

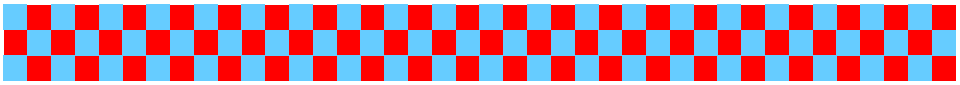
MAKEngineering Kit

Instructions:

Pedometer:

Increasing Steps

Task adapted from Teach Engineering STEM curriculum developed at the University of Colorado.



LET'S START WITH A FIGURE!

What do you notice?

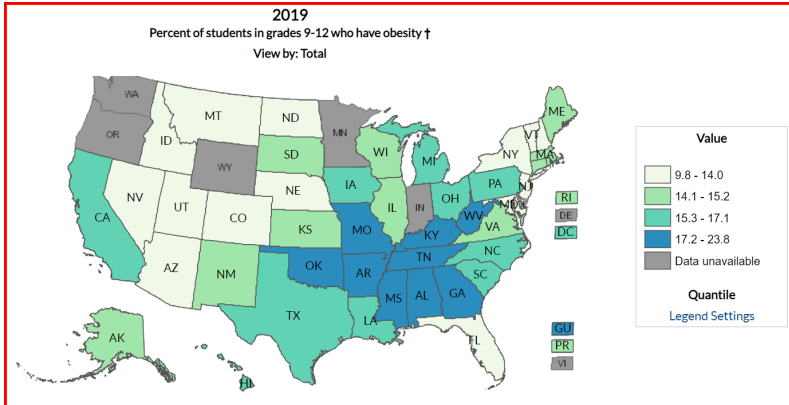


Image from Centers for Disease Control and Prevention (CDC)

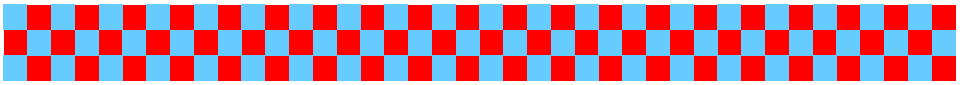
ENGINEERING TASK

To prevent obesity, it is recommended that all children between the ages of 5 and 19 should take around 12,000 steps a day. (What does this mean for the number of steps you take in one week? What about one year?) Your task is to design a wearable pedometer prototype that will track children's number of steps. (How might this help with childhood obesity?)



MATERIALS IN KIT

- ◇ Micro:bit Kit
- ◇ Scissors
- ◇ Fabric & Felt Pieces
- ◇ Measuring Tape
- ◇ Velcro Dots
- ◇ Binder Clips
- ◇ Nylon Strap
- ◇ 2 Pipe Cleaners
- ◇ Ribbon
- ◇ Sewing Kit
- ◇ Duct Tape
- ◇ Tacky or Fabric Glue
- ◇ Psst: Consider how to use items in your home like a cereal box.



WARNING! WARNING!

What do you think will happen to the micro:bit if you use glue to get it to stick to other material in the kit or in your home? Correct. So please **do not** use glue on the micro:bit.



STEP 1—RESEARCH



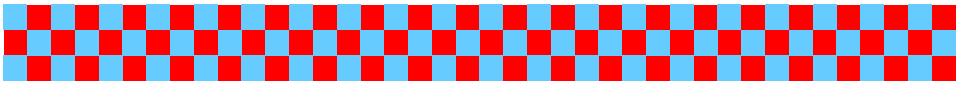
Pedometer? A pedometer is a gadget that counts each step you take. But how does it work? Where might pedometers be worn on your body? How are they worn (e.g., Tied? Clipped? Strapped?) What are the different types of pedometers? What are the advantages and disadvantages?



These are questions you want to consider before you start thinking about your pedometer design!

DID YOU KNOW...?

