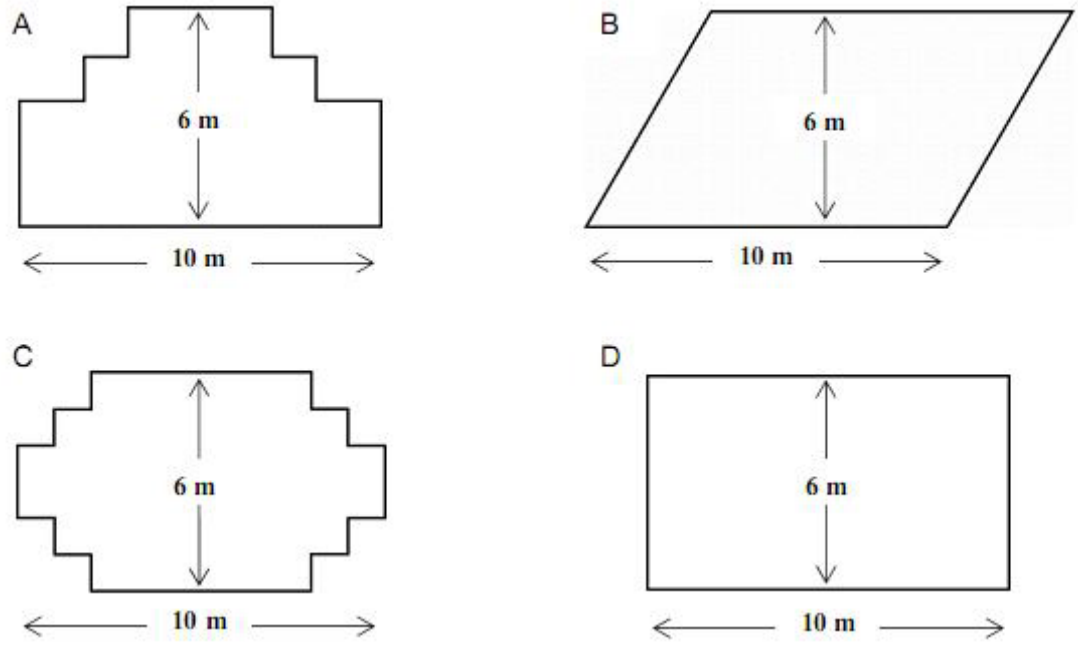
國立臺北教育大學100學年度碩士班招生入學考試

數學暨資訊教育學系數學教育碩士班　數學教育　科試題

一、(1)國際學生能力評量計畫（the Programme for International Student Assessment，PISA）的評量內容涵蓋閱讀、數學和科學三個領域的素養程度。請說明何謂數學素養？

(2)以下為PISA數學樣本試題，請解題（含說明理由），並對此試題進行評析。（共25分）

木匠有32 公尺的木材，想要在花圃周圍做邊界。他考慮將花圃設計成以下的造型。



上面哪幾個花圃的設計可以用長度32公尺的木板來圍成？

二、底下是一篇論文＜Children's strategies for division by fractions in the context of the area of a rectangle＞的摘要，請說明此研究之研究問題、研究方法，以及研究結果。(25分)

This study investigated how children tackled a task on division by fractions, and how they formulated numerical algorithms from their strategies. The task assigned to the students was to find the length of a rectangle given its area and width. The investigation was carried out as follows: First, the strategies invented by eight 10- or 11-year-old students, all identified as capable and having positive attitudes towards mathematics, were categorised. Second, the formulation of numerical algorithms from the strategies constructed by nine students with similar abilities and attitudes towards mathematics was investigated. The participants developed three types of strategies (making the width equal to 1, making the area equal to 1, and changing both area and width to natural numbers) and showed the possibility of formulating numerical algorithms for division by fractions referring to their strategies.

三、何謂「Content Knowledge / CK」？何謂「Pedagogical Content Knowledge / PCK」？何謂「Knowledge of Learners and their characteristics / LK」？並請以「數與量」主題中，擇一數學概念說明之。(25 分)

四、一個減法文字題的算式「9－3=？」其解題情境至少有以下五種：拿走型、合併型、比較型、追加型、被加數未知型，請分別寫出各型的文字題外，並以比較型和追加型分別說明學生的學習困難。(25 分)