Science Notes





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。

2020.09.02

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Unit

Sun and Light 太陽與光 Unit 1 Sun and Light 太陽與光

Changes of the Sun's position in the sky 太陽在天空中的 位置變化 Sun and shadows 太陽和影子。 We can use shadows to measure the Sun's direction and elevation angle. 我們可以用影子測量太陽的方位和高度角。

Changes of the Sun's position in the four seasons (along the Tropic of Cancer) 太陽四季中的位置 變化(北迴歸線地區)

The Sun rises right in the east and sets right in the west on the spring and autumn equinoxes. 春、秋分時,太陽由正東方升起、正西方落下。

The Sun rises in the northeast and sets in the northwest on the summer solstice.

夏至時,太陽由東偏北方升起、西偏北方落下。

The Sun rises in the southeast and sets in the southwest on the winter solstice.

冬至時,太陽由東偏南方升起、西偏南方落下。



Refraction 光的折射 Refraction occurs when light passes from one medium to another obliquely. 光斜斜地 進入不同介質時會產生折射 。

Light 認識光的現象

Rainbow 彩虹

放大鏡

When sunlight goes from the air into water and then comes back out again, it makes a rainbow. 陽光從空氣經過水再進入空氣,會形成彩虹。

A magnifying lens focuses light onto one point. 放大鏡會匯聚光線。
Magnifying lens

A magnifying lens makes things look bigger. 放大鏡可以放大物體影像。

Energy in our daily life 能源對生活的影響 Solar energy 太陽能

Energy conversion 能量的轉換 Solar energy is a renewable energy source. 太陽能是可再生的能源。

We use solar energy to generate electricity. 太陽能可以轉換成電能。



UNIT 1 Sun and Light 太陽與光

日期:

應聽懂及認讀的生字

□ 1. 東	east	□ 17. 日升	sunrise
□ 2. 西	west	□ 18. 日落	sunset
□ 3. 南	south	□ 19. 春分	spring equinox
□ 4. 北	north	□ 20. 夏至	summer solstice
□ 5. 東北	northeast	□ 21. 秋分	autumn equinox
□ 6. 西北	northwest	□ 22. 冬至	winter solstice
□ 7. 東南	southeast		
□ 8. 西南	southwest	□ 23. 折射	refraction
		□ 24. 平行	parallel
□ 9. 觀察(v.)	observe	□ 25. 垂直	vertical
□ 10. 觀察(n.)	observation	□ 26. 雷射光	laser
□ 11. 測量	measure		
□ 12. 影子	shadow	□ 27. 彩虹	rainbow
□ 13. 長度	length	□ 28. 角度	angle
□ 14. 位置	position	□ 29. 放大透鏡	magnifying lens
□ 15. 方位	direction	□ 30. 聚光(v.)	focus light
□ 16. 高度角	elevation angle	□ 31. 成像(v.)	form image
		□ 32. 能量	energy
		□ 33. 太陽能	solar energy

- 1. We can use shadows to measure the Sun's direction and elevation angle. 我們可以用影子測量太陽的方位和高度角。
- 2. The position of the Sun in the sky changes over the different seasons. 太陽的位置在不同季節會產生改變。
- 3. Light refracts when it passes from air to water at an oblique angle. 光由空氣斜斜地進入水中會產生折射。
- 4. A magnifying lens focuses light onto one point and makes things look bigger. 放大鏡會匯聚光線,也可以放大物體影像。
- 5. We use solar energy to generate electricity. 太陽能可以轉換成電能。

Science Videos Unit 1

1-1 Light and Shadows





1-1 The Sun





1-1 The Sun's Surprising Movement across the Sky





1-1 Reasons for the Seasons





1-2 Refraction of Light





1-2 How Is a Rainbow Formed





1-2 Convex Lens





1-3 How the Sun Affects the Earth





1-3 How Do Solar Panels Work?





