



# LESSON 1

## The Intertidal Zone: Tides and How Creatures Survive

### Kindergarten to Grade 3

#### Objectives

- To observe what happens with tides and tidal action.
- To describe and act out the appearance and behaviour of a variety of animals and seaweed that live in the intertidal zone.

#### Materials

Cake pan, water pitcher, sand, gravel, rocks, water, earth ball, photos of a beach at high and low tide, pictures of limpet, crab and clam (include shells if available)

#### Concepts

- Tides rise and fall twice a day here.
- Tides are caused by gravitational pull of the sun and moon on the ocean.
- Tidal currents can cause movement of objects. Heavier objects are more stable.
- Intertidal animals have adapted to survive tidal action.

#### Activities

##### 1. How much of the earth is covered by water?

Students stand in a circle and begin to throw an inflatable earth ball back and forth around the circle. Each time a student catches it they must look at where their thumbs are and state whether they are touching land or water. As they play, one student or the teacher can keep a record of how many times student's thumbs land on water and how many times they land on land. (Use blue poker chips to represent water and white poker chips to represent land.) Discuss why they land on water more times than land. Water covers more than 70% of the earth.

##### 2. How are tides caused?

It is the combination of the gravitational pull of the moon and sun. The moon has more

affect because it's closer to the earth than the sun. The pull of the moon creates a bulge in the ocean nearest the moon (and a second bulge on the opposite side of the earth from centrifugal force.)

##### 3. What does the beach look like at low tide?

**At high tide?** Show photos of the same beach at low tide and then at high tide. Here in the northeast Pacific, the tide comes in (floods) and goes out (ebbs) twice a day.

**Solve these mysteries** (from *Beside the Sea*, by K. Francis and G. S. Jamieson, Page 26)

**A.** You build a sand castle at low tide. The next day you take your friends to see it and it's gone. What happened?

**B.** One morning at low tide, you notice a large clump of mussels on a wharf pile. You take your little brother to see it in the afternoon and it's gone. Where is it?

**C.** One morning at low tide you leave your shoes on the beach. The next day, you go back to find them. You do find them but they are 100 m from where you left them. Who moved them?

*Answers: The rising tide, A. levelled the castle, B. covered the mussels and C. carried the shoes along the beach.*

**4. Set up a beach model.** Put in the sand, rocks and gravel and then pour in water.

**A.** What covers the ocean bottom?

*A: Sand, rocks and gravel*

**B.** Slowly tip pan back and forth to simulate tidal action. If there is enough time, let each student try this too. What happens?

*A: The tide causes things to shift, moves things around. Note that larger heavier rocks move less than smaller lighter ones.*

**5. To survive tidal action:**

**A.** If you were a creature that could move like a crab, what would you do?

*A: Live in a tide pool, burrow under the sand, hide under a rock.*



**B.** What if you were a creature that couldn't move, like a barnacle?

*A: Attach to a rock, build a strong shell*

**C.** How do intertidal animals and plants protect themselves so they don't get carried off or battered by the waves?

*A: They have hard shells (eg clams, crabs, limpets); They are well-attached to large rocks (eg barnacles, seaweed, limpets); They have flexible stems (seaweed).*

**D.** Where do you find most intertidal creatures? Why?

*A: They are around, on or under large stable rocks because the rocks provide protection from tidal action and provide a place for them to attach. The larger the rock, the more stable it is.*

**E.** Why is it important for some intertidal creatures to be able to hang on tightly to one place?

*A: So they don't get picked up and tossed around by tidal action.*

## **6. Students act out being animals and plants in the intertidal.**

**A.** Seaweed attached by their holdfast but able to bend with the waves.

**B.** Limpets using their strong suction cup-like foot to hang onto rocks.

**C.** Crabs hiding under a rock.

**D.** Clams burrowing in the sand.

Try having students act out what these plants and animals do at high and at low tide. Other students can also be the tide moving in and out.

## **7. How do intertidal animals stay put?**

**A.** If you were a small beach creature, how would you survive the tides?

**i.** Show picture cards of different animals and seaweed and talk about how they survive.

**ii.** Talk about what they do at high and low tide.

**iii.** Act out being some plants and animals:

- seaweed (flexible stalks),

- sea anemone, sea star, whelk (foot or feet like suction cups),
- crab (hide under rocks, bury in sand)
- barnacles (glue head to rock),
- barnacles at high tide (kick food into your mouth with your feathery feet), and
- barnacles at low tide (close up tight).

**B.** Complete the “Staying Put” worksheet where students circle the part that helps each creature to stay put (eg. tube feet, suction cup-like foot, cement, holdfast).

## **8. How do the creatures stay moist?**

- close shell (barnacles),
- close up (anemones),
- attach tightly to rocks (limpets)
- seal off open parts where foot is with a “trap door” called an operculum (whelks, turban snails, moon snails),
- cling to underside of rocks (sea stars, sponges, tunicates),
- hide under rocks and seaweed
- (gunnels, tidepool sculpins, shore crabs),
- stay in tide pools (sculpins, sea stars, hermit crabs)

## **Conclusion**

Review tides and staying put. Have students demonstrate different ways animals and plants have of staying put. Have students act out being the “tide” as a group, moving to be high and low tide.

## **Extension**

### **Tide Zone Activity**

Divide the room into four areas using flagging tape. Label each area different intertidal zones: spray, high, middle, and low tides.

Students get a card with a creature and tide zone on it. They go to the tide zone they would be found in and act out how they are able to move and stay put. They should look around them and notice the other creatures in their zone and those in the other zones.

Students can also draw or colour their creature in the correct tide zone.