

# 國立彰化師範大學 97 學年度博士班招生考試試題

系所：科學教育研究所

組別：甲組

科目：數學教育

☆☆請在答案紙上作答☆☆

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一、九年一貫數學領域的正式綱要已開始實施，正綱之編寫學者認為先前的暫綱重視概念的理解，卻弱化了計算能力的培養，因此在正綱中特別強調「強化數學流暢的計算能力」的重要。請從學生應發展的數學能力與相關學習理論的角度，來評論正綱中上述的主張及其所持的理由。(20%)

二、「科學素養」(Scientific literacy) 是國際上科教研究的重要議題，發展全民的科學素養也成為各國科學教育的重要目標，同樣在數學教育的研究中也有對所謂「數學素養」的討論。請就以下所摘錄的一段文獻做翻譯與詮釋。(40%)

Mathematical proficiency has five components, or strands :

- *conceptual understanding*--- comprehension of mathematical concepts, operations, and relations
- *procedural fluency*--- skill in carrying our procedures flexibly, accurately, efficiently, and appropriately
- *strategic competence*--- ability to formulate, represent, and solve mathematical problems
- *adaptive reasoning*--- capability for logical thought, reflection, explanation, and justification
- *productive disposition*--- habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with belief in diligence and one's own efficacy.

These strands are not independent; they represent different aspects of a complex whole. The most important observation is that *the five strands are interwoven and interdependent in the development of proficiency in mathematics.* (cited from Kilpatrick, Swafford, and Findell, *Adding It up*, 2001, p.116.)

三、請以評量的相關理論來評論傳統紙筆測驗之適切性。(20%)

四、請描述你心目中一個理想的數學課室所應該具備的特徵，並解釋你的理由。(20%)