英語授課用語

國小自然科學領域

雙語教學資源手冊

Natural Sciences
6th Grade

教育部師資培育及藝術教育司
國立臺北教育大學雙語教學研究中心

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6th grade 1st semester

6th grade 2nd semester

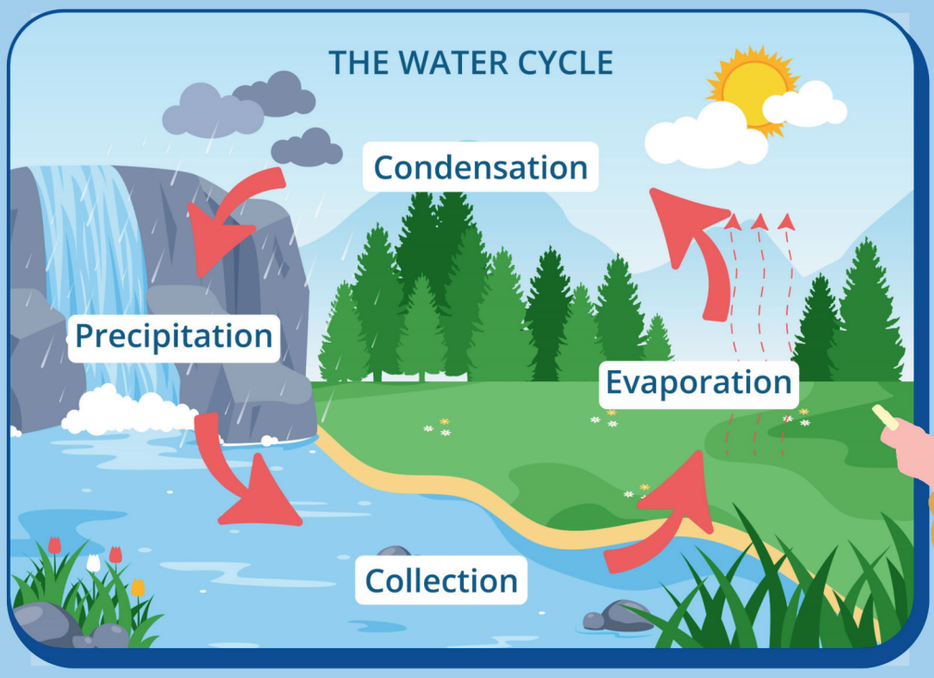
Unit 1

Weather Changes
天氣的變化

Lesson Overview 課程簡介

Water in the atmosphere comes in different forms such as cloud, fog, rain, dew, frost and snow. The water cycle shows how water changes form. Water in the atmosphere also affects weather. To forecast weather, scientists use tools like satellite images. Then the weather forecast is shown as a surface weather chart. A typhoon is a type of weather that can cause disasters. We should always be prepared for typhoons.

大氣中的水有雲、霧、雨、露、霜、雪等多種形式。水循環讓我們知道水是如何變化的。大氣中的水也會影響天氣。為了預測天氣，科學家們使用衛星圖像等工具。天氣預報以地面天氣圖示意。颱風是一種可能導致災害的天氣。我們應該時刻為颱風做好防颱準備。



Weather Changes 天氣的變化

Water in the atmosphere 在大氣裡頭的水

- Cloud and fog 雲與霧
  - Factors afecting cloud and fog formation. （雲）和（霧）的形成原因。
- Rain, dew, frost and snow 雨、露、霜與雪
  - Factors afecting rain, dew, frost and snow formation. （雨、露、霜、雪）的形成原因。
- Water cycle 水循環
  - Water cycle in nature. 大自然中（水的循環）過程。

Weather chart and weather changes 天氣圖與天氣的變化

- Satellite images 衛星雲圖
  - How to read satellite images to predict forecast weather changes. 如何閱讀（衛星雲圖）來預測未來天氣演變。
  - Satellite images are photographed by meteorological satellites. 衛星雲圖是由（氣象衛星）拍攝而成的圖片。
- Surface weather chart 地面天氣圖
  - The meaning of the symbols and information on the weather charts. （地面天氣圖）上的符號意義及帶給我們的資訊。

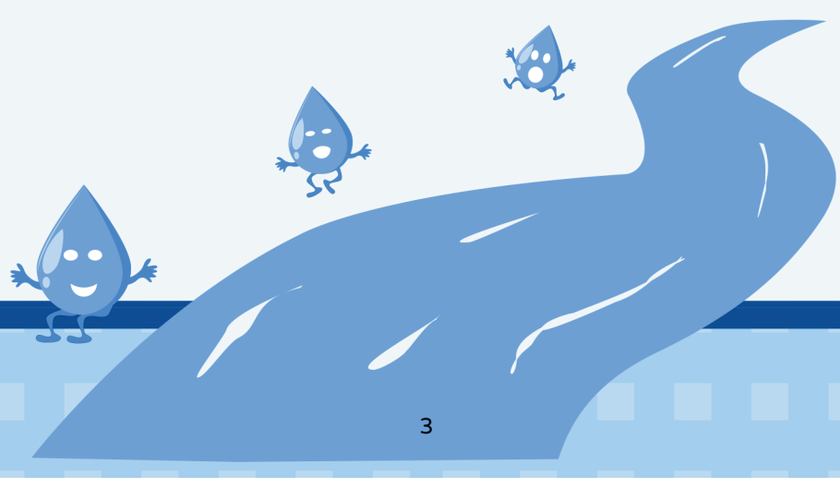
Typhoon 颱風

- Typhoon is coming 颱風要來了
  - The impact of typhoon to life. （颱風）對生活的影響。
  - To decrease disasters caused by typhoon, we should know how to prevent typhoons. 要減少颱風所帶來的災害，就要知道防颱的方法。
- Learn about typhoons 認識颱風
  - Factors affecting the formation and path of a typhoon. 颱風的（形成原因）及（路徑）。
  - Read typhoon-related information. 閱讀颱風相關資料。

Words and Phrases 單字與片語

1-1 Water in the atmosphere 大氣中的水

☐	atmosphere	大氣	☐	condensation	凝結
☐	evaporation	蒸發	☐	transpiration	蒸散
☐	freezing	凝固	☐	melting	融化
☐	water vapor	水蒸氣	☐	water droplet	小水滴
☐	cloud	雲	☐	fog	霧
☐	frost	霜	☐	snow	雪
☐	dew	露	☐	rain	雨
☐	precipitation	降水	☐	solid	固態
☐	liquid	液態	☐	gas	氣態
☐	water cycle	水循環	☐	thermometer	溫度計
☐	incense	線香	☐	conical flask	錐形瓶
☐	beaker	燒杯	☐	ice crystal	冰晶
☐	affecting	影響著(某物)			



1-2 Weather chart and weather changes 天氣圖與天氣變化

atmosphere	大氣層	Central Weather Bureau	中央氣象局
isobaric line	等壓線	surface weather chart	地面天氣圖
satellite image	衛星雲圖	weather forecast	氣象預報
temperature	溫度	humidity	濕度
atmospheric pressure	氣壓	high pressure	高氣壓
low pressure	低氣壓	tropical depression	熱帶性低氣壓
air mass	氣團	warm air	暖空氣
cold air	冷空氣	front	鋒面
cold front	冷鋒	warm front	暖鋒
stationary front	滯留鋒		

1-3 Learn about typhoon 認識颱風

typhoon	颱風	typhoon eye	颱風眼
hurricane	颶風	disaster	災害
flooding	淹水	landslide	坍方/土石流
blackout	停電	out of water	停水
path	路徑	flashlight	手電筒

Key Concepts 課程焦點

1-1 Water in the atmosphere
大氣中的水

1. Water in the atmosphere comes in different forms such as cloud, fog, rain, dew, frost and snow.
   大氣中的水有雲、霧、雨、露、霜、雪等多種形式。
2. The water cycle shows how us water changes.
   水循環讓我們知道水是如何變化的。

1-2 Weather chart and weather changes
天氣圖與天氣變化

1. The weather in a low pressure area is cloudy.
   低壓區天氣多雲。
2. The weather in a high pressure area is sunny.
   高壓區天氣晴朗。
3. The weather in a stationary front is rainy.
   滯留鋒的天氣多雨。
4. Today's weather forecast is _____.
   今天的天氣預報是 _____.

