科目：**科學課程**　　　　　　　　　　　適用系所：**科學教育研究所**

注意：1.本試題共 2 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣分。

一、試定義並比較以下各組名詞。(每題 10 分，共 30 分)
　（一）常模參照測驗(norm-referenced test) vs. 標準參照測驗(criterion-referenced test)
　（二）試題難易度(item difficulty) vs. 試題鑑別度(item discrimination)
　（三）高風險測驗(high-stakes testing) vs. 課室評量(classroom assessment)

二、若要透過紙筆測驗評量學生高層次思考能力，此類試題需具備什麼特徵？試舉例說明。(20 分)

三、十二年國教國高中自然科學領域課程綱要中『學習表現架構表』如下所示。請按照你的學科背景，設計一個國中或高中的科學課程或教材，能讓學生在學習過程中展現至少 **3 個學習表現子項**。並請簡述 3 個學習表現子項之意義，再說明你的課程設計如何促進學生的學習表現。
　　(本大題共 25 分，科學課程或教材 13 分，學習表現子項說明 2 分/子項，共 6 分，如何促進學生學習表現說明 6 分)

項目		子項
探究能力	思考智能	想像創造
		推理論證
		批判思辨
		建立模型
	問題解決	觀察與定題
		計劃與執行
		分析與發現
		討論與傳達
科學的態度與本質		培養科學探究的興趣
		養成應用科學思考與探究的習慣
		認識科學本質

四、請閱讀以下文章，說明本段文章對 "social constructivism" 詮釋的內容大意。接下來，請按照你的學科背景，舉一個數理科的例子，說明在設計科學課程或科學教材時，如何將"social constructivism"的理念落實於科學教學實務中。(本大題共 25 分，說明本段內容大意 10 分，舉例說明 15 分)

For science education, social constructivism emphasizes the importance of engaging students in classroom discourse in order to develop the "social capital" of science (i.e., values, knowledge, skills, language), especially scientific ways of reasoning and

negotiating to reach consensus in a community of practice. Engaging in discussion, whether it be teacher-directed whole-class question-and-answer or student-directed small-group work, gives students opportunities to put language to their ideas and test their viability against the ideas of other students. Peer learning is a powerful socializing process, involving a strong emotional relationship with significant others. Contributing actively to classroom discussion or listening actively to other students' questions and responses can help develop the metacognitive skill of reflective thinking (i.e., thinking about one's own thinking) which is an important step towards developing an ability to assess the viability of one's own prior knowledge and developing concepts. In collaborative learning, especially in small groups, students have opportunities to develop social inquiry skills, including active and empathic listening, learning to "take turns" in speaking, offering strategies for investigating a problem or issue, and negotiating a consensual solution or conclusion to their scientific inquiries. (from Taylor P.C. (2015) Constructivism. In: Gunstone R. (eds) Encyclopedia of Science Education. Springer, Dordrecht)