

Science Notes

English Immersion Program

6th grade
2nd semester



Name: _____

Class: _____

Number: _____

Teacher: _____

Preface

前言

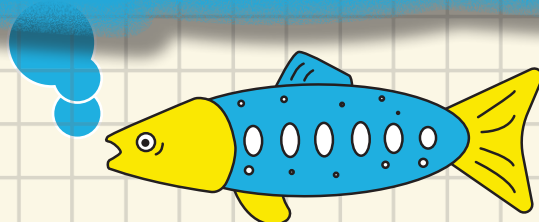
面對全球化及國際化浪潮，2030雙語國家政策發展藍圖中強「厚植國人英語力」、「提升國家競爭力」為重要目標(國家發展委員會，2020)，因此，為提升國民英語力以增加國際競爭力，政府預計於2030年打造臺灣成為雙語國家。

臺北市為因應此國家重要政策，積極推動每個行政區至少一所雙語實驗課程學校，自106學年度起至109學年度止，臺北市已有20所雙語實驗課程國小及8所雙語實驗課程國中，並將於110學年度再增加20校，達到48校之多，期望成為我國雙語教育之先驅，讓臺北市的孩子成為具有國際移動力的未來公民。

本校有感於雙語教育及近年來我國積極培養學童STEAM (Science, Technology, Engineering, Arts, and Mathematics)結合科學、技術、工程、藝術，以及數學跨學科素養的教育趨勢，因此自108學年度開始針對六年級試辦自然課程雙語教學，以英語營造生活情境中的科學，透過趣味科學實驗增進學童以英語來進行科學探究的興趣與能力。

這本科學筆記本是本校六年級自然任課老師陳美卿、林怡伶、林雨慶、范瑋庭、張淑惠、陳姿瑾所共同設計的，期望學生可以紮紮實實的學習自然科學知識，更透過以英語指導科學實驗步驟，動手做實驗來激發學童的科學探究潛能、啟發學童善用英語進行科學領域學習的能力。

2020.09.02





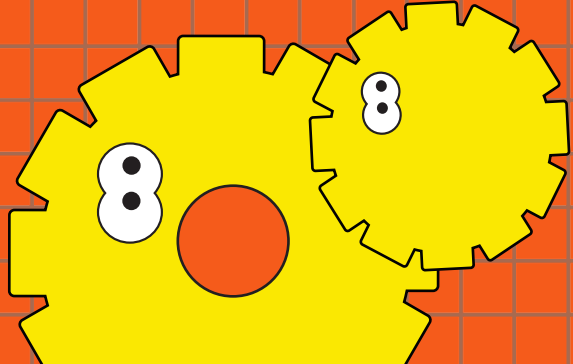
Unit 1

Simple Machines

簡單機械



Simple Machines 簡單機械



Lever
槓桿

Resistance arm
抗力臂

Effort arm
施力臂

long

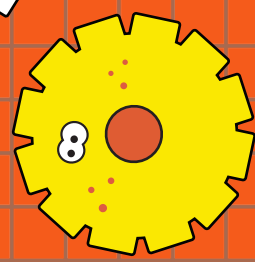
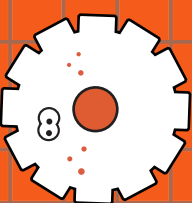
short

short

long

Convenient but more effort
方便但費力

Less effort
省力



Change direction of force
改變施力方向

Less effort
省力

Fixed pulley
定滑輪

Movable pulley
動滑輪

Wheel and axle
輪軸

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

Direction of rotation
轉動方向

Interlocked
互相咬合

Opposite directions
相反方向

Connected by chain
鍊條連接

Same direction
相同方向

Number of turns is related to gear size
轉動圈數與齒輪數有關

Gear and chain
齒輪與鏈條

應聽懂及認讀的生字

1. 槓桿 lever
2. 滑輪 pulley
3. 輪軸 wheel and axle
4. 齒輪與鏈條 gear and chain

5. 槓桿原理 principle behind lever*
6. 支點 fulcrum
7. 施力點 effort* point
8. 抗力點 resistance* point
9. 施力臂 effort arm*
10. 抗力臂 resistance arm*

11. 定滑輪 fixed pulley
12. 動滑輪 movable pulley
13. 砝碼 standard weight*
14. 垂直的 vertical*
15. 平衡 balance*

16. 順時針 clockwise*
17. 逆時針 counterclockwise

Force is applied on the wheel

施力在「輪」上的物品:

1. 水龍頭 faucet
2. 削鉛筆機 pencil sharpener
3. 螺絲起子 screwdriver
4. 喇叭鎖 knob

生活用品

1. 鉗 pliers
2. 開瓶器 can opener
3. 榨汁器 juicer
4. 鑷子 tweezer
5. 麵包夾 bread tong
6. 釘書機 stapler
7. 拔釘器 staple remover
8. 剪刀 scissors
9. 握把 handle*
10. 彈簧秤 spring balance
11. 棉線 cotton thread
12. 起重機 crane*
13. 旗桿 flagpole*
14. 翹翹板 seesaw

Force is applied on the axle

施力在「軸」上的物品:

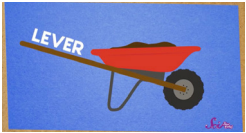
1. 竹蜻蜓 bamboo dragonfly*
2. 擀麵棍 rolling pin
3. 電風扇 electric fan*

*表示學測指考7000單字內

- ① If the fulcrum is between the effort point and resistance point,
 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。

Science Videos Unit 1

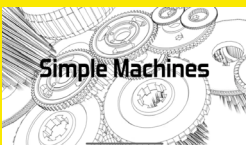
1-1
Super Simple Machines:
Levers



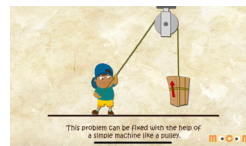
1-1
The Mighty Mathematics of the
Lever - Andy Peterson and Zack
Patterson



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



1-2
What is a Pulley? - Simple
Machines | Science for Kids |
Educational Videos by Mocomi



1-2
Need a Lift? Try a Pulley!



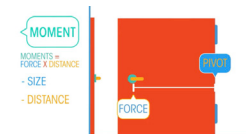
1-2
Pulley - Simple Machines
Lesson for Kids



1-3
Pulley, Wheel, Lever and More
Simple Machines - Science for
Kids | Educational Videos by
Mocomi



