

THE STANDARD

Defining Design Problems

"Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost."

 ANCHORING PHENOMENON

The Backpack That's Breaking Your Back

Every elementary student knows the struggle: a backpack so stuffed it pulls your shoulders down and digs into your straps. It is a real, daily, annoying need. But "my backpack stinks" is not a problem you can solve yet. The challenge is to take that complaint and sharpen it into a design problem with clear rules. 3rd to 5th graders will argue about what "better" even means, and that argument IS the work.

DRIVING QUESTION

"How do we turn "my backpack is too heavy and uncomfortable" into a clear problem an engineer could actually solve?"

 INVESTIGATIVE 1

The Lunchbox That Won't Keep Anything Cold

A student opens their lunch at noon and the yogurt is warm and the juice is room temperature. Gross. This sharpens the anchor's big idea around CRITERIA: before anyone designs a better lunchbox, the class has to agree on what "success" actually means. Cold by lunchtime? For how long? Fits in a backpack? Students discover that a need is useless until you decide what would count as solving it.

DRIVING QUESTION

"What would a lunchbox have to DO for us to say the cold-food problem is solved?"

 INVESTIGATIVE 2

The Class Pet Cage on a Tiny Budget

The class wants a better hideout for the class hamster, but there is a catch: you can only use the bin of recycled cardboard, three pieces of tape, and one class period. This sharpens the anchor's big idea around CONSTRAINTS. Suddenly the dream design crashes into real limits on materials, time, and cost. Students learn that a good problem statement names the limits up front, so nobody designs something they could never actually build.

DRIVING QUESTION

"How do the limits on our materials, time, and cost change what problem we should even try to solve?"