

中原大學 97 學年度碩士班入學考試

4 月 13 日 14:00~15:30 教育研究所科學教育組

誠實是我們珍視的美德，
我們喜愛「拒絕作弊，堅守正直」的你！

科目：科學課程與教學

(共 2 頁第 1 頁)

可使用計算機，惟僅限不具可程式及多重記憶者

不可使用計算機

一、解釋下列名詞或片語:40%

1. Four goals of Science Education (Harms, 1977): 5%
2. Scientific literacy: 5%
3. Piaget's(1970) 「Accommodation」: 5%
4. Team teaching: 5%
5. Creativity 4P (Rhodes, 1967): 5%
6. Social Constructivism: 5%
7. Metacognition: 5%
8. STS: 5%

二、請寫下一段英文主題 “The development of pedagogical content knowledge” 之主要意涵(10%)，與 PCK (pedagogical content knowledge)操作型定義 (10%)。

The development of pedagogical content knowledge

According to Smith and Neale (1989), the development of PCK depends on teachers having a “deeply principled conceptual knowledge of the content.” As for preservice teachers, the subject matter knowledge they have acquired during disciplinary education usually contains misconceptions and deficiencies (Smith, 1999). For instance, Gess-Newsome and Lederman (1993) noted that the subject matter structures of preservice biology teachers, who had nearly completed the requirements for a BS in Science Education, was often vague and fragmented at the start of their teacher education program. During this program, the preservice teachers developed more coherent and integrated subject matter structures. However, the development of PCK was hindered by the complexity of teaching practice.

According to Lederman, Gess-Newsome, and Latz (1994), the development of PCK among preservice science teachers is promoted by the constant use of subject matter knowledge in teaching situations. Initially, preservice teachers separate subject matter knowledge from general pedagogical knowledge. As a result of teaching experiences however, these types of knowledge are being integrated.

三、假設 a, b, c, d 皆為整數且 $ac \neq 0$ ，請用小學五、六年級學童可以理解的例子來解釋以下(a)、(b)、(c)三個問題，以便逐步引導 $\frac{b}{a} \div \frac{d}{c} = \frac{bc}{ad}$ 的分數除法算則。(4+6+8 共 18 分)

(a) $1 \div \frac{1}{5} = 5$ ，也恰為 $\frac{1}{1} \times \frac{5}{1} = 5$

(b) $\frac{4}{5} \div \frac{1}{5} = 4$ ，也恰為 $\frac{4}{5} \times \frac{5}{1} = \frac{20}{5} = 4$

(c) $\frac{4}{5} \div \frac{1}{3} = \frac{12}{15} \div \frac{5}{15} = \frac{12}{15} \times \frac{15}{5} = \frac{12}{5}$

四、想想看以下三個整數乘法問題的教學順序為何？請詳細說明為什麼。(12 分)

題一：媽媽買了一塊長方形的窗簾布，兩邊長分別為 7 公尺和 4 公尺；請問這塊窗簾布的面積是多少平方公尺？

題二：劉老師準備了 6 個砝碼，每一個砝碼的重量都是 10 公克，請問 6 個砝碼一共重多少公克？

題三：美芳的芭比娃娃有 9 件各式上衣，又有褲子和裙子共 8 件；美芳每次為芭比娃娃搭配一件上衣、一件褲子或裙子，請問一共有多少種不同的組合？

五、試說明三角形的「高」的意義，再用您的說明來解釋下圖中的「鈍角三角形」中相對於角 A 的高。(10 分)