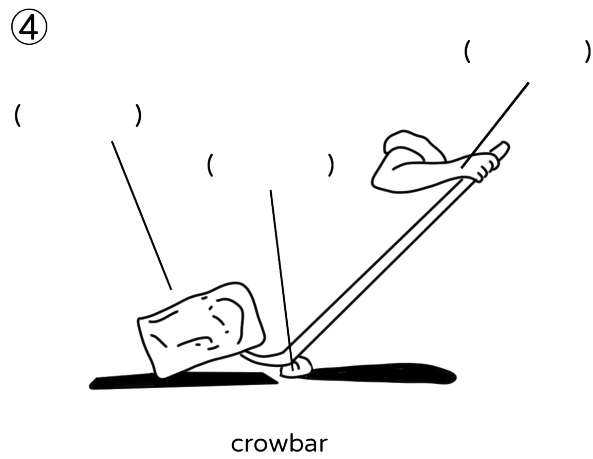
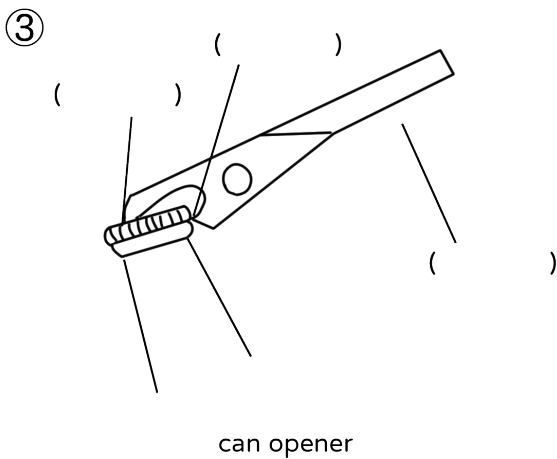
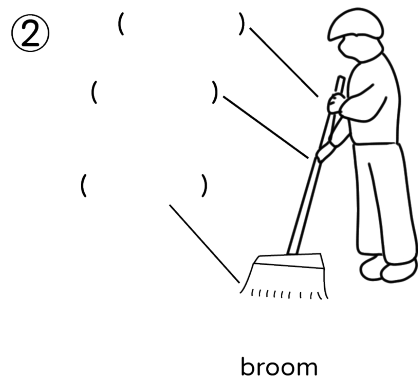
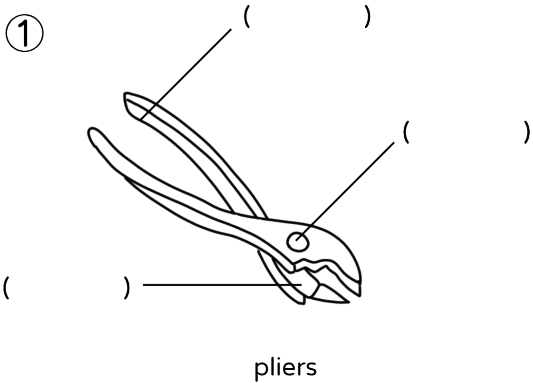
1-3
Gears and Levers | Forces and
Motion | Physics | FuseSchool



LEVER

Below are examples of lever. Label the parts by writing A, B or C inside the ().
 以下為槓桿原理使用的例子，在()內填入與其原理相符的代號A、B、C。

A. fulcrum 支點	B. resistance point 抗力點	C. effort point 施力點
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上述的工具中，
 省力 (less effort) 的工具為號碼 1 2 3 4 ；
 費力 (more effort) 的工具為號碼 1 2 3 4 。

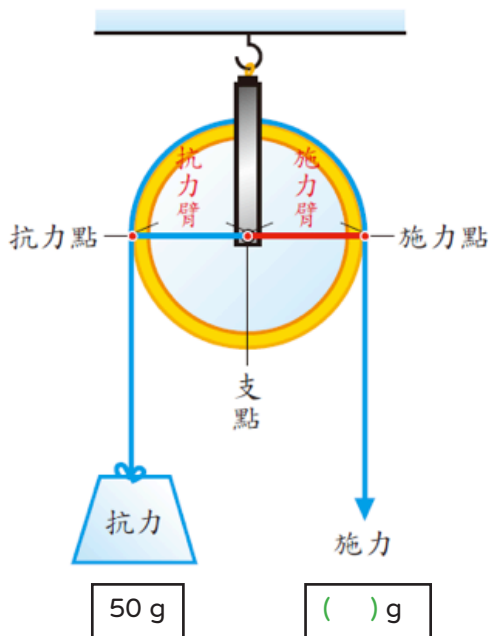
Pulley

There are two types of pulleys: fixed pulley and movable pulley.

1. What type of pulley is it? Write **fixed** or **movable** inside the ().
2. Does it need less effort or more effort? Circle **省力** or **費力**.
3. Which way will the resistance move (抗力移動的方向)? Draw **↑** or **↓**.
4. The weight of the pulley (滑輪的重量) is 20 g, and the resistance (抗力) is 50 g. How much force is required to pull the resistance (施力需要多少)? Write the weight inside the ().

