

# TEACHER LED ACTIVITIES

## ORIENTEERING ACTIVITY

### The Silva System: Easy as 1-2-3

1



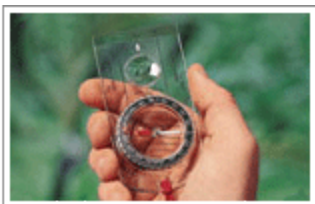
Place your compass on the area map with the Base Plate edge connecting where you are with where you want to go.

2



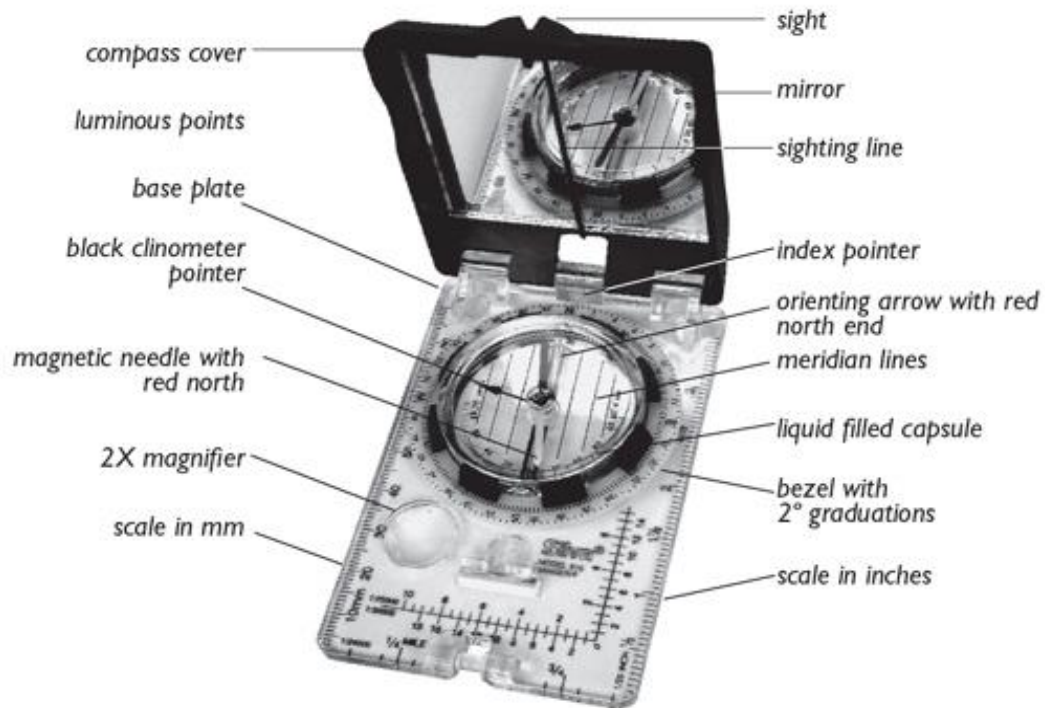
Set the compass heading by turning the compass Dial until the "N" aligns with Magnetic North (MN) on the map.

3



Remove the compass from the map and hold it level in front of you with the Direction of Travel Arrow pointing straight ahead. Turn your body until the red end of the Needle is directly over the Orienting Arrow, pointing to the "N" on the dial. The Direction of Travel Arrow now points precisely to your destination. Look up, sight on a landmark and walk to it. Repeat this procedure until you reach your destination.

## THE PARTS OF THE SILVA COMPASS



### OBJECTIVES:

1. Be able to use a GPS (Global Positioning System) and search for waypoints.
2. Be able to orient compasses and follow proper directions of a fixed point.

### MATERIALS:

- 24 GPS units
- Laminated directions for GPS units (yellow)
- Magnetic Compass (12 total)
- Large demonstration compass
- Model of Earth (Globe)

**BACKGROUND:**

A GPS unit is an electronic device that can determine your approximate location (within around 6-20 feet) on the planet. Coordinates are normally given in Longitude and Latitude. You can use the unit to navigate from your current location to another location. Some units have their own maps, built-in electronic compasses, etc. The GPS unit serves as a receiver to pick up signals from satellites orbiting the earth. Once the GPS unit locates three separate satellites it can use triangulation to give you the exact coordinates of your position.

**Latitude** – is a measurement on a map or globe of locations north and south of the Equator. Equidistant circles are drawn parallel to the equator and to each other. Lines of latitude are also called parallels.

**Longitude** – is a measurement on a map or a globe of locations east or west of the Prime Meridian. The Prime Meridian of Greenwich was chosen as the designated imaginary north-south line that passes through both poles and Greenwich, England. Longitude is measured 180 degrees East and 180 degrees West of the Prime Meridian. Lines of longitude are also called meridians.

The combination of parallels and meridians form a grid for plotting positions anywhere in the world. Weather channels as an example use this grid to plot hurricane positions.

