Holiday Footprint

finale-assignment for the

Alympiade 2011

Garderen,

11 en 12 maart 2010

Texas Instruments

getal en ruimte

GUIDE FINAL MATHEMATICS A-LYMPIAD 2010

IN ADVANCE:

- First read the full text of the assignment so you will know what you have to do this weekend
- Check wheather you can open the files on the memory stick.
- Discuss each others dreamed holiday plans and fill in the missing details.
- Divide tasks where possible.

TIME MANAGEMENT:

- Keep an eye on the time when you work on the different parts.
- A report has to be handed in and a presentation has to be prepared. Make a planning when and who works on what.
- Saturday afternoon, before lunch, at 13.00 h, you hand in the memory stick.

HANDING IN:

Saturday afternoon, at 13.00 h, you hand in the memory stick

Be sure the report is only one file, a pdf is preferred. Try out if the pdf Works on several different computers. The jury will receive digital copies of your report, so you can use colours in it. Each team is responsible for the technical quality of the handed in file.

JUDGING:

Among other things, the following points are important for the jury:

- how complete the answers for the various parts are;
- the analysis of the footprint calculator;
- the final report on the system for the sustainability label;
- the use of math and reasoning;
- the argumentation used and how choices that have been made are justified;
- de diepgang waarmee de verschillende opdrachten worden beantwoord;
- the depth to which the various assignments have been answered;
- originality and creativity.

Holiday Footprint

As a start

Dreaming is allowed during this Alympiad final… Every person has to describe the holiday of his or her dreams. You depart from Garderen and from There There are no limits. With who, how long, where to, everything is allowed as long as it fits on one piece of paper.

Inleiding

There's only one earth. It can provide us with all our needs, but the capacity is limited. Everybody consumes products and uses energy. People need more and more space for their way of living. Space to live, to grow food, to transport, to process the waste and to make holidays. So man and nature compete for the available space. The influence of this competition can be made clearly in several different ways. For instance by calculating the equivalence of area of land to produce food and energy and to process the waste. In order to eat meat, you need animals, but these animals need space and food themselves. For producing this food, you need land. In this way, for each person, everything he uses, produces or processes can be imagined as a certain area of land. This area, measured in hectares (ha, 1 ha = 10.000 m^2), is called the *ecological footprint*, or simple just *footprint*.

In this assignment you will investigate the contribution of holiday making on this ecological footprint. You will analyse a *holiday footprint* calculator and you will design a system for determining how ecological a certain holiday trip is.

Ecological footprint

The Living Planet Report (2010) shows data for the average footprint in some countries. (table 1).

Tabel 1 mean footprint per inhabitant and other data

country	***mean footprint***	***population***	***area***	***GNP* per person***
Arabic Emirates	*10.7 hectare*	*6.2 million*	*83600 km²*	*$ 37 400*
USA	*8.0 hectare*	*308.7 million*	*9372614 km²*	*$ 46 300*
Belgium	*8 hectare*	*10.8 million*	*30528 km²*	*$ 36 200*
The Netherlands	*6.2 hectare*	*16.5 million*	*41528 km²*	*$ 38 600*
Denmark	*8.3 hectare*	*5.4 million*	*43094 km²*	*$ 37 200*
Germany	*5.1 hectare*	*82.7 million*	*357022 km²*	*$ 34 200*
Iran	*2.7 hectare*	*69.5 million*	*1648195 km²*	*$ 11 300*
China	*2.2 hectare*	*1336.6 million*	*9596961 km²*	*$ 4900*
Algeria	*1.6 hectare*	*33.9 million*	*2381741 km²*	*$ 6600*
Kenia	*1.1 hectare*	*37.8 million*	*580367 km²*	*$ 1600*
India	*0.9 hectare*	*1164.7 million*	*3287263 km²*	*$ 2500*

* GNP: Gross National Product

In case of an honest distribution, each person would have 1.8 ha available. Worldwide, each person now uses up to 2.7 ha. So we use more than there is. Because we use the sources faster than earth can replenish them, we are digging into the reserves. This is one of the reasons why There is less space for nature.
The way of making holidays has a large influence on our ecological footprint.

