

# MAKEngineering Kit

## Trendy Tennies

Inspired by *Pete the Cat: I Love my White Shoes* by E. Litwin & J. Dean



This engineering kit would not have been possible without funding and support from the National Science Foundation.

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

# ENGINEERING TASK

Read the book *Pete the Cat: I love my White Shoes*.

In the story, Pete the Cat keeps messing up his shoes but he keeps on walking and singing. Do you like Pete's shoes? What was your favorite color?

What type of shoes do you like?



## ENGINEERING TASK

Your engineering task is to design a new trendy shoe for Pete the Cat or one of his four friends. Their only request is that the shoe be an original design—your design. You decide to use everyday products to construct the shoe prototype.



# PETE'S FRIEND—CUSTOMER 1

**Shoe size:** Kid's 3

**“Feet”:** 6 arms and 2 legs

**About:** Octopus is Pete's friend. He loves juggling and having fun.



**OCTOPUS**

Image from: <https://www.petethecatbooks.com/friends/>

## PETE'S FRIEND- CUSTOMER 2



**GRUMPY TOAD**

**Shoe size:** Kid's 1.5

**“Feet”:** 2 front legs with four toes & 2 back legs with five toes

**About:** Grumpy Toad loves riding his motorcycle and he plays a pretty good bass guitar.

## PETE'S FRIEND—CUSTOMER 3

**Shoe size:** Kid's 2

**“Feet”:** 4 feet with sharp claws

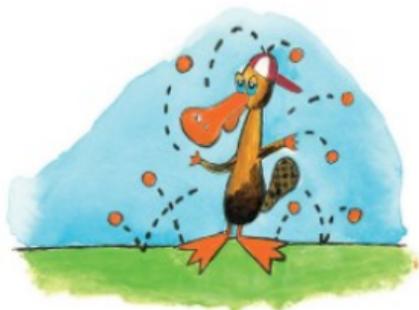
**About:** Squirrel is often timid and nervous. Squirrel worries about things going wrong and is afraid of getting lost.



**SQUIRREL**

Image from: <https://www.petethecatbooks.com/friends/>

## PETE'S FRIEND—CUSTOMER 4



GUS

**Shoe size:** Men's 10.5

**“Feet”:** 4 webbed feet

**About:** Gus the platypus is a little shy around others, but has a great passion for music. He is an excellent drummer.

Image from: <https://www.petethecatbooks.com/friends/>

## MATERIALS IN KIT

- \* ~20 Cotton balls
- \* 3-4 Sheets of White Cardstock
- \* 2 rolls of ribbon (different colors)
- \* Pieces of Felt
- \* ~20 Velcro dots
- \* 3-4 Sheets of Sandpaper
- \* Tacky Glue
- \* Hole puncher
- \* ~10 Pipe cleaners
- \* ~2-3 Foam sheets
- \* 2-3 Markers
- \* Pom-poms
- \* Stickers (Foam)

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

## DID YOU KNOW...?

Failure is something that happens to every one of us. We make or try something new and things do not work the way we imagine. Our minds let us imagine amazing projects and we are optimistic that everything will be perfect. But then things do not work out, our ideas do not fly and our boats sink. What do we do? Just like Pete the Cat, we bounce back and try again.

## STEP 1—RESEARCH

Let's do research on Pete the Cat or his friends as we want to design an useful 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., playing the drums, riding a motorcycle)? How will you make your prototype uniquely stylish, a one-of-a-kind design?

## STEP 1—SUPPORT

Optional questions to ask:

- What other things should we consider for the shoe?
- How important is comfort and flexibility?
- What material would be strong and supportive for the bottom of the tennis shoe prototype?
- Will your shoe have laces, straps, or both?
- What material will support the toes of the foot? Is this important in your design?

## STEP 1—EXTENSION

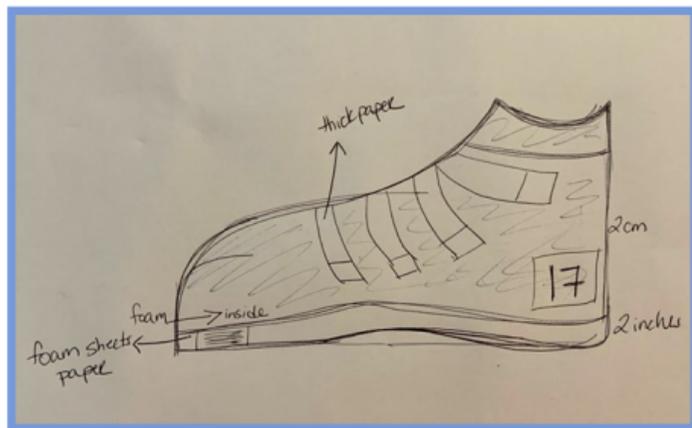
Watch the YouTube video entitled “Blippi Explains:  
How To Make Shoes”

<https://youtu.be/Ey7RjzyLR7Y>

One possible question to ask is “What did you notice?” Another is “What did you notice that we can use in the design of our shoe?”

## STEP 2—DESIGN

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.



## STEP 2-SUPPORT

Optional questions to ask:

- How might we use \_\_\_\_\_ (e.g., ribbon) in our design?  
What is its purpose?
- How is \_\_\_\_\_ based on your research?
- Again, let's think about the user. What might they think about \_\_\_\_\_?
- What additional tools (e.g., scissors, screwdriver, tape) might we need? How will we use them in the design of the prototype?

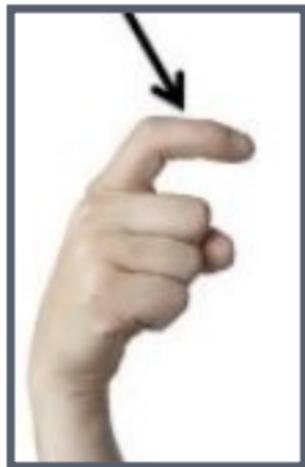
## STEP 3—TRACE

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



## STEP 3—DID YOU KNOW?

You can use the middle part of your pointer finger as a way to measure the length in inches. Check out this video for additional ways to use your body to measure objects.



<https://youtu.be/FnTGpnl2lXY>



## STEP 4

CREATE AND  
TEST YOUR  
PROTOTYPE.

## STEP 4-SUPPORT

Here are a few questions to consider asking.

- This is not working as we planned, what might we do differently?
- I like how you are \_\_\_\_\_.
- Explain to me the purpose of \_\_\_\_\_ (material).  
What function does it serve?
- Can I show you something that I was thinking about? (ask for permission)

## STEP 5—IMPROVE

How would your user rate your prototype?



Based on your user 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>

## STEP 6—COMMUNICATE

Let's create a commercial. Here are a few questions we might want to address in our commercial.

- What name would you give your shoe? How does this name represent the purpose and/or look of the shoe?
- Explain your design. How does your design meet the needs of your user?
- What makes your shoe unique?
- In your opinion, what is the most unique use of material? Why?

# SHARE THE FUN AND PASS IT ON!

Thank you for participating.

When you are done with this project, gift the book and the directions to your friend to make the idea of engineering leave footprints.

