

Focus: Sand & Habitats

Grade Level: 3-5

Session Length: Four activities of 25-30 minutes each

Driving Questions

- Which beach has the best habitat for a crab?
- How can we protect the marine animals in Crystal Cove's tide pools?

During Week 4: Mystery of the Kidnapped Crab, students investigate the reappearance of a crab that has been taken from her home in Crystal Cove's tidepools.

On Day 1, a breaking news story introduces students to the mystery of the kidnapped crab. They examine sand from the crab's bucket and four sand samples from Crystal Cove's beaches to look for similarities and try to determine which beach is the crab's home. On Day 2, students think about what crabs need to survive and compare two habitats to determine which one is most likely the crab's home. On Day 3, students take a virtual trip to the tidepools to learn more about the animals that live there and return the crab to its home. On Day 4, students design a sign to encourage people to protect the tidepools by being good tidepoolers.

Learning Outcomes and Assessments

<i>By the end of this module, students will be able to...</i>	<i>You can assess this using...</i>
1. Compare and contrast different types of sand.	Reporter notebooks on Day 1
2. Assess the habitat at different beach sites to see if they meet the needs of a crab.	Student discussions on Day 2
3. Design a sign that communicates why it is important to follow Good Tidepooler Rules.	Student-created signs on Day 4

Weekly Sequence

Section	Description	Length	Format
Day 1	<p><i>Kidnapped Sand Crab: Sand Investigation</i></p> <p>Students are introduced to the mystery of the kidnapped sand crab through a breaking news story. Students examine the sand from the crab's bucket and four samples from different beaches at Crystal Cove to determine which beach is the crab's home.</p>	25-30 minutes	Classroom
Day 2	<p><i>Kidnapped Sand Crab: Habitat Investigation</i></p> <p>Students think about what a sand crab needs in its habitat to survive and then visit two beaches virtually and compare the habitats there to determine which is most likely the crab's home.</p>	25-30 minutes	Classroom
Day 3	<p><i>Kidnapped Sand Crab: Tidepool Exploration</i></p> <p>Students learn more about Crystal Cove's tidepools during a virtual visit with State Park Interpreter Alex.</p>	25-30 minutes	Classroom
Day 4	<p><i>Kidnapped Sand Crab: Design a Sign</i></p> <p>Students design a sign to tell the public about Good Tidepooler rules and protect tidepool animals like the crab from being taken in the future.</p>	25-30 minutes	Classroom

Big Science Idea

When we think of beaches, we often think of long stretches with soft sand. But sand does not always look the same from beach to beach! Sand is technically defined as loose granular material that is formed as rock breaks down. It can vary a lot in different locations depending on its source, the shape of the beach, and the waves there. These factors can affect the color of sand particles, which is determined by the minerals that make up the sand, and their size, which is often affected by how much the sand is broken down by waves.

Tidepools are formed in rocky areas when the tide recedes, leaving seawater trapped behind in small puddles or pools. They can provide shelter and respite from the sun for marine animals that live there, such as crabs, snails, sea anemones, octopuses, and more. While the tide is out, these intertidal animals take shelter in the small pools until the tide rises and the ocean returns again.

Like many tidepools throughout California, Crystal Cove State Park's tidepools are part of a Marine Protected Area. As such, state law prohibits any animals, plants, or shells from being collected and taken from the tidepools. However, tidepooling is an extremely popular hobby and many visitors do not realize that the tidepools are a protected space.

If you want to learn more...

- [*NOAA: How Does Sand Form?*](#)
- [*NOAA: What is a Tidepool?*](#)
- [*OC Explore: Tidepools to Visit in Orange County*](#)
- [*OCMPAC's Tidepool Brochure*](#)

If you want to share more with students...

- [*Life in a Tidepool*](#)
- [*In One Tidepool Book Reading*](#)

Day 1

Sand Investigation
(25-30 minutes)

Each teacher will need...	Each student will need...
<ul style="list-style-type: none"> <input type="checkbox"/> Day 1 Slideshow <input type="checkbox"/> Computer, projector, and speakers <input type="checkbox"/> At least five containers <input type="checkbox"/> Three sizes of sediment: Sand, small rocks, and large rocks 	<ul style="list-style-type: none"> <input type="checkbox"/> Reporter notebooks <input type="checkbox"/> Pencil <input type="checkbox"/> Magnifying hand lens

Before you start teaching...

- Open the day’s slideshow and check to make sure that the videos play with sound.
- If not already done, set up and label the sand containers. You will need at least five containers to put the sand mixtures inside. One of the boxes represents the sand from the bucket where the crab was found, and the other four represent sand “taken” from four different beaches at Crystal Cove State Park.