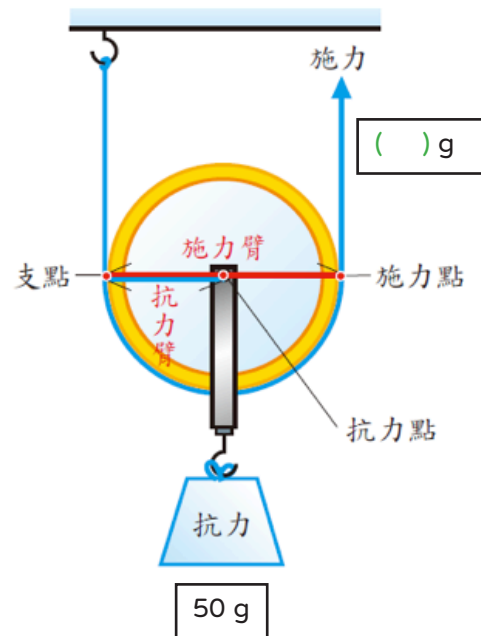
() pulley

此滑輪：省力 費力



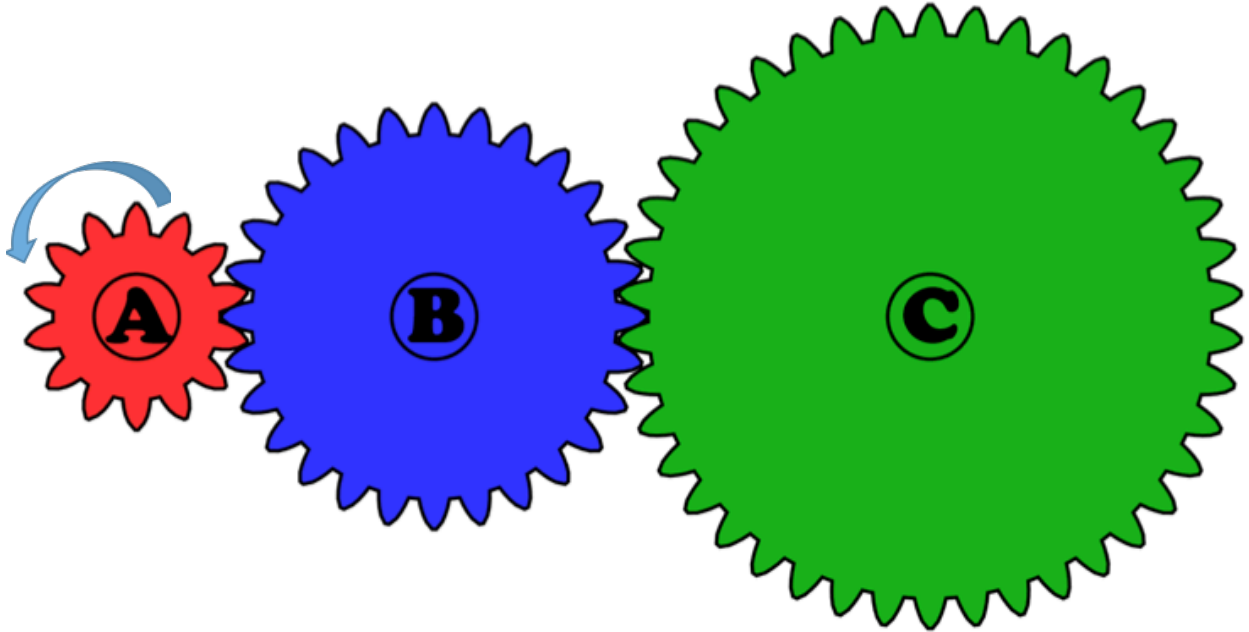
() pulley

此滑輪：省力 費力

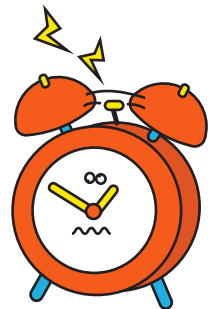


Gears

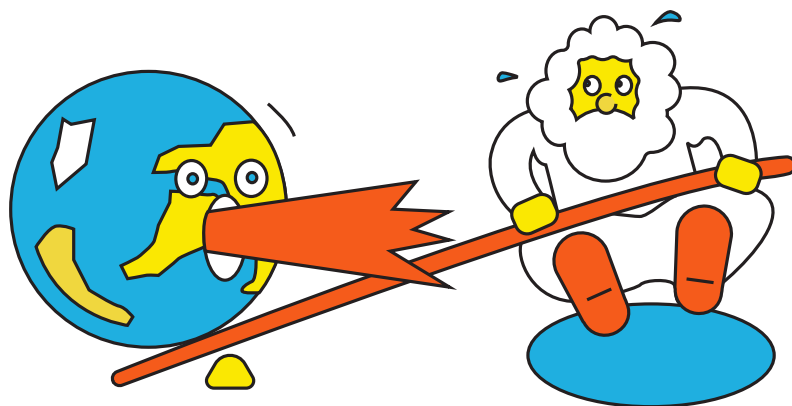
Observe the gears below and answer the questions.



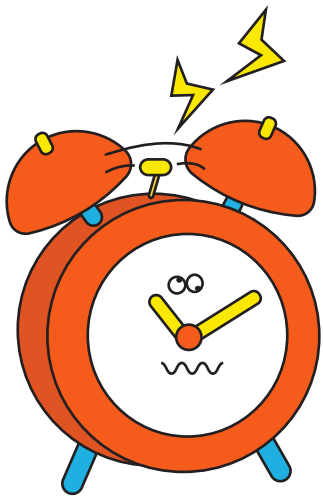
1. If **gear A** turns counterclockwise (逆時針), which direction will **gear B** and **gear C** rotate? Draw ↻ or ↻ above the gears.
2. If **gear A** makes one full turn clockwise (順時針), **gear B** will turn:
 in which direction? _____
 by how many teeth? _____
gear C will turn:
 in which direction? _____
 by how many teeth? _____



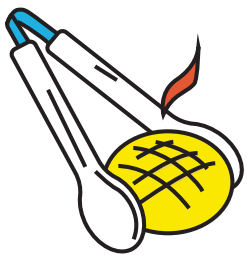
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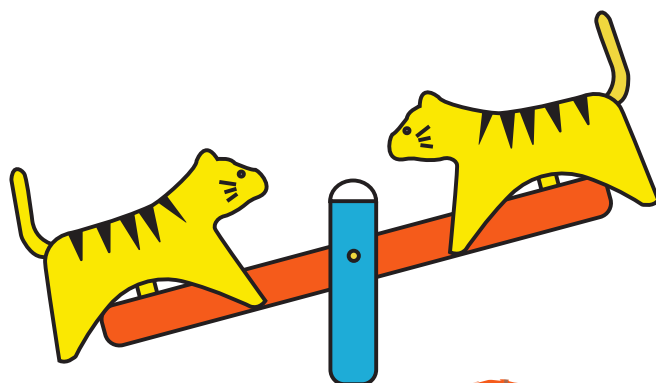
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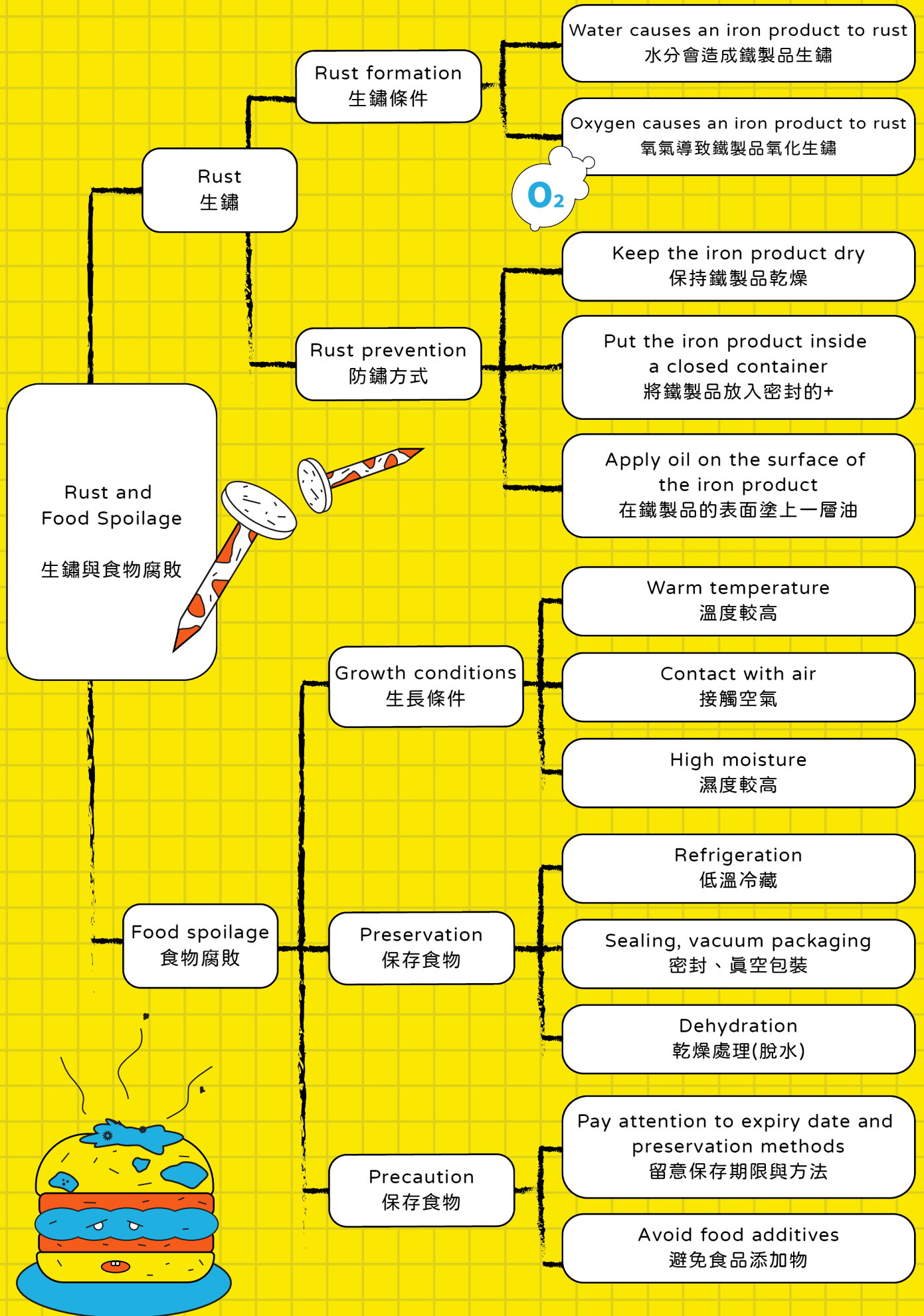
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Unit 2

