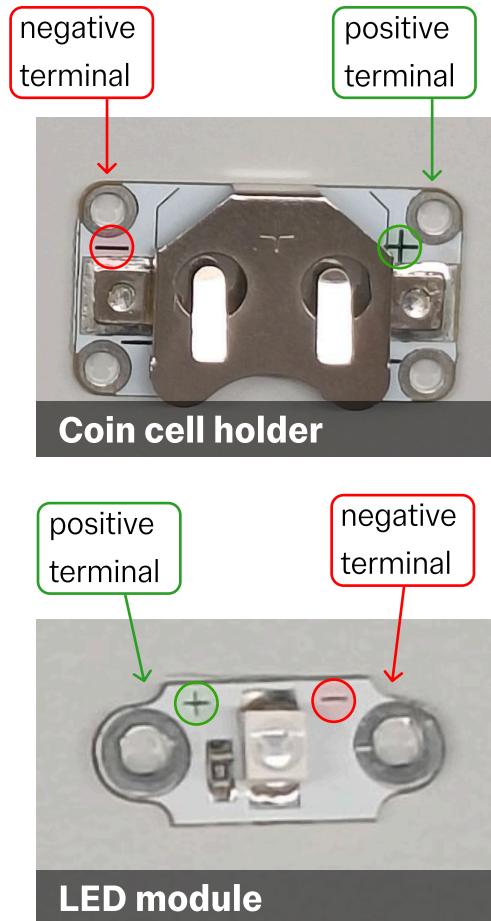
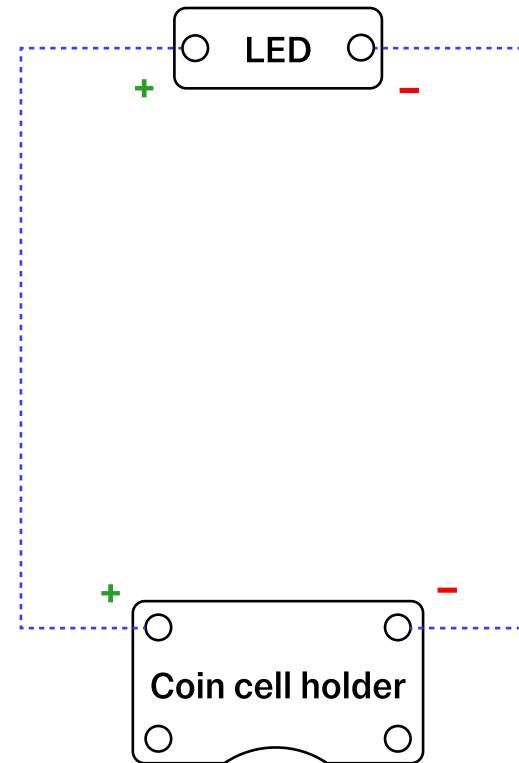


ACTIVITY A: sewing 1 LED

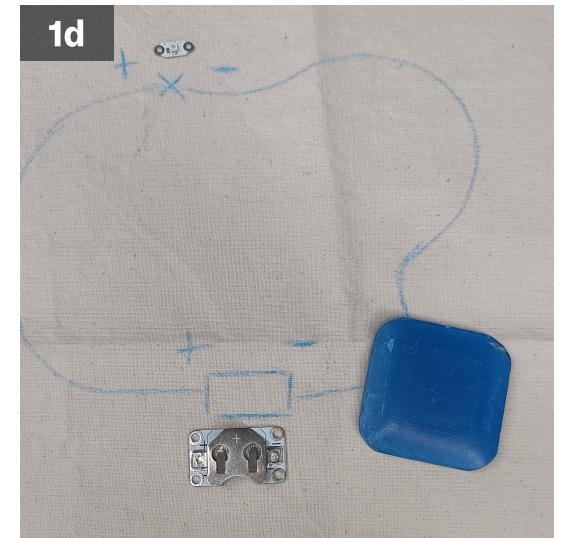
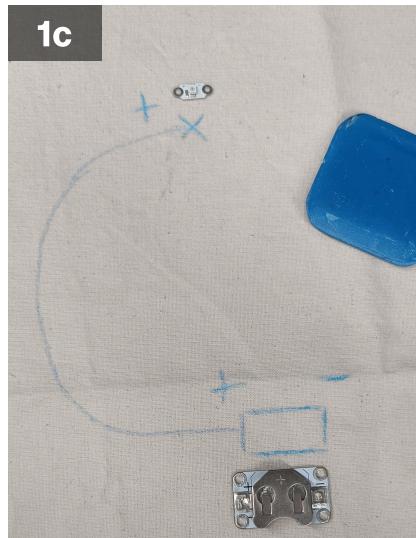
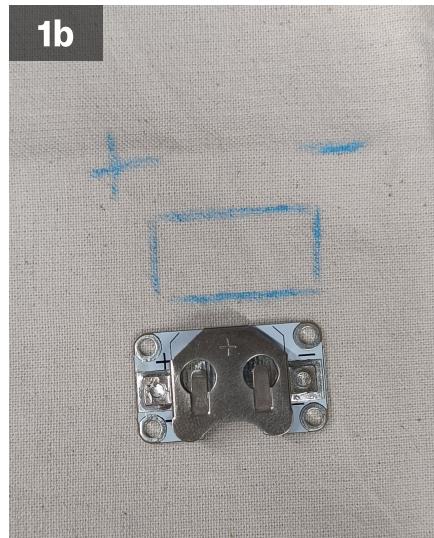
E-textile Components:



