Learn by Doing: Engineering Activity

Design and Build a Prosthetic Leg

The objective of this activity is to design a functional prosthetic leg for one member of you group to wear. The leg must be able to attach to your team member, fit the length of their leg correctly, and must be able to support their weight.

High School Girls: As engineers you often have to balance the cost of a design with the benefits of the design. Extra points will be awarded for creativity and a low-cost design that still functions correctly.

Execution

Teams will have a variety of objects to construct a prosthetic leg. You can use as many elements as you want in whatever fashion you want.

Each team will have a cardboard tube, plastic pieces, poster board, scrap cardboard, zip lock bag, sponge, bubble wrap, cotton balls, twine, scissors, bean bags, ace bandages, binder clips, paper clips, resistance bands, duct tape, rubber bands, dowels, erasers, markers, and glue.

Things to Consider

Your designs will be judged at the end based on creativity, comfort, functionality, and aesthetics. High school groups will also be judged on the cost of their design. We've included a copy of our score sheet on the following page.

Your prosthetic should have all the components of a human leg, including:

- A piece to balance where the leg meets the floor (a foot on a human leg)
- A piece to distribute your weight from the knee to the floor (a calf/shin on a human leg)
- A piece to connect the prosthetic to rest of the leg (the knee and ligaments).

Movement at the joints (knee and ankle on a human leg) is also something to think about!

Engineers work in team and collaborate with other people. Feel free to discuss your design with other teams or lend other teams some of your materials you are not going to use.

High School Girls: Some of the more obvious items for you to use may cost more than others. Use your creativity to come up with alternate solutions or to offset the cost of using an expensive item in your design.

Cost Worksheet

High School Girls: As engineers you often have to balance the cost of a design with the benefits of the design. Extra points will be awarded for creativity and a low-cost design that still functions correctly.

Fill in the worksheet below to document which items you used, and to determine the total manufacturing cost of your leg. This will be a judging criteria to determine first place, with a lower cost getting more points.

Item	Cost		Quantity Used	Total Cost
Cardboard tubes	$10.00	each		
Bean bags	$ 4.00	each		
Baton	$ 4.00	each		
Sponges	$ 5.00	each		
Ace bandages	$10.00	each		
Resistance bands	$ 2.00	each		
Binder clips	$ 2.00	each		
Cardboard	$ 5.00	per piece		
Poster board	$ 1.00	per page		
Plastic pieces	$ 2.00	each		
Dowels	$ 2.00	each		
Rubber bands	$ 1.00	each		
Ziplock bags	$ 1.00	each		
Eraser	$ 1.00	each		
Cotton Balls	$ 3.00	half bag		
Bubble wrap	$ 5.00	per piece		

Scorecard

Category	Score 1-10
Creativity	
Stability	
Comfort	
Aesthetics	
Cost (High School Girls Only)	
Total Score	

Notes:

Visit http://www.nitscheng.com/about-us/educational-offerings/introduce-a-girl-to-engineering-day for additional resources and similar event information!