



## Sample Lesson 2: Designing an Air Cushion to Protect Fallers from Injury

Prompted by an incident in which a worker fell from a construction site, student teams decide to design a cost-effective air cushion that will protect someone falling from a high structure from injury. The teams begin by studying acid-base reactions. Each team has access to a variety of materials and figures out a way to produce a predictable, controlled acid-base reaction inside a plastic bag. Team members then investigate the amounts of sodium bicarbonate and acetic acid that they think will produce enough gas (carbon dioxide) to inflate a gallon-size plastic bag to a size that would protect a falling person. One criterion is that no person is allowed to touch the ground or bounce off the cushion.

Each team constructs its air cushion. Teams evaluate success of their air cushions based on the condition of a model faller (a portion cup with 10 pennies) dropped onto the cushion from a height of 1.5 meters.

Teams compare their air cushion designs with those of other teams, collect data on the results of all drops, and construct scatterplots. They then use the information to redesign their airbags to increase their effectiveness.

Each team videos a successful test and includes the video as part of a technical report to a company to market this product.