

School Learning Experience

Guiding Concept: Students will learn about how kelp and the organisms that live in the kelp forest are adapted to the physical environment and why it is important to protect kelp.

Make a Difference Actions:

- (Today) Be a citizen scientist and visit a Marine Protected Area.
- (Tomorrow) Work as an urban planner to design a protected area in your neighborhood.

STEM Discovery Focus: Investigate and Analyze

Ocean Discovery Unit

Cross Cutting Concept: Understanding Structure and Function: *The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.*

SE Practice: Constructing Explanations & Designing Solutions: *The products of science are explanations and the products of engineering are solutions.*

DCI:

- Physical Science: 4-PS4-1 *Waves and Their Applications in Technologies for Information Transfer*
 - Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- Life Science: 4-LS1-1 *From Molecules to Organisms: Structures and Processes*
 - Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Unit NGSS Alignment

Main instructor

- Classroom management
- Watch timing of lesson
- Lead class discussion
- Provide rules for activities
- Call on students to include as much of the class as possible

Additional staff/volunteers

- Prep materials
- Whenever not prepping supplies
 - Walk around the classroom and interact with students, ask questions, help, etc.
 - When students are not engaged in an activity, spread out throughout the classroom and stand near any students struggling to pay attention

Supplies:

- Chart paper
- Sharpies (3)
- Visuals
 - Community Agreements poster
 - Kelp forest poster
- Pencils (40)
- Half sheets of paper (1/student)
- Giant butcher paper drawing of kelp forest (approx. 4-5 feet tall) and include:
 - Canopy, blades, stipe, airbladders, and holdfast
- 6-8 Plastic Bins with minimal art supplies
 - 2-3 pairs of scissors
 - 2-3 glue sticks
 - Multiple pieces of colored paper
 - Multiple pieces of colored tissue paper
 - 10-15 magic markers of various colors
 - Multiple feathers
 - Multiple poppoms
- Laminated Kelp Forest ID Cards
 - Marine Mammals (6)
 - Inverts (12)
 - Fish and Sharks (12)
 - Birds (6)
- Tape (3-4 rolls)
- Beads
 - 4 colors, 6 bowls per color with enough beads for multiple classes
- White pipe cleaners for bracelets (1 per student)
- Printed list of bracelet questions
- Post cards (40) – 1/student
- Folder (1/classroom)

Time	Activity
0:00 – 0:10	Introduction & Community Agreements
0:10 – 0:55	Exploration Activity + Engagement
0:55 – 1:00	Reflection

Introduction & Community Agreement (10 minutes)

Set Up

- Introduce yourself and volunteers to teacher
- Ask teacher for waivers (Return to Rochelle)
- Prep chart paper w/ guiding questions (found below)
- Set up chart paper and sharpies at front of room where whole class can see
- Bring Community Agreements poster to front of classroom
- Place half sheets of paper on center of each table (1/student)

Teaching Notes

- Stand/walk around the classroom to help monitor students. If all student are sitting on a rug sit down around them. In particular sit down close to any student who seems to be struggling to pay attention.
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- Introduce yourself and Ocean Discovery Institute
 - All staff + volunteers take a minute each to introduce themselves and share their story. Focus on:
 - College and major (explain what your major is in student friendly language)
 - Why you work/volunteer at Ocean Discovery
 - Include something fun and interesting
 - Community connections (ODI alum, attended a school in City Heights, etc.)
 - *Ex. I'm Sally. I went to college at UC San Diego and I studied Oceanography. Oceanography is the study of the ocean, how it works and the plants and animals that live in the ocean. When I was in college I participated in research digging up clams on the beach. I went to Clark and Hoover High and was an Ocean Leader. I had a lot of great opportunities with Ocean Discovery, that why I love working there. I volunteered for Ocean Discovery Institute for two years and now I am an instructor.*
 - Give a very brief overview of the program and introduce the platform.
 - You will **be scientists** with ocean discovery institute **working together as a team to explore** the kelp forest.
 - Scientists ask **questions, make observations, notice patterns and construct explanations** to explain the observations and patterns they noticed.
 - Introduce the idea of community agreements -expectations about how **scientists work together**.
 - Show CA poster and ask students what each one means to them.
 - Be your best self: Responsible, helpful & kind, include others
 - Be safe: make good decisions to keep each other safe
 - Be respectful: staff, materials, classmates, each other, environment
 - Be curious: ask questions, support each other as we try new things

Ask students if they can all agree to these community agreements since they are **scientists** with Ocean Discovery with a verbal "yes" or thumbs up, etc

Engagement (15 minutes TOTAL)

Goal: Students believe they are scientists and feel like they are part of a community of scientists who think somewhat alike but are also unique.

