How to Get Un Lost:
A Navigation Course

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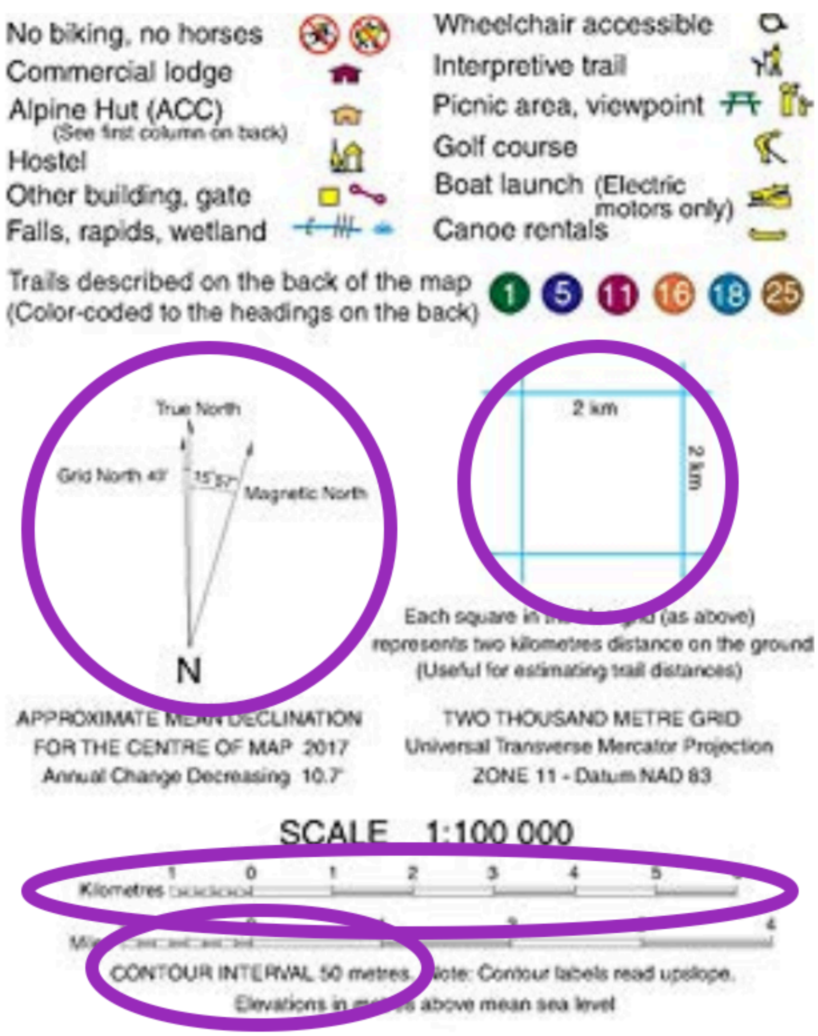
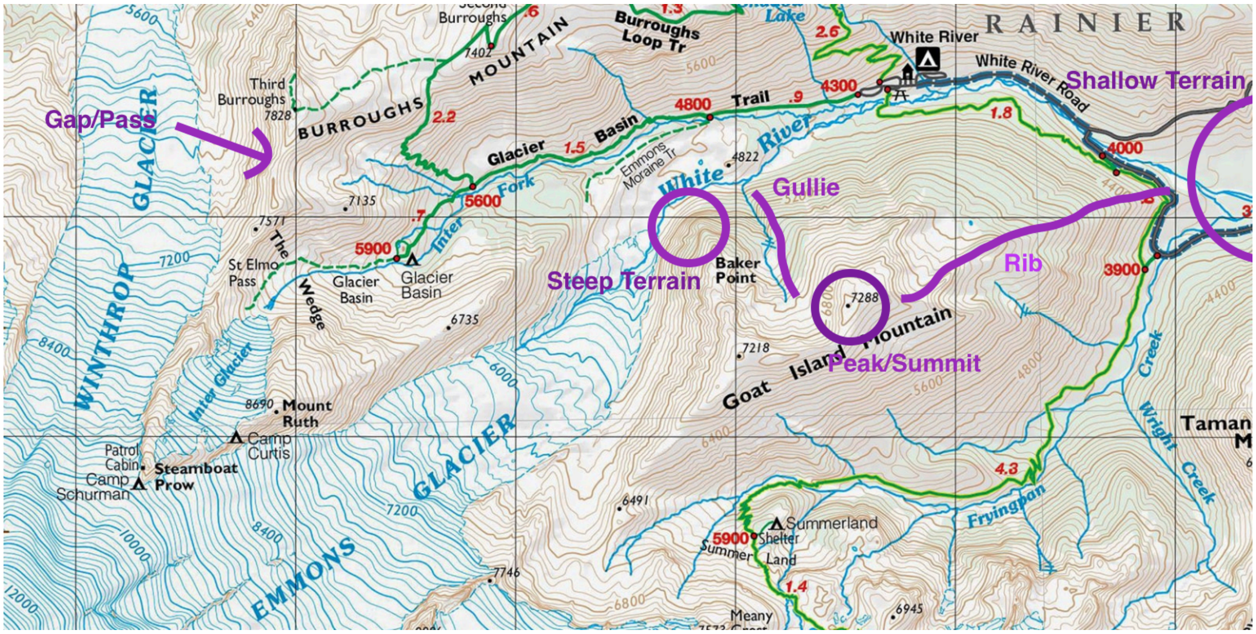
This handout is conglomeration of helpful hints and exercises to go along with your navigation course by Get Outside. If you have any questions please let us know.
info@getoutsideadventures.ca