Rust and Food Spoilage

生鏽與食物腐敗



應聽懂及認讀的生字

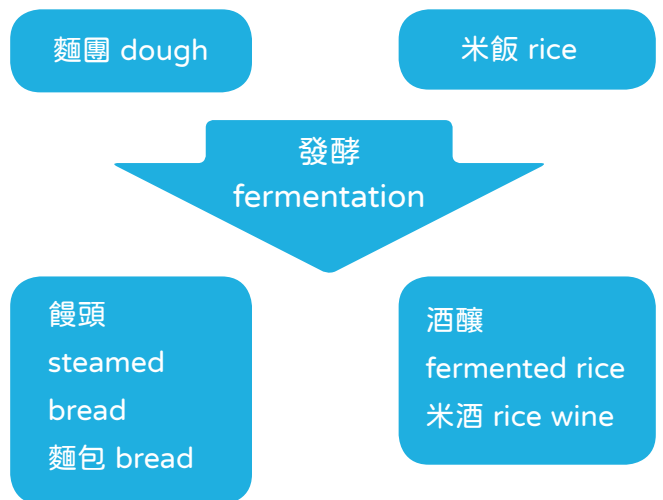
1. 微生物 microbe
2. 真菌 fungus
3. 黴菌 mold (n.)
4. 孢子 spore
5. 酵母菌 yeast*
6. 細菌 bacteria* (複) bacterium (單)
7. 發霉 mold (v.)

8. 發酵 fermentation
9. 生長 growth
10. 繁殖 breed
11. 外觀 appearance
12. 顏色 color
13. 氣味 smell

14. 米酒 rice wine
15. 食用醋 vinegar*
16. 優酪乳 yogurt*
17. 乳酪 cheese*
18. 味噌 miso
19. 醬油 soy sauce
20. 饅頭 steamed bread
21. 泡菜 kimchi
22. 豆腐乳 fermented bean curd
23. 豆豉 fermented soybean

24. 有害的 harmful*
25. 有益的 useful*
26. 生鏽 rust
27. 腐敗 spoilage

1. 放大鏡 magnifying glass*
2. 顯微鏡 microscope*
3. 生長條件 growth condition*
4. 醃漬食品 pickled food*
5. 食物保存 food preservation*
6. 乾燥 dry
7. 真空包裝 vacuum packaging*
8. 低溫保存 low temperature storage*
(freezing / refrigeration)
9. 密封包裝 sealed packaging*
10. 隔絕 isolate*
11. 乾燥劑 desiccant
12. 脫氧劑 deoxidizer
13. 高溫殺菌 high-temperature sterilization



*表示學測指考7000單字內

- ① Food or things will change looks, color or smell because of mold's growth and multiplication.
食物或物品會因為黴菌的生長與繁殖，而使外觀、顏色、或氣味產生變化。
- ② Food gets spoiled because molds multiply. Moisture, air and temperature affect mold growth.
食物腐壞是因為黴菌大量繁殖所造成，水分、空氣和溫度都會影響黴菌生長。
- ③ Keep food in a dry and cool place and remove air so that it will not get spoiled.
保持乾燥、低溫保存及隔絕空氣可以讓食物不易腐壞。

Science Videos Unit 2

2-1
Corrosion and Rust – Science



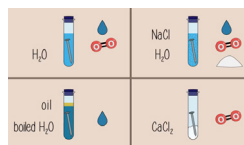
2-1
Rusting - Iron + Water + Oxygen
= Iron Oxide



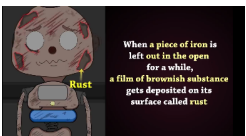
2-2
Prevention of Rusting –
Physical and Chemical
Changes || Chapter 6 || Class 7



2-2
Rust: Prevention & Treatment |
Environmental Chemistry |
Chemistry | FuseSchool



2-2
Rusting of Iron



2-3
Are Food Preservatives Bad for
You? – Eleanor Nelsen



2-3
Food Poisoning | Food
Preservation | Microorganisms
| Don't Memorise



2-3
Food Preservation – Seven
Wonders of the Microbe
World (3/7)



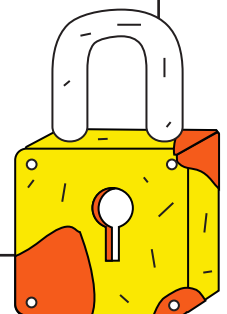
Why does iron rust?

Many things around us are made of iron. After sometime, they rust (生鏽). Please look for iron products (鐵製品) on campus. Observe their environment and answer the questions below.

1. What iron products did you find on campus?

2. What are the characteristics (特徵) of these iron products after rust forms? You can draw your answer.

3. Based on your observations, what things help rust to form?



Protect iron products against rust

一年前媽媽買了一個全新的金屬雕塑品，並被保存在透明玻璃箱內，擺設在家中客廳。媽媽規定都只能隔著透明玻璃看雕塑品，不能直接觸摸它。媽媽偶爾會用清潔劑擦拭透明玻璃盒，每半年將雕塑品搬出透明玻璃箱，到戶外面曬太陽。

最近小強發現這個未知金屬做的雕塑品變色了，他回想雕塑品變色前，奶奶曾經拿出雕塑品對它說話；弟弟運動後，用手摸過玻璃外箱，最近媽媽有用溼抹布沾清潔劑擦過雕塑品，除此以外，從未曾被其他人取出過。

看完以上的敘述，試著回答以下問題：

1. What caused the metal sculpture to change color?

Please put "√" or "x" inside the ().

- | | |
|----------------------------|---------------------|
| () air | () detergent (清潔劑) |
| () different temperatures | () saliva (口水) |
| () salt | () sugar |
| () sunlight | () water |

2. 小強從雕塑品下面挖了一些金屬，要測試什麼原因造成雕塑品變色的實驗，假設小強發現A溶液，可能與雕塑品突然變色有關，想知道是否與A溶液有關，請選擇必要的做法，並在()裡打√。

- () 把金屬沾A溶液，放到夾鏈袋裡不封口，放置十天。
- () 把金屬沾A溶液，放到夾鏈袋裡，密封開口、擠出空氣，放置十天。
- () 把金屬沾A溶液，放到夾鏈袋裡不封口，加熱後，放置十天。
- () 把金屬放到夾鏈袋裡不封口，放置十天。
- () 把金屬放到夾鏈袋裡，密封開口，擠出空氣，放置十天。
- () 把金屬放到夾鏈袋裡不封口，加熱後，放置十天。