Set Up

- Prep bracelet supplies in the back (open all bead containers and stack in groups for each table)
- Count out pipe cleaners

Teaching Notes

- Help students put bead on bracelets if they are struggling.
- Help students tie bracelets on wrists.

(7 minutes)

- Introduce bracelet making.
- Throughout class today, we will all make a bracelet that represents ourselves as scientists and our interests.
- I will ask a question and depending on your answer you will place a bead of a certain color on your bracelet.
- For example, “Would you rather: climb the tallest mountain on Earth OR dive to the bottom of the ocean?” If you would rather climb the tallest mountain put an orange bead on your pipe cleaner (demonstrate) if you would rather dive to the bottom of the ocean, place a dark blue bead on your bracelet. While you are doing this discuss at your table which you are more interested in and why.
- Ask THREE more questions:
 - What animal superpower would you rather have? Super strength like an ant OR super vision like a hawk?
 - As a scientist would you rather study plants and animals on the land or plants and animals in the water?
 - As an engineer, would you rather draw your ideas with pen and paper or build your ideas with tools?
- Have students hold bracelets up and show each other. Point out that while they are similar because we are all scientist they are also diverse because we all have different interests.
- Explain to students that as we learn about the diverse organisms in the kelp forest we will continue to build our bracelets.

Exploration (30 minutes)

Goal: Students learn about the anatomy of kelp and that it is a habitat for many organisms.

Set Up

- Uncover chart paper with guiding questions after Think-Pair-Share has been introduced.
- Prep art bins (1-2/table)

Teaching Notes

- Stand/walk around the classroom to help monitor students.
- Make sure all students get a half sheet of paper to write their thoughts during the “Think” portion.
- Help students with the Think-Pair-Share. Point them to the kelp forest drawing or verbally ask one of the guiding questions to help them begin.
- Walk around while students are pair sharing and listen to their answers. If a student pair finishes before time is up ask them some follow up questions.
- Record student responses on chart paper during “Share” portion

Brainstorm – THINK-PAIR-SHARE (5 min)

- Have each student take a blank half sheet of paper on their table and a pencil or pen.
- Show students the visual poster of the kelp forest.
- Guide students through a **Think-Pair-Share**.
 - THINK – Point at kelp forest poster and ask students to brainstorm anything they know or any **questions** they have about kelp forests. Have students write these down on scratch paper.
 - *Point out guiding questions on chart paper.*
 - Where do you think/know we find kelp forests?
 - Do kelp forests remind you of anything similar on land? Why?
 - Do you think kelp is a plant or animal?
 - PAIR – Have students talk to a partner about what they wrote down.
 - SHARE OUT - whole class
 - Students may share out their own thoughts or their partner’s.
 - Have a volunteer/staff write what students are saying on chart paper

Add to Bracelets (3 min)

- Have students pick up bracelets again.
- Ask TWO questions:
 - As a scientist would you rather make observations for animals far away with binoculars, or small ones close up with a microscope?

- As a scientist would you rather observe marine plants and animals in a fish tank or diving underwater in the ocean to observe plants and animals?

Set Up

- Tape butcher paper kelp forest up at the front of the room.

Teaching Notes

- Stand/walk around the classroom to help monitor students while the instructor is teaching.

