活動名稱：讓我們看「雲」趣(2.0)！

校名：前金國中　　【 攤位編號：D602 】

指導老師：殷宏良、吳采坪、蔡嘉慧、翁仲甫

一、活動目的：

(一)奠定本市學生科學教育基礎，培養學生參與科學活動之興趣。
(二)寓教於樂，讓參與人員在活動中獲得大氣科學知識及技能，並藉以推動全民科學教育。
(三)發揮動態之教學功能，培養學生科學概念、科學態度及科學方法，以提升學生科學素養。

二、活動對象：本市學生及一般民眾

三、闖關流程：

闖關活動說明

第一關
【雲從哪裡來？】

第二關
【認識雲的家族】

第三關
【帶一朵雲回家】

闖關成功：蓋章

紀念品：自製雲朵熱縮片

GLOBE 前金 大氣觀測團

四、活動器材：

項目名稱	器材
第一關 【雲從哪裡來？】	汽水加壓器(雲霧製造器) 、寶特瓶、75%酒精(噴霧罐)
第二關 【認識雲的家族】	十大雲屬簡介海報、雲朵拼圖板(雲朵圖卡及天空白板)
第三關 【帶一朵雲回家】	熱縮片、彩色奇異筆、切割墊、十大雲屬圖畫模板、 打洞器、烤箱

五、關卡內容

第一關：【雲從哪裡來？】

活動目的：利用汽水加壓器(雲霧製造器)，讓參加民眾透過原理說明並配合實際動手操作，了解「雲如何生成」。

科學原理：寶特瓶打氣之後，內部的空氣壓力大於一大氣壓，當快速拔開瓶塞時，壓力瞬間降低。寶特瓶內的壓力突然降低時，會有二個現象同時發生：(1)溫度降低，因為氣體急速膨脹時，會吸收熱量。如同噴殺蟲劑時，可以感覺到殺蟲劑的罐子變得涼涼的（罐子裡的氣體噴出來，急速膨脹）。(2)由於壓力急速降低，寶特瓶內的水會產生蒸發的現象，亦即產生水蒸氣。而產生的水蒸氣由於溫度降低，因此就凝結成肉眼看得到的雲霧了。

操作流程：

步驟 1. 使用噴霧罐在寶特瓶中噴入少量 75%酒精。

步驟 2. 在寶特瓶瓶口處鎖緊汽水加壓器。

步驟 3. 按壓汽水加壓器，進行寶特瓶灌氣加壓，觀察寶特瓶中發生的現象，並用手捏捏寶特瓶瓶身，感覺壓力與溫度。

步驟 4. 按壓汽水加壓器 10 下後，開啟汽水加壓器進行寶特瓶洩氣，觀察寶特瓶中發生的現象，並用手捏捏寶特瓶瓶身，感覺壓力與溫度。

步驟 5. 說出加壓前後，寶特瓶中發生的現象、壓力與溫度有何變化。

第二關：【認識雲的家族】

活動目的：運用十大雲屬海報簡介，讓參加民眾認識十大雲屬特色區別及天氣現象，並配合猜猜看遊戲，增加學習樂趣與生活常識。

科學原理：空中的雲，根據它們的形狀和高度來區分雲的基本型式，一般分成四族十屬，下列圖表是它們的簡單分類及特性描述：

雲族	種類	特徵	高度
高雲族	1 卷雲 Ci	纖維狀	高層 (5~13公里)
	2 卷積雲 Cc	鉤狀	
	3 卷層雲 Cs	淡層狀	
中雲族	5 高積雲 Ac	中度鉤狀	中層 (2~7公里)
	6 高層雲 As	中度層狀	
	9 雨層雲 Ns	濃層狀	
低雲族	8 層積雲 Sc	濃鉤狀	低層 (2公里以下)
	10 層雲 St	濃層狀	
直展雲族	7 積雲 Cu	堡狀	雲底在低層雲頂到高層
	4 積雨雲 Cb	堡狀	

