Assembly - overview

Assembling a Foldscope is a valuable experience because it allows for people to learn by doing and gain a better understanding of the tool, inside and out! The assembly process itself reveals how the tool functions, and this knowledge can support people’s ability to use, maintain, and even hack/modify their Foldscopes for years to come.

Estimated time:
- 30 min. - 1 hour depending on size of group

Video Tutorials
Video tutorials for the assembly process can be found at www.foldscope.com/tutorials. Foldscope also has a YouTube channel, home these videos and more, including translated tutorials and live skill-sharing events! Visit www.youtube.com/FoldscopeInstruments.

Practice
Practice assembling a Foldscope yourself before leading a workshop. By taking time to practice, you familiarize yourself with the assembly process, gain confidence, and have a more experienced understanding of what difficulties other people may face.

Point out Purpose
When leading a workshop, discuss the function of each piece of the Foldscope as you fold it, so once the assembly process is complete their role in the tool is more obvious!

Breaking into Groups
Break workshop participants into smaller groups. This gives them a space where they can ask questions, refer to their neighbors, and help each other as they go along! This is especially helpful for larger workshops. If your event has multiple trainers, assign a trainer to one or more groups so they can focus their full attention on the progress of a limited number of people.

Learn From Mistakes
Point out frequent mistakes before they happen. We highlight the most common errors throughout the step-by-step instructions in the following pages.

Training Volunteers Before
If you are planning to have a workshop with multiple volunteers, coordinate a meeting before the event date to train them. Just as it is important for you to practice beforehand, it’s important to make sure your volunteers are confident in their abilities assembling the tool! This will help large events go smoother.

Reminders:
Don’t forget to be flexible, and most of all, have fun! If something isn’t working, change it! Foldscope itself is an innovative and hackable tool, your workshop can reflect that.
Assembly - step-by-step

1. Punch out the Pieces

Every Foldscope begins as a flat sheet of paper. Begin the assembly process by punching out its four main pieces. There are also 6 paper slides in the sheet, punch those out too!

Color Coding

The four main pieces are color coded so that when the Foldscope is fully assembled it is blue on the front side and yellow on the back side. Note, when assembled correctly, all red areas should be covered by the end!

Tearing & Taping

Especially when doing workshops for larger groups, we recommend punching this piece out first and making a point to show it!

It has been our experience that when this entire piece is not punched out and shown to the group at the start, many people will tear it in half, mistaking it to be two pieces.

However, the beauty of a paper based tool is if any tears occur, simply tape them back into their original form! The Foldscope will be usable after tape repairs.

2. Lenses & Couplers

There are two kinds of magnetic pieces: lenses and couplers. The general rule to tell them apart is the lens piece is circular, while couplers are square.

- **Lens**: The lens that provides 140X magnification is at the center of the circular piece.
- **Coupler**: Couplers are used to help align the optics of the Foldscope. Later on, couplers also help attach camera phones and accessories.

Separate the Stack!

The lens & coupler pieces come magnetically stacked together. Pull the stack apart! Make sure there are no pieces stuck together before moving forward!

- In Classroom Kit pouches, the stack is found in small bubble bag and contains 1 lens and 3 couplers.
- In Deluxe Individual Kits, the stack is found on the white tray and contains 2 lenses and 4 couplers.

3. Insert One Coupler

The “T” shaped piece shown on the right is called the **Lens Stage**, because it will hold all of the optics once assembled!

Important!

It is essential to get the magnet orientations right in the next few steps. Pay careful attention, and take time to check in with all workshop participants to ensure they’re on the right track!

Insert Right Side

Place coupler with its silver magnet side facing UP over the hole in the center of the Lens Stage. The line of small holes on the coupler should be on the right. Slide the right side of the coupler into the slots.

Then Punch in Corners

Then pop the corners of the coupler into the left two slots. The result of this step should look like this, one coupler securely inserted with its silver magnet facing up.
Assembly - step-by-step

4. Insert Second Coupler

Flip the Lens Stage over to the yellow side.

This time, insert one coupler into the bottom red area of the Lens Stage, with the silver magnet side facing DOWN, and the line of small holes on the coupler should be on the left. Slide coupler into the slots.

