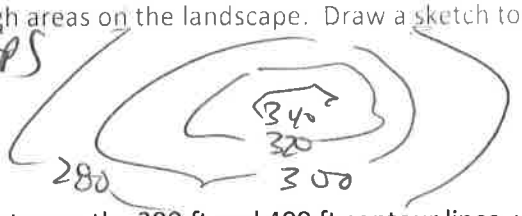
KEY

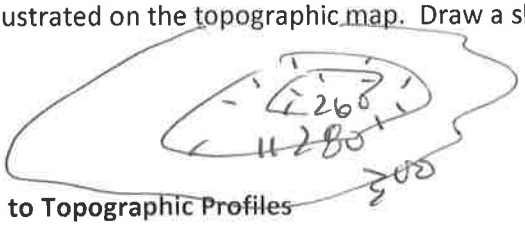
ES202 Video Review Exercise – Introduction to Topographic Maps

Watch Youtube Video https://www.youtube.com/watch?v=zqPMYGDxCr0 (~15 minutes); answer the following questions / define the following terms.

1. Contour Line – LINE CONNECTING POINTS OF EQUAL ELEVATION
2. Contour Interval – VERTICAL DISTANCE BETWEEN EACH LINE
3. Index Contour Line – LABELED AND DARKENED EVERY 5TH LINE
4. True or False. Steeply sloping land surfaces are associated with closely spaced contour lines.
5. True or False. Gentle sloping land surfaces are associated with more widely spaced contour lines.
6. What is the "rule of V's" as applied to contour lines crossing rivers and streams? Draw a sketch to illustrate your answer. CONTOUR LINES form V-shape when crossing STREAM VALLEYS, APEX of V POINTS UPSTREAM
7. True or False: rivers flow from low elevation to high elevation, against the force of gravity.
8. What is the rule of contour lines that represents hills or high areas on the landscape. Draw a sketch to illustrate your answer. CLOSURE AT HILL TOPS



9. Example problem: you are located at a position half way between the 380 ft and 400 ft contour lines, using the principle of interpolation, what is your approximate elevation based on the contour intervals. 390 ft
10. How are bowl-shaped depressions illustrated on the topographic map. Draw a sketch with contour lines to illustrate your answer. HACHURES

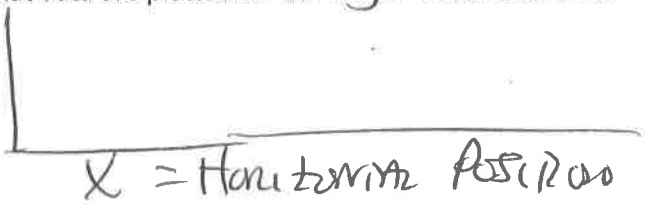


ES202 Video Review Exercise – Introduction to Topographic Profiles

Watch Youtube Video https://www.youtube.com/watch?v=StDYPluk25M (~6 minutes); answer the following questions / define the following terms.

1. What is a topographic profile, draw a sketch to illustrate your answer. SIDE-CUT PROFILE OF EARTH SURFACE TOPOGRAPHY

2. In drawing a profile on a Cartesian X-Y graph, what data are plotted on the Y axis? What does the X axis represent? ELEVATION = Y



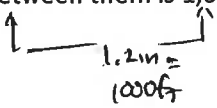
KEY Kim

ES202 Topgraphic Map Exercises – Part 2 **More on Contour Mapping and Topographic Profiles**

1. Scaling Problems – SHOW ALL OF YOUR MAP WORK
   a. Convert the following fractional scales to equivalent ground distances measured by select map distances

      i. 1:24,000 — 1 inch on map = 2000 feet on ground — $1\text{in} = 24{,}000\text{in}\left(\frac{1\text{ft}}{12\text{in}}\right) = 2000\text{ft}$
      ii. 1:31,680 — 3 inch on map = 1.5 miles on ground — $(3\text{in})(31{,}680) = 95{,}040\text{in}\left(\frac{1\text{ft}}{12\text{in}}\right)\left(\frac{1\text{mi}}{5280\text{ft}}\right)$
      iii. 1:48,000 — 1 inch on map = 0.76 miles on ground — $1\text{in} = 48{,}000\text{in}\left(\frac{1\text{ft}}{12\text{in}}\right)\left(\frac{1\text{mi}}{5280\text{ft}}\right) = 0.76$
      iv. 1:1,000,000 — 1 cm on map = 10.0 kilometers on ground — $(1\text{cm})(1{,}000{,}000) = 1{,}000{,}000\text{cm}\left(\frac{1\text{m}}{100\text{cm}}\right)\left(\frac{1\text{km}}{1000\text{m}}\right) = 10\text{km}$

   b. A map of unknown scale shows two cell towers that are 1.2 inches apart on the maps page, and the actual ground distance between them is 1,000 feet. What is the fractional scale of the map? SHOW ALL YOUR MATH WORK.

