Maths in the Low Lands

The Dutch word for mathematics is wiskunde. We owe the name to Simon Stevin. Wiskunde is what you get in Dutch secondary education. The supposedly highest level of Dutch secondary education is VWO, which loosely translates as PSE, Preparing (for) Scientific Education. Essentially VWO is the only secondary education (highschool) that allows you to enter university in the Low Lands. VWO takes 6 years, after 6 years in primary education (following 2 years in Kindergarten). In primary education you don't get wiskunde but rekenen, which I would translate as arithmetic, in accordance with the language switch in wikipedia:

https://nl.wikipedia.org/wiki/Rekenen

https://en.wikipedia.org/wiki/Arithmetic

Many things have changed since I had arithmetic (rekenen) and mathematics (wiskunde) in school. A first omen of changes to come was when one of the highschoolteachers, having returned from Utrecht where Freudenthal had delivered his farewell lecture, reported that Freudenthal had predicted that wiskunde as we knew it then was bound to disappear from highschool. A worrying statement that I had happily forgotten when I enrolled for mathematics at Leiden University a year later.

Why did I choose for mathematics after school? Because I enjoyed it. What had really struck me in my highschool mathematics was complex numbers and the first steps in complex analysis from a book co-authored by Freudenthal. This was a special topic in Wiskunde II which was mainly linear algebra and 3D-geometry. There were only 8 pupils (all boys unfortunately) in that Wiskunde II class. Most of them later chose for mathematics or physics in university.

The mainstream Wiskunde I was a combination of differential and integral calculus, probability, statistics, and some geometry. Especially the study of functions and their graphical representations I liked a lot, and the calculus required to sketch the graphs was also fun. I did not have a calculator in highschool. You learned mathematical techniques and how to apply them. Nowadays we don't have Wiskunde I and II, but Wiskunde A,B,C,D. It's a long and complicated story to explain what those stand for.

I don't remember a lot of applications to real life problems from the calculus part, but Wiskunde I gave you a solid basis for a university study in any of the exact sciences, as likewise rekenen (arithmetic) in elementary school had given you a solid basis voor wiskunde (mathematics) in highschool. Thanks to a systematic treatment of calculating with numbers such as integers, fractions and decimal representations, and applications in which physical units were required.

Forty years have passed since I came to hear of Freudenthal's prophecy. I now know that Freudenthal's prophecies were plans, and that these plans were not restricted to wiskunde in highschool, as rekenen in elementary school was in for a complete makeover as well. Since then rekenen en wiskunde have been redefined and merged into what I and others now call Dutch Reform Math, with devastating consequences that are systematically denied by the school of reformers founded and positioned in the center of educational power by Freudenthal. Why Freudenthal did so is for others to discuss. But he did.

Unlike Freudenthal himself, these reformers are mostly not mathematicians and therefore lack the capability of responding to critical observations on the lack of mathematics, be it rekenen or wiskunde, in Dutch Reform Math. What's worse is that whereas Freudenthal, towards the end of his life, eventually came to face his educational failures, his school perceives a quite different different reality, exemplified in a plenary lecture at one of these conferences by Marja van den Heuvel-Panhuizen titled *Reform under attack Forty Years of Working on Better Mathematics Education thrown on the Scrapheap? No Way!* You will find it. It's still on the webpages of the Freudenthal Institute.

The first thing of MvdHP I read was an article in one of our quality newspapers, coauthored by Adri Treffers, one of the other Dutch professors of arithmetic. You will (also) find it here:

http://www.fisme.uu.nl/nl/nieuws/20090323_rekendiscussie.pdf

Just like the conference paper it flatly denies the problems created by Dutch Reform Math, but it does offer an opening for a discussion in that it describes a *realistic* treatment of an exercise (not a problem) that as we probably all agree on young pupils should learn to know how to do. The bald problem is $62 - 57 = 5$ and it is discussed in a so-called realistic context deemed suitable by the professors: a guy stands on a weighing machine with his cat and reads off 62 kg, while without the cat he read off 57 kg (now that's a realistic context these days). What's the weight of the cat?

An exercise for pupils in group 5, in which 5 is $5 = 2 + 3$, as we start counting (the years in education in our Low Lands) in Kindergarten nowadays. So what would one expect from children of age 9 as far as simple subtractions are concerned? Hopefully something that goes beyond what you can do by counting upwards (from 57 in this case). The professors however had something else in their realistic minds and suggested a group discussion about the possibility of 6 or 4 kg as a possible outcome. I'm not joking.

At the time I did not know of the TAL project (http://www.fi.uu.nl/talbovenbouw/). I wrote about the books that resulted from this project in Dutch here: http://www.few.vu.nl/~jhulshof/TAL.pdf, submitted to Euclides, the journal of and for the Dutch Society of highschool teachers, but rejected because of the very topic. TAL is an acronym that refers to intermediate goals (Tussendoelen) and *Leerlijnen* (learning lines, which translates as educational curricula). I read the TAL-books because as I became interested in what had happened to the elementary math schoolcurricula, many of which now no longer contain standard subjects like long division and calculating fractions with numerators and denominators, these books turned out to belong to the curricula at the academies for elementary schoolteachers. I actually started reading them under the in hindsight false assumption that they were just about a different didactical method for the same subjects, and I was curious to see how they did it. To make a long story short: I then found out they didn't.