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WLF 502: GIS for Orienteering
CRN 10010

Orienteering Exercise at the Virgil Phillips Farm

Overview: I designed and tested an orienteering exercise for use by Moscow High School Biology and Outdoor Skills classes. The exercise is designed to complement and enhance the map and compass exercise taught to all Moscow Junior High School 7th graders. The orienteering exercise could also be made available to other visitors to the Phillips Farm.

Project Site: The site I selected for the exercise is the Virgil Phillips County Park. This park is appropriate for this orienteering exercise because it is already used as an outdoor classroom by the Moscow High School biology classes, and because it provides a variety of terrain and vegetation types in which to navigate. It also accommodates a variety of orienteering skill levels. Some of the control points are located near the park entrance, and are easy to find. Other points are located near the far boundaries of the 160-acre park. All of the points are located on or near the trails, to minimize loss of students during the orienteering exercise.

Mapping the Park Trails and Control Points: In order to create an orienteering exercise, I first had to develop an accurate trail map for the Virgil Phillips County Park. I walked the trails, and used a Garmin e-trex GPS personal navigator to map them. I then down-loaded the trail locations onto an aerial photo of the Phillips Farm created in the mapping program ArcView 3.2. I entered the 33 control points into an Excel spreadsheet, and then added the orienteering control points to the trail map. I printed one map with the labeled control points (Map 1) and one map without the control points (Map 2). (There are actually only 30 different points; I deleted Control Point #5. Control Point 15 is the same as 16, and 19 is the same as 20.)

Control Point Hole Punches: In order for students to prove that they have reached a control point, they must punch their Record Sheet (Figures 1 and 2) with a unique hole punch specific to each control point. Each hole punch will be located in a coffee can attached to a permanent structure, such as a tree, building, or artificial nest box. The Answer Key for the control points is shown in Figure 3.

Orienteering with Map and Compass: In the first exercise, students will use a compass and **the trail map with labeled control points** (Map 1) to navigate to their specific control points. In order to disperse students and to minimize cheating, different students will be assigned different control points. Since students learned how to navigate with map and compass in 7th grade, they will be given assistance only to get started navigating. Upon successfully reaching a control point, the student will mark Record Sheet A (Figure 1) – the sheet with no GPS coordinates – with the hole punch specific to that site. Students will reach as many sites as possible on their list within the allotted time, then return to the designated meeting area at a pre-arranged time.

Orienteering with GPS Personal Navigator: In the second exercise, students will navigate with a GPS navigator and Map 2, **the trail map without labeled control points**. They will navigate to their assigned control points specified on the Record Sheet B (Figure 2) – the sheet **with** GPS coordinates. The coordinates are given both in latitude-longitude and UTM coordinates (NAD 83). Instructions for navigating with Garmin e-trex personal navigators are included in Figure 4. Upon reaching a control point, they will proceed as in the above exercise, locating as many points as possible within the time limit.

Evaluation: Students will be graded on their ability to successfully navigate to the designated points.

Figure 4. Instructions for using a Garmin e-trex Personal Navigator.

Instructions for entering Control Points into a Garmin e-trex Personal Navigator.

When you arrive at the Phillips Farm, turn on the unit: depress the Power Button for 5 seconds until the "e-trex" screen appears.

Press the Page button until the Menu appears.

Scroll to Mark. Press Enter.

The Mark Waypoint screen is now displayed, and the "OK" symbol should be highlighted. Instead of pushing Enter to confirm "OK", Scroll past the elevation data until the UTM coordinates are highlighted. Press Enter.

Now use the Scroll and Enter buttons to replace the given UTM coordinates with the coordinates to which you wish to navigate.

When you have entered the desired coordinates, Scroll to "OK" at the bottom of the screen, and press Enter.

The Mark Waypoint screen is displayed. Check that the coordinates are the ones you entered. Scroll up to "OK" and press Enter.

Instructions for Orienteering with a Garmin e-trex Personal Navigator.

Press the Page Button until the Menu appears.

