

Bloom's Taxonomy: A Framework for Learning

Over forty years ago, Benjamin Bloom and several co-workers created a taxonomy of educational objectives that continues to provide a useful structure for organizing learning exercises and assessment experiences at all levels of education (Bloom and others, 1956; Anderson and Sosniak, 1994; Anderson and Krathwohl, 2001). Bloom's taxonomy divided cognitive learning into six levels, from lower-level thinking skills such as memorization to higher order thinking that involves the evaluation of information. The taxonomy has been used by instructors in geology courses to guide the development of questions that address a full range of cognitive skills. Each taxonomy level is described briefly below and examples of specific questions linked to each of level are discussed. The revised framework of Pohl (2000) is displayed (original levels in parentheses).

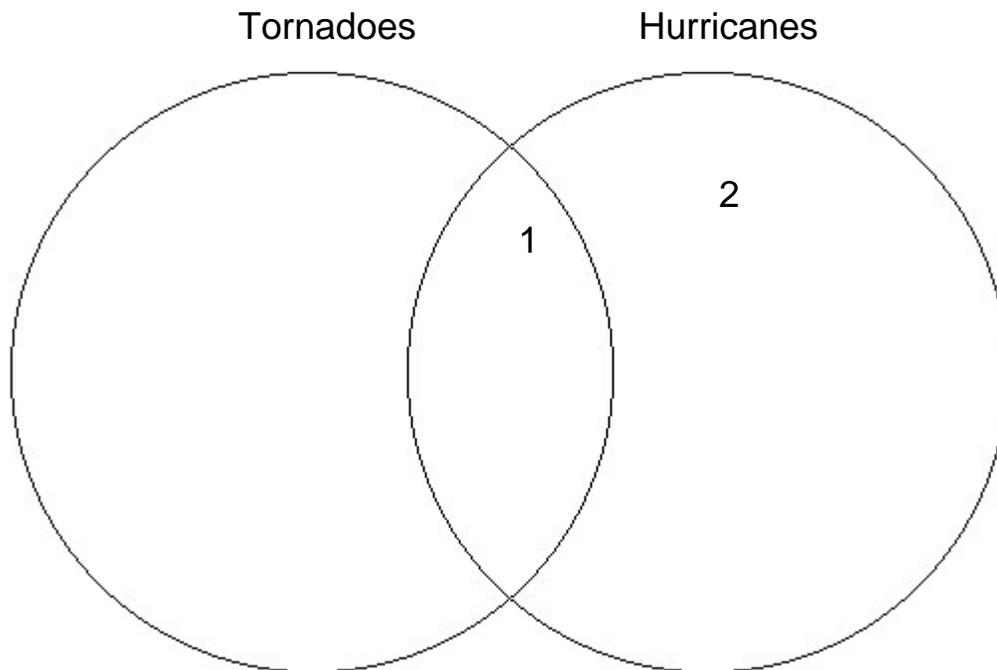
Bloom's Taxonomy (original)	Learning Skill	Question stems*
Remembering (Knowledge)	Recognizing and Recalling	What is . . . ? Who, what, when, where, how ...? Describe . . .
Understanding (Comprehension)	Interpreting, Exemplifying, Classifying, Summarizing, Inferring, Comparing, Explaining	What would happen if . . . ?; What does . . . illustrate about . . . ?; What is analogous to . . . ? How would you explain . . . ?; Illustrate the . . . ?; What was the main idea . . . ?
Applying (Application)	Executing and Implementing,	How could . . . be used to . . . ? What is another example of . . . ? Use these steps to solve ... Clarify why ...
Analyzing (Analysis)	Differentiating, Organizing, Attributing	How does . . . affect . . . ? What are the differences (similarities) between . . . ? What causes . . . ? How does . . . compare/contrast with . . . ?
Evaluating (Synthesis)	Checking, Critiquing, Reorganizing, Assessing, Making judgments	What is a possible solution for the problem of . . . ? How does . . . relate to what we learned before about . . . ? Why is . . . important? What is the best . . . , and why? Do you agree/disagree that . . . ?
Creating (Evaluation)	Generating, Planning, Producing	Can you design a ...? What would happen if ...? Can you create new uses for ...? How many ways can you ...?

* revised from King, A., 1995, Teaching of Psychology, v.22, p. 13-17.