The Key to Understanding a map:
A legend will be your reference point, it tells you what all the little symbols, colours, and various lines mean. It is also important for you to familiarize yourself with the following information found in the legend

- Scale
- Contour interval
- Declination
- How much distance the blue squares represent



Examples of topographic features on a map:



Determining your UTM on a map:

- UTM is a grid system that covers the entire globe. Looking at the map above it is the overlying black grid. On your gem trek map it is the blue grid.
- If there is an emergency knowing how to calculate your UTM will help people locate you within 100m squared
- It is a series of 6 numbers. The first three are for West to East. The second three are for South to North ("You go in through the door before going up the stairs")
- To calculate the first two, of the three, numbers: Run your finger along the map from West to East. Stop at the last solid grid line prior to hitting your objective. The number associated with this line will be found at the edge of the map. To calculate the third number, of three, break that square you just found into 10 imaginary equal parts. The number between 0-10 that is closest to your objective is your third number. Repeat with running your finger South to North.

Exercise A:

- Find the UTM for the parking lot for Grotto Pond (Located close to Lac Des Arcs)
- What is located at UTM 229 542

Calculating distance on a map:

- String on compass – follow the string along the trail and then place this section of string on the scale in the legend.
- Edge of piece of paper – mark the start of the trail on the edge of the paper. Follow the trail along the edge of the paper pivoting the paper where necessary to stay in contact.
- Numbers next to trail – sometimes they just give you the information

Exercise B:

- Calculate the distance from the parking lot to the summit of Mt Allan via the Centennial Trail using the North Approach. The UTM for the parking lot is: 229 542

Calculating elevation gain on a map:

- Check the legend to see what the contour interval is for this particular map. Count how many lines you cross as you follow along the trail you want to hike. Ensure you're not counting the same line twice. An example of this would be a large dip in the trail as you hike up. Multiply this number by the contour interval.
- Subtract the highest known elevation from the elevation of the starting point

Exercise C:

- Calculate the elevation gain from the parking lot to the summit of Mt. Allan via the Centennial Trail using the North Approach

Time Estimation:

- A general time estimate for travel is 3km/hr. This is what Jenna uses when guiding regardless of the trail type. This is the estimate that will be used to calculate the answer for Exercise D
- Other estimates include:
  - Well maintained trail 5km/hr
  - Established trail but not well maintained 4km/hr
  - Off trail 3km/hr
- A general time estimate for elevation gain is 1hr/300m
- A general time estimate for elevation loss is 10min/300m
- Over time you will begin to notice how fast you hike. You may find the estimates above are either too fast or too slow. With this new knowledge you will be able to make more accurate estimates
- Here is a blog post showing how to calculate a time estimate

Exercise D:

