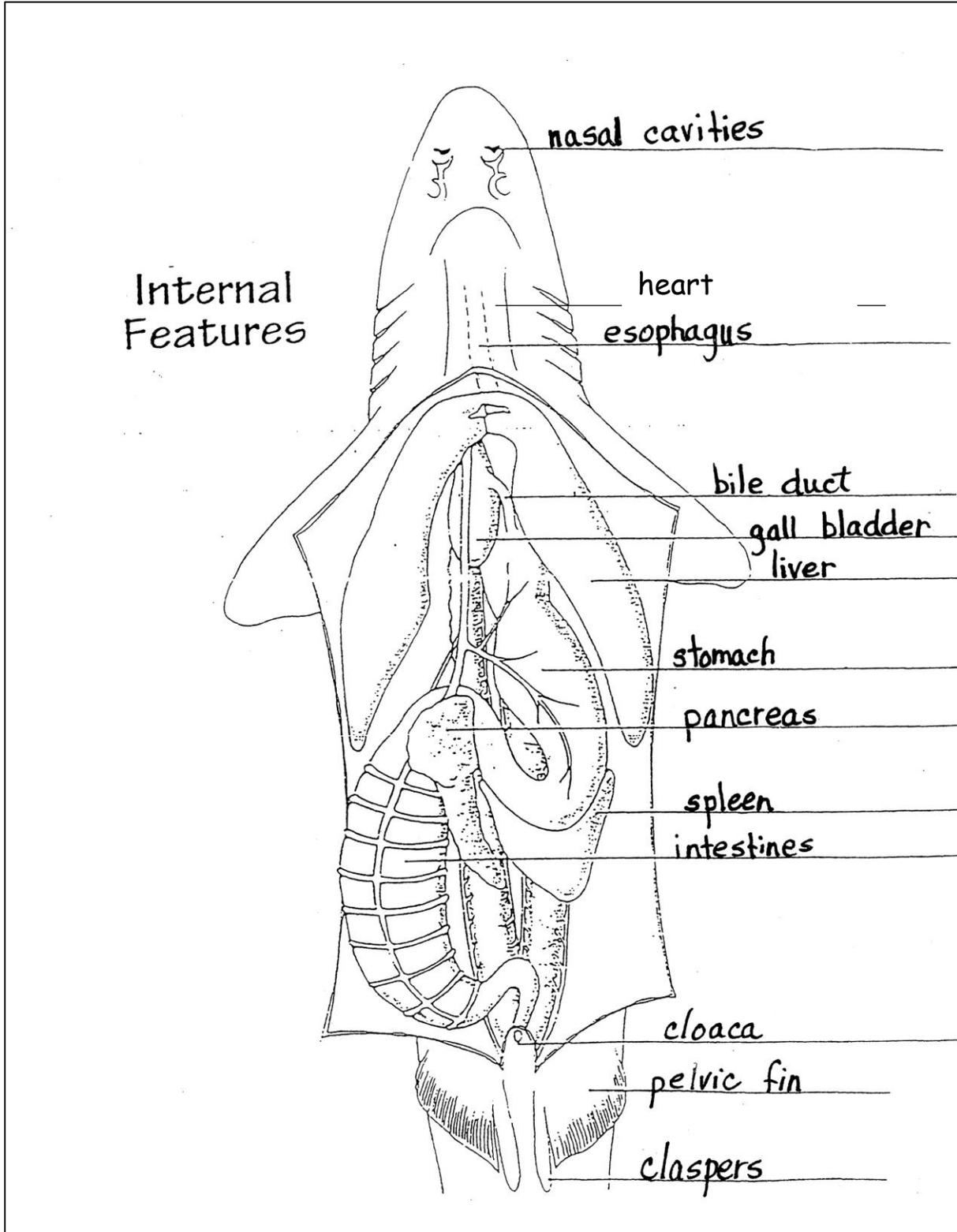


Instructor Supplement: Shark Dissection Information

External Anatomy:



