

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1、請用 **300 字以內**，說明：(1)何謂「運動生物力學」(sport biomechanics)? (5%) (2) 此學門發展的目的為何? (5%) (3) 研究的方向有哪些? (5%)

2、高空走鋼索的表演者，常會帶著一根很長的竿子(如下圖)。請以力學的角度說明，表演者手持的長竿如何幫助表演者維持平衡?(15%)



(圖片來源: <http://gate.sinovision.net:82/gate/big5/news.sinovision.net/portal.php?mod=view&aid=218551>)

3、(1) 請說明何謂「解剖學姿勢」(anatomical position)? (5%) (2) 運動生物力學的研究中，常會以哪三個解剖面 (anatomical planes)，來描述人體肢段的相對運動? 並請以肩、腕、髖、踝等四個關節之運動說明之。(20%)

4、在運動生物力學的研究中，研究人員常會使用儀器設備來擷取人體的運動學(kinematics)或動力學(kinetics)參數，請就以下常用儀器設備，舉例說明研究人員可以使用這些儀器設備來取得那些數據(data)?

- (1) 動作捕捉系統 (motion capture system) (5%)
- (2) 測力板 (force platform) (5%)
- (3) 肌電儀 (electromyography) (5%)
- (4) 加速規 (accelerometer) (5%)
- (5) 等速肌力測試儀 (isokinetic dynamometer) (5%)

(背面仍有題目，請繼續作答)

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

5、請讀以下一篇綜評論文(a review paper)的摘要，並依此摘要說明此篇論文討論的重點，以及作者的結論和建議為何？（請勿直接翻譯，否則不給分）(20%)

（節錄自：Bartlett, Roger, Wheat, Jon and Robins, Matthew, 'Is movement variability important for sports biomechanists?', Sports Biomechanics, 6:2, 224-243）

#### Abstract

This paper overviews the importance for sports biomechanics of movement variability, which has been studied for some time by cognitive and ecological motor skills specialists but, until quite recently, had somewhat been overlooked by sports biomechanists. The paper considers biomechanics research reporting inter- and intra-individual movement variability in javelin and discus throwing, basketball shooting, and locomotion. The overview does not claim to be comprehensive and we exclude such issues as the theoretical background to movement and coordination variability and their measurement. We overview evidence, both theoretical and empirical, of inter-individual movement variability in seeking to achieve the same task goal, in contrast to the concept of "optimal" movement patterns. Furthermore, even elite athletes cannot reproduce identical movement patterns after many years of training, contradicting the ideas of motor invariance and "representative" trials. We contend that movement variability, far from being solely due to neuromuscular system or measurement "noise" – as sports biomechanists may have previously supposed – is, or could be, functional. Such functionality could allow environmental adaptations, reduce injury risk, and facilitate changes in coordination patterns. We conclude by recommending that sports biomechanists should focus more of their research on movement variability and on important related topics, such as control and coordination of movement, and implications for practice and skill learning.