1-3 Learn about typhoon
認識颱風

1. Before a typhoon comes, we should prepare flashlight, food and water.
   颱風來襲之前，我們應該準備好手電筒、食物和水。

References 參考資訊

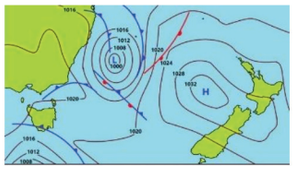
1-1The Water Cycle

1-2 Super Typhoon Haiyan Satellite Image Time Lapse 12th November 2013

1-2 What is a Satellite?

1-2 How to Read a Synoptic Weather Chart

1-2 How to Read Weather Maps



1-3 Hurricane

1-3 What to Do Before a Typhoon Hits

1-3 How to Name a Typhoon

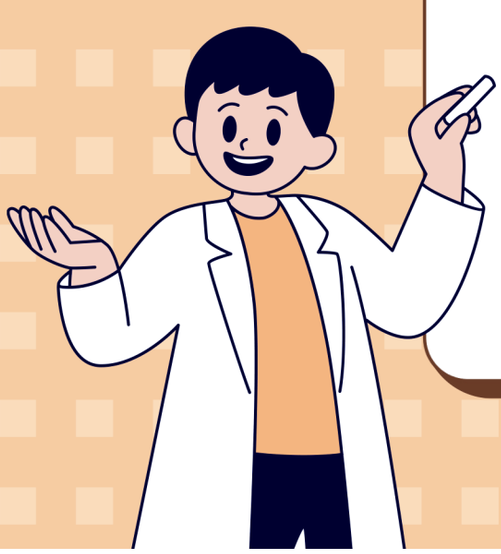
Unit 2

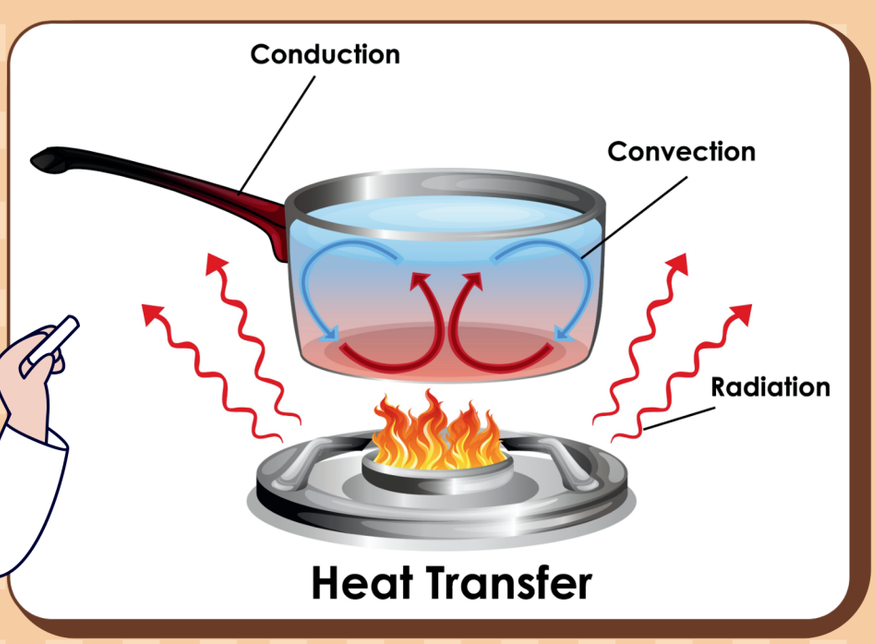
The Effect of Heat on Matter
熱對物質的影響

Lesson Overview 課程簡介

Heat changes an object's physical properties like hardness, color and smell. The change can be reversible or irreversible. Heat causes an object to expand, and removing heat causes an object to contract. Heat transfers from one object to another through conduction, convection or radiation. Heat can heat up a building, but there are ways to prevent it.

熱會改變物體的物理特性，如硬度、顏色和氣味。這種變化可以是可逆的或不可逆的。熱會使物體膨脹，而除去熱會使物體收縮。熱通過傳導、對流或輻射從一個物體傳遞到另一個物體。熱可以使建築物升溫，但有一些方法可以防止它。

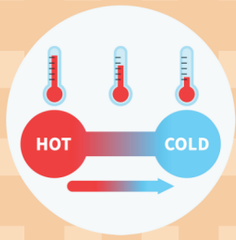




The Effect of Heat on Matter
熱對物質的影響

Changes in heated materials 物體加熱後的改變

Physical properties 物理性質
- Hardness 硬度
- Color 顏色
- Smell 氣味



Volume 體積
Thermal expansion and contraction 熱脹冷縮
- Liquid 液體
- Gas 氣體
- Solid 固體

Heat transfer 熱傳遞

Conduction 傳導
Heat is transferred from higher temperature to lower temperature through materials.
藉著物質將熱由（高溫）處傳向（低溫）處。

Convection 對流
Liquid and gas transfer heat through convection.
利用對流來傳播熱的形態有（液體）、（氣體）

Radiation 輻射
Heat is transferred from higher temperature to lower temperature without materials.
不用倚靠（物質）就可以傳播熱，但還是由高溫傳向低溫。

The heated part of air and water will start to move upward and the colder part will move downward, causing a cycle.
空氣和水等會流動的物質，會由（受熱）的部分開始向上運動，同時引起較（冷）的部分（向下）運動，造成循環。

Buildings in hot places 炎熱地區的建築

Ventilation 通風措施
Convection, radiation (dissipation)
對流、散熱。

Transparent 透明地
Radiation is inevitable because heat enters as long as light enters.
無法阻擋（輻射熱），因為（光）進入屋內，（熱）就進入屋內。

Keep the sun out and use insulation 遮陽並使用絕熱措施
Different designs for sunshade
各種（遮陽）設計

Words and Phrases 單字與片語

2-1 Changes in heated materials 物質受熱的變化

- thermal expansion 熱脹
- reversible change 可逆的改變
- chocolate 巧克力
- air conditioner 冷氣
- alcohol lamp 酒精燈
- electric tower 電塔
- hardness 硬度
- inevitable 無法變免的 (注定發生的)
- contraction 冷縮
- irreversible change 不可逆的改變
- egg 雞蛋
- hot-air balloon 熱氣球
- railroad gap 鐵軌縫隙
- bridge 橋樑
- physical property 物理性質

2-2 Heat transfer 熱傳遞

- heat transfer 熱傳遞
- convection 熱對流
- insulated bag 保溫袋
- thermos bottle 保溫杯
- conduction 熱傳導
- radiation 熱輻射
- down jacket 羽絨外套

2-3 Building in hot places 炎熱地區的房屋建築

- blinds 百葉窗
- rainwater recycling 雨水回收
- carbon reduction 減碳
- green building 綠色建築
- energy saving 節能

Key Concepts課程焦點

2-1 Changes in heated materials
物質受熱的變化

1. Heat causes an object to expand.
   熱使物體膨脹。
2. Removing heat causes an object to contract.
   除去熱會使物體收縮。

2-2 Heat transfer
熱傳遞

1. Conduction is when heat moves from a hot object to a cold one through direct touch.
   傳導是指熱通過直接接觸從熱的物體傳遞到冷的物體。
2. Convection is when heat moves from a hot object to a cold one through moving liquid or gas.
   對流是指熱通過流動的液體或氣體從熱的物體傳遞到冷的物體。
3. Radiation is when heat moves from a hot object to a cold one without touching each other.
   輻射是指熱從熱的物體轉移到冷的物體，而不相互接觸。

2-3 Building in hot places
炎熱地區的房屋建築

1. Heat can heat up a building, but there are ways to prevent it.
   熱可以使建築物升溫，但有一些方法可以防止它。

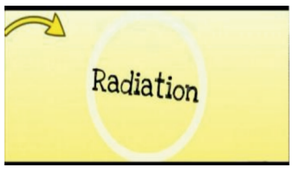
References 參考資訊

2-1 Thermal Expansion – Why are Gaps Left Between Railway Tracks?