1-3 How Solar Power Works



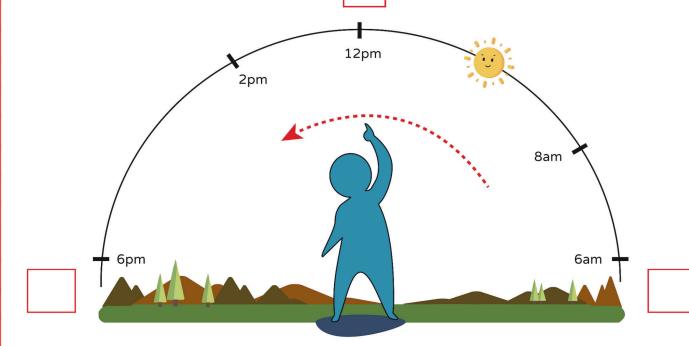


Sun's Position and Shadow

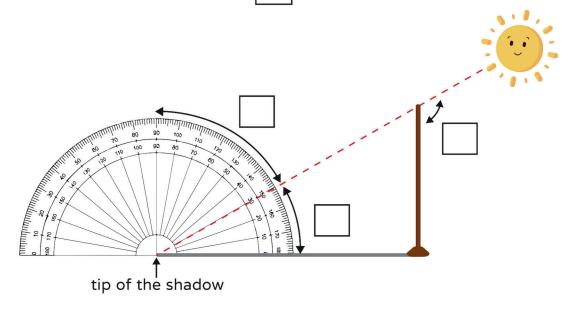
1. Xiaonan observed the Sun's position at different times of the day.

Look at how the sun moves in the picture, and write down the

correct direction (方位) in each box .



2. Which angle represent the Sun's elevation angle (高度角)? Put a check mark () inside the box .



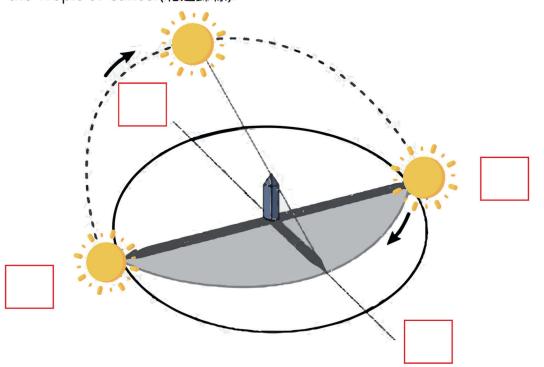
Sun Clock

Back in ancient Egypt (埃及), people built obelisks, just like the one shown in the picture.



Obelisks © Courtney Cook, via Unsplash

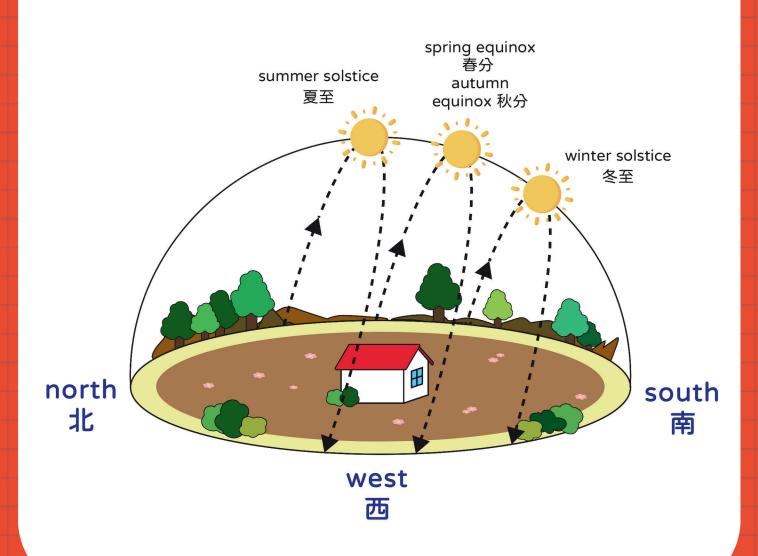
Obelisks (方尖碑)are like sun clocks. People used the shadows of obelisks to tell the time of day and the direction of north, south, east, and west. Can you use the obelisk's shadow in the picture below to find out which way is north, south, east, and west? Write your answers inside each box . Remember that Egypt and Taiwan are near the Tropic of Cancer(北迴歸線).



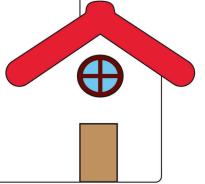
Position of the House

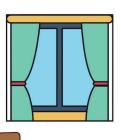


家在北回歸線經過地區的美美,房間有一扇窗開在南方。不同季節的清晨到傍晚,陽光照入美美房間的情形有什麼不同?



