

### Visible Elements in Photo



- A crab with two prominent eyestalks and brown/tan coloring on its shell
- Sandy beach environment with fine, light-colored sand
- Crab's claws/pincers visible at its sides
- Burrow or depression in the sand near the crab
- Uneven sand surface with scattered grains

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### Reasonable Inferences

1. From the burrow near the crab !' The crab digs and maintains underground shelters for protection and survival in the sandy beach habitat.
2. From the eyestalks and claw placement !' The crab uses specialized body parts to sense its environment and interact with sand (digging, moving, catching food).
3. From the loose, granular sand !' Beach sand shifts and slides easily, making shelter construction and stability a real challenge for burrowing creatures.

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### Engineering Task

#### K-2 Challenge:

Design a safe hiding spot for a crab in the sand. Your crab needs a hole or tunnel where it can stay safe from bigger animals. Use sand, pebbles, and other materials to build a shelter that doesn't cave in. Test it by gently pouring water near it—does your shelter stay open so the crab can hide?

#### 3-5 Challenge:

Design and build a stable burrow system for a ghost crab that must meet these criteria:

- Structure: Create a burrow at least 4 inches deep that remains open (does not collapse) for at least 2 minutes.
- Material constraint: Use only sand, water, and one binding material (seaweed, small shells, or clay) to reinforce walls.
- Stability test: Pour water slowly at the entrance; the burrow must not collapse entirely.
- Success measure: The burrow holds its shape while remaining accessible for a crab-sized object (marble or small toy) to enter and exit.

Document which binding material worked best and why.

### EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a real organism solving a real environmental challenge (living safely in shifting sand). Students identify the problem the crab faces—finding stable shelter in an unstable material—before designing a solution. The need is clear from nature itself.

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## Suggested Materials

- Sand (beach, play sand, or sandbox sand)
- Water (spray bottle or cup)
- Seaweed pieces or dried grass
- Small shells or pebbles
- Clay or modeling putty
- Shallow containers or trays to contain the sand
- A marble or small toy to test accessibility

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## Estimated Time

45–60 minutes (One full class session or two 30-minute sessions: 15 min planning, 20 min building, 10 min testing, 5–10 min reflection and material comparison)

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## Why This Works for Teachers

This task directly supports NGSS ETS1.A (defining and delimiting engineering problems) by asking students to understand and solve a real biological need—shelter stability in a granular environment—using observable evidence from the crab's actual habitat.