活動流程：

步驟 1. 參加學生及民眾向活動關主領取一張天空白板。

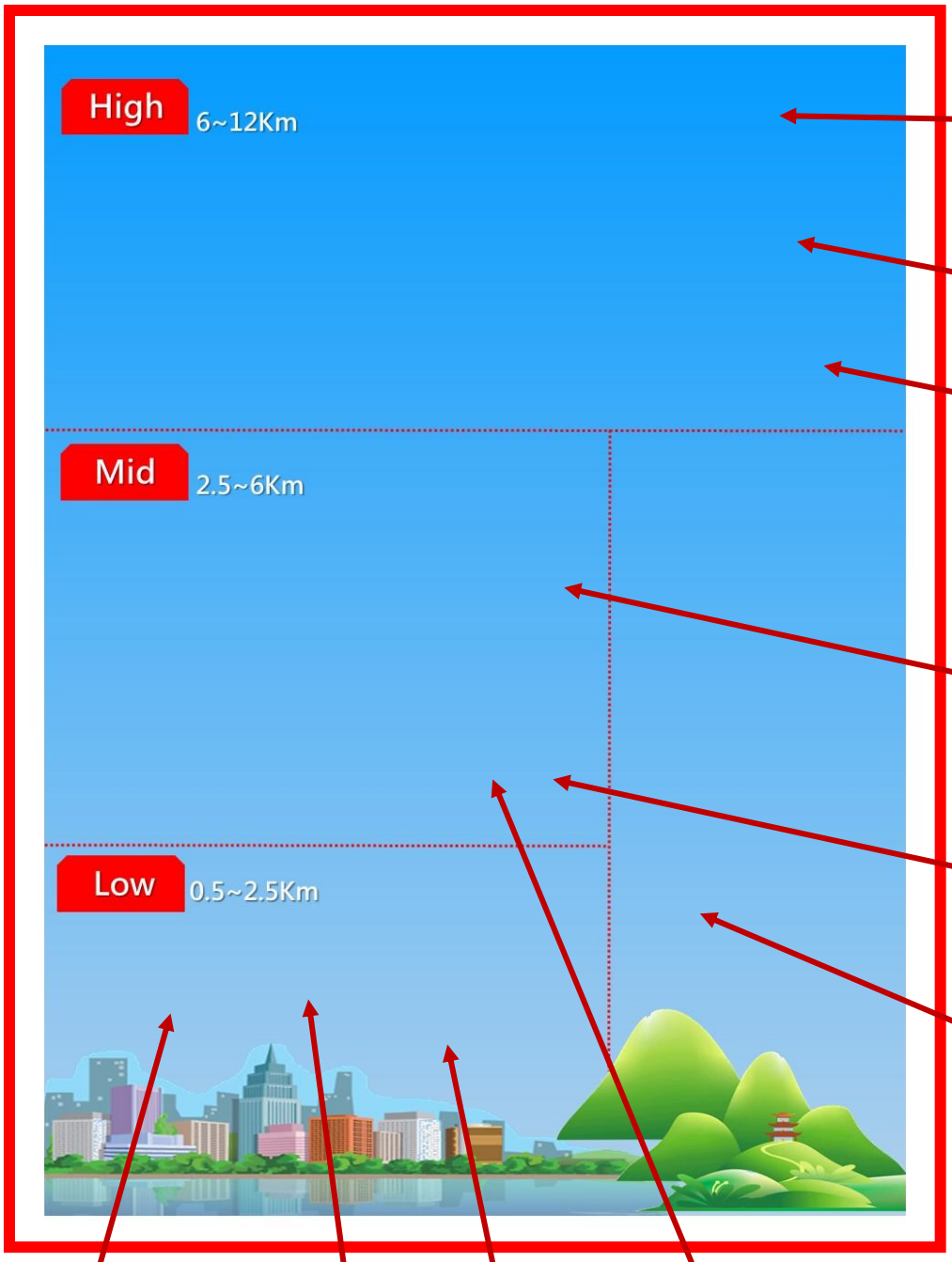
步驟 2. 活動關主向參加學生及民眾介紹十大雲屬形狀、特性和高度。

步驟 3. 參加學生及民眾將雲朵圖卡擺放在天空白板上相對應的位置。

步驟 4. 十大雲屬的雲朵圖卡擺放至正確位置即可過關。

步驟 5. 針對無法擺放正確的雲朵圖卡，活動關主將再加以說明及引導，直到擺放正確位置過關。

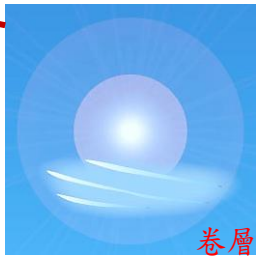
【天空白板】



【雲朵圖卡】


卷雲 Ci


卷積雲 Cc


卷層雲 Cs

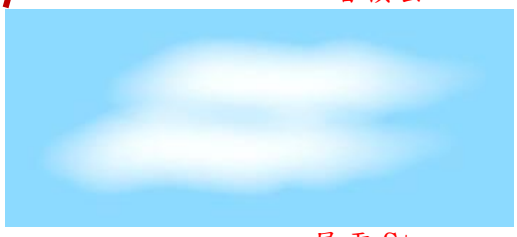

高積雲 Ac


高層雲 As


積雨雲 Cb


層積雲 Sc


雨層雲 Ns


層雲 St


積雲 Cu

【認識雲的家族—拼圖解答】


高雲
6至12km
卷積雲
晴天時出現，雲塊很小，呈白色鱗片狀，常成群整齊地排列，像微風吹過水面形成的小波紋。
卷雲
晴天時出現，具有纖維狀結構，薄而纖細，形如細絲，通常為白色，日出前和日落後呈黃色或紅色。
卷層雲
晴天時出現，均勻成層，為透明或乳白色，能看見日月輪廓，常伴有日暈或月暈。若其增厚，天氣可能轉陰。
中雲
2.5至6km
高積雲
晴天時出現，雲塊較小，常呈扁圓形、魚鱗片或水波狀，成群整齊地排列。
高層雲
陰天時出現，均勻成層，呈灰白色或灰色，佈滿天空。
雨層雲
陰天時出現，呈灰暗色，佈滿天空，完全遮蔽日月，常伴有連續降雨。
積雨雲頂部
積雨雲
陰天時出現，常伴有雷雨，雲濃而厚，龐大如聳立的高山，頂部輪廓模糊，雲底陰暗，雷雨過後天氣則會好轉。
低雲
0.5至2.5km
層積雲
晴天時出現，雲塊較大，呈灰白色或灰色，底部有明顯的波浪起伏。
層雲
陰天時出現，雲底很低，呈灰色，像霧，常將小山頂部籠罩，可能會降下小雨。