2-2 Types of Heat Transfer

2-2 Animation –
Third Heat Flow: Radiation

2-2 Heat Transfer: Conduction, Convection, and Radiation



2-2 Conduction, Convection, and Radiation

2-3 10 Ways to Save Electricity at Home

2-3 Saving Energy Around the Home – Energy Efficiency Tips

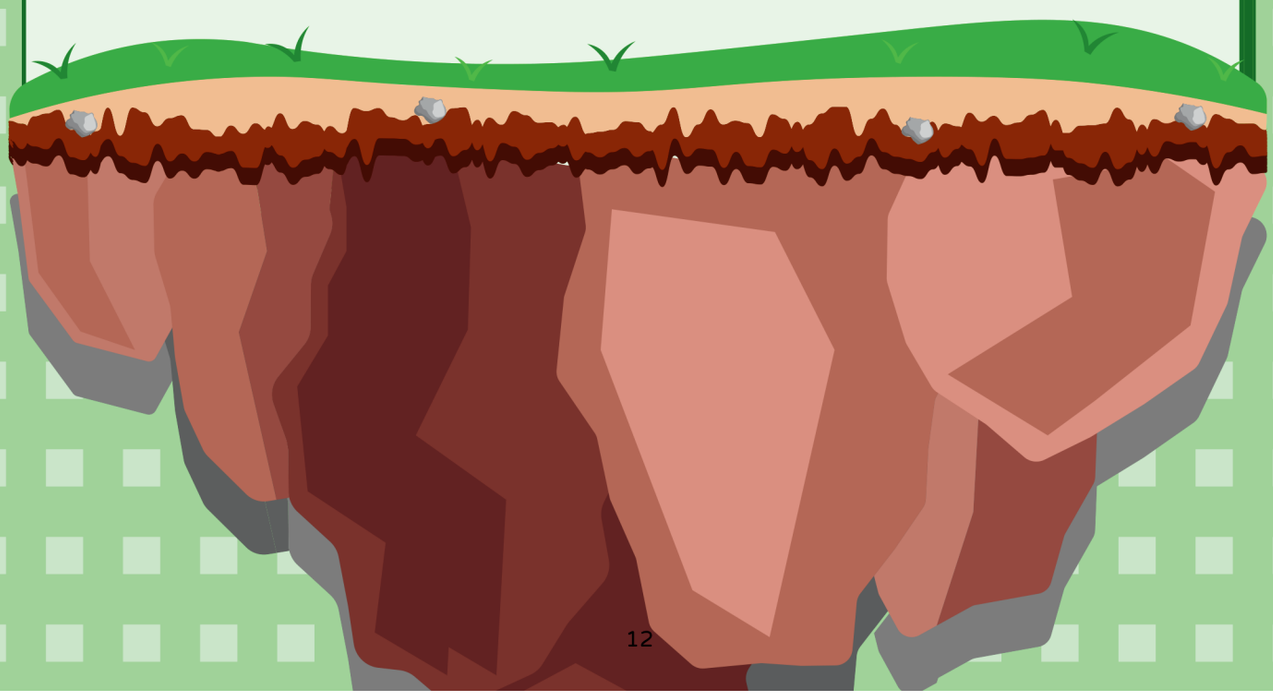
Unit 3

Land Changes
地質的變化

Lesson Overview 課程簡介

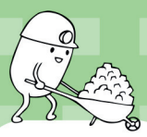
A mineral can be classified based on its color, luster, shape, hardness and odor. A rock is made up of one or more minerals. There are three types of rocks: igneous, sedimentary and metamorphic. The Earth's surface changes because of weathering, erosion and deposition. The Earth's surface also changes because of earthquakes. We should learn how to protect ourselves and how to stay safe from earthquakes.

礦物可以根據其顏色、光澤、形狀、硬度和氣味進行分類。岩石由一種或多種礦物質組成。岩石分為三種類型：火成岩、沉積岩和變質岩。地球表面因風化、侵蝕和沈積發生變化。地球表面也會因地震而發生變化。我們應該學習如何保護自己以及如何在地震時保持安全。



Land Changes 陸地上的變化

Mineral and rock 礦物與岩石



Mineral 礦物

How to classify 如何分類

- Color 顏色
- Luster 光澤
- Shape 形狀
- Hardness 硬度
- Odor 氣味

Rock 岩石

- Made up of minerals 由礦物組成
- Types 種類
  - Igneous rock 火成岩
  - Metamorphic rock 變質岩
  - Sedimentary rock 沉積岩

Changes in Earth's surface 地表上的變化

- Transport 搬運
- Erosion 侵蝕
- Deposition 堆積

The strength of each process depends on locations of the river.
每個過程的強度取決於河流位置。

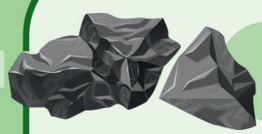
- Upstream, transport and erosion are stronger than deposition.
上游，搬運和侵蝕比堆積強。
- Midstream, transport and erosion are weaker while deposition is stronger (when compared to upstream).
中游，搬運和侵蝕較弱，而堆積則較強（與上游相比）。
- Downstream, transport and erosion are weaker than deposition.
下游，搬運和侵蝕比堆積要弱。

Earthquake 地震

- Damages/ disasters 損失(破壞) / 天災

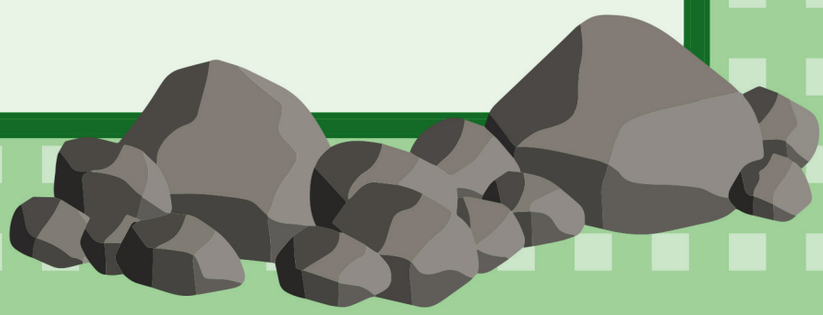
Learn how to protect yourself and be safe against earthquakes.
學習了解如何保護自己及如何安全防震。

Words and Phrases 單字與片語



3-1 Minerals and rocks 礦物與岩石

mineral	礦物
gypsum	石膏
feldspar	長石
white mica	白雲母
diamond	鑽石
copper	銅礦
graphite	石墨
igneous rock	火成岩
basalt	玄武岩
sedimentary rock	沉積岩
shale	頁岩
metamorphic rock	變質岩
slate	板岩
crystallization	結晶
Mohs hardness scale	莫氏硬度表
talc	滑石
quartz	石英
black mica	黑雲母
calcite	方解石
sulfur	硫磺
iron ore	鐵礦
rock	岩石
granite	花崗岩
andesite	安山岩
sandstone	砂岩
limestone	石灰岩
marble	大理石
gneiss	片麻岩
hardness	硬度