The containers should be labeled and set up with the following sand mixtures:

- **Bucket:** Sand with a few small rocks
- **Site 1 (Reef Point):** Sand with large and small rocks
- **Site 2 (Historic District):** Sand with a few small rocks, similar to the Bucket’s sand
- **Site 3 (Rocky Bight):** Sand with a few small rocks, similar to the Bucket’s sand
- **Site 4 (Pelican Point):** Plain sand with no rocks
- Decide where you will set out the sand samples for students to examine. These could be placed inside or outside the classroom. Make sure each one is clearly labeled with the name of the site.

Instructional Learning Sequence

1. Open the slideshow and play the video on **Slide 2** for the class. Kaitlin will introduce the breaking news story for the week: a sand crab has been found in a bucket on the beach at Crystal Cove, and CCCN needs help returning her to her home!

After watching the video, recap the story with students: What happened? What do we need to do to help?

2. Advance to [Slide 3](#), where Kaitlin will set up the task for students. They should examine a sand sample from the bucket, and then try to match it to a sand sample from four beaches along Crystal Cove State Park's coast: Reef Point, the Historic District, Rocky Bight, and Pelican Point.
3. On [Slide 4](#), there is an example of a chart that students can use to record their observations about the sand samples. Show students the chart, and ask them to copy it into their reporter notebooks.
4. Move on to [Slide 5](#), where Kaitlin will give students directions on how to examine the sand samples and record their observations. These directions are provided in written form on [Slide 6](#).

Go over the directions one more time with students, and give any supplementary directions that are specific to your class. Then pass out one magnifying hand lens to each student and ask them to make observations about all five samples.

5. Give students time to move and examine each sample, recording their observations in their reporter notebook. As they do so, move between the samples to keep an eye on their progress. Encourage students to compare the size of the grains in the samples, and ask them if they have any ideas about which sample matches the sand from the bucket.
6. After students have completed their observations, bring the class back together. Ask them to share what they've noticed:

- What did you notice about each sand sample?
- Which beach do you think the kidnapped crab was taken from? Do we have enough evidence to support a claim?

The sand from the bucket should look similar to the sand samples from Site 2 (The Historic District) and Site 3 (Rocky Bight). Tell students that since we cannot draw a firm conclusion simply based on the sand samples that we'll need more information, which we'll hopefully get on the following day!

Day 2

Habitat Investigation
(25-30 minutes)

Each teacher will need...	Each student will need...
<ul style="list-style-type: none"> <input type="checkbox"/> Day 2 Slideshow <input type="checkbox"/> Computer, projector, and speakers <input type="checkbox"/> Beaches Virtual Exploration on Thinglink 	<ul style="list-style-type: none"> <input type="checkbox"/> Reporter notebooks <input type="checkbox"/> Pencil <input type="checkbox"/> Computer with access to internet (optional)

Before you start teaching...

- Open the day's slideshow and check to make sure that the videos play with sound.
- During this session, students will explore the two habitat sites virtually using a free online tool called Thinglink, which is easy to use. Spend a few minutes exploring the Thinglink to familiarize yourself with it.
- Decide how you want to share the Thinglink with students: You can either present it on your computer to the whole class using a projector, or you can let students explore it individually or in small groups using personal computers or laptops.

Instructional Learning Sequence

1. Open the slideshow and play the video on **Slide 2**. Kaitlin will give an update on the Mystery of the Kidnapped Crab. Thanks to the students' help on the previous day, it has been possible to narrow the sand crab's home down to two beaches. Now, students will need to help investigate those two beaches to see if they can determine which one seems more likely to be the crab's original home!
2. Move on to **Slide 3**, where Kaitlin will introduce the first task for students. Before they assess the habitat at the two sites, they need to think about what living things need to stay alive and be happy.

Students are asked to create a list of everything that a crab would need to survive and be happy.

3. On *Slide 4*, review the question prompt with students:

- What does a crab need to survive and be happy?

You can decide whether to have students brainstorm this list individually or in small groups, or build a list together as a class. Some of the items you might think about include:

- Shelter (both from the elements and from humans)
- Food
- Water
- The company of other crabs

4. After students have brainstormed their list, move on to *Slide 5*. This slide has two prompts for discussion:

- What does a crab need to survive and be happy?
- When we're deciding which of the two beach sites is a more likely home for the kidnapped crab, what should we look for?

Have students share their list (if they haven't already). Ask them to also think about what they might look for when they're assessing the two beach sites. This could include safety away from people, rocks or other structures that give the crabs places to hide, shelter from the sun, food to eat, etc.

You can ask students to turn these ideas into a checklist in their reporter notebook or create one together on the whiteboard.

5. After students have brainstormed what they might look for when they assess the two sites, move on to *Slide 6*. There, Kaitlin will share the next task. Students will visit each of the two beach sites virtually and assess them to see which one is more likely to be the crab's home.