Food preservation

1. Which of these foods come from fermentation (發酵)? Circle them.



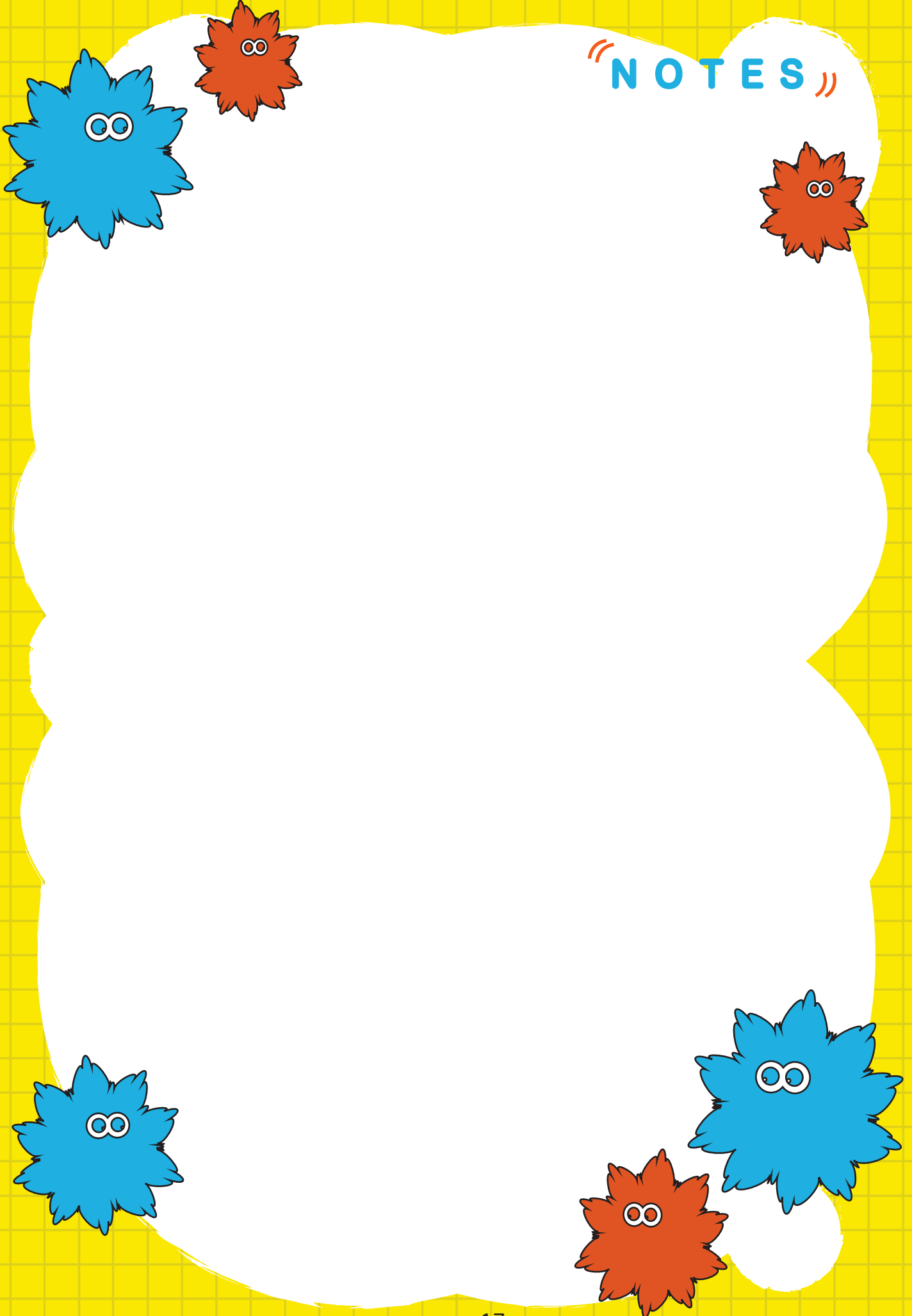
2. Things to note before buying food:

A.
B.

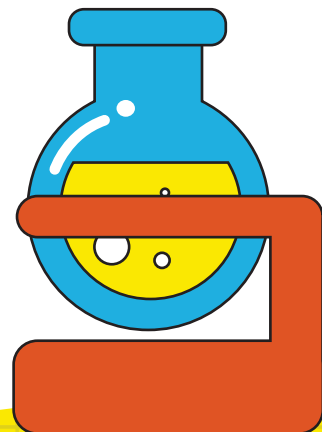
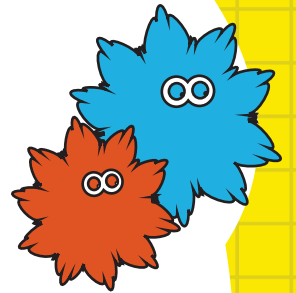
3. Ways to preserve food

