

ES202 LAB EXERCISE - INTRODUCTION TO TOPOGRAPHIC MAPS

(updated Feb. 2009, AGI Lab Manual 8th Edition)

Part 1 - Refer to the lab manual for the following questions.

1-1. What are the latitude and longitude coordinates of points A and B in Figure 9.1, p. 169?

1-2. Using a protractor, what is the azimuth compass bearing from point C to point D in Figure 9.14, p. 184? How about from point D to point A?

1-3. In Figure 9.11 (p. 179), locate points X and Z using the Township-Range-Section method of location (Public Land Survey System).

	X	Z
Township	_____	_____
Range	_____	_____
Section	_____	_____

1-4. Referring to Figure 9.11B, how many acres are covered in 1 section (1 square mile = 640 acres)?

1-5. Complete the topographic map depicted in Figure 9.19 (p. 187). Label each contour line using a contour interval of 10 feet. Start with 0 m elevation at sea level.

1-6. Referring to Figure 9.17 and 9.18 (p. 186), read the figure captions and complete the tasks.

1-7. Refer to Figure 9.20 (p. 188), read the figure caption and complete the tasks.

1-8. Read and review the topographic profile instructions presented in Figure 9.21, p. 189. Using the example topographic map in Fig. 9.22 (p. 190), draw a topographic profile along line A-A'. Plot your profile on the graph paper provided in the lab manual. Start with an elevation of 500 ft at the origin of the y-axis, and use a vertical scale of 1 in = 100 ft.

A) What is the horizontal fractional scale of the map?

B) What is the fractional scale of the vertical axis of your profile (hint: convert 1in =100 ft to a dimensionless fractional scale)?

C) Refer to the example on p. 163 of your lab manual ("step 4") and determine the vertical exaggeration of your profile.

1-8. Refer to Figure 9.3 (p. 171) of your lab manual (Ontario, CA), answer the following questions:

- A. What cultural feature is located in the northwest corner of Section 31, T.2N., R.6W.?
 - B. What is the contour interval of this map?
 - C. How much land area (in square miles) is contained within 1 Township of the Public Land Survey grid? (hint look at fig. 9.9)?
 - D. What is the distance in km from the railroad intersection in Grapeland (Sec 31, T1N, R6W) to the Day Canyon Guard Station (sec. 17, T1N, R6W).
 - E. In what direction does the stream in Day Canyon flow? How do you know?
- E. Calculate the average gradient of the stream in Day Canyon from Cucamonga Peak to the gaging station located at Sec. 8, T1N, R6W.

$$\text{Stream gradient} = (\text{vertical elevation change})/(\text{horizontal distance})$$

Step 1, Locate the two points on the stream in Day Canyon, as described above.

Step 2, Determine the elevation of the two points, by using the contour lines (elevation is in feet). Determine the difference of elevation between the two points (this is the vertical elevation change). You can determine this directly by knowing the contour interval, and counting the number of contour lines between the two points.

Step 3, Determine the horizontal map distance between the two points, as measured along the twists and turns of the stream course (i.e. not the "straight line distance") (distance is in miles).

Step 4. Divide the elevation difference in Step 2 by the horizontal map distance in Step 3, your answer will be in ft/mi. This is the gradient of the stream.

1-9. Using a contour interval of 10 ft, draw the following contour lines for the spot elevation data provided on Figure 9.16 (p. 185): 80 ft, 90 ft, 100 ft, 110 ft, 120 ft, 130 ft, 140 ft.

1-10. Using a contour interval of 100 feet, draw the following contour lines for the spot elevation data provided on Figure 9.15 (p. 185): 100, 200, 300, 400, 500, 600.

Part 2. - Refer to the Monmouth Quadrangle (maps located on table in lab)

2-1) What is the fractional scale, contour interval, and magnetic declination of this map?

a) Scale: b) Contour Interval: c) Declination:

2-2) What quadrangle maps are located immediately adjacent to the Monmouth Quad.?

a) North: b) South: c) East: d) West:

2-3) What is the quadrangle size series of this map (in long. and lat.)?

2-4) What is the date of publication of this map?

