

See how this **example filled-in maker challenge template** looks on the TeachEngineering website:

https://www.teachengineering.org/makerchallenges/view/cub_sneaker_maker1

Snazzy Sneakers (maker challenge)

Maker Challenge title	Snazzy Sneakers
Grade level	5 (5-9)
Subject area(s)	problem solving, science & technology
Estimated time required	120 minutes
Header image	Insert image 1 here



Image 1

Image file: cub_sneaker_maker1_image1web.jpg

ADA Description: A photograph shows a pair of dark green high-top laced sneakers with rubber soles, edges and toe caps.

Source/Rights: 2006 Irum Shahid, Free Images
<http://www.freeimages.com/photo/sneakers-1420693>

Caption: Lots of engineering goes into the shoes on your feet!

Maker Challenge Recap

For this maker challenge, students decide on specific design requirements (such as good traction or deep cushioning), sketch their plans, and then use a variety of materials to build prototype shoes that meet the design criteria. The bottoms (soles) of sneakers provide support, cushioning, flexibility and traction as makes sense for the sport or activity. In addition, some sneakers are intended to be fashionable with cool colors, materials or added height. Sneakers are engineered products that use a mix of materials to create highly functional, useful shoes.

Maker Materials & Supplies

- an assortment of materials to provide cushioning, support, protection, flexibility, height and/or traction for shoe prototype construction, such as fabric, canvas, sponges, foam packing material, foam core board, rubber gloves, rubber baseboard, sandpaper, brillo pads, paint
- an assortment of fabrication tools and adhesives to work with the materials, such as scissors, twine, glue and tape

Kickoff

These days, sneakers are so specialized! What different kinds of sneakers can you think of? (Listen to student ideas.) You can see that it is important to have design criteria in mind when you create footwear like sneakers. The way shoes are made and the materials that are used depend on the intended purpose and end use.

Why might engineers be involved in the design of sneakers? Well, while it is important for sneakers to look stylish in order to appeal to buyers, they must also function correctly. The best designs combine

physics, biomechanics and materials science. They take advantage of a wide range materials and inventive structural designs to provide durability, comfort, cushioning and stability.

Many factors must be taken into consideration when designing sneakers, such as who will wear them (men, women, children) and for what types of activities. For example, women's feet are usually narrower with higher arches than men's feet. The end user and activity type dictate what shoe requirements are most important for the design, such as traction, cushioning, flexibility and/or sole thickness.

What are your ideas for a sneaker that has never been made before? Think about the type of sneaker you want to create. Define its specific characteristics. Sketch your design and select materials. Then create and test a prototype (a working model)—just as engineers do.

Resources

- It may help students with their prototypes if they start with a simple fabric base, such as that provided in the Pattern for Cutting Fabric Base Forms. Or provide some old shoes from a second-hand shop that students can disassemble to gain construction and pattern ideas.
- Consider showing students a 6:37-minute video, “How People Make Sneakers 1991,” from the *Mr. Rodgers Neighborhood* TV show, which shows the shoe-making factory process to inspire students and prompt them to think about the materials, cut pieces, fabrication and details that go into creating footwear. See <https://www.youtube.com/watch?v=RnRX7oYCwHI>.
- Consider showing students the 2:29-minute video, “How High-End Sneakers Are Made from Start to Finish,” during which skilled artisans construct a pair of leather Le Coq Sportif sneakers. See <http://www.complex.com/sneakers/2015/01/how-high-end-sneakers-are-made-from-start-to-finish>.
- Consider showing students photographs of the SoleFly x Air Jordan 16—a very fancy, expensive and “collectable” sneaker. See <http://solecollector.com/news/2016/11/solefly-air-jordan-16>.
- Encourage students to document their work, perhaps through the use of a design journal, such as the following Maker Challenge Design Journal.

Maker Time

If students need prompting during the design and planning stage, ask them:

- For what sport or activity do you want to design a sneaker?
- What motions do you use in this sport/activity?
- How do the feet move? Have one student go through some of the motions involved in the sport/activity while other students observe. (For example, fast start, fast stop, pushing motion, turning motion, jumping up.)
- What types of properties do the sneakers need for this sport/activity? (For example, flexible or stiff, slippery or sticky, bouncy or firm, able to bend and twist, thick or thin sole.)
- What materials give you the properties you want for your sneaker?

Suggest students liberally sketch their ideas in advance of starting fabrication. This includes detailed sketches for how to combine and adhere together the various materials and shoe components.

Guide students to use and then evaluate their sneaker prototypes. Remind them that much can be learned from failures—such as changes to materials and design that make better end products.

Wrap Up

As a class, have students share, compare and reflect about their sneaker creations:

- Describe the purpose for your sneakers. Who would buy and use your sneakers?
- Did you test your prototype(s)? What worked well? What didn't work as well?
- What did you learn from failed tests of certain designs and materials?
- What ideas do you like from other sneaker prototypes you saw students make?

- What would you improve if you were to make another prototype? Other materials? Design changes?

Attachments

Pattern for Cutting Fabric Base Forms (pdf)
Maker Challenge Design Journal (pdf)
Maker Challenge Design Journal (docx)

Tips

None

Other

None

Contributors

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Key: Yellow highlight = required component