



學校：大仁國中

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一、活動旨趣

透過趣味物理實驗（伯努力長條袋、康達效應氣球）引導遊客體驗空氣的力量，再進一步了解空氣品質指標（AQI）與日常生活行為的關聯，培養環境保護意識，實踐聯合國永續發展目標（SDGs）。

二、活動器材

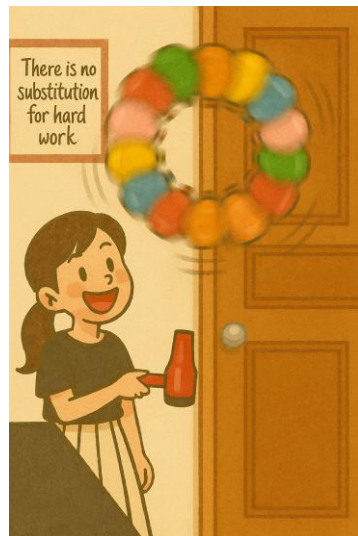
- 長條塑膠袋
- 氣球、吹風機
- AQI 六色卡與數值卡
- 清新大冒險任務卡

三、挑戰任務

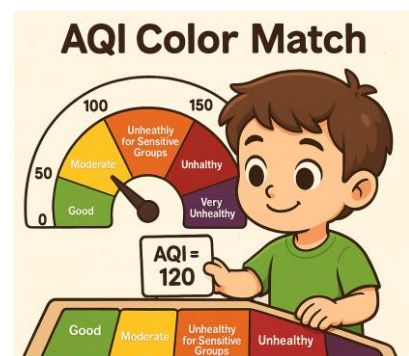
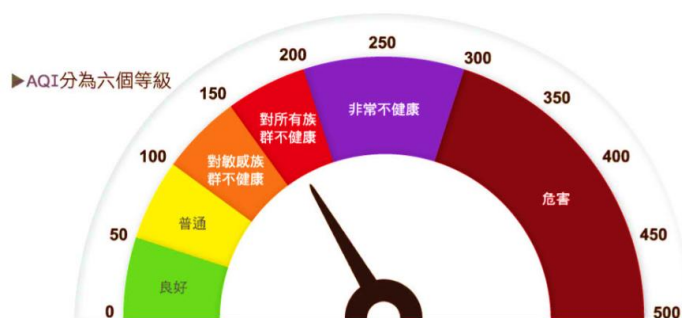
1. **一口氣吹長袋**：挑戰張口吹氣，快速把 1.5 公尺的長條塑膠袋吹滿！



2. **氣球圈轉轉樂**：拿起吹風機，對著氣球圈吹氣，讓它轉圈，並保持連續轉動 5 秒以上，就算成功！



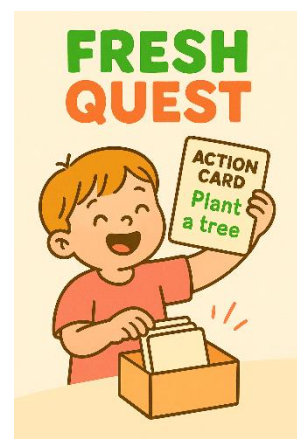
3. **空氣品質對對碰**：抽一張空氣品質數值卡（如 AQI=120），根據 AQI 分級標準，把卡片放到對應的顏色區域（綠色 = 良好、黃色 = 普通、橘色 = 對敏感族群不健康、紅色 = 對所有人不健康……）。配對正確就算成功！



4. **清新大冒險**：從多張「行動卡」中，快速抽出一張並大聲朗讀卡上的內容，表示自己願意執行這個改善空氣品質的小行動。

- 植樹或照顧綠植
- 多搭乘大眾運輸工具
- 隨身攜帶環保袋或水瓶
- 避免焚燒紙錢與垃圾

只要選好並宣示，就完成挑戰！



四、原理解釋

1. 伯努力原理 (Bernoulli's Principle)

- **原理解釋：**流體速度愈快，壓力就愈低。當我們把氣流快速吹進袋子，袋口附近的空氣被捲入，導致袋子能快速充滿。
- **生活案例：**
 - 火車經過時，站在月台邊會感到被吸向火車 → 火車快速移動產生低壓，周圍空氣推動人靠近。
 - 飛機的機翼上方氣流較快、壓力較低，下方壓力較高 → 產生升力讓飛機飛起來。