      $\frac{1.2\text{in}}{\text{MAP}} = \frac{1000\text{ft}}{\text{ground}}\left(\frac{12\text{in}}{\text{ft}}\right) = \frac{12{,}000\text{in}}{1.2\text{in}}$ 1 : 10,000

   c. A straight stretch of road on an aerial photo was found to be 500 meters long in actual ground distance. The same segment on the photograph is 0.75 inches; what is the fractional scale of the photograph? SHOW ALL YOUR MATH WORK.

      $\frac{0.75\text{in}}{\text{MAP}} = \frac{500\text{m}}{\text{ground}}\left(\frac{100\text{cm}}{\text{m}}\right)\left(\frac{1\text{in}}{2.54\text{cm}}\right) = \frac{19{,}685\text{in}}{0.75\text{in}}$ 1 : 26247

   d. A map has a fractional scale of 1:500,000. How many kilometers on the ground are represented by 10 centimeters on the map? SHOW ALL YOUR MATH WORK.

      $(10\text{cm})(500{,}000)\left(\frac{1\text{in}}{1000\text{cm}}\right)\left(\frac{1\text{km}}{1000\text{m}}\right) = 50\text{km}$

2. Read the section entitled "Contour Lines" on pages 242-244 in the AGI lab manual (10th edition). Using the base map on the attached Figure 1, complete the following tasks.
   a. ✓ Construct a topographic map from the spot elevations, drawing contour lines (connecting points of equal elevation) using a contour interval of 20 ft. Pay attention to the Law of V's when crossing stream channels (i.e. contour lines for a V-shape with vertex pointing up stream as they cross a valley).
      i. USE A PENCIL SO YOU CAN ERASE LINES AS YOU WORK THROUGH THE PROBLEM. Hint: start at the edge of the map at lower elevations, and work upstream to successively higher elevations.
   b. ✓ Using your topographic map in 2a above, construct a topographic profile along line X-Y, using the graph paper below Figure 1.
   c. Using a ruler and the bar scale in figure 1, determine the fractional scale of the map. SHOW ALL OF YOUR MATH WORK.

      $\frac{0.95\text{in}}{0.95\text{in}} = 1\text{mi}\left(\frac{5280\text{ft}}{\text{mi}}\right)\left(\frac{12\text{in}}{\text{ft}}\right) = \frac{63{,}360\text{in}}{0.95\text{in}} = 66{,}695$ 1 : 66,695

   d. Using a ruler and the y-axis scaling, calculate the vertical (fractional) scale of your topographic profile in the graph below. SHOW ALL OF YOUR MATH WORK.

      $1\text{in} = 200\text{ft}\left(\frac{12\text{in}}{\text{ft}}\right) = 2400\text{in}$ 1 : 2400

   e. Calculate the vertical exaggeration of your topographic profile. SHOW ALL OF YOUR MATH WORK.

      $\text{VERTICAL EXAGGERATION} = \frac{\text{VERTICAL SCALE}}{\text{HORIZONTAL SCALE}} = \frac{1/2400}{1/66{,}695} = \frac{66{,}695}{2400} = \times 27.8$

      ~~×28~~
   f. ✓ Add vector arrows to the streams on your map to show their direction of flow.
   g. Determine the maximum relief for the map area. Express in feet and meters.

