Mineralogy Exam 1 – 2015   Name _____
NDSU Dept. of Geosciences

1. The screw symmetry operation is a combination of a _____ operation followed
   by a _____ operation.   [4 pts]

2. The space group of pyrite (FeS_2) is $P2_1/a\bar{3}$. It has a _____ Bravais lattice and
   the point group _____ in the _____ crystal system.   [4 pts]

3. A direction in the a-b plane of a crystal with a component along b that is twice as great as the
   component along a has the notation [   ].   [4 pts]
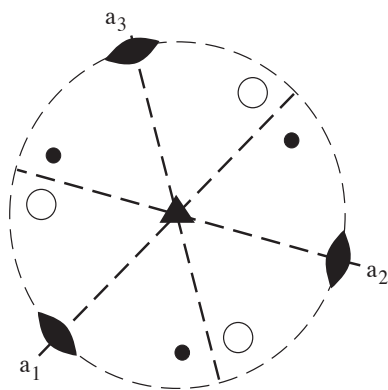
4. Fill in the blanks: [4 pts]

Crystal System	Characteristic Symmetry	Metrical Properties
Tetragonal		
		$a{\neq}b{\neq}c$; $\alpha{=}\beta{=}\gamma{=}90°$

5. For the following figures, what are the: [12 pts]

   Crystal system: _____   Crystal system: _____

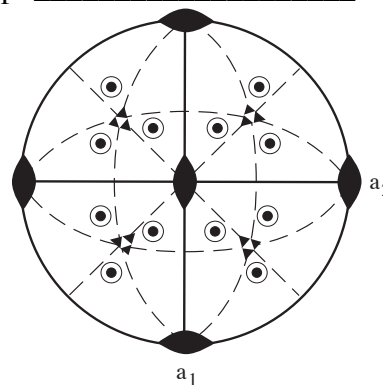   Principal directions: <   ><   ><   >   Principal directions: <   ><   ><   ><   >

   Point group: _____   Point group: _____

6. Draw a complete stereogram with symmetry elements and generalized equivalent faces for the

   point group $\frac{2}{m}$. Indicate the principal directions.   [20 pts]

7. Assume the lengths of the sides of a unit cell for the newly discovered mineral bradyite are: $a_1 = 6$ Å, $a_2 = 6$ Å, and $c = 2$ Å. Axial intercepts are given for face A in the mineral. Calculate the Miller index for the face. Be sure to show your calculations neatly. [12 pts]

   a) Face A: $a_1 = 2$ Å
            $a_2 = 4$ Å
            $c = 4$ Å

   c) What crystal system do you suspect this crystal is in? _____

8. Define the property of **streak** in minerals. Contrast its use in mineral identification with **color**. [6 pts]

9. Name the crystal systems that our textbook recognizes. [12 pts]

10. List the Mohs hardness scale from 1 to 10. [10 pts]

11. Are the following minerals? Why or why not? [8 pts]
   a) the quartz crystal in my watch   b) coal

   c) a fossil animal shell made of calcite   d) obsidian (volcanic glass)

12. List the Miller indices of all the faces of an octahedron. [4 pts]