Lesson Plan Session 4 & 5

Presenting GeoGebra Practical Session

General aspects:

1. *Learning Goals:*

To develop an understanding of the use of GeoGebra in mathematics teaching

To develop problem solving and - posing skills using GeoGebra as a technological tool

2. *General strategy:*

Working practically in GeoGebra, alongside discussing the use of technology

3. *Structure*

Lesson segments: work in groups of three investigating GGb, using the spreadsheet ind GGb, logging in to the GeoGebra materials on the website, logging in to a GGb group and sharing materials.

4. *Resources:*

PowerPoint presentation, Barbie dolls, rubberbands, washbowl, toy cars, measuring tape, dart, tennis balls and pc/tablet. If possible, the app Video Physics (iPad/appstore).

5. *Note:*

Two different versions of GeoGebra (GGb 5 and GGb 6) are shown here to make it easier for you to follow the steps no matter which version you choose.

Development of the Lesson:

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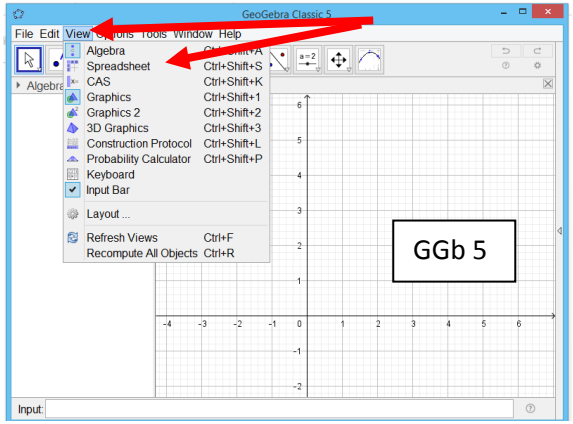
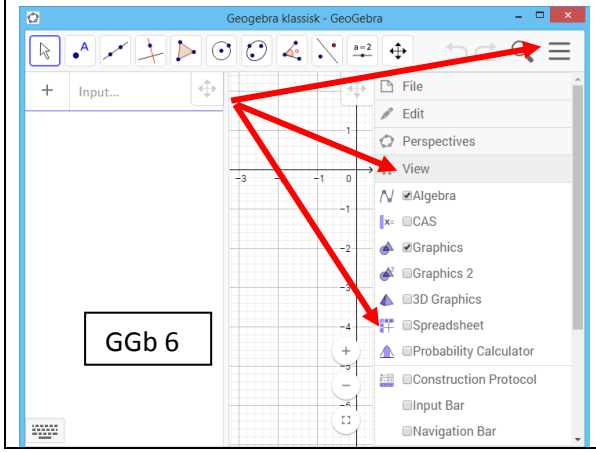
Task and Learning Activities	Expected Duration	Class Activity (potential difficulties)	Instructor Support	Goal and Assessment
Introduction   	10 mins	Present the spreadsheet in GGb.	Show the students how to mark the spreadsheet: GGb 5: Click on ‘view’ and on spreadsheet GGb 6: Click on the ‘burger menu’ (upper right corner) then click on View (the small house) and choose spreadsheet.	*Goal:* the students are able to open a spreadsheet in GGb

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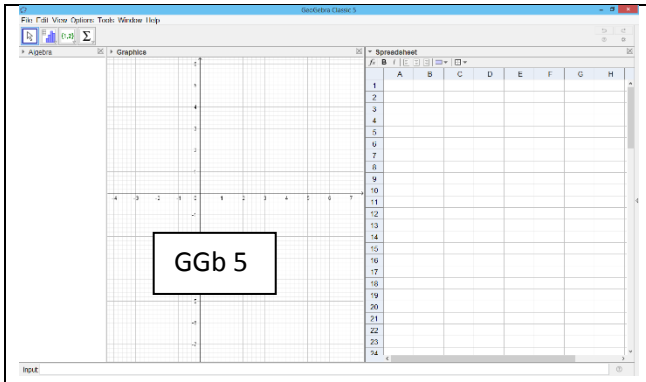 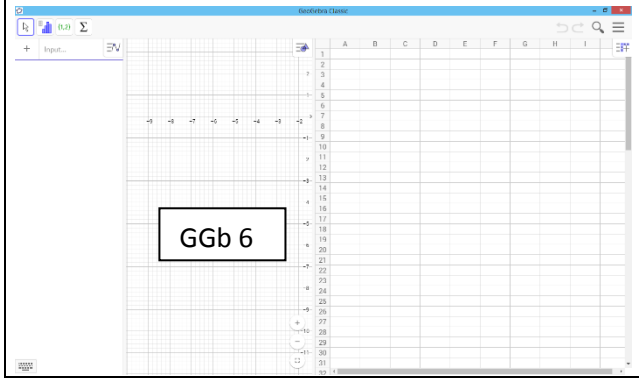		When the spreadsheet appears in the window, you are ready to write your data. Write your data in the spreadsheet.		*Goal:* the students are able to open a spreadsheet in GGb and fill in data.

