

Science Notes

5th grade
2nd semester

Name:

Class:

Number:

Teacher:

國立臺北教育大學附設實驗國民小學
國立臺北教育大學雙語教學研究中心

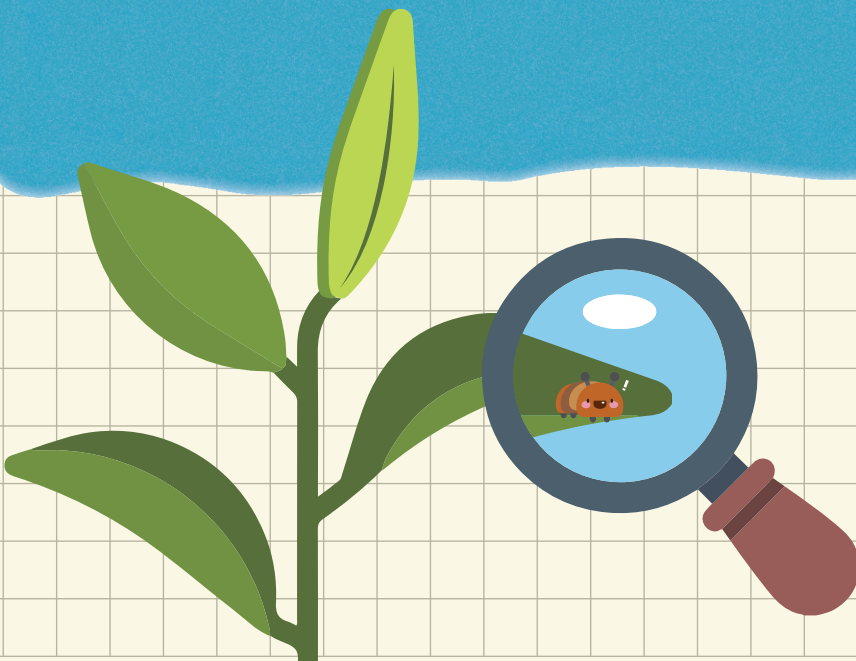
Preface 前言

在「2030雙語國家政策發展藍圖」中強調「厚植國人英語力」、「提升國家競爭力」（國家發展委員會，2020）；而如何提升國民英語力以增加國際競爭力，是學校教育中努力的目標。

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，本校自108學年度開始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自然課程雙語教學團隊~陳美卿、林雨慶、林怡伶、范瑋庭、陳宜君等教師所共同設計的；國立臺北教育大學雙語教學研究中心協助自然科學英語內容校對、編排及印製；期望學童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，厚植學童的科學力及英語力。

2022.01



Unit 1

Stars

恆星



The Sun is a star.
太陽是恆星

A constellation is a group of stars that form a pattern.
(星座) 是指天上一群群的恆星組合

Rotate the star wheel based on the date and time to find the constellations.
依當時的(國曆日期)和(時間)轉動底盤

Use a compass to know the direction of a star.
利用指北針測量(方位)

Use the number of fists to measure the vertical angle.
利用拳頭數測量(高度角)

Use a star wheel to understand the starry sky.
利用(星座盤)核對實際星空

Put the star wheel above your head. Face the wheel down with its north aligned with the north of a compass.
面對北方, 向上高舉星座盤, 盤面朝下對自己, 星座盤上的「北」字對準(北方)

Stars move from east to west.
大部分的星星會由(東)向(西)移動

Polaris stays in the same place while other stars move around it.
繞著(北極星)移動

Polaris is almost directly above the North Pole.
接近(正北方), 高度角等於觀測點當地的(緯度)

Look for the Big Dipper or Cassiopeia to find Polaris.
可以用(北斗七星)、(仙后座)協助辨認北極星的位置

Since stars move, the starry sky changes depending on the time and season.
不同季節、相同時刻, 天空中出現的星星和星座(不同)

Look at the stars in the sky.
仰望星空

Use a star wheel.
操作星座盤

Measure the position of stars.
測量星星的位置

Check the actual starry sky.
核對實際星空

Stars seem to move.
位置移動的規律性

We can find Polaris.
北極星的位置

The starry sky changes with time and the seasons.
星空隨時間四季變化

We can learn about constellations.
認識星座

We can observe stars.
觀測星空

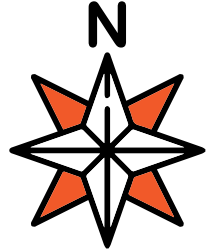
The starry sky changes.
星星的移動

Stars
恆星

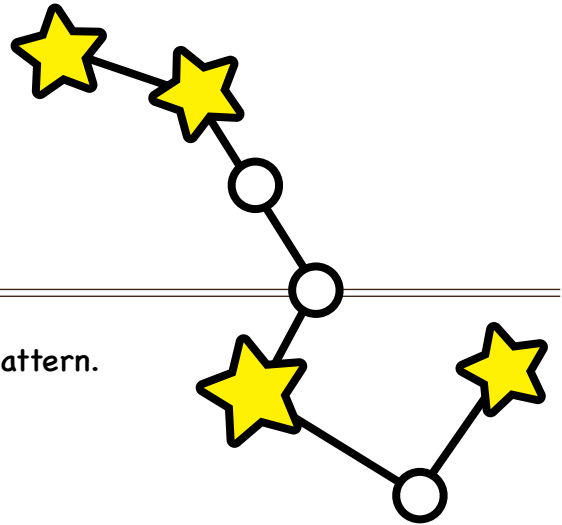
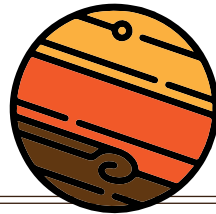
應聽懂及認讀的生字

- 1. 恆星 star
- 2. 行星 planet
- 3. 星座 constellation
- 4. 星座盤 star wheel
- 5. 星空 starry sky
- 6. 觀測點 observation point
- 7. 指北針 compass
- 8. 手錶 watch
- 9. 手電筒 flashlight
- 10. 方位 direction
- 11. 高度角 vertical angle
- 12. 地平線 horizon
- 13. 拳頭數 number of fists

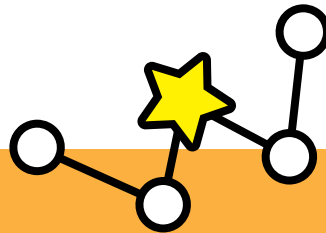
- 14. 北 north
- 15. 南 south
- 16. 東 east
- 17. 西 west



- 18. 北極星 Polaris
- 19. 北斗七星 Big Dipper
- 20. 仙后座 Cassiopeia



1. A constellation is a group of stars that form a pattern.
星座是指天上一群群的恆星組合。
2. Use a star wheel to understand the starry sky.
利用星座盤了解實際星空。
3. The starry sky changes with time and the seasons.
星空隨四季時間變化。



Science Videos Unit 1

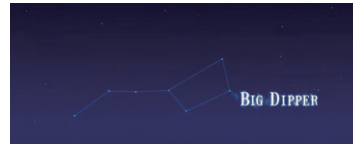
1-1 Stars | The Dr. Binocs Show



1-1 The 12 Star Signs



1-1 How Do We Study the Stars?



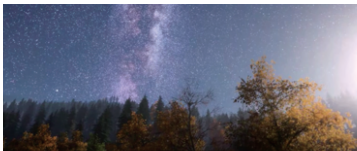
1-2 How to Read the Stars in the Night Sky



1-2 What are Stars?



1-2 All About Stars for Kids: Astronomy and Space for Children



1-3 How to Navigate Using the Stars



1-3 What are Stars and Constellations?

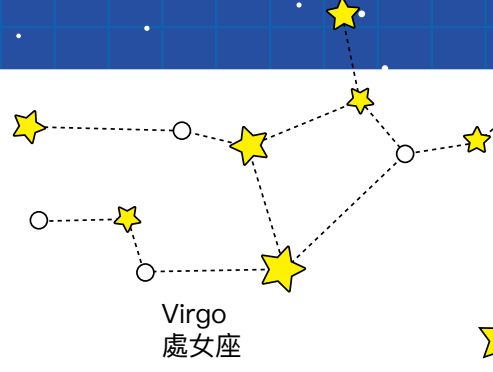


1-3 Why are Stars Star-Shaped?

