The Möbius Strip

Equipment: Scissors, tape, pens, clear strips

Experiment 1

• Using the attached paper cut strip1 making it as long as possible.

• Make the strip into a loop and turn one end over before taping the two ends securely together on both sides of the paper. The result, a loop with a half-twist, is a Möbius strip.

• Put your pencil or marker down midway between the edges of the Möbius and draw a line down its center, continuing the line until you return to the line where you started.

Now, answer the following questions using the eight square strip.

1. How many times does the line go around the strip before returning to the original point?

2. How many sides of the strip does the line seem to be on?

3. In drawing the line, you never crossed over the edge to get to the other side; so how many sides does the strip have?

4. If you tried to paint just one side of the strip, what would happen?

• Cut the band along the line you have drawn.

5. What is strange about the result?
• Put your pencil or marker down midway between the edges of the resulting strip and draw a line down its center, continuing the line until you return to the point at which you started.

6. When you turn the strip over, is the line on the other side?

7. How many sides does the strip have?

8. Is it a Möbius strip? Explain why or why not.

• Cut the new band along the line that you drew.

9. What is the result?
Experiment 2

- Using the attached paper cut strip as long as possible. Do not cut off the ends of the strips.
- Make this strip into a Möbius band.
- Cut the Möbius strip parallel to and one-third of the way from the edge. When you have cut all the way around the loop you will find that you are not at the point from the point at which you started.
- Continue cutting, staying the same distance from the edge as before, until you come back to where you began.

10. What is the result?

11. How do they compare in width?

12. How can this be?

13. How do they compare in length?

13. Which one is a Möbius strip?
Experiment 3

- Möbius Strip II was created by Escher. See Plate 1, 'To Infinity and Beyond', page 143.

14. What property of a Möbius strip that you discovered in the preceding exercises does it illustrate?

- Möbius Strip I was also created by Escher. See Figure 18.3, 'To Infinity and Beyond', page 142.

15. Trace the figure with your finger. How many strips are there in this figure?

16. Again, trace one side of this figure. How many sides does this figure have?

17. How was this figure obtained?

Experiment 4

What if Flatland was really part of a huge Möbius strip? Remember that you are part of the surface, and the 'air' around you moves to let you pass. Create a Möbius strip from the transparent strip and tape the edge.

18. Think of your self as an $F$ and walk around the strip. Draw a picture of your self as you go along. Remember that you are actually part of this land. What happened to you when you reached your starting position?
"Möbius Strip I, M. C. Escher, 1961"

"Möbius Strip II, M. C. Escher, 1963"