Ways	Theory (原理)	Examples

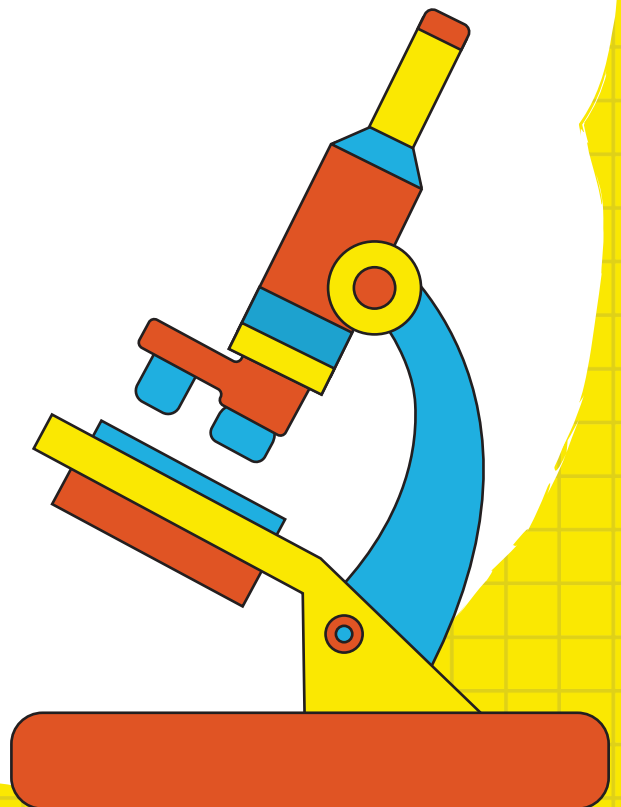
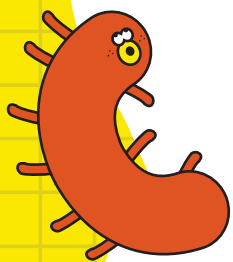
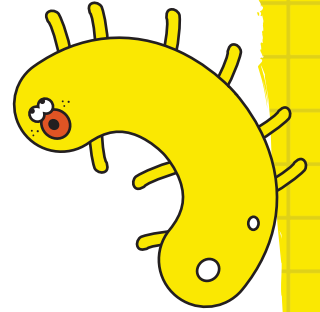
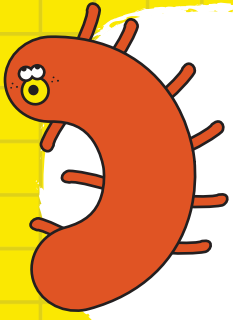
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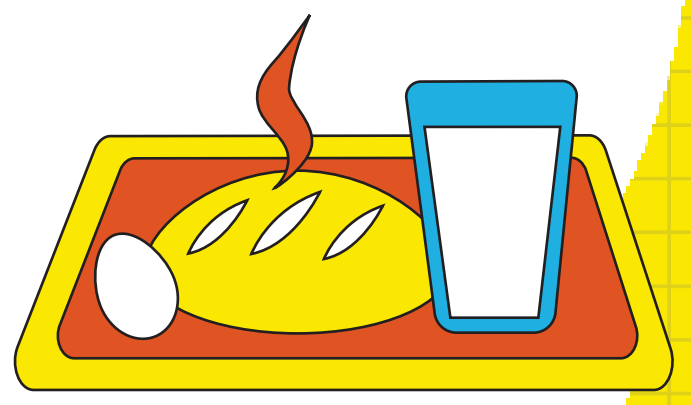
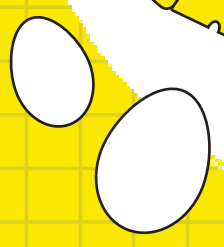
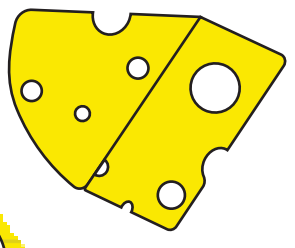
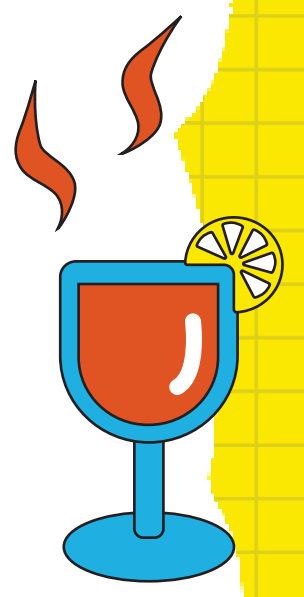
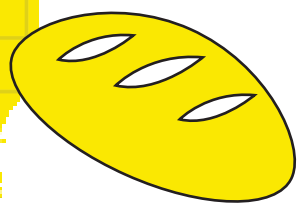
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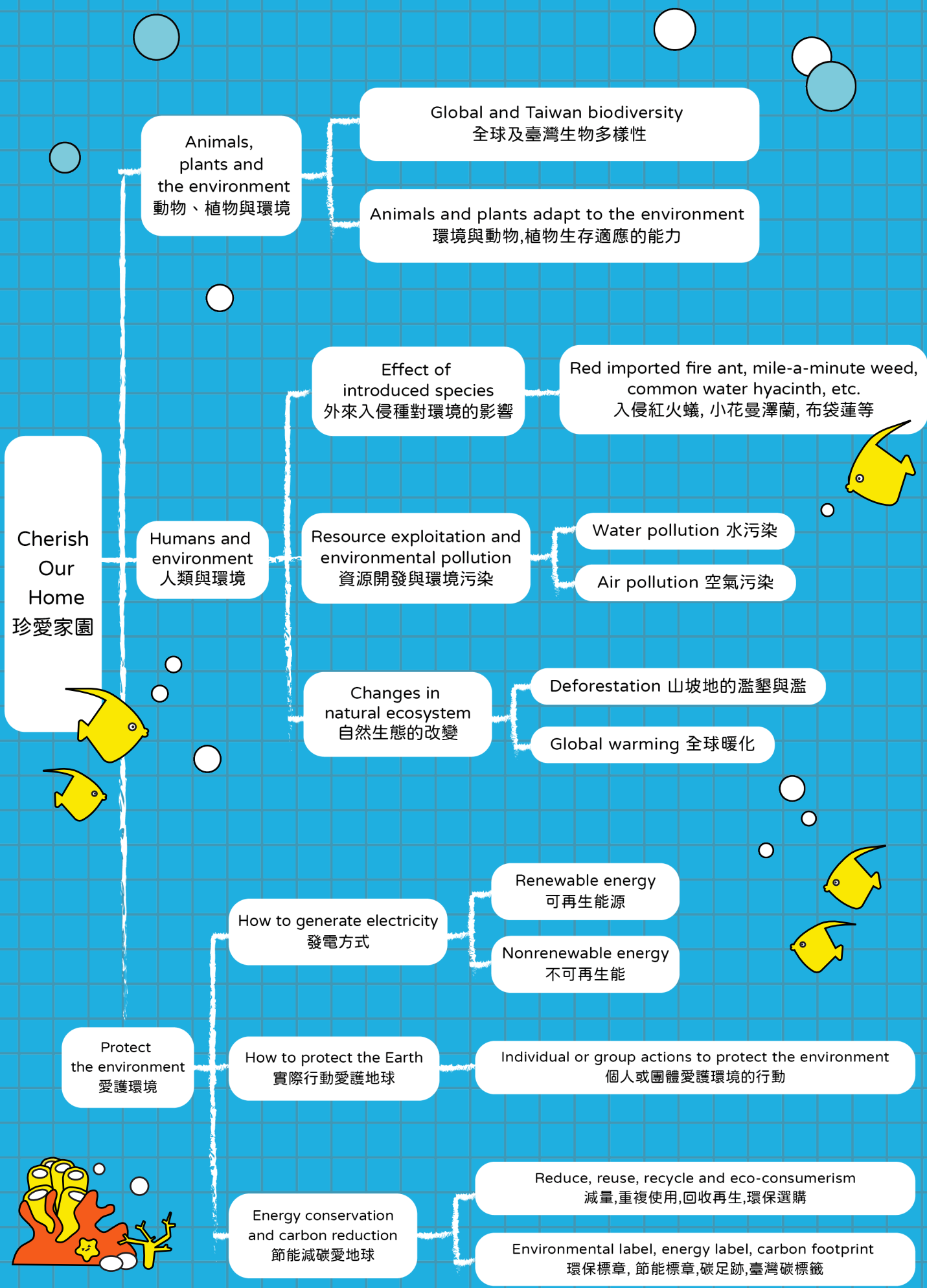
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Unit 3

