

OXFORD

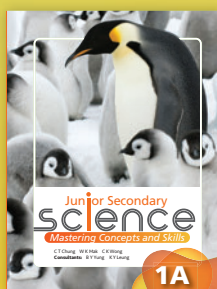
Junior Secondary  
**science**  
Mastering Concepts and Skills

初中科學

基礎概念與技能



課本教材齊備  
係初中科學老師嘅**最強**後盾!



e-learning



科學技能訓練



實驗探究訓練



教師支援

STEM



大量題目

了解更多  
教材內容



# 顧問及作者團隊

## 顧問簡介

### 容顯懷博士 Dr H W Yung

於1986至1992年為香港考試局課目主任，參與擬定生物科公開考試試題。及後，容博士任職香港大學教育學院副教授，專職生物科及科學科教師培訓工作，至2015年退休。他對學習評估、科學探究、科學本質及教師專業發展具豐富心得。



### 梁健儀女士 K Y Leung

曾任中學科學科及物理科科主任，於2006年獲頒行政長官卓越教學獎，強調通過探究活動，加強學生的科學素養。梁女士現為香港大學教育學院高級講師及院校夥伴計劃總監。她的教學及研究範疇包括科學教育、STEAM教育及教師教育與發展。



## 作者簡介

### 鍾卓廷先生 C T Chung

資深中學科學科及化學科教師，亦曾任教生物科。鍾先生是英國皇家化學學會 (Royal Society of Chemistry) 會員。在科學教學方面，鍾先生強調實驗與理論緊密結合。他積極發展校內的STEAM教育，以裝備學生應付未來社會的轉變和挑戰。



### 麥永佳先生 W K Mak

資深中學科學科教師，於2006年獲頒行政長官卓越教學獎。麥先生深明中學科學科教師與學生的教與學需要，積極參與課堂規劃及評核方法設計，以激勵和啟發學生對科學探究的興趣。



### 黃志堅先生 C K Wong

資深中學科學科及物理科教師，於2007–2008年度獲頒國際啟發潛能教育聯盟 (香港) 傑出教師獎。黃先生着重訓練學生的實驗技巧，並善於運用電子學習工具來培養學生的科學概念、技能和態度。



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# 系列一覽

**Textbook and Workbook 課本及作業**  教師  學生  
1A, 1B, 2A, 2B, 3A, 3B, 3C

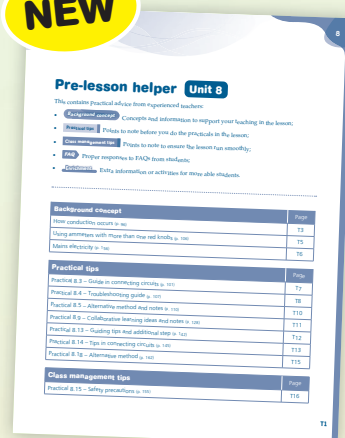


Teacher's edition 教師用書




Pre-lesson helper 備課筆記

**NEW**




## 電子學習資源

-  一站式教與學平台連電子書
  - 新增網頁版

**UP!**

**iSolution**

 教師  學生


-  全新試卷製作工具
  - 毋須下載
  - 新增題目分類搜尋

**NEW**



**Online Question Bank**  
線上試題庫

 教師


-  虛擬與實境混合學習工具

**NEW**




**OxfordSciXR App**

 教師  學生

-  教學資源網站
  - 新增個人化功能


**UP!**

**Teaching and Learning Resources Centre**  
教與學資源中心 

-  學習資源網站


**NEW**

**e-Resources List 電子學習資源表** 

-  多元化影片


**UP!**

**YouTube Channel 牛津初中科學**  教師  學生

-  最新資訊發佈

**NEW**

**Padlet 牛津科學教師關注組** 

-  練習發佈平台

**NEW**



**Oxford Exercise Platform**  
牛津網上練習平台

 教師  學生

詳盡內容見於電子教學資源簡介



## Practical resources

- NEW** Pre-lesson helper (in Textbook Teacher's Edition)
- Up!** Practical tips (in Textbook Teacher's Edition)
- NEW** Interactive practicals & simulation worksheets ▶
- Practical assessment handbook
- NEW** Further investigation worksheet



