



# THE MOBIUS BAND: AN UNUSUAL VEHICLE FOR SCIENCE EXPLORATION!



## INTRODUCTION

What is a Mobius band? M. Escher has paraded ants around it, Gardner has penned fiction about it, and Brazil has issued postage stamps of it! Now YOU are going to find out about it!

DID YOU KNOW? August Mobius was a 19<sup>th</sup> century German scholar. An astronomer throughout his professional career, Mobius is remembered instead for his contributions to mathematics. His passions included: topology, symmetry, and celestial mechanics, but his hallmark was his imagination!

## MATERIALS

- 1) Three strips of paper, 6 cm x 40.5 cm each 2) Glue stick 3) markers 4) scissors

## PROCEDURE

### I. Constructing a Mobius band

- 1. Use one strip of paper and make a regular loop, like a chain.

A. How many sides or surfaces do you have?\_\_\_\_\_

B. How could you prove that you have the number of sides that you mentioned in "A?"\_\_\_\_\_

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\_\_\_\_\_  
\_\_\_\_\_

Complete your proof. Was your prediction supported / not supported?\_\_\_\_\_

Why?\_\_\_\_\_

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\_\_\_\_\_  
\_\_\_\_\_

- 2. Now let's make another loop. This time before you make the loop, twist one end so the top side faces down. Then glue or tape the ends together.

A. How many sides or surfaces do you have?\_\_\_\_\_

B. How could you prove that you have the number of sides that you mentioned in "A?"\_\_\_\_\_

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Complete your proof. Was your prediction supported / not supported?\_\_\_\_\_

Why?\_\_\_\_\_

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## II. Hypotheses about the Mobius band properties:

3. *Prediction:* What will happen when you cut down the middle of the regular loop?\_\_\_\_\_

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A. Now, cut down the middle of your regular loop and describe your observations in detail about what happens.\_\_\_\_\_

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4. *Prediction:* What will happen when you cut down the middle of the Mobius band?\_\_\_\_\_

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A. Now, cut down the middle of your Mobius band and describe your observations in detail about what happens.\_\_\_\_\_

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### III. Exploring more properties of the Mobius band

5. Now make a second Mobius Band.
6. *Prediction:* What will happen when you measure the width of the Mobius band in thirds and then cut  $\frac{1}{3}$  of the band away from the rest? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. Now, cut  $\frac{1}{3}$  of the Mobius band away from the rest and describe in detail what happens \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. Was your prediction supported by the results obtained? Explain \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. Your group can make more Mobius bands and devise ways to make unusual results by cutting different ways. Share your idea! \_\_\_\_\_  
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