Assignment 1

> For which countries in table 1 do you think that the holiday footprint is a large part of the total ecological footprint? Explain your answer.

An honest annual amount of holiday footprint is 1600 m². The Dutch are making an average of 18 days of holiday. That yields an honest daily holiday footprint of 89 m². The average annual footprint for a Dutch person is 4700 m², which means a daily holiday footprint of 260 m².

Holiday footprint: exploration

As mentioned before, the way you make your holiday has a large influence on your ecological footprint. Your holiday footprint is determined by your way of travelling, the destination, the activities you do, the kind of company you are with, the accommodation you stay in etc. The holiday footprint can be calculated with a programme in in Excel file. By changing the various inputs you can find out how this holiday footprint is calculated.

Assignment 2

To strat with, you calculate the footprint of all the dreamed holidays in your team. This results in outputs like the one you see below. Analyse and discuss the differences you see in the results of all these holidays.

Total Holiday Footprint (m²)	**10600**
Total Holiday Footprint per day (m²/day)	**530**

Distribution of the footprint	(m²)	%
HF food and waste:	800	8
HF local transportation:	398	4
HF own transportation	0	0
HF other transportation	7796	74
HF accomodation:	360	3
HF activities:	1246	12
TOTAL	10600	100

Assignment 3

Choose one of the dream holidays in your team. Adjust this holiday in a way that the footprint is distributed more or less equally over the five categories. Describe how you adjusted this holiday and discuss if this is a realistic adjustment.

Assignment 4

Here you see a description of a city trip:

City trip to Rome, for a family of four people: man (46), woman (47), boy (18) and girl (17). Lenth: seven days, travelling time included, in Mai. Accomodation: not on a campsite nor staying with friends or relatives. Activities: going to the disco and sight seeing in and around Rome.

Design this city trip in a way that it has the lowest possible holiday footprint, within the given conditions. Describe and explain the choices that you made.

Holiday footprint: analysis

The holiday footprint calculator allocates values to all different categories. In the following assignments you will find out how this is done.
A part of the footprint is determined by the kind of holiday you make. In table 2 you see the descriptions of the different kind of holidays the calculator distinguishes.

Tabel 2 different kind of holidays

Soort vakantie	Verantwoording
Active holiday	An active holiday means going to many points of interest, so lots of local kilometers and a rather high consumption in restaurants.
Relax	Assume not too many things happen (low consumption) and hardly any travelling (lazy days).
Focused on nature	A holiday really into nature, not much to buy or consume, but many kilometers are requiered.
Sun and beach	Urban vicinity, lots of opportunities to consume, accomodation close to the beach.
Travelling around	Many opportunities to consume and the highest amount of kilometers every day.
Wintersport	Many opportunities to consume, lodging relatively close to the ski slopes.
Visiting friends or relatives	Urban environment. Sightseeing around, large amount of local kilometers.

Assignment 5

Find out how each of these kinds of holidays make their contribution tot the holiday footprint. Explain how you investigated this.

Assignment 6

The activities you do also have a large effect on the footprint. Find out how Also find out whether this effect is influenced by other factors. Describe both the result and the method you chose.

Final assignment 1: analysis

Analyse how the calculator works and write a clear report about this. Describe how you analysed this, zoom in on the effects of all factors. Use examples to elucidate.

Final assignment 2: presentation and final report

The Excel calculator is a nice device but it takes somr time to fill in all the data. For a traveling agent it would be convenient to have a system with which you can immediately label a holiday with a kind of sustainability degree. Design such a system, based on the previous tasks and analyses.
In the final report you explain this system and the way it is designed, together with the result of final assignment 1.

During the Saturday afternoon presentation, every team plays the role of a travelling agent. The label system is clarified to the customers and you label their proposed holidays right away.

Colofon

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