**Cherish
Our Home**

珍愛家園

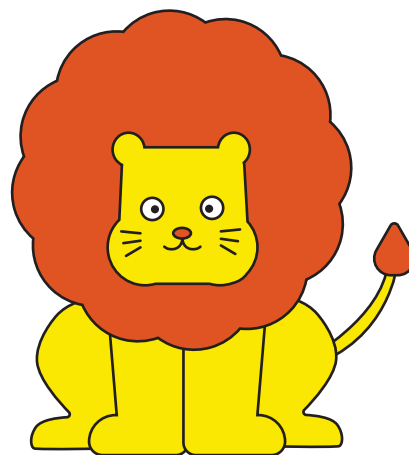


應聽懂及認讀的生字

- | | |
|---|---|
| <p>1. <input type="checkbox"/> 生物多樣性 biodiversity*</p> <p>2. <input type="checkbox"/> 寒帶生物群 frigid biome</p> <p>3. <input type="checkbox"/> 溫帶生物群 temperate biome</p> <p>4. <input type="checkbox"/> 熱帶生物群 tropical* biome</p> <hr/> <p>5. <input type="checkbox"/> 南/北極地 North / South Pole*</p> <p>6. <input type="checkbox"/> 熱帶雨林 rainforest</p> <p>7. <input type="checkbox"/> 草原 grassland*</p> <p>8. <input type="checkbox"/> 沙漠 desert*</p> <p>9. <input type="checkbox"/> 海洋 ocean*</p> <p>10. <input type="checkbox"/> 溪流 stream*</p> <p>11. <input type="checkbox"/> 高山 mountain*</p> <p>12. <input type="checkbox"/> 森林 forest*</p> <p>13. <input type="checkbox"/> 溼地 wetland</p> <p>14. <input type="checkbox"/> 河口 estuary*</p> <hr/> <p>15. <input type="checkbox"/> 特有種 endemic species*</p> <p>a. <input type="checkbox"/> 麝香貓 civet</p> <p>b. <input type="checkbox"/> 大冠鳩 crested serpent eagle</p> <p>c. <input type="checkbox"/> 帝雉 mikado pheasant</p> <hr/> <p>16. <input type="checkbox"/> 保育類生物 protected species*</p> <p>a. <input type="checkbox"/> 臺灣黑熊 Formosan black bear</p> <p>b. <input type="checkbox"/> 黑面琵鷺 black-faced spoonbill</p> <p>c. <input type="checkbox"/> 櫻花鉤吻鮭 cherry salmon</p> <hr/> <p>17. <input type="checkbox"/> 瀕危、瀕臨絕種的 endangered*</p> <p>18. <input type="checkbox"/> 受到威脅的 threatened*</p> <p>a. <input type="checkbox"/> 短尾信天翁 short-tailed albatross</p> <p>b. <input type="checkbox"/> 水獺 otter</p> <p>c. <input type="checkbox"/> 石虎 leopard cat</p> <hr/> <p>19. <input type="checkbox"/> 絕種的 extinct*</p> <p>20. <input type="checkbox"/> 野生動物 wildlife*</p> <p>21. <input type="checkbox"/> 保育 conservation*</p> <p>22. <input type="checkbox"/> 生物 creature</p> | <p>1. <input type="checkbox"/> 自然資源 natural resource*</p> <p>2. <input type="checkbox"/> 發電能源 electricity generation*</p> <hr/> <p>3. <input type="checkbox"/> 可再生 renewable</p> <p>a. <input type="checkbox"/> 水力發電 hydropower</p> <p>b. <input type="checkbox"/> 風力發電 wind energy</p> <p>c. <input type="checkbox"/> 生質能 biomass energy</p> <p>d. <input type="checkbox"/> 太陽能 solar* energy</p> <p>e. <input type="checkbox"/> 海洋能 marine* energy</p> <p>4. <input type="checkbox"/> 不可再生 non-renewable</p> <p>a. <input type="checkbox"/> 核能 nuclear* energy</p> <p>b. <input type="checkbox"/> 化石燃料 fossil fuel</p> <hr/> <p>5. <input type="checkbox"/> 綠色行動 green action*</p> <p>6. <input type="checkbox"/> 綠色能源 green energy*</p> <p>清潔能源 clean energy</p> <p>7. <input type="checkbox"/> 節能減碳
energy conservation and carbon reduction*</p> <p>8. <input type="checkbox"/> 環境改變 environmental change*</p> <p>9. <input type="checkbox"/> 人類活動 human activity*</p> <p>10. <input type="checkbox"/> 水汙染 water pollution*</p> <p>11. <input type="checkbox"/> 空氣汙染 air pollution*</p> <p>12. <input type="checkbox"/> 過度開發 overexploitation*</p> <p>13. <input type="checkbox"/> 外來種 introduced/invasive species*</p> <p>14. <input type="checkbox"/> 生態失衡 ecological imbalance</p> <p>15. <input type="checkbox"/> 環境保護 environmental protection*</p> <p>16. <input type="checkbox"/> 懸浮微粒 particulate matter</p> <p>17. <input type="checkbox"/> 空氣品質指標 air quality index (AQI)</p> <p>18. <input type="checkbox"/> 水土保持 water and soil conservation</p> |
|---|---|

*表示學測指考7000單字內

- ① Different creatures have special structures that let them live in their environment.
不同的生物都具有適合生存在當地環境的構造。
- ② Natural environment is destroyed by human activity and development.
Some animals are endangered and some are listed as protected species.
自然環境受到人類活動與開發的破壞。有的生物甚至瀕臨絕種被列為保育類。



Science Videos Unit 3

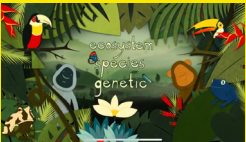
3-1
What is Biodiversity?



3-1
Polar Bears 101 | Nat Geo Wild



3-1
Why is Biodiversity so Important?



3-1
The Threat of Invasive Species - Jennifer Klos



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



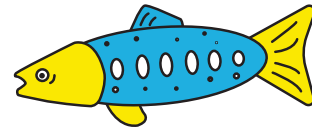
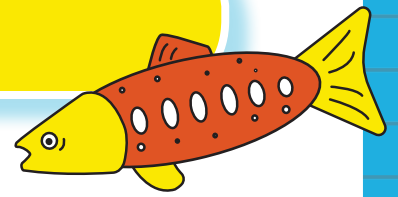
3-3
The Ecological Footprint Explained



3-3
How to Save Energy



Animal habitats



Match each **habitat** to its description.

Match each description to where the **animal** lives.

Match each **animal** to its description.

grassland 草原	•	•	終年冰雪，只有少數動、植物。	•	•	polar bear 北極熊	•	•	體型小，以植物碎屑為食。
polar 極地	•	•	乾季和雨季分明。	•	•	camel 駱駝	•	•	色澤鮮艷
rainforest 熱帶雨林	•	•	氣候乾燥，日夜溫差大。	•	•	toucan 彩虹巨嘴鳥	•	•	奔跑速度極快
wetland 濕地	•	•	淡水水域，流速較快。	•	•	walrus 海象	•	•	群體生活
ocean 海洋	•	•	鹽度變化以及水位漲落變化皆明顯。	•	•	cheetah 獵豹	•	•	能儲存水分
stream 溪流	•	•	分布在赤道兩側，溫暖潮濕，雨量豐沛。	•	•	macaw 金剛鸚鵡	•	•	鰭狀構造
desert 沙漠	•	•	分布最廣的環境，各地溫度與深度皆不同。	•	•	mudskipper 彈塗魚	•	•	皮下脂肪肥厚
						green turtle 綠蠔龜	•	•	皮膚可以幫助呼吸，適應半水陸生活。
						zebra 斑馬	•	•	濃密毛髮能阻隔風沙。
						freshwater shrimp 溪蝦	•	•	
						stingray 魷魚	•	•	

Air Quality Index (AQI)

- What is AQI in Chinese? _____
- Shade each box with its assigned color. An example is given to you below. The missing colors are green, orange, purple, red, and yellow.

Value	0 - 50	51 - 100	101 - 150	151 - 200	201 - 300	301 and higher
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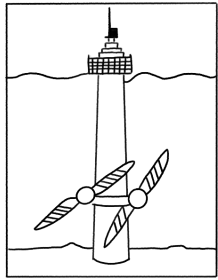
Health effect	Moderate	Very unhealthy	Good	Unhealthy for sensitive groups	Hazardous	Unhealthy for everyone
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Renewable or Non-Renewable?

Some sources of energy are **renewable** (可再生) while some are **non-renewable** (不可再生). Non-renewable sources are not environmentally friendly because they cannot be easily replaced.

Is the energy source below renewable (R) or non-renewable (N)? Circle R or N.



