You should know...

- the definition of a group.
- the definition of an Abelian group.
- how to show something is a group or that it is not a group.
- how to work with examples of groups. Like for example: $\mathbb{Z}_n$, $U(n)$, the quaternion group, dihedral groups, and permutation groups.
- facts about Cayley tables.
- the definition of a subgroup.
- the subgroup tests.
- the definition of a cyclic group.
- the definition of the order of a group/element.
- how to find the order of an element and the cyclic subgroup generated by that element.
- theorems about cyclic groups.

You should carefully review our discussion of the Dihedral groups $D_n$ (symmetries of a regular $n$-gon). These groups aren't discussed (entirely) in the textbook. In particular, know how to list the elements of $D_n$ (for $n = 3, 4, 5, 6$) — either use "generators and relations", geometry, or permutations to "realize" $D_n$ — know how to find the cyclic subgroups and orders of elements.

USE WHATEVER YOU ARE MORE COMFORTABLE WITH...

**Example:** (Using permuatations...label the vertices of a square 1,2,3,4.)
$D_4 = \{(1), (1234), (13)(24), (1432), (13), (24), (14)(23), (12)(34)\}$ whose orders are 1, 4, 2, 4, 2, 2, 2, 2 and for example: $\langle (13) \rangle = \{(1), (13)\}$.

OR...

**Example:** (Generators and relations) $x$ = rotate counter-clockwise 90°. $y$ = reflect across a diagonal. Then $D_4 = \{1, x, x^2, x^3, y, xy, x^2y, x^3y\}$ where we have the relations: $x^4 = 1$, $y^2 = 1$, and $xyxy = 1$. The orders are still 1, 4, 2, 4, 2, 2, 2, 2 and for example: $x^2yx^2y = xxyxxy = xxyx(yy)xy = x(xyxy)yxy = x(1)yxy = xyxy = 1$ so $\langle x^2y \rangle = \{1, x^2y\}$.

IF YOU LIKE PERMUTATIONS BETTER USE THEM INSTEAD!

Some sample suggested problems...

- 3.1: 5, 6, 21, 44, 45
- 3.2: 2, 11, 23, 24, 30
- 3.3: 2, 7, 17, 22, 26
- 4.1: 1-9 (practice computing), 12, 13