3-2 Changes in Earth's surface 地表的變化

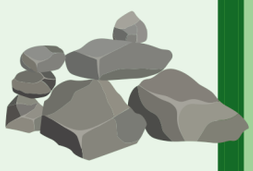
canyon	峽谷	valley	山谷
tofu rocks	豆腐岩	sea cliff	海蝕崖
wave-cut platform	海蝕平台	marine cave	海蝕洞
weathering	搬運/風化	erosion	侵蝕
deposition	堆積	even	平坦的
steep	陡峭的	landslide	土石流
collapse	倒塌	turbulent	湍急的

3-3 Earthquake 地震

earthquake	地震

Key Concepts 課程焦點

3-1 Minerals and rocks
礦物與岩石



1. A rock is made up of one or more minerals.
   岩石由一種或多種礦物組成。
2. A harder mineral can scratch a softer one.
   較硬的礦物會刮傷較軟的礦物。

3-2 Changes in Earth's surface
地表的變化

1. Weathering is the breaking down of Earth's surface into smaller pieces.
   風化是將地球表面分解成更小的碎片。
2. Erosion is moving small pieces from one place to another.
   侵蝕是將小碎片從一個地方移動到另一個地方。
3. Deposition is dropping small pieces into another place.
   沉積就是將小塊碎片放到另一個地方。

3-3 Earthquake
地震

1. When there is an earthquake, drop, cover and hold.
   發生地震時，趴下、掩護、穩住。
2. Learn how to protect yourself and how to stay safe from earthquakes.
   學習了解如何保護自己及如何安全防震。

References 參考資訊

3-1 Be a Rock Detective

3-1 Types of Rocks

3-1 3 Types of Rocks

3-2 Erosion and Sedimentation: How Rivers Shape the Landscape

3-2 Why Do Rivers Curve?

3-2 Why Do Rivers Have Deltas?

3-3 What Causes Earthquakes?

3-3 What is an Earthquake?

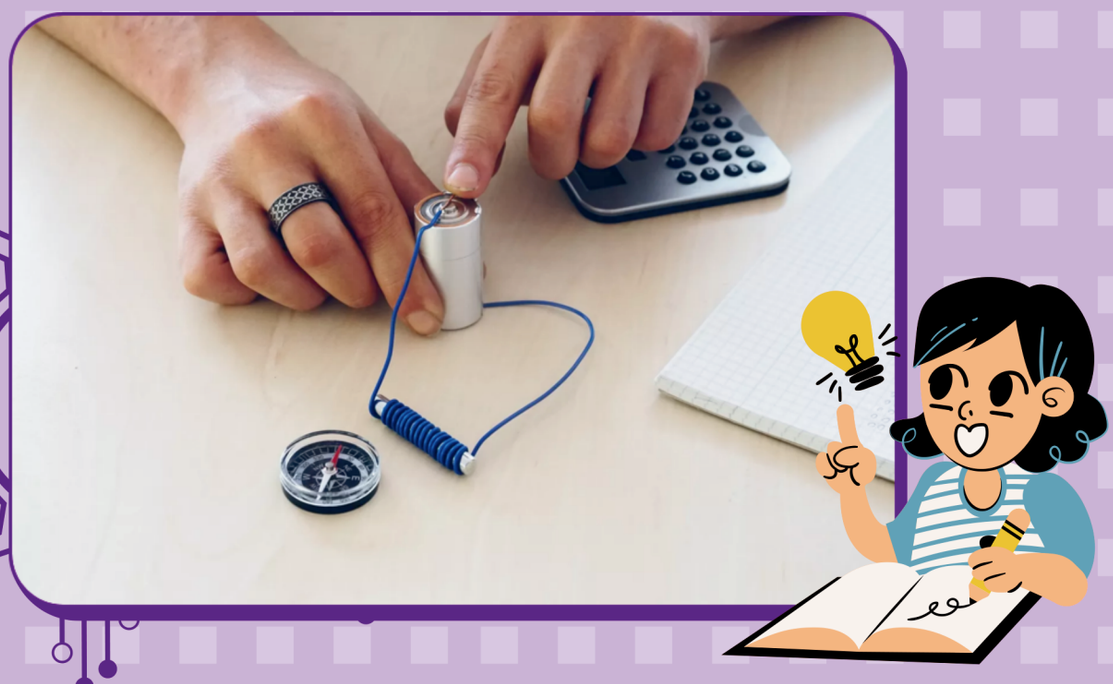
Unit 4

Electricity and Magnetism
電磁作用

Lesson Overview 課程簡介

A compass is attracted to Earth's magnetic field, and its needle points north. Electricity creates magnetism. If a battery or electric wire is reversed, a compass needle's deflection is also reversed. A compass needle's deflection is also affected by an electromagnet. To increase the strength of an electromagnet, increase the number of batteries, add more turns to the coil, or wrap the coil around an iron rod. An electromagnet has many daily life applications.

指南針被地球磁場所吸引，它的指針指向北方。電產生磁力。如果電池或電線顛倒，羅盤指針的偏轉也會顛倒。指南針的偏轉也會受到電磁鐵的影響。為了增加電磁鐵的強度，增加電池的數量，增加線圈的匝數，或者將線圈纏繞在鐵棒上。電磁鐵有許多日常生活應用。



Electricity and magnetism 電與磁

Geomagnetism and compass 地磁與指北針

Earth is like a big magnet that interacts with a compass needle
地球像個大磁鐵，會影響指北針的指向。

- A compass is attracted to Earth's magnetic field.
  羅盤受地球磁場吸引。
- The compass needle points north.
  羅盤指針指向北方。

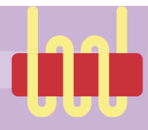
Electricity creates magnetism 電流會產生磁場(電會生磁)

- Live wire 有通電的電線
  - Reversing the battery or electric wire also reverses the compass needle's deflection.
    改變電池或電線(擺放位置)也會改變羅盤針的偏轉。
- Electromagnet 電磁鐵
  - An electromagnet affects a compass needle's deflection.
    電磁鐵會影響指南針的偏轉。

Strength of an electromagnet 電磁鐵的

How to make an electromagnet stronger 如何把電磁鐵的強度增高

- Increase the number of batteries
  增加電池數量
- Add more turns to the coil
  增加線圈數量
- Wrap the coil around an iron rod
  將線圈纏繞在鐵棒上



Applications of electromagnets 電磁鐵的應用

- Telephone, electric bell, maglev train
  電話、電鈴、磁浮列車
- Handmade toy (電池電動機)

Words and Phrases 單字與片語

4-1 Compass and geomagnetism 指北針與地磁

☐	compass	指北針	☐	magnet	磁鐵
☐	magnetic	磁力的	☐	magnetism	磁性
☐	geomagnetism	地磁	☐	needle	針
☐	repel	排斥	☐	attract	吸引
☐	pole	極			

4-2 Magical electromagnet 神奇的電磁鐵

☐	electromagnet	電磁鐵	☐	electromagnetic	電磁的
☐	magnetic field	磁場	☐	current	電流
☐	battery	電池	☐	electric wire	電線
☐	enameled wire	漆包線	☐	sandpaper	砂紙
☐	coil	線圈	☐	iron rod	鐵棒
☐	wooden stick	木棒	☐	paper clip	迴紋針
☐	reverse	反轉	☐	deflection	改變方向