## STEM resources

- NEW** Home lab - video and worksheet ▶
- NEW** STEM project - video and worksheet ▶
- Up!** Guide to 3D printing and coding in Science

## Concepts and Skills assessment pack

- NEW** Skill builder & Skill practice – video and worksheet ▶
- NEW** Example & Follow-up practice – video and worksheet ▶
- Up!** Flipped classroom - video and worksheet ▶

5-min Short quiz  
15-min Section quiz  
Unit test

備有 Google Forms 及  
Microsoft Forms 版本

**Up!** First term exam  
Final exam

Science news file  
Question bank

題目數量  
+70%

## Language and bridging resources

中英  
對照

PowerPoint  
Lesson worksheet  
Short notes for revision

- NEW** Pre-DSE booklet
- NEW** NSE Teaching resources pack - Teaching notes & PPT
- Up!** Mini science dictionary
- Science in English
- Bridging Book (P6 to S1 / S3 to S4)

## Multimedia resources

- Up!** Animations, 3D models, simulations, AR, VR

## 實驗資源



- 備課筆記 (附於教師用書開首)
- 實驗備忘 (附於教師用書內)
- 互動實驗 及 模擬實驗工作紙 ▶
- 實驗評核手冊
- 進一步探究工作紙

## STEM 資源

- 在家小實驗 – 影片及工作紙 ▶
- STEM 專題研習 – 影片及工作紙 ▶
- 科學科 3D 打印與編程指引

## 概念與技能評核資源套



- 技能教室及技能應用 – 影片及工作紙 ▶
- 例題解說及即時訓練 – 影片及工作紙 ▶
- 翻轉課堂 – 影片及工作紙 ▶

5 分鐘短測  
15 分鐘分段小測  
單元測驗  
上學期考試  
期終試  
科學新聞檔案  
試題庫

多份試卷  
持續更新

## 語文及銜接資源套



- 簡報
- 課堂工作紙
- 簡易溫習筆記
- DSE 預備手冊
- 國家安全教育資源包 - 教師筆記及簡報
- 課本小詞典
- Science in English
- 銜接手冊 (升中一 / 升高中)

## 多媒體資源



- 動畫、3D 模型、模擬程式、AR、VR

# 課本設計理念

## ① 章節清晰分明

每節開首以色塊設計明顯標示，全部備有 **Flipped classroom 翻轉課堂**

每節末備有 **Section summary 本節重點** 及 **Section exercise 本節練習**，顯示該節完結

**Did you know?**

Why do our hands feel particularly cool when rubbing with alcohol?

When we rub our hands with alcohol\*, our hands feel particularly cool. Do you know why? Alcohol has a lower boiling point (82 °C) than water. When it is applied on our hands, it evaporates more quickly and more energy is absorbed from the skin. Thus our hands feel cooler.




Fig 2.11 Our hands feel cool when rubbing with alcohol

**Section exercise 2.1**

**Level 1**

The following cases involve a process of change in states of water. Name the process in each case.

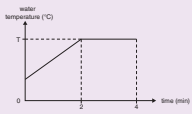
1 Fruit juice turns into ice lollies

2 Wet clothes gradually dry in the air

3 Water forms on the surface of a cold bottle

**Level 2**

4 A beaker of water is heated over a Bunsen flame. The graph on the right shows the change in water temperature with time.



a What is the state of water during 0-2 min? (1 mark)

b i Name the process of change in states of water during 2-4 min. (1 mark)

ii Is energy absorbed from the surroundings or released to the surroundings in the process in b? (1 mark)

c Suggest a value for T in the graph. (1 mark)

**Section summary 2.1**

1. Water exists in three physical states: **solid state** (ice), **liquid state** (water) and **gas state** (water vapour or steam).