Internal Anatomy:





Anatomical Feature	Fish	Sharks	Student Action	Fun Shark Facts	High School*
“Skin” or Outer covering	Scales	Dermal Denticles	Let students touch the shark’s skin. The sand paper feel is the “skin teeth”. Place Velcro tab for Dermal Denticles on shark poster.	Shark skin helps reduce friction in the water and therefore allow sharks to swim fast. Olympic swimmers have worn swimsuits that mimic shark skin to help them swim faster!	
Jaws	Made of bone	Made of cartilage	Pass around shark jaw		
Teeth	Single row – teeth stay in place because they are embedded in bone.	Several rows - teeth fall out easily because they are embedded in cartilage.	Look at shark jaw & teeth on dissection animal- notice there are several rows of teeth in the shark’s mouth at the same time. Question: Why would a shark have more than one row of teeth?	Sharks don’t have hands to eat so they use their mouths to bite their prey and then swallow it whole. It’s pretty messy and that’s often how they lose teeth because they are pulled out of the cartilage which is softer than bone.	Sharks can lose up to 100 teeth a day and 20,000 in a lifetime. When a shark loses a tooth the one behind it rolls in place to replace it. Sharks don’t get cavities because the surface of their teeth contains 100% fluoride!
Fins	<u>Pectoral</u> – used for steering in some fish and propulsion in others	<u>Pectoral</u> – rigid used for turning and for lift <u>Dorsal fins</u> - there are two –	Place Velcro tab for different fins on shark poster.	Sharks are heavier than water and would sink if not for pectoral fins that act	<u>Pelvic</u> : paired fins used for stability (like a rudder)

	<p><u>Dorsal</u> – used to balance fish and keep it from tipping over</p> <p><u>Caudal</u> – propulsion (moves side to side)</p>	<p>anterior (closer to nose) and posterior (closer to caudal fin) used for balance and to keep the shark from tipping from side to side</p> <p><u>Caudal</u> – propulsion (moves side to side)</p>	<p>Let students feel the fins and notice how much more rigid the pectoral fins are than the other fins which are floppy.</p>	<p>like airplane wings and help provide lift for the shark.</p>	<p><u>Anal</u>: also used for stability</p>
<p>Gill Slits</p>	<p>Gills + Operculum Operculum is a bony covering that protects the gills of fish and is used to move water across the gills so fish can be still and get oxygen.</p>	<p>Gill slits – allows water to exit the shark after passing over the gills.</p>	<p>Allow students to touch gill slits and feel they are soft with no bony covering like a fish.</p> <p>Questions: How do sharks get oxygen?</p> <p>Place Velcro tab for gill slits on shark poster.</p>	<p>Most people think that sharks must always be swimming in order to breathe- that is not true for most sharks! Only a few types of sharks must continuously swim in order to get oxygen like the Great White!</p>	<p>Sharks can get oxygen in three ways</p> <ol style="list-style-type: none"> 1) Ram ventilation – swimming with their mouth open to push water over their gills 2) Buccal pumping – sharks create a vacuum by contracting cheek muscles and pulling water in and over the gills. Ex. Nurse shark, Angel shark <p>Some sharks can go back and forth between both types. Ex. Sand Tiger, Tiger,</p> <ol style="list-style-type: none"> 3) Obligate Ram Ventilators – those are the sharks that must always be