Use the Scroll Button to scroll to Waypoints. Press Enter.

Use the Enter and Scroll Buttons to select the desired Control Point. Press Enter.

Scroll to GoTo. Press Enter.

Page to the Compass. The top of this screen displays how far you need to walk to reach your control point. The Compass indicates in which direction you need to begin walking, as indicated by the flag on the compass. It also tells you the distance to your Control Point.

Page to the screen with the Walking Man. You must walk around a bit to activate this screen. Walk in the direction indicated by the Walking Man.

To re-evaluate your position, Page to the Waypoints Screen, and repeat Step7.

When you believe you have found the correct control point, punch your Control Point Sheet next to the appropriate coordinates.

Then determine and record your actual coordinates. To do this, Page to Mark. Press Enter. The GPS coordinates and elevation are displayed at the bottom of the screen. Write them on your sheet.

Repeat the above steps as long as time permits, then return to the meeting area.

Figure 1. Record sheet for use with Map 1.

Station	Comments
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Figure 2. Record sheet with GPS coordinates of control points, for use with Map 2.

Station	North	West	UTMEast	UTMNorth
1	4648’32.8”	11701’19.3”	498319	5183951
2	4648’35.4”	11701’19.4”	498317	5184031
3	4648’37.2”	11701’18.9”	498329	5184087
4	4648 ’42.6”	11701’18.1”	498345	5184254
6	4648’48.3”	11701’13.8”	498435	5184431
7	4648’45.7”	11701’07.2”	498576	5184349
8	4648’44.7”	11701’04.4”	498636	5184320
9	4648’47.1”	11700 ’59.0”	498749	5184392
10	4648’51.2”	11700’53.4”	498868	5184520
11	4648’49.2”	11700’55.2”	498829	5184459
12	4648’48.0”	11701’15.7”	498396	5184421
13	4648’48.5”	11701’15.8”	498393	5184436
14	4648’50.5”	11701’15.9”	498391	5184498
15	4648’51.3”	11701’18.2”	498343	5184542
16	4648’51.8”	11701’18.2”	498343	5184539
17	4648’55.5”	11701’21.4”	498276	5184651
18	4648’57.5”	11701’22.2”	498257	5184716
19	4648’55.7”	11701’14.5”	498422	5184659
20	4648’55.7”	11701’14.5”	498422	5184659
21	4648’55.1”	11701’10.5”	498505	5184641
22	4648’50.4”	11701’05.1”	498622	5184496
23	4648’49.7”	11701’02.7”	498672	5184475
24	4648’47.5”	11700’53.6”	498864	5184407
25	4648’47.2”	11700’56.0”	498814	5184396
26	4648’46.4”	11701’00.1”	498726	5184371
27	4648’39.8”	11701’01.1”	498705	5184169
28	4648’37.8”	11701’03.3”	498659	5184105
29	4648’33.6”	11701’05.0”	498623	5183976
30	4648’36.8”	11701’10.6”	498503	5184075
31	4648 ’48.4”	11701’00.9”	498709	5184432
32	4648’50.5 ”	11700’57.4”	498784	5184499
33	4648’51.1”	11700’56.4”	498805	5184517

Figure 3. Answer Key for both Record Sheets.

Station	UTMEast	UTMNorth
1	498319	5183951
2	498317	5184031
3	498329	5184087
4	498345	5184254
6	498435	5184431
7	498576	5184349
8	498636	5184320
9	498749	5184392
10	498868	5184520
11	498829	5184459
12	498396	5184421
13	498393	5184436
14	498391	5184498
15	498343	5184542
16	498343	5184539
17	498276	5184651

18	498257	5184716
19	498422	5184659
20	498422	5184659
21	498505	5184641
22	498622	5184496
23	498672	5184475
24	498864	5184407
25	498814	5184396
26	498726	5184371
27	498705	5184169
28	498659	5184105
29	498623	5183976
30	498503	5184075
31	498709	5184432
32	498784	5184499
33	498805	5184517