- Calculate the estimated total time to hike from the parking lot to the summit of Mt. Allan and back to your car via the Centennial Trail using the North Approach

How to Make a Route Plan

- When planning to hike a trail it is helpful to create a route plan. The route plan will help you determine how long the entire hike will take you as well as each individual section. By breaking the trail into sections, it will help you create a mental picture of what to expect in the field and minimize your chance of error and let you catch your mistakes sooner.
- Here is an example from the trail system out by Mount Yamnuska

	Destination	UTM	Elevation	Bearing and Distance	Vert	Duration	Time Est	Time Actual
1	Trailhead	320 605	1305m				9:00	
2	90deg L turn (look for powerlines and gate)	318 612	1328m	N for 100m, W for 100m, N for 600m	23m	16min	9:16	
3	Junction	316 612	1337m	W for 250m	9m	5min	9:21	
4	Reed Lake (look for junction to L)	328 625	1337m	N for 400m, trending to NE 1.9km	0m	46min	10:07 10:17	
5	Power Lines	333 624	1325m	NE for 200m around end of lake, 400m SE	-12	12min	10:29	
6	Gate (look for power lines join on L)	318 607	1320m	SW for 2.3km	-5	46min	11:15 11:25	
7	Trailhead	320 605	1305m	S for 150m, E for 120m, S for 100m	-15	7.5min	11:33	

For this route card the elevation change is negligible and therefore was not included in the calculation. For travel time/duration a speed of 3km/hr was used. You'll also notice two times listed in section #4 and 6. This was to account for 10min added for every hour on the trail.

Calculating Declination:

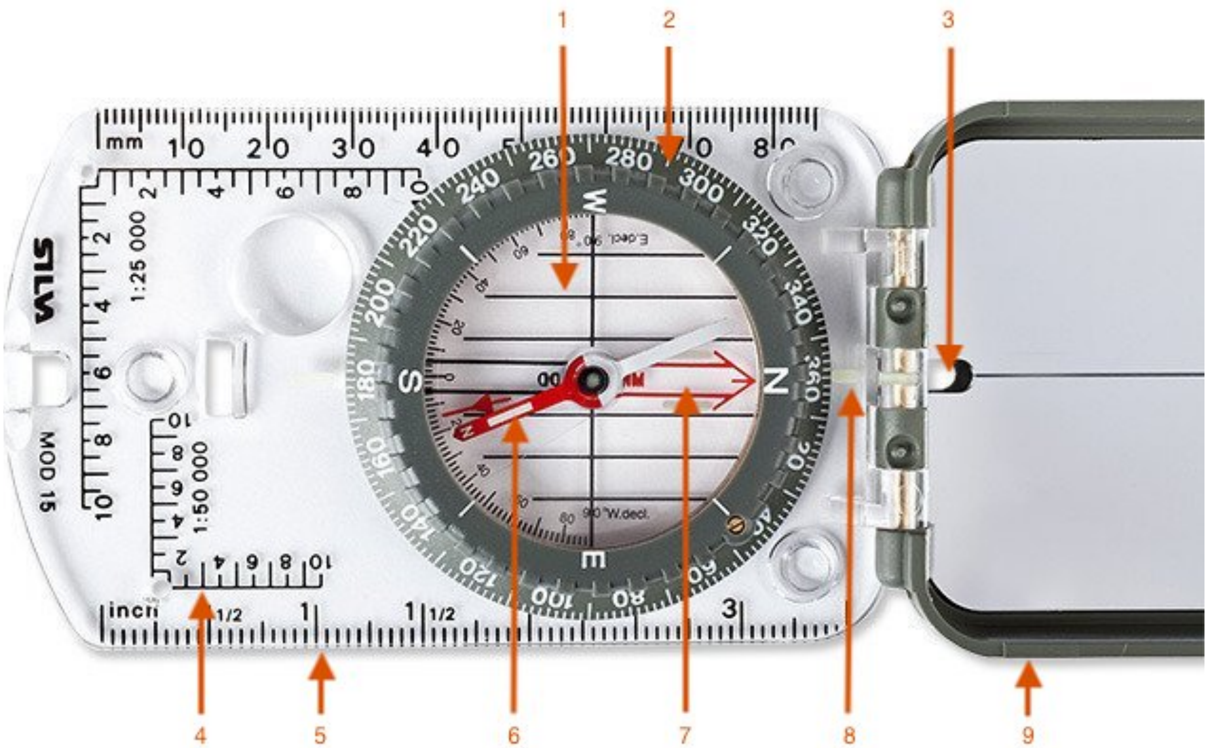
- When travelling to various locations to hike you will need to adjust the declination on your compass. The declination accounts for the difference between grid north (what is shown on a map) and magnetic north (what you compass will tell you is north). The hiccup is that magnetic north changes each year. Therefore, the declination of an area changes slightly each year.
- 1 deg (°) = 60 min (')
- Example:
  - The declination for an area was 14°34' in 2010. It is decreasing by 11' per year
  - 2020 – 2010 = 10 years
  - 11'/year x 10 years = 110'
  - 110' = 1°50'
  - Therefore, the declination for this area in 2020 is:
    - 34 cannot subtract 50 so… my new declination is:
    - 13°94'
    - 94' – 50' = 44'
    - 13° - 1° = 12°

