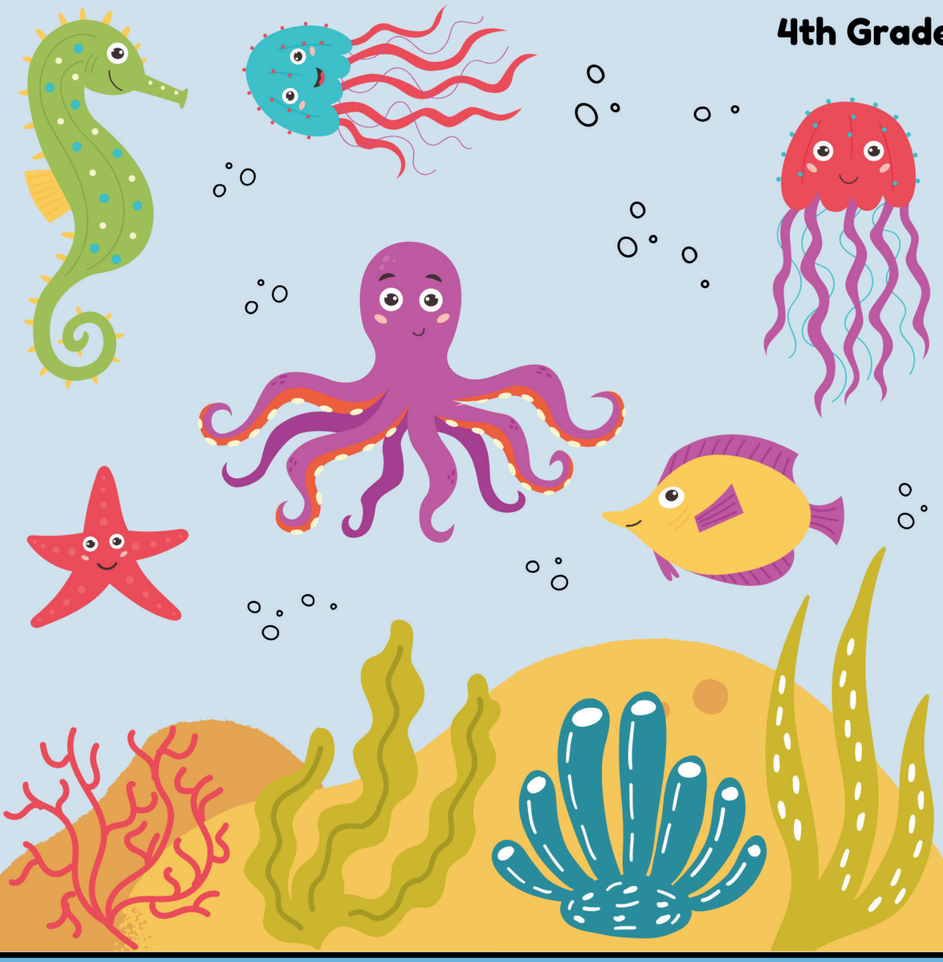
英語授課用語

國小自然科學領域

雙語教學資源手冊

Natural Sciences
4th Grade



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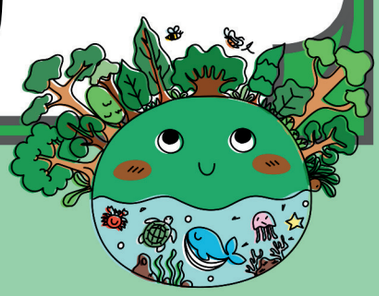
國立臺北教育大學雙語教學研究中心

Table of Contents

Unit 1

Stillness and Movement on the Earth's Surface

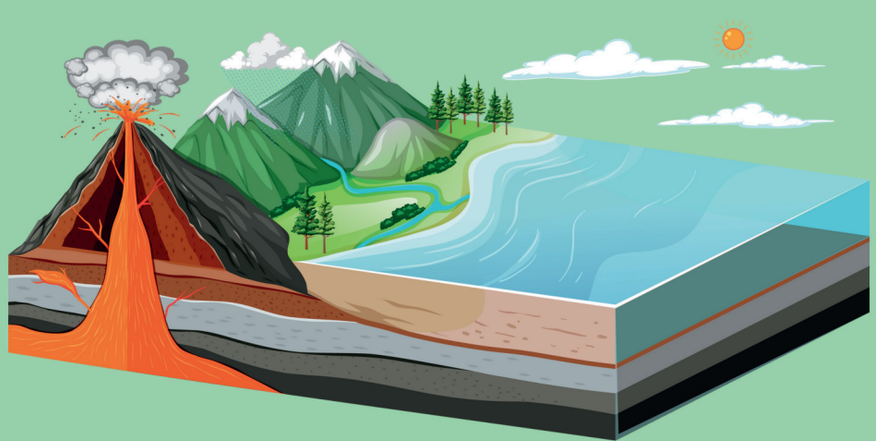
地表的靜與動



Lesson Overview 課程簡介

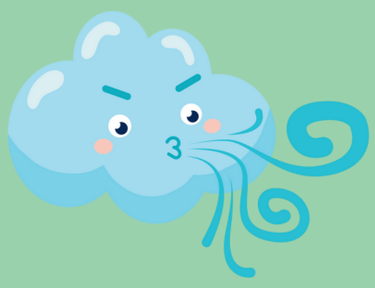
The Earth's surface environment is made up of living things and non-living things. Living things need air and water to survive. Non-living things include rock, sand and soil. The Earth's surface environment can change because of wind, flowing water and human activities. To protect it, do not deforest, do not plant on slopes, and do not dig riverbeds. It can also change because of earthquakes. Make sure that you know what to do before, during and after an earthquake to reduce disasters.

地球表面環境由生物和非生物組成。生物需要空氣和水才能生存；非 生物包括岩石、沙子和土壤。地球表面環境會因風、流水和人類活動而發生變化。為了保護它，我們不要砍伐森林、不要在斜坡上種植並且不開挖河川地。地球表面環境也可能因地震而改變， 請確保你知道在地震之前、地震期間和地震之後該做什麼，以減少災害的發生。



Stillness and Movement on the Earth's Surface
地表的靜與動

- Surface environment 地表環境
  - Examples of surface environment are mountain, plain, forest, river and ocean. 地表環境例子有高山、平原、森林、河流、海洋。
  - Parts 組成部分
    - Living things 生物
      - Living things need air and water to survive, and some can only live in specific environments. 生物需要空氣與水存活，有些只能要在特定環境生存。
      - Watermelon, rice, bird and crab are living things. 西瓜、水稻、鳥、螃蟹都是生物。
    - Non-living things 非生物
      - A rock is big and rough. 岩石顆粒大及粗糙。
      - Sand is smaller than rock, and it is powdery. 沙子比岩石小，粉末狀。
      - Soil is smaller than rock and sand, and it is fine. 土壤比岩石和沙子小，而且細緻。
- Changes in the surface environment 地表環境變動
  - Wind and flowing water 風與流水
    - Wind and flowing water can move surface materials to other places and pile them up. 風和流水可以將地表物質移動到其他地方並堆積起來。
    - The stronger the wind and/or flowing water, the farther the surface material will move. 風和/或流水越強，地表物質就會移動得越遠。
    - Smaller surface materials move farther than bigger ones. 較小的地表物質比較大的地表物質移動得更遠。
  - Human impact 人類造成的影響
    - **Deforested areas are prone to landslides during rainfall. 森林砍伐地區容易在降雨時產生土石流。**
    - **Soils are washed into rivers by rainwater, causing river beds to be destroyed. 土壤會被雨水沖刷到河流導致河床被破壞。**
  - Protect the surface environment 保護地表環境
    - Do not deforest, plant on slopes, and fix rivers. 不要砍伐森林、在斜坡上種植和整治河流。
- Earthquake safety tips 地震安全措施
  - Make sure that you know what to do before, during and after an earthquake. 確保你知道在地震之前、期間和之後該做什麼。



Words and Phrases
單字與片語

1-1 Description of the surface environment 地表環境有什麼

☐ stillness	靜止	☐ movement	移動
☐ surface	地表；表面	☐ environment	環境
☐ living thing	生物	☐ non-living thing	非生物
☐ survival	生存(n.)	☐ survive	生存(v.)
☐ water	水	☐ air	空氣
☐ rock	礫石	☐ sand	沙子
☐ soil	土壤		

1-2 Changes in the surface environment 地表環境會變動嗎

☐ wind	風	☐ flowing water	活水；流水
☐ surface material	地表物質	☐ landslide	土石流
☐ deforestation	森林砍伐(n.)	☐ deforest	森林砍伐(v.)