					swimming in order to get oxygen. They have evolutionarily lost the ability to use buccal pumping. Ex. Great white, Mako, Whale Sharks
Spiracles		In some sharks is used for pumping water over gills to get oxygen.	Look at dissection animal and compare to eyes. (Students will often think the spiracles are the eyes.) Question: How do you think this shark gets oxygen? Place Velcro tab for spiracles on poster	Only Hammerheads and Requiem sharks don't have spiracles.	Sharks with spiracles can stop moving and lay on the bottom because they are able to pump water over their gills to get oxygen.
Senses	Most 6 – No Ampullae of Lorenzini Some 7 – (sturgeon, paddlefish, etc.)	7	Ask students how many senses they have and what they are.	Sharks have two more senses that humans!	
Eyes - Sight	Yes	Used to detect movement. Sight is not great until things are close. Sharks have good night vision.	Place Velcro tab for eyes on shark poster	Shark can see in color.	<u>Nictitating membrane</u> – A cover over the eye that protects the shark when they are eating. <u>Tapetum Lucidum</u> - Sharks are often nocturnal predators and have developed

					guanine platelets behind their retinas to aid in reflecting light for increased night vision, this is why shark eyes often seem to “shine”.
Nares- Smell	Yes	Sharks strongest sense. They can locate food up to a mile away.	Show nares Place Velcro tab for nares on shark poster	Research shows sharks are able to respond to one part blood for every one million parts of water; this is like being able to smell one teaspoon of something in a swimming pool	Up to 2/3 of a sharks brain is dedicated to their sense of smell.
Sense - Hearing	Yes	No external part. Small hole behind the eyes (can be difficult to locate). Fairly strong especially at low frequency.		Hearing is often the first sense sharks use in detecting prey.	Underwater sound travels 4.5 times faster than sound on land.
Sense - Touch	Yes	Sharks have nerve endings under their skin. They also have nerves in their teeth- they will often investigate things through biting.		Sharks sense of touch is very sensitive and they can detect changes in temperature and currents.	

Sense-Taste	Yes	<p>Not very strong.</p> <p>Will taste things using a “test bite” spit out things they don’t want (shark attacks).</p>			
Ampullae of Lorenzini - Electrical	Yes	<p>Used to detect electrical impulses.</p> <p>Helps sharks find buried prey because all living organisms give off electrical impulses from muscle contractions like a heartbeat.</p>	<p>Show holes under sharks nose.</p> <p>Place Velcro tab for Ampullae of Lorenzini on shark poster</p>		<p>Name for these sensors is: Ampullae of Lorenzini</p> <p>Sharks use the earth’s geomagnetic field to help them navigate the world’s oceans and follow migratory paths.</p> <p>Some sharks can migrate up to 1,000 miles per year such as dusky, sandbar, night, bigeye thresher, shortfin mako, and tiger sharks.</p>
Sense – Lateral Line	Yes	<p>Senses water pressure changes.</p> <p>Used to detect prey and predators.</p>	<p>Show lateral line.</p> <p>Place Velcro tab for Lateral Line on shark poster</p>	<p>K-2 Grade Adaptation: Activity: Have students stand in a school of fish. Tell them you are the lead fish and they must follow your</p>	<p>A row of microscopic organs sensitive to changes in the surrounding water pressure, enabling the shark to detect minor vibrations.</p>

				<p>every movement while staying in their “school”. Move around. Students will quickly lose their “school” formation and bump into each other, etc.</p> <p>Ask students why they aren’t able to maintain a “school” like fish do? They don’t have a lateral line!</p>	<p>Helps sharks to navigate (i.e. they can feel the waves their bodies make bounce off of objects so that they don’t run into things like reefs, or rock ledges, etc.)</p> <p>Helps fish maintain a “school”. When one fish moves the water moves and the fish next to them senses the pressure change and is able to move accordingly.</p>
<p>Sex of Shark</p>	<p>Can’t be told by external features.</p>	<p>Male: Claspers Female: No claspers</p>	<p>Place Velcro tab for claspers on shark poster</p>	<p>Spiny dogfish had the longest confirmed pregnancies of any vertebrate! Spiny dogfish can be pregnant up to two years!</p> <p>In some species of ovoviparous sharks the first shark that hatches from their egg will eat all the other sharks in the womb!</p>	<p>Male claspers are used for internal fertilization.</p>

