

Visible Elements in Photo



- Sandy beach with shells, seaweed, and debris scattered across the shoreline
- Ocean waves with active water movement and foam
- Multiple people wading and swimming in the water
- Seabirds (gulls) standing on the beach
- Tall residential buildings visible in the hazy distance
- Hazy air quality (reduced visibility of background structures)

Reasonable Inferences

1. From scattered debris and seaweed: The beach receives regular water movement and sediment transport; shorelines naturally collect materials that could be organized or managed.
2. From active waves and people in water: Ocean waves create dynamic forces and currents that pose both opportunities and challenges for beach safety and structures.
3. From seabirds on beach: Wildlife relies on the beach environment for food and shelter, suggesting the shoreline is an ecosystem that human activity may impact.

Engineering Task

K-2 Challenge:

"Design a Safe Beach Spot"

Imagine you're helping people stay safe and comfortable at the beach. Build a small area using sand, pebbles, and sticks where visitors can rest without getting wet from the waves. Your design should:

- Keep people dry from splashing water
- Be strong enough so the waves don't wash it away
- Have a space inside where people can sit

Try different ways to arrange your materials. What works best?

3-5 Challenge:

"Engineer a Coastal Protection Barrier"

Design and build a small-scale barrier structure that reduces wave energy and protects a designated "visitor zone" on a sandy beach or in a sand table. Your barrier must:

- Be constructed from natural or recyclable materials (sand, clay, wood pieces, stones, or cardboard)
- Reduce water flow or wave splash by at least 50% (measured by how far water travels past the barrier)
- Remain stable when tested with moving water (simulate waves with a spray bottle or gentle water pour)
- Be no taller than 15 cm and fit within a 30 cm x 30 cm footprint

Measure the distance water travels with and without your barrier. Which design shape works best—curved, straight, or angled?

EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a natural coastal environment with visible human activity, debris management challenges, and wave dynamics. Students first need to identify what problem exists (How do we protect the beach? How do we manage erosion? How do we keep visitors safe?), then design solutions—rather than jumping straight to building from a given solution idea.

Suggested Materials

1. Sand (play sand or beach sand in a sand table or bin)
2. Small rocks, pebbles, and shells (from the beach or collected by students)
3. Sticks, twigs, or craft wood pieces (for structural framing)
4. Water source (spray bottle, watering can, or small pitcher for testing)
5. Cardboard tubes or plastic barriers (optional, for reinforcement in K-2)
6. Measuring tape or ruler (for 3-5 to document wave reduction)

Estimated Time

- K-2: 30–45 minutes (design, build, test with water splash)
- 3-5: 45–60 minutes (design, build, measure baseline, test, iterate, document results)

Why This Works for Teachers

This task directly addresses NGSS ETS1.B (Develop a Simple Sketch, Drawing, or Physical Model) and ETS1.A (Asking questions, defining a problem) by grounding the engineering challenge in a real-world coastal environment where students observe natural forces and design human solutions to protect or manage a shoreline.