1-3 Earthquake safety tips 怎麼做好地震防災

☐ earthquake	地震	☐ safety	安全
☐ first aid kit	急救箱	☐ drill	演練
☐ escape route	逃生路線	☐ elevator	電梯
☐ electrical equipment	電器設備	☐ disaster prevention hood	防災頭套

Key Concepts
課程焦點

1-1 Description of the surface environment 地表環境有什麼

1.Different surface environments have different characteristics.
不同的地表環境有不同的特點。
2.Living things need air and water to survive, and some can only live in specific environments.
生物需要空氣與水存活，有些只能要在特定環境生存。

1-2 Changes in the surface environment 地表環境會變動嗎

1.Wind, flowing water and human activities can change the surface environment.
風、流水和人類活動會改變地表的環境
2.To protect the environment, do not deforest, do not plant on slopes, and do not dig riverbeds.
為了保護環境，不要砍伐森林、在斜坡上種植以及開挖河川地。

1-3 Earthquake safety tips 怎麼做好地震防災

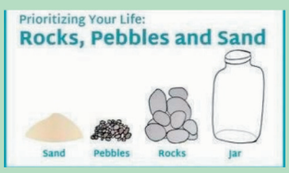
1.Make sure that you know what to do before, during and after an earthquake.
確保你知道在地震之前、期間和之後該做什麼。

References
參考資訊

1-1 Types of Landforms

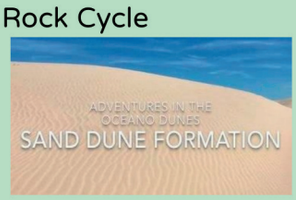
1-1 Animal Habitats | Animal Homes

1-1 Rocks, Pebbles and Sand



1-1 Earth Materials

1-2 Sand Dune Formation and the Rock Cycle



1-2 Weathering and Erosion for Kids

1-2 Weathering, Erosion and Deposition Experiment

1-2 Habitat Destruction

1-3 What is an Earthquake?

1-3 The Earthquake Plan

Unit 2

Aquatic Life and the Environment
水生生物與環境

Lesson Overview 課程簡介

Taiwan has a rich aquatic environment. Aquatic plants and aquatic animals live in this environment. There are four types of aquatic plants: floating plant, floating-leaf plant, emergent plant, and submerged plant. There are many kinds of aquatic animals such as fish, snail, crab, turtle, tadpole, frog and shrimp. Pollution is harmful to the aquatic environment. To care for the aquatic environment, do not litter, do not catch aquatic animals, but and do join beach cleaning activities.

臺灣擁有豐富的水域環境，其中有水生植物和水生動物。水生植物有四種類型：漂浮植物、浮葉植物、挺水植物和沈水植物；水生動物種類繁多，如魚、蝸牛、螃蟹、烏龜、蝌蚪、青蛙和蝦。 污染對水域環境是有害的。愛護水域環境，我們應該不亂扔垃圾、不抓水生動物、參加淨灘活動等。

Aquatic Life and the Environment
水生生物與環境

Aquatic environments 水域環境

- Examples of aquatic environment are stream, lake, paddy field, pond, intertidal zone and ocean.
  水域環境的例子有溪流、湖泊、稻田、池塘、潮間帶和海洋。
- When going to an aquatic environment, you can bring a fishing net, picture book, binoculars and bucket. Wear suitable clothing.
  到水域環境時，可以準備撈網、圖鑑、望遠鏡、水桶及穿著適合的服裝。

Aquatic plants 水生植物

- Floating plant 漂浮性植物
  - The leaves float on water and the roots hang in the water.
    葉子浮在水面上，根懸在水面上。
    - water lettuce, duckweed, common water hyacinth
      大萍、浮萍、布袋蓮
- Floating-leaf plant 浮葉性植物
  - The flowers are above water, the leaves float on water and the roots are in the soil.
    花在水面上，葉子浮在水面上，根在土裡。
    - water lily, yellow water-lily
      睡蓮、臺灣萍蓬草
- Emergent plant 挺水性植物
  - The flowers and leaves are above water and the roots are in the soil.
    花、葉在水之上，根在土裡。
    - lotus, cattail
      荷花、香蒲
- Submerged plant 沉水性植物
  - The leaves are below water and the roots are in the soil.
    葉子在水下，根在土壤中。
    - large-flowered waterweed
      水蘊草

Aquatic animals 水生動物

- Examples of aquatic animal are fish, snail, crab, turtle, tadpole, frog and shrimp.
  水生動物的例子有魚、蝸牛、螃蟹、烏龜、蝌蚪、青蛙和蝦。

Take care of the environment 愛護環境

- Harmful for the environment 有害環境
  - Throwing garbage in aquatic environments causes pollution.
    將垃圾扔在水域環境中會造成污染。
  - Overuse of pesticides causes pollution.
    過度使用農藥會造成污染。
  - Wastewater from factories causes coral bleaching.
    來自工廠的廢水會導致珊瑚白化。
- Helpful for the environment 有益環境
  - Do not throw trash in aquatic environments.
    不要將垃圾扔在水域環境中。
  - Do not catch aquatic animals.
    不要捕捉水生動物。
  - Join beach cleaning activities.
    參加淨灘活動。

Words and Phrases
單字與片語

2-1 Do all living things live in the same environment?
生物生存的環境都相同嗎？

- ☐ aquatic 水生的
- ☐ aquatic environment 水域環境
- ☐ stream 溪流
- ☐ lake 湖泊
- ☐ paddy field 水田
- ☐ ecological pond 生態池
- ☐ intertidal zone 潮間帶
- ☐ ocean 海洋
- ☐ wetland 濕地

2-2 How aquatic plants and animals adapt to their environment?
水生生物如何適應環境？

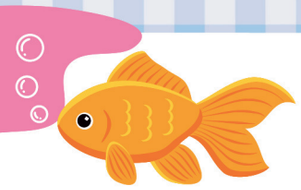
- ☐ aquatic plant 水生植物
- ☐ floating plant 漂浮性植物
- ☐ floating-leaf plant 浮葉性植物
- ☐ emergent plant 挺水性植物
- ☐ submerged plant 沉水性植物
- ☐ petiole 葉柄
- ☐ hollow 空心的
- ☐ leaf/leaves 葉子
- ☐ flower 花
- ☐ stem 莖
- ☐ root 根
- ☐ body 軀幹
- ☐ lungs 肺
- ☐ gill cover 鰓蓋
- ☐ fin 鰭
- ☐ breathing structures 呼吸結構

2-3 How to take care of the environment?
如何愛護環境？

- ☐ pollution 汙染
- ☐ pesticide 殺蟲劑
- ☐ wastewater 廢/汙水
- ☐ coral reef 珊瑚礁
- ☐ coral bleaching 珊瑚白化

Key Concepts

課程焦點



2-1 Do all living things live in the same environment?
生物生存的環境都相同嗎？

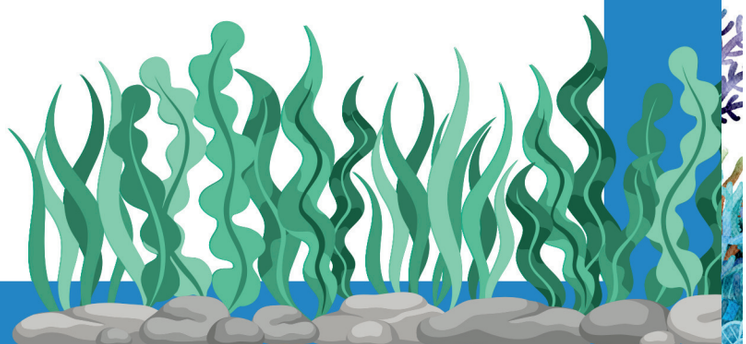
1.When going to an aquatic environment, you can bring a fishing net, picture book, binoculars and bucket. Wear suitable clothing.
到水域環境時，可以準備撈網、圖鑑、望遠鏡、水桶及穿著適合的服裝。

2-2 How do aquatic plants and animals adapt to their environment?
水生生物如何適應環境？

1.Aquatic plants have special structures to help them live in water.
水生植物有特殊構造幫助它們在水中生活。

2-3 How to take care of the environment? 如何愛護環境？

1.Do not throw trash in aquatic environments.
不要將垃圾扔在水域環境中。
2.Do not catch aquatic animals.
不要捕捉水生動物。
3.Join beach cleaning activities.
參加淨灘活動。



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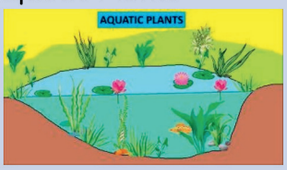
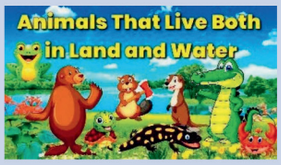
2-1 13 Animals Live on Trees

