2/1

3- cyclic groups: $\langle g\rangle = G = Z_k$

where $Z_k = \{e, g, g^2, \dots, g^{k-1}\}$, where multiplication defined by $g^i \cdot g^j = g^{i+j}$ and $g^0 = e = g^k$

Note if $i+j > k-1$ say $i+j = k+m$ ~~then~~ $0 \leq m < k$

then $g^{i+j} = g^{k+m} = g^k \cdot g^m = e g^m = g^m$

for example $\mathbb{Z}_2 = \{e, g\}$ & $g^2 = e$

$\mathbb{Z}_3$ have the following multiplication table

	e	g	g^2
e	e	g	g^2
g	g	g^2	e
g^2	g^2	e	g

Remarks: 1- for any group G,

$(x^{-1})^{-1} = x \quad \forall x \in G$.

2- The number of elements of G is called the order of the group denoted by $|G|$, it may be finite as examples 2 and 3 or infinite as example 1.

3- If $xy = yx \quad \forall x, y \in G$, we say that G is abelian or commutative.