Growth of Dutch Children

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In this task you use the data from the Dutch growth studies of 1997 and the Coach program to study the mean weight and weight increase for boys and girls. The goal is to find points in common and differences in weight growth for boys and girls. We formulate the research questions as follows:

Research Questions
- How does the mean weight for Dutch boys and girls change between 1 and 21 years of age? What points in common and what differences exist?
- Does there exist a simple formula that fits well the mean weight for boys up to some age? If so, what is this formula and up to what age can it be applied? What about a formula for girls?

Task C. Mean Weight Growth

1. Start Coach and select the project *Growth of Dutch Boys and Girls*.
2. Select activity C: *Mean Weight Growth.*
3. Carry out the subtasks in this activity and answer the questions.

Growth Data
Growth data have been placed in a text window inside the Coach activity. We write these data down below for those who want to put the text window in the background during their work.

Age is in years; weight is in kilograms (and is of course a mean value).

Age	Weight boys	Weight girls	Age	Weight boys	Weight girls	Age	Weight boys	Weight girls
1	10.2	9.6	8	27.9	27.8	15	58.8	56.0
2	13.0	12.3	9	30.8	31.0	16	63.8	58.4
3	15.2	14.7	10	33.8	34.5	17	67.4	60.0
4	17.4	16.9	11	37.2	38.5	18	70.1	61.3
5	19.8	19.2	12	41.5	43.2	19	72.0	62.3
6	22.4	21.8	13	46.8	48.3	20	73.7	63.1
7	25.0	24.7	14	52.9	52.7	21	75.3	63.9

Hints
Once you have a table with the growth data you can use several tools of Coach to answers the research questions. We give some hints:
- Make use of diagrams.
- Also study the weight increase diagram.
- Select in the diagram window the menu option `'Analyse'` ▸ `'Function-fit'` and use it to find a nice linear fit of the mean weight for boys between 2 and 7 years of age. A new window pops up in which you can match the graph of any desired quantity with the graph of a known mathematical function. For example, you can determine the straight line that fits best with the mean weight increase for boys. This can be done manually or automatically (see the online help or the text in the paragraph below).

- The shape of the increase diagram of weight for boys gives a clue to what kind of formula for weight might be suitable in the age between 2 and 11 years.
- Once you have an idea about the kind of formula you are looking for, you can select in the diagram window the menu option 'Analyse' ▸ 'Function-fit' and try to find a simple formula as meant in the second research question. If desired, restrict the data to an age interval for which a simple formula will work.
- Also try to find a simple formula that describes well the mean weight for girls in relation to their age until puberty.

Function-fit

The screen dump below shows manual fit in action. The formula of a straight line, $y = a\,x + b$, has been selected as function type; the selected column corresponds with the mean weight for boys. The icon of the pin on the screen dump is such that the approximation has been fixed at that location. By dragging another point of the straight line with the mouse you can rotate the line. When you release the fixed pin by double clicking, then you can translate the line. When you press 'Auto-fit', then you let the software itself find the least-squares fit of all data.