2-1 Explore Aquatic Habitats

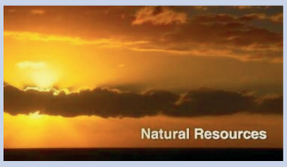
2-2 CBSE: Class 4: Science: Aquatic Plants



2-2 Animals that Live Both in Land and Water



2-3 Natural Resources for Kids



2-3 Natural Resources eLearning Video Lesson for Kids

2-3 How Kids Can Protect Water Sources

2-3 Save Our Ocean from Plastic Pollution

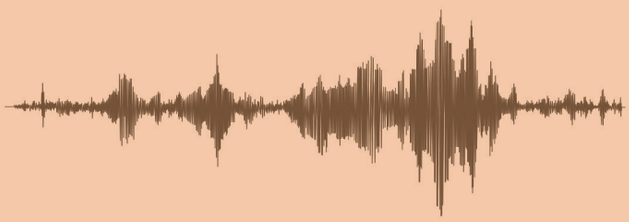
Unit 3

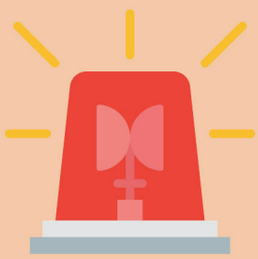
Interesting Sound and Light Phenomenon
有趣的聲光現象

Lesson Overview 課程簡介

Sound and light are always around us, but how are they produced? Sound is produced when an object vibrates. It can travel through gas, liquid and solid. Light comes from different sources like the Sun and lit candle. It travels in a straight line. When light hits a mirror, it is reflected. Reflected light also travels in a straight light. When an object blocks light, it forms a shadow. Sound and light can be used for decoration, entertainment, signal or warning.

聲音和光隨時都在我們身邊，但我們想知道它們是怎麼產生?物體振 動時會產生聲音，它可以透過氣體、液體和固體來傳播。光來自不同的 來源，例如太陽和點燃的蠟燭，它是直線前進的。當光線照射到鏡子上 時，它會被反射，反射光也是直線前進的；當物體把光線擋住時，物體 會產生陰影。聲音和光可用於裝飾、娛樂、信號或是警示作用。





Interesting Sound and Light Phenomenon
有趣的聲光現象

Sound 聲音

- Sound is produced when an object vibrates.
  聲音是由物體振動產生。
- Sound can travel through gas, liquid and solid.
  聲音透過氣體、液體、固體傳播。

Light 光

- Light comes from different sources like the Sun and lit candle.
  光來自不同光源，例如太陽、點燃的蠟燭。
- Light travels in a straight line.
  光是直線行進的。
- Shadow forms when an object blocks light.
  光被物體阻擋形成影子。

Reflection 反射

- When light hits a mirror, it is reflected.
  光照射到鏡子時，光會產生反射。
- Reflected light also travels in a straight line.
  反射的光也是直線行進的。
- When light hits a smooth and shiny object, mirror-like reflections are produced.
  當光線照射到光滑而有光澤的物體上時，會產生鏡面反射。

Applications 應用

Decoration 裝飾

- Music box and lights are used as Christmas decorations.
  音樂盒與光用作聖誕裝飾。

Entertainment 娛樂

- Toys with sound and light, hot air balloon and light sculpture concert provide entertainment.
  聲光玩具、熱氣球和燈光雕塑音樂會提供娛樂。

Signal 信號

- Bicycle bell and light from lighthouse send signal.
  自行車鈴和燈塔發出信號。

Warning 警示

- Carbon monoxide detection alarm and ambulance warning light send warning.
  一氧化碳檢測報警器和救護車警示燈發出警示作用。

Words and Phrases

單字與片語

3-1 How sound is produced and travels 聲音如何產生和傳播

- ☐ phenomenon 現象
- ☐ production 產生(n.)
- ☐ object 物體
- ☐ vibrate 振動(v.)
- ☐ gas 氣體
- ☐ solid 固體
- ☐ sound 聲音
- ☐ produce 產生(v.)
- ☐ vibration 振動(n.)
- ☐ travel 行進、傳播
- ☐ liquid 液體

3-2 Properties of light 光有什麼特性

- ☐ light 光
- ☐ sunlight 陽光
- ☐ laser 雷射光
- ☐ reflect 反射(v.)
- ☐ smooth 光滑的
- ☐ shadow 影子
- ☐ light source 光源
- ☐ candle 蠟燭
- ☐ reflection 反射(n.)
- ☐ mirror 鏡子
- ☐ shiny 閃亮的

3-3 Applications of sound and light 如何應用聲與光

- ☐ decoration 裝飾
- ☐ signal 信號
- ☐ entertainment 娛樂
- ☐ warning 警示

Key Concepts

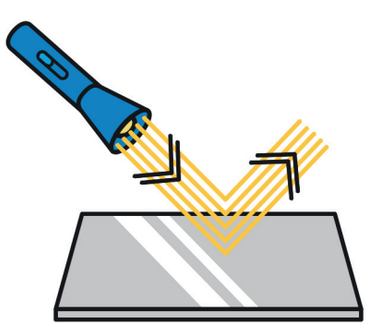
課程焦點

3-1 How sound is produced and travels 聲音如何產生和傳播

1.Sound is produced when an object vibrates.
聲音是由物體振動產生。
2.Sound can travel through gas, liquid and solid.
聲音透過氣體、液體、固體傳播。

3-2 Properties of light 光有什麼特性

1.Light travels in a straight line.
光是直線行進的。
2.When light hits a mirror, it is reflected.
光照射到鏡子時，光會產生反射。
3.Shadow forms when an object blocks light.
光被物體阻擋形成影子。



3-3 Applications of sound and light 如何應用聲與光

1.Sound and light can be used for decoration, entertainment, signal or warning.
聲光可以用於裝飾、娛樂、信號或警告。

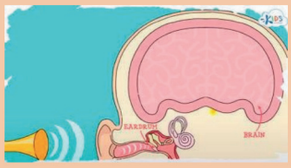
References

參考資訊

3-1 What Is Sound? | The Dr. Binocs Show

3-1 What Is Sound? | Physics for Kids

3-1 Sound Experiments for Kids | Science for Kids



3-2 Light | The Dr. Binocs Show

3-2 Light and Shadows for Kids | Science Video for Kids

3-2 Sources of Light | Science for Kids

3-3 Light and Sound for Children | Science for Kids

3-3 Communication Using Light and Sound | Science for Kids

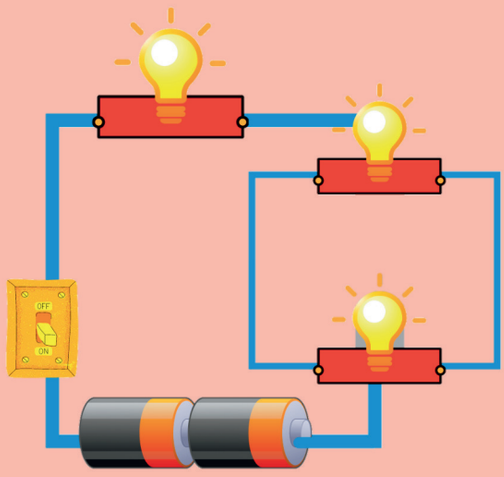
Unit 4

Fun Circuits
好玩的電路

Lesson Overview 課程簡介

A simple circuit has three parts: battery, wire and light bulb. A battery has two electrodes: positive and negative. A wire is made of copper. It is covered with plastic. A light bulb emits light. There are two kinds of circuit: series and parallel. If two light bulbs are connected in series, they will be less bright. If two light bulbs are connected in parallel, they will have the same brightness. In a circuit, the wire is connected to the metal sheet of the motor. This lets the motor rotate. A motor makes electric toys and electrical appliances move.

