

國立彰化師範大學 101 學年度博士班招生考試試題

系所：科學教育研究所

組別：甲

科目：數學教育

☆☆請在答案卷上作答☆☆

第 1 頁，共 1 頁

- 一、 數學本質是什麼？教學生學數學到底是要學生學會什麼？(30%)
- 二、 何謂數學建模(mathematical modeling)? 數學建模和解題(problem solving)有何不同?(20%)
- 三、 請翻譯以下所摘錄的一段文章(25%)，並舉例來詮釋說明所謂的”horizontal mathematization”與”vertical mathematization”(25%)。

Instead of seeing mathematics as subject matter that has to be transmitted, Freudenthal stressed the idea of mathematics as a human activity. Education should give students the "guided" opportunity to "re-invent" mathematics by doing it. This means that in mathematics education, the focal point should not be on mathematics as a closed system but on the activity, on the process of mathematization (Freudenthal, 1968).

Later on, Treffers (1978, 1987) formulated the idea of two types of mathematization explicitly in an educational context and distinguished "horizontal" and "vertical" mathematization. In broad terms, these two types can be understood as follows:

In horizontal mathematization, the students come up with mathematical tools which can help to organize and solve a problem located in a real-life situation. Vertical mathematization is the process of reorganization within the mathematical system itself, like, for instance, finding shortcuts and discovering connections between concepts and strategies and then applying these discoveries.

(cited from the NORMA-lecture, by Marja van den Heuvel-Panhuizen, Kristiansand, Norway, 1998)