**PROCEDURE:**

1. Begin the activity by asking the class to point in the direction which they think is north. Giving students a hint about the positions of the sun may be helpful. (Sun rises in the East, sets in the West.) (Actually the earth rotates and the sun appears to rise in the East.)
2. Demonstrate the proper procedure for finding a bearing on the compass. Use demonstration compass.
  - Hold the compass horizontal in the left hand so that the needle floats freely. The front of the compass (see two red read bearing arrows) should be pointed directly straight out from your belly. Turn the dial to N which should be directly between the two red read bearing arrows and pointing at the clear triangle. The red end of the black and red needle should align to magnetic **North**. Notice as you turn the red end of the needle continues to point the same direction (magnetic north).
  - Hold the compass still and now turn your feet until the red arrow aligns with the red arrow underneath (also the spinning arrow should be between the two white marks on the compass). You are now facing magnetic North.
3. Pass out one compass to every two students and show them how to find magnetic north (use the procedure above).
  - Now find a bearing 60 degrees Northeast. Turn the dial to 60° so that it aligns with the clear triangle between the two red lines. Again by turning your body, align the red arrow with the

arrow under it. Now align your sight with the direction of the two red arrows and you're facing 60° Northeast.

4. Help students answer the three questions on their worksheet concerning compasses.
5. Now discuss background information for a GPS. (See above) Help students answer the three questions of the student page concerning the GPS.
6. Review the student answer sheet with the students so they know how to follow a GPS course. There are six GPS courses with colored stakes and one more course with letters nailed onto tree trunks. (Students should look for stakes of the same color. Each stake has a letter near the top. Record the letters in the proper blanks below as you move from one waypoint to the next. If your group follows the course correctly, the letters should spell a five-letter word.)

**Blue Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Blue 1        Blue 2        Blue 3        Blue 4        Blue 5

**Purple Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Purple 1      Purple 2      Purple 3      Purple      Purple 5

**Red Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Red 1        Red 2        Red 3        Red 4        Red 5

**Green Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Green 1      Green 2      Green 3      Green 4      Green 5

**Yellow Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Yellow 1     Yellow 2     Yellow 3     Yellow 4     Yellow 5

**(Challenge) Courses**

**White Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
White 1      White \_\_\_\_    White \_\_\_\_    White \_\_\_\_    White \_\_\_\_

Answer Questions on bottle. The next waypoint to follow will be listed next to the correct answer.

**Brown Course**

Waypoint    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_  
Brown 1      Brown 2      Brown 3      Brown 4      Brown 5

- The Blue **or** RED course is for practicing with the students.
- After the entire class has practiced with the Blue or Red course, then assign groups of students to try the other colors (purple, green, yellow). If students do well and clearly understand how to follow these courses you can send them to the challenge courses (White or Brown).
- The WHITE course provides a different challenge. This course has containers on the colored stakes. The containers have science questions inside which the students will need to answer to continue with the course. They do not need to open the container. The laminated questions can be seen through the container. The next waypoint to follow will be listed next to the correct answer. Students should record the correct waypoint number on the student sheet

before going to the next stake. Students should find the correct stake with a letter to record along with the next container and question to answer. Should students answer incorrectly the waypoint will lead them to a single stake that states “Wrong Answer” and students should return to the previous stake and try again.

- The BROWN course is the one with letters nailed to the tree trunks. All letters are (7 feet) above the ground so students will have to look up slightly to find the letters for the brown course.
7. Pass out a GPS to each student or group of two students if necessary. Demonstrate how to turn on the GPS and have the entire group form a circle in an open area out from under the trees. Trees and buildings block satellite signals. Now make sure each GPS is on and working properly.
  8. Use the laminated yellow directions sheet in the kit and walk through the steps for using the GPS. Do this while the students are still in a circle so you can monitor their progress.

#### **HELPFUL HINTS:**

- The number box in the upper right corner of the GPS display screen tells you how far you have to travel to find the waypoint. The number will decrease the closer you get to the waypoint.
  - It is important to first walk in a straight line so the GPS can determine your direction of travel. The black and white arrow will then indicate which direction to walk. It is more important to make sure your distance to the waypoint is getting decreasing than to follow the arrow exactly.
  - Because the accuracy of the GPS is not exact start looking for the colored stick (waypoint) when the distance is less than **(5 meters)**.
  - If you have lost your place, push the Menu button twice to get back to the list of choices. Then choose waypoints.
9. Begin the practice Blue or Red course with the students by finding the first waypoint Blue 1 or Red 1.
  10. Once students are familiar with the GPS and have completed most of the practice course, assign students (groups of four) to another color course. Again when you see that the students can master any of the first five courses you can assign them the challenge courses.
  11. Students will need to set their GPS to the first waypoint of their assigned color course to begin.
  12. With five minutes remaining in the activity have students return to the start area to discuss results and return all 24 GPS units to the correct numbered slots in the container. All GPS units should be turned off to save battery power.