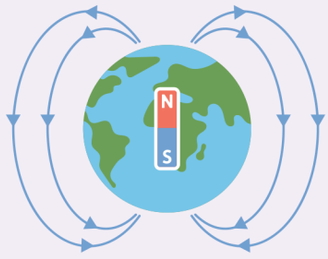
4-3 Applications of electromagnet 電磁鐵的應用

☐	maglev train	磁浮列車	☐	magnetic crane	電磁起重機
☐	telephone	電話	☐	remote control	遙控器
☐	electric motor	電動馬達	☐	electric bell	電鈴
☐	hair dryer	吹風機	☐	flashlight	手電筒

Key Concepts課程焦點

4-1 Compass and geomagnetism
指北針與地磁

1. A compass is attracted to Earth's magnetic field.
   羅盤受地球磁場吸引。
2. A compass needle points north.
   羅盤指針指向北方。
3. Like poles repel; opposite poles attract.
   同極相斥;異極相吸。



4-2 Magical electromagnet
神奇的電磁鐵

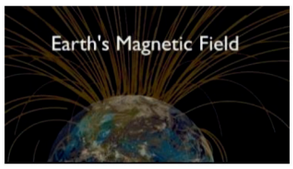
1. An electromagnet affects a compass needle's deflection.
   電磁鐵會影響指南針的偏轉。
2. The greater the number of coils, the stronger the magnet.
   線圈越多，電磁鐵磁性越強。
3. The greater the number of batteries, the stronger the magnet.
   電池數量越多，電磁鐵磁性越強。

4-3 Applications of electromagnet
電磁鐵的應用

1. An electromagnet has many daily life applications.
   電磁鐵在日常生活中有很多應用。

References 參考資訊

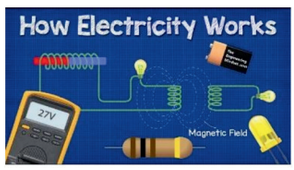
4-1 Earth's Magnetic Field | Earth Itself Is a Huge Magnet | Magnetosphere



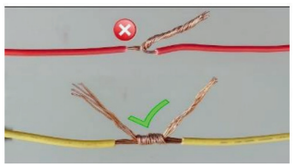
4-1 Magnets How Do They Work

4-1 Earth and Compasses | Magnetism | Physics

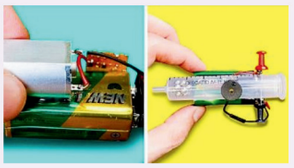
4-2 How Electricity Works – Working



4-2 Awesome Idea! How to Twist Electric Wire Together

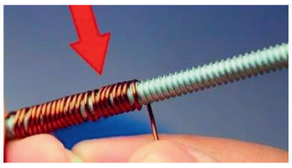


4-2 18 Electric Inventions to Make Your Home Smart

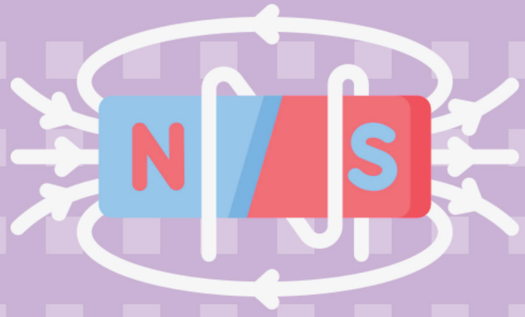


4-2 Introduction to Electricity

4-3 Build Your Electric Magnet in 30 Seconds



4-3 How Do Maglev Trains Work?



Unit 1

Simple Machines
簡單機械

Lesson Overview 課程簡介

Simple machines make work easier. Examples of simple machines are lever, pulley, and wheel and axle. A lever has a fulcrum, resistance arm and effort arm. Their positions will determine the type of lever and the amount of effort needed to do work. A pulley can be fixed or movable. A fixed pulley changes the direction of force while a movable pulley lessens effort. A wheel and axle move objects with lesser effort. A gear is a wheel with teeth. If two gears are interlocked, they rotate in opposite directions. If they are connected by a chain, they rotate in the same direction.

簡單的機器使移動更容易。簡單機器的例子有槓桿、滑輪和輪軸。槓桿具有支點、抗力臂和施力臂。他們的位置將決定槓桿的類型和移動所需的力量。滑輪可以是固定的或可移動的。固定滑輪、改變力的方向，而動滑輪減少力。有了車輪和車軸，可以較小的力移動物體。齒輪是帶齒的輪子。如果兩個齒輪連扣，則它們以相反的方向旋轉。如果它們通過鏈條連接，它們將沿相同方向旋轉。

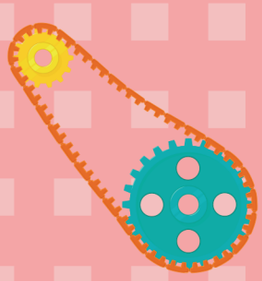
Simple Machines 簡單機械

- Lever 槓桿
  - Resistance arm 抗力臂
    - long → Convenient but more effort 方便但費力
    - short → Less effort 省力
  - Effort arm 施力臂
    - short → Convenient but more effort 方便但費力
    - long → Less effort 省力

- Pulley 滑輪
  - Fixed pulley 定滑輪 → Change direction of force 改變施力方向
  - Movable pulley 動滑輪 → Less effort 省力

- Wheel and axle 輪軸 → Wheel and axle rotate at the same time 輪與軸同步轉動

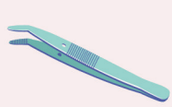
- Gear and chain 齒輪與鏈條
  - Direction of rotation 轉動方向
    - Interlocked 互相咬合 → Opposite directions 相反方向
    - Connected by chain 練條連接 → Same direction 相同方向
  - Number of turns is related to gear size 轉動圈數與齒輪數有關

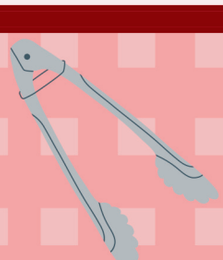


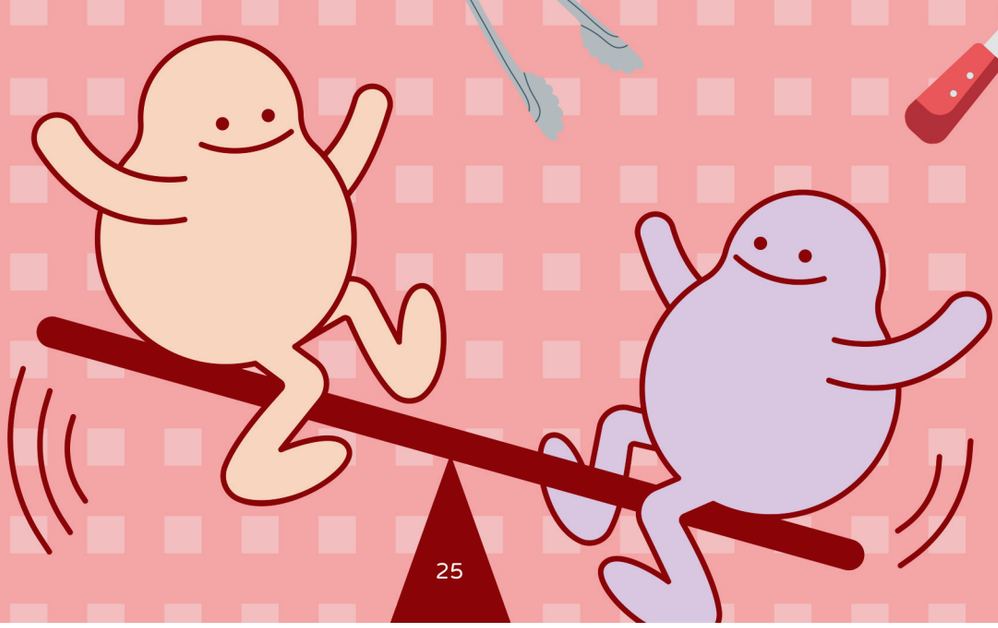
Words and Phrases 單字與片語

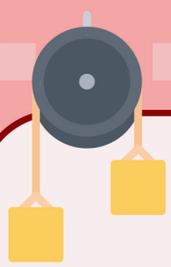
1-1 Lever 槓桿

lever	槓桿	fulcrum	支點
effort point	施力點	resistance point	抗力點
effort arm	施力臂	resistance arm	抗力臂
seesaw	翹翹板	pliers	鉗
scissors	剪刀	bottle opener	開瓶器
juicer	榨汁器	nail puller	拔釘器
stapler	釘書機	tweezers	鑷子
bread tongs	麵包夾	rotate	旋轉
interlocked	緊密連接的；相扣的	beam	應為槓桿的桿子



