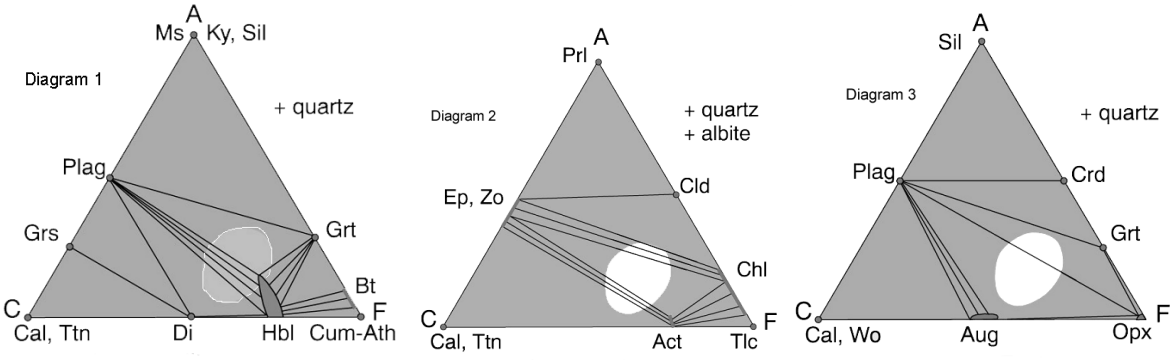
NDSU Geology 422 Petrology Answer in blue book provided
Sample Exam 3

1. Traversing a series of metamorphosed pelitic rocks you observe increasing metamorphic grade:
   a. What is the protolith of a pelite?
   b. What, if any, changes in average grain size would you expect to see?
   c. What is the sequence of classic Barrovian metamorphic zones that you would expect to see?
   d. What is the term for the boundary that separates two metamorphic zones?
   e. Why are new metamorphic assemblages generated when changes in P, T, or chemistry occur?

2. Draw a neat schematic cross section of an island arc, and relate metamorphic facies to this tectonic setting. Label the following facies on your diagram using the letters given:

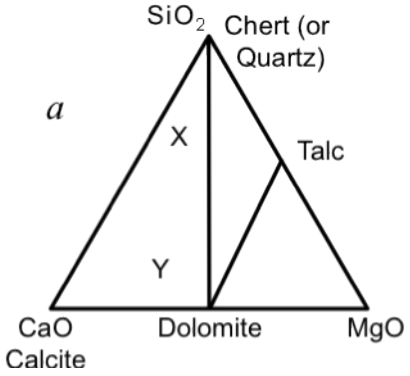
   a. zeolite
   b. prehnite-pumpellyite
   c. blueschist
   d. eclogite
   e. greenschist
   f. amphibolite
   g. granulite

3. You are studying prograde metamorphism of metabasalts. You observe the mineral assemblages as shown in the circled areas, on the ACF diagrams below (note – they are out of order!). Which minerals are stable in the circled areas in each diagram, and what metamorphic facies does each diagram represent?



4. Alert Student did geothermometry measurements on a schist sample for their petrology term project.
   a) What instrumentation is used to carry out these measurements?
   b) Describe in detail (illustrate if necessary) the physical basis this instrument uses, and how data is obtained.
   c) What mineral assemblage did they use?
   d) What is the theoretical basis for geothermometry? In Alert's work, what elements or element ratios vary with temperature, which allow us to calculate a T value? What assumptions are made in this process? (formulas not required)
   e) In terms of P/T slope, what is a characteristic of a good geothermometer?

5. Consider metamorphism of a siliceous dolostone. What rocks would compositions X and Y represent? Show, using diagrams and chemical reactions, how tremolite could be formed from these assemblages with increasing metamorphic grade.



These are just examples – think of others on topics we've discussed!