**Make sure each GPS is in a number coded compartment before dismissing students.**

## Directions for Garmin etrex 10 GPS Units

1. Turn on GPS – Hold down **light** button on right side for two seconds.
2. You should see the square with “Satellite” highlighted. Press down once on black **toggle** switch. Wait while GPS is “Acquiring Satellites” (do not stand under a tree).
3. When you see “GPS #of meters” in upper right corner, you can begin. (5 meters or less is best)
4. Press **Menu** button on left side two times.
5. Move the **toggle** switch toward “Where To?” to highlight the box. Now press the **toggle** switch down.
6. “Waypoints” is highlighted so now press down on **toggle** button.
7. Move **toggle** switch up or down to highlight the “done” section at the bottom of the screen. Press the **toggle** switch down so that the list of waypoints is shown. (Example BLUE 1)
8. Select the desired waypoint by moving the **toggle** switch up or down. Then press the **toggle** switch down to go to that waypoint.
9. Press the **toggle** switch down to select the “go” section.
10. A map will appear. Now press **Menu** button on left side two times.
11. Move **toggle** to highlight “Compass” and press down on **toggle** button. You are now ready to search for the waypoint by using the electronic compass.
12. The black and white arrow will point to a compass reading such as NW, SE. The GPS will also list the distance to the colored waypoint stake (see box in upper right corner “Dist to Next”).
13. Slowly start walking in a straight line. The black and white arrow will move and align to the correct direction of travel. **You will know which direction to continue walking when the black and white arrow points to the long black line at the top of the compass.**
14. Follow the arrow in the compass and look at the number of meters in the upper right corner. It tells you how far you have to go until you reach the waypoint marked with a colored stake. **Very important** - As you walk the distance number should decrease (get smaller).
15. When the distance is less than five meters you should be near the stake. Stop and look.
16. There will be a letter on the top of the stake. Record the letter on your worksheet next to the correct color and number.
17. Press **Menu** button on left side two times and repeat the process to find another waypoint.
18. You should see the “Satellite” box highlighted. Move the **toggle** button to select the box “Where to?” Press down on the **toggle** button.
19. The “Find Another” box will be highlighted. Press down on the **toggle** button.
20. Move **toggle** to select the “Waypoints” box and press down on the **toggle** button.
21. Move **toggle** switch up or down to highlight the “done” section at the bottom of the screen. Press the **toggle** switch down so that the list of waypoints is shown.
22. Now move **toggle** button to select next waypoint.
23. Repeat steps 8-11 except choose another waypoint such as “Blue 2” or start another color course and select “Red 1”.  
When you finish finding waypoints Blue1-5 or Red 1-5 you should have spelled a word.
24. When finished, hold down the **light** button on right side for two seconds to turn off GPS.
25. Return GPS unit to the correct numbered slot in storage container.

# TEACHER LED ACTIVITIES

## ORIENTEERING – USING A COMPASS/GPS

### STUDENT ACTIVITY

Student Name: \_\_\_\_\_

Listen to the teacher's instructions on how to use a compass and a GPS. Answer the questions below.

- The red part of the magnetic compass needle always points in what direction? \_\_\_\_\_
- How many degrees does a compass or circle have? \_\_\_\_\_
- Make a sentence that helps you remember the order of the four directions on a compass.  
N \_\_\_\_\_ E \_\_\_\_\_ S \_\_\_\_\_ W \_\_\_\_\_
- What does GPS mean? \_\_\_\_\_
- The GPS serves as a receiver to pick up signals from \_\_\_\_\_
- The GPS can help you locate your position on the \_\_\_\_\_

#### USING THE GPS:

1. Move to an open area so the GPS unit can receive satellite signals and then turn on the GPS.
2. When searching for each waypoint (marked with a colored stake), make sure you move in a straight path so the **satellites** can locate your **position**. (do not spin in circles)
3. Once you take about 10 steps you can then follow the black and white arrow on the electronic compass.
4. The number at the top right corner of the display screen tells you how far you have to travel to find the waypoint. The number will decrease (get smaller) the closer you get to the waypoint.
5. Because the accuracy of the GPS is not exact start looking for the colored stick (waypoint) when the distance is less than **(5 meters)**.
6. You should look for stakes of the same color. Each stake has a letter near the top. Record the letters in the proper blanks below as you move from one waypoint to the next.
7. If your group follows the course correctly, the letters should spell a five-letter word.

**Red Course** – \_\_\_\_\_  
Waypoint Red 1 Red 2 Red 3 Red 4 Red 5

**Purple Course** – \_\_\_\_\_  
Waypoint Purple 1 Purple 2 Purple 3 Purple 4 Purple 5

**Blue Course** – \_\_\_\_\_  
Waypoint Blue 1 Blue 2 Blue 3 Blue 4 Blue 5

**Green Course** – \_\_\_\_\_  
Waypoint Green 1 Green 2 Green 3 Green 4 Green 5

#### (Challenge)

**Brown Course** – \_\_\_\_\_  
Waypoint Brown 1 Brown 2 Brown 3 Brown 4 Brown 5

**Yellow Course** – \_\_\_\_\_  
Waypoint Yellow 1 Yellow 2 Yellow 3 Yellow 4 Yellow 4

**(Challenge) White Course** – \_\_\_\_\_  
Waypoint White 1 White \_\_\_\_ White \_\_\_\_ White \_\_\_\_ White \_\_\_\_