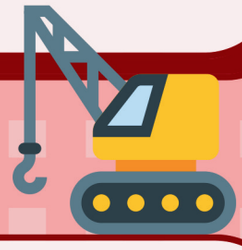






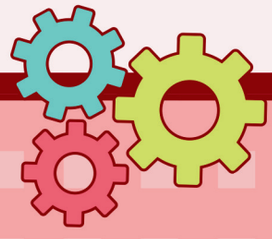
1-2 Pulley, wheel and axle 滑輪與輪軸

pulley	滑輪
movable pulley	動滑輪
spring balance	彈簧秤
vertical	垂直的
cotton thread	棉線
crane	起重機
faucet	水龍頭
screwdriver	螺絲起子
bamboo dragonfly	竹蜻蜓
electric fan	電風扇
fixed pulley	定滑輪
balance	平衡
weights	砝碼
grip	握把
flagpole	旗桿
wheel and axle	輪軸
pencil sharpener	削鉛筆機
knob	喇叭鎖
rolling pin	擀麵棍



1-3 Power transmission 動力傳送

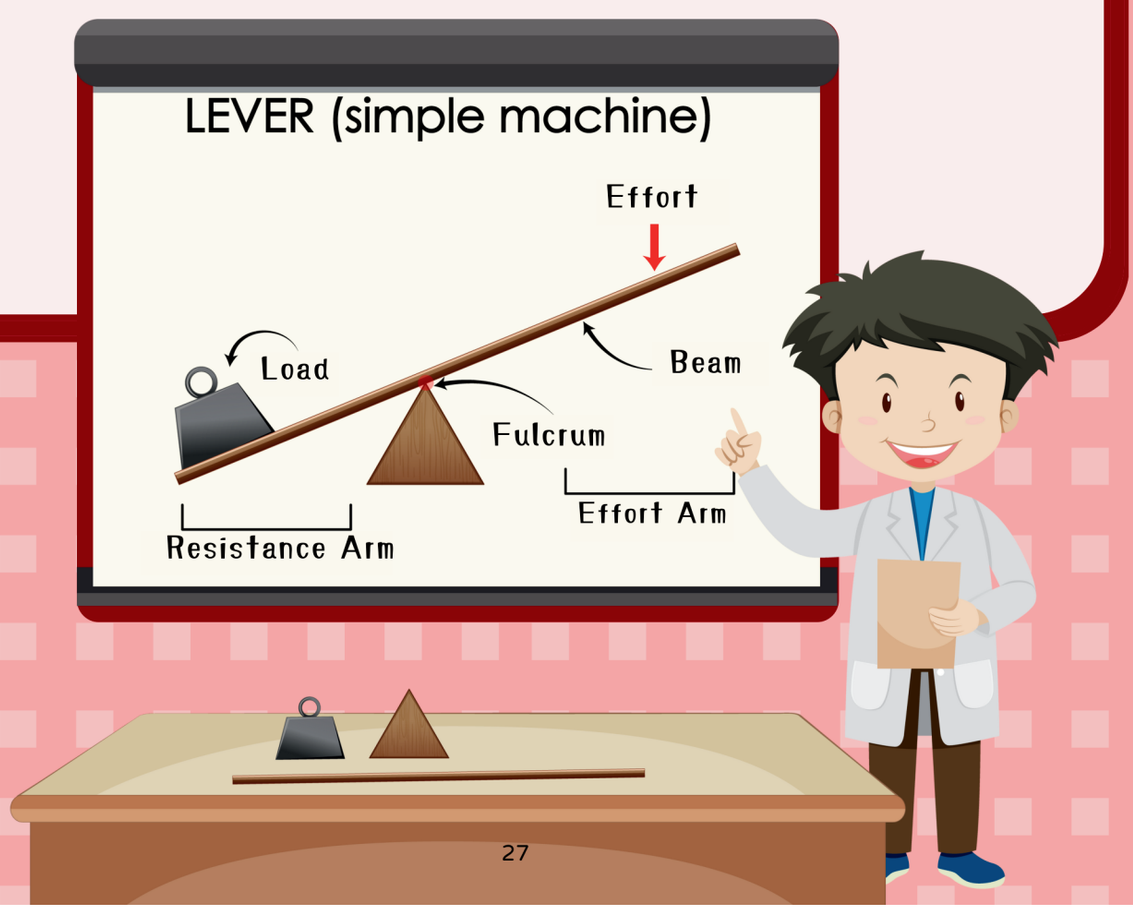
clockwise	順時針
counterclock wise	逆時針
gear and chain	齒輪與鏈條



Key Concepts 課程焦點

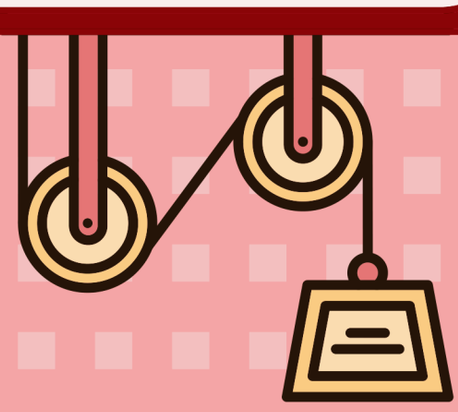
1-1 Lever 槓桿

1. If the fulcrum is between the effort point and resistance point,
   如果支點在施力點和抗力點之間
   effort arm ＞ resistance arm, less effort
   施力臂 ＞ 抗力臂，可以省力；
   effort arm ＜ resistance arm, more effort
   施力臂 ＜ 抗力臂，比較費力；
   effort arm ＝ resistance arm, same effort
   施力臂＝抗力臂，不省力也不費力。
2. If the resistance point is between the effort point and fulcrum,
   effort arm ＞ resistance arm, less effort.
   抗力點在中間的工具，施力臂＞抗力臂，可以省力。
3. If the effort point is between the resistance point and fulcrum,
   effort arm ＜ resistance arm, more effort.
   施力點在中間的工具，施力臂＜抗力臂，比較費力。



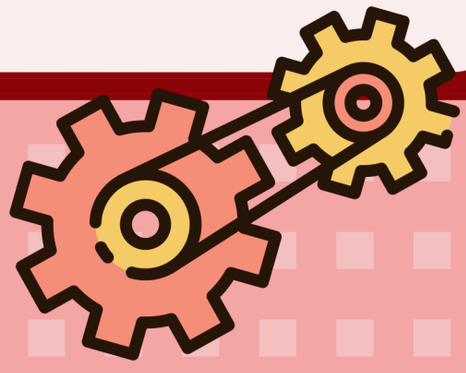
1-2 Pulley, wheel and axle滑輪與輪軸

1. A fixed pulley changes the direction of force.
   定滑輪改變力的方向。
2. A movable pulley lessens effort.
   動滑輪減輕了力。
3. A wheel and axle move objects with less effort.
   輪軸以較小的力移動物體。

