

# Sample Student Responses for Assessment Items for Engineering 1-4

## Item 1 Sample Student Response

Mr. Newton's school has a problem. Many laptops and tablets are being dropped by students in his classroom. The screens break when they hit the floor. Replacing them is expensive. The school is looking into ways to reduce the number of devices that break. Mr. Newton has challenged his science students to design a solution to the problem.

When discussing possible solutions to the breakage problem, several students suggested using padding on the floor. Mr. Newton agreed that padding might work. The school principal is impressed with this solution, but before the school invests in padding for the classroom floor, he would like to know if it will work in the real world. Students can't test their solution with real devices, which might be damaged during testing.



Suggest a physical model of a device that students could make and use to evaluate whether the padding might be useful. For your model, describe:

- the components of the model and why each component is needed for the problem you are solving.
- how the components of the model might be varied.
- the data you will collect to help you figure out whether padding the floor is a possible solution.
- what you would do next after collecting and analyzing your first round of data.

### **Expected Student Response**

*My model would need to include two components—a model for the device’s screen and a model for the padding for the floor. For the device’s screen, I would use a plastic bag with a piece of glass like the glass used for device screens in the bag. The bag would prevent the glass from scattering if it breaks. For the padding, I could use a sample of floor padding from a store. I could vary this by using different padding materials on the floor. I would collect data on whether the glass cracks or breaks from a distance of about 1 meter when dropped onto the padding. I would then do more tests with an improved design (better padding or a better model for the screen) based on what I learn.*

**Scoring notes:** Students might suggest other models. For the screen they might suggest bringing in old devices from home that are no longer working but have intact screens or any other model that approximates the screen of a device. For the padding, they might suggest changing another variable, such as the thickness of padding. Accept any reasonable models for the screen and padding.