1. In which of the four seasons does the room get the most sunlight at noon (12:00)? Why?





2. If we open a window on the south side, will it make the room warmer in winter and cooler in summer? Why?

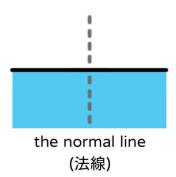


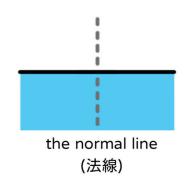
3. Why is sunlight important in our lives? Write down two reasons.



Refraction of Light

- 1. Draw the path of light.
- a.Light travels from air to water at an angle of 90 degrees.
- b.Light travels from air to water at an oblique angle.





2. What does a magnifying lens do? Check the boxes next to the correct answers below.



□ Correct nearsightedness (矯正近視)



□ Make things look bigger (放大物體影像)



□ Focus light onto one single point (匯聚光線)



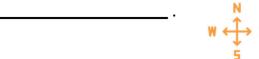
□ Show your reflection just as you are (呈現與自己實際模樣相符的影像)

Let's Review

• Fill in the blanks using the words below.

summer solstice length southwest energy refraction

- 1. As the Sun moves through the sky, the ______ of shadows change.
- 2. When the Sun is in the northeast, the shadow falls in the



3. The Sun is directly overhead at noon on the



- 4. Light does not always travel in a straight line. When light travels from air to water (or from water to air) obliquely,

 ______ happens.
- 5. The Sun plays an important role in our lives. It provides heat and light, and we can use solar _______ to generate electricity.

Unit 2

Plants 植物世界



Functions of roots, stems, and leaves 植物根莖葉的功能 Roots 根

Stems 莖

Leaves 葉

Functions of reproductive organs 繁殖器官的功能

Creation of new life 植物的繁殖 Ways for seeds and fruits to move around 果實和種子的傳播方式

Reproduction through vegetative organs 營養器官的繁殖

Plants in our life 植物與人類生活 Economic plants 具有經濟價值的植物

Biomimicry 仿生學 The roots hold the plant in the soil. 根可以固定植物體。

The roots take in water and food from the soil. 根負責吸收水分和養分。

The stem holds up the plant. 莖可以支撐植物。

The stem carries water and food though the plant. 莖負責運輸水分和養分。

The leaves take in sunlight to make food. 葉片行光合作用製造養分。

Water leaves the plant through their leaves. 植物體內的水分會由葉片蒸散。

Flowers make seeds and fruits after pollination. 花朵授粉後,會發育成種子和果實。

The ovule develops into the seed after fertilization. 胚珠與花粉結合後,會發育成種子。

The ovary develops into the fruit after fertilization. 胚珠與花粉結合後,子房會發育成種子。

Seeds travel on the wind. 種子隨風飄。

Seeds pop out from the seeds pods. 種子透過自身彈力傳播。

Seeds travel with the help of animals. 種子藉由動物傳播。

Fruits float and travel across water. 果實漂浮在水面,隨水流傳播。

Sweet potatoes grow new plants from their roots. 番薯利用塊根繁殖。

Potatoes grow new plants from their tubers. 馬鈴薯利用塊莖繁殖。

Stone lotus plants grow new plants from their leaves. 石蓮花利用葉子繁殖。

Orchids, Tea trees 蘭花、茶樹

The lotus effect, Velcro 蓮葉效應、魔鬼氈



UNIT 2 Plants 植物世界

日期:

應聽懂及認讀的生字

□ 1. 根 □ 2. 莖 □ 3. 葉 □ 4. 花	root stem leaf / leaves flower	□ 16. 繁殖(v.) □ 17. 繁殖(n.) □ 18. 授粉(v.) □ 19. 授粉(n.) □ 20. 花粉	reproduce reproduction pollinate pollination pollen
□ 5. 雄蕊 □ 6. 花藥 □ 7. 花絲	stamen anther filament	□ 20. 化初 □ 21. 構造 □ 22. 功能 □ 23. 土壌	structure function soil
□ 8. 雌蕊 □ 9. 柱頭 □ 10. 花柱 □ 11. 子房 □ 12. 胚珠	pistil stigma style ovary ovule	□ 24. 吸收(v.) □ 25. 養分 □ 26. 輸送(v.) □ 27. 蒸散(v.) □ 28. 蒸散(n.)	absorb nutrient transport transpire transpiration
□ 13. 花瓣 □ 14. 萼片 □ 15. 種子	petal sepal seed	□ 29. 開花(v.) □ 30. 仿生學 □ 31. 經濟植物 □ 32 . 魔鬼氈	bloom biomimicry economic plants velcro

