

Name: _____

Geology 232 Mineralogy

Mid-term Examination October 24th, 2012 (1 hour)

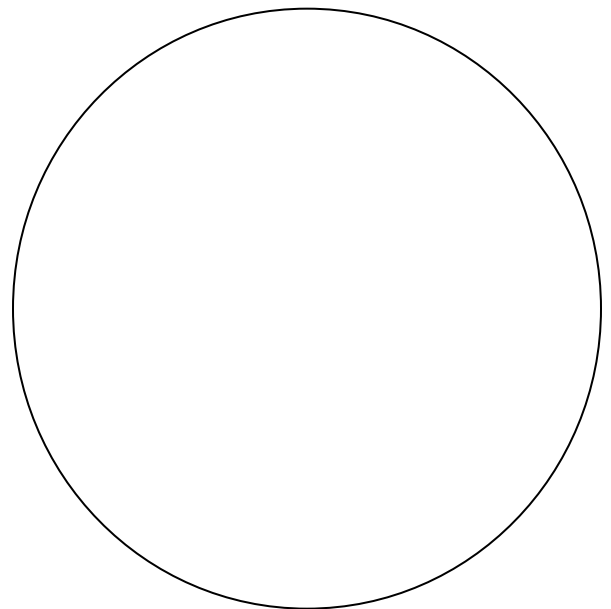
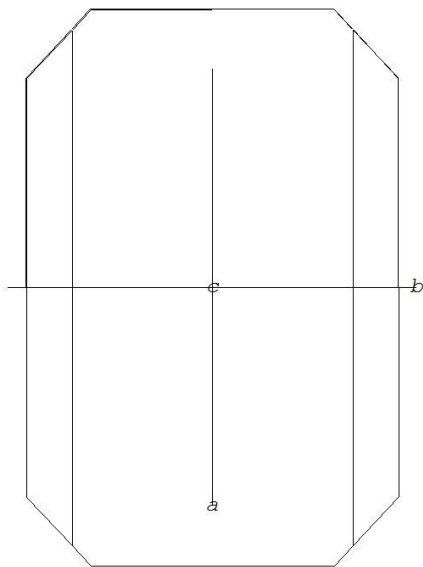
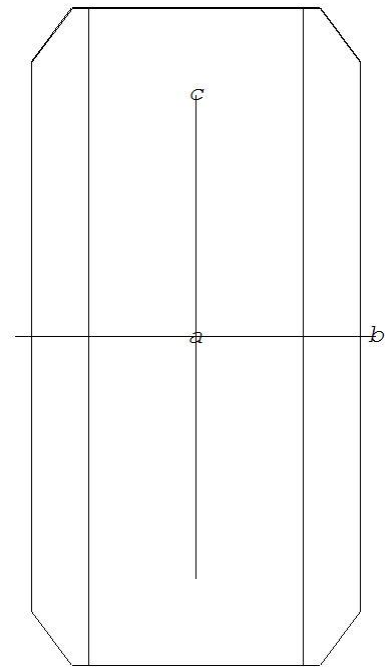
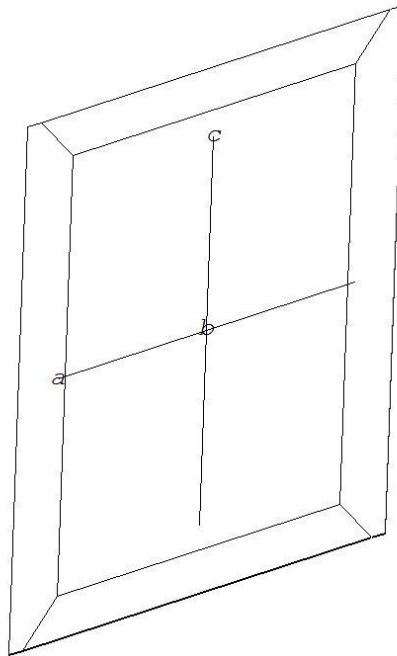
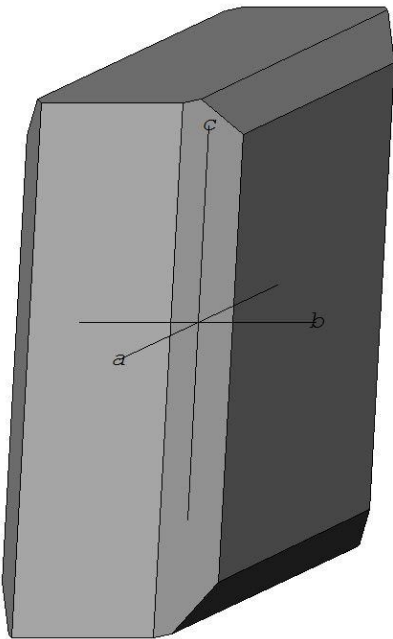
Directly on the crystal image below, draw lines to each visible face and give the Miller indices. The positive ends of the axes are labeled.