Context: Students complete this exercise at the beginning of class as a review of a reading assignment or as a follow up a lecture segment on the characteristics of extreme weather systems.

Venn Diagram: Tornadoes vs. Hurricanes

List the features that are unique to either group or that they share on the back of this page. Provide a brief but clear description of each feature (see examples). Two features are included as examples. Write the appropriate number in the corresponding locations on the Venn diagram below. (One example has been included.)



Features

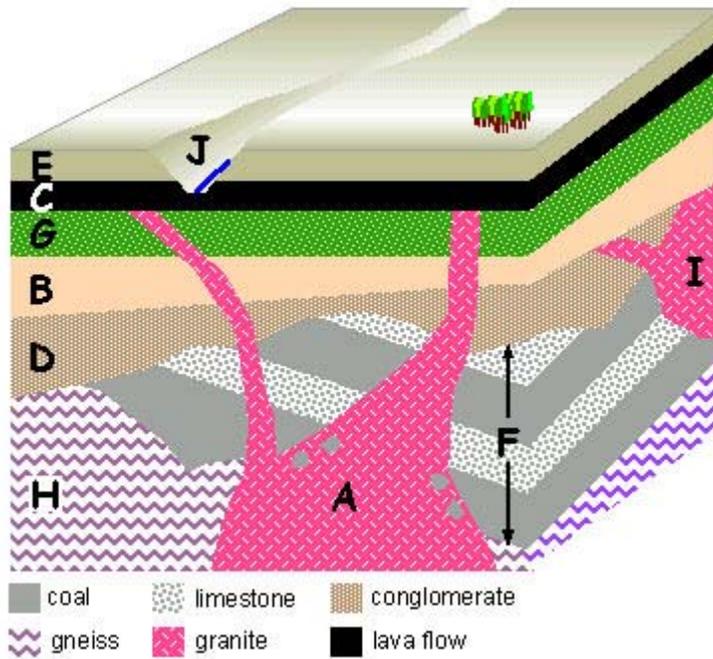
- | | |
|-------------------------|-----|
| 1. Low pressure systems | 11. |
| 2. Form over oceans | 12. |
| 3. | 13. |
| 4. | 14. |
| 5. | 15. |
| 6. | 16. |
| 7. | 17. |
| 8. | 18. |
| 9. | 19. |
| 10. | 20. |

Context: Students complete this exercise following a lecture segment that describes the three principles (superposition, original horizontality, cross cutting relationships) used to unravel the sequence of geological events.

Relative Time

Complete the exercise by using the principles of superposition, original horizontality, and cross-cutting relationships to determine the order of events for the idealized location shown in the figure.

Place the rock units in their order of formation, oldest to youngest.



Oldest

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Youngest

One Question Style, Many Uses

Different assessment methods can be used to target multiple levels of Bloom's Taxonomy.

Formative Assessment Methods and Bloom's Taxonomy

<i>Bloom's Taxonomy</i>	<i>Learning Skill</i>	<i>Learning Tool (Assessment Method)</i>				
		Venn Diagram	Image Analysis	Concept Map	Open-ended Question	Evaluation Rubric
<i>Remembering</i>	<i>memorization and recall</i>	•	•	•	•	•
<i>Understanding</i>	<i>comprehend</i>	•	•	•	•	•
<i>Applying</i>	<i>using knowledge</i>				•	•
<i>Analyzing</i>	<i>taking apart information</i>	•	•	•	•	•
<i>Evaluating</i>	<i>reorganizing making judgments</i>			•	•	•
<i>Creating</i>	<i>Planning or generating new ideas</i>			•	•	•

Venn diagrams and concept maps are examples of assessment methods can be used in different ways to match with multiple levels of the taxonomy.

Venn Diagrams

Remembering – Provide a list of terms to be distributed in a labeled Venn diagram.

Analyzing – Provide a labeled Venn diagram and have students identify and place relevant terms.

Evaluate – Take some sample Venn diagrams created by another class and have students rank them and justify their rankings.

Evaluation Rubrics

Remembering – Provide a partially a list of suitable terms and risk levels for students to use for assigning risk.

Analyzing – Create an incorrect evaluation rebric that may feature unsuitable terms, leave off some necessary terms, or use inappropriate values. Ask students how rubric could be improved.

Evaluate – Provide a scenario and have students evaluate risk from scratch.

Create – Have students evaluate a scenario and come up with an emergency response plan or resource allocation plan.