PROCEDURE

PART A

Figure 13.9 shows the topography of an area of central Utah known for its production of coal. Geologists located the contact between the Salina Canyon Formation and the overlying Huntington Formation at point A on the east side of the ridge that trends north–south through the map area. The contact is overlain by a coal seam that comprises the lower 15 ft of the Huntington Formation. Both formations are Cretaceous (K) in age. Strata in the map area strike 0° (north) and dip 10° to the west.

1. Using the technique illustrated in figure 13.6, trace the contact between the Huntington and Salina Formations across the map of this area. Create a geological map by lightly coloring and labeling the two Cretaceous formations.

2. Is the coal seam exposed on both sides of the prominent north–south trending mountain, or just on the east side? What is the lowest elevation at which coal occurs in the map area?

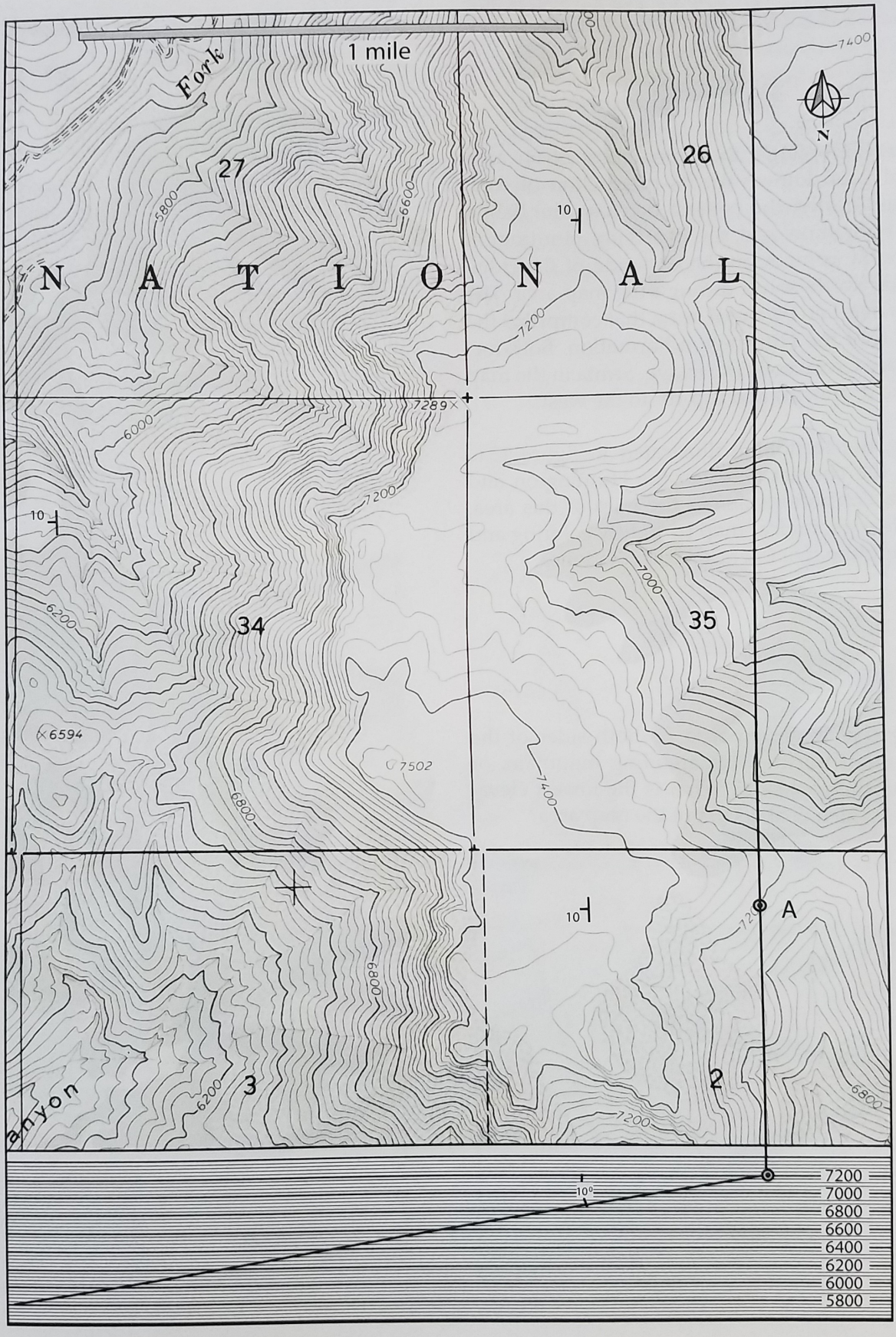

FIGURE 13.9 Topographic map showing a portion of the central Wasatch Plateau in Utah.

PART B

