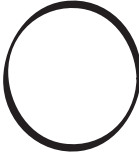



## The Group of Order 2 and The Group of Order 3

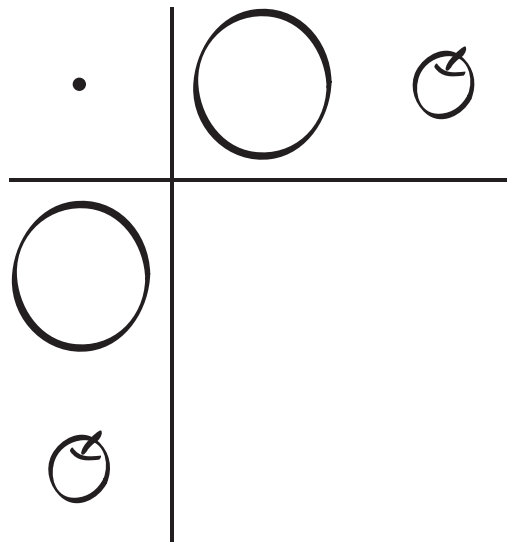
### A. The Group of Order 2

Begin with a sheet of paper marked **F** on one side for Front and **B** on the reverse side for Back.

The starting position of the paper is when the **F** is in front. There are two things we can do with the sheet of paper. We can either do nothing with the paper or we can flip the paper. A table is shown below that lists the **symbol** we use to represent each fruit, the **name** of each fruit, the **action** each fruit represents, and the **result of the action** on the piece of paper when starting from its starting position.

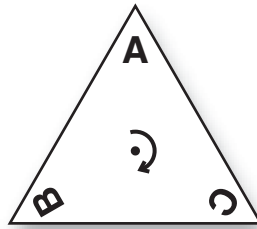
<u>Symbol</u>	<u>Name</u>	<u>Action</u>	<u>Result of Action</u>
	cantaloupe	do nothing	<b>F</b>
	apple	flip paper	<b>B</b>

Now, fill out the table along with Dr. Wang on the video.

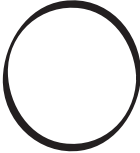
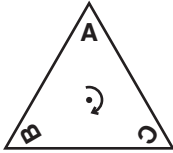

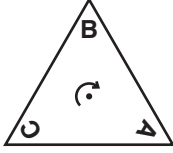

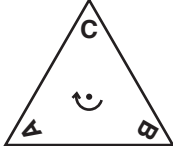


### B. The Group of Order 3

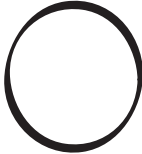





Begin with an equilateral triangle (a triangle with sides of equal length) with the vertices marked **A**, **B**, and **C**, as shown. The starting position of the triangle is when the **A** is on top, as shown.



Now, there are three things we can do with this triangle. We can **do nothing**, we can **turn** it clockwise once, or we can **“tuurn”** it, meaning to turn it clockwise twice. A table is shown below that lists the **symbol** we use to represent each fruit, the **name** of each fruit, the **action** each fruit represents, and the **result of the action** on the triangle when starting from its starting position.

<u>Symbol</u>	<u>Name</u>	<u>Action</u>	<u>Result of Action</u>
	cantaloupe	do nothing	
	banana	turn	
	orange	“tuurn” (turn twice)	

Now, fill in the multiplication table. Dr. Wang will fill in some of the entries on the video, and you do the rest.

•			
			
			
			

### Problem Set 1

1. a. What is the Order of the Group we studied in Part A of this worksheet?  
b. What is the Order of the Group we studied in Part B of this worksheet?

2. Using the multiplication table in Part A, fill in the blanks.

a.  • \_\_\_\_\_ = 

b.  • \_\_\_\_\_ = 

3. Using the multiplication table in Part B, fill in the blanks.

a.  • \_\_\_\_\_ = 

b.  • \_\_\_\_\_ = 

c.  • \_\_\_\_\_ = 

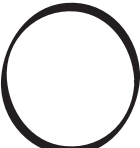
4. What do you notice about all the answers to Problems 2 and 3?


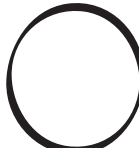
5. Using the multiplication table in Part A, fill in the blanks with the correct answer.

a.  • \_\_\_\_\_ = 

b.  • \_\_\_\_\_ = 

6. Using the multiplication table in Part B, fill in the blanks.

a.  • \_\_\_\_\_ = 

b.  • \_\_\_\_\_ = 

c.  • \_\_\_\_\_ = 


7. a. What is the identity element for the Group in Part A?


b. What is the identity element for the Group in Part B?


8. a. What is the inverse of each of the elements in the Group in Part A?

b. What is the inverse of each of the elements in the Group in Part B?

9. Fill in the blanks using the multiplication table in Part B.

a. <sup>-1</sup> = \_\_\_\_\_

b. <sup>-1</sup> = \_\_\_\_\_

c. <sup>-1</sup> = \_\_\_\_\_

10. Refer to the Group in Part B to solve.

a. What is <sup>3</sup> ?

b. What is <sup>3</sup> ?