- Roots take in water and food from the soil.
 根負責吸收水分和養分。
- 2. Stems carry water and food though the plant. 莖負責運輸水分和養分。
- 3. Leaves take in sunlight to make food. 葉片行光合作用製造養分。
- 4. Water leaves the plant through their leaves. 植物體內的水分會由葉片蒸散。
- 5. Flowering plants reproduce through seeds. 開花植物可以利用種子繁殖。
- 6. We use many different ways to take care of plants and improve plant species. 我們運用各種栽培方法維持植物的優良品質和改良品種。
- 7. We use biomimicry to solve problems in our daily life. 我們可以利用仿生學來解決生活的問題。



Science Videos Unit 2

2-1 Plant Parts and Functions





2-1 Parts of a Plant





2-2 Parts of Flower





2-2 What Is Pollination?





2-2 How Do Seeds Travel?





2-2 Seed Dispersal





2-3 Biomimicry





2-3 Lotus Effect





Plant Structure and Function

- Choose a plant that you like.
- Draw the basic parts of the plant inside each box below.
- Write down the function of each part. Plant Name:

1. Roots

2. Stems



3. Leaves

4. Flowers and fruits

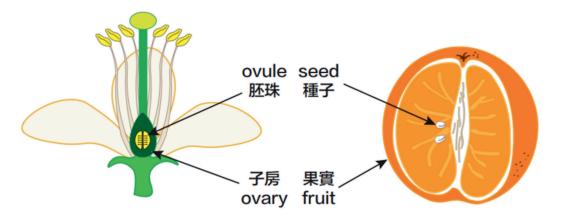






Plant Reproduction

Look at the picture below. Did you know that the flowers of an orange tree can become orange fruits?



When a flower becomes a fruit, it goes through a few different steps. Read each step below and answer the questions.

Step	Question	Answer
Pollen (花粉) moves from the male part of the flower to the female part.	How does pollen move from the male part of the flower to the female part?	
After pollination (授粉), a fruit starts growing.	Which female part of the flower develops into the fruit?	
Inside the fruit, you will find seeds.	Which female part of the flower grows into seeds?	
The seeds will spread out and grow into new plants.	How can seeds spread out?	

Biomimicry

人類從大自然裡獲得靈感,發展出新奇的創意點子。這種發明稱為 「仿生學」:模仿自然中生物的特點,改善人類的生活。

Nature gives us cool ideas, and we use them to create new inventions. We copy the amazing things animals and plants can do and use them to make our lives better. We call this practice "biomimicry."

★Match each invention to the correct animal or plant that gives us ideas for biomimicry.



barbed wire (鋼絲)



velcro (魔鬼氈)



diving fins (潛水鞋)



suction cups (吸盤)



hitchhiker plants (大花咸豐草)



an octopus (章魚)



thorns (刺)

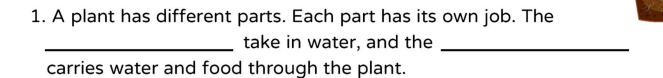


a duck (鴨子)

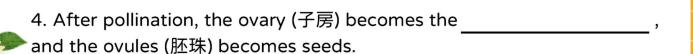
Let's Review

• F	Fill in	the	blanks	using	the	words	below.
-----	---------	-----	--------	-------	-----	-------	--------

stem seeds fruit biomimicry pollen roots



- 2. Plants reproduce in different ways. Flowering plants typically use to reproduce.
- 3. Pollination happens when ______ travels from the anther (雄蕊) to the stigma (雌蕊) of a flower.



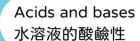
5. We use _____ to solve problems in our daily life. For example, we use the lotus effect to invent self-cleaning surfaces.

Unit 3

Solutions 水溶液



Dissolution 溶解現象



Eletrical conductivity 水溶液的導電性





When a substance dissolves in water, it creates a solution.

