Last Name: _____ First Name: _____ ID: _____

Learning Assessment #5: Geologic Time ANSWER KEY

Using the cross-section provided with the accompanying information, answer questions for Part 1, 2 and 3.

Rock Types
Ss (a, b and c) = sandstone Cg = conglomerate
Sh (a and b) = shale
Slt = siltstone
Lm (a and b) = limestone

Age Information
• Fossils in Ssa are lower Eocene (Ypresian) • Fossils in Lmb are Middle Pennsylvian
• Fossils in Ssc are lower Ordovician
• Zircon minerals in Ssb are 750 Ma
V = andesite
Di = diorite
M = kyanite-garnet-biotite schist Gr = granite
   • Zircon in granite (Gr) is 600 Ma
   • Zircon in Diorite (Di) is 260 Ma
   • Biotite in Andesite (V) is 450 Ma
   • Zircon in granite clasts in the conglomerate (Cgl) are 600 Ma

There are two unconformities in the sequence of rocks shown by the darker wiggly lines.

Part 1: Relative Time Sequence of Events
Place a number between 1 and 14 beside the geologic events, where the number corresponds to the correct relative timing of events with the oldest being event #1 and the youngest being event #14. (14 marks)

Number in the sequence of events	Geologic Event
13	Formation of angular unconformity
3	Formation of nonconformity
2	Intrusion of Granite (Gr)
11*	Intrusion of Diorite (Di)
7	Formation of Andesite unit
4	Formation of Cg
5	Formation of Ssc
6	Formation of Slt
8	Formation of Shb
9	Formation of Lmb
10	Formation of Ssb
14	Formation of units Ssa, Lma and Sha
12*	Folding of Paleozoic and Precambrian rocks
1	Formation of schist (M)

It is possible to argue that the diorite could have intruded after folding; arguing that it followed the already folded layering in the rocks it's intruding. In this case #11 and #12 event could be reversed and still correct. If this option is chosen then the folding age bracket would between 260 Ma and 311.7 Ma

Part 2: In the table below put the numerical age bracket for the event/unit (7 marks).

Event / Unit	Numerical Age Bracket
Age bracket for non- conformity Maximum time gap (i.e how many years are missing) for the non- conformity	*Time Bracket: 600 Ma – 471.8 Ma (488.3 also accepted)* *Time Gap: 129* Ma (or 112 if older age is used)*
Folding of Paleozoic rocks	*260 Ma – 48.6 Ma (55.8 Ma also accepted)*
Formation of Ssb (Sandstone layer 'b')	*311.7 Ma (307.2 also accepted) – 260 Ma*

Part 3: Explain reasoning and principles you used to determine the numerical age bracket for the Ssb unit. (6 mks)

Age bracket for Ssb

The SSb unit (sandstone b) is younger than Lmb. This is determined using the Principle of Superposition as SSb is above Lmb.
Lmb's oldest possible age is 311.7, therefore this gives the oldest possible age bracket that SSb, which it is younger than.

Ssb is older than the diorite.
This is determined by the Principle of cross-cutting relationships as the diorite cuts Ssb.
Diorite is 260 Ma so this gives a youngest possible age bracket for Ssb as it must be older than 260 Ma.

Reid & Cowie (2011)