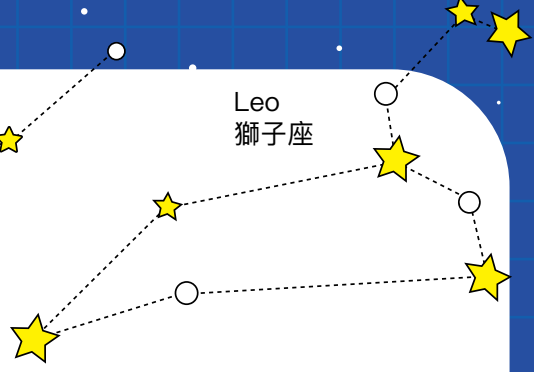




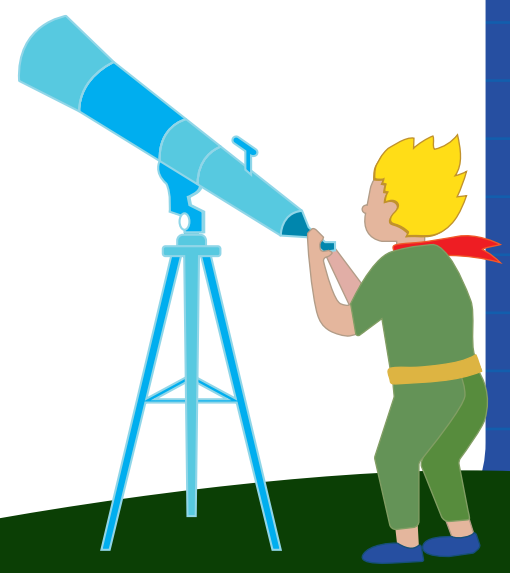
Libra
天秤座



Virgo
處女座



Leo
獅子座

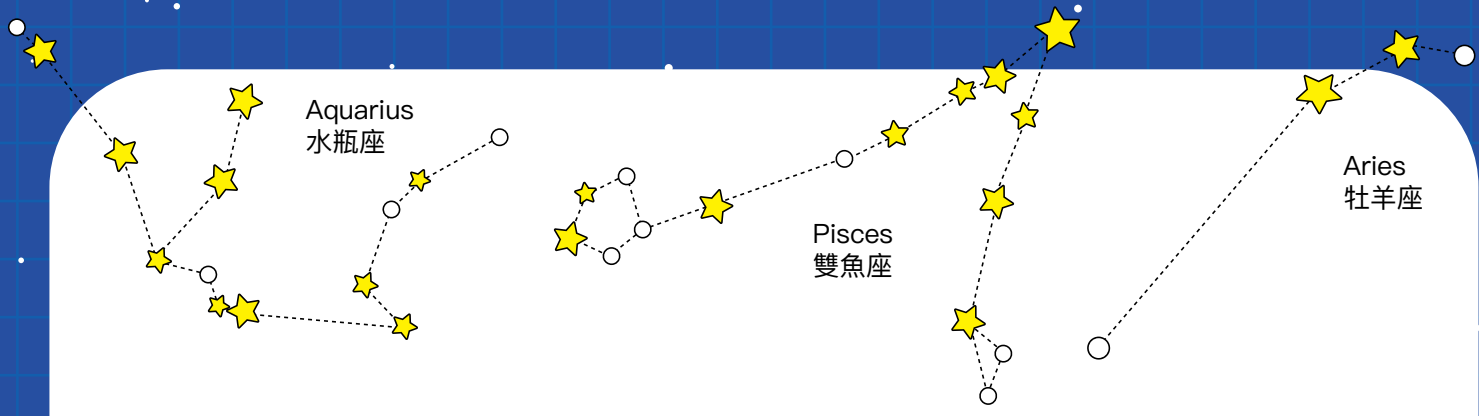


Capricorn
摩羯座

Sagittarius
射手座

Scorpio
天蠍座

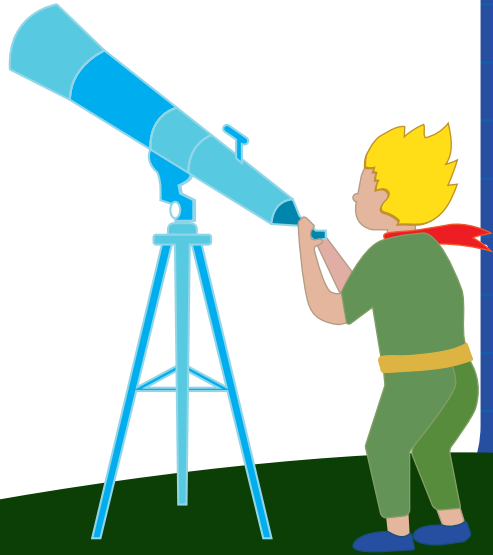


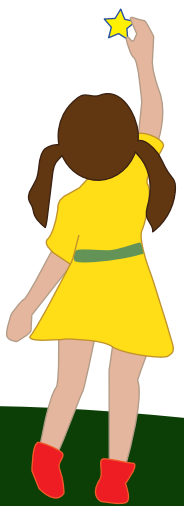
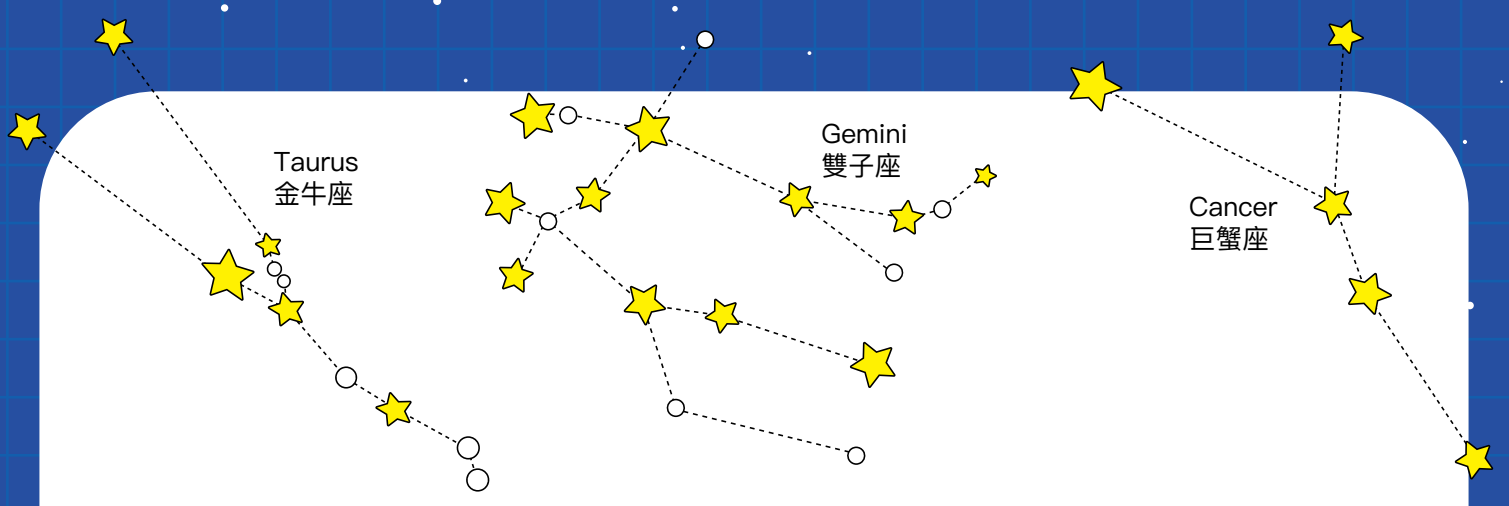


Aquarius
水瓶座

Pisces
雙魚座

Aries
牡羊座

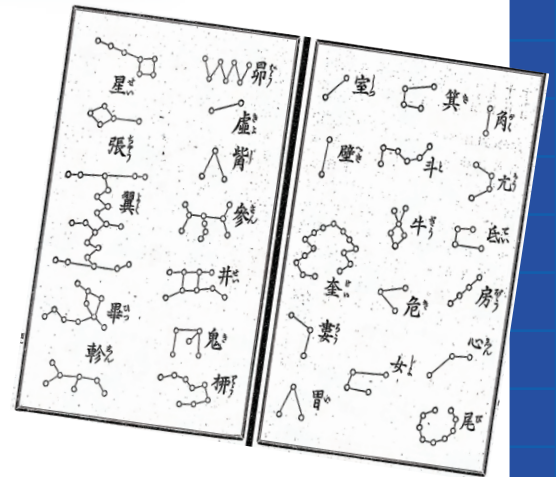




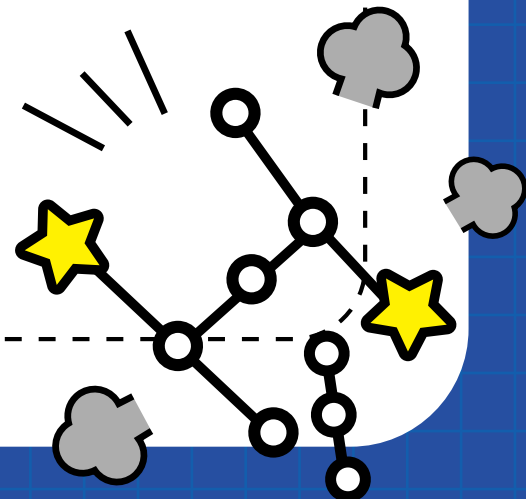
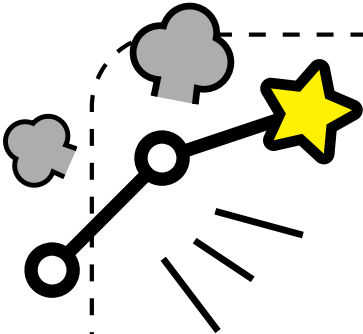
The world of stars

