Last Name: _____ **First Name:** _____

Crandall University
GEOGRAPHY 1013

Lab 3: ***The "Tools of the Trade," Part III***
Relief Representation by Contours

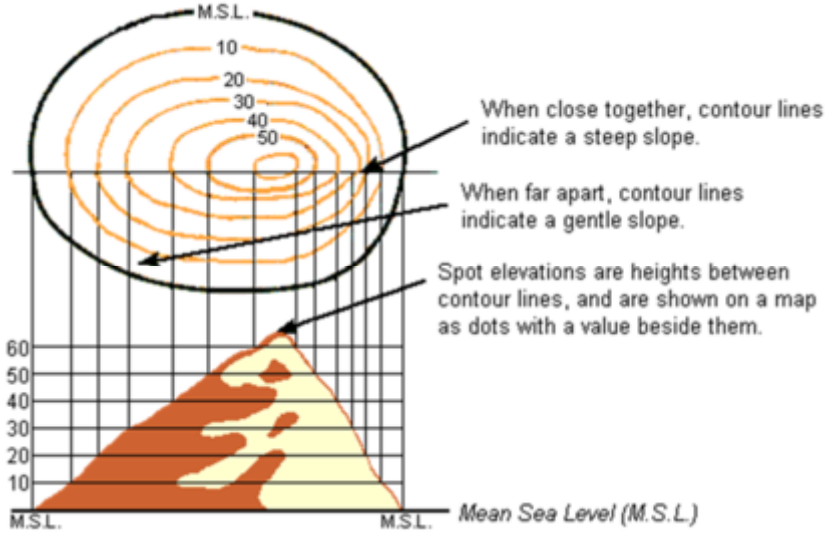
Print this lab off. Complete it. And then scan/photo it and send it as <u>ONE PDF document</u> through Canvas. Please do send it as <u>ONE PDF document with the</u> <u>pages in order</u>. Before you send it, make sure it is legible. If you cannot read it, neither can I 😊

Cartographers most commonly depict the third dimension (height) on maps using **contour lines** (those brown lines circling all over the maps). Computer techniques allow for rapid, accurate contouring from aerial photographs. On the ground, **bench marks** are placed at surveyed reference points to provide precise height information on metal plates. On large-scale maps, additional **spot heights** are printed, giving exact elevations at key points such as road intersections and hilltops.

> *A **contour line** is a line on a map that connects points of equal elevation above mean (average) sea level (s.l.).*

- *Every point on a contour line is exactly the same height* - land on one side is all higher than the height represented by the line; land on the other side is all lower than the height shown by the line.
- *The vertical difference (difference in height) between two contour lines is standardized on each map* (e.g. 25 m, 50 m). This difference in elevation of neighbouring contours is the **contour interval**; it is always specified on the bottom margin of a map. Usually every fifth contour line is drawn more boldly in order to make it easier to interpret the map (this is done on your maps).

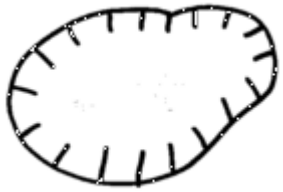
Note that on some NTS maps, contour lines and elevations are still given in ***feet*** not ***metres*** (not updated recently). ***Yours, however, have been converted to metric.*** When Canada "metricized" the horizontal scale of maps could simply be enlarged/reduced by computer to a metric-friendly scale (e.g. 1:50 000 = 1 cm to ½ km) from the old scale (1:62 500 = 1 inch to 1 mile). However the contour lines were actually already drawn at foot intervals. Each line has to be ***redrawn*** at new, metric intervals. Because of the huge cost, the maps are slowly being updated. Yours are the new, metric, system! This makes your life much, much easier! Rejoice!



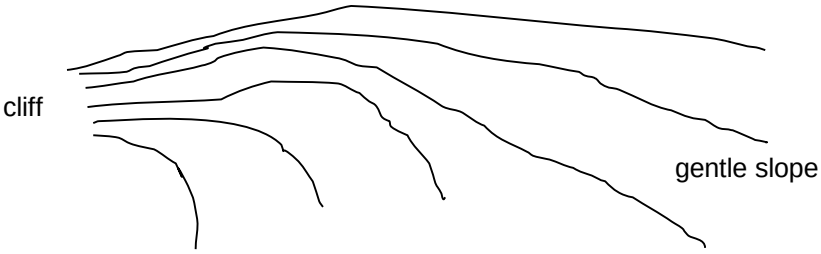
ALWAYS CHECK THE INFORMATION ON YOUR MAP SO YOU KNOW IF THE ELEVATIONS ARE IN METRIC (metres) OR IMPERIAL (feet)!

Properties of contours:

- contours separate land higher in elevation from land which is lower.
- contours are drawn at standard intervals; the contour interval is the same on any one map.
- all contour lines are drawn as if seen from directly above the landform.
- contours are continuous lines - they either enclose an area on a map or disappear off the edge of the map.
    - closed contours always enclose higher ground. The ***only exception*** is when a special symbol is used to indicate a *depression* - depression contours, enclosing lower ground, are contours ticked in the direction of the depression:



    - Contours never cross each other and never split. However they may merge (but never actually touch) along a near vertical cliff.



