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."

DCI
DISCIPLINARY CORE IDEA

ETS1.A · Defining and Delimiting Engineering Problems

> *"Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account."*

This standard is not about building yet. It is about getting the problem clear before anyone touches a glue stick. Elementary students take a fuzzy need, like "my backpack is too heavy," and turn it into a sharp problem with rules. Criteria are what success looks like (it has to hold all my books and feel lighter). Constraints are the limits you have to live with (only these materials, only this much time). **The whole task is naming both before you design.**

SEP
SCIENCE & ENGINEERING PRACTICE

Asking Questions and Defining Problems

> *"Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost."*

In this standard, defining the problem IS the science work. Elementary students do not get handed a tidy task. They look at a messy need, ask sharp questions about it, and pin it down into a problem someone could actually solve. **The skill is turning "this is annoying" into "here is exactly what has to happen and exactly what I have to work with."**

CCC
CROSSCUTTING CONCEPT

Influence of Science, Engineering, and Technology on Society and the Natural World

> *"People's needs and wants change over time, as do their demands for new and improved technologies."*

Here is the big idea students carry out the door: engineering starts with people. Every gadget, tool, and design exists because somebody had a need or a want. As life changes, the needs change, so the designs change too. **When a 3rd to 5th grader defines a problem, they are doing the very first thing real engineers do: listening to what people actually need.**