詩人杜甫以「人生不相見，動如參與商」形容朋友離別後，很難再次相見。「參」、「商」是中國古代二十八星宿中的二宿。（註：商宿一般也稱為心宿。）

傳說中，在遠古時代有一位名叫高辛氏的人，他的兩個兒子一見面就吵架，後來甚至帶著武器打架。高辛氏為了不讓兩個兒子自相殘殺，將大兒子發配到「商丘」，小兒子發配到「大夏」，這兩塊屬地分別對應到天上的商宿與參宿的區域。因此後世流傳著「參商不相見」的說法。

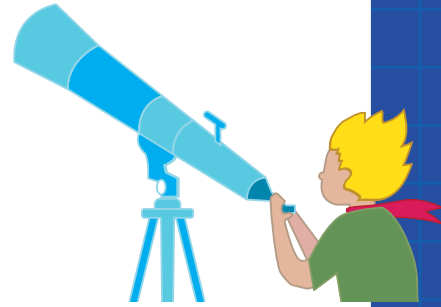


Do you know any other story about stars?
Write it down.



Polaris

Polaris is almost directly above the North Pole. It does not move a lot. It is not very bright, so we need to look for other stars or constellations to find Polaris.



How can we use the Big Dipper or Cassiopeia to find Polaris?
Draw your answer below and label the parts.

How can Polaris help us in our daily lives? Put inside the .

- It can help us find our way when we get lost.
- It can help us know the latitude (緯度) of a location.

If you can think of other ways, write them down.

Stars for the season

Which stars or constellations do we see during the different seasons? Use a star wheel to complete the tables below.



Winter 1月15日晚上9點可以看到哪些星星或星座？

星星或星座	方位	高度角

Spring 4月15日晚上9點可以看到哪些星星或星座？

星星或星座	方位	高度角

Summer 7月15日晚上9點可以看到哪些星星或星座？

星星或星座	方位	高度角

Autumn 10月15日晚上9點可以看到哪些星星或星座？

星星或星座	方位	高度角

Let's review

Fill in the blanks using the words below.

Big Dipper
constellations
vertical angle

Cassiopeia
Polaris

compass
star wheel

We can learn about _____ by looking at the stars in the sky.
We can also rotate a _____ based on the date and time.

We can observe stars. We can use a _____ to know the direction of a star. We can use the number of fists to measure the _____. We can also use a star wheel.

The starry sky changes with time and the seasons. This is because _____ stays in the same place but other stars move from east to west. To find Polaris, look for the _____ or _____.

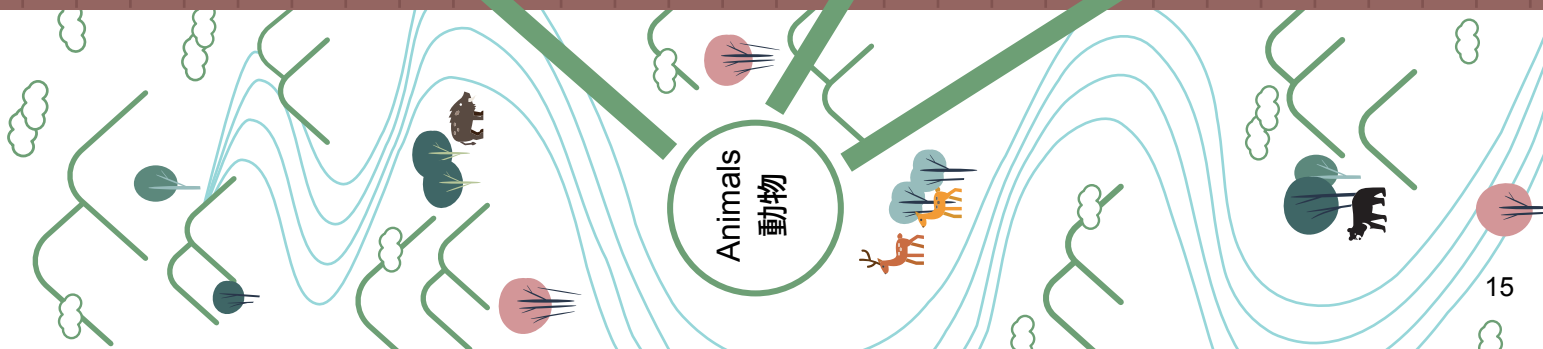


A large magnifying glass with a dark red handle and frame is centered on a dark green background. The lens of the magnifying glass is filled with a lighter red color and contains the text for the unit.

Unit 2

Animals

動物

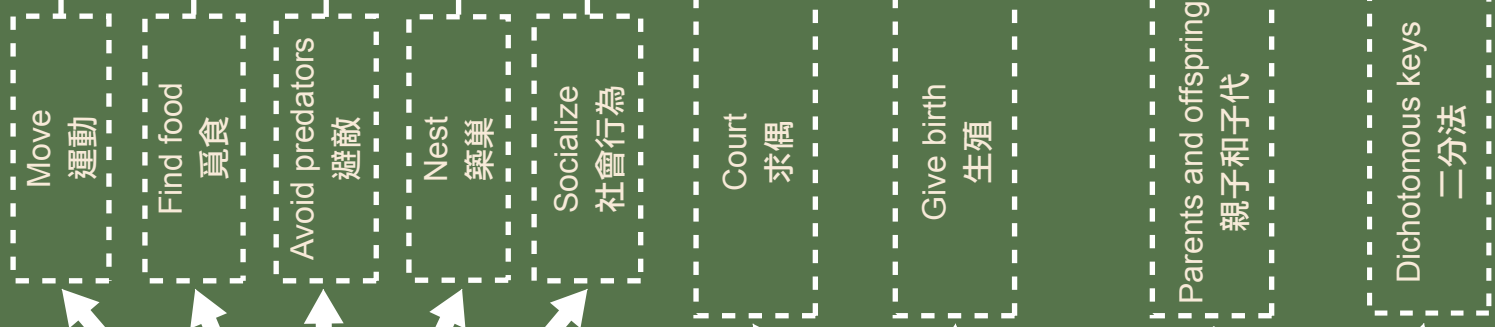


Animals
動物

Behavior
動物的行為

Reproduction
動物的生殖方式

Classification
動物分類



Move
運動

Find food
覓食

Avoid predators
避敵

Nest
築巢

Socialize
社會行為

Court
求偶

Give birth
生殖

Parents and offspring
親子和子代

Dichotomous keys
二分法

Animals use their muscles, bones and joints to move.
利用（肌肉）帶動（骨骼）和（關節）來運動

Animals find food based on their body structure.
不同動物的覓食方式和牠們的（身體構造）有關

Animals do different things to avoid predators.
為了避免遭到（獵食），動物會以不同方式避敵

Animals build nests to keep and protect their offspring.
築巢的目的主要是為了（繁殖）和保護下一代

Animals live and work together.
動物會分工合作、共同生活稱為（社會行為）

Animals look for a mate.
目的是為了（繁衍子代）

Oviparity
卵生

Oviparous animals lay eggs that later become live offspring.
卵生動物藉由（產卵）進行繁殖

Viviparity
胎生

Viviparous animals give birth to live offspring.
胎生動物直接在母體內發育完後生出

Animals raise their offspring so that they live and continue to pass their traits.
有些動物有（育幼）的行為，親代會照顧子代

The traits of parents and offspring are the same in some ways, but different in others.
親代和子代的特徵（相似），但不完全相同

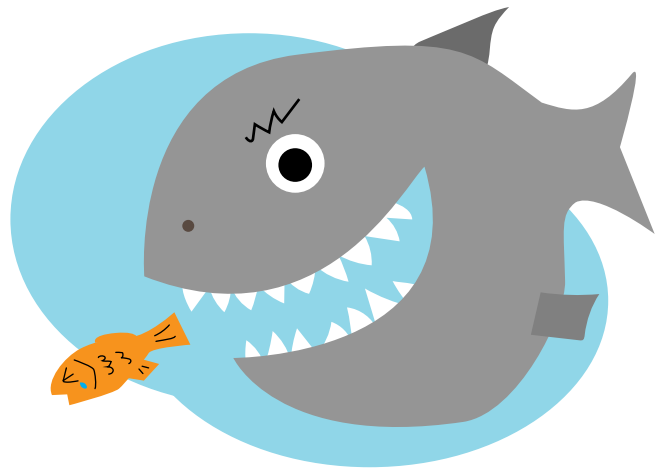
Animals can be classified based on their structure and function.
先找出（分類標準），再分成符合標準和不符合標準的動物