Circuit diagram:



1. Trace out your circuit onto your fabric



Draw a cross with a chalk pencil where you want to place the LED.

Then draw a box where you want to place the cell holder.

Look at the positive and negative marks on the cell holder.

Draw those + and - signs on the fabric to match the cell holder.

Connect the **+ side** of the cell holder with one side of the LED.

Mark that side of the LED with a **+** sign.

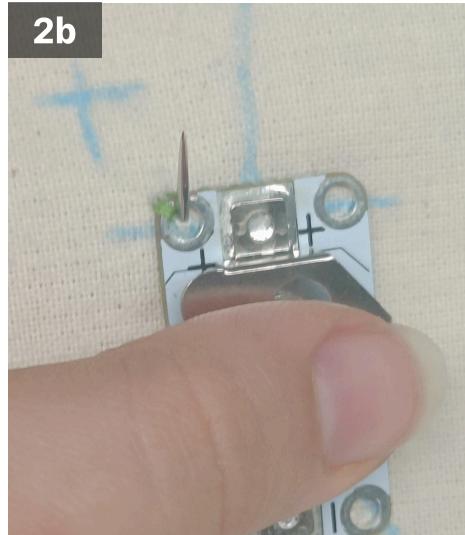
Connect the **- side** of the cell holder with the other side of the LED. Make sure the **line doesn't cross** the other line you drew.

Mark the second side of the LED with a **- sign**.

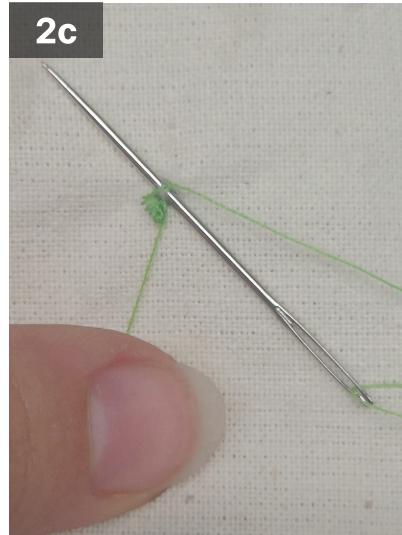
2. Sew the coin cell holder to your fabric



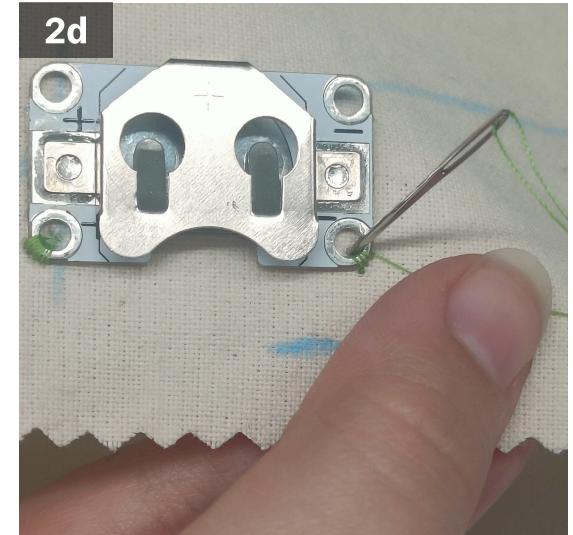
2a



2b



2c



2d

Check coin cell holder for **positive +** and **negative -** markings.

Place the cell holder on the fabric so these match up with your drawings.

Thread your needle with **regular cotton thread**. Bring your needle up from the back of the fabric near one of the + marked holes.

Stitch several tight loops around the **outer edge of the hole**.