6. Advance to *Slide 7*, which includes the link to the virtual exploration on Thinglink. You can either explore this together as a class using a projector, or share the link with students so that they can access it individually on their computers.

When students open the Thinglink, they'll see a map of Crystal Cove State Park with two sites highlighted with a star. When they click on each star, they'll be able to visit the Historic District beach and the Rocky Bight beach. As they click around and explore, they'll be able to make notes about the two sites and look for things like shelter, food, and water.

7. After students have explored, move on to *Slide 8*, which has discussion questions:

- What did you notice about the two beach sites? How were they similar? How were they different?
- Which site is more likely to be the crab's home? Why? Give evidence to support your claim.

Ask students to share their observations and thoughts. As they argue for one beach or the other, encourage them to explain their thinking and use evidence to support their claims. The class will likely conclude that the Rocky Bight beach is a better home for a crab because it has more shelter in the form of tidepools and fewer people!

Day 3

Tidepool Exploration
(25-30 minutes)

Each teacher will need...	Each student will need...
<ul style="list-style-type: none"> <input type="checkbox"/> Day 3 Slideshow <input type="checkbox"/> Computer, projector, and speakers <input type="checkbox"/> Video of Virtual Tour of the Tidepools 	<ul style="list-style-type: none"> <input type="checkbox"/> Reporter notebooks <input type="checkbox"/> Pencil

Before you start teaching...

- Open the day's slideshow and check to make sure that the videos play with sound.

Instructional Learning Sequence

1. Open the slideshow and play the video on *Slide 2*. Kaitlin will thank students for helping return the crab back to its home. Kaitlin will introduce the video of Alex who will take the students on a virtual tour of the tidepools at Crystal Cove's Marine Protected Area.
2. Move on to *Slide 3* and play the *video of Alex*, Crystal Cove State Park's tidepool interpreter, who will introduce the students to the marine life that lives in the tidepools. Ask students to take notes about what they learn about the tidepools, the marine life that lives there, how people can protect the tidepools, and why it's important to protect the tidepools.

3. Advance to *Slide 4* and play the video where Kaitlin will introduce some reflection questions that the students will consider and then share their thoughts with the class.

4. Advance to *Slide 5*, which shows the following reflection questions. Facilitate a discussion with the class so students can share their thoughts on the questions. Remind students to use the notes that they took in their notebook to help them gather their thoughts on the questions:

- What animals live in Crystal Cove’s tidepools?
- Were there any animals that you’ve seen before? Did any of them surprise you?
- Why do you think it’s important to protect the tidepools?
- What do people need to know or do in order to keep the tidepools safe?

Day 4

Design a Sign
(25-30 minutes)

<i>Each teacher will need...</i>	<i>Each student will need...</i>
<ul style="list-style-type: none"> <input type="checkbox"/> <i>Day 4 Slideshow</i> <input type="checkbox"/> Computer, projector, and speakers 	<ul style="list-style-type: none"> <input type="checkbox"/> Reporter notebooks <input type="checkbox"/> Pencil <input type="checkbox"/> Piece of white paper <input type="checkbox"/> Colored pencils

Before you start teaching...

- Open the day’s slideshow and check to make sure that the videos play with sound.
- Gather colored pencils if you want each student to have these supplies for creating their final design.

Instructional Learning Sequence

1. When you open the slideshow, advance to *Slide 2* and play the video. Kaitlin will review how important it is to protect the marine life that lives in the tidepools and ask students to help raise awareness about the issue by creating a sign that tells the public about good tidepooling rules that they can follow to protect marine life.

2. Advance to *Slide 3* and play the video where Kaitlin will remind the students of the good tidepooler rules, which include leaving animals, rocks, and shells where you find them; walking gently; not turning over rocks; and not poking or prodding animals. Kaitlin will direct the students to design a sign that informs the public of what they should do when they visit the tidepools to protect the marine life. They will create a rough draft in their notebooks and then ask for a piece of white paper that they will use for their final draft.

3. Advance to *Slide 4*, which shows shows the following instructions for designing a sign:

- Create a rough draft of the sign in your reporter notebook.
- When you're ready, get a white sheet of paper and turn your design into a final draft!

Give students time to work on their signs. Walk around the room to check on progress and answer any questions.

4. Once students have completed their final drafts, advance to *Slide 5*, which prompts students to share their signs with the class. Facilitate a way for students to share their signs with each other. There are several ways to do this. You could have each student share with the entire class, you could have them share within small groups or with a partner, or you could arrange for a gallery walk where half of the students stay with their design to explain it to the other half of the students who walk around to visit each student and then the groups switch and the other half can explain their designs.

5. After everyone has shared their designs, advance to *Slide 6* and play the video. Kaitlin will thank the students for helping return the crab and for all of their help throughout the last four weeks.