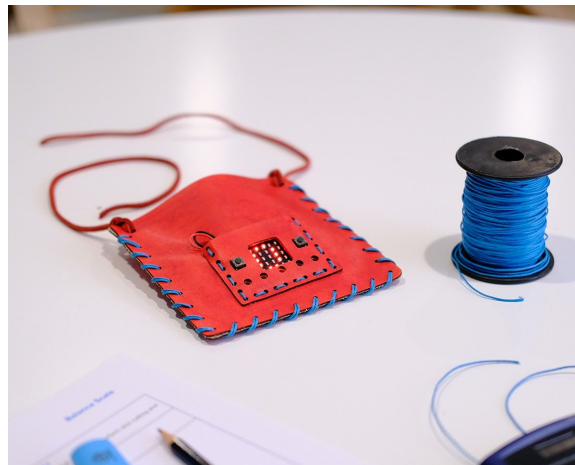**LESSON**

Step Tracker + Case

📖 **Overview**

In this lesson, students will:

- Laser cut the material for the carrying case
- Stitch together the carrying case
- Insert the micro:bit and power pack
- Code the microbit to become a step counter
- Test the step counter

THE OBJECTIVE

Create and sew a carrying case for the micro:bit. Write a program that allows the micro:bit counts your steps

GRADE LEVEL:	DIFFICULTY
Elementary grades 4-5	Easy
SUBJECTS	**DURATION**
Art, Computer Science, Technology	60 minutes
.	

Supplies

MATERIALS & TOOLS:

- Micro:bit Materials
- micro:bit microcontroller
- micro:bit battery pack
- Proofgrade Leather
- Thick thread or cord
- large blunt needle
- Keyrings or shoelaces to attach step tracker to your clothing

Description

The micro:bit is a microcontroller – a kind of tiny computer - that you can program using drag and drop code blocks. It has sensors that can detect conditions in the world around you and a 5x5 LED matrix which can display text and images. The micro:bit can run off of a small 2xAAA battery pack, and is easy to take with you wherever we go.
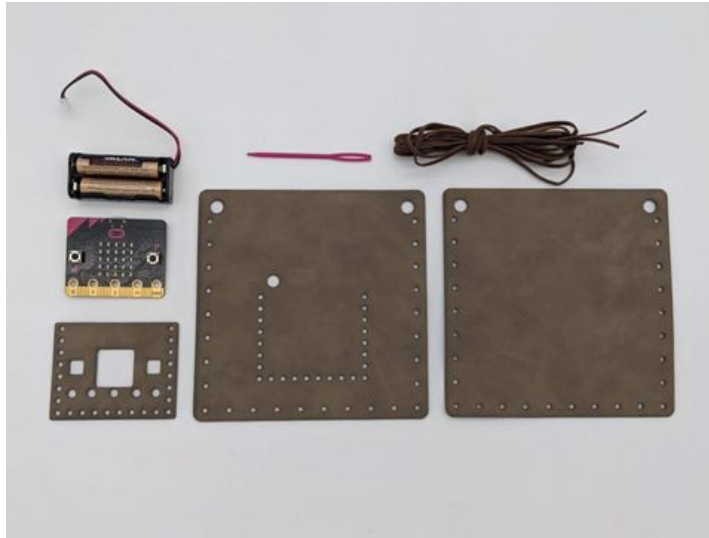
In this lesson, students will cut and assemble the parts to create a micro:bit carrying case allowing them to wear the micro:bit and its battery pack on their person. They can then program the microbit to detect steps to create a wearable step counter.

Lesson Instructions

Step 1: Laser Cut the Material

Choose a material to make the body of the carrying case. Laser cut the three pieces from the template provided. When laser cutting fabric, be careful to use low power and high speed. Fabric can catch fire, and the edges will singe easily if overheated.

The two large pieces constitute the main carrying case compartment, and the small rectangle forms the front pocket.

