Name: _____________________________________

Note: Carefully read instructions for each part before you start to answer the questions, otherwise you may find yourself doing more work than is necessary. Provide answers to written questions in the boxed space(s) below each question (there should be plenty of room for you, but if necessary, feel free to additional paper). Make sure that you also record your name in the space provided above.

THIS EXAM HAS 5 PARTS: TOTAL POINTS AVAILABLE = 100 [Part 1: 20 points + 1 bonus; Part 2: 20 points; Part 3: 10 points; Part 4: 15 points; Part 5: 35 points].

PART 1: Multiple Choice: 2 points each (Worth 10 x 2 = 20 points).

CIRCLE CORRECT ANSWER

1) What type of seismic waves travel through the Earth via compression?
   a) primary   b) secondary   c) shear   d) sonic   e) sound   f) none of these

2) Which is the next mineral to form after biotite in a slowing cooling magma?
   a) hornblende   b) quartz   c) muscovite   d) Ca-plagioclase   e) none of these

3) Which layer of the Earth is the thickest?
   a) lithosphere   b) crust   c) outer core   d) mantle   e) inner core   f) hydrosphere

4) In the rock cycle, what process is responsible for converting metamorphic rock into sediment?
   a) heat and pressure   b) lithification   c) melting   d) weathering   e) none of these

5) The atomic weight tells you:
   a) the number of neutrons in an atom   b) the number of protons in an atom
   c) the number of protons & electrons in an atom   d) the number of neutrons & electrons in an atom
   e) the number of protons & neutrons in an atom   f) the size of the atom

6) The type of chemical bond that occurs when electrons float freely between atomic nuclei is:
   a) covalent   b) metallic   c) ionic   d) hydrogen   e) none of these

7) How many electrons does it take to fill up the \( k \) shell of an atom?
   a) 1   b) 2   c) 4   d) 8   e) 10   f) none of these

8) Where are you most likely to find a composite volcano?
   a) convergent plate boundary   b) divergent plate boundary   c) transform plate boundary
   d) mid oceanic ridge   e) oceanic hot spot   f) any of these locations

9) Silicate minerals where 3 oxygen ions are shared between silicate tetrahedral are called the
   a) phyllosilicates   b) inosilicates   c) nesosilicates   d) tectosilicates   e) sorosilicates

10) What is the intrusive equivalent of a andesite
    a) gabbro   b) rhyolite   c) diorite   d) syenite   e) granite   f) none of these
Bonus: What is the most common gas erupted by composite and shield volcanoes?

_______________________  (worth 1 point)

PART 2: EASY STUFF: Fill in the blanks on the following cartoon. It's a cross-section of a volcano and the outer portion of the Earth. You saw this several times in class and in your text book (e.g., Figure 5.1) (Worth 10 points)

Now try the following "fill in the blank" type questions (Each blank worth 2 points each)

6) A positively charged ion is called a ____________________________.

7) All phosphate minerals contain the ion __________________________.

8) Ropey basalt is also known as ________________________________.

9) Name any one of the native elements ________________________.

10) Which texture is most common in extrusive igneous rocks? ______________________________.
PART 3: Short answer questions. Answer 1 of the following questions in 2 or 3 sentences. Use the box below the question (Worth 10 points)

1) Compare and contrast pyroclastic and lava flows.

or

2) Compare and contrast covalent and ionic bonding in minerals.

PART 4: Definitions: Define 3 of the following terms in the boxes provided below (i.e. in one or two short sentences). (Worth 3 x 5 = 15 points)

<table>
<thead>
<tr>
<th>geophones</th>
<th>subduction</th>
<th>Lahar</th>
<th>tuff</th>
<th>polymorph</th>
</tr>
</thead>
</table>

1) 

2) 

another answer box follows on the next page
PART 5: Discussion Question: Answer 1 of the following questions in proper essay fashion! Do not do a point form answer! Use about a page for your answers; provide sketches where you can (worth 35 points).

1) Compare and contrast the types of igneous rocks that are produced at divergent and convergent plate boundaries. Be sure to discuss the compositional and textural differences of the rocks as well as why these differences occur. Illustrate your answer.

2) What is Bowen's reaction series and how is it used to characterize igneous rocks? All of the minerals in the Bowen’s Reaction Series are silicates. To what subclasses do they belong? How are the subclasses distinguished? Use sketches to augment your answer.

3) The periodic table summarizes a whole lot of information about the chemical elements. What information is summarized and how are the elements arranged or grouped in the table to make this information easier to digest? You do not need to draw the periodic table for this question, but a few sketches illustrating atomic structures would be a good idea.

Rough draft/notes