物質溶解於水中會形成溶液。

A solution is made up of solvents and solutes.

溶液由溶劑和溶質組成。

Solutions differ in color and smell. 不同溶液具有不同的顏色和氣味。

Solutions are either acidic, basic, or neutral. 溶液可能是酸性、鹼性或中性的。

We use litmus paper to test if a solution is acidic or basic.

我們可以用石蕊試紙檢測水溶液的酸鹼性。

We can create a neutral solution by mixing an acidic solution with a basic one. 將酸性和鹼性水溶液混合可以形成中性水溶液。

Some solutions are good conductors of electricity.

有些水溶液容易導電。

We can create a simple conductivity tester with batteries, wires, and an LED bulb. 我們可以用電池、電線和燈泡製作簡單的導電性測試裝置。

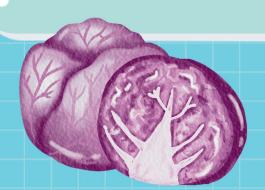
UNIT 3 Solutions 水溶液

日期: /

應聽懂及認讀的生字

□ 1. 水溶液 □ 2. 溶質 □ 3. 溶劑 □ 4. 特性	solution solute solvent property / properties	□ 15. 石蕊試紙 □ 16. 紫高麗菜 □ 17. 鑷子	litmus paper purple cabbage ; red cabbage tweezers
□ 5. 咖啡 □ 6. 茶 □ 7. 果汁;蔬菜汁 □ 8. 純水	pure water	□ 18. 酸性 □ 19. 酸性的 □ 20. 鹼性 □ 21. 鹼性的 □ 22. 中性的	acid acidic base basic neutral
□ 9. 糖水 □ 10. 食鹽水 □ 11. 小蘇打水 □ 12. 石灰水 □ 13. 檸檬酸 □ 14. 醋	sugar water salt water baking soda water limewater citric acid vinegar	 □ 23. 導電性 □ 24. 可導電的 □ 25. 電池 □ 26. 電路	conductivity conductive battery circuit

- 1. When a solute dissolves in a solvent, it forms a solution. 溶質溶解於溶劑中會形成水溶液。
- 2. We use litmus paper to identify if a solution is acidic or basic. 我們可以使用石蕊試紙檢測不同溶液的酸鹼性。
- 3. An acidic solution changes the color of litmus paper from blue to red. 酸性水溶液會使藍色石蕊試紙變紅色。
- 4. A basic solution changes the color of litmus paper from red to blue. 鹼性水溶液會使紅色石蕊試紙變藍色。
- 5. Some solutions are good at carrying electricity. 有些水溶液容易導電。



Science Videos Unit 3

3-1 Dissolving





3-1 Solute, Solvent, and Solution





3-1 Dissolving Experiment



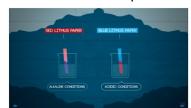


3-2 Acid and Base





3-2 What Is the pH Scale?





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





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





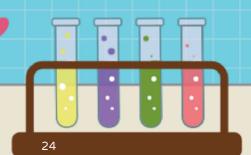
3-3 Does Water Conduct Electricity?











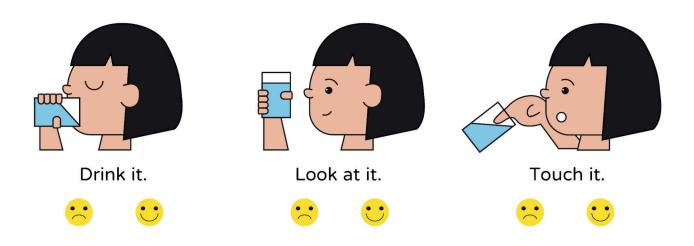
Dissolution

• What dissolves in water? Please write three examples.

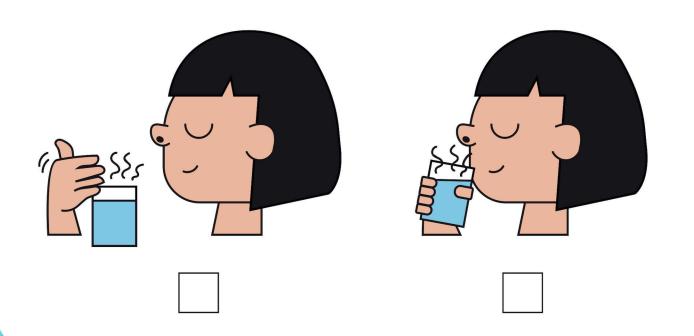
• Fill in the blanks using the words below.

