GY 302: Crystallography and Mineralogy (2011)
Assignment 1: Isometric and Hexagonal Crystallography

Your Task: This lab assignment will introduce you to elements of symmetry in crystals and how to identify them. As this is the first lab dealing with crystallography, expect some initial difficulties in doing this. Be patient. You will improve as time goes on (I hope). Use the plastic models provided in the classroom for guides in identifying crystallographic axes (a, b, c), mirror planes, rotational axes etc.) In this lab, we will focus on the most symmetrical crystal systems; the isometric and hexagonal crystal systems. Select 1 wooden crystal models from each of these 4 groups and answer the following questions:

1) What is it's highest rotational symmetry?
2) How many mirror planes does it have?
3) How many 2 fold, 3 fold, 4 fold or 6 fold rotational axes does it have?
4) Does it have any rotoinversion axes? (3-fold and higher)
5) Does it have a center of inversion?
6) What is its point group?

In addition, draw a stick diagram for each of the models in the spaces provided

In total, I expect 4 answer sheets from you by the due date. **Make sure that you indicate the number of the model you do in the space provided on the answer sheets. Use an L- prefix for the large models (ink stamp).**

Due Date: See calendar/website

Group 1 Models (Easy Isometric crystals; do this one first)
- Large models: 1, 2, 3, 8, 13, 14, 16, 17, 19, 36, 37, 45
- Small models: 3, 4, 5, 10, 20, 24, 40, 46

Group 2 Models (Challenging Isometric crystals)
- Large models: 5, 7, 9, 18, 26, 31, 41, 43
- Small models: 6, 7, 9, 13, 14, 23, 27, 28, 30, 35, 36, 39, 43, 49

Group 3 Models (Easy Hexagonal crystals)
- Large models: 84, 86, 89, 94, 97, 100, 102, 106, 118, 131
- Small models: 96, 97, 98, 99, 101, 105, 107, 119, 129, 142

Group 4 Models (Challenging Hexagonal crystals)
- Large models: 97, 98, 109, 113, 114, 136
- Small models: 119, 123, 131, 133, 138, 144, 145, 198, 199
Isometric and Hexagonal Models

Name: ________________________________     Date: __________________

Model Number: ___________                             Crystal System_______________

1) What is the highest rotational symmetry of the model?________________________________

2) How many mirror planes does it have? ____________________________________________

3) How many 2 fold rotational axes does it have? ______________________________________

4) How many 3 fold rotational axes does it have? ______________________________________

5) How many 4 fold rotational axes does it have? ______________________________________

6) How many 6 fold rotational axes does it have? ______________________________________

7) Are any of the axes (above 2-fold) rotoinversion axes (e.g. $\bar{3}$ and above)?  □ Yes  □ No
   (indicate which on questions 2-6)

8) Does the model have a center of inversion? □ Yes □ No

9) What is the point group of the model? ____________________________________________
Isometric and Hexagonal Models

Name: ________________________________     Date: __________________
Model Number: ___________                             Crystal System___________

1) What is the highest rotational symmetry of the model?________________________________
2) How many mirror planes does it have? ____________________________________________
3) How many 2 fold rotational axes does it have? ______________________________________
4) How many 3 fold rotational axes does it have? ______________________________________
5) How many 4 fold rotational axes does it have? ______________________________________
6) How many 6 fold rotational axes does it have? ______________________________________
7) Are any of the axes (above 2-fold) rotoinversion axes (e.g. 3 and above)? ☐ Yes ☐ No (indicate which on questions 2-6)
8) Does the model have a center of inversion? ☐ Yes ☐ No
9) What is the point group of the model? __________________________________________
Isometric and Hexagonal Models

Name: _____________________________________     Date: ________________

Model Number: ___________                             Crystal System_______________

1) What is the highest rotational symmetry of the model?________________________________

2) How many mirror planes does it have? ____________________________________________

3) How many 2 fold rotational axes does it have? ______________________________________

4) How many 3 fold rotational axes does it have? ______________________________________

5) How many 4 fold rotational axes does it have? ______________________________________

6) How many 6 fold rotational axes does it have? ______________________________________

7) Are any of the axes (above 2-fold) rotoinversion axes (e.g. 3 and above)?  □ Yes  □ No  
   (indicate which on questions 2-6)

8) Does the model have a center of inversion?       □ Yes       □ No

9) What is the point group of the model? __________________________________________
1) What is the highest rotational symmetry of the model? ______________________________________

2) How many mirror planes does it have? _________________________________________________

3) How many 2 fold rotational axes does it have? _________________________________________

4) How many 3 fold rotational axes does it have? _________________________________________

5) How many 4 fold rotational axes does it have? _________________________________________

6) How many 6 fold rotational axes does it have? _________________________________________

7) Are any of the axes (above 2-fold) rotoinversion axes (e.g. 3 and above)? □ Yes □ No
   (indicate which on questions 2-6)

8) Does the model have a center of inversion? □ Yes □ No

9) What is the point group of the model? _________________________________________________