積雲
晴天時出現，光照到的部分潔白光亮，雲底較暗。若雲層變濃，表示可能會有驟雨。

第三關：【帶一朵雲回家】

活動目的：以熱縮片為媒材，讓參加民眾親自動手創作一朵雲，除了加深各種雲的形狀印象，更可以啟發想像力，並且作為收藏紀念。

活動流程：

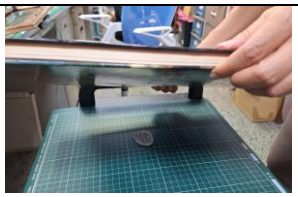
步驟 1. 選擇一張喜歡的雲造型圖卡，以油性筆畫出在熱縮片的光滑面上。

步驟 2. 為雲朵塗上顏色。(使用色鉛筆時，需畫在霧面上)

步驟 3. 使用打洞器在熱縮片上打洞。

步驟 4. 將熱縮片交給關主，進烤箱烘，當縮片不再縮小時，取出，以厚書壓扁。

步驟 5. 將作品放上手機吊線，即全部闖關成功。作品帶回家作為紀念。

1. 描繪圖案並打洞	2. 將完成圖片交給關主，進烤箱	3. 出烤箱，以精裝書壓平
		 
以油性筆先畫出外框，再進行彩繪。並先打洞。	烤箱預熱 3 分鐘，放入作品約 30 秒就會完成。(當作品往上翻，再往下縮小至最小，就可拿出烤箱。	不再縮小的作品拿出烤箱，以精裝書壓平，完成雲朵紀念小裝飾。

Let's Explore "Cloud" Fun (2.0)!

Event Name: Let's Explore "Cloud" Fun (2.0)!

School Name: Cianjin Junior High School [Booth Number: D602]

Instructors: Hungliang Yin, Tasiping Wu, Chiahui Tsai, Chungfu Weng

I. Objectives:

(1) To establish a foundation in scientific education for students and cultivate their interest in participating in scientific activities.