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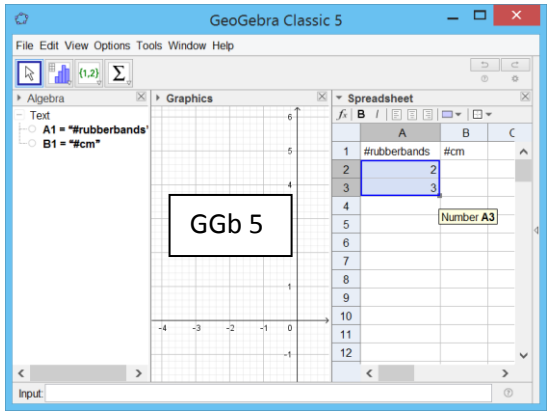 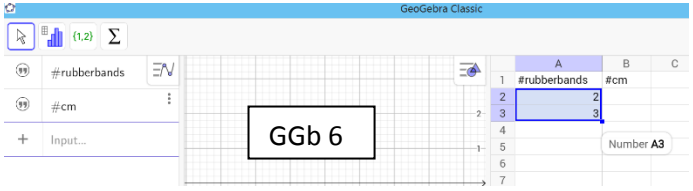	10 mins	Write only the first two numbers in a row of data and you are able to draw them down to get the next numbers in the row (here: 4, 5, 6, …..20 or more)		*Goal:* the students learn how the spreadsheet works
Four different activities: 1. Bungy Jump with Barbie: You can watch this Norwegian video on youtube: https://www.youtube.com/watch?v=VgNGj1UVMZk 2. How far does the car run compared to the hight of the ramp? 3. Bean Bags 4. Garden Gates and problem solving You can use these documents for the instruction of the investigation: https://tinyurl.com/investigations-math	35 mins	Divide the class into groups of three or four students and choose which investigation they are going to make. Make sure that they are collecting their data and maybe you want them to make more than one run with the car for each height - that will make the data more confident.		*Goals:* The students learn that mathematical models can be used in real life and a model is not always precise.

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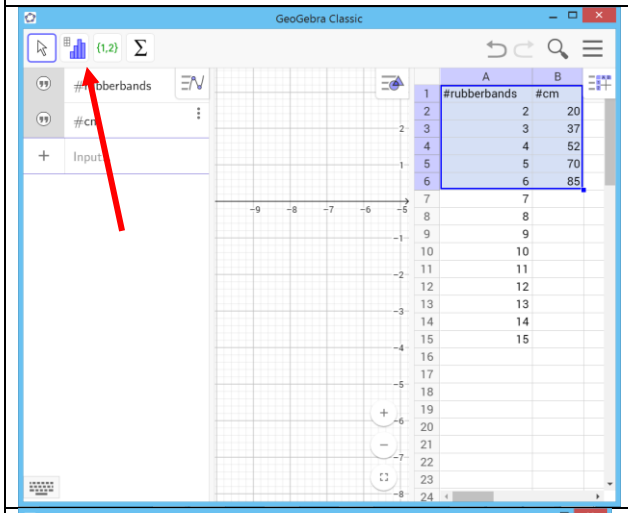
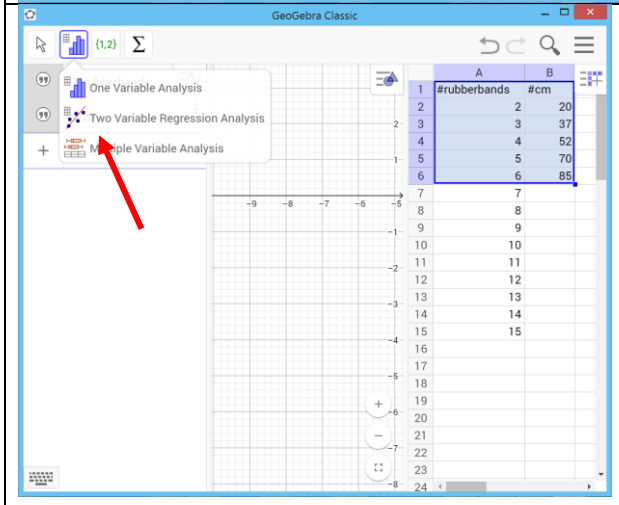
		The students write their data in the spreadsheet and afterwards they follow this procedure:		
	20 mins	Mark your data and choose the ‘diagram’-icon		
		A menu unfolds and you choose: Two Variable Regression Analysis		

