

**Advanced Physical Geology**  
**Interpreting Karst Processes**  
**and Topography**

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Name \_\_\_\_\_  
Period \_\_\_\_\_

**Karst** refers to the geologic processes involving the interaction of soluble rocks (usually limestone and dolostone, and sometimes marble) with slightly acidic ground water, and the landforms that interaction produces. Karst terrain is typified by such features as caves, sinkholes, 'disappearing streams', and springs. In the earliest stages, acidic groundwater dissolves away rock to create caverns in the rock. As karst development continues, cavern collapse is common and extensive topographical relief becomes evident. These features are visible on topographic maps and can be used to better understand the geomorphology and groundwater flow in a karst region.

**Materials:**

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| Lab Manual: Exercises in Physical Geology | 1 Piece of Transparency Paper |
| Schoharie, NY Topographic Map             | 1 Transparency marker         |
| Mammoth Cave, KY topographic Map          | 1 piece of graph paper        |

**Procedure:**

1. In your lab manual, read the introduction to Karst topography on pages 116 to 118.
2. Use the topographic map of Schoharie, NY, supplied by your teacher, to answer the questions in part 1 of this lab.
3. Use the topographic map of Mammoth Cave, KY, supplied by your teacher, to answer the questions in Part 2 of this lab.

**Part 1 – Schoharie, NY**

A. Examine the topographic map of Schoharie, NY. You are all familiar with this area after traveling to Schoharie on Day 2 of our field trip. List at least 3 karst features that you would expect to find on this quadrangle:

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B. Can you locate any of these features on the Schoharie map? If so, where?

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C. Recent glaciation has modified the landscape throughout this area. How could this impact your ability to locate karst features on this map?

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D. Notice the width of the Schoharie river valley and compare that to the width of the creek itself. How do you suppose this valley formed? How can these observations lead to evidence of glaciation in this region?

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- E. Use graph paper to draw a profile across the Cobleskill creek just northeast of Mine Dump. Do the same across the Schoharie creek just east of terrace Mt. How do the shapes of these two river valleys compare?

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Is Cobleskill Creek responsible for carving its own valley? \_\_\_\_\_ How do you know?

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- F. Now that you've compared these valleys: What type of material do you think the Cobleskill flows through? How does that compare with the material that the Schoharie creek flows?

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- G. Dye traces are often used in Karst regions to better understand groundwater flow routes. In the late 1950's, Rhodamine WT was used to positively trace some of these flow routes. Dye was deposited in Gage Cave in the northeast portion of Barton Hill. This dye was detected at Cow sink and Young's spring. Follow these steps to locate ground water flow paths in this area:

1. Use a clear transparency to lie over the area of Barton Hill and the Fox Creek. Locate the area of Gage Cave, which runs from the top of the northeastern portion of Barton Hill to its base at the northeastern corner. Mark this on your transparency with a marker. Now locate Cow's sink that appears as a pond at the southern base of Barton Hill and mark that on your paper. Young's spring is 0.5 miles east of Vroman corners at the 900 ft contour. Mark Young's spring on your paper. Now draw arrows indicating the direction of ground water flow between these locations.
2. Locate Juber Hole in the lower portion of the large sinkhole along the eastern edge of Barton Hill. Mark this on your transparency paper. Dye was traced from this sink to Dugan's spring located on the north side of the Louse Kill River just above the "K" in Kill on the 1040 ft contour. Draw an arrow on your paper connecting this flow route.

After examining these groundwater flow routes, what can you say about the general direction of groundwater flow of the Barton Hill area?

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There is a spring that is located between Young and Dugan spring that did not have a positive trace from either of these dye traces. What does this tell you about the complexity of Karst aquifers?

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- H. Young's spring was once a back-up water supply for the town of Schoharie. An extensive research project was conducted in the late 1950's to determine the potential for contamination of this water. Why is this a critical concern in a karst region?

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*Note: as a result of this study, steps have been taken to control disposal of garbage, sewage and dead animals in the Schoharie region.*

I. Locate one of the quarries on this map. What do you think is being quarried at this location? Why would this material be of economic value?