Observe Solutions

• Which way is right for observing a solution? Circle if it is right or if it is wrong.



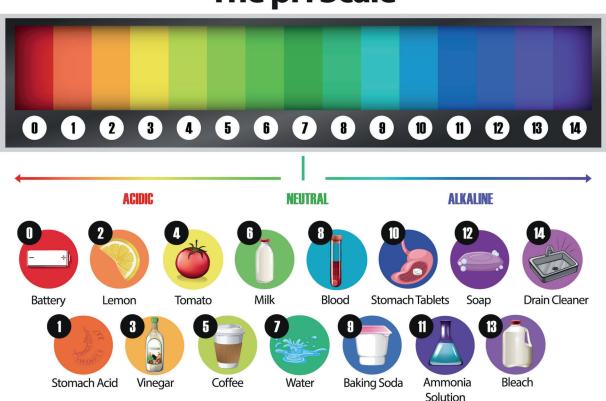
• Which way is right for smelling a solution? Put a checkmark () inside the box.



Acids and Bases

 Look at the pH scale and circle the correct word for each sentence below.

The pH Scale



- 1. Lemon juice is an acid / neutral / a base.
- 2. Baking soda is an acid / neutral / a base.
- 3. Citric acid is an acid / neutral / a base.
- 4. Soap is an acid / neutral / a base.
- 5. The pH of a neutral solution is less than 7 / 7 / more than 7.

© brgfx, via Freepik

Conductivity

• Study the table below and circle the correct word to complete each sentence below.

	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6
Acidic, neutral, or basic?	Acidic	Basic	Neutral	Neutral	Acidic	Basic
Conductive (可導電)	Yes	Yes	No	Yes	Yes	Yes

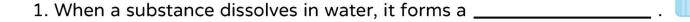
Circle the correct word.

- 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.

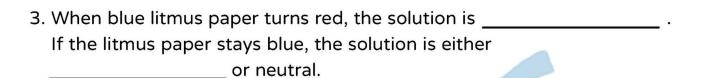
Let's Review

• Fill in the blanks using the words below.

acidic batteries neutral sugar solution basic



2. Solutions are either acidic, basic, or _______ .



- 4. We can make a simple conductivity tester with ______ , wires, and an LED bulb.
- 5. Salt water is a good conductor of electricity, but _____ water is a bad conductor of electricity. It cannot light up an LED bulb.

Unit 4

Force and Motion 力與運動



Types 力的種類

Measure forces 力的測量 Size 力的大小

Balance 力的平衡

Friction 摩擦力 Size 摩擦力的大小

Uses 摩擦力的應用

Speed of movement 運動狀態的快慢

Energy of motion 認識動能

Speed 速度的快慢 Contact forces: push and pull.

接觸力:推力和拉力。

Non-contact forces: gravity and magnetism.

非接觸力:重力和磁力。

We use a spring scale to measure the size of a force

我們可以用彈簧秤測量力的大小。

The spring stretches more when the force is greater.

力量愈大,彈簧伸得愈長。

When the pushes or pulls on opposite sides are the same, the object stays still.

左右兩邊施力一樣,物體不動。

Rough surfaces have more friction.

粗糙面摩擦力大。

Smooth surfaces have less friction.

平滑面摩擦力小。

Tread patterns of shoes create more friction. 鞋底的紋路可增加摩擦力。

Wheels of shoes create less friction. 推車的輪子可減少摩擦力。

When things move faster, they have more energy of motion.

物體運動速度快,具有的動能愈大。

If you travel the same distance in less time, it means that you move faster.