      MAX = 520ft
      MIN = 270ft
      MAX RELIEF = 520ft − 270ft = 250ft
      $250\text{ft}\left(\frac{1\text{m}}{3.28\text{ft}}\right) = 76.2\text{m}$

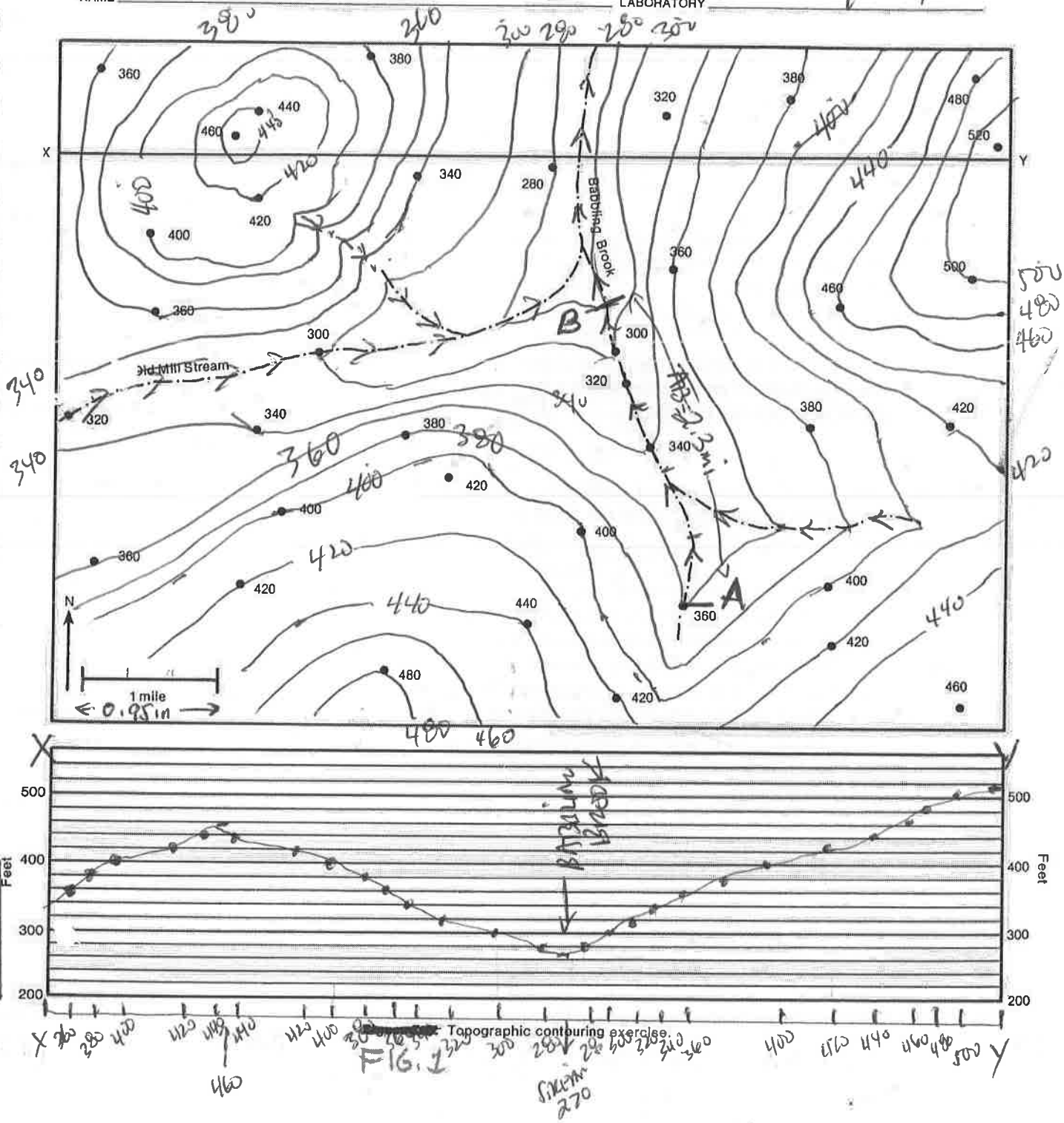
3. Read over the section on Stream gradient, p. 292, Fig. 11.6 in the AGI lab manual (10th edition).
   a. For your map in 2 above, calculate the stream gradient of the main stem of "Babbling Brook" in feet per mile and in ft per ft (dimensionless ratio). SHOW ALL OF YOUR MATH WORK.

