Learning Assessment #5 – Geologic Time
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This assignment is the fifth of a series of in-class activities known as learning assessments. These assignments were used in an introductory physical geology course that is a requirement for geoscience majors but has no pre-requisites and is open to students in all faculties.

The purpose of the learning assessments is to provide students with frequent feedback on their understanding of the fundamental concepts taught in the course. The learning assessments also provide information to the instructors and teaching assistants on student learning which can be used to help direct instruction in the course.

This assignment package includes:
1. Instructions for students and assignment worksheets
2. Checklist of required elements

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Learning Assessment #5: Geologic Time

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)

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

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

<table>
<thead>
<tr>
<th>Event / Unit</th>
<th>Numerical Age Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age bracket for non-conformity</td>
<td></td>
</tr>
<tr>
<td>Maximum time gap (i.e how many years are missing) for the non-conformity</td>
<td></td>
</tr>
<tr>
<td>Folding of Paleozoic rocks</td>
<td></td>
</tr>
<tr>
<td>Formation of Ssb (Sandstone layer ‘b’)</td>
<td></td>
</tr>
</tbody>
</table>

**Part 3:** Explain reasoning and principles you used to determine the numerical age bracket for the Ssb unit. (6 mks)
Cross-Section Diagram for Learning Assessment 5
GLGY 201 LEARNING ASSESSMENT #5 (GEO TIME) STUDENT CHECKLIST

Part 1: Order of Events (Oldest #1 to Youngest #14) (14 pts)
1 pt for each event in the correct order

Part 2: Age Bracketing (7 pts)
___ Non-conformity time bracket (oldest possible age)
___ Non-conformity time bracket (youngest possible age)
___ Non-conformity time gap
___ Folding time bracket (oldest possible age)
___ Folding time bracket (youngest possible age)
___ Formation of SSb oldest possible age
___ Formation of SSB youngest possible age

Part 3: Reasoning for Age Bracket of Ssb (6 pts)
___ Age of unit that is older than Ssb
___ Reasoning for this unit being the unit to use for oldest time bracket
___ Principle used to determine oldest age
___ Age of unit that is younger than Ssb
___ Reasoning for choosing this unit
___ Principle used to determine youngest age

Total for LEARNING ASSESSMENT #5: ______ / 27