

### Visible Elements in Photo



- Large rock or boulder with an irregular, roughly rectangular shape resting on soil
- Green vegetation and grass surrounding the rock on all sides
- Patches of lichen or moss (darker spots) covering portions of the rock surface
- Soil and loose earth beneath and around the rock
- Shadow cast by the rock visible on the ground, indicating direct sunlight

### Reasonable Inferences

- From the rock's position and moss patches: This boulder has been stationary in this outdoor location for an extended period, long enough for biological growth to colonize its surface.
- From the irregular surface and weathering: The rock shows signs of erosion and weathering, suggesting exposure to outdoor elements (rain, wind, temperature changes).
- From its size and weight: Moving or removing this rock would require significant force or a mechanical advantage system.

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### Engineering Task

#### K-2 Challenge:

"Design a Helper to Move the Big Rock"

Imagine this big rock is blocking a path where animals need to walk. Your job: build a tool or machine that could help move it. You can use ramps, levers, wheels, or rollers. Test your design by moving a smaller rock across your workspace. Does your helper make it easier? How do you know?

#### 3-5 Version

"Engineer a Rock-Moving System"

A landscaper needs to relocate this boulder without digging it out (to preserve the soil). Design and test a system that reduces the force needed to move the rock at least 2 feet across level ground using simple machines (lever, ramp, pulley, or wheel/axle).

Success Criteria:

- The system must move the rock at least 2 feet without breaking.
- The system must require less force than moving it by hand alone (test with a spring scale if available).
- Explain which simple machine(s) you chose and why.

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**EDP Phase Targeted**

Ask / Define Problem

This phase fits because the photo shows a real-world obstacle (a large, immobile rock in a landscape) without suggesting an obvious solution. Students must first identify the problem (how to move something heavy) before imagining solutions. The natural context invites genuine questioning about force, weight, and mechanical advantage.

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**Suggested Materials**

- Wooden blocks, dowels, or sticks (for levers)
- Cardboard tubes or PVC pipe (for rollers)
- Books or wooden boards (for ramps)
- Rope or string (for pulleys or dragging)
- Small rocks or weighted containers (to simulate the boulder)

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**Estimated Time**

- K-2: 30–45 minutes (one session: brief explanation, build, test, reflection)
- 3-5: 60–90 minutes (two sessions: design planning and sketching, building, testing with measurements, redesign if needed)

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**Why This Works for Teachers**

This task directly supports NGSS 3-5-ETS1-1 ("Define a simple design problem that can be solved by applying scientific ideas about magnets, forces, or friction") by grounding the challenge in the visible, real-world problem of moving a heavy object, encouraging students to apply force and simple machine concepts.