

STUDENT NAME		EDUCATION	
STUDENT NUMBER			

Test name	Object-Oriented Programming 2
Subject code	OOP2
Test date	
Test time	
Examiners	Martijn Pomp, Jan Doornbos
Test duration	180 minutes
Number of exercises/questions	5 (+1 challenge exercise)
<input type="checkbox"/> Answer form <input type="checkbox"/> Answer sheet <input type="checkbox"/> Writing paper <input type="checkbox"/> On the test itself <input checked="" type="checkbox"/> Git repository	You can get your repository here:

Maximum attainable points	100		
Number of points with which the test was passed	55		
Permitted aids			
<input type="checkbox"/> none	<input type="checkbox"/> textbook	<input type="checkbox"/> calculator	<input checked="" type="checkbox"/> printed coding conventions
<input checked="" type="checkbox"/> draft paper	<input type="checkbox"/> law book	<input type="checkbox"/> graphics calculator	<input type="checkbox"/>
<input type="checkbox"/> graph paper	<input type="checkbox"/> dictionary	<input checked="" type="checkbox"/> IntelliJ (without plugins)	<input type="checkbox"/>

General test instructions:

- Write your details clearly and correctly in your repository (README.md).
- Warn the invigilator if something is unclear about the test.
- Hand in all the material when leaving the test room.

If, during the test, you have a complaint about the contents of the test or about how the test is held, you must submit your complaint in writing within 2 working days to the relevant Examination Committee.

My school can trust the fact that I took this test independently without the help of others and that I have only used the tools and aids that the examiner has allowed me to do.

CASE GENETICALLY MANIPULATED VEGETABLE GARDEN

With last year's farm protests, it is not entirely unwise to start your own vegetable garden.

You have been asked to build an application in Java that tracks the process of vegetables.

A garden consists of vegetables. The vegetables are all planted in a row. Three types of vegetables are available in the vegetable garden. The vegetables have a few common characteristics: they all have a color. These can be red, orange, green, pink, yellow and blue. In addition, they all have a size (in cm). This, of course, changes as the vegetable grows. They also have two growth factors: one for sunshine (cm/Lux) and one for water (cm/mm).

Also, vegetables have three statuses: growing, ready to harvest and destroyed. Each vegetable can appear multiple times in the garden.

Three vegetables are now found in our garden: asparagus, pepper and kale.

VEGETABLE	CM/LUX	CM/MM	COLOR	READY
ASPARAGUS	0,000027	0,0049	Blue	20 cm
PEPPER	0,000044	0,0013	Pink	7 cm
KALE	0,0057	0,032	Yellow	16 cm

Table 1, Vegetable characters

In the vegetable garden, there should be one method that makes the sun shine (number of lux) and makes it rain (number of mm) over a certain number of days. So, the method has three parameters. In this method, the vegetable grows. Keep in mind the following:

Asparagus

When the asparagus receives less than 14mm of rain for ten days it breaks down.

Pepper

When it rains at the pepper for more than four days, with more than 31mm of precipitation, the pepper breaks down. If it receives less than 25mm of precipitation in ten days it does not grow.

Kale

If kale receives more than 40mm of water in six days it will not grow.

In the garden, there should be an opportunity to pick up all vegetables ready for harvest.

A colleague of yours has already started making a class diagram. You'll find this one in the appendix. Unfortunately, he did spill coffee on the diagram.

ASSIGNMENT 1

Build the application based on the given class diagram and the text above.

ASSIGNMENT 2

The Jumbo got a view of our beautiful vegetable garden. Especially the asparagus and pepper are wanted by this supermarket chain. Jumbo would like to buy these vegetables from us but makes high demands. Create a method that returns whether the vegetable is marketable and a method that can retrieve the price (see Table 2).

The following conditions apply to marketability:

Asparagus

It should be a maximum of 29 cm.

Pepper

The pepper should be a minimum of 15 cm and a maximum of 21 cm.

VEGETABLE	PRICE PER CM
ASPARAGUS	€ 0,12
PEPPER	€ 0,15

Table 2, Price by vegetable

You want to keep the marketable vegetables in a separate class. In this class you also want to be able to collect your profits from the saleable vegetables.

ASSIGNMENT 3

Our garden continues to grow and we are slowly encroaching on our neighbors' property. It turns out that only 27 vegetables can fit in our garden.

Throw an exception (*TooManyVegetablesException*) when a new vegetable is planted that no longer fits in the garden.

ASSIGNMENT 4

We want to move our vegetables into a greenhouse. The greenhouse can be compared to a normal garden. There will only be a weather generator.

- Create a Weather Generator with two static methods that return a random Lux and a random mm.
The Lux value ranges from 1000 to 101592.
The number of mm can range from 0 to 48.
- Create a method in the greenhouse *runWeather* that retrieves these values and then uses them to grow the vegetables.
The *runWeather* function runs for one day.

ASSIGNMENT 5

Write Unit tests for the growth method of asparagus. Also write Unit tests for the maximum number of vegetables in your garden.

ASSIGNMENT 6 (CHALLENGE EXERCISE)

After some time, we want to rearrange our vegetable garden. Instead of arranging everything in a row, we want to divide the vegetables into a fixed grid of 16 by 34.

Make the implementation of the grid garden in a separate class. Note that this garden can also get full!

APPENDIX 1: CLASS DIAGRAM