Exercises (please include UNITS in all answers … ** no units, ½ mark off! **):

A. Consult NTS maps 21 H/16 and 83 C/3 ...

The maps are in the Library or online – there is a link on the Labs home page.

What is the contour interval on sheet 21 H/16 (include UNITS)? _____
(this is written on the bottom edge or side of the map, by the scales)

What is the contour interval on sheet 83 C/3 (include UNITS)? _____

The cartographers used different intervals on the different maps! Think about what each map would be like if they had used the same interval on both …

Why do you think they did NOT use the 21 H/16 interval on 83 C/3?
(What would the map be like if the 21H/16 scale were used on the 83 C/3 map?)

Why do you think they did NOT use the 83 C/3 interval on 21 H/16?
(What would the map be like if the 83 C/3 scale were used on the 21 H/16 map?)

On 83 C/3 ... (remember units in EACH answer!)

1. What is the elevation of Wilcox Peak (835883)? _____
2. What is the approximate elevation Sunwapta Lake (840850)? _____
3. How high is Wilcox Peak above Sunwapta Lake? _____
   (take the elevation of Wilcox Peak and subtract the elevation of Sunwapta Lake)
4. What is the elevation the start of Parker Ridge Trail (922825)? _____
5. What is the elevation the top of Parker Ridge Trail (927815)? _____
6. What is the elevation gain on Parker Ridge Trail? _____
   (take the elevation at the top of the trail and subtract the elevation at the start)

B. On 83 C/3 …

1. Find the little lake in Wilcox Pass at 848883. The shortest distance from the highway (as the crow flies) would be to go from about 829870 – a distance of about 2.25 km. However, the trail by the lake begins at 874853 and travels a distance of about 4.5 km. Consider the SLOPE of these two routes. Slope is shown by how closely or widely spaced the lines are (see the diagram on the bottom of Page 1). *In terms of the SLOPE, why do you think the trail builders chose the route they did, even though it is a longer journey?*

2. Notice how closely spaced the contour lines are at the Weeping Wall (995783). This means that the elevation is going up VERY quickly vertically over virtually no distance horizontally. They almost merge. What might this look like if you were looking at it from the ground? (google it if you want: Weeping Wall (Alberta) - Wikipedia)

3. Highway 93 (the red one) goes up the only major valley on the map.

    a. Notice that on the right hand side of the map, the highway goes up the North Saskatchewan River Valley – the river doesn't cross many contour lines – it's a fairly gentle slope. Its elevation is 1600-1560 m.
    b. On the top of the map, the road follows the Sunwapta River Valley, which also crosses few contour lines and has a gentle slope. At Sunwapta Pass the elevation is 2035 m (891849).
    c. This creates a problem for road builders. The road has to rise over 400 m vertically in a very short distance. Notice how closely the contour lines are spaced from 960812 – 970800. You couldn't build a straight road here – it would be too steep for trucks/RVs and super slippery in winter time.
    d. How did the road builders get around this problem? How does this solution help?

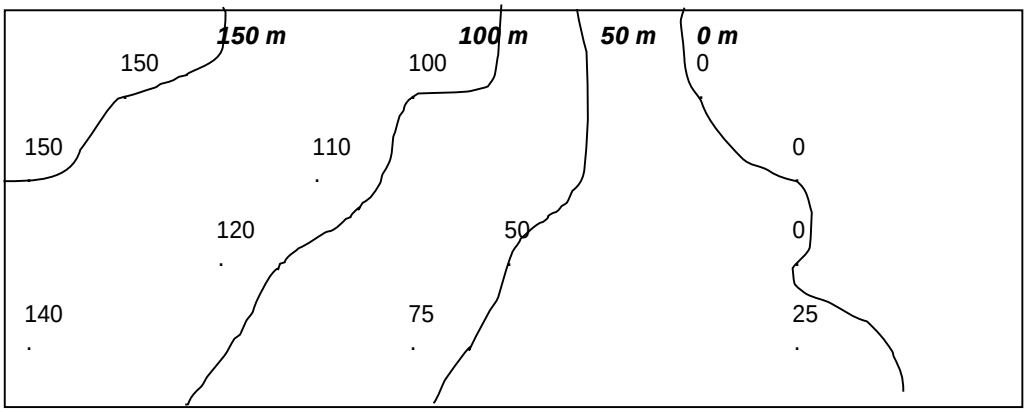
C. Now it's your turn to try drawing contours!

This may seem crazy, but it really does help you understand the concept better!!!