      SEE MAP LOCATIONS "A" & "B" OF BABBLING BROOK

      $\text{GRAD}_{AB} = \frac{\text{RISE}}{\text{RUN}} = \frac{\Delta\text{ELEV}}{\Delta\text{HD}} = \frac{\text{ELEV PT A} - \text{ELEV. PT B}}{\text{AB HORIZONTAL DISTANCE}} = \frac{360\text{ft} - 280\text{ft}}{2.3\text{mi}} = \left(\frac{80\text{ft}}{2.3\text{mi}}\right) = 34.8\frac{\text{ft}}{\text{mi}}$

      $\text{GRAD} = \frac{80\text{ft}}{2.3\text{mi}\left(5280\frac{\text{ft}}{\text{mi}}\right)} = \left(\frac{80\text{ft}}{12{,}144\text{ft}}\right) = 0.007$

NAME _____ LABORATORY _____ KEY



Topographic contouring exercise

FIG. 1

VERTICAL SCALE: 1 in = 200 ft 1:2400

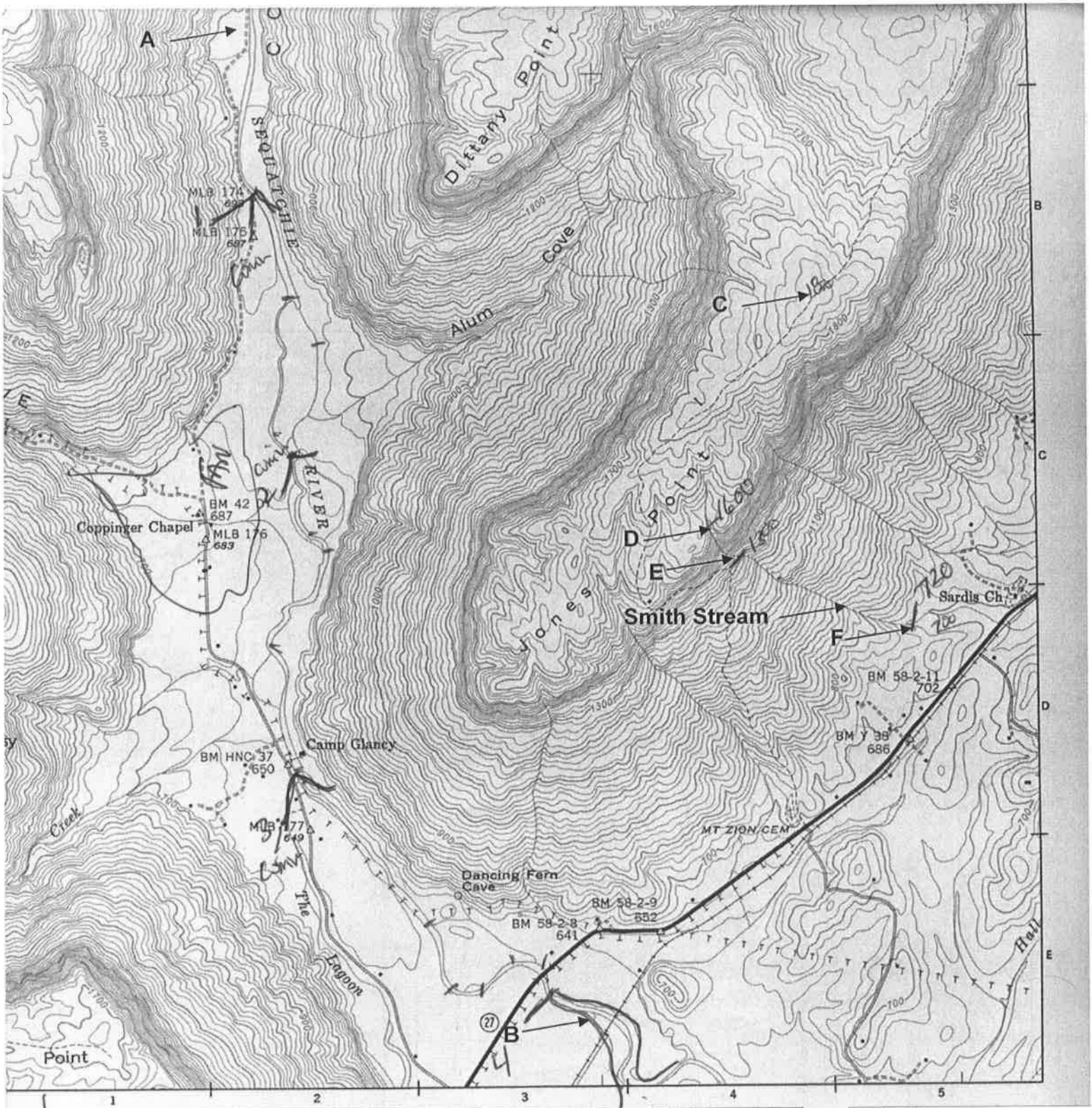
HORIZONTAL SCALE 0.95 in = 1 mile 1:66,695

KEY

ES202 Additional Map Exercise – Whitwell, TN Map

Refer to the attached map and answer the following questions.