<p>Cloaca</p>	<p>Fish have an anus.</p>	<p>Follow intestines to opening at claspers – hole is the cloaca</p> <p>Where what is left of non-digested material is eliminated.</p>	<p>Place Velcro tab for cloaca on shark poster</p>		<p>Intestinal, urinary and genital tracks all open to the cloaca.</p>
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Internal Anatomy:

- **K– 5th grade:**
 - Teacher to make the scalpel cuts. Students can make vertical cut with scissors.
 - (Pass out a pair of scissors to each partner pair.)
- **6th– 10th grade:**
 - Students can make two horizontal cuts with a scalpel between two pelvic fins and between the pectoral fins when supervised by an adult.
 - Students can also make cut vertical cut with scissors to connect scalpel cuts & can cut off flaps (allow multiple students to help).
 - (Pass out a pair of scissors and a scalpel to each partner pair.)

Anatomical Feature	Fish	Sharks	Student Action	Fun Shark Facts	High School*
Buoyancy	Swim bladder <ul style="list-style-type: none"> • Fish can control the amount of air in their swim bladder to allow them to rise or sink in the water column. 	Oil filled liver <ul style="list-style-type: none"> • Largest organ • Oil is lighter than water and provides some floatation to shark. • Liver has three lobes 	Place Velcro tab for liver on shark poster	Liver stores energy for the shark. Human livers have two lobes and shark livers have three lobes.	Liver is used for detoxification and protein synthesis. Have students find all three liver lobes. Two larger (right and left lobes) and third shorter one located towards the center – gall bladder is attached to this one. Fish also have a liver use for detoxification and protein synthesis in addition to a swim bladder.
Gall Bladder	Fish also have gall bladders to store bile.	Location under liver closer to top of head. Stores bile created by liver.	Place Velcro tab for gall bladder on shark poster		

<p>Stomach</p>	<p>Fish also have a stomach used to digest food.</p>	<p>Location under right liver lobe towards middle of shark body.</p> <p>Used to digest food.</p> <p>Question: What is a stomach and intestine used for?</p> <ul style="list-style-type: none"> • Digest food and give nutrients to the body. 	<p>Have students cut open stomach and look at contents- what did this shark eat?</p> <p>Place Velcro tab for stomach on shark poster</p>	<p>Sharks are sometimes called the garbage cans of the ocean.</p> <p>This title is most frequently applied to tiger sharks, which have been known to eat various items of trash including cans, bottles, tires, coal, rags, nails and even a chicken coop. They also have been found with land animals in their stomachs such as chickens, pigs, deer antlers and hyenas.</p>	<p>Sometimes sharks can eat things that are bad for them like trash or things that can't be easily broken down by their stomach and intestines so some sharks are able to evert their stomachs! (Basically like throwing up their stomach)!)</p>
<p>Intestine</p>	<p>Fish also have intestines for digestion</p>	<p>Follow the stomach to find the start of the intestines.</p> <p>Used for digestion. Relatively short and compact but contains lots of coils to increase surface area</p>	<p>Students dissect intestines to find digested material.</p> <p>Place Velcro tab for intestines on shark poster</p>		
<p>Oviduct/ Womb</p>		<p>Dogfish are aplacental viviparous.</p>	<p>If students are old enough you can cut open the egg and see the developing shark attached to its yolk sac where it gets its energy to grow.</p>	<p>Spiny dogfish has the longest gestation period for all sharks – 24 months!</p>	<p>Reproduction can be: <u>Oviparous</u>: Egg laying <u>Viviparous</u>: Live birth <u>Aplacental viviparity</u> The developing shark is nourished via a yolk</p>

					sac from its egg carried inside the mother. The shark hatches while inside the mother but is no longer nourished (no placenta) until it is born alive.
Heart	Fish have a heart that pumps blood around the fish.	Location: You will need to make an additional cut using the scalpel beneath the shark's jaws. (see photo below). Heart pumps blood around the sharks body.	Place Velcro tab for heart on shark poster		A sharks heart only has two chambers where as human hearts have four chambers.