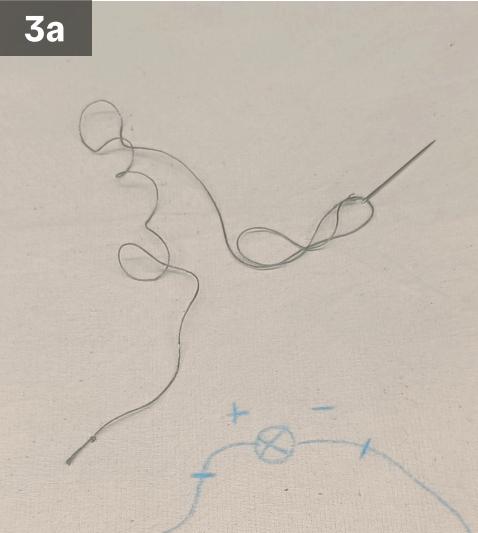
After sewing one side, tie off on the back and cut your thread.

Make sure your knots are tight and can't be undone easily.

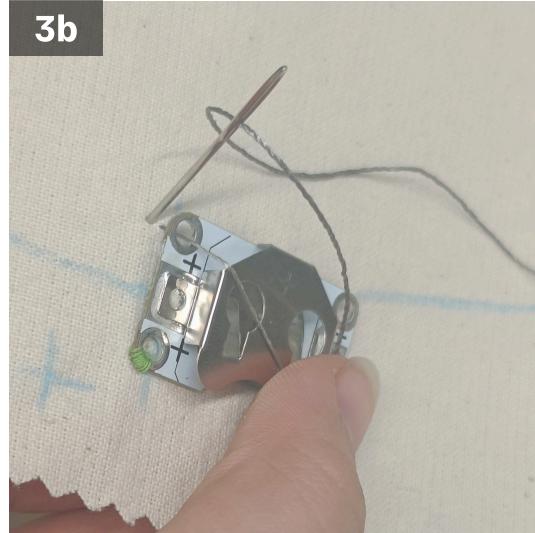
Rethread your needle and repeat that process but sewing the hole on the other side down.

Make sure you are sewing through a **negatively** marked hole this time.

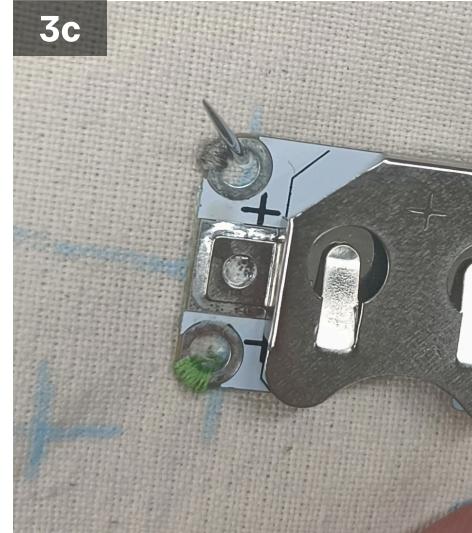
3. Start making a circuit from the cell holder



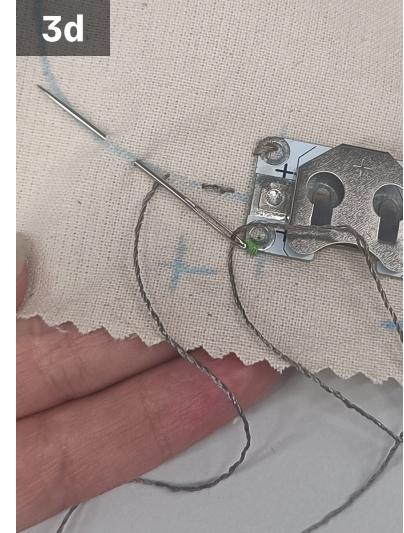
3a



3b



3c



3d

Now work with the conductive silver thread!

Thread your needle with around 15cm. Create a few secure knots at the end of the thread.

Find the **positive** marked hole you haven't sewn down.

Bring your needle up from the back of the fabric by the hole. Stitch a loop around the edge of the circular hole as before.