Anatomy of a Kelp Forest – Intro (5 min)

- Compliment students on their questions and/or knowledge of kelp forests.
- Show students large butcher paper replica of a kelp forest.
- Cover the following:
 - Kelp is similar to a rainforest.
 - Kelp is neither plant or animals but is an brown algae. Algae is similar to plants and needs many of the same things, sunlight, water, nutrients, etc.
 - Point out and label the parts of kelp. Briefly mention what each part does.
 - Canopy – air bladder and blades gather at surface to collect sunlight
 - Air bladders – keeps blades towards the surface where sunlight is
 - Stipe – like the trunk of a tree, helps keep the kelp upright
 - Blades – like leaves collect sunlight
 - Holdfast – “holds” the kelp in place
 - Kelp lives in the ocean where there are waves (draw these on the butcher paper)

Set Up

- Place ID cards on table (1/student) – make each table one type of card
 - Example one table: all inverts
 - Another table: all fish, etc.
- Place 1-2 art bins on the center of each table

Teaching Notes

- Walk around the classroom and help students decide which organism to make.
- Help students create animals, encourage students who are struggling to get started.
- Help students who are finished tape their organisms into the kelp forest.
- Throw away any old/used up art supplies.

Create Animals (10 minutes)

- Explain that students will be populating the kelp forest.
- Give students one minute to look over their ID cards and pick an animal they want to create to add to the kelp forest. Have students give a thumbs up when they have decided on an animal.
- Explain to students that they can draw or build their animal.
- Tell students to look at art supplies without touching them and to think about what they want to use to build or draw their animals (30 seconds).
- Let students know that they will have 7 minutes to build their organism and they must be finished by then. Remind them that their animal does not need to be perfect but we want as many animals as we can get in the kelp forest.
- Put a visual timer up on the board and tell students to begin working.
- Give students lots of verbal reminders of time.
- If a student finishes early invite them up to place their organism in the kelp forest (tape animals into forest).
 - Let students know they can create another animal if they have time.

Populate the Kelp Forest/Debrief (10 min)

- As students are finishing bring a table of students up in a group and have them tape their organisms to the poster
 - Ask them where they think their organism belongs (ex. down in holdfast, swimming among the blades, up in the canopy, on a blade, etc.)
 - Be sure to get organisms in all parts of the kelp (blades, canopy, holdfast, etc.)
- Have all tables come up then gather students together to debrief
- Debrief with students and cover:
 - The kelp forest has many different organisms.
 - Animals live in all parts of the kelp from the holdfast to the canopy.
 - Ask students if they think animals that live in the kelp forest have to deal with any stresses.
 - Predations
 - Waves
 - Cold temperatures
- Discuss with students the importance of protecting kelp forests because they are a habitat for so many animals.
- Tell students that next time they are with Ocean Discovery they will be visiting a Marine Protected Area (MPA) which is a protected kelp forest.

Finish Bracelets (5 min)

- Have students pick up bracelets again.
- Ask as many questions as time allows (be sure to leave time for postcards)
 - As a scientist, would you rather make observations in nature or asks questions about nature?
 - Are you more excited to see a seal or a sea lion on your field trip next week? (show visual)
 - As a scientist with Ocean Discovery, are you most excited to talk to real scientists or most excited to learn how to protect kelp forests?
 - As a scientist would you rather study diseases that make people sick or study what is causing the earth to slowly get warmer?
- Show students how to make bracelet and have them help their partner.
- Two staff walk around and help students, additional staff clean up beads.
- Look around you – we all have bracelets because we are all scientists and we are all part of a community. Not everyone’s bracelet is the same though! We are a diverse group of scientists with different interests just like there is diversity of animals that live in the kelp forest!
- Encourage students to share their bracelets and ideas as scientists with their families.
- If time allows ask students if they have any questions about their upcoming trips.

Self Reflection (5 minutes)

Set Up

- Collect and close up all bead containers
- Prep a folder with school and teacher name
- Place post cards in the center of every table (1 postcard/student)
- Collect completed postcards and place postcards in a folder with teacher name and school

Post Card

- Students will get their own postcards back at the end of their Ocean Discovery experience.
- Have all students write a postcard to themselves:
 - How did it feel to explore the kelp forest as a scientist today?
 - Why they are excited to be scientists when they visit the coast and the Living Lab?
 - What did you learn about kelp forests today?
- Collect postcards and remind students that they will receive these postcards after their experience with Ocean Discovery so they can remember what the experience was like.
- Today, we tried new things, and made new discoveries. Whenever we do that, we have an Ocean Discovery cheer to send us off. We say “Go Awesome!” Say it with me on the count of 3.
1, 2, 3... Go Awesome!!

Kelp Forest Visual