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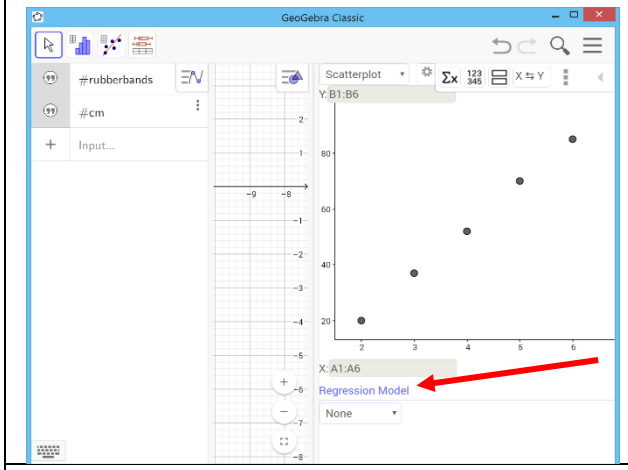
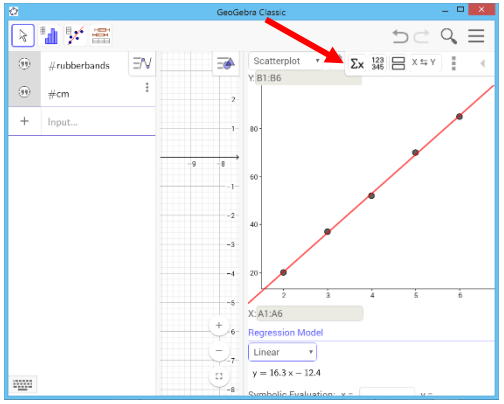
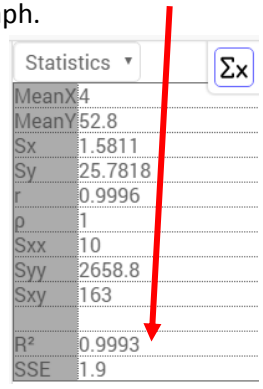
		This picture shows up and you see a scatterplot of your data. Now you can choose a Regression Model - these observations are close to linear, so we choose the linear model.		
		Here you can see how the linear model fits the scatterplot. If you want to know how precise it is, you can click on the icon : Σx Here you will find all the statistical descriptors and the R^2 value, which tells you how close your model is to the fittest graph. 		*Goal:* The students learn to analyse data in GGb and they learn to interpret their results

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		Remember to let the students present their results and tell the rest of the class how they got to their conclusion.		
Let the students brainstorm on ideas concerning ideas for problemposing-activities. You may present different stuff for the students to give them ideas: Tennis balls (make a movie where the ball bounces in nice parabolas), plasticbags (does a plasticbag constructed to contain 4L really contain 4L? - is it possible to draw a 3D model I GGb close to the form of the plasticbag when it is filled with water?) Is it possible to measure the height of the flagpole?	60 mins	Scaffolding is important here - give the students time to prepare the investigation and problemposing.		*Goal:* The students learn to pose problems and investigate in maths.

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