(2) To integrate education with entertainment, allowing participants to gain knowledge and skills in atmospheric science through the event, thus promoting science education for all.

(3) To utilize dynamic teaching methods to foster students' understanding of scientific concepts, scientific attitudes, and scientific methods, thereby enhancing their scientific literacy.

II. Target Audience: Students in this city and the general public

III. Challenge Process:

Instructions for the Challenge

Where do clouds come from?

↓

Getting to Know the Cloud Family

↓

Bring a Cloud Home

→ Successfully Completed: Stamp

Souvenir: Handmade Cloud Shrink Plastic.

IV. Equipment:

Challenge Name	Equipment
First Checkpoint ["Where Do Clouds Come From?"]	Soda Pump (Cloud generator), plastic bottles, 75% alcohol (spray bottle)
Second Checkpoint ["Getting to Know the Cloud Family"]	Introduction posters for the ten major cloud genera, cloud puzzle boards (cloud picture cards and sky whiteboards)
Third Checkpoint ["Bring a Cloud Home"]	Shrink plastic, colored markers, cutting mats, templates for the ten cloud genera's pictures, hole punch, oven

V. Challenge Content

Checkpoint One: "Where Do Clouds Come From?"

Objective:

To use a soda pump (cloud generator) to help participants understand the science behind cloud formation through an explanation of the principles and hands-on experience.

Scientific Principle:

After pressurizing a plastic bottle, the internal air pressure becomes greater than the atmospheric pressure. When the bottle cap is quickly removed, the pressure rapidly decreases. Two phenomena occur simultaneously: (1) The temperature decreases because the gas expands rapidly, absorbing heat. Similar to the sensation when spraying insecticide, you can feel that the insecticide can become cool (the gas inside the can sprays out rapidly and expands). (2) Due to the rapid pressure drop, the water inside the soda bottle undergoes evaporation, forming water vapor. As the water vapor cools, it condenses into visible clouds.

Procedure:

Step 1. Spray a small amount of 75% alcohol into the plastic bottle.

Step 2. Securely attach the soda pump to the bottle's mouth.

Step 3. Press the soda pump to pressurize the plastic bottle, observe the phenomena inside the bottle, and use your hand to feel the pressure and temperature.

Step 4. After pressing the soda pump ten times, open it to release the pressure from the plastic bottle. Observe the phenomena inside the bottle and use your hand to feel the pressure and temperature.

Step 5. Describe the changes in phenomena, including pressure and temperature inside the plastic bottle before and after pressurization.

Checkpoint Two: "Getting to Know the Cloud Family

Objective:
Through an introduction to ten major cloud genera, participants will learn about the distinctive characteristics and weather phenomena of the ten major cloud genera. Combined with a guessing game, this activity aims to enhance the pleasure of learning and common knowledge.