應聽懂及認讀的生字

- 1. 行為 behavior
- 2. 運動 move
- 3. 肌肉 muscle
- 4. 骨骼 bone
- 5. 關節 joint
- 6. 身體構造 body structure
- 7. 捕食者 predator
- 8. 獵食 (物) prey
- 9. 築巢 nest
- 10. 子代 offspring
- 11. 社交 socialize

- 12. 分類(n) classification
- 13. 分類(v) classify
- 14. 二分法 dichotomous keys
- 15. 構造 structure
- 16. 功能 function

- 17. 求偶 court
- 18. 伴侶 mate
- 19. 繁殖 reproduction
- 20. 卵生(n) oviparity
- 21. 卵生的(adj) oviparous
- 22. 胎生(n) viviparity
- 23. 胎生的(adj) viviparous
- 24. 特質 trait

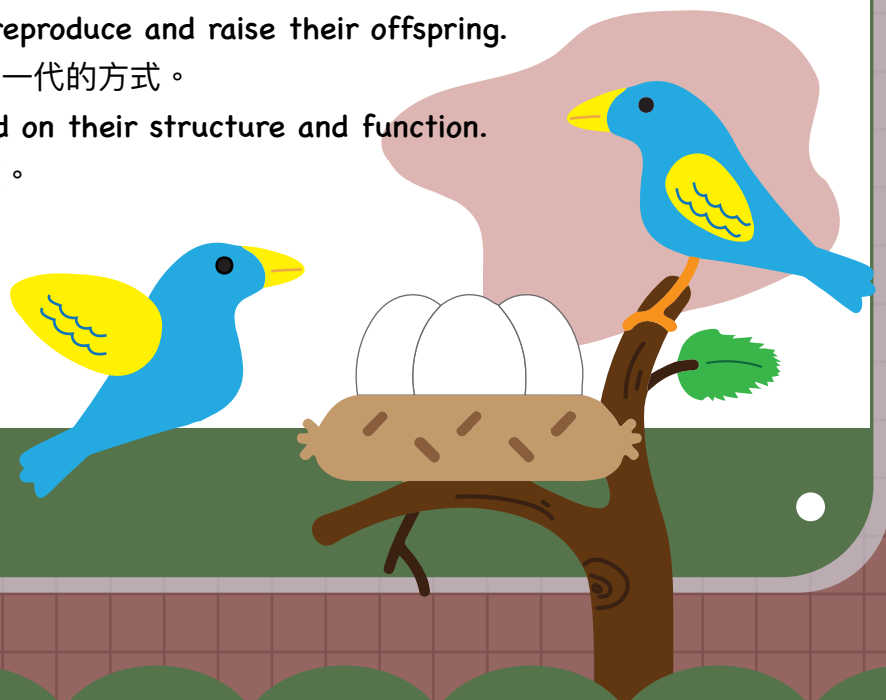


1. Animals find ways to survive, reproduce and raise their offspring.

動物有不同的生存繁殖與養育下一代的方式。

2. Animals can be classified based on their structure and function.

動物藉由身體構造與功能來分類。



Science Videos Unit 2

2-1 Animals: Body Parts and Movements



2-1 Animals on the Move



2-1 Top 10 Animals with Amazing Camouflage



2-2 Animals that Mate for Life | Nat Geo Wild



2-2 Oviparous and Viviparous Animals



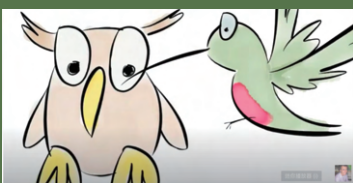
2-2 Animal Parents | Animals for Kids | Wild Animal Families



2-3 Animal Classification for Children: Classifying Vertebrates and Invertebrates for Kids



2-3 Dichotomous Key



2-3 Dichotomous Keys: Identification Achievement Unlocked

















Animal movements

Put **V** inside the .

Animal	Moves by	Body part used
 <p style="text-align: center;">fish</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> swimming <input type="checkbox"/> walking	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings
 <p style="text-align: center;">bird</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> swimming <input type="checkbox"/> walking	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings
 <p style="text-align: center;">crocodile</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> running <input type="checkbox"/> swimming	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings
 <p style="text-align: center;">lion</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> swimming <input type="checkbox"/> walking	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings
 <p style="text-align: center;">dog</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> swimming <input type="checkbox"/> walking	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings
 <p style="text-align: center;">turtle</p>	<input type="checkbox"/> crawling <input type="checkbox"/> flying <input type="checkbox"/> swimming <input type="checkbox"/> walking	<input type="checkbox"/> feet <input type="checkbox"/> fins <input type="checkbox"/> wings

Animal reproduction

Write **oviparous** or **viviparous** inside the .

Then classify the animals by writing their names on the _____.



snake



bat



cat



fish



beetle



human



bird



elephant



turtle



koala

_____ animals give birth to live offspring.

Examples are

_____, _____, _____ and _____.

_____ animals lay eggs.

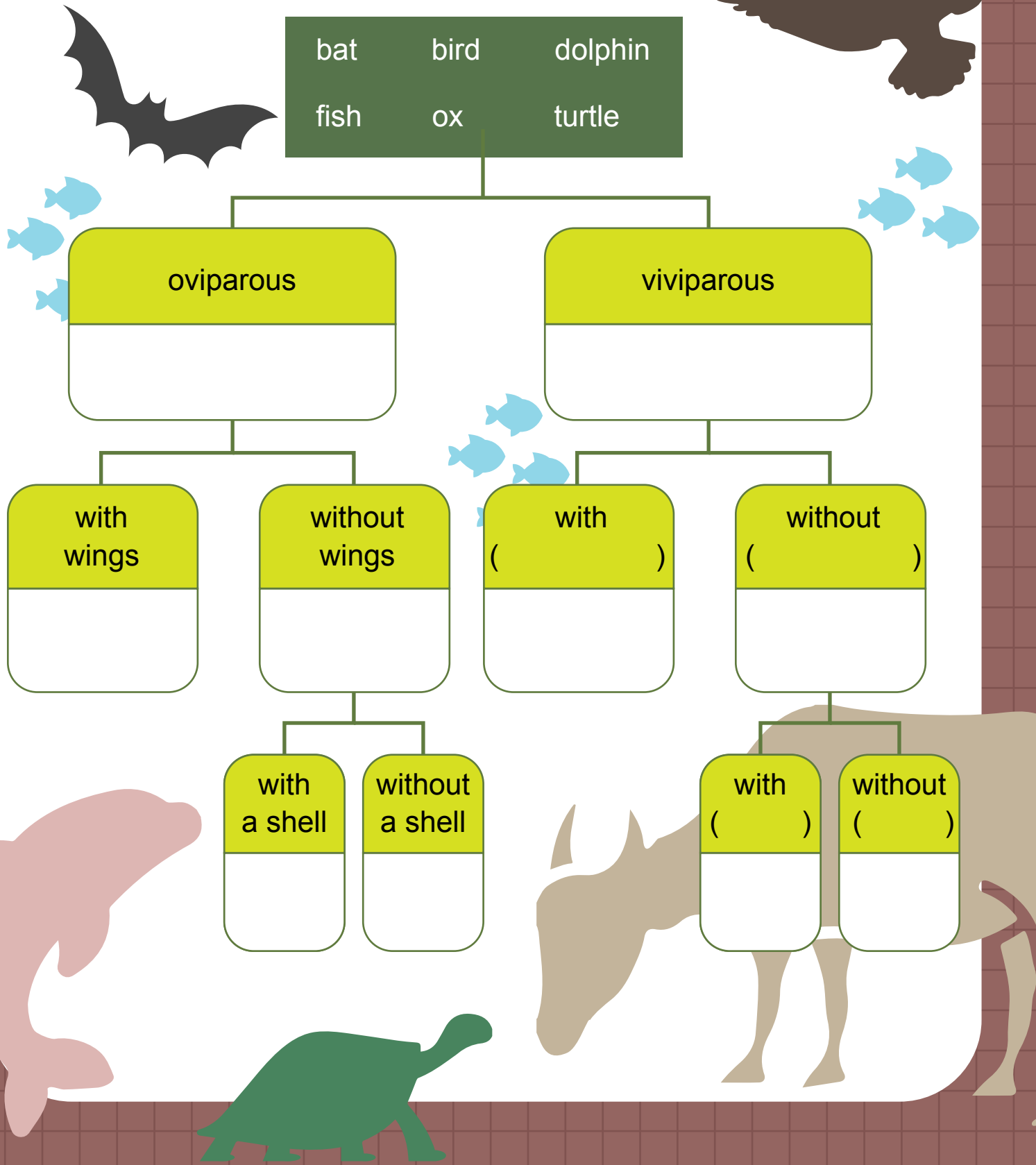


Examples are

_____, _____, _____ and _____.

Animal classification

Classify the animals by completing the chart below.



