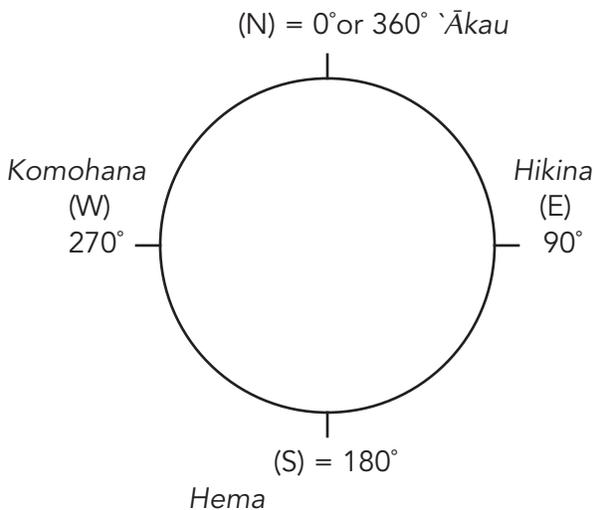


Science lecture #2: Using the Compass (*Pānānā*)

Now that you have familiarized yourself with maps and globes, this is a good time to learn how to use a compass. The Hawaiian word for compass is *pānānā*. A *pānānā* will show you which direction the North Pole (*Wēlau`Ākau*) is, and once you know that, you will be able to determine any other direction you want to go. This is known as your **heading** (*po`omana`o*). A *pānānā* can also help you determine the location of an object which is away from you; for example, a mountain peak, a lake, or a waterfall. Those directions are known as your **bearings** (*kūlana*). Once you figure out your *kūlana*, you can use a map (*palapala`āina*) to find out where those bearings are, and then figure out where you are. With the aid of a *palapala`āina* and a *pānānā*, you should be able to figure out which direction you want to go and make sure you follow that *po`omana`o*.

BUT, before you can properly use your *pānānā*, you must first know the four main directions as they relate to *Kahonua* (the earth). Locate a globe and have a student point out the North Pole (*Wēlau`Ākau*) and the South Pole (*Wēlau Hema*). Next, tell your students that *Wēlau`Ākau* is a very important place on the globe because it helps to determine all the other directions. Its magnetic field will always cause a *pānānā* needle to point toward it. The four main directions are called **cardinal points**, and they are north (N), south (S), east (E), and west (W). Notice on your *pānānā* that these four cardinal points are strategically placed where (N) and (S) are opposite of each other, and (E) and (W) are opposite as well. If you compare these *pānānā* points to the face of a clock, (N) is at the 12 o'clock position, (E) is at the 3 o'clock position, (S) is at the 6 o'clock position, and (W) is at the 9 o'clock position. The Hawaiian word equivalents to the four cardinal points are *`Ākau* (N), *Hema* (S), *Hikina* (E), and *Komohana* (W).

In addition to the four cardinal points, you will also notice lots of numbers on your *pānānā*. These numbers represent the degrees (°) of a circle. If you are familiar with geometry, then you know that 360° makes one complete circle. On your *pānānā*, 0° and 360° are the same thing, and represents (N); 90° represents (E); 180° represents (S); 270° represents (W).



There is no easy way to remember these numbers, except to memorize it or know your basic math. By remembering 360°, 360 divided by 4 (the four cardinal points) = 90. Each cardinal

point is exactly 90° apart from each other. $90 + 90 = 180$; now add 90 more and you have 270; add 90 again and you have 360.

A *pānānā* works by using a magnetized needle that orients itself with the natural magnetic field of *Honua*. The magnetized needle will always point in the direction of magnetic north. Your heading (*po`omana`o*) or bearing (*kūlana*) can then be read from orienting your *pānānā* in such a way that the numbers on your *pānānā* will tell you which direction you are headed (in degrees). For example, if your *po`omana`o* is toward the (E), you are said to be on a heading of 90°. If your *po`omana`o* is toward the (W), you are said to be on a heading of 270°.

To properly read a *pānānā*, it is important to know that *pānānā* are very sensitive to magnetic fields. It is easily affected by small metal or magnetic objects, like metal belt buckles, a camera, a two-way radio, or other electronic items. If these items are in close proximity to your *pānānā*, you may not get accurate readings. The first step when using your *pānānā* is to make sure there are NO metal or magnetic objects nearby.

Next, it is important to know that *Honua* has a “**true North**” (also called Geographic North) and a “**magnetic North**.” True North is the direction toward the *geographic* North Pole, the one your student found at the top of the globe earlier. True North is *Wēlau`Ākau*. Magnetic North is slightly different. It is the direction toward the *magnetic* North Pole, which moves around each and every year. The movements are slight, but it’s enough to cause you to “miss” a small island if you are not aware of the difference between true North and magnetic North. The reason is because your *pānānā* needle will point toward magnetic North, but maps and charts are made with reference to true North.

Please note that for the most part, you need not worry about the differences between true North and magnetic North, unless you are on a boat in the middle of an ocean with no landmarks in sight. For purposes of the lessons in this curriculum folder, basic *pānānā* instruction is sufficient.

One final note: sometimes you will see directions which have two of the cardinal points joined together, like NW or SE. These are often generalized directions to point you in a certain direction. NW represents “NorthWest;” NE represents “NorthEast;” SW represents “SouthWest;” SE represents “SouthEast.” Look at the examples below and see if you can determine their generalized directions.