2-5) What is the name of the major river system flowing through this area. Of What larger drainage basin(s) does this river form a part of?

2-6) What is the approximate elevation of the Natural Sciences Building based on the map representation?

2-7) Given the fractional scale determine the following

5 inches on the map= _____ Feet on ground = _____ Miles on ground.

10 inches on the map= _____ Meters on ground = _____ Kilometers on ground.

2-8) A. What is the road distance in miles along Rt. 99 between Helmick State Park and Monmouth city limits?

B. What is the distance in kilometers?

2-9) A. What is the highest point of elevation represented on this map?

B. What is the lowest point of elevation represented on this map?

C. What is the maximum relief.

2-10) A. What is the longitude and latitude location of the road intersection at Buena Vista

B. What is the longitude and latitude location of Davidson Hill?

C. What is the straight line distance in miles between these two points?

D. What is the azimuth bearing FROM Davidson Hill TOWARDS Buena Vista?

E. What is the quadrant bearing FROM Buena Vista TOWARDS Davidson Hill?

2-11) A. What is the nature of the topographic slope in the vicinity of the town of Monmouth? What is the local relief between WOU and the Willamette adjacent to Independence?

2-12) Determine the elevations of the following locations:

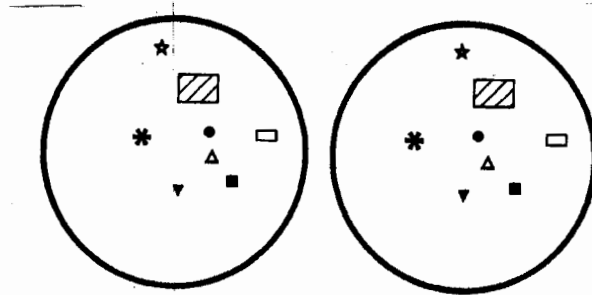
A. Wigrich

B. Oak Hill (SC)

Part 3 - Introduction to Aerial Photographs

3-1. Read over p. 191-192 in your lab book, and provide a general discussion as to what air photos are, and how are they used to obtain 3-D stereoscopic views.

3-2. Test of Stereo vision: to test your ability to see in 3-D, use a student pocket stereoscope and view the image below. Observe the apparent height of the shapes, and rank from highest = 1, to lowest = 8.



A. Left and right images.

3-3. Refer to Air Photo Station 1 in the lab. View the images in stereo and answer the following questions.

- What is the dominant type of surface environment? (fluvial, glacial, coastal, or other?)
- What is the dominant type of climate (warm or cold? wet or dry?)
- Is this area vegetated or non-vegetated?
- Do you see evidence for human landuse? If so, list your observations.
- Hypothesize as to what you think the cone-shaped geologic feature is in the lower right of the photograph.
- Hypothesize as to where you think these photos were taken in the U.S.. What is your line of reasoning?

3-4. Refer to Air Photo Station 2 in the lab. View the images in stereo and answer the following questions.

- A. What is the dominant type of surface environment? (fluvial, glacial, coastal, or other?)
- B. What is the dominant type of climate (warm or cold? wet or dry?)
- C. Is this area vegetated or non-vegetated?
- D. Do you see evidence for human landuse? If so, list your observations.
- E. Hypothesize as to what you think the dominant mode of surface erosion is in this area. What is your evidence?
- F. Hypothesize as to where you think these photos were taken in the U.S. What is your line of reasoning?.

3-5. Refer to Air Photo Station 3 in the lab. View the images in stereo and answer the following questions.

- A. What is the dominant type of surface environment? (fluvial, glacial, coastal, or other?)
- B. What is the dominant type of climate (warm or cold? wet or dry?)
- C. Is this area vegetated or non-vegetated?
- D. Do you see evidence for human landuse? If so, list your observations.
- E. Hypothesize as to what you think the horseshoe shaped objects are in the center of the photo. How might they form?
- F. Hypothesize as to where you think these photos were taken in the U.S.. What is your line of reasoning?

3-6. Using the “pocket stereoscopes” available in the lab, complete questions 49 and 50 in your lab manual on p. 192.