Let's review

Fill in the blanks using the words below.

behavior
nests
traits

classify
offspring

mate
predators

There are many ways to describe an animal's _____. They use their muscles, bones and joints to move. They find food based on their body structure. They do different things to avoid _____. Animals build _____ to keep and protect their offspring. Animals live and work together.

Animal reproduction is a process. First, an animal looks for a _____. Together, they produce an _____. They raise their offspring so that they live and continue to pass their _____. The traits of parents and offspring are the same in some ways, but different in others.

We can _____ animals based on their structure and function.





Unit 3

Aqueous Solutions

水溶液

Different solutions
各種水溶液

Properties
水溶液的性質

Solutions differ in color and smell. They can be acidic, basic or neutral.
不同水溶液的（顏色）、（氣味）和（酸鹼性）等性質不大相同

Test using litmus paper
利用石蕊試紙檢驗

An acidic solution does not change the color of red litmus paper, but it turns blue litmus paper into red.
酸性：紅色石蕊試紙（不變色）；藍色石蕊試紙（變紅色）

A basic solution does not change the color of blue litmus paper, but it turns red litmus paper into blue.
鹼性：紅色石蕊試紙（變藍色）；藍色石蕊試紙（不變色）

A neutral solution does not change the color of litmus paper.
中性：紅色石蕊試紙和藍色石蕊試紙都（不變色）

Acidic, basic and neutral solutions
水溶液的酸鹼性

Test using purple cabbage juice
利用紫色高麗菜汁

An acidic solution turns purple cabbage juice into red.
酸性：顏色呈（紅色系）

A basic solution turns purple cabbage juice into blue or green.
鹼性：顏色呈（藍色系）或（綠色系）

A neutral solution does not change the color of purple cabbage juice.
中性：顏色呈（紫色系）

Test using other plants
利用其他植物檢驗

Velvet plant leaves, red rose petals and purple grape skin can also be used to test a solution.
（紅鳳菜葉）、（紅玫瑰花瓣）、（紫葡萄外皮）可以用來測試水溶液

Conductivity of solutions
水溶液的導電性

Experimental test
利用實驗檢驗

Use a circuit with LED light, battery and wire to test the conductivity of a solution.
利用（通路）的概念，設計含有（LED燈）、（電池）和（電線）的電路來檢驗

Safety
用電安全

Do not touch electrical appliances when you are wet.
身體（潮溼）時，觸摸電器用品可能會產生觸電的危險

Aqueous Solutions
水溶液

Unit 3 Aqueous Solutions 水溶液

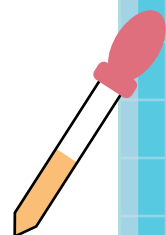
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應聽懂及認讀的生字

- 1. 水溶液 aqueous solution
- 2. 特性 / 特質 property / properties

- 3. 石蕊試紙 litmus paper
- 4. 紫色高麗菜 purple cabbage / red cabbage
- 5. 汁 juice
- 6. 純水 pure water
- 7. 砂糖水 sugar solution
- 8. 食鹽水 saline solution
- 9. 小蘇打水 baking soda solution
- 10. 石灰水 limewater
- 11. 檸檬酸 citric acid
- 12. 醋 vinegar
- 13. 鑷子 tweezers
- 14. 棉花棒 cotton swab

- 15. 酸性(n) acid
- 16. 酸性的(adj) acidic
- 17. 鹼性(n) base
- 18. 鹼性的(adj) basic
- 19. 中性 neutral
- 20. 導電性 conductivity
- 21. 電路 circuit
- 22. 電器用品 electrical appliance
- 23. 迴紋針 paper clip
- 24. 硬幣 coin
- 25. 鐵尺 iron ruler

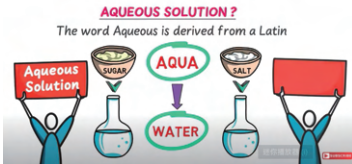


1. Solutions differ in color and smell. They can be acidic, basic or neutral.
不同水溶液的（顏色）、（氣味）、（味道）、（酸鹼性）等性質不大相同。
2. Different things can be used to test if a solution is acidic, basic or neutral.
不同的東西可以用來檢測物質的酸鹼性。
3. Do not touch electrical appliances when you are wet.
身體（潮溼）時，不要觸摸電器用品。



Science Videos Unit 3

3-1 Aqueous Solution Chemistry



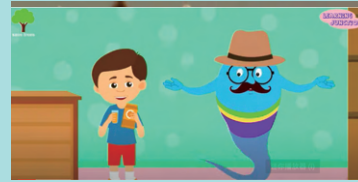
3-2 What is Litmus? What Does Litmus Mean?



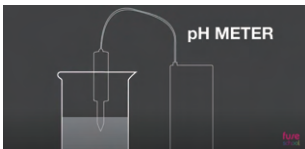
3-2 Make Litmus Paper from A4 Paper at Home by Yourself



3-2 Acid and Base



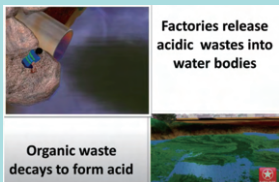
3-2 What are Indicators & How Do We Use Them?



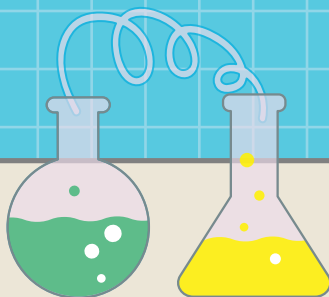
3-2 Neutralisation | Acid Bases and Salts

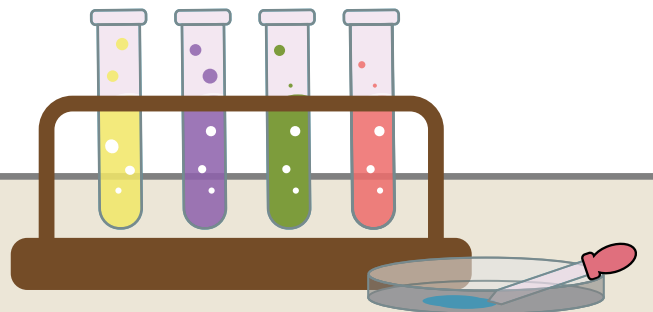
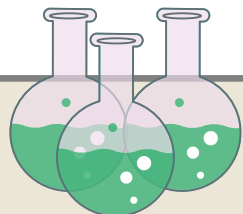


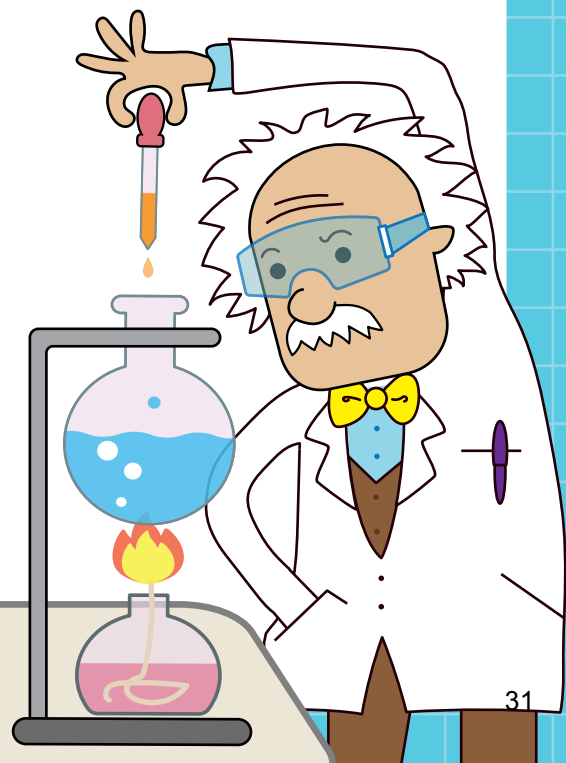
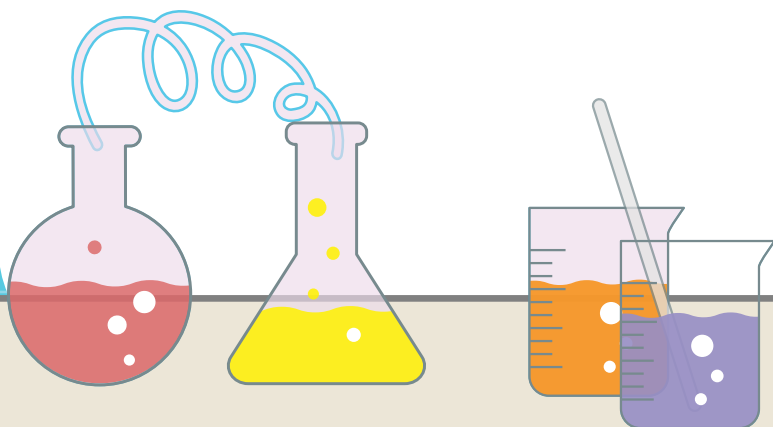
3-2 Science – What is Neutralization

