

THE STANDARD

Comparing Design Solutions

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

 ANCHORING PHENOMENON

The Hybrid Car That Took Over the Driveway

Two engineers walk into a problem. One has a gas engine that's powerful but burns fuel. One has an electric motor that's clean but runs out of charge fast. Each design solves part of the problem and fails at another part. Then somebody combined them, put a small gas engine and an electric motor in the same car, and the hybrid was born. Same fuel tank, way more miles. Students will see hybrids on the road all week.

DRIVING QUESTION

“How do engineers decide which parts of two different designs to combine, and how do they know the combination will be better than either one alone?”

 INVESTIGATIVE 1

The iPhone Was Never Just a Phone

Pull up a picture of a 2006 desk: a flip phone, an iPod, a digital camera, a planner. Then a 2007 iPhone. Same functions, one device. Steve Jobs introduced it as a combination of three products: a widescreen iPod with touch controls, a mobile phone, and an Internet communicator. The iPhone wasn't a brand-new invention. It was a combined solution that pulled the best features from several products into one design. Use this one to sharpen the lens the anchor is pushing on: combining beats inventing from scratch.

DRIVING QUESTION

“When engineers combined the features of several products into one, what trade-offs did they have to make for it to work?”

 INVESTIGATIVE 2

Three Backpacks, One Better Backpack

A student tested three backpacks on the way to school. One had great straps but a tiny main pocket. One held everything but the zipper broke in a week. One was waterproof but heavy. None was great. The student sketched a v4 combining the straps from Bag 1, the layout from Bag 2, and the waterproofing from Bag 3. Same kind of design analysis the anchor demands, only with something every middle schooler has tested in real life.

DRIVING QUESTION

“How would you decide which features from three so-so backpacks to combine into a v4 worth carrying?”