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Chemistry 734b   2008
Problem Set 1: Due January 30, 2008.
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This problem set is designed to illustrate the rearrangement theorem and the concepts of classes.
Full marks require that you show all your work.

1. Consider the symmetry operations of the group for a square. There are eight symmetry elements:
E = identity
A, B, C, D = 180° rotations about the corresponding labelled axes shown in the figure below which are considered fixed in space, not on the body.
F, G, H = clockwise rotations in the plane of $\pi/2$, π, and $3\pi/2$, respectively.
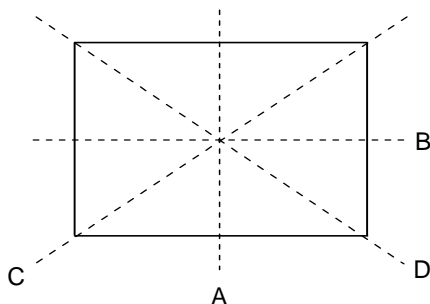
a) From the geometry, work out the multiplication table of the group; take advantage of the rearrangement theorem to check your results.
b) Divide the group elements into classes using the multiplication table and the definition of conjugate elements.

2.) Consider the group below:
a) What is the identity operator?
b) Show that the following multiplications are associative: J.L.M; K.H.P
c) What are the inverses of O and K?
d) Find the products H.K.H^{-1}; L.O.L^{-1}; P^{-1}.P.P
e) Show that H and P are in the same class.

	G	**K**	**H**	**J**	**L**	**M**	**O**	**P**
G	G	K	H	J	L	M	O	P
K	K	M	J	P	G	L	H	O
H	H	O	G	L	J	P	K	M
J	J	H	K	G	P	O	M	L
L	L	G	O	H	M	K	P	J
M	M	L	P	O	K	G	J	H
O	O	P	L	M	H	J	G	K
P	P	J	M	K	O	H	L	G

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