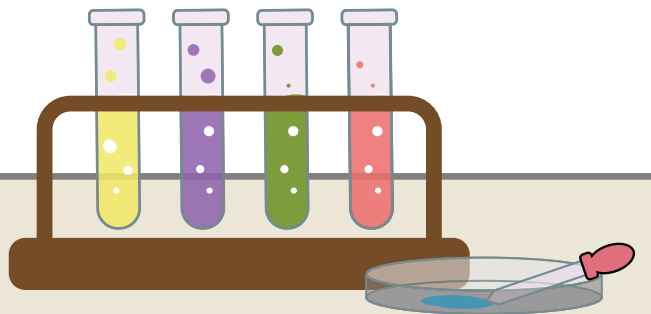
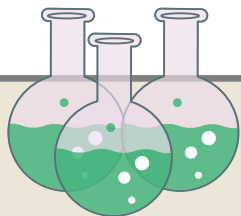


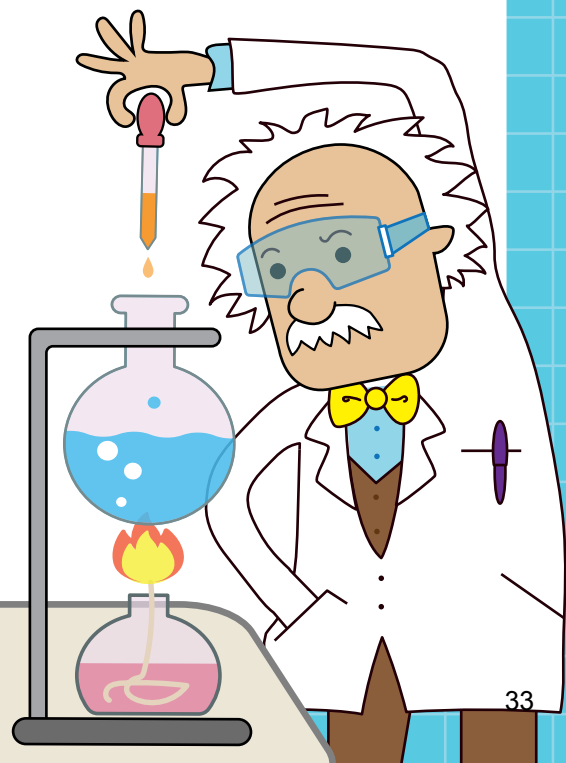
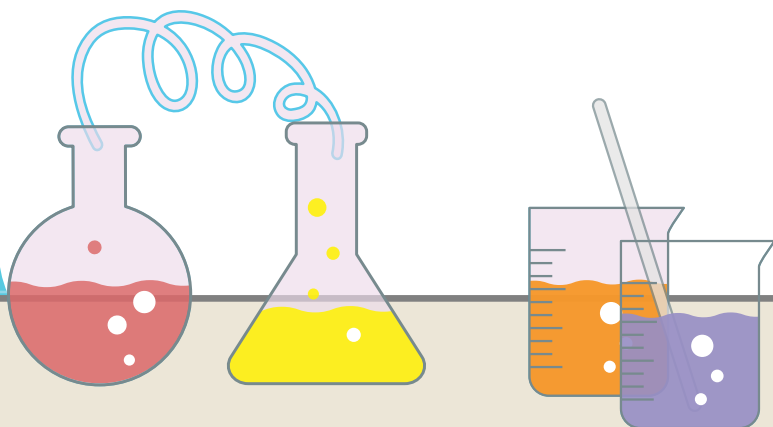
3-3 Conductivity of Solutions





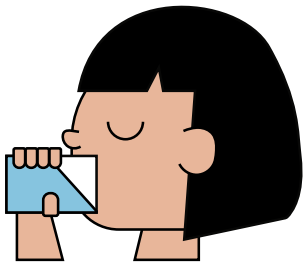




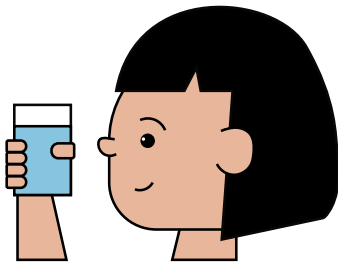


Observing a solution

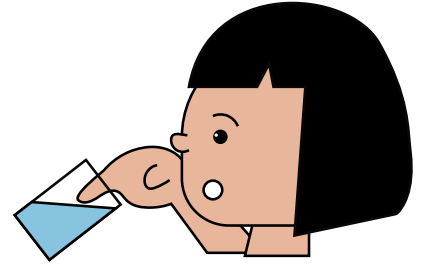
Should you do these when observing (觀察) an aqueous solution? Circle 😊 if yes and circle ☹️ if no.



drink



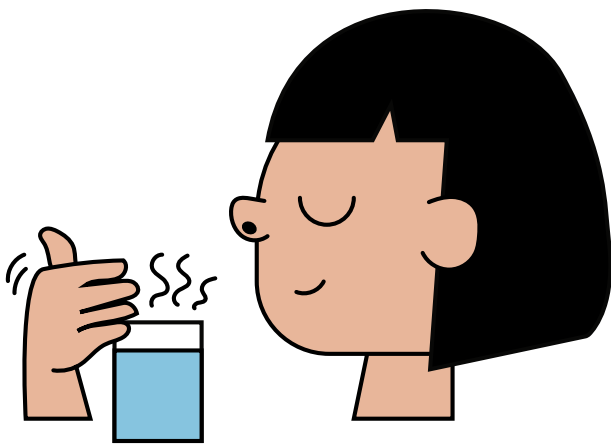
look



touch



How should you smell an aqueous solution? Put / inside the .

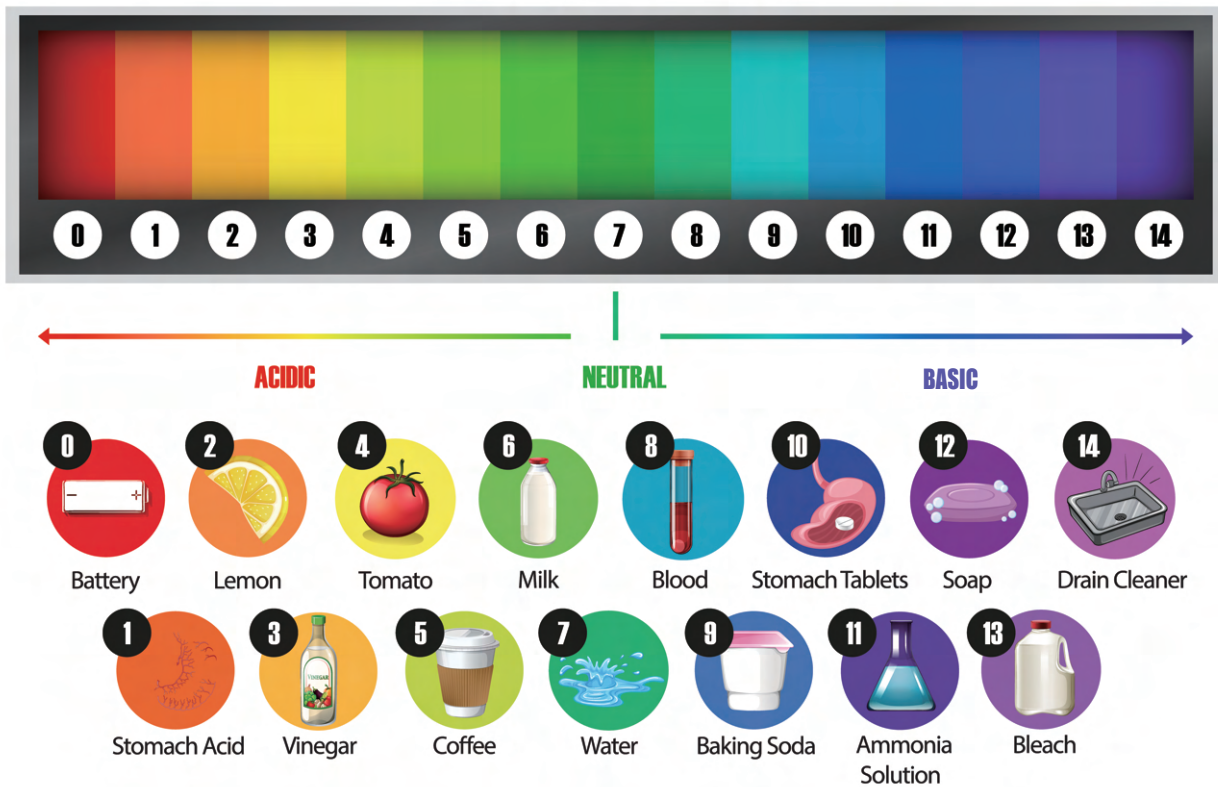


Acidic, neutral and basic

Study the picture below.