一個簡單的電路是由電池、電線和燈泡等三部分所組成。在電池中有兩個電極：正極和負極；電線是由銅製成的，它被塑料覆蓋，燈泡發出光。電路的連接方式分為串聯和並聯兩種。如果兩個燈泡串聯，它們的亮度會降低；如果兩個燈泡並聯，則它們的亮度是一樣的。在電路中，電線連接到馬達的金屬片上，使電達旋轉。馬達可以用來製作電動玩具，也可以使電器產生作用。



Fun Circuits
好玩的電路

Circuit connection 電路連接

Parts 構造

- A battery has two electrodes: positive and negative.
  電池有兩個電極：正極與負極。
- A wire is made of copper. It is covered with plastic.
  電線是銅線，外面是塑膠皮。
- A light bulb emits light.
  燈泡發出光。

Types 型式

- Electricity flows through a closed circuit.
  通路(電可以流通)。
- Electricity does not flow through an open circuit.
  斷路(電無法流通)。

Conductivity 傳導

- Metals like paper clip and coin conduct electricity.
  金屬物質，如迴紋針或硬幣有導電性。
- Non-metals like paper and rubber do not conduct electricity.
  非金屬物質，如橡皮筋、紙團沒有導電性。

Series and parallel circuits 串聯與並聯

Series circuit 串聯電路

- In a series circuit, all light bulbs and batteries are connected along the same path.
  串聯電路：數個燈泡或電池串接在同一個通路上。
- If two light bulbs are connected in series, they will be less bright.
  燈泡（串聯）時，燈泡亮度會減弱。

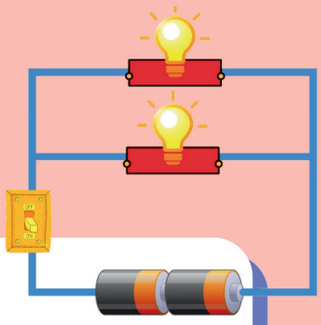
Parallel circuit 並聯電路

- In a parallel circuit, light bulbs and batteries are connected along different paths.
  並聯電路：數個燈泡或電池分別接在不同通路上。
- If two light bulbs are connected in parallel, they will have the same brightness.
  燈泡（並聯）時，燈泡亮度不變。

Circuits in daily life 生活中的電路

- Motor is used in things like electric toy car and electric fan.
  馬達用於電動玩具車，電動風扇。
- Things are powered by batteries or electricity from power stations.
  有些物品的供電來自電池或發電站傳送的電力。
- Throw used battery in recycling stations.
  電池電量用盡後要送到回收站。

Words and Phrases
單字與片語



4-1 How to turn on a light bulb 如何讓燈泡發亮

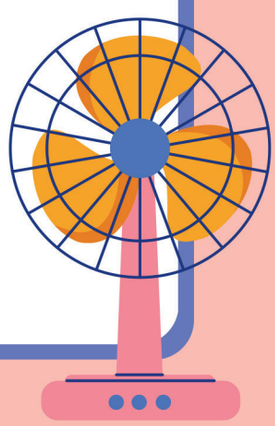
☐ circuit	電路	☐ battery	電池
☐ wire	電線	☐ copper wire	銅線
☐ light bulb	燈泡	☐ electricity	電力
☐ conductivity	傳導性	☐ conduct / conducts	傳導
☐ conductor	導體	☐ switch	開關
☐ conduct	導電(v.)		

4-2 How circuits can be connected電路有哪些連接方式

☐ positive electrode	正極	☐ negative electrode	負極
☐ closed circuit	通路	☐ open circuit	斷路
☐ series circuit	串聯電路	☐ parallel circuit	並聯電路

4-3 Circuits in daily life 用電概念知多少

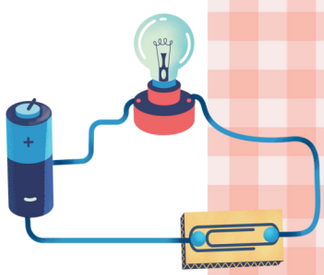
☐ handle	提把	☐ switch	開關
☐ lampshade	燈罩	☐ paper clip	迴紋針
☐ coin	硬幣	☐ flashlight	手電筒
☐ metal sheet	金屬片	☐ motor	馬達
☐ electric toy car	電動玩具車	☐ electric fan	電風扇



Key Concepts

課程焦點

4-1 How to turn on a light bulb 如何讓燈泡發亮



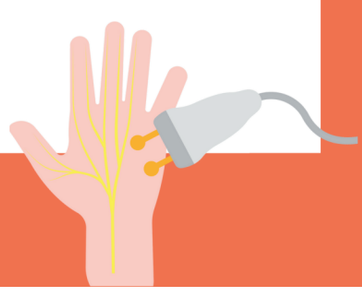
1.A simple circuit has three basic parts: battery, wire and light bulb.
一個簡單的電路包含三個基本部分:電池、電線和燈泡。
2.Electricity flows through a closed circuit.
在閉合的電路中，電流可以流通。
3.Electricity does not flow through an open circuit.
非閉合電路中，電流無法流通。
4.Metallic objects like paper clip and coin conduct electricity.
金屬物質，如迴紋針或硬幣有導電性。
5.Non-metallic objects like paper and rubber do not conduct electricity.
紙、橡膠等非金屬物體不導電。

4-2 How circuits can be connected? 電路有哪些連接方式

1.In a series circuit, all light bulbs and batteries are connected along the same path.
串聯電路:數個燈泡或電池串接在同一個通路上。
2.In a parallel circuit, light bulbs and batteries are connected along different paths.
並聯電路:數個燈泡或電池分別接在不同通路上。

4-3 Circuits in daily life 用電概念知多少

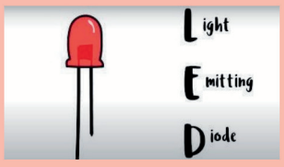
1.When using electrical appliances, save electricity and pay attention to safety.
使用電器時，要節約用電，注意安全。



References
參考資訊

4-1 Invention of Bulb

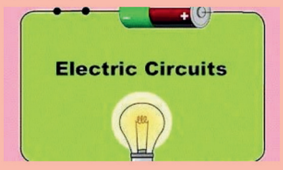
4-1 How Does an LED Work



4-1 LED Explained

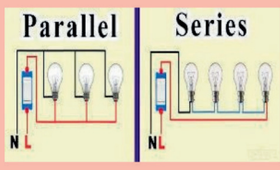
4-1 The Power of Circuits

4-2 Electrical Circuits - Series and Parallel



4-2 What are Parallel Circuits

4-2 Series and Parallel Circuits Wiring



4-2 Why Parallel Circuit is Best for Hanging Lights

4-3 How Do Motors Work

4-3 Kids Safety

Unit 1

Day and Night Sky
白天和夜晚的天空

Lesson Overview 課程簡介

When it's daytime, we can see the Sun. The Sun's light makes the day feel brighter and warmer. When something blocks the Sun's light, a shadow shows up. The length of a shadow changes throughout the day. Usually, a shadows is shortest around noon and longest in the morning and afternoon. At night, we can see the Moon up in the sky. The Moon goes from being completely dark to a bright circle, and then becomes dark again in a cycle. This happens every 29 to 30 days. Our lunar calendar is based on the changing phases of the Moon.

白天時，我們可以看到太陽。太陽的光線讓白天變得更加明亮溫暖。當物體擋住陽光時，會有影子出現。影子的長度會在一天之中變化，通常影子在中午時最短，早上和下午時則最長。到了晚上，我們可以在天空中看到月亮。月相的變化由缺到圓，再由圓到缺，形成一個週期。月相變化的週期大約是29到30天，而我們的農曆正是根據月相變化而來。

Day and Night Sky
白天和夜晚的天空

- Differences between day and night 日夜景象的不同
  - Daytime view 白天的景象
    - We can see the Sun during the day. The day feels brighter and warmer because of the Sun's light. 白天能看到太陽，因為陽光照射，白天較明亮，氣溫也較高。
  - Night view 夜晚的景象
    - We can see the Moon and stars at night. Some stars are bright and some are dim. 夜晚能看見月亮和星星。星星有些亮，有些暗。
- Sun 太陽
  - Sun and shadows 太陽和影子
    - The shadow of an object is on the side opposite to the Sun. 物體形成的影子和太陽方位相反。
  - Changes of the Sun's position during the day 一天中太陽位置的變化
    - The Sun rises in the east and sets in the west. 太陽從東方升起，由西方落下。
    - Shadows are shortest around noon and longest in the morning and afternoon. 中午時，影子最短；上午和下午時，影子較長。
- Moon 月亮
  - The Moon I know 我知道的月亮
    - The Moon's surface has both dark and bright areas. 月亮表面有亮有暗。
    - We can see the Moon both during the day and at night. 白天和夜晚都能看見月亮。
  - Changes of the Moon's position 月亮的位置變化
    - The Moon rises in the east and sets in the west. 月亮從東方升起，由西方落下。
  - Moon phases 月相
    - The Moon waxes and wanes. It takes the Moon 29 to 30 days to go through its different phases. 月相變化由缺到圓，再由圓到缺，通常需要29到30天。
    - The lunar calendar is based on the Moon phases. 農曆是根據月相變化而來。