Determine the crystal system, determine the point group and draw a stereographic projection of the symmetry and the crystallographic axes, projected down the c axis.

List the forms that are present. On the stereographic projection, plot the face poles for all the faces on this crystal using a different colour for each crystal form. (Include both the faces that are visible and not visible in the sketch assuming the symmetry you identify). The crystallographic axes **a** and **c** are not at right angles to each other for this crystal. (30 pts)

Crystal system =

Point group =



Form 1.

Form 2.

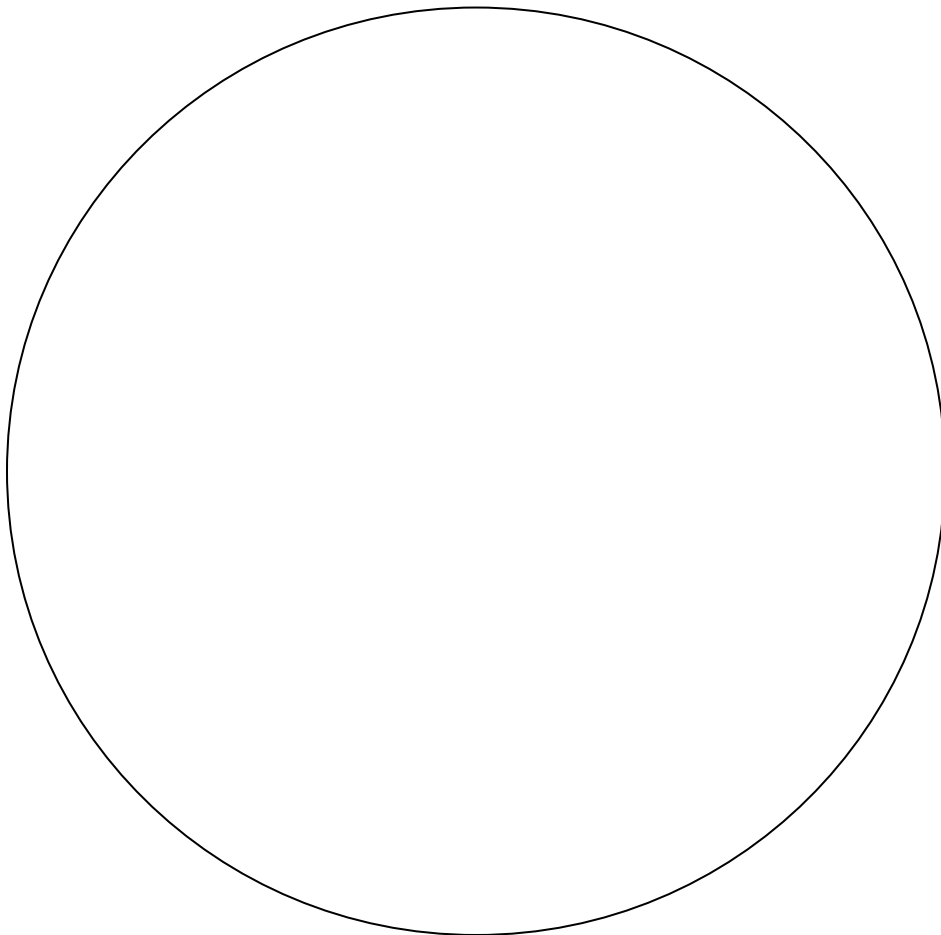
Form 3.

Form 4.

Form 5.

2) For point group $2/m2/m2/m$ (30 pts):

- 1) plot the stereographic representation of the symmetry operators
- 2) label the crystallographic axes (use standard orientation)
- 3) plot the face poles for the planes (100), (110), (010), (001) and (111)
- 4) plot all the face poles that are created by the symmetry operations (use the same colours for related face poles). Use dots for upper hemisphere face poles and circles for lower hemisphere face poles.
- 5) label the Miller indices for all of these face poles in the projection
- 6) name all the crystal forms



3) What is the definition of a mineral? Explain what definite but not fixed means by giving an example(15 pts)

4) List the six crystal systems and give the constraints on the axial lengths and angles (15 pts)

5) One of Pauling's Rules relates atom size to coordination number. Explain the details of this rule and outline how it may be used as a predictive tool in understanding mineral structures (10 pts)