1. What is the contour interval of the map? 20 ft between each LINE
   100 ft between INDEX CONTOURS
2. Using a ruler and the graphical scales, determine the fractional scale of the map. Show all of your math work. $\frac{2.6\text{ in}}{2.6\text{ in}} = 1\text{ mi}\left(\frac{5280\text{ ft}}{\text{mi}}\right)\left(\frac{12\text{ in}}{\text{ft}}\right) = \frac{63,360\text{ in}}{2.6\text{ in}} \Rightarrow 1:24,369$
3. What is the drainage pattern of the stream network in "Alum Cove", north-central portion of the map? DENDRITIC - BRANCHING TRIBUTARY CONFLUENCES
4. Which direction is the Sequatchie River flowing? Which direction is the stream in Alum Cove flowing? ASSUME N TO BE AT PAGE TOP. SEQUATCHIE = SOUTH
   ALUM COVE = SOUTHWEST
5. Calculate the average gradient of the Sequatchie River between points A and B. Calculate gradient in ft/mi. Show all your math work. CONTOUR LINES CROSS RIVER AT PTS 1, 2, 3, 4
   VALLEY FLAT
   $\text{GRAD} = \frac{\text{RISE}}{\text{RUN}} = \frac{\Delta\text{ELEV } 1\text{-}4}{\text{H.D. } 1\text{-}4} = \frac{(3\text{ CI})(100\text{ ft/CI})}{2.9\text{ mi}} = \frac{300\text{ ft}}{2.9\text{ mi}} = 103.4\frac{\text{ft}}{\text{mi}}$ ★
6. What is the elevation of point C? ≈ 1,870 ft
7. In which direction is "Smith Stream" flowing? EAST - SOUTHEAST
8. Calculate the average gradient of Smith Stream between points D and E. Calculate gradient in ft/mi. Show all your math work.
   STEEP HILL SLOPE
   $\text{DE GRAD} = \frac{\text{RISE}}{\text{RUN}} = \frac{1600\text{ ft} - 1300\text{ ft}}{0.13\text{ mi}} = 2308\frac{\text{ft}}{\text{mi}}$ ★
9. Calculate the average gradient of Smith Stream between points E and F. Calculate gradient in ft/mi. Show all your math work.
   MID-SLOPE/FOOTSLOPE
   $\text{EF GRAD} = \frac{\text{RISE}}{\text{RUN}} = \frac{1300\text{ ft} - 720\text{ ft}}{0.84\text{ mi}} = \frac{580\text{ ft}}{0.54\text{ mi}} = 1074\frac{\text{ft}}{\text{mi}}$ ★
10. Based on your results from questions 8 an d 9 above, what can you conclude about the change in stream gradient when water flows from high elevation to low elevation? Describe your observations. GRADIENT FLATTENS IN DOWNSTREAM DIRECTION
11. What is the shape of the channel pattern of Sequatchee River near point A? What about point B? Is this river braided in any given reach?
    SINUOUS TO MEANDERING; NOT BRAIDED
12. Calculate the maximum relief for this map (answer in feet). MIN ELEV ≈ 620 ft
    RELIEF = 1870 ft − 620 ft = 1250 ft MAX ELEV ≈ 1870 ft
13. Is the topography around Dittany Point relatively steep or relatively gentle? What about the hill above Dancing Fern Cave? DITTANY PT = WIDE LINES = GENTLE RIDGE TOP
    DANCING FERN CAVE: VERY STEEP UPSLOPE; GENTLE RIVER VALLEY TO SOUTH
14. What fluvial landform is Coppinger Chapel located on? Is this an erosional or depositional landform? What fluvial landform is Camp Glancy located on?
    COPPINGER = ALLUVIAL FAN
    CAMP GLANCY = FLOODPLAIN WITH COLLUVIUM