Words and Phrases

單字與片語

1-1 What are the differences between day and night?
日夜景象有什麼不同

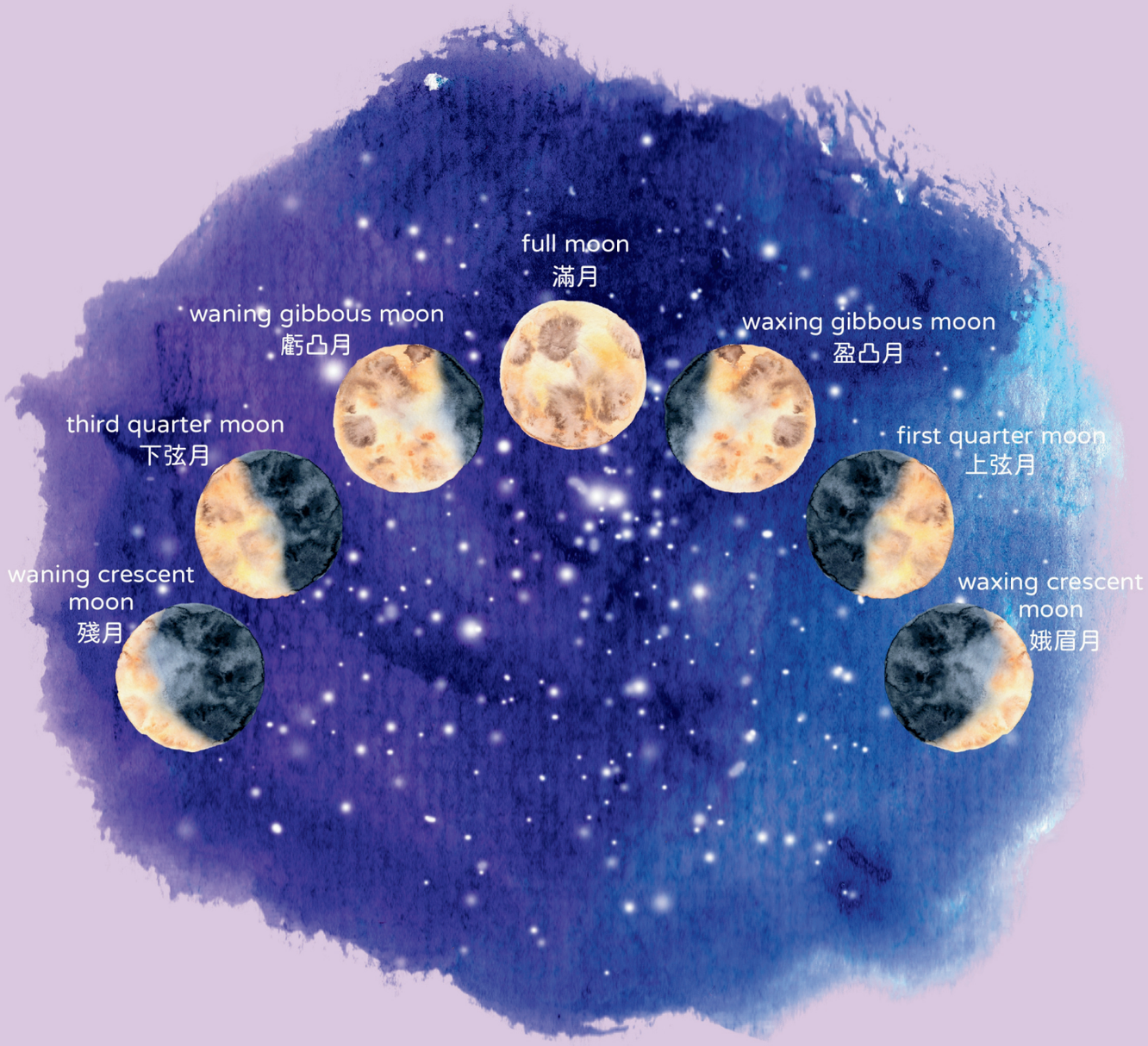
☐ day	日	☐ night	夜晚
☐ daytime	白天	☐ nighttime	夜間
☐ sky	天空	☐ moon	月亮
☐ sun	太陽	☐ sunlight	陽光
☐ star	星星	☐ telescope	望遠鏡
☐ bright	明亮的	☐ brightness	亮度
☐ dark	暗的		

1-2 Does the Sun change its position during the day?
一天中太陽的位置會改變嗎

☐ rise	上升	☐ set	落下(日、月)
☐ east	東方	☐ west	西方
☐ position	位置	☐ compass	羅盤
☐ shadow	陰影		

1-3 Does the moon change every day? 月亮每天都在變嗎

☐ surface	表面	☐ moon phase	月相
☐ waning	(月)虧缺	☐ waxing	(月)漸圓
☐ new moon	新月	☐ waxing crescent moon	峨嵋月
☐ first quarter moon	上弦月	☐ full moon	滿月
☐ third quarter moon	下弦月	☐ lunar calendar	陰曆



Key Concepts

課程焦點

1-1 What are the differences between day and night?
日夜景象有什麼不同

1.We can see the Sun during the day, and the moon at night.
白天能看見太陽，晚上能看見月亮。
2.Due to the Sun's light, the day feels brighter and warmer.
因為陽光照射，白天較明亮，氣溫也較高。

1-2 Does the Sun change its position during the day?
一天中太陽的位置會改變嗎

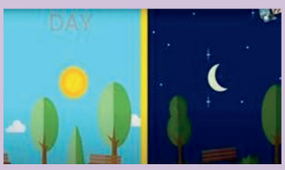
1.The shadow of an object is on the side opposite to the Sun.
物體的影子和太陽方位相反。
2.Shadows are shortest around noon and longest in the morning and afternoon.
中午的時候，影子通常最短；上午和下午的時候，影子較長。

1-3 Does the Moon changes every day?
月亮每天都在變嗎

1.The Moon waxes and wanes. It usually takes 29 to 30 days for the Moon to go through its different phases.
月相的變化是由缺到圓，再由圓到缺。月相變化的周期需要約29到30天才能完成。
2.The lunar calendar is based on the Moon phases.
農曆是根據月相變化而來。

References
參考資訊

1-1 Day and Night

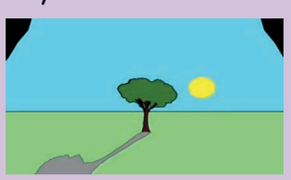


1-1 What Causes Day and Night

1-1 Day and Night Explanation, Causes Science for Kids

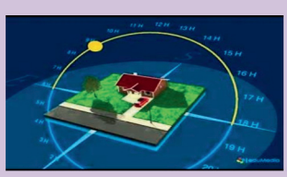
1-2 How the Sun Affects the Earth

1-2 Solar Energy—the Sun's Apparent Daily Movement



1-2 Sun and Shadow

1-2 The Apparent Path of the Sun



1-3 The Moon for Kids

1-2 Why Does the Moon Change?

1-3 Why Can I See the Moon During the Day?

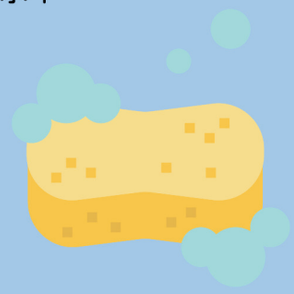
Unit 2

Water Movement
水的移動

Lesson Overview 課程簡介

Water likes to flow from high places to low places, but it can also travel through really tiny spaces inside objects. The size of the tiny spaces can change how water moves inside objects. This special way of moving is called capillary action. Water can also move through a special tube called a siphon. In the siphon process, water goes up and flows out of one container through the siphon, and then flows into another container with a lower water level. Finally, when water inside a special vessel called a communicating vessel is not moving, the water levels in each connected container stay at the same height. This is known as the principle of communicating tubes. We can use this principle to check if an object is level.