Fold up the lower portion of the red area. To lock the lower portion in place, insert the 3 tabs into the slots.

Once all the lines are strongly creased, fold the small side inward.

The final result is a ramp, thin on one side, thick on the other. It should also be blue on one side, yellow on the other.

Then weave the ramp into the Lens Stage, down one slot and up the other.

Fold up the small tabs to keep the ramp in place. Remember to keep the color code: blue side with blue side!

5. Mount the Lens

Next, grab the lens piece and the sheet of ring stickers. The ring sticker will ensure the lens piece stays in place.

Flip the Lens Stage over to the yellow side.

Note: handle the lens piece with care! Make sure to not scratch or smudge fingerprints onto the lens itself.

A cotton swab is included to clean the lens. Keep this in your kit to reuse.

Then place the lens piece directly on the sticker, magnet side DOWN.

Note: the sticker is transparent and double-sided. There is a white cover on top of the sticker. Discard the cover, and make sure the actual sticker is on the Lens Stage.

6. Fold the Focus Ramp

Next, grab the Focus Ramp.

As the name implies, the piece will later be used in the Foldscope to adjust the focus (move the lens up and down in the z axis).

Begin on the all grey side of the piece. The arrows above point out 8 dotted lines, strongly crease each line. It does not matter which direction, just make sure each line is sharply creased!

The small holes on the left side of the coupler should line up with the black circles on the sheet. Pop all the corners of the coupler into the right slots. The result of this step is one coupler inserted with its silver magnet facing down.

Flip up the lower portion of the red area. To lock the lower portion in place, insert the 3 tabs into the slots.

Then place the lens piece directly on the sticker, magnet side DOWN.

Note: the sticker is transparent and double-sided. There is a white cover on top of the sticker. Discard the cover, and make sure the actual sticker is on the Lens Stage.

A cotton swab is included to clean the lens. Keep this in your kit to reuse.
During the event

Assembly - step-by-step

7. Fold the Sample Stage

Fold the tab down and through the hole, and repeat this step on the top and bottom of the piece.

Result: if you flip the piece to the yellow side, the tabs should be popping up through the holes. Slides will be held in these slots, as the arrows show!

Next, grab the Sample Stage. This piece will later serve to hold the microscope slide! Begin by opening the holes shown above.

8. Combine the Sample Stage and Panning Guide

In this step you will weave the Sample Stage through the Panning Guide, so that by the end the red areas of the Panning Guide are hidden!

1. Weave One Side

Begin with both pieces' blue side facing up. Place the Panning Guide on top of the Sample Stage. Then weave the left side of the Sample Stage up and over the red area on the left side of the Panning Guide.

2. Repeat on Other Side

Then weave the right side of the Sample Stage up and over the remaining red area on the right side of the Panning Guide.

Result: if you flip the piece to the yellow side, the tabs should be popping up through the holes. Slides will be held in these slots, as the arrows show!

9. Put it Together

The pieces should all be coming together at this point! The Lens Stage has its Focus Ramp, and the Sample Stage and Panning Guide have been combined.

1. Stack pieces

Begin with both pieces' blue side facing up. Place the Lens Stage directly on top of the Sample Stage/Panning Guide.

2. Snap Red Areas Forward

Flip the piece together. From the back side, you should see 8 red areas. These red areas are flaps, push them forward! They should snap into place, hiding the red area.

Result: if you flip the piece to the yellow side, the tabs should be popping up through the holes. Slides will be held in these slots, as the arrows show!

10. Finish & Register

Fold the Bottom

Next, fold the dotted lines on the bottom or the Lens Stage. Viewing from the blue side, from top to bottom, fold the top three lines downwardly (toward the back) and fold the fourth and last line forwardly (toward the front).

Join the Microcosmos!

The final step is to register your Foldscope on the Microcosmos website! Go to microcosmos.foldscope.com and select the “Register” menu tab. Complete the registration form. You will need to input the 12 digit code from the ID sticker shown right (this sticker is found in the same bag as the ring stickers).

Once your Microcosmos account is created, you will gain access to Foldscope’s spectacular global network, where users share data, collaborate, and find inspiration!