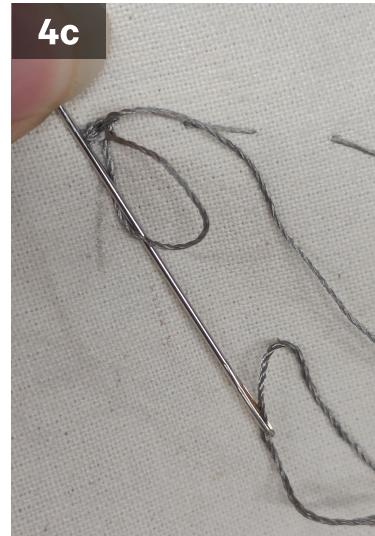
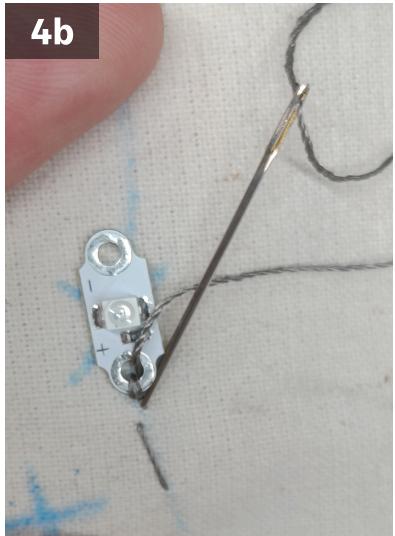
Make sure the stitch is **short and pulls tight** around the terminal.

Stitch 4 more loops close together around the circular hole. You should build up a thick thread connection to the metal.

Do not tie off yet!

Sew running stitch along the path you have drawn towards where you want the LED to be.

4. Sew the positive LED terminal



Look at the markings on the LED and **find the positive side**.

Align this with your markings on the fabric and place the LED in the position you want.

Stitch **5 tight loops** around the edge of the positive terminal.

Make sure all the stitches are **grouped together** to build a secure connection to the LED.

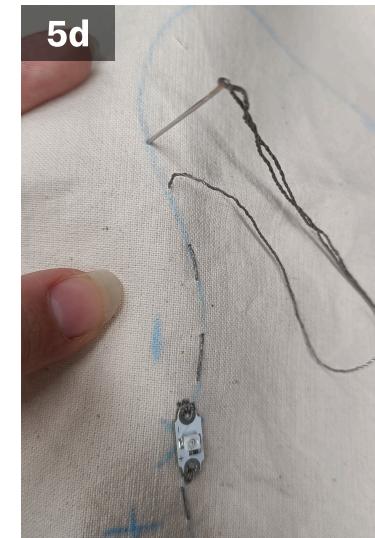
On the back of the fabric, sew **3 tight knots** to finish off your thread.

Keep these knots very tight to stop the thread coming loose.

Cut the end leaving only a **very short tail** of loose thread.

It's important to keep this short to avoid it touching other parts of your sewn circuit.

5. Sew the negative LED terminal



Re-thread your needle with another **20-30cm of conductive thread**.

Tie secure knots in the end to prepare for starting a new section of sewing.

Insert your needle from the back side of the fabric, coming up through the **negative terminal of the LED**.

Stitch **5 tight loops** around the negative terminal building a secure connection.

The LED should be tightly held onto the fabric now through both holes.

Continue sewing along your drawn path in **running stitch** back towards the coin cell holder.

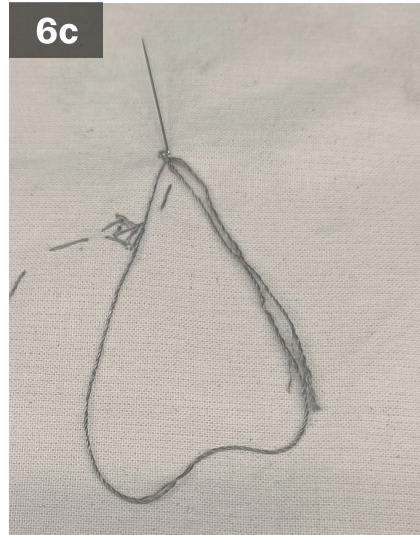
6. Closing the circuit



6a



6b



6c



6d

Finish sewing in running stitch along your drawn line to reach the remaining hole of the coin cell holder.

Check that this is the **negative terminal!**

Bring your needle up through the fabric into the hole.

Stitch **5 tight loops** around the outer edge of the hole, creating good contact.

Turn over the fabric to the back, and stitch **3 tight knots** with the thread.

Keep the knots tight and close to your stitching to stop the thread coming loose.

Cut the end of the thread leaving only a **very short tail**.

Remember to keep this short to avoid it touching other parts of your sewn circuit.

Observations

Insert the coin cell into the holder on your fabric, making sure the + on the battery is facing up.



You have now sewn an electrical circuit!

Use these questions to **observe what is happening** and why you think that might be:

1. What happens when the battery is added?

2. Can you try to explain in a sentence what is making this happen using the words "voltage" and "current"?

3. Look at someone else's circuit sat near you. Can you name one similarity and one difference you can notice?

4. Measure the length of your sewing path and someone else's and think if you can link this to any differences you see.