

114 年 高雄市科學園遊會 執行計畫

組別：國際雙語科學組

Ding Ding Dong Dong Play Sound

叮叮咚咚 玩聲音

校名：高雄市鳳山區忠孝國民小學

指導老師：蕭雅琳、黃鈺慈、曾偉苙、張彥士

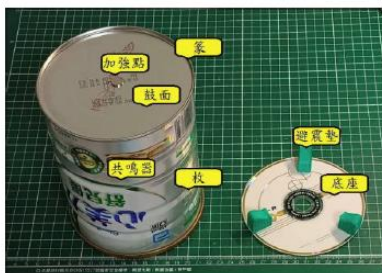
報名類別：國際雙語科學組

類別：物理類

攤位編號：

壹、活動目標 | Purposes of the Activity

- 一 認識聲音的音高與物體大小、面積、重量的關係。
- 二 體驗利用配重調整音高，學習音高與頻率的關聯。
- 三 結合台語聲音辨識與旋律挑戰，提升趣味與記憶度。
- 四 激發學生觀察、比較與歸納的科學探究精神。



1. Understand how pitch relates to object size, area, and weight.
2. Experience tuning pitch by adding weights and learn the relationship with frequency.
3. Combine Taiwanese language sound recognition and melody challenge to enhance fun and memory.
4. Encourage observation, comparison, and scientific inquiry spirit.

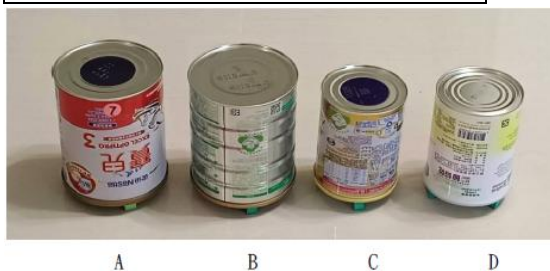
貳、實驗器材 Experimental Equipment

回收鐵罐、回收光碟片、強力磁鐵、竹筷子

recycled tin cans, recycled CDs, strong magnets, chopsticks

參、闖關活動 | Game Stations

第一關：比高低！大罐小罐大對決



活動說明：

(1) 敲擊兩個大小不同的鐵罐，比較音高差異

(2) 用手比出哪個高哪個低，答對即可過關

☆結論：物體越大，振動越慢，頻率越低，所以聲音更低沉。

Station 1: High or Low? Big Can vs. Small Can.

1. Strike two cans of different sizes and compare their pitch.

2. Show which one is higher or lower – get it right to pass.

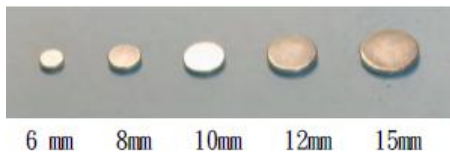
In Conclusion: Larger objects vibrate slower, produce a lower frequency, and result in a lower pitch.

第二關：音高調音師

(1)聽音高題目

(2)利用強力磁鐵在面積相同的兩個鐵罐上調整音高，直到與題目相同即可過關

☆結論：增加強力磁鐵會使鐵罐表面重量增加，進而讓振動變慢，使頻率降低，音高下降。



Station 2: Pitch Tuner

1.Listen to the sound of tin can.

2. Use strong magnets to tune cans of the same size until they match the reference sound.

In Conclusion: Adding strong magnets increases the weight of the can, slowing its vibration and lowering the frequency and pitch.

第三關：聽聲辨物·台語挑戰

1. 先學會唸三張圖卡上的台語：如:便當 (piān-tong)、香蕉 (king-tsio)、火鍋 (hué-ko)

2. 關主隨機敲擊其中一張圖卡的音高，闖關者回答是哪一張

☆結論：台語比起中文，更有旋律感，字與字的連結就像一段又一段的旋律，很適合與音樂做結合。

Station 3: Sound Recognition – Taiwanese Challenge

1.Learn to say three picture cards in Taiwanese.

2.Host plays one pitch pattern, and the player guesses the correct card.

In Conclusion: Compared with Mandarin, Taiwanese has a stronger melodic contour. The connection between characters is like a series of melodies, making it well-suited for integration with music.

終極挑戰：科學小音樂家



1. 挑戰敲擊懸掛鐵罐，抽旋律或台語卡片，唱出後再敲出對應音高

2. 成功挑戰 4 關者可獲得神秘小禮物

結論：鐵罐可以透過不同大小的強力磁鐵來調整音高並達到 12 平均律的標準，它不僅是個罐子，更能像古代的編鐘或編磬一樣，用來演奏音樂。

Final Challenge: Little Scientist Musician

1. Draw a Taiwanese phrase card or a melody card, sing it, then play the matching pitch on the hanging can instrument.

2. Challengers who pass all four stations will receive a mystery gift.

In Conclusion: You can tune a tin can with different sizes of strong magnets to match the twelve-tone equal temperament scale. It's not just a tin can — it can actually be played like ancient Chinese chime instruments to make real music!

肆、參考文獻：

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鄭慧慈。(2008). 聲音的探討—以電腦測音分析陶磬與陶鐘為例 (碩士論文). 國立高雄師範大學工業科技教育學系。