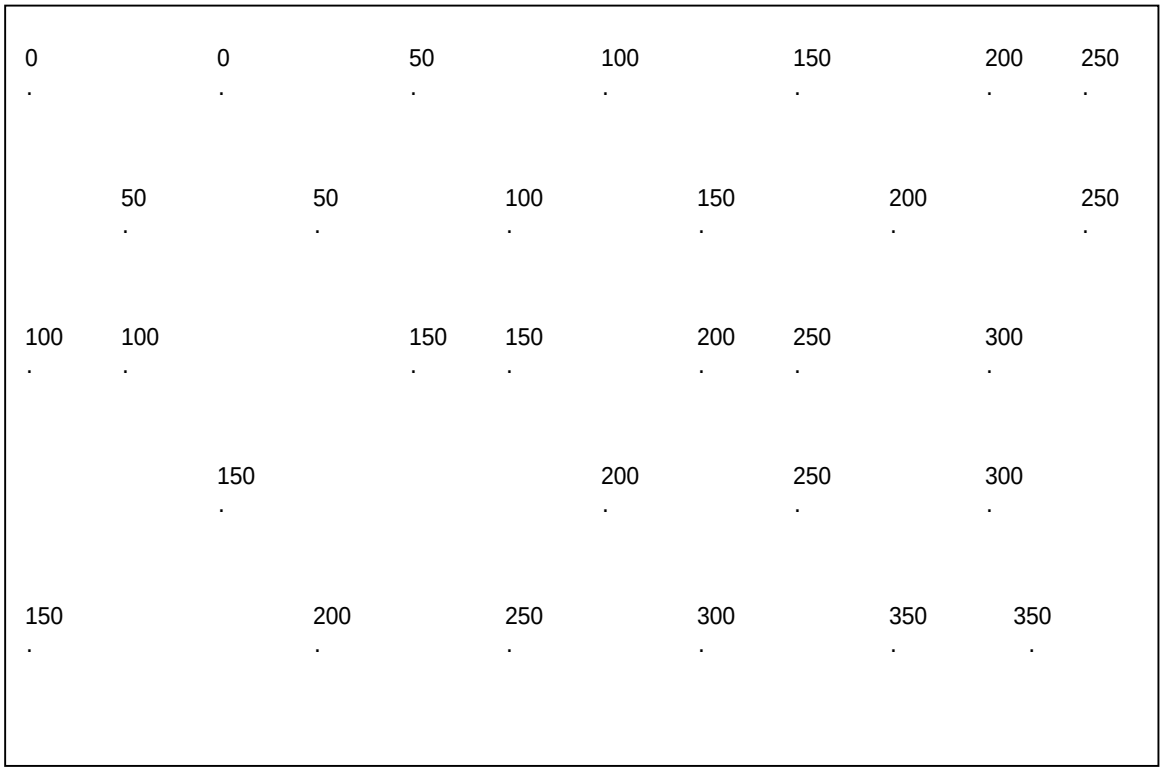
1. Note the contour interval required, and the units!

2. Draw lines …
    a. sometimes points at the exact heights are indicated – lines go through those points
    b. most times, points will be above or below your line – you will have to estimate the line
    c. remember:
        - lines never cross
        - lines never "end" on the map – they either go in circles or go off the edge
        - lines need to be labeled

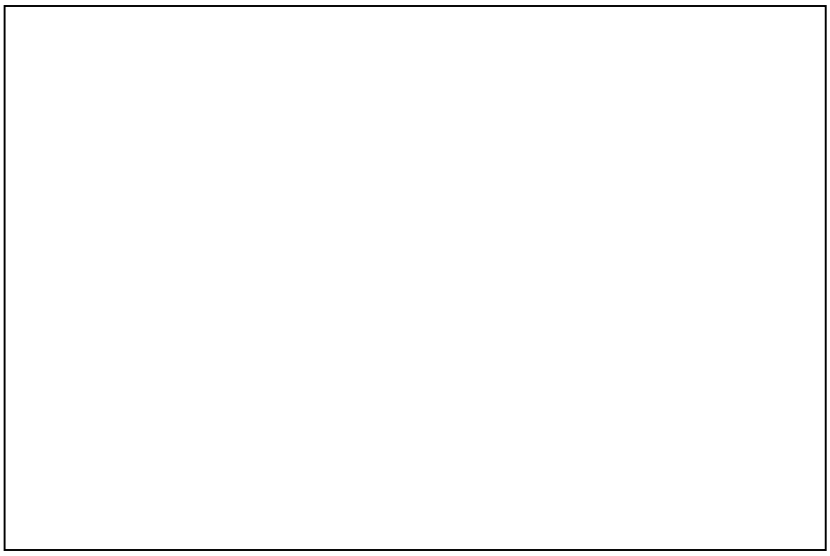
Example: (contour interval of 50 metres)



1. Draw in and label contours (contour interval 50 m) on this map:



2. a. Using a contour interval of 50 m, draw a ***gentle*** slope from 0 m to 300 m in the box below *(remember, label all contour lines!):*



b. Using a contour interval of 50 m, draw a ***steep*** slope from 0 m to 600 m in the box below:
(Remember, label all contour lines)