水由高處往低處流，但水也會沿著物體中的細縫移動。物體 細縫的大小會影響水在物體內部移動的情形，這種特別的移動方 式稱為毛細作用。水也能透過稱為虹吸管的特殊管來移動。在虹 吸現象的過程中，水能經由虹吸管，向上從較高的容器流出，接 著流入一個水位較低的容器。最後，水在稱為連通容器的特殊容 器中靜止不動時，每個相連容器的水位會維持水平且等高，這就 是連通管原裡。我們可以應用此原理來測量物體是否水平。



Water Movement
水的移動

- Properties of capillary action 毛細現象的特性
  - In nature 大自然中
    - Water flows from high to low places. 水由高處往低處流動。
  - Water movement through tiny spaces 水在細縫中的移動
    - Materials that absorb water have tiny space. 會吸水的物質都具有細縫。
    - The size of the spaces affects how water moves. 細縫大小會影響水的移動情形。
  - Capillary action in life 生活中的毛細現象
    - Many household items, like towels, are the application of capillary action. 許多生活用品如毛巾，是毛細現象的應用。
- Properties of the siphon phenomenon 虹吸現象的特性
  - Conditions for the siphon phenomenon 虹吸現象的條件
    - The water tube needs to be filled with water. 水管內需要裝滿水。
    - The water outlet must be lower than the water surface. 出水口需低於水面。
- Properties of U-tubes 連通管原理的特性
  - The horizontal phenomenon 水平的現象
    - When water is still, its surface remains horizontal. 水靜止時，水面會維持水平。
  - Fantastic U-tubes 奇妙的連通管
    - Water in containers connected at the base will be at the same level. 水在底部相通的容器內，水面會保持相同高度。
  - Applications of U-tubes 連通管的生活應用
    - We can use the principle of U-tubes to measure if an object is level. 連通管原理可以用來測量物品是否水平。
    - For example, the water level indicator of a water boiler, the U-shaped tube under the sink, etc. 例如熱水瓶水位裝置、水槽下方U型管等。

Words and Phrases

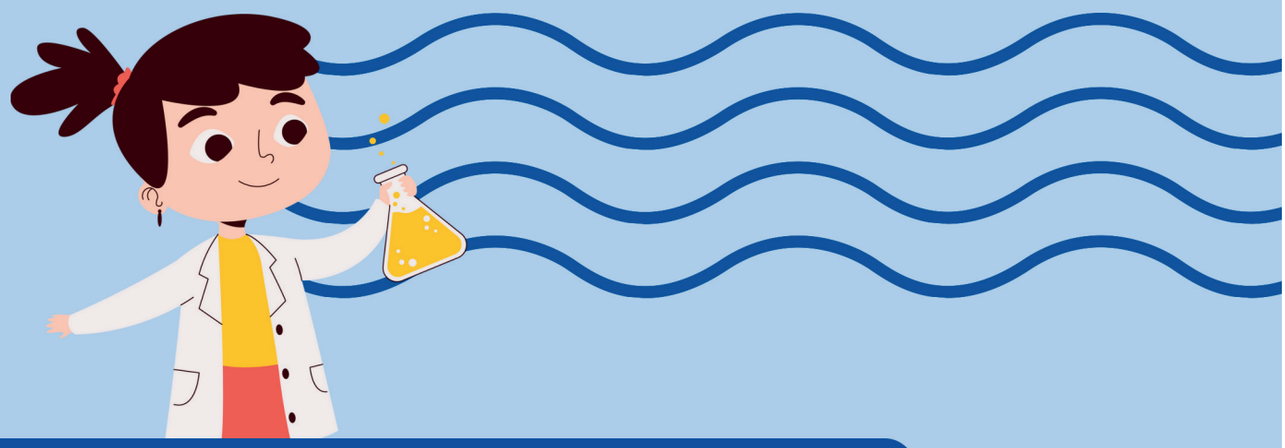
單字與片語

2-1 Capillary action 毛細現象有什麼特性

☐ water	水	☐ water flow	水流
☐ high place	高處	☐ low place	低處
☐ water movement	水的移動	☐ capillary action	毛細現象
☐ absorb	吸收	☐ absorbent	能吸收(液體)的
☐ slit	裂縫		

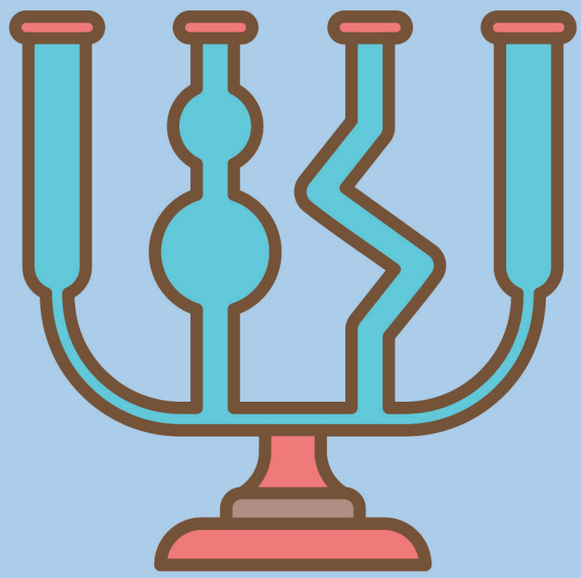
2-2 Siphon phenomenon 虹吸現象有什麼特性

☐ siphon	虹吸管	☐ siphon phenomenon	虹吸現象
☐ pipe	管道	☐ pipe principle	管道原理
☐ water pipe	水管	☐ tap water	自來水
☐ tank	容器	☐ water container	水容器
☐ water pump	水泵	☐ water motor	水力馬達
☐ water filter	淨水器	☐ water outlet	出水口
☐ aquarium	水族館	☐ toilet	沖水馬桶



2-3 Communicating tubes 連通管原理有什麼特性

- ☐ communicating tube 連通管
- ☐ horizontal 水平的
- ☐ tilted 傾斜的
- ☐ water level 水位
- ☐ horizontal phenomenon 水平現象



Key Concepts

課程焦點

2-1 Capillary action 毛細現象有什麼特性

1.Capillary action is the ability of water to move in tiny spaces without the help of an outside force.
毛細現象是指水不依靠外力在狹小空間中移動。

2-2 Siphon phenomenon 虹吸現象有什麼特性

1.In the siphon process, we need to fill the water tube with water, and the water outlet must be lower than the water level of the source container.
虹吸現象的過程中，水管需要填滿水，而且出水口必須低於原容器的水面。

2-3 Communicating tubes 連通管原理有什麼特性

1.When water is still, its surface remains horizontal.
水靜止時，水面會維持水平。
2.If some containers are connected at the base, the water level in each container will be the same.
如果數個容器的底部相連，每個容器內的水位高度會是相同的。

Activity
Capillary action

★Use the words below to fill in the _____ .

*faster *slower *up *down * capillary action

What is **capillary cction**?

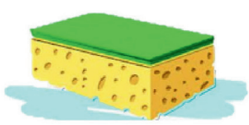
When water moves _____ through narrow space, we call _____.

1) The thinner paper absorbs water ☐

2) The thicker paper absorbs water ☐

★What are examples of capillary action? Circle them.

The root of the plant absorbs water.
植物的根吸收水分



The sponge absorbs water.
海綿吸水

Water fiows from high to low.
水從高處往低處流

We write with a Chinese brush.
用毛筆沾墨汁寫字

References
參考資訊

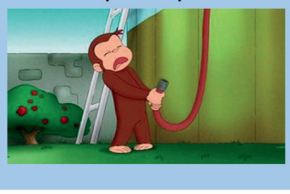
2-1 The Water

2-1 Capillary Action Experiment

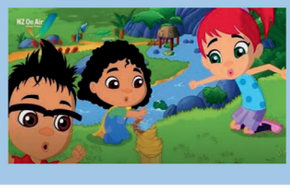
2-1 Capillary Water

2-1 The Color-Changing Celery Experiment!

2-2 Curious George George's Simple Siphon

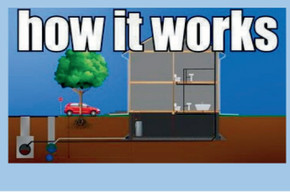


2-2 Kid Experiments: Syphon



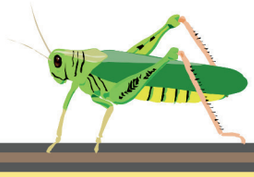
2-3 How Does Water Get to Your House?

2-3 How Your Home Plumbing Works (From Start to Finish)