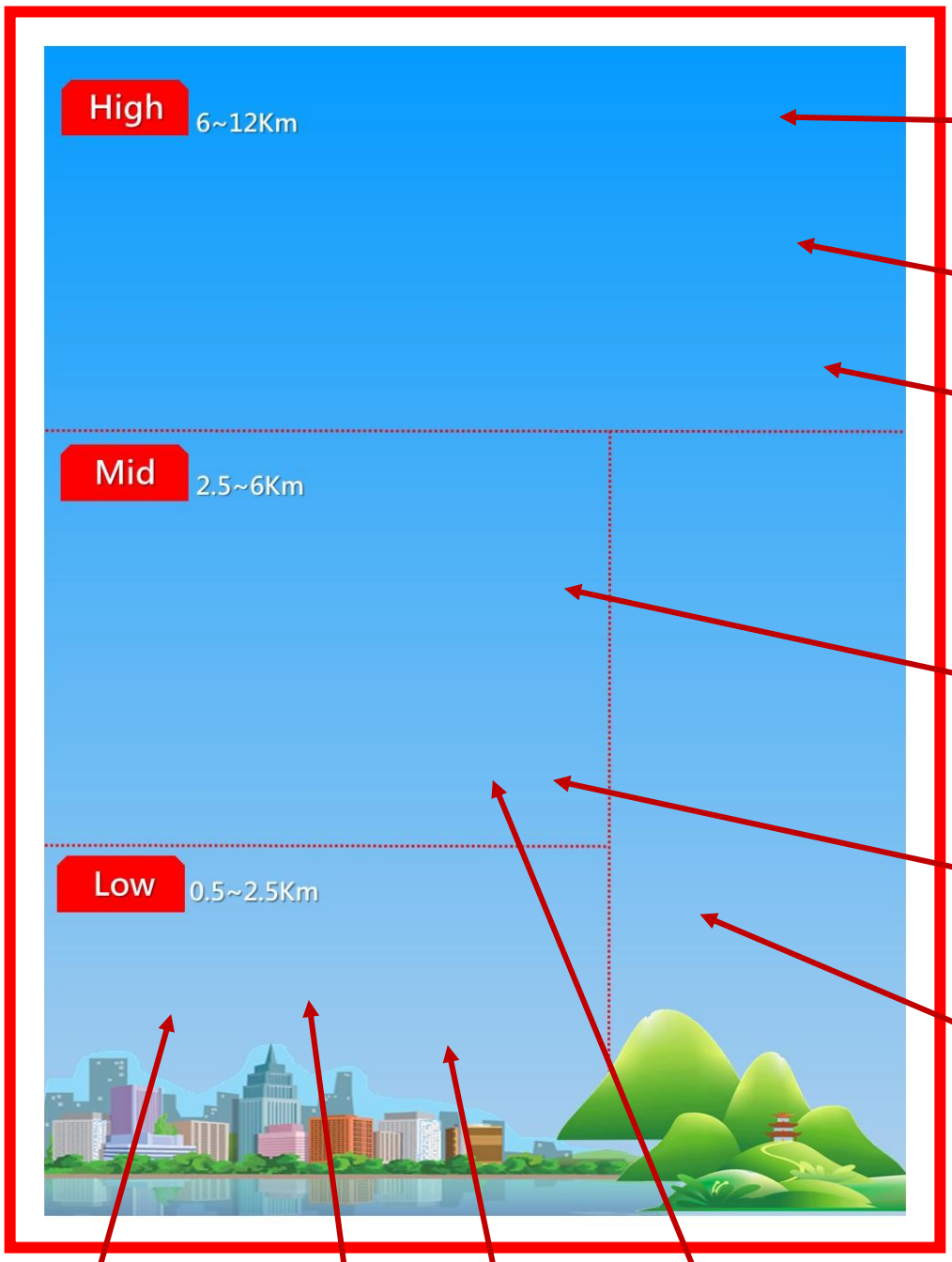
Scientific Principle:
Clouds in the sky are classified into basic types based on their shape and altitude, generally divided into four families with ten genera. The following chart provides a simple classification and description of their characteristics:

Family	Genus	Characteristics	Altitude
High Clouds	①Cirrus (Ci)	thin fibrous	High altitude (6~12km)
	②Cirrocumulus (Cc)	white small grain or scale-like aligned in ripples	
	③Cirrostratus (Cs)	veil-like layer	
Middle Clouds	⑤Altocumulus (Ac)	lump or heap-like clouds aligned in rows	Middle altitude (2.5-6km)
	⑥Altostratus (As)	medium layer	
	⑨Nimbostratus (Ns)	dense layer	
Low Clouds	⑧Stratocumulus (Sc)	a layer of cloud clumps with thick and thin areas	Low altitude (0.5-2.5km)
	⑩Stratus (St)	dense layer	
Clouds with Vertical Development	⑦Cumulus (Cu)	fort-like	Cloud Bottom are in low altitude and tops can up to high altitude.
	④Cumulonimbus(Cb)	fort-like	

Activity Procedure:
Step 1. Participants receive a sky whiteboard from the checkpoint host.
Step 2. The checkpoint host introduces the shapes, characteristics, and altitudes of the ten major cloud genera to the participants.
Step 3. Participants place cloud picture cards on the sky whiteboard in their corresponding positions.
Step 4. Participants who place all the cloud picture cards correctly can pass the checkpoint.
Step 5. As for those who cannot place cards correctly, the checkpoint host will provide further explanations and guidance until they can pass the checkpoint.

