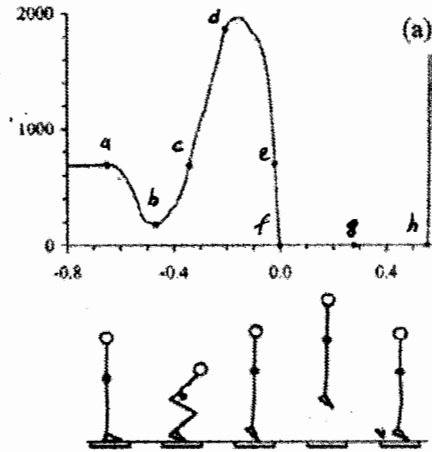


※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. 請說明以下各組專有名詞的相關性或差異性。

- (1) speed and velocity (3%)
- (2) force and moment (3%)
- (3) mass and moment of inertia (4%)
- (4) stress and strain (5%)
- (5) inversion and eversion (5%)



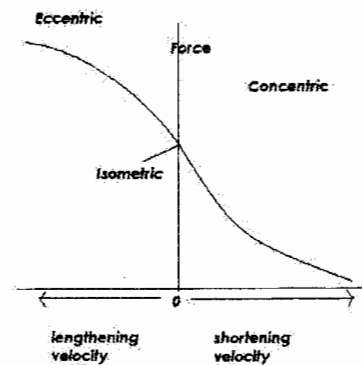
圖一：Countermovement jump 的垂直方向地面反作用力。  
(Source: <http://quizlet.com/22222870/week-3-lecture-1-force-plates-flash-cards/>)

2. 圖一為 countermovement jump 的垂直方向地面反作用力。

- (1) 地面反作用力的圖形中(上圖)，縱軸的單位是甚麼？(3%)
- (2) 蹲至最低點的時間點是在甚麼時候(請以英文代號表示)？(3%) 請說明原因。(5%)
- (3) 由上圖，跳者(jumper)騰空的時間多長？(3%) 並請估算跳者所跳的高度( $g=10m/s^2$ )？(5%)
- (4) 請畫出起跳落地後的地面反作用力圖形(上圖 h 之後的圖形)。(5%)

3. 圖二為肌肉收縮速度與力量之間的關係。

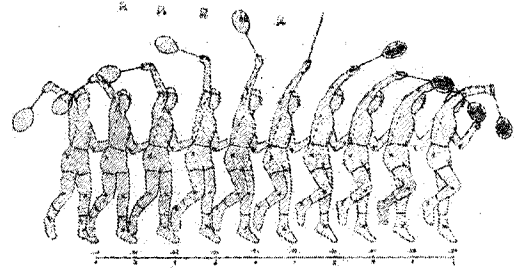
- (1) 請由圖二，舉例說明肌肉收縮速度與其力量產生的關係。(6%)
- (2) 圖中所呈現的結果，如何應用在運動員肌力的訓練上？(10%)



圖二：肌肉收縮速度與力量之間的關係。  
(Source: <http://www.sports-training-adviser.com/slowlifting.html>)

4. 當棒球投手將球投出後，球在空中飛行過程中，將會受到那些力的作用？(6%) 這些力如何影響球的移動速度與軌跡？(10%) 請以曲球、蝴蝶球為例說明。

5. 羽球殺球的連續動作中(圖三)，可以發現頂尖球員在擊球瞬間，前臂(forearm)會做內旋(pronation)的動作，此動作也常在網球發球中出現。以力學角度來看，此前臂內旋動作的效益是甚麼？並請說明原因(8%)



圖三：羽球殺球的連續動作。

(Source : <http://www.essentialtennisinstruction.com/bts/coursework/badminton.html>)

6. 請讀以下論文的摘要，並說明此研究的方法？(3%) 採用的統計方法？(3%) 結果與結論？(10%)

**Background:** Subjective comfort of footwear is important for shoe and orthosis design. This study compared shoe preferences between walking and running, using subjective comfort as an outcome tool. **Methods:** Forty-one participants walked and ran 20 times each along a runway in three types of footwear (cushioning, lightweight, and stability) and chose the model that they preferred most for walking and running separately based on subjective comfort. **Results:** More participants preferred the cushioning model (walking, 34%; running, 41%) or the lightweight model (walking, 44%; running, 41%) over the stability model (walking, 22%; running, 17%).  $\chi^2$  tests revealed no differences between walking and running, runners and nonrunners, and lighter and heavier individuals. Women were more likely (odds ratio = 4.09) to prefer the lightweight model, whereas men preferred the cushioning (odds ratio = 2.05) and stability (odds ratio = 3.19) models. Most participants (71%) chose the same model for both activities. **Conclusions:** Shoe preference varies among individuals and is influenced by sex. Most people feel comfortable walking and running in the same shoe model. (J Am Podiatr Med Assoc 100(6): 456-462, 2010)