

# 磁之呼吸—舞之型 Dancing Magnets

## 高雄市第 43 屆中小學科學園遊會

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報名類別：國際雙語科學組

類 別：物理類

攤位編號：

## 壹、活動旨趣（目的） The Purposes of the Activity

1. 透過遊戲體驗，了解磁鐵靠近時產生的排斥、吸引的現象。
2. 透過動手操作，了解磁鐵懸浮的奧秘。
3. 設計一系列應用磁鐵特性的遊戲，利用排斥力來控制玩偶旋轉的方向和移動路徑。

1. To understand the principles of magnetic repulsion and attraction through the magnetic games.
2. To understand the mystery of levitating magnet via hands-on activities.
3. Create the magnetic activities by using magnetic repulsion to control the directions of the doll.

## 貳、實驗器材 Experimental Equipment

圓形磁鐵、環形磁鐵、圍棋、玩偶、熱融膠、寶特瓶瓶蓋、氣球座等。

Round magnets, ring magnets, Go pieces, dolls, hot-melt glue, bottle caps, balloon sticks

## 參、關卡設計 Activities Design

（第一關）磁鐵的秘密-吸引與排斥

First Level: The Secrets of Magnets- Attraction and Repulsion



問題 1：當兩個磁鐵互相靠近的時候，會出現什麼結果呢？

問題 2：磁鐵有兩個不同的磁極，一邊是 S 極，一邊是 N 極，什麼時候會互相靠在一起（吸引）？什麼時候會互相遠離（排斥）？

Question 1: What happens when the two magnets get close?

Question 2: A magnet has two different magnetic poles on the end of each side. One is called S (South) pole, and the other is called N (North) pole. What makes the two magnets get close and attract each other? And what makes two magnets push away and repel each other?

**結論：**相同磁極互相靠近時，會互相排斥；不同磁極互相靠近時，會互相吸引。

就算其中一個磁鐵“沒有標示” S 極和 N 極，我們可以用這種方式來找到“沒有標示”的磁極唷！

**In Conclusion:** When the similar magnetic poles get close, they will repel each other; however, when the different magnetic poles get close, they will attract each other. Even though there are no marks of S pole and N pole on one of the magnets; by using the way, we are able to find out which side S pole is and which side N pole is.



### （第二關）磁鐵懸浮術

#### Second Level: The Technique of Magnetic Levitation



（適合低、中年級思考）It is suitable for grade 1 ~ 4 students.

問題 1：猜猜看，這是怎麼做到的？[展示完成圖片](#)

試試看，讓磁鐵懸浮就算成功囉！

問題 2：你利用磁鐵吸引還是排斥原理讓磁鐵懸浮呢？

Question 1: Make a guess, how does the magnet raise and float in the air? (Please see the picture above). Give it a try! Let's make the magnets levitate!

Question 2: Which magnetic principle do you use to make the magnets levitate, attraction or repulsion?



(適合高年級思考) It is suitable for grade 5 ~ 6 students.

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(第三關) 旋轉吧！磁鐵玩偶

Third Level: Let's Spin, Magnetic Doll!



疑？為什麼瓶蓋靠近的時候玩偶就會開始旋轉呢？！

用瓶蓋不同位置靠近磁鐵玩偶時，轉動的方向跟速度也不一樣呢！

Why does the magnetic doll spin when the bottle cap gets close to it? When the different places (green dot or red dot) of the bottle cap get close to the magnetic doll, it spins in different directions and different speed. (Please see the pictures above)

肆、科學原理 **Scientific Principle**



原理一：利用磁鐵相同磁極彼此靠近，產生排斥的現象。

原理二：當一個磁鐵斜放時，與另一個平放的磁鐵產生交互作用，產生的吸引或排斥力有時強、有時弱，因此就會出現旋轉的現象。所以瓶蓋貼上貼紙的地方，就是我們測試過旋轉效果最好的位置。

Principle 1: The similar poles of magnets **repel** each other.

Principle 2: When the magnet is **tilted**, it will interact with the lying magnet on the table. There is magnetic attraction or repulsion between the two magnets (Please see the picture above). Also, the magnetic attraction and repulsion are sometimes strong and sometimes weak, so this causes the lying magnet **spins**. Therefore, in the third activity "Let's Spin, Magnetic Doll", there is a tilted magnet hidden in the bottle cap with the green and red dot stickers. When the places of the dot stickers on the cap get close to the magnetic doll, it spins smoothly and well.

## 伍、參考資料 Reference

國立台中教育大學 科學遊戲實驗室：<https://scigame.ntcu.edu.tw/electric/electric-025.html>