Mat301H5F

Date: Sep, $6^{th}$, 2016, Tue

Lecture #1

Notes:

## Chapter 1 & 2

### Introduction to groups

Example (1):

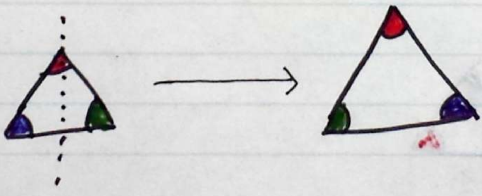
Symmeteries of triangle

Starting position

(means rotation) → $R_{120}$

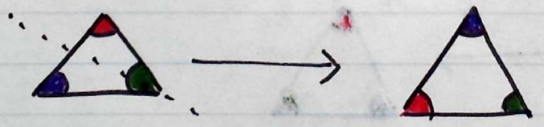

(means flip) → $F_V$

vertical



$F_R$

right



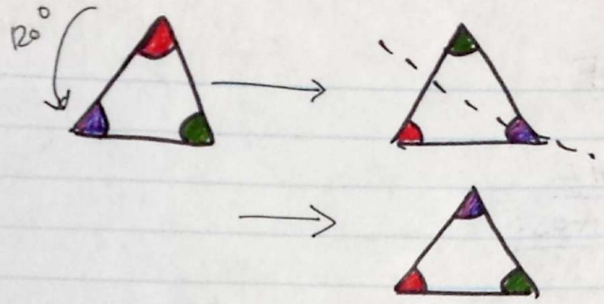
Important note:

→ Rotating any direction 360°, means the same as not doing any thing.

$F_V \circ R_{120}$

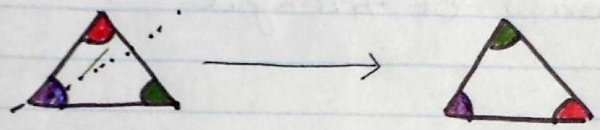
means that we compose $F_V$ with $R_{120}$

In general terms means that we first $R_{120}$ then $F_V$



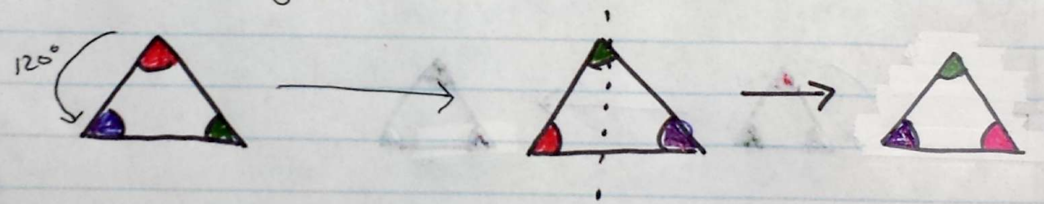

$F_L$

left

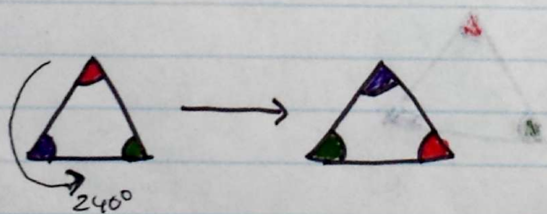


$\boxed{\text{Note: } F_V \circ R_{120} = F_L}$

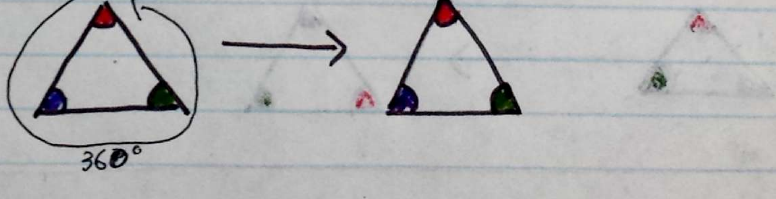
↳ let's actually visualize this:




$R_{240}$




$R_{360} = R_0$



- There are 6 Symmeteries in total: $\{R_0, R_{120}, R_{240}, F_V, F_R, F_L\}$

what if we Combine/compose? Then happens?

An operation table, or "Caley Table":

| $\circ$ | $R_0$ | $R_{120}$ | $R_{240}$ | $F_V$ | $F_R$ | $F_L$ |
|---|---|---|---|---|---|---|
| $R_0$ | | | | | | |
| $R_{120}$ | | | $R_0$ | | | |
| $R_{240}$ | | | | | $F_V$ | |
| $F_V$ | | $F_L$ | | | | |
| $F_R$ | | | | | | |
| $F_L$ | | | | | | |

Note

| $\circ$ | ② |
|---|---|
| ① | |

} First do, ②. then do ①.

$\rightsquigarrow$ $R_{240} \circ F_R = F_V$

Do this first

Inverse property

$R_{240} \circ R_{120} = R_0$ } $R_{240}$ & $R_{120}$ are inverses of each other.

HWK: Fill all the rest of the table.

Answer these Questions:

① will you need more than 6 actions to fill out the table?

② Do you see any inverses other than $R_{120}$ & $R_{240}$?

③ which of the 6 actions have inverses?