Unit 3

Demystifying Insects
昆蟲大解密



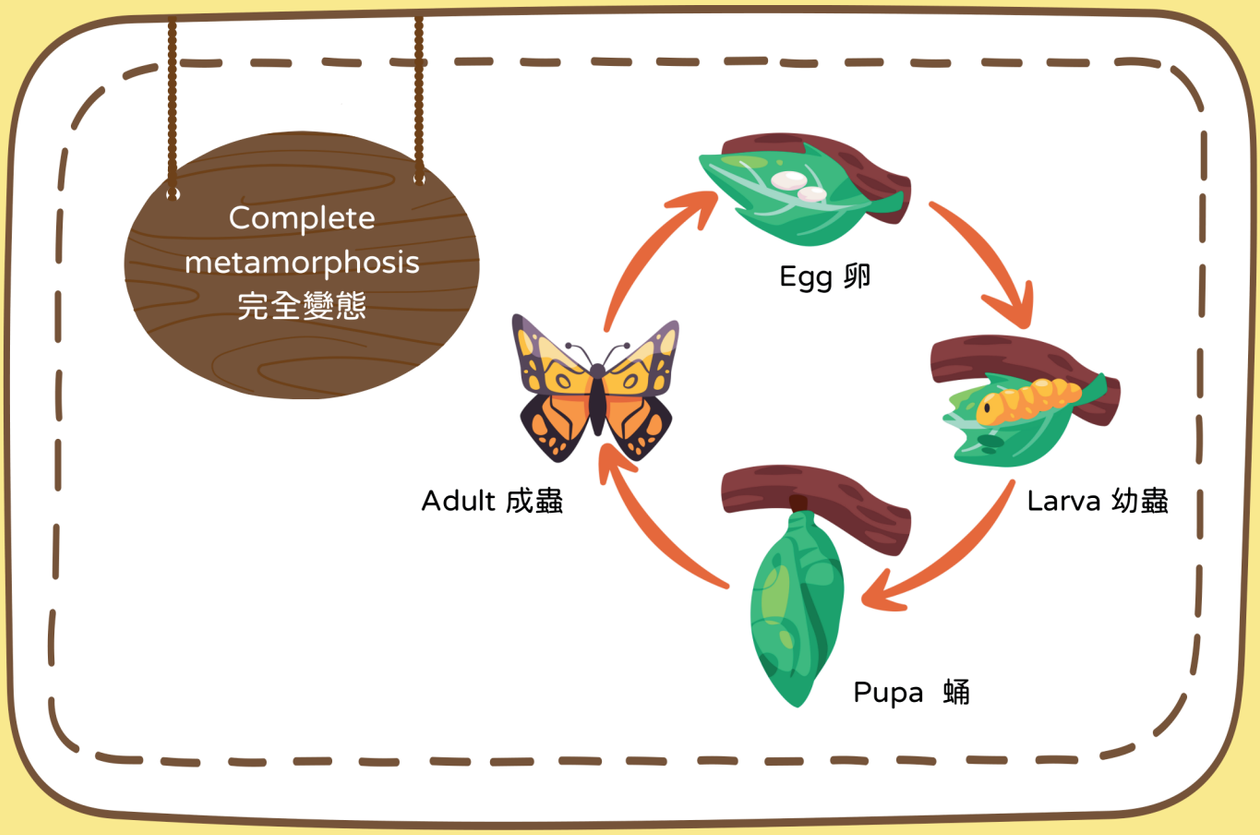
Lesson Overview 課程簡介

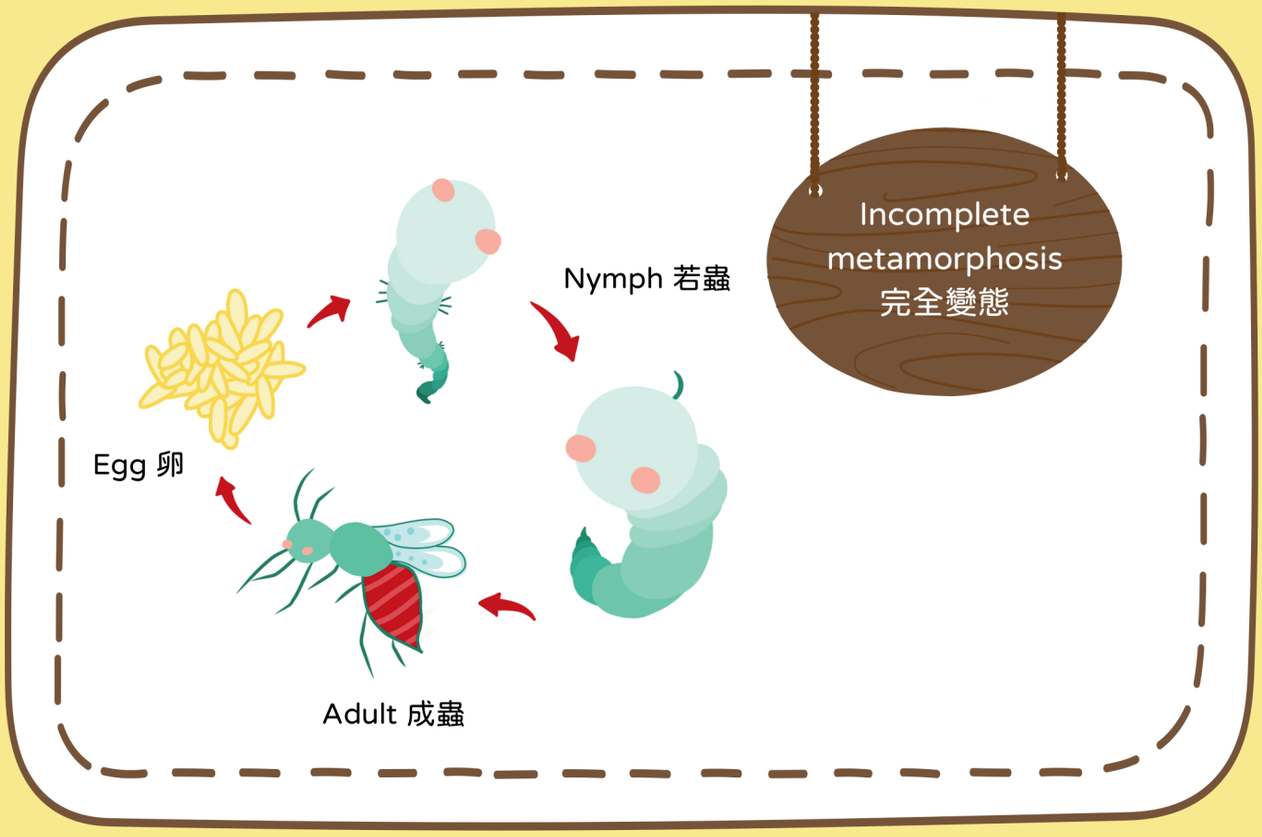
When we spot insects, we can find a reference point and use it to describe their position. Most insects have three main body parts: the head, thorax, and abdomen. The head is where you can find the eyes and antennae, and the thorax is where you can find the legs and wings. Insects often experience different types of changes as they grow. Some go through complete metamorphosis. This has four stages: egg, larva, pupa, and adult. Others go through incomplete metamorphosis. It only has three stages: egg, nymph, and adult. Finally, insects can be either helpful or harmful to humans. Bees, for example, are helpful because they can provide us with honey. Mosquitoes are harmful because they can spread dengue fever.

發現昆蟲時，我們可以先找出一個參照點，再用它來描述昆蟲的位置。昆蟲的身體通常分為頭、胸和腹三個部分。昆蟲的頭一般有眼睛和觸角，胸部則有腳和翅膀。昆蟲在成長的過程中，往往會經歷不同型態的蛻變。有些昆蟲會經歷完全變態，這個過程包含卵、幼蟲、蛹和成蟲，共四個階段；有些昆蟲會經歷不完全變態，這個過程只有卵、若蟲和成蟲三個階段。昆蟲可以為人類生活帶來益處，也可能帶來危害。例如，蜜蜂是有益於人類的，因為它們可以為我們提供蜂蜜，蚊子則是有害的，因為它們會傳播登革熱。

Demystifying Insects
昆蟲大解密

- Where are insects? 昆蟲在哪裡
  - How to find insects 如何找昆蟲的位置
    - Find the reference point 找出參照點
    - Determine the direction and distance 確定方位與距離
- How do insects change and grow? 昆蟲如何成長變化
  - Characteristics 特徵
    - Head 頭部
    - Eyes, antennae 眼睛,觸角
    - Thorax 胸部
    - Six legs, wings 六隻腳, 翅膀
    - Abdomen 腹部
  - Complete metamorphosis 完全變態
    - Egg, larva, pupa, adult 卵、幼蟲、蛹、成蟲
  - Incomplete metamorphosis 不完全變態
    - Egg, nymph, adult 卵、若蟲、成蟲
- Are insects important? 昆蟲重要嗎
  - Nature 大自然
    - Animals, plants 動物、植物
  - Human 人類
    - Life/lives 生活


Complete metamorphosis
完全變態
Egg 卵
Larva 幼蟲
Pupa 蛹
Adult 成蟲


Incomplete metamorphosis
完全變態
Nymph 若蟲
Egg 卵
Adult 成蟲

Words and Phrases
單字與片語

3-1 Where are insects? 昆蟲在哪裡

☐ insect	昆蟲	☐ mosquito	蚊子
☐ bee	蜜蜂	☐ butterfly	蝴蝶
☐ ant	螞蟻	☐ cockroach	蟑螂
☐ dragonfly	蜻蜓	☐ moth	蛾
☐ beetle	甲蟲	☐ cricket	蟋蟀
☐ head	頭	☐ eye	眼睛
☐ thorax	胸部	☐ abdomen	腹部
☐ antenna	觸角	☐ leg	腿
☐ wing	翅膀	☐ habitat	棲息地
☐ grasshopper	蚱蜢	☐ mantis	螳螂

3-2 How do insects change and grow? 昆蟲如何成長變化

☐ life cycle	生命週期	☐ metamorphosis	變態
☐ stick bug	竹節蟲	☐ egg	卵
☐ hatch	孵化	☐ larva	幼蟲
☐ nymph	若蟲	☐ pupa	蛹
☐ adult	成蟲；成人		

3-3 Are insects important? 昆蟲重要嗎

☐ pest 害蟲　　☐ dengue 登革熱

☐ clothing 衣服　　☐ cotton 棉布

☐ honey 蜂蜜

Key Concepts

課程焦點

3-1 Where are insects? 昆蟲在哪裡

1.When we spot insects, we can find a reference point and use it to describe their position.

