

Name: \_\_\_\_\_

Geos 306, Mineralogy  
Midterm, Oct 17, 2005  
100 pts

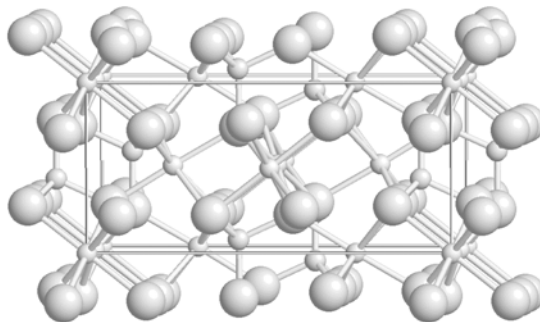
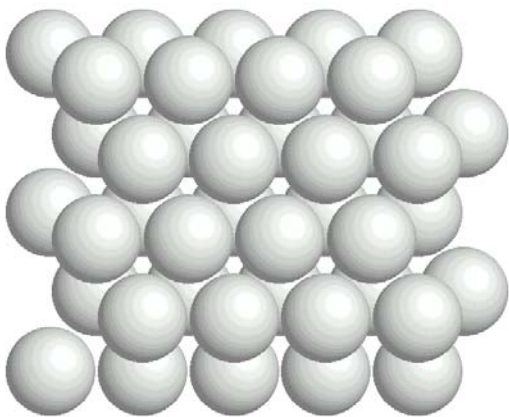
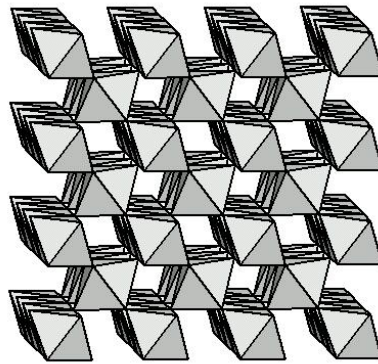
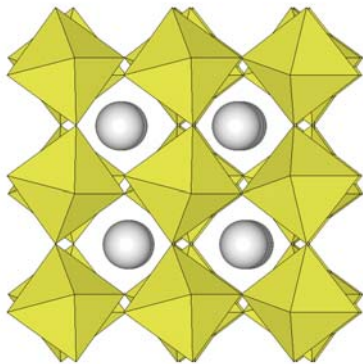
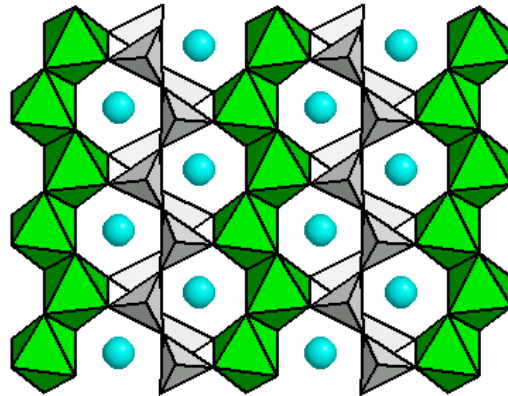
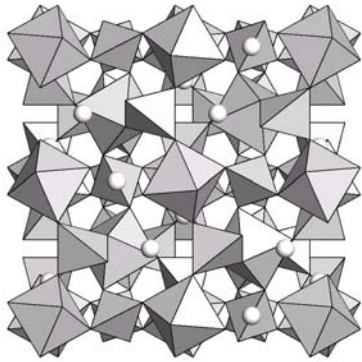
1. (18 pts) In the table below, please fill in the empty cells with crystal systems and their unit cell parameter relations.

System	a	b	c	$\alpha$	$\beta$	$\gamma$

2. (8 pts) Draw and label an illustration of lattice planes in a crystal under diffraction conditions, showing the d-spacing and X-ray waves. Use this drawing to explain Bragg's equation.

3. (20 pts) Sketch a diagram showing the structure of the earth. Make a table and define the boundaries of each region by
- depth,
  - temperature, and
  - pressure.
- Include the surface and the center of the earth in your answer.  
List the important mineral phases that are found in each of the different regions.

4. (18 pts) For each illustration:
- Provide representative chemical formula for each, assuming composition is from Mg, Fe, Si, O space.
  - Name the minerals whose structures are illustrated and whose chemistry matches that given in part a).





9. (20 pts) The image provided below is an electron microscopic picture of a sample of feldspar, of bulk composition ~50% K-spar, ~30% albite, ~20% anorthite.
- Identify each of the 3 feldspar phases in the image.
  - Describe and explain their mixing properties. Provide your explanation at the atomic scale in terms of cation radii.
  - Names each of the different phases defined by Al/Si ordering in the K-spars and in albite, including the type of temperature conditions you would expect to find these phases.

