



## **Trash Sliders: The Latest UVA Engineering Teaching Kit (P12 Resource Exchange)**

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## P12 Resource Exchange

### *Trash Sliders: the latest UVA engineering teaching kit*

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**From TRASH**



**To Trash Sliders**



The first four authors of this paper are the UVA mechanical engineering students who designed this activity, built the slide, and conducted the initial classroom trials. We tested this activity in two science classes taught by Ms. Deanine Lilley at Jack Jouett Middle School in Albemarle County, Virginia. We have since used it in a summer program for high school students sponsored by the Virginia Space Grant Consortium (BLAST).

Students and faculty at the University of Virginia have been developing Engineering Teaching Kits (ETKs) since 2002. Our purpose is to expose precollege students to engineering and have them complete an engineering design challenge. Over 60 ETKs have been developed to date; about 20 have been widely distributed and used in schools and summer programs. We have adapted ETKs to both elementary and high school audiences.

To learn more, please visit our Facebook page (<https://www.facebook.com/theengineersway/>) or contact us at [lgr@virginia.edu](mailto:lgr@virginia.edu) to gain access to the complete lessons plans.



*Trash Sliders* was developed to increase awareness of the problems of trash and waste, their impact and costs to society and the environment; highlight the practices of sustainable design, including materials reuse and upcycling; and present an engineering design challenge that requires building a vehicle from trash. We discuss the role of suspension systems in safely transporting payloads by road and rail.

The *Trash Sliders* Engineering Teaching Kit introduces the fundamentals of engineering design, the concepts of sustainability and upcycling, the basic physics of forces and motions, and the design of suspension systems. Several days of lessons culminate in a final design challenge: student teams design and build a vehicle capable of transporting a container filled with liquid over rough terrain. The goal is to complete the course with as little spillage as possible. All materials provided for construction of their vehicles are items normally considered trash, in order to emphasize the concept of reuse in promoting sustainability. Students were encouraged to bring trash from home if they thought it would be useful for their Trash Slider.

In the engineering design challenge, a team's vehicle had to transport a 2L drink bottle down a slide with various built-in obstacles. The bottle has a slit cut into the top and is filled with water during the competition. Each team designed, built, and tested their vehicle (during initial testing the bottle was filled with golf balls). Typically several different designs were tried before finding one that performed acceptably.

The results of our initial classroom tests were extremely successful. The students in both classes were engaged in and excited by this activity. All teams achieved acceptable final designs. The variation between designs was incredible, and the middle school students devised structures and systems we had not thought of. We do not show examples of successful designs to the students before the design challenge, as that tends to limit their vision. With no preconceptions of what the design should look like, our students are free to be truly innovative. Every team produces a unique design.