The pH Scale

Designed by brgfx / Freepik



Circle the correct word/s.

1. Coffee is **acidic** / **neutral** / **basic**.
2. Soap is **acidic** / **neutral** / **basic**.
3. The pH of a neutral solution is **less than 7** / **7** / **more than 7**.

Conductivity

Study the table below.

	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6
Acidic, neutral or basic?	acidic	basic	neutral	neutral	acidic	basic
Conducts electricity (導電)?	yes	yes	no	yes	yes	yes

Circle the correct word.

1. An acidic solution **always** (總是) / **sometimes** (有時候) / **never** (從不) conducts electricity.
2. A neutral solution **always** (總是) / **sometimes** (有時候) / **never** (從不) conducts electricity.
3. A basic solution **always** (總是) / **sometimes** (有時候) / **never** (從不) conducts electricity.

Let's review

Fill in the blanks using the words below.

acidic
conductivity
solutions

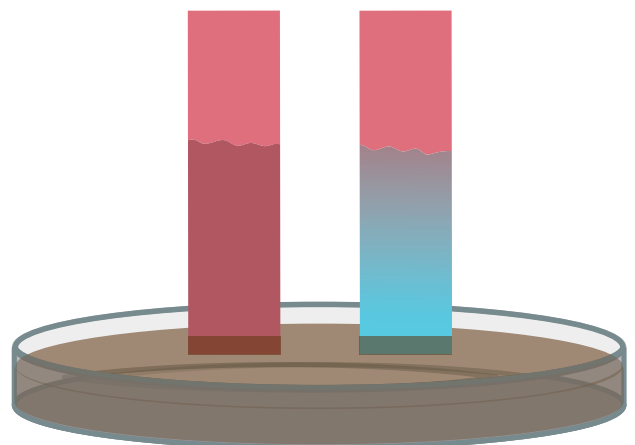
basic
litmus paper

circuit
neutral

There are different aqueous _____. They differ in color and smell. They can be acidic, basic or neutral.

Different things can be used to test if a solution is _____, _____ or _____. Examples include purple cabbage, velvet plant, red rose, purple grape and _____. A color change will tell if a solution is acidic, basic or neutral.

The _____ of a solution can be tested. To do so, use a _____ with LED light, battery and wire. Do not touch electrical appliances when you are wet.

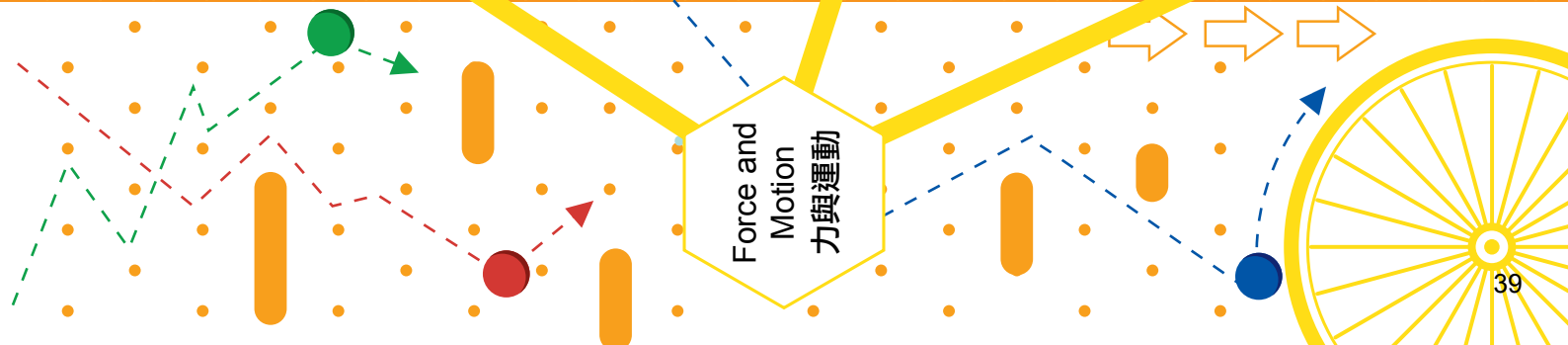




Unit 4

Force and Motion

力與運動



Force and Motion
力與運動

Force
力

Friction
摩擦力

Motion
物體運動

Types
力的類型

Measurement
力的測量

Balanced forces
力的平衡

Effect
力的效果

Factors
因素

Application
應用

Fast
快

Slow
慢

Contact force happens when objects touch each other. Examples are push and pull.
(須接觸) 才能產生作用的力：拉力、推力等

Non-contact force affects an object without touching it. Examples are gravity and magnetic force.
(不須接觸) 就能產生作用的力：磁力、重力等

The longer the spring of a balance, the greater the force.
力量愈大，彈簧變得愈(長)

If the forces on an object are equal but from opposite directions, there is no change in the object's motion.
大小(相等)、方向(相反)的力作用在同一物體上時，物體可以保持平衡

Friction makes an object move slower.
摩擦力會使物體移動速度變(慢)

The rougher the surface, the greater the friction.
接觸面愈(粗糙)，摩擦力愈大

The heavier the object, the greater the friction.
物體重量愈(重)，摩擦力愈大

The dots on a basketball and anti-slip mat increase friction.
(增加) 摩擦力的例子：防滑墊、籃球表面的紋路

The wheels on a chair and roller skates decrease friction.
(減少) 摩擦力的例子：電扇轉軸加潤滑油、直排輪輪子

To move faster, travel the same distance with less time or travel a longer distance with the same time.
相同距離，花費的時間愈(少)，速度愈快

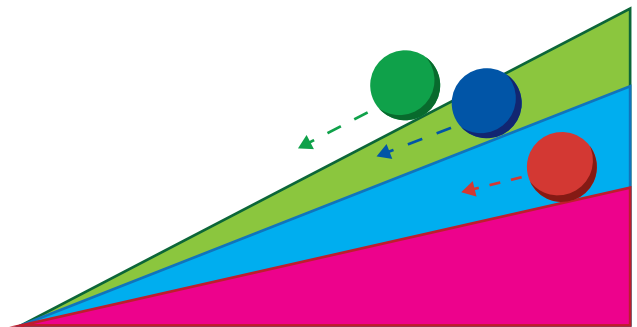
To move slower, travel the same distance with more time or travel a shorter distance with the same time.
相同時間，移動距離愈(遠)，速度愈快

應聽懂及認讀的生字

- 1. 力 force
- 2. 接觸力 contact force
- 3. 推力 push
- 4. 拉力 pull
- 5. 非接觸力 non-contact force
- 6. 重力 gravity
- 7. 磁力 magnetic force
- 8. 測量(n) measurement
- 9. 測量(v) measure
- 10. 彈簧秤 spring balance

- 16. 摩擦力 friction
- 17. 平衡 balance
- 18. 相反 opposite
- 19. 紋路 texture
- 20. 粗糙 rough
- 21. 平滑 smooth
- 22. 應用 application
- 23. 迴紋針 paper clip
- 24. 硬幣 coin
- 25. 鐵尺 iron ruler

- 11. 運動 motion
- 12. 快 fast
- 13. 慢 slow
- 14. 距離 distance
- 15. 時間 time



1. Contact force happens when objects touch each other.

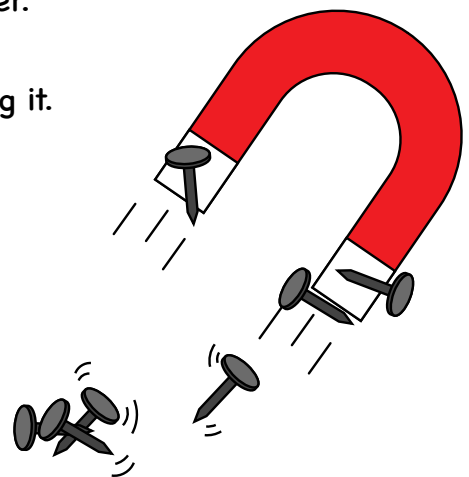
接觸力: 物體須接觸才能產生作用的力。

2. Non-contact force affects an object without touching it.

非接觸力: 不須接觸就能產生作用的力。

3. Friction makes an object move slower.

摩擦力會使物體移動速度變慢。

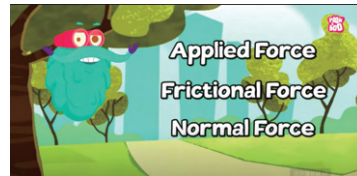


Science Videos Unit 4

4-1 What is Force?
Part 1 | Forces and Motion



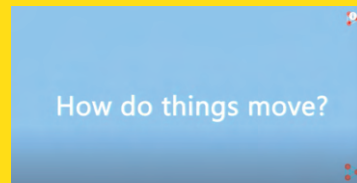
4-1 Work, Force & Energy | What is Force?



