

## Lesson 17

### MORE ON QUOTIENT GROUPS – PRACTICE

Recall that the rotational and reflexive symmetries of a square give us the dihedral group of degree 4,  $D_4 = \{ (), (2,4), (1,2)(3,4), (1,2,3,4), (1,3), (1,3)(2,4), (1,4,3,2), (1,4)(2,3) \}$ , and recall that  $D_4$  contains the subgroups that follow. Decide which one of these subgroups is the commutator subgroup, and also determine the multiplication table for  $D_4 / D_4'$  and identify what group you've seen before that this quotient group is isomorphic to.

$$H_1 = D_4 = \{ (), (2,4), (1,2)(3,4), (1,2,3,4), (1,3), (1,3)(2,4), (1,4,3,2), (1,4)(2,3) \}$$

$$H_2 = \{ (), (1,3), (2,4), (1,3)(2,4) \}$$

$$H_3 = \{ (), (1,3)(2,4), (1,2)(3,4), (1,4)(2,3) \}$$

$$H_4 = \{ (), (1,2,3,4), (1,3)(2,4), (1,4,3,2) \}$$

$$H_5 = \{ (), (1,3) \}$$

$$H_6 = \{ (), (1,4)(2,3) \}$$

$$H_7 = \{ (), (2,4) \}$$

$$H_8 = \{ (), (1,2)(3,4) \}$$

$$H_9 = \{ (), (1,3)(2,4) \}$$

$$H_{10} = \{ () \}$$