Heart Location





Shark Specimen Information

How Dogfish are Collected:

“The dogfish sharks that Carolina preserves for dissection (*Squalus acanthias*) are obtained from commercial fishing sources. The U.S. National Marine Fisheries Service enforces sustainability by monitoring populations and establishing fishing grounds and quotas each year. The commercial fishing industry catches the dogfish for the human food market until the season’s quotas are met. We purchase a very small portion of the catch. We don’t get any dogfish from outside the established quotas.”

Type of Preservative: Formalin

Preservative: A preservative, also called a holding solution, is used to store fixed specimens. These solutions prevent bacterial growth, contamination, and desiccation of the specimens.

From the company website:

“Formalin

The most well-known tissue fixative is formalin, an aqueous solution of formaldehyde and a stabilizing chemical, usually methanol.

Formaldehyde is a gas at room temperature. Per the United States Consumer Product Safety Commission (CPSC), exposure to this gas can cause "adverse health effects, such as eye, nose, throat, and skin irritations, coughing, wheezing, and allergic reactions." The CPSC states that "long-term exposure to high levels of formaldehyde has been associated with cancer in humans."

Many specimens used in science education are initially fixed with formalin. These include Carolina's Carosafe[®] specimens along with most specimens from other science education suppliers.

After reading about the hazards of formaldehyde, using these specimens may seem dangerous. However, initial formaldehyde concentration in fixatives is low, and most science supply companies use various procedures after tissue fixation, such as water baths and chemical scavengers, to minimize the amount of formaldehyde off-gassing.

At Carolina, Carosafe[®] specimens are initially fixed with formalin and then transferred to Carosafe[®], a formaldehyde-free holding solution. This preservative is a propylene glycol solution. Propylene glycol is a common additive in foods and cosmetics. Holding specimens in this solution reduces the presence of formaldehyde, thereby diminishing or eliminating unpleasant odor.”

If any fluids or preserved tissues come in contact with bare skin, what should I do?

Students should wear gloves when handling the sharks. However, if contact is made with the skin, wash the area with water. The necessity of any further treatment would not be expected. Of course, as always, should an unexpected symptom occur, seek medical attention.

Is special ventilation needed for a dissection activity?

Local ventilation (e.g., fume hoods) is not required when using any of Carolina’s preserved specimens. However, some ventilation is recommended in all cases.

When using Carosafe® specimens, good ventilation is suggested to minimize formaldehyde exposure. Though off-gassing from these specimens is minimal, teacher and student safety and comfort are paramount, and compliance with OSHA regulations is crucial.

With Carolina's Perfect Solution® specimens, formaldehyde exposure is not a concern. With both Perfect Solution and Carosafe® specimens, however, air flow in the lab increases most students' comfort level as it minimizes the biological and chemical smells that may be present.

Do specimens require special disposal?

Carolina's Perfect Solution® and Carosafe® specimens are not classified as federal hazardous waste nor are they biohazards. Therefore, in most cases, they can be disposed of as regular waste destined for a landfill or incinerator. Specimens should be double-bagged and sealed before being placed in the trash.

Extra holding fluids are not considered hazardous wastes and can usually be discarded down the drain into the sanitary sewer system. However, if your school or home has a septic tank system, ask an administrator or expert before you dispose of the fluids as they could upset the microbial balance that is vital to a septic system.

Although Carolina specimens and their holding fluids are not hazardous wastes or biohazards under federal and almost all state regulations, you should always check with your local solid waste or wastewater authority before disposing of them. This may mean contacting the local government office that oversees waste disposal, the local landfill, your waste disposal company, or the local wastewater treatment plant. Check with your school or university safety officer for any disposal guidelines.

Quick Tips Shark Dissection Video (1:59)

<https://www.carolina.com/teacher-resources/Video/carolina-quick-tips-dogfish-shark-dissection/tr30401.tr>