4-1 What is Force? |
Force and Pressure



4-2 What is Friction?



4-2 What is Friction?
Types of Friction |
Advantages of Friction



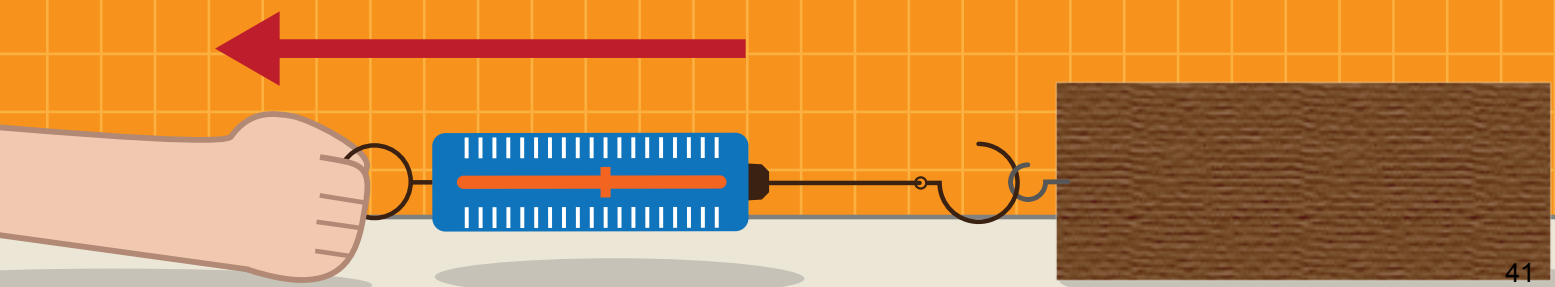
4-2 What is Friction in
Physics?

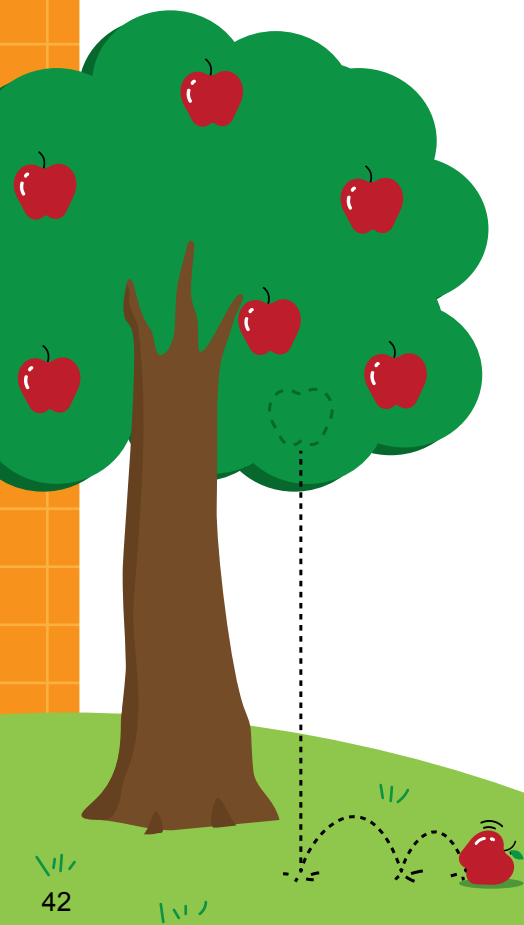


4-3 What is Speed? |
Motion and Time

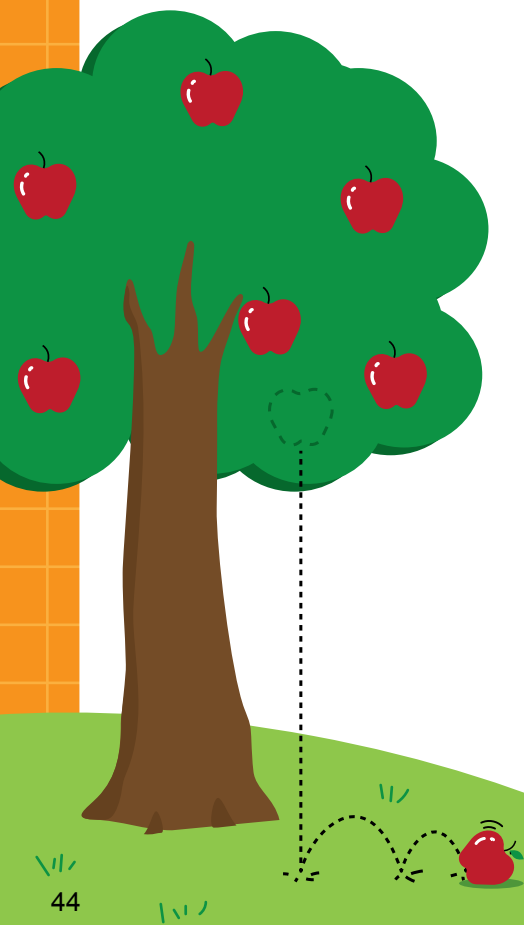


4-3 The Science of a
Cheetah's Speed











Force affects motion

Draw a line to match each force with its effect.



catch a ball

•

• start moving



pedal harder

•

• stop moving



kick a ball

•

• move faster



squeeze clay

•

• move slower



use bicycle brakes

•

• change direction



hit a moving ball
with a bat

•

• change shape

Friction

Circle the pictures that show friction.



Speed

In each box, circle the picture that moves faster.



fish



starfish



cheetah



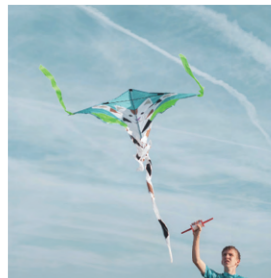
sloth



airplane



hot-air balloon



kite



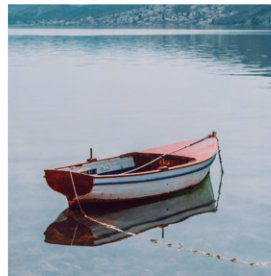
tornado



bicycle



motorcycle



boat



sailboat

Let's review

Fill in the blanks using the words below.

contact force
motion

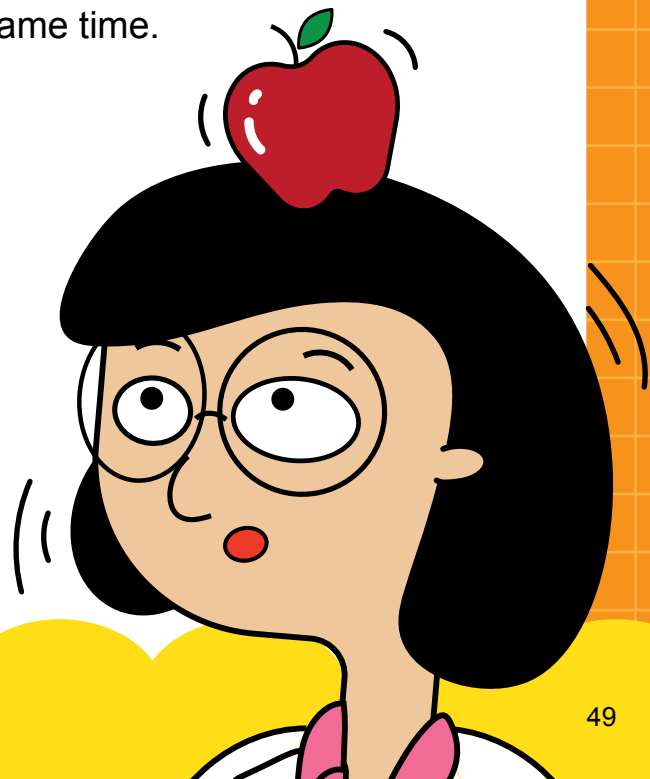
distance
non-contact force

friction
time

There are two types of force. _____ happens when objects touch each other. Examples are push and pull. _____ affects an object without touching it. Examples are gravity and magnetic force.

_____ makes an object move slower. To increase it, use a rough surface or a heavy object.

_____ can be fast or slow. To move faster, travel the same distance with less _____ or travel a longer distance with the same time. To move slower, travel the same distance with more time or travel a shorter _____ with the same time.



Rewards

Date	Points	Emoticon	Date	Points	Emoticon

Science Notes

English Immersion Program

5th grade

2nd semester

Authors

陳美卿、林雨慶、林怡伶、范瑋庭、陳宜君

Editors

Michelle Jose、簡雅臻、許瑀恩

Graphic designer

許瑀恩

國立臺北教育大學附設實驗國民小學 / 國立臺北教育大學雙語教學研究中心