【sky whiteboard】

【cloud picture cards】



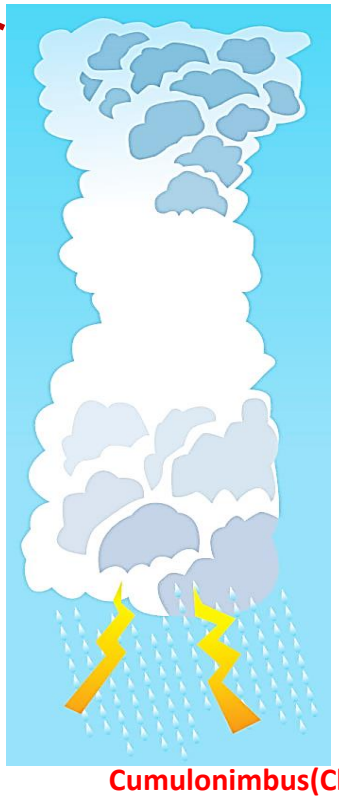

Cirrus (Ci)


Cirrocumulus (Cc)


Cirrostratus (Cs)


Altocumulus (Ac)


Altostratus (As)

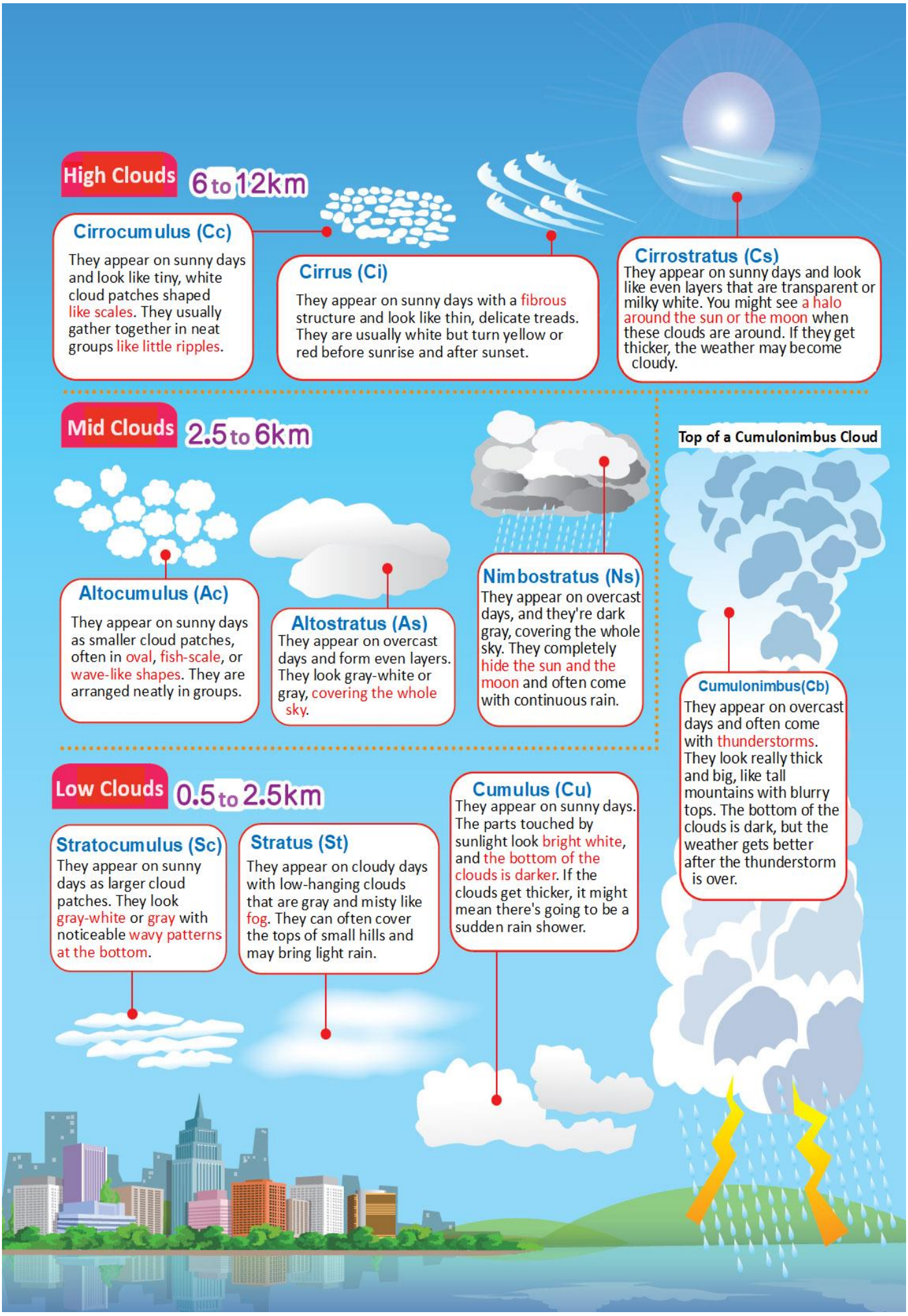

Cumulonimbus(Cb)


Nimbostratus (Ns)


Stratocumulus (Sc)


Stratus (St)


Cumulus (Cu)


High Clouds
6 to 12km
Cirrocumulus (Cc)
They appear on sunny days and look like tiny, white cloud patches shaped like scales. They usually gather together in neat groups like little ripples.
Cirrus (Ci)
They appear on sunny days with a fibrous structure and look like thin, delicate treads. They are usually white but turn yellow or red before sunrise and after sunset.
Cirrostratus (Cs)
They appear on sunny days and look like even layers that are transparent or milky white. You might see a halo around the sun or the moon when these clouds are around. If they get thicker, the weather may become cloudy.
Mid Clouds
2.5 to 6km
Altocumulus (Ac)
They appear on sunny days as smaller cloud patches, often in oval, fish-scale, or wave-like shapes. They are arranged neatly in groups.
Altostratus (As)
They appear on overcast days and form even layers. They look gray-white or gray, covering the whole sky.
Nimbostratus (Ns)
They appear on overcast days, and they're dark gray, covering the whole sky. They completely hide the sun and the moon and often come with continuous rain.
Top of a Cumulonimbus Cloud
Cumulonimbus(Cb)
They appear on overcast days and often come with thunderstorms. They look really thick and big, like tall mountains with blurry tops. The bottom of the clouds is dark, but the weather gets better after the thunderstorm is over.
Low Clouds
0.5 to 2.5km
Stratocumulus (Sc)
They appear on sunny days as larger cloud patches. They look gray-white or gray with noticeable wavy patterns at the bottom.
Stratus (St)