Modern pedometers interact with devices such as smartphones and Fitbits. However, your customers are children between the ages 5-19. How many five-year old children own a phone? Also, the average cost for a smartphone is about \$580. WOW! One last fact for you to keep in mind. About 42 million Americans do not have access to the internet, so you cannot rely on wi-fi for the prototype.

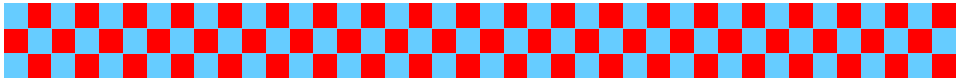


STEP 2—PLAN

Brainstorm and sketch at least 2 designs. Here are a few questions to think about in your design.

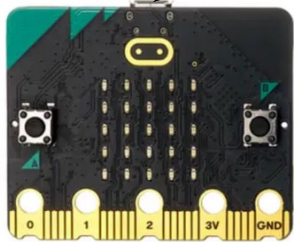
1. Where is the pedometer to be worn?
2. Should it be adjustable?
3. How might you make it comfortable? Stylish?
4. How can you make it suitable for daily activities such as running and jumping?
5. Why might the size of the micro:bit be an important part of your design?

For each design, make a list of material you will use in your prototype.



MEET THE MICRO:BIT

Hello. My name
is Marvin!



Watch this video to learn
more about a micro:bit
and the online interface.

<https://youtu.be/u2u7UJSRuko>

STEP 3—CREATE

To begin your prototype, let's program your micro:bit. The following website will walk you through this process.

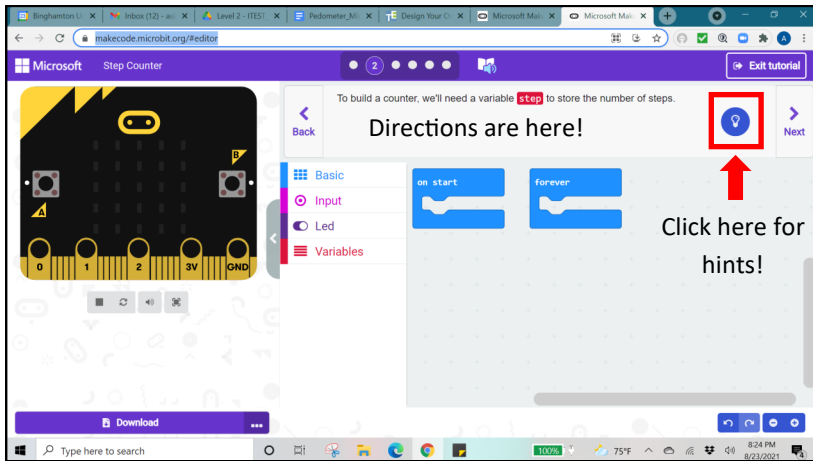
<https://makecode.microbit.org/>

Open “step counter” under the heading “Fashion.”

If you are asking yourself, “Did I find the right project?”, look at the next page.



STEP 3—CREATE



STEP 3—CREATE

Now, you might be asking yourself,
“How do I download my program?”
Or “What is this battery pack for?”

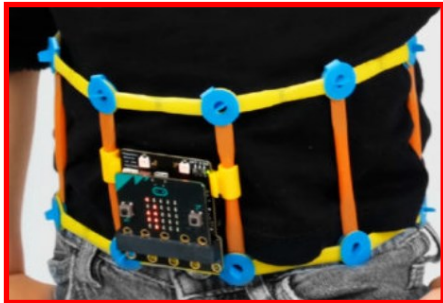
Let's watch a video:

<https://youtu.be/ybTImPzvqKA>

How would you explain this to a six-year old, or a sixty year old?



STEP 3—CREATE



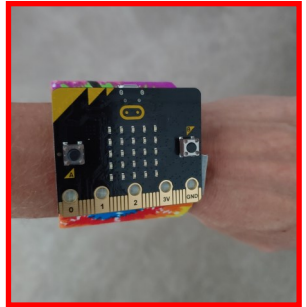
Use materials from the kit, or your home, to create a wearable pedometer. Refer back to your plans as needed.

