

Lesson plan – GPS exercise parking space – Worksheet

Introduction:

In this exercise, you will use GIS to calculate how much parking space is actually available in the city centre of Geel, within a range of 300m around the church of St. Amandus.

Description of the exercise:

In order to be sure to make accurate calculations in ArcMap, you will use a detailed satellite image, from Google Earth, of the city centre of Geel. After all, the parking lots are not clearly indicated on the topographic map, so you need this detailed image to be able to draw your polygons on exactly the right spot. However, before you can use this satellite image in a GIS, you will need to georeference the image first.

If you want to georeference the image, you need coordinates of spots that are easily recognizable visually (see iNote 40 about georeferencing). You have a GPS device at your disposal, read the quick-start manual, and go into the city centre to explore your subject of research and get 4 coordinates (your GPS device will call it “*Marking Waypoints*”). Before you start your field trip, it is highly recommended that you read iNote 40 and the instructions of the exercise very well first, so that you get a good idea of what the exercise is about, and know exactly what you need to do. If you have any more questions, you can always ask the instructor. Then go into the city centre.

<i>number</i>	<i>instruction</i>	<i>iNotes</i>	<i>Teachers' / Trainers' activity</i>	<i>Pupils' / participants' activity</i>
1	Open ArcMap from the windows start menu		<input type="checkbox"/>	X
2	Add the topographical raster maps TOP17-5.tif and TOP16-8.tif	1	<input type="checkbox"/>	X
Use Google Earth to find a detailed satellite image of the city centre of Geel, more specific of the surroundings of the church of St. Amandus.				
3	Open Google Earth, zoom in on Geel, Belgium, and find the church of St. Amandus. You could use the measuring tool and measure a distance of 300 metres to know how far you need to zoom in. If you are confident with the image you have on your screen, save it by clicking File > Save > Save Image, or use the Ctrl+Alt+S key combination. Pay attention to where you save the image. You will need it later on in the exercise!		<input type="checkbox"/>	X
Fieldwork: First study the Google Earth image and look for good visual landmarks. Agree on the four locations where you will collect the coordinates from which you will use to georeference your satellite image. Choose locations that are not collinear (points which are on a single straight line) and are equally distributed over the area covered by your satellite image. If you have reached an agreement, it is time to go into the field and pick up the coordinates of the four good visual landmarks you have selected. When you return with your coordinates, you will draw them on your map and use them as “anchor points” to georeference your satellite image.				

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4	Once you have come back from collecting the coordinates, create a table (in ArcCatalog or in Excel), with an “X” and a “Y” column and enter the coordinates you collected. Before you enter the coordinates, you might need to convert them from WGS 84 (the coordinate system in which your GPS device operates) to Belge 72 (the coordinate system in which your map is georeferenced). Use the tool on the following link to do this: http://zoologie.umh.ac.be/tc/tcbel.asp .	2; 7; 30	<input type="checkbox"/>	X
5	It is crucial to define the right coordinate system for your data frame, to make sure that in the next step, your coordinates will be drawn on the correct location on the map. Choose World >“Belge 1972” as geographic coordinate system You do not need to choose a projected coordinate system.	41	<input type="checkbox"/>	X
6	Draw the locations of your coordinates on the map, using the tool “add XY data”.	24	<input type="checkbox"/>	X
7	Add the satellite image of Geel, that you created in Google Earth, to the table of contents.	1	<input type="checkbox"/>	X
Get ready to georeference your satellite image.				
8	Activate the georeferencing toolbar.	27	<input type="checkbox"/>	X
9	Start georeferencing your satellite image.	40	<input type="checkbox"/>	X
Congratulations! You have georeferenced your satellite image now. The scale and position of the image is perfectly aligned with the topographic map, and ready to be used for your calculations.				
10	Create a new information layer. You will use this layer to draw the polygons on, representing the available parking space.	20	<input type="checkbox"/>	X
11	Draw the polygons, using your satellite image as a detailed reference.	12	<input type="checkbox"/>	X
12	Make sure the map units are set to meters.	15	<input type="checkbox"/>	X
13	Let ArcMap calculate the area of the parking spaces automatically and check the statistics	8	<input type="checkbox"/>	X

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