1. On figure 13.10, draw a geologic cross section representing line A–A′ in figure 13.1. The topographic profile has been drawn already, so in this case you need only transfer the geological data to the profile and project relationships into the subsurface.

2. What geological structures are predominant in this part of Pennsylvania?

3. How can the pattern of a syncline on a geological map be distinguished from the pattern of an anticline?

4. What type of tectonic stress (compressional, tensional, or shear) is indicated by the folding and faulting present in the map area?

5. List the two or three formations that appear most resistant to weathering and erosion.

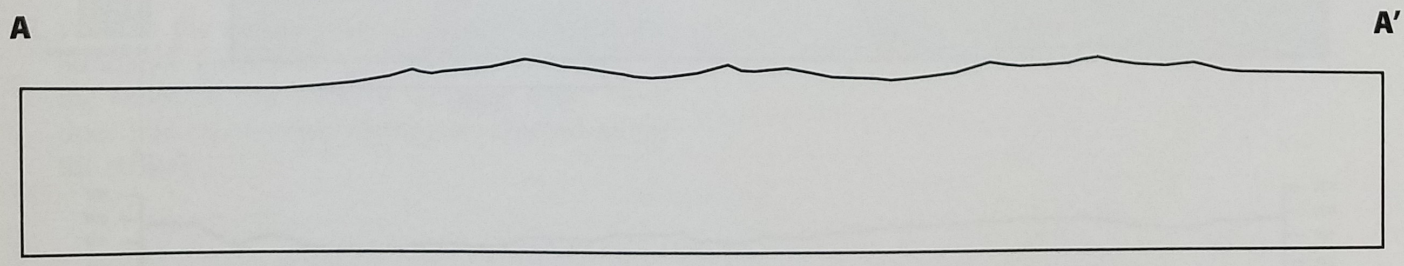

FIGURE 13.10 Topographic profile to be used in completing part B of this exercise.

PART C

1. A portion of the Salem, Kentucky, geological quadrangle map is shown in figure 13.11. Carefully examine the stratigraphic and structural relationships shown on the map and construct a geological cross section along the line A–A′.

2. What geological systems are present in this map area?

3. Why is the outcrop width of the Kincaid Limestone (Mkc) greater on the eastern side of the syncline than it is on the western side?