Step 2: Stitch the Pocket to the Front Layer
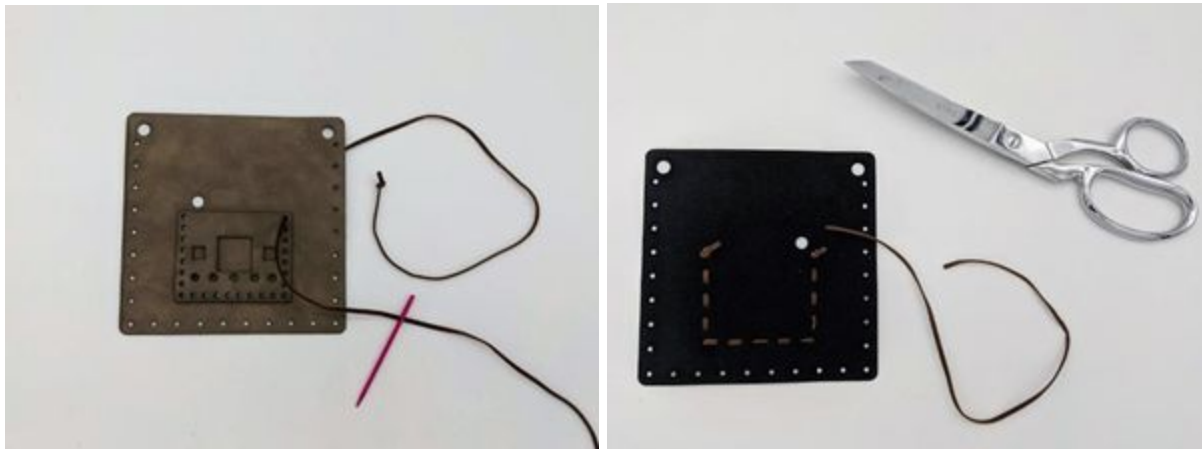
Lay the pocket over the front piece of the bag so that the holes around the pocket edge line up with the holes in the front of the bag.

Cut a piece of yarn or cord about 10 Inches long, tie a knot at one end, and thread the untied end through the eye of a plastic needle. With the needle, thread the cord up and down through the matching holes in the pocket and front layer of the bag. Start the first stitch from underneath the front layer of the bag and pull the cord upwards unto the knot rests against the back side of the front layer.

Stitch around the edge of the pocket, pulling the needle and cord alternately up and down through the holes. When you reach the final hole, turn the pieces over, tie a knot in the cord on the back side of the front layer. Cut the excess string.