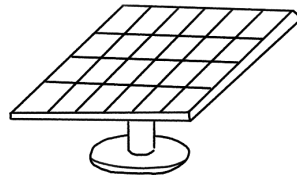
Oceans--Tidal

R N



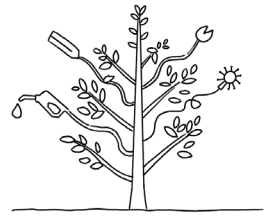
Geo-Thermal / Earth Heat

R N



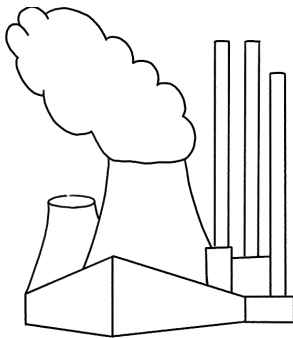
Solar (Sun)

R N



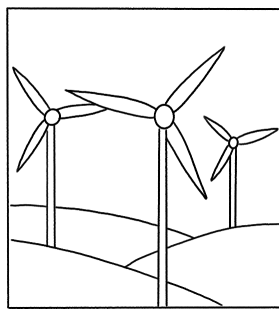
Bioenergy 生質能

R N



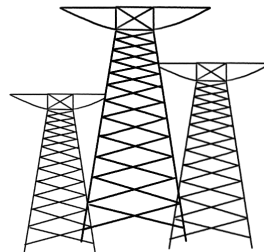
Nuclear

R N



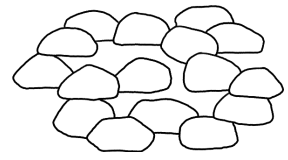
Wind

R N



Hydro

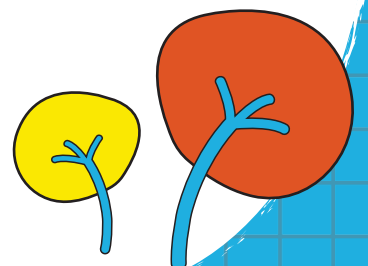
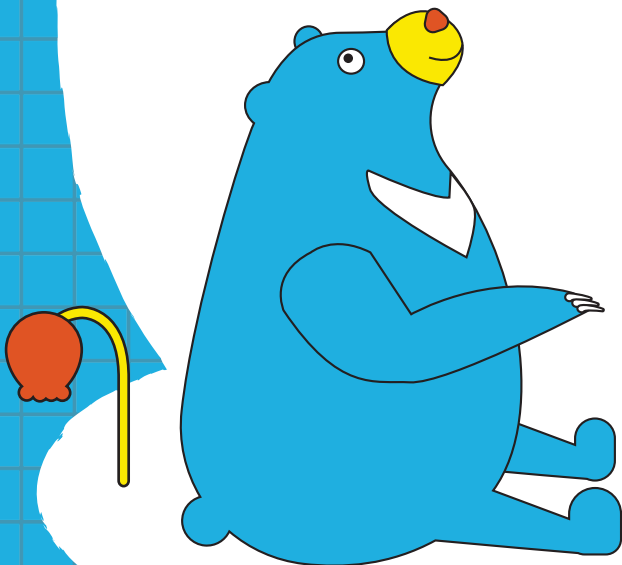
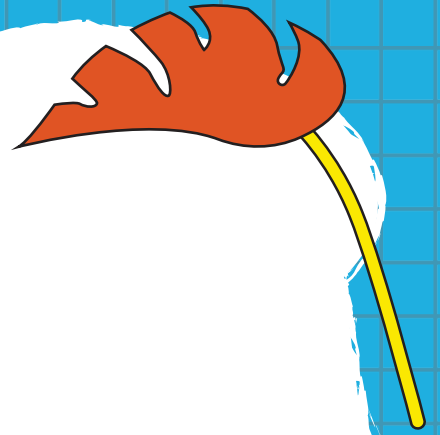
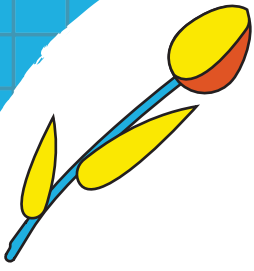
R N



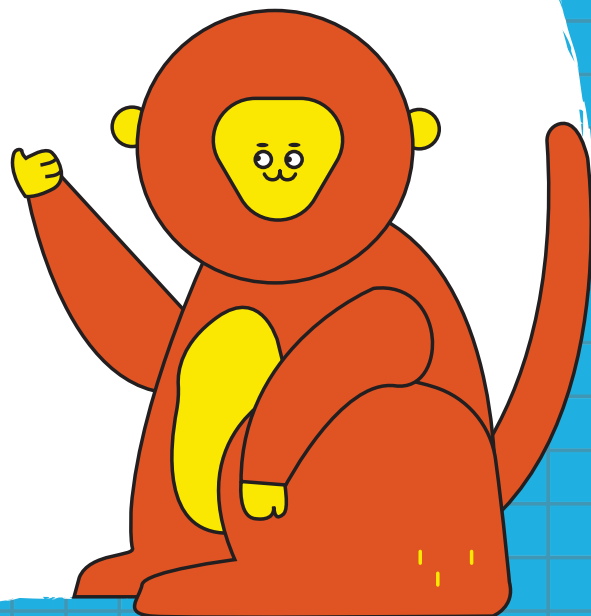
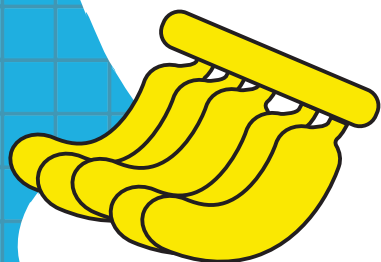
Coal

R N

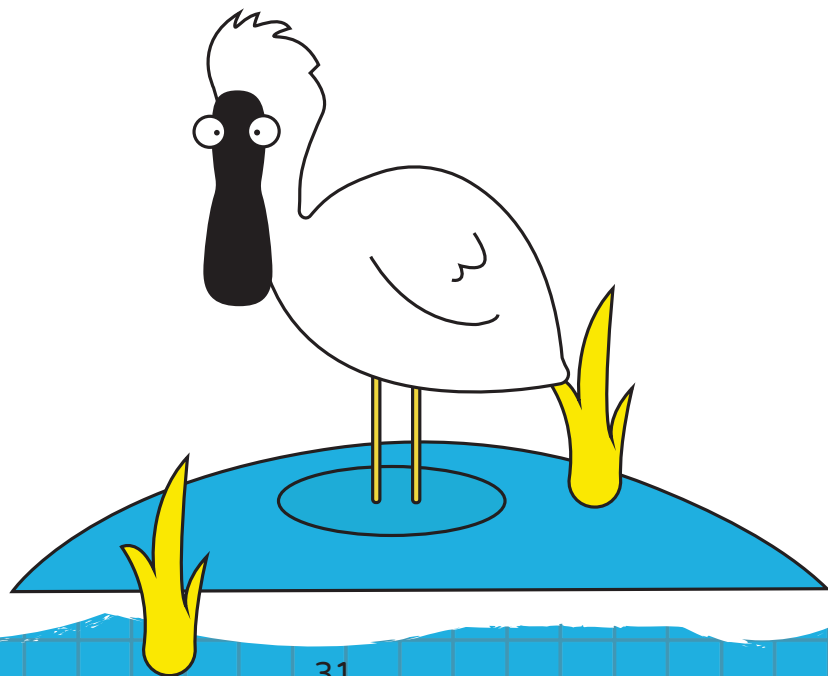
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