

Visible Elements in Photo



- A large green agricultural tractor with oversized tires and a cabin, numbered "6," positioned on a dirt embankment
- A brown/reddish metal fence in the foreground with horizontal rails
- Freshly tilled or excavated soil visible on the embankment
- A yellow/gold piece of equipment (appears to be a loader or similar machinery) partially visible on the left
- Flat agricultural fields and trees visible in the background under clear sky

Reasonable Inferences

- From tractor size and tire design: The machine is engineered to support heavy loads and navigate soft, uneven soil without sinking or compacting it excessively. This suggests a need for weight distribution and traction.
- From embankment and tilled soil: The landscape has been deliberately modified, likely for drainage, land leveling, or soil management—indicating heavy earth-moving work.
- From fence placement: The fence marks a boundary or containment area, suggesting a need to control access or organize work zones on the property.

Engineering Task

K-2 Challenge:

"Design a Strong Fence to Keep Equipment Safe"

Your farmer needs a fence that won't break when a big, heavy machine leans against it. Using popsicle sticks, straws, and paper cups, build a fence that is at least as long as a ruler and can hold a toy truck pushing on it without falling over. What shape or pattern makes the strongest fence?

3-5 Challenge:

"Engineer a Support Structure for Heavy Equipment"

A farmer is moving soil on a steep embankment using a large tractor. The fence holding back the embankment must support sideways pressure from loose soil and prevent a machine from rolling. Design and build a fence model using craft sticks, string, and paper that:

- Is at least 30 cm long
- Remains stable when 500 grams of sand or pebbles are piled against it
- Can support the weight of a toy vehicle placed against it without bending more than 2 cm

Test different frame shapes (rectangular, triangular, braced) and measure which design performs best.

EDP Phase Targeted

Ask / Define Problem

This phase fits because the photo shows a real-world structure (the fence) under real-world conditions (supporting loose soil and heavy equipment). Students must first understand why the fence is designed the way it is—what problem does it solve?—before jumping to building. The visible strain and context make problem identification concrete and meaningful.

Suggested Materials

- Craft sticks or popsicle sticks (varying thicknesses)
- String or twine (for bracing)
- Paper cups or small boxes (to hold test loads)
- Sand, pebbles, or water bottles (to simulate soil pressure and equipment weight)
- Tape or hot glue gun (to assemble frame)

Estimated Time

One 45-minute session (K–2: design and quick test) or Two 30-minute sessions (3–5: design, build, test multiple iterations, and measure results).

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (define and delimit engineering problems) by asking students to identify real constraints (load, slope, material failure) visible in the photo and design solutions that meet measurable criteria.