4. What type of fault is most common in this area? Cite your evidence.

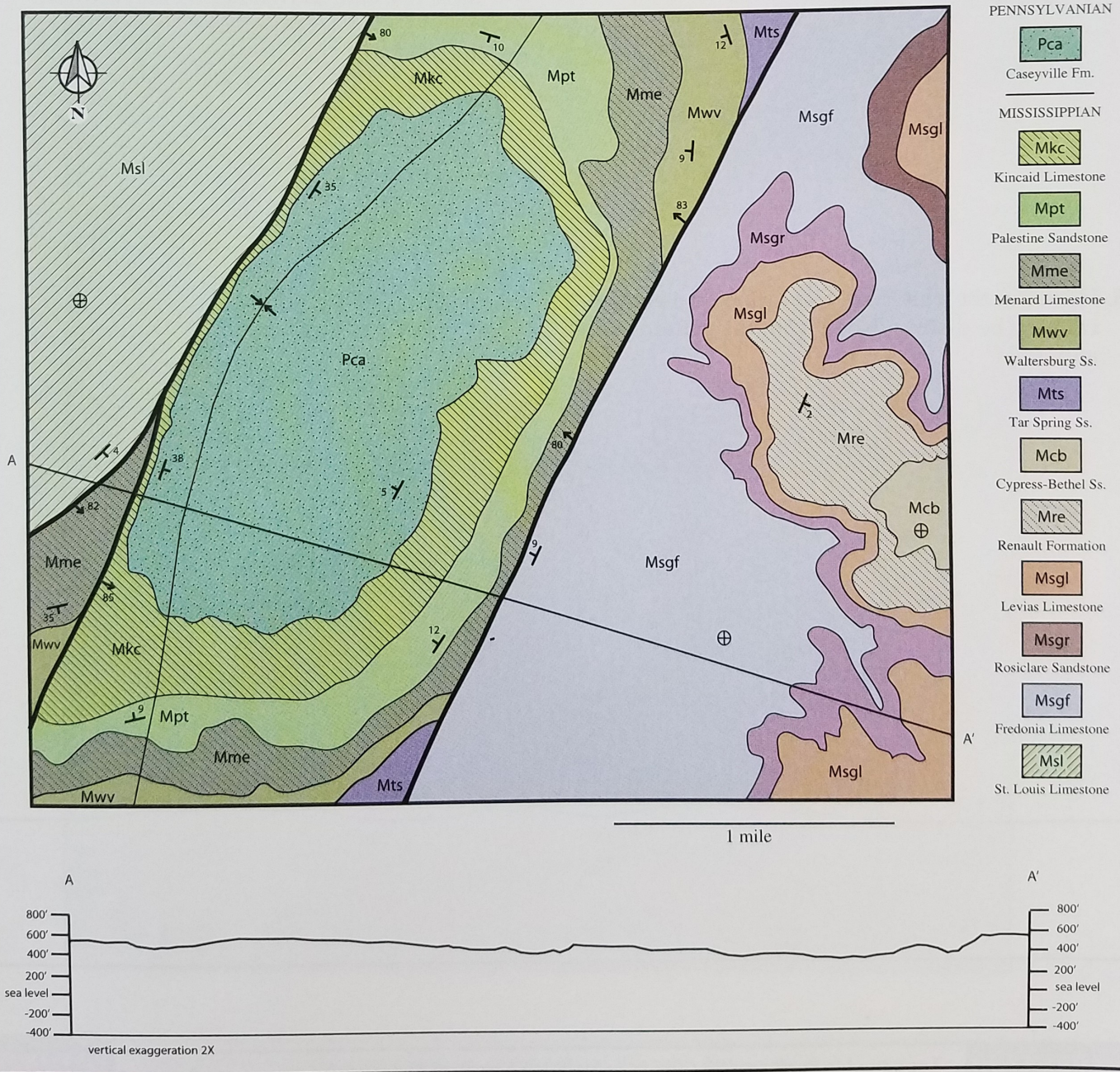

FIGURE 13.11 A portion of the Salem, Kentucky, geological quadrangle map.

PART D

Figure 13.12 is a geological map of the southeastern Black Hills, South Dakota. This region displays a variety of unconformities. Briefly review the definitions of nonconformity, angular unconformity, and disconformity in exercise 1 and then answer the following questions.

1. Which Paleozoic and Mesozoic geological systems are represented in the map area?

2. Which Paleozoic geological systems are not represented?

3. What is the nature of the contact between Precambrian rocks and the base of the Deadwood Formation? Cite your evidence.

4. What is the nature of the contact between the Deadwood Formation and the Englewood Limestone? How much "time" is missing?

5. What is the nature of the contact between the Sundance Formation and Skull Creek Shale in the southern one-third of the map area? How does this relationship change northward along the strike?

6. The Tertiary White River Group crops out on the eastern edge of the map. List the formations that are in contact with the base of the White River Group.

7. What type of unconformity is represented by the contact of the White River Group with underlying formations?

8. Steeply dipping Paleozoic and Mesozoic strata in the map area are part of the east-dipping limb of the Black Hills uplift, a structure associated with the Laramide orogeny. Based upon relationships seen in the map area, indicate the age of the Laramide orogeny. Explain your reasoning.

9. How can the pattern of an angular unconformity be distinguished from that of a disconformity on a geological map?