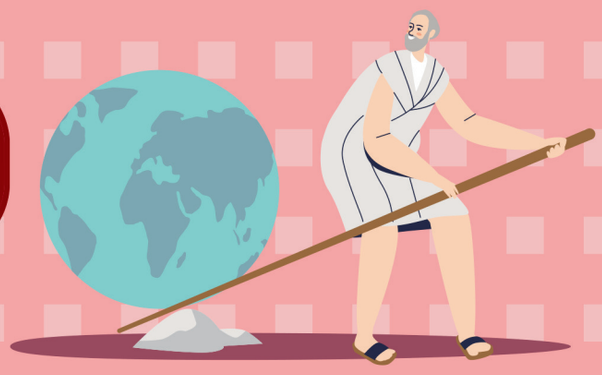


1-3 Power transmission 動力傳送

1. If gears are interlocked, they rotate in opposite directions.
   如果齒輪連扣，它們的旋轉方向相反。
   If gears are connected by a chain, they rotate in the same direction.
2. 如果齒輪用鏈條連接，它們的旋轉方向相同。



References 參考資訊

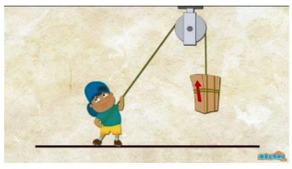


1-1 Super Simple Machines: Levers

1-1 The Mighty Mathematics of the Lever

1-1 Simple Machines for Kids | Learn All About the 6 Simple Machines

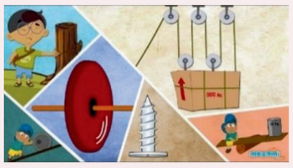
1-2 What is a Pulley? – Simple Machines



1-2 Need a Lift? Try a Pulley

1-2 Pulley – Simple Machines Lesson for Kids

1-3 Pulley, Wheel, Lever and More Simple Machines



1-3 Gears and Levers | Forces and Motion

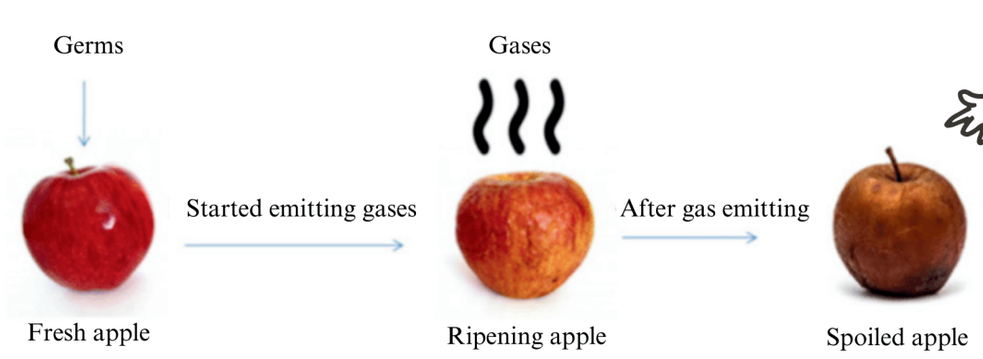
Unit 2

Rust and Food Spoilage
生鏽與食物腐敗

Lesson Overview 課程簡介

Rust forms when iron reacts with water and oxygen. To prevent an iron product from rusting, keep it dry, put it inside an airtight container, or apply oil on its surface. Food gets spoiled because mold grows in warm temperature, contact with air, and high moisture. To prevent food from spoiling, keep it in a cool and dry place and remove air. Be careful about what you eat. Pay attention to the expiry date and preservation methods and avoid food additives.

當鐵與水和氧氣反應時會形成生鏽。為防止鐵製品生鏽，請將其保持乾燥，放入密封容器中，或在其表面塗抹油。食物腐敗是因為黴菌在溫暖的溫度、接觸空氣和高濕度下生長。為防止食物變質，請將其存放在陰涼乾燥的地方並排除空氣。注意你吃的食物。注意保存、有效期限和保存方法，避免使用食品添加劑。



Rust and Food Spoilage
生與食物腐敗

Rust
生鏽

Rust formation
生鏽條件

- Water causes an iron product to rust
  水分會造成鮮製品生鏽
- Oxygen causes an iron product to rust
  氧氣導致鐵製品氧化生鏽

Rust prevention
防鏽方式

- Keep the iron product dry
  保持鐵製品乾燥
- Put the iron product inside a closed container
  將鐵製品放入密封的容器
- Apply oil on the surface of the iron product
  在鐵製品的表面塗上一層油

Food Spoilage
食物腐敗

Growth conditions
生長條件

- Warm temperature
  溫度較高
- Contact with air
  接觸空氣
- High moisture
  濕度較高

Preservation
保存食物

- Refrigeration
  低溫冷藏
- Sealing, vacuum packaging
  密封、眞空包裝
- Dehydration
  乾燥處理(脫水)

Food safety awareness
飲食安全意識

- Pay attention to expiry date and preservation methods
  留意保存期限與方法
- Avoid food additives
  避免食品添加物

Words and Phrases 單字與片語

2-1 Rusting of iron products 鐵製品生鏽的探討

- rust 生鏽

2-2 Prevent iron products from rusting 防止鐵製品生鏽

- dry 乾燥
- vacuum packaging 眞空包裝
- airtight container 封閉容器 (空氣進不去的)
- isolate 隔絕
- sealed packaging 密封包裝

2-3 Food spoilage and preservation 食物的腐敗與保存

- spoilage 腐敗
- fungus 眞菌
- mold 發霉(v)
- yeast 酵母菌
- bacteria 細菌(複)
- growth 生長
- appearance 外觀
- smell 氣味
- microbe 微生物
- mold 黴菌(n)
- spore 孢子
- bacterium 細菌(單)
- fermentation 發酵
- breed 繁殖
- color 顏色
- rice wine 米酒

- [ ] vinegar 醋
- [ ] cheese 乳酪
- [ ] soy sauce 醬油
- [ ] kimchi 泡菜
- [ ] fermented soybean 豆豉
- [ ] beneficial 有益的
- [ ] pickled food 醃漬食物
- [ ] desiccant 乾燥劑
- [ ] high-temperature sterilization 高溫殺菌
- [ ] magnifying glass 放大鏡
- [ ] expiry date 有效期限
- [ ] yogurt 優酪乳
- [ ] miso 味噌
- [ ] steamed bread 饅頭
- [ ] fermented bean curd 豆腐乳
- [ ] harmful 有害的
- [ ] growth condition 生長條件
- [ ] food preservation 食物保存
- [ ] deoxidizer 脫氧劑
- [ ] low-temperature storage 低溫保存
- [ ] microscope 顯微鏡

Key Concepts 課程焦點

2-1 Rusting of iron products 鐵製品生鏽的探討

1. Rust forms when iron reacts with water and oxygen.
   鐵與水和氧反應時會生鏽。

2-2 Prevent iron products from rusting 防止鐵製品生鏽

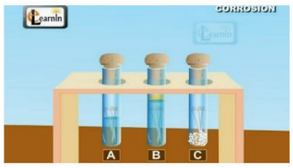
1. Keep an iron product dry.
   保持鐵製品乾燥。
2. Put an iron product inside an airtight container.
   將鐵製品放入密封的容器裡。
3. Apply oil on the surface of an iron product.
   在鐵製品的表面塗上一層油。

2-3 Food spoilage and preservation 食物的腐敗與保存

1. Food gets spoiled because mold grows with warm temperature, contact with air, and high moisture.
   食物腐敗是因為黴菌在高溫、與空氣接觸和高濕度下生長。
2. Keep food in a cool and dry place and remove air so that it will not get spoiled.
   將食物存放於陰涼乾燥處，並排除空氣，以免變質。

References 參考資訊

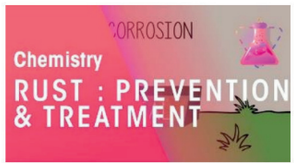
2-1 Corrosion and Rust



2-1 Rusting - Iron + Water + Oxygen = Iron Oxide

2-2 Prevention of Rusting – Physical and Chemical Changes

2-2 Rust: Prevention & Treatment



2-2 Rusting of Iron

2-3 Are Food Preservatives Bad for You?