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**Part 2: Mammoth Cave, KY**

Mammoth Cave is the most extensive cave system in the United States. The cave system was formed in the limestone layers of the region. The limestone that comprises the northern two thirds of this map are capped with resistant sandstone. This region is known as the Chester Upland. The bottom third of this map is known as the Pennyroyal Plateau. The cap rock is not continuous through this southern region of the map. Note the abrupt contrast in topography between these areas. The cross-section below shows the extent of the sandstone cap rock and the dip of the rock layers in a northerly direction.

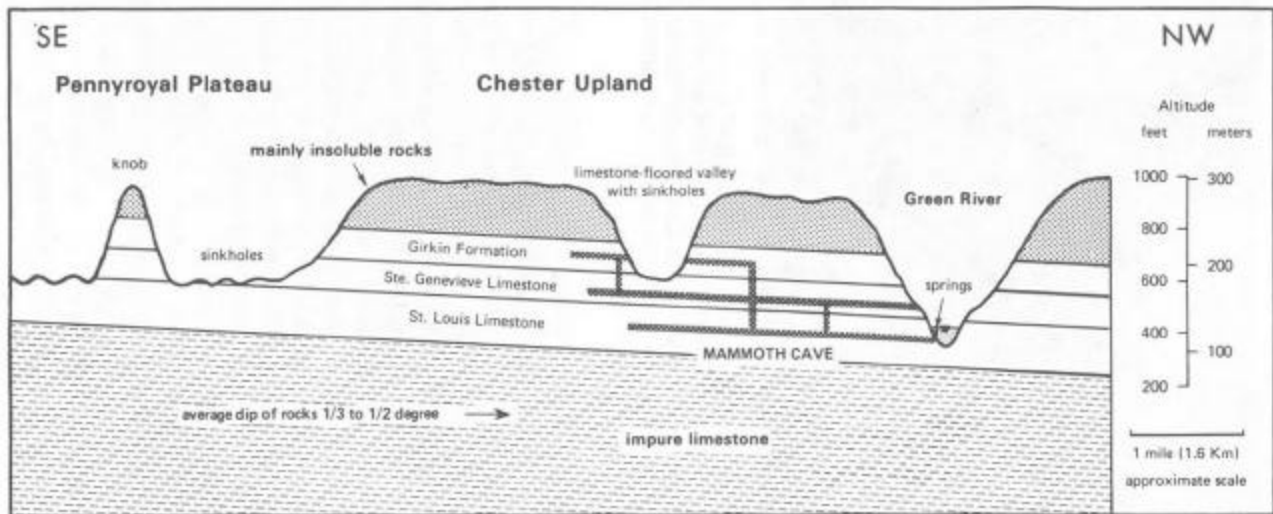


Figure 6. Cross section through the Mammoth Cave area, showing the relationship of the cave to the surrounding land surface and rock layers.

A. Examine the Chester Uplands on the topographic map of Mammoth Cave, KY. How does the developmental stage of this karst region compare to that of the Schoharie region? (see pg 117 in your lab manual) What observations of the Mammoth Cave map did you use to form this conclusion?

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B. The sedimentary rock layers in this area dip towards the north. What do you think happened to the sandstone that once covered the penny royal plateau?

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Based on dip direction, what is the direction of groundwater flow in this area?

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C. With the exception of the Green River there is no surface drainage in Chester Uplands. What does this tell you about ground water flow in this area? Where is all of the water sinking into the ground?

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D. Locate the Cedar Spring, Woolsey and Owens Valleys on this map. How do you think these valleys formed? Keep in mind there aren't any rivers flowing within them.

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E. Locate the boundary between the Chester Uplands and the Pennyroyal Plateau. Note the cliff face that can be detected by the closely drawn contour lines. This cliff face runs along the border of these contrasting regions.

1. What causes this abrupt change in topography? (*reread the introduction to part2*)

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2. As erosion occurs, will the position of the cliff face change? If so, explain.

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3. What is the fate of this region? What will it look like in the future? Explain.

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