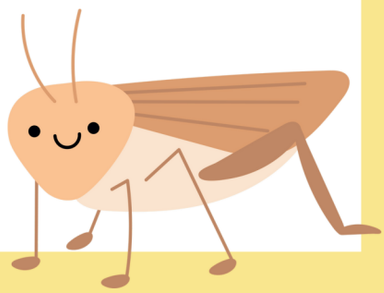
發現昆蟲時，我們可以先找出一個參照點，再用它來描述昆蟲的位置。

3-2 How do insects change and grow? 昆蟲如何成長變化

1.An insect's body has three main parts: the head, thorax, and abdomen.
昆蟲的身體通常由頭、胸和腹三個部分構成。
2.Usually, the head is where you can find the eyes and antennae, and the thorax is where you can find the legs and wings.
昆蟲的頭一般有眼睛和觸角，胸部則有腳和翅膀。
3.Some insects go through complete metamorphosis as they grow. This process includes egg, larva, pupa, and adult stages.
有些昆蟲成長時會經歷完全變態，這個過程包含卵、幼蟲、蛹和成蟲階段。
4.Other insects go through incomplete metamorphosis. This process includes only three stages: egg, nymph, and adult.
有些昆蟲成長的過程會經歷不完全變態，這個過程只有卵、若蟲和成蟲三個階段。

3-3 Are insects important? 昆蟲重要嗎

1.Some insects are helpful to humans. Others are harmful.
有些昆蟲對人類有益處，有些則有害。
2.Bees can provide us with honey, whereas mosquitoes can spread dengue fever.
蜜蜂可以提供蜂蜜，蚊子則可能傳播登革熱。



References
參考資訊

3-1 Inspect an Insect

3-1 All About Insects for Children

3-1 Insects (Body Parts)

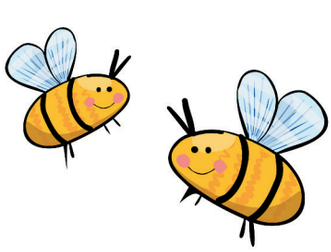
3-1 10 Interesting Insects

3-2 From Caterpillar to Butterfly

3-2 Life Cycle of a Butterfly

3-2 Life Cycle of European Rhinoceros Beetle

3-3 Why Are Insects Important?



Unit 4

Utilization of Natural Resources
自然資源與利用

Lesson Overview 課程簡介

The Sun is the main source of energy on Earth. The Earth gets warmth and light from the Sun, and sunlight is very important for plants and animals to grow. The Earth has many natural resources. We can put the resources into two groups: biological and non-biological. When we use the natural resources, we must be careful. Both biological and non-biological resources will run out if we use too much of them. Overusing natural resources can also lead to pollution. To protect nature, we should learn more about the harms of overusing natural resources and follow eco-friendly principles.

太陽是地球主要的能量來源，地球的溫暖與光亮源自於太陽，而植物與動物依賴陽光生 長。地球擁有豐富的自然資源，這些資源可以 分為兩類：生物與非生物資源。我們運用自然 資源時，必須小心，無論是生物資源還是非生 物資源，如果我們不當使用，這兩種資源均有 可能耗盡，甚至導致污染。為了保護自然環 境，我們應該要去了解過度開發自然資源的危害，並遵守環保原則。

Utilization of Natural Resources
自然資源與利用

Energy
能量

- Survival
  生存
  - Humans need food.
    人類需要食物。
  - Plants need sunlight.
    植物需要陽光。
- Work
  運作
  - Cars need gasoline and a battery to run.
    汽車行駛需要汽油和電池。
  - Waterwheels need water to spin around.
    水車轉動需要水。
- Sources of energy
  能源
  - Sun
    太陽
  - Wind
    風
  - Water
    水
  - Natural gas
    天然氣
  - Oil
    石油

Natural resources
自然資源

- Biological resources
  生物資源
  - Plants and animals
    植物和動物
- Non-biological resources
  非生物資源
  - Coal, oil, sunlight, wind, and water
    煤、石油、陽光、風和水

Environmental action
環保行動

- Save water and electricity.
  省水省電。
- Bring reusable water bottles, green bags, or reusable utensils with you.
  自備水壺、環保袋或餐具。
- Use public transportation more often.
  多搭乘大眾運輸工具。
- Recycle.
  資源回收。

Words and Phrases
單字與片語

4-1 Is energy important? 能量重要嗎

- ☐ plant 植物
- ☐ energy 能量；能源
- ☐ water 水
- ☐ sunlight 陽光
- ☐ natural gas 天然氣
- ☐ kinetic energy 動能
- ☐ electricity 電
- ☐ geothermal energy 地熱能
- ☐ fossil fuel 化石燃料
- ☐ coal 煤炭
- ☐ renewable energy 可再生能源
- ☐ biofuel 生質能
- ☐ sustainability 永續
- ☐ animal 動物
- ☐ forms of energy 能量形式
- ☐ wind 風
- ☐ light energy 光能
- ☐ heat energy 熱能
- ☐ sound energy 聲能
- ☐ nuclear energy 核能
- ☐ potential energy 勢能(位能)
- ☐ fuel 燃料
- ☐ gasoline 汽油
- ☐ non-renewable energy 不可再生能源
- ☐ green energy 綠色能源

4-2 How to use natural resources 如何運用自然資源

- ☐ biological resource 生物資源
- ☐ non-biological resource 非生物資源
- ☐ natural resource 自然資源
- ☐ food 食物
- ☐ clothing 衣服
- ☐ daily necessities 日用品
- ☐ housing 住房
- ☐ transportation 運輸
- ☐ solar panel 太陽能板
- ☐ energy label 節能標章
- ☐ wind power 風力發電
- ☐ turn off the light 隨手關燈
- ☐ energy conservation 節約能源

4-3 Impacts of developing natural resources 開發自然資源會有什麼影響

- ☐ environmental problems 環境問題
- ☐ environmental protection 環境保護
- ☐ pollution 汙染
- ☐ plastic waste 塑膠垃圾
- ☐ air pollution 空氣汙染
- ☐ water pollution 水汙染
- ☐ consumption 消耗
- ☐ overexploitation 過度開發
- ☐ reduce 減少
- ☐ reuse 重複使用
- ☐ recycle 回收

Key Concepts

課程焦點

4-1 Is energy important? 能量重要嗎

1.Energy is essential for life.
生命的延續需要能量。
2.The Sun is the main source of energy on Earth.
太陽是地球主要的能量來源。
3.The Earth gets warmth and light from the Sun, and plants and animals need sunlight to grow.
地球的溫暖與光亮源自於太陽，而植物與動物依賴陽光成長。

4-2 How to use natural resources 如何運用自然資源

1.There two types of natural resources on Earth: biological and non-biological.
地球的自然資源可分為生物資源與非生物資源。
2.Plants and animals are biological resources; the Sun, wind, water, and fuels are non-biological resources.
植物和動物屬於生物資源；太陽、風、水和燃料屬於非生物資源生物。

4-3 Impacts of developing natural resources 開發自然資源會有什麼影響

1.If we use too many natural resources, they will run out.
我們如果不當使用自然資源，會導致資源耗竭。
2.To protect natural resources, we need to learn about the impacts of overusing them and follow eco-friendly rules, such as the 3R's —reduce, reuse, and recycle.
為了保護自然資源，我們應該要去了解過度開發自然資源對環境的影響，並遵守環保原則，比如3R原則—垃圾減量、重複使用和資源回收。

References
參考資訊

4-1 Energy

4-1 What Is Energy?

4-1 What Are Sources of Energy?

4-1 Renewable Energy Sources

4-1 How Are Fossil Fuels Formed?

4-3 Environmental Protection

4-3 How to Take Care of the Environment

4-3 Reduce, Reuse and Recycle, to Enjoy a Better Life

4-3 Climate Change and the Greenhouse Effect

國小自然領域雙語教學資源手冊:英語授課用語 [四年級]

A Reference Handbook for Elementary School Bilingual Teachers in Natural Sciences : Instructional Language in English [4th Grade]

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