They appear on cloudy days with low-hanging clouds that are gray and misty like fog. They can often cover the tops of small hills and may bring light rain.
Cumulus (Cu)
They appear on sunny days. The parts touched by sunlight look bright white, and the bottom of the clouds is darker. If the clouds get thicker, it might mean there's going to be a sudden rain shower.

Checkpoint Three: "Bring a Cloud Home"

Objective:

Participants can make a cloud with their own hands by using shrink plastic as a material. This not only deepens their impression of various cloud shapes but also sparks their imagination. The clouds created can be kept as mementos.

Activity Procedure:

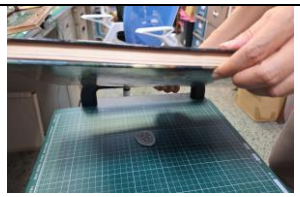
Step 1: Choose a cloud card that you like and draw it on the smooth side of the shrink plastic with oil-based markers.

Step 2: Color the cloud. (When using colored pencils, be sure to color on the frosted side.)

Step 3: Make a hole in the shrink plastic with a hole punch.

Step 4: Hand over the shrink plastic to the checkpoint host, who will bake it in the oven, take it out when the shrink plastic stops shrinking and flatten it with a heavy book.

Step 5: Attach your artwork to a mobile phone strap, and you've successfully completed all the checkpoints. Take your creation home as a memento.

1. Draw a picture and punch a hole	2. Hand over the completed picture to the checkpoint host to put it in the oven.	3. Remove from the oven and flatten it with a hardcover book.
		 
Outline with an oil-based marker, then color and punch a hole.	Preheat the oven for 3 minutes, and place the artwork inside for about 30 seconds to complete. (When the artwork is flipped up and then scaled down to its smallest size, it can be taken out of the oven.	Remove the artwork from the oven, and flatten it with a hardcover book to finish the cloud-themed memorial ornament.