2-3 Food Poisoning | Food Preservation | Microorganisms

2-3 Food Preservation – Seven Wonders of the Microbe World

Unit 3

Cherish Our Home
珍愛家園

Lesson Overview 課程簡介

The world is rich in biodiversity. Different animals and plants live in the environment, and they adapt in order to survive. However, humans have changed the natural environment through introduced species, pollution and resource exploitation. We must protect the environment by using renewable energy, reducing carbon emissions and conserving resources.

世界擁有豐富的生物多樣性。不同的動、植物生活在環境中，它們為了生存而適應。然而，人類透過引入物種、污染和資源開發改變了自然環境。我們必須通過使用可再生能源、減少碳排放和節約資源來保護環境。

Cherish Our Home 珍愛家園

Animals, plants and the environment 動物、植物與環境

- Global and Taiwan biodiversity 全球及臺灣生物多樣性

- Animals and plants adapt to the environment 環境與動物,植物生存適應的能力

Humans and environment 人類與環境

- Effect of introduced species 外來入侵種對環境的影響
  - Invasive red fire ant, mile-a-minute weed, common water hyacinth, etc. 入侵紅火蟻,小花曼澤蘭,布袋蓮等
- Resource exploitation and environmental pollution 資源開發與環境污染
  - Water pollution 水污染
  - Air pollution 空氣污染
- Changes in natural ecosystem 自然生態的改變
  - Deforestation 山坡地的濫墾與濫伐
  - Global warming 全球暖化

Protect the environment 愛護環境

- How to generate electricity 發電方式
  - Renewable energy 可再生能源
  - Nonrenewable energy 不可再生能源
- How to protect the Earth 實際行動愛護地球
  - Individual or group actions to protect the environment 個人或團體愛護環境的行動
- Energy conservation and carbon reduction 節能減碳愛地球
  - Reduce, reuse, recycle and eco-consumerism 減量,重複使用,回收再生,環保選購
  - Environmental label, energy label, carbon footprint, carbon label 環保標章,節能標章,碳足跡,台灣碳標籤

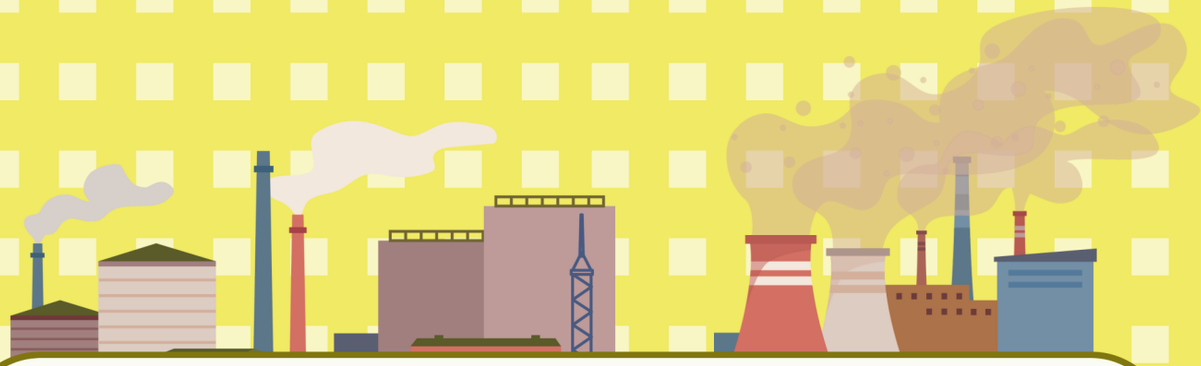
Words and Phrases 單字與片語

3-1 Living things and the environment 生物與環境

living things	生物	biodiversity	生物多樣性
North Pole	北極地	South Pole	南極地
frigid biome	寒帶生物群	temperate biome	溫帶生物群
tropical biome	熱帶生物群	forest	森林
tropical rainforest	熱帶雨林	mountain	山脈
grassland	草原	desert	沙漠
ocean	海洋	estuary	河口
stream	溪流	wetland	濕地
ecosystem	生態系		

3-2 Humans and the environment 人類與環境

endemic species	特有種	civet	麝香貓
crested serpent eagle	大冠鳩	mikado pheasant	帝雉
protected species	保育類生物	Formosan black bear	臺灣黑熊
black-faced spoonbill	黑面琵鷺	cherry salmon	櫻花鉤吻鮭
endangered	瀕危/瀕臨絕種的	threatened	受到威脅的
short-tailed albatross	短尾信天翁	otter	水獺
leopard cat	石虎	extinct	絕種的



environmental change	環境改變	human activity	人類活動
overexploitation	過度開發	introduced species	外來種
water pollution	水汙染	invasive species	入侵種
particulate matter	懸浮微粒	air pollution	空氣汙染
ecological imbalance	生態失衡	air quality index (AQI)	空氣品質指標

3-3 Protect the environment 愛護環境

wildlife	野生動物	conservation	保育
environmental protection	環境保護	natural resource	自然資源
electricity generation	發電能源	renewable resource	可再生
hydropower	水力發電	wind energy	風力發電
biomass energy	生質能	solar energy	太陽能
marine energy	海洋能	non-renewable resource	不可再生
nuclear energy	核能	fossil fuel	化石燃料
green action	綠色行動	green energy	綠色能源
clean energy	清潔能源	energy saving and carbon reduction	節能減碳
water and soil conservation	水土保持	conserve	保護、保存
carbon emissions	碳排放		

Key Concepts 課程焦點

3-1 Living things and the environment 生物與環境

1. Plants and animals have special structures that allow them to survive in their environment.
   動植物有特殊的結構，可以讓它們生活在它們的環境中。

3-2 Humans and the environment 人類與環境

1. The natural environment is destroyed by human activity and development.
   自然環境受到人類活動與開發的破壞。
2. Some animals are endangered and some are listed as protected species.
   有些生物瀕臨絕種而有些被列為保育類。

3-3 Protect the environment 愛護環境

1. We must protect the environment by using renewable energy, reducing carbon emissions and conserving resources.
   我們必須通過使用可再生能源、減少碳排放和節約資源來保護環境。

References 參考資訊

3-1 What is Biodiversity?

3-1 Polar Bears 101 | Nat Geo Wild

3-1 Why is Biodiversity so Important?

3-1 The Threat of Invasive Species

3-2 Air Quality Index (AQI) – What It Means for You

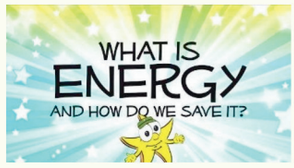
3-2 Air Pollution

3-2 Global Warming – The End Game

3-3 How to Take Care of the Environment

3-3 The Ecological Footprint Explained

3-3 How to Save Energy



NOTES

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A Reference Handbook for Elementary School Bilingual Teachers in Natural Sciences : Instructional Language in English [6th Grade]

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