Step 3: Stitch the Front and Back Layers Together

The body of the bag will be sewn together using a "whipstitch.". Cut a piece of cord about 21 inches long and tie a knot at the end. Using the needle sew upward through the aligned holes in the two bag layers as shown. Bring the needle back underneath the bag and up through the next hole as shown. You will always be pushing the needle upwards through the matching holes.
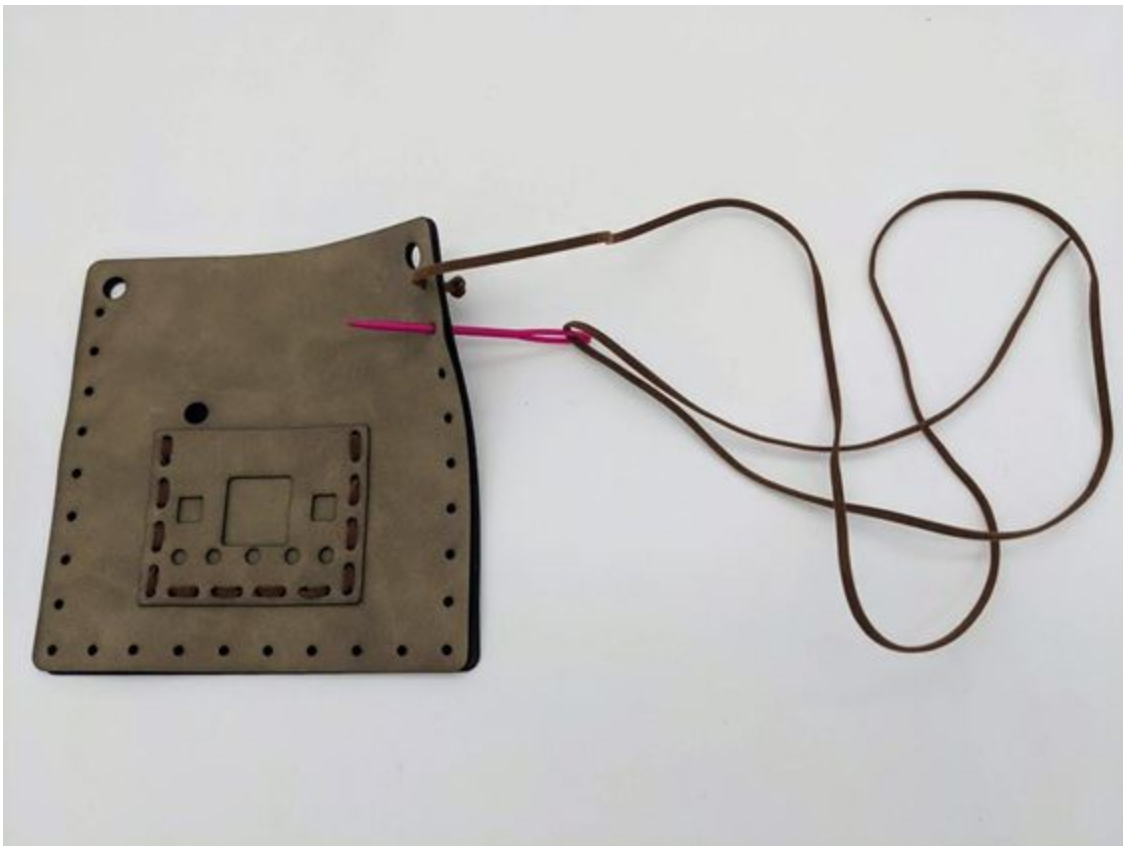
.When you reach the last hole, turn the bag over and stitch the end of the cord through the last loop to form a knot. Add a second knot by stitching through the first, pull the cord taut, and snip the end.

The two large holes at the top of the carrying case may be used to attach ribbon for a handle or shoulder strap. Alternatively, string can be threaded through the holes to attach the carrying case to a belt loop.

Step 4: Insert the Micro:bit and Connect the Battery Pack

Slide the micro:bit into the front pocket. Place batteries inside the battery pack, and slide the pack inside the main carrying case compartment as shown. Thread the battery pack power plug through the big hole in the front layer of the case and plug it into the top of the micro:bit. Your micro:bit is now powered and ready to go with you!

Step 5: Coding the Micro:bit

You don't need to remove the micro:bit from the carrying case to program it. You may simply plug the programming cable into the micro USB connector on the top edge of the micro:bit, while the micro:bit is seated in the pocket. If you have never coded a micro:bit before, see underlineinstructions.

The micro:bit educational foundation has a number of guides for fun micro:bit activities at makecode.microbit.org/projects. The step counter project is ideally suited for use with your micro:bit in its carrying case. Follow the instructions in this micro:bit guide to program a step counter:

Step 6: Test your Step Counter

Now you can wear your step counter out with you and see how far you go. Set a goal, and check your step counter.

Evaluate and Test:

Test the step counter for accuracy: Take 10 steps, then see what your step counter reads. Does it catch all your steps or just the ones where you take a hard step. Does it detect jumping?

How many steps can you get it to register in one minute?

Other Ways to Use Your Step Counter:

Set a goal for how many steps you'd like to take in a day. Wear your step counter and check throughout the day to see how close you are.

Record the number of steps you take every day for a week, and make a step chart.

Check out these other micro:bit projects that are fun to take with you in your carrying case.

Emotion badge – Let everyone know how you are feeling

Name badge – So everybody knows your name:

Compass - Navigate by compass using the micro:bit to sense the Earth's magnetic field