距離固定,移動的時間愈短,表示速度愈快。

If you use the same amount of time but travel a greater distance, it means that you move faster. 時間固定,移動的距離愈長,表示速度愈快。

UNIT 4 Force and Motion 力與運動

日期:

應聽懂及認讀的生字

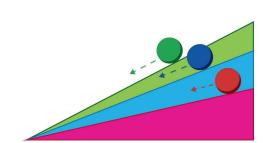
- □ 1. 力 force
 □ 2. 接觸力 contact force
 □ 3. 推力 push
 □ 4. 拉力 pull
 □ 5. 非接觸力 non-contact force
 □ 6. 重力 gravity
- □ 6. 重力 gravity
 □ 7. 磁力 magnetic force
 □ 8. 測量(v.) measure
 □ 9. 彈簧秤 spring scale

time

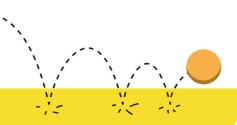
□ 10. 運動 motion
□ 11. 速度 speed
□ 12. 快 fast
□ 13. 慢 slow
□ 14. 距離 distance

□ 15. 時間

□ 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.硬幣 coin □ 23.鐵尺 iron ruler □ 24.獵豹 cheetah



- 1. A contact force is a push or pull that happens when objects touch each other. 接觸力是物體須接觸才可以產生作用的力。
- 2. A non-contact force is a force that acts on objects without touching them. 非接觸力是不須接觸也可以產生作用的力。
- 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 Push and Pull





4-1 What Is Force?





4-1 Work, Force, and Energy





4-2 What Is Friction?





4-2 What Is Friction?



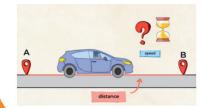


4-2 Friction





4-3 Understanding Speed







Force and Motion

• Draw a line to match each force to 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

• Circle the object or animal that moves faster in each pair.









fish

starfish

leopard

sloth











airplane

hot-air balloon

kite

tornado











bicycle

motorcycle

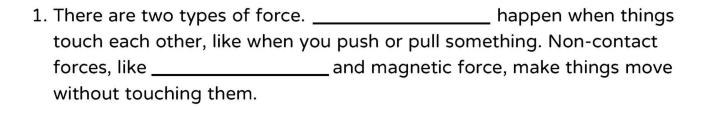
boat

sailboat

Let's Review

• Fill in the blanks using the words below.

Contact forces distance friction Speed gravity time



- 2. A toy car moves slower on a rough surface because rough surfaces create more ______.
- 3. _____ is how fast something is moving.



4. A rabbit runs at a slower pace if it takes more time to cover the same



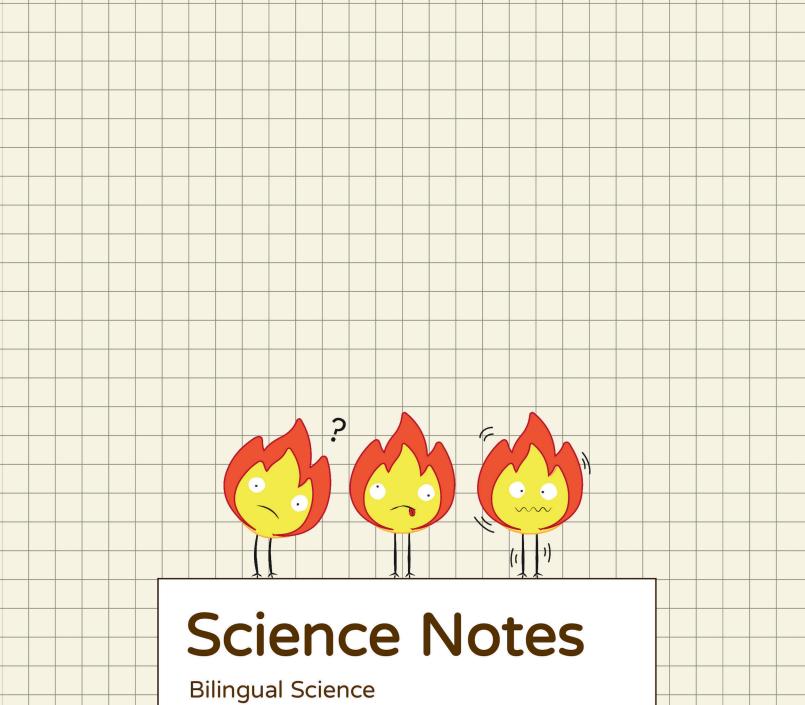
5. A leopard runs at a faster pace if it covers a longer distance in the same amount of ______.



Date	Points	Emoticon	Date	Points	Emoticon



Date	Points	Emoticon	Date	Points	Emoticon



5th Grade 1st Semester

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