

MAKEngineering Kit

Instructions:

Trendy Tennies

Task adapted from Teach Engineering STEM curriculum developed at the University of Colorado Boulder. Images from previous families who completed this kit.

ENGINEERING TASK

You have been asked by a popular shoe company to design a new trendy tennis shoe for unique needs of their four customers. Pick one of the customers and design a tennis shoe to meet their needs. You decide to use everyday products to construct the tennis shoe prototype.

CUSTOMER 1—OLAF

Age: 3 (Frozen 2)

Shoe size: Kid's 3

About: Olaf has a layer of permafrost to keep him from melting. He enjoys riding Sven and hanging out with Else in Arendelle.



CUSTOMER 2—SERENA WILLIAMS



Age: 39

Shoe size: Women's 10.5

About: Serena is an American professional tennis player and has won 23 Grand Slam singles titles.

CUSTOMER 3—HULK/BRUCE BANNER

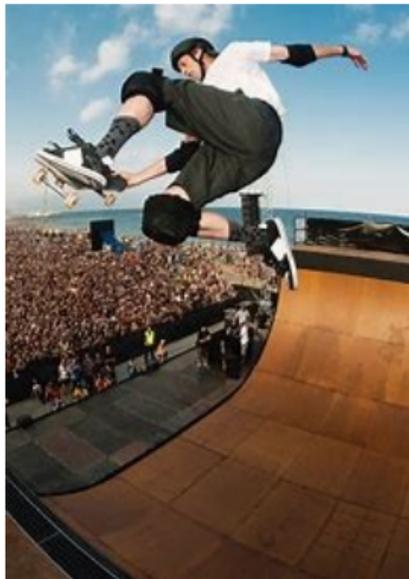
Age: 49

Shoe size: Unknown; feet change sizes

About: Bruce is a brilliant scientist. As Hulk, he has unlimited superhuman power, can leap great distances, and can heal injuries within seconds.



CUSTOMER 4—TONY HAWK



Age: 42

Shoe size: Men's 8.5

About: Tony is a famous skateboarder who was the first person to land the 900, a trick where he spins 2.5 times on a board.

MATERIALS IN KIT

- * ~20 Cotton balls
- * 3-4 Sheets of White Cardstock
- * 3 rolls of ribbon (different colors)
- * Pieces of Fabric and/or Felt
- * ~20 Velcro dots
- * 3-4 Sheets of Sandpaper
- * Tape
- * Pair of Scissors
- * White Glue
- * Hole puncher
- * ~10 Pipe cleaners
- * ~2-3 Foam sheets
- * 3-4 Markers

We also encourage you to use materials and tools in and/or around your home environment.

PROTOTYPE

Prototype is a term we will use often, so what does it mean? One way to think of a prototype is a rough draft on a paper. Here are two videos that explain a prototype in engineering.

https://youtu.be/_1bOaNSy5XY

https://youtu.be/k_9Q-KDSb9o

STEP 1—RESEARCH

Let's do research on the customer or user you selected as we want to design an appropriate shoe. As you search and find interesting things about your customer, be sure to write them down.

Next think about how you will use the information about your customer in the design of the shoe. For example, what is the intended purpose (e.g., running)? How will you make your prototype uniquely stylish, a one-of-a-kind design?

STEP 1—RESEARCH

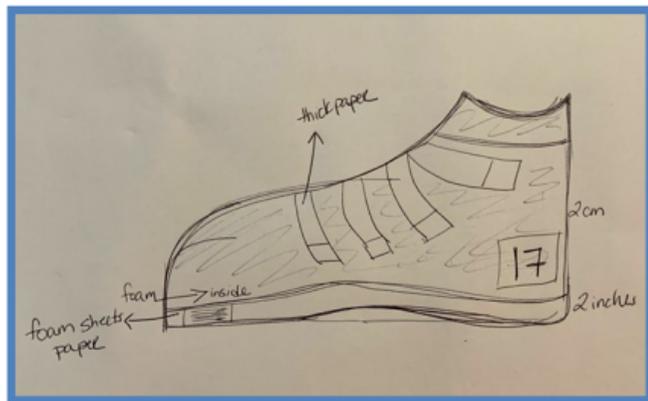
Below is another place to learn more about the design of the shoe such as the thickness of the sole or bottom of the shoe.

<https://naturalfootgear.com/blogs/educational-articles/problematic-shoe-design-features>

Additional shoe design elements for you to research may include (a) flexibility, (b) traction, and (c) ankle support.

STEP 2—PLAN

On a sheet of paper, sketch your shoe design and list the material you will use for your prototype shoe. You are free to use the material in the kit and/or material in your home.



It is okay to ask others to also sketch a design.

STEP 3—TRACE

Trace someone's foot to use in your design. Next, estimate the length of the foot print in inches.





STEP 4

**CREATE AND
TEST YOUR
PROTOTYPE.**

STEP 5—IMPROVE

How would your customer rate your prototype?



Based on your customer and your research, what changes and/or additions might you make to improve your prototype? Explain why. Continue to redesign the prototype until you get a 5-star rating.

DID YOU KNOW?

Biomechanical engineers are involved in designing shoes and other products such as backpacks and child safety car seats. They must understand the mechanics of how our bodies move to design products that are comfortable, safe, and enhance human performance.

Check out <https://youtu.be/Pu0lp7apU1Y>

WHAT TYPE OF ENGINEER ARE YOU?

Add a sticker to your Engineering Passport that identifies the type of engineer you were most like in the design of trendy tennies. Don't forget to write why you chose the type of engineer.

****We also conclude with a video highlighting the trendy tennies design process.****

<https://youtu.be/svGia40SYm4>



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