2. 康達效應 (Coandă Effect)

- **原理解釋：**氣流遇到彎曲的表面時，會「貼著表面走」而不容易直線偏離。這種現象會改變氣流方向，並對物體產生推力或旋轉力。
- **生活案例：**
 - 用吹風機吹氣球，氣球會沿著圈旋轉而不是飛走。
 - 把水從湯匙背面倒下，水會沿著湯匙彎曲往下流，而不是直接垂直滴下。

五、生活應用

- 空污與健康息息相關，AQI 高時應減少戶外活動。
- 搭乘大眾運輸、減少焚香與一次性塑膠，能有效改善空氣品質。
- 人人參與，才能達成 SDG 3 健康與福祉、SDG 11 永續城市、SDG 13 氣候行動。

六、參考資料

- 行政院環境保護署「空氣品質監測網」
- 聯合國永續發展目標 (SDGs) 官方網站
- 科普文章：《隱形殺手—懸浮微粒》
- 翰林版國中自然科學第三冊課本

Air Power × AQI — Play with Air, Protect Our Home!

I. Purpose

Through fun physics experiments (Bernoulli long bag and Coanda effect balloon), visitors experience the power of air, then move on to understand the Air Quality Index (AQI) and how daily actions affect air quality. The activity raises environmental awareness and supports the United Nations Sustainable Development Goals (SDGs).

II. Materials

- Long plastic bags
- Balloons, hair dryer, or air tube
- AQI six-color cards and number cards
- Clean Action Task Cards

III. Challenge Tasks

1. Blow Up the Long Bag!

Can you blow into the bag and fill the entire 1.5-meter plastic bag in no time?

2. Balloon Ring Spin Challenge

Use the hair dryer to blow air at the balloon ring. Make it spin around in circles and keep it moving for more than 5 seconds to succeed!

3. Air Quality Match-Up

Pick an air quality number card (e.g., AQI=120). Using the AQI scale, place the card in the matching color zone (Green = Good, Yellow = Moderate, Orange = Unhealthy for Sensitive Groups, Red = Unhealthy, etc.). A correct match means success!

4. Fresh Air Adventure

From a set of “Action Cards,” quickly draw one and read it out loud to show that you are willing to take this small step to improve air quality. For example:

- Plant trees or take care of greenery
- Take public transportation more often
- Carry a reusable bag or water bottle
- Once you pick a card and make your pledge, you complete the challenge!

IV. Principles Explained

1. Bernoulli's Principle

- **Explanation:** The faster a fluid moves, the lower its pressure becomes. When air is blown quickly into the bag, the surrounding air near the opening is drawn in, causing the bag to inflate rapidly.
- **Everyday Examples:**
 - When a train passes by, people standing on the platform may feel pulled toward it. The fast-moving train creates low pressure, and the surrounding air pushes them closer.
 - On an airplane wing, the air moves faster above (lower pressure) and slower below (higher pressure), creating lift that allows the plane to fly.

2. Coandă Effect

- **Explanation:** When a stream of fluid meets a curved surface, it tends to “stick” to the surface rather than flow straight away. This changes the direction of the airflow and generates thrust or rotational force on the object.
- **Everyday Examples:**
 - When blowing a balloon with a hair dryer, the balloon spins along the airflow instead of flying away.
 - When water is poured onto the back of a spoon, it curves and flows along the spoon instead of dripping straight down.

V. Daily Applications

- Air pollution directly affects health; avoid outdoor activities when AQI is high.
- Using public transport, reducing incense burning, and cutting single-use plastics improve air quality.
- Everyone's participation contributes to SDG 3 Health, SDG 11 Sustainable Cities, and SDG 13 Climate Action.

VI. References

- Environmental Protection Administration, Taiwan: Air Quality Monitoring Network
- United Nations Sustainable Development Goals (SDGs) official site
- Popular Science Article: *Invisible Killer – Suspended Particulates*
- Hanlin Junior High School Science Textbook, Book 3