- All together 2020 declination is 12°44’

Exercise E:

- Calculate the declination for the Canmore Kananaskis Map for the year 2023

Anatomy of a Compass:



1. Orientating lines to be aligned with the UTM grid lines on a map.
2. Rotating Bezel
3. Sighting notch. Used when taking a bearing from the field. There is also one on the top of the mirror.
4. Scale used for measuring on the map. Can be used to break the UTM (blue) squares into 10 equal parts with more accuracy when calculating the 6-digit UTM
5. Base plate
6. The compass needle. It floats on liquid so it can rotate freely. The red end will always point to magnetic north.
7. The “house” or “shed”
8. The index line. It is fixed with the baseplate. It is where you read your bearing.
9. Mirror

Determining a Compass Bearing:

- This video will provide you with an example of how to take a compass bearing from the map. This is what we did in the parking lot prior to hiking to the lake.

Using a Compass Bearing:

- This video will show you how to use the compass bearing to determine what direction you should hike after finding the compass bearing using the map. This is what we did to determine what way to hike from the parking lot to the lake.

How to Align the Map to the Real World:

- Turn the bezel on the compass so that north is aligned with the index line. Place your compass on the map. Align the edge of the base plate with blue UTM lines going north and south. Ensure your mirror is towards north on the map. Leaving the compass in place, turn the map and compass together until the red arrow is in the "house". Now the map is aligned with the world around you.

How to Find North Without a Compass

- The shadows from a stick or hiking pole
- Half way between sunrise and sunset the sun will be pointing due south
- The hour hand on a watch
- Here is a great blog post explaining these techniques in more detail

Other navigation videos providing tips can be found on Get Outside's YouTube channel

- Here you will find videos showing ways to find north without a compass and videos reviewing some of the techniques we covered on the course.
- If there is a video you'd like to see let us know and we will do our best to create it!

Great Resources:

- Gem Trek Map of Canmore Kananaskis
- Suunto MC-2 NH Compass
- Silva Expedition Compass
- Backpacker Trailside Navigation Book
  - This is a great resource to help you progress your navigation skills

More Questions?

- Have more question? Feel free to reach out to us. We'd be more than happy to help you out! 403-478-1331. info@getoutsideadventures.ca

Exercise Answers:

- Exercise A
    - 258 586
    - The parking lot for Mt Allan/ Centennial Trail
- Exercise B
    - 10.8km
- Exercise C
    - The parking lot is 1425m. The summit is 2819m. Therefore, the elevation gain is: 1394m
- Exercise D
    - Up: 10.8km + 1394m
        - 10.8km/3 = 3hours 36min
        - 1394m/300 = 4hours 38min
        - Total Up: 8hours 14min
    - Down: 10.8km - 1394m
        - 10.8km/3 = 3 hours 36min
        - 1394m/300 = 46min
        - Total Down = 4hours 22min
    - Total Up and Down = 12hours 36min
- Exercise E
    - My map from 2010 shows 15°54’ and an annual change decreasing 12’
    - 12’ x 10 = 120’
    - 120’ / 60 = 2°
    - Therefore 15°54’ becomes 13°54’