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## Physical Geography

Lab Activity \#08
Due date $\qquad$

## Using a compass

COR Objective 4

### 8.1. Introduction

The compass is undeniably a valuable tool in finding your way, but it is also useless if you don't know how to actually use it.A needle pointing to north is only one tool in successfully finding your way out of the wilderness. This lab will introduce you to using the compass in the real world.

### 8.2. Cardinal Direction and Azimuth

We know that the compass points north, but cardinal direction is more than the letter "N". We divide the round compass rose into sixteen different directions. North is at the top, east points to the right, south to the bottom, and west to the left. In between two main directions like north and west, we have northwest (NW). In between NW and west we have west-northwest (WNW) and in between NW and N we have north-northwest (NNW).

1. Fill in the missing directions on the compass rose below:


Azimuth is similar to cardinal direction, but way more useful in applying to navigation with a map and compass. Rather than use north, south, etc. azimuth relies on degrees. North corresponds with $0^{\circ}$, east is $90^{\circ}$, south is $180^{\circ}$, and so on. When reporting azimuth we always use three digits. Add two zeroes to the front if the number is below ten and one zero if it is below 100 (e.g. $15^{\circ}$ would be $015^{\circ}$ ).
2. Fill in the missing azimuths on the compass rose below:


### 8.3. Pacing

You now understand direction, but the other crucial component in using a compass is distance. Measuring long distances in the field is not easy. Knowing your pacing distance will allow you to have a pretty good idea of how far you've gone without having to stretch a tape measure over rocky terrain. Pacing distance is the distance between every other step.

1. Walk at a normal pace for a distance of 100 feet. Count every other step.
2. Write down the number you counted here. $\qquad$
3. Do it again. Write the number here. $\qquad$
4. Do it one more time. Write the number here. $\qquad$
5. Take the average of the three numbers from above. Your pace is $\qquad$ paces per 100 ft
6. Now divide 100ft/ $\qquad$ paces. Your pace is $\qquad$ ft/pace. This final number will be very important for this and other labs. Commit it to memory.

### 8.4. Practicing with the compass

To use a compass to find an azimuth you simply do the following:

- Chose a specific object or landmark that is at least twenty feet away.
- Hold the compass flat in your hand. Any tilting can cause the needle to drag and give you the wrong direction. Also make sure you aren't wearing any jewelry or electronics that could cause the magnetic needle to be pulled away from north.
- Point the front of the compass at the object.
- Twist the compass housing (the part with the numbers) until the red arrow outline is directly underneath the red needle
- Read the number that is now lined up with the front of the compass. That is the azimuth of the object or landmark you are pointed towards.

It sounds easy enough, but using a compass with confidence takes practice. That is what you will do now.
7. Find an object on campus that you can shoot an azimuth for. Write it here
8. Now walk to the object and shoot an azimuth back to where you were first standing. Write that new azimuth here $\qquad$ .
9. Subtract the larger azimuth from the smaller $\qquad$ . If you are using the compass properly, you should get a difference of exactly 180. Being off by a degree or two isn't a big deal, but if you are off by more than five degrees you need to try it again.
10. Repeat this with four more objects
a. Azimuth $\qquad$ Back azimuth $\qquad$ , Difference $\qquad$
b. Azimuth $\qquad$ Back azimuth $\qquad$ , Difference $\qquad$
c. Azimuth $\qquad$ , Back azimuth $\qquad$ Difference $\qquad$
d. Azimuth $\qquad$ , Back azimuth $\qquad$ , Difference $\qquad$

### 8.5. Declination

Declination refers to the difference between the geographic north pole, or true north, which is the one at the top of the globe, and the magnetic north pole which is where the north end of the magnetic field actually is. You need to correct for declination because the needle on your compass aligns with magnetic north and not the north arrow on your map. Not doing so can get you horribly lost when travelling over long distances.

One way to check for magnetic declination is to compare a linear feature on the map with its magnetic azimuth.
11. Using your attached campus map find a nearby linear feature running northsouth. A sidewalk could work just fine.
12. Find the magnetic azimuth for that same feature with your compass. If the azimuth is to the west of north subtract that number from 360. If your azimuth is to the east of north, simply write down that number. Be sure to add the direction to your declination.
13. The declination on campus is $\qquad$ .

If you are using a declinated compass you can adjust the dial to correct for the local declination. The convenience of this is that you never have to think about declination again. If you are using a simple base plate compass you will need to make mathematic corrections to every azimuth you take.


### 8.6. Charting a compass course

With your compass and knowledge of your pacing distance, you should be able to record a route that others can follow. Working in groups, first look at your campus map and try to visualize a twelve point course. Walk the course and record the azimuth, distance, and description of the objects you visit below.
14. Starting point: $\qquad$

| Azimuth | Number of Paces | Distance (ft) | Description |
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15. Final point: $\qquad$

### 8.7. Following a compass course

Have one member of your group rewrite the final course below, but do not write down the descriptions or the final point. Give this sheet to another group in your class. Each group will try to follow the other's routes and make it to the final point. When you are following another group's course, make sure to write down where you think the final point is. When you finish the course give this paper back to the original group. Did you make it to the right final point? If not, what went wrong?
16. Starting point: $\qquad$

| Azimuth | Distance (ft) | Number of Paces |
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17. Final point: $\qquad$