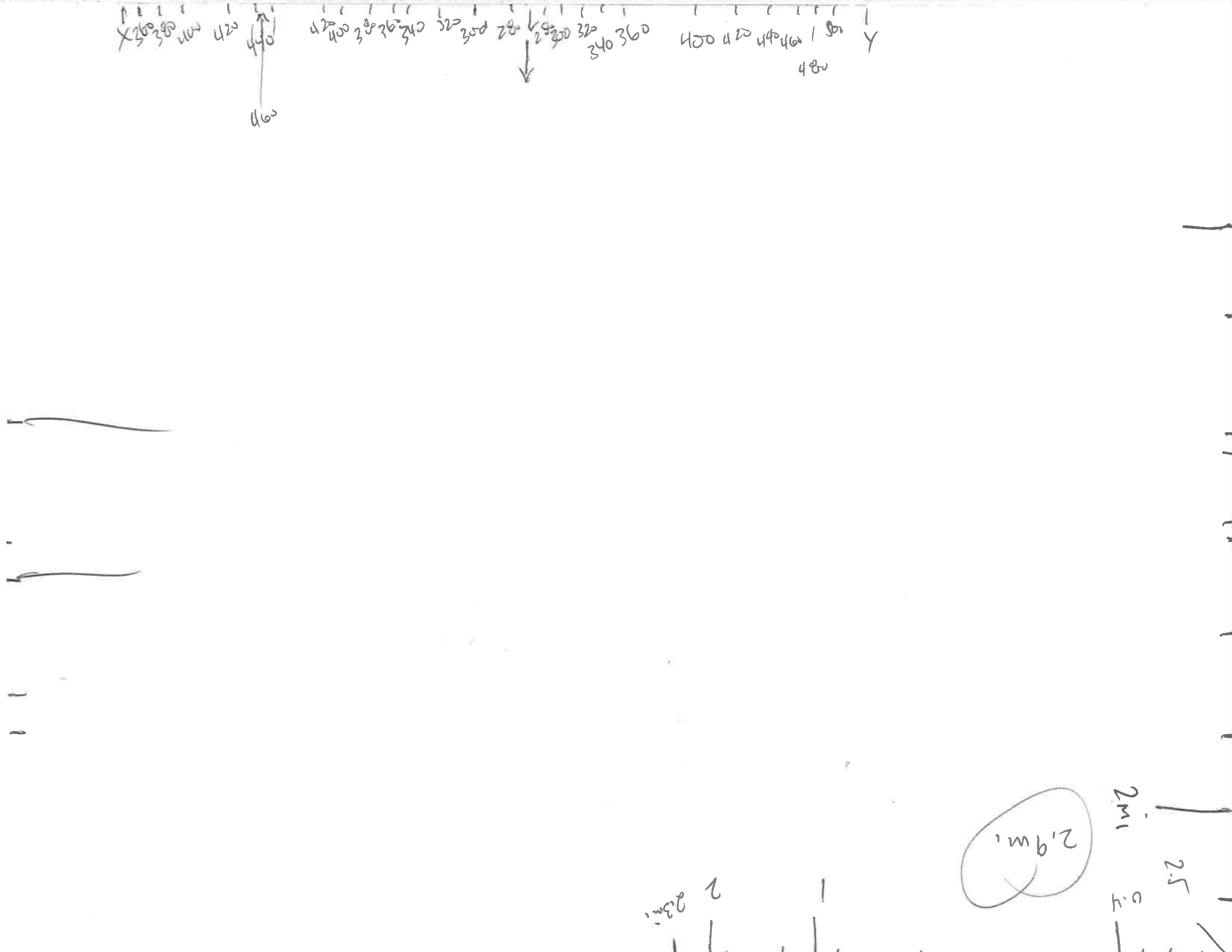
RIVER DISTANCE
Pt 1 → 4 = 2.9 in.
DROP RIVER = 300 ft
1 ← 2.6 in → 1

CONTOUR LINE

CI = 20 ft

1 MILE
1 KILOMETER

SCALE 2.6 in = 1 mi


X 360 380 400 420 440
460
420 400 380 360 340 320 300 280
280 300 320 340 360
400 420 440 460 500 Y
480
2,9mi
2mi
2.5
0.4
2 2.3mi