A compass tells you in what direction you are headed relative to magnetic north. You can combine use of a compass with pacing to find your way across country (where there may not be any paths or roads) with the help of a topographic map that shows mountains, streams, and other landmarks. Using a compass and pacing with a topographic map across country or through a forest is called orienteering.

Pacing is a simple means of measuring linear distance by walking. It can be used outdoors, indoors, in the woods, or over land. The history of pacing goes back to Roman times. The Roman pace was measured from the heel of the foot to the heel of the same foot after taking two steps. We use the same definition of pace today.
THE COMPASS

To use a compass successfully in the Alabama 4-H forestry program, you need to understand the following: a) what is magnetic north, b) what is a quadrant, and c) what is a bearing.

1. Everyone knows that a compass needle always points north. Yet, some do not know that it does not point to the North Pole, but to magnetic north, which actually is not in the same place. On the typical 4-H compass, the red end of the floating needle points to magnetic north.

2. The needle will be located in a round housing on the compass with the four cardinal directions – north, south, east, and west – plainly marked on the top of the housing. The compass, therefore, has four quadrants: northeast, northwest, southeast, and southwest.

3. All the way around the outside of the needle housing are degree marks. These degree marks are used to determine the bearing, or direction, of a sighting. Each of the quadrants of the compass is divided into 90 degrees. Every 10 degrees is plainly stamped on the needle housing and subdivided into 2 degree increments. A bearing is taken by reading the correct number off this scale. A bearing never exceeds 90 degrees.

4. Note that there is a small ruler on either side of the compass to help measure the distance on maps as well as an attached string, or lanyard, for carrying the compass around your neck.
PARTS OF A COMPASS

V Sight
Sighting Mirror
Sighting Line
Magnetic Needle
Needle Housing
Graduated Dial 2°
Index Pointer and Line
Orienting Arrow
Compass Base
Slider
Lanyard
Screwdriver
USING THE COMPASS

1. Adjust the mirror angle.
Open the lid covering the needle housing to an angle where you can comfortably see the needle housing in the mirror and your target through the V sight at the same time.

2. Make sure the needle is floating free.
It is important that the compass be held level to ensure that the needle floats free in its housing.

3. Align correctly.
It is also important that when taking a sighting, the sighting line in the mirror runs dead center through the index pointer and the center of the needle. The target, V sight, index line, pointer, and center of the needle should all be in the best possible alignment.

4. Line up the orienting arrow.
As you hold the compass steady and keep your V sight on the target, slowly turn the needle housing until the orienting arrow at the bottom of the needle housing is directly below the magnetic arrow. The red part of the orienting arrow must be under the red part of the magnetic arrow. The better the alignment of the two arrows, the more accurate the sighting.
USING THE COMPASS

**HINT:** Sometimes the angle of the mirror is such that you cannot see if the orienting arrow is directly below the magnetic arrow. In this case, the sides of the orienting arrow should be parallel to the magnetic arrow as you look in the mirror.

5. **Read the bearing.**
After you are sure you have done your best to match up the magnetic and orienting arrows while holding steady on your target, then read your bearing. Look at the index line on the compass base just below the mirror. Remember, the degree marks are in 2-degree increments, so if the center of the index line is between two degree marks, then the bearing degree will be an odd number.

6. **Write down your bearing.**
To correctly write your bearings, first record north or south followed by the degree, and, finally, east or west. For example, N26W.

**REMEMBER**
Keep your compass level and aligned with the target.
Line up the orienting arrow and the magnetic arrow with precision.
Correctly read and record your bearing.
Let’s say you want to take a bearing from Point A to Point B. What is the bearing? Standing behind Point A, sight the compass through Point A to Point B. Your compass then becomes the third point in a straight line. Determine the bearing and carefully record it. To ensure the accuracy of your sighting, go to Point B and take a “backsighting,” meaning that you take a reading from Point B back to Point A. If you are correct on both your sightings, then the degree will be exactly the same but the quadrants will be different. For example, let’s say the first sighting was S25°W from Point A to Point B. The backsighting should then be N25°E. Of course, such accuracy is difficult because of terrain and field conditions. When the backsightings are not exactly the same, then you can either average the two degree readings (if they are close) or continue to take your measurements until you are sure of the results.
THE AZIMUTH COMPASS

There are two types of compasses. The first is the quadrant compass, which we have already learned. The second is the azimuth compass, which has a different way of labeling the degrees on the compass. On an azimuth compass, due east is 90 degrees, due south is 180 degrees, and due west is 270 degrees. In the example below, a degree line midway through the SW quadrant of the compass can be read as 235 degrees.

Using an azimuth compass is no more complicated than using a quadrant compass. The process of carefully sighting the compass, aligning the target, and carefully reading the degree scale is the same. You just have to remember to record your results in the correct manner.
Pacing is used to measure distance across the ground. The accuracy of this measurement is dependent upon three things:

1. walking at a normal step
2. having a consistent step
3. precisely knowing your pace

Pacing is best done using a normal walk. Trying to go faster or slower than a comfortable walk is usually not advised. Also, your rate of speed and stride length should be the same to accurately determine distances through pacing. Try to be consistent with both the speed and the stride of your walk. This takes practice. Consistency is more of a problem when going uphill or downhill.

The third component of accurate pacing is to know precisely the length of your pace. This is easy to calculate and can be done in three easy steps.

1. Using a tape measure, mark a specific distance on a level plot of ground. This distance should be a minimum of 50 feet but can be any distance you prefer. A commonly used course is 100 feet.
2. Begin your pacing by putting the back of your right or left heel against the first marker of your course. Begin walking using a normal speed and stride, counting the number of paces as you go. Remember a pace is from the heel of one foot to the heel of the same foot as you take two steps.
3. Upon reaching the end of your course, write down the number of paces you made. Divide the distance of your course by the number of paces you needed to cover the course and that will equal your pace.
4. Repeat this process several times until you are sure you have an accurate measure.

HINT: Your pace will almost always end up being a fraction of a foot. Do not try to adjust your pace to equal an even number. It is much better to accurately determine your pace and use that number for distance determination even if it is a fraction.

\[
\text{Distance} \div \# \text{ paces} = \text{feet/pace}
\]

Example 100 feet $\div 22.5$ paces $= 4.4$ feet /pace

Magic # is 4.4

Ex. 35.5 paces $= 35.5 \times 4.4 = 156$ ft
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