Image: *learning.strawbees.com*

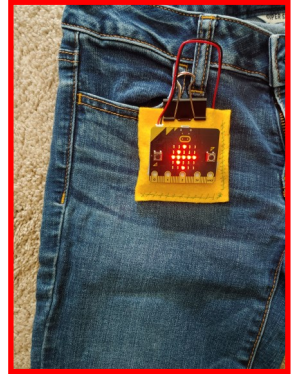
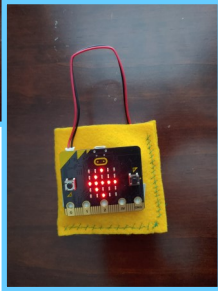
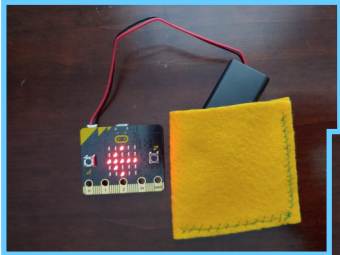
EXAMPLE 1



PSST! Speaking from experience, be careful where you place the Velcro dots. Where do you think the other side of the Velcro dots are located in this design?

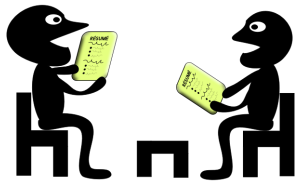


EXAMPLE 2



STEP 4—PREP FOR TEST FEEDBACK

Product engineers determine how well potential customers like their product. Develop 4-5 questions to ask “customers” about your prototype. Think about how it works (functionality), comfort, and style.



STEP 4—TEST



Image from [micro:bit.org](https://micro.bit.org)

Test your prototype with 2-3 “customers” between the ages 5-19. Psst. Don’t forget to interview and get feedback from your customers. You might want to take notes because our short-term memory lasts between 15-30 seconds.

STEP 4—IMPROVE

What feedback did you hear and/or observe?
Based on the feedback from your tests and your customers, how would you rate your prototype?



How will you improve the prototype? Why?
Make changes to your prototype and test again. This is what is referred to as an iteration.



STEP 6—EXTENSION

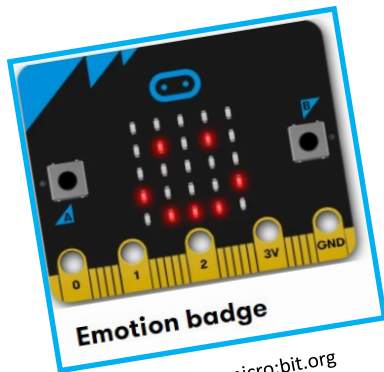


Image from [micro:bit.org](https://micro.bit.org)

Adapt your prototype for another use, like a watch.

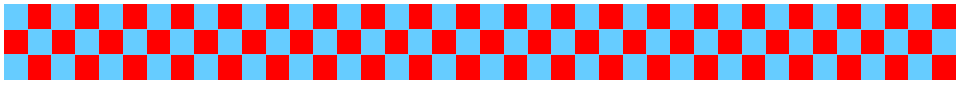
Play around with the different tutorials on the micro:bit website for additional ideas.

Be creative!!!

STEP 7—EXPLORATION

CREATE YOUR OWN!!

Play around with the different tutorials to learn more about block programming with the micro:bit. Once you feel comfortable, we challenge you to develop your own programming project for us to share with others.



DID YOU KNOW...

Ada Lovelace, born in 1815, is often referred to as the world's first computer programmer. She published the first algorithm designed for a machine, a century before the first computer was created.

Are you interested in meeting current women engineering? Check out this website—<https://www.engineergirl.org/3/Engineers>.



getty images

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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 a pedometer prototype. Don't forget to write why you chose the type of engineer.



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