2. The table below summarizes the changes in states of water:

Process	Change in states	Temperature at which the process occurs	Energy absorbed or released
Melting	solid (ice) → liquid (water)	0 °C (melting point)	Absorbed
Boiling	liquid (water) → gas (steam)	100 °C (boiling point)	Absorbed
Evaporation	liquid (water) → gas (water vapour)	Temperatures below the boiling point	Absorbed
Freezing	liquid (water) → solid (ice)	0 °C (freezing point)	Released
Condensation	gas (water vapour / steam) → liquid (water)	Temperatures at or below the boiling point	Released

## 2.1 Change in states of water

### Let's begin

#### Flipped classroom

Watch a video and answer the questions.

The photo shows the mist-spraying machine\* in the Avenue of Stars\*. On hot summer days, the machine sprays mists to the air to lower the surrounding\* temperature.



Why can spraying mists to the air lower the surrounding temperature?

The answer to Let's begin is related to one of the processes of the change in states of water. Let us learn about the states of water first.

### Processes of change in states of water

Look at the glass of iced water in Fig 2.1. Water exists in three physical states\*, in this case:

- liquid state\*, we commonly call it water;
- solid state\*, we call it ice;
- gas state\*, we call it water vapour\*.

#### Key point

Water exists in three physical states. Ice is in the \_\_\_\_\_ state. Water is in the \_\_\_\_\_ state. Water vapour is in the \_\_\_\_\_ state.

time 時間 狀態 Avenue of Stars 星光大道 surrounding 周圍環境 physical state 物態 liquid state 液態 gas state 氣態 water vapour 水汽 invisible 不可見

## ② 善用圖表、infographics

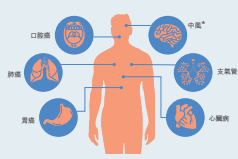
以 **infographics** 展示數據，讓學生容易理解並加深印象

**5 吸煙對健康的影響**

吸煙不只會減低氣體交換的效率，還會對身體造成很多其他影響，例如香煙煙霧中的尼古丁\*會使人上癮，下面列出吸煙對身體的一些不良影響。

**吸煙對健康的不良影響**

吸煙差不多對身體所有器官都會造成損害，引致多種疾病，例如：



每年全球約有 **800 萬人** 死於和吸煙相關的疾病，佔總死亡人數的大約 **15%**。

研究指出，吸煙者的預期壽命較非吸煙者短至少 **10 年**。

## 2 Filtration

In *Practical 2.7*, some solid impurities are still suspended in or floating on the water after sedimentation. We can remove them by passing the water through a **filter**\*. This method of water purification is called **filtration**.

A filter is made up of materials that consists of **many small pores**. Substances smaller than the pores can pass through the filter while substances larger than the pores cannot. Fig 2.25 shows a commonly used coffee filter. It can separate the ground coffee beans from the coffee extracts.

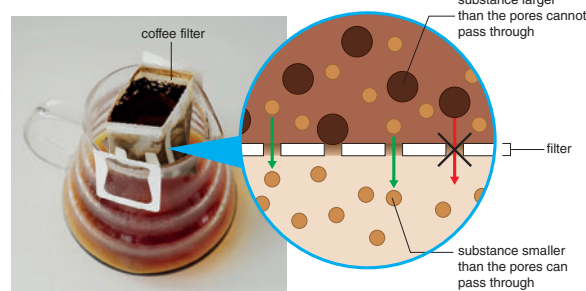


Fig 2.25 How a filter works

適當課文輔以 **粒子圖**、**圖表** 或 **流程圖** 解說，豐富學生的科學概念

### ③ 跨頁設計及色彩運用

善用跨頁設計及色彩，讓閱讀更富趣味，提高學習成效

#### 2 全球暖化可能帶來的後果

許多科學家相信全球氣溫上升會導致**氣候變化**，繼而帶來以下後果：

- 較暖的氣候加快南北兩極的冰層融化，導致：
  - 極地生物（例如北極熊）因為失去生境而死亡。
  - 海平面上升，淹沒低窪地區。
- 反常天氣（例如颱風、颶風、熱浪、乾旱和水澇）可能會更頻密地發生。
- 不能適應較暖氣候的生物可能會滅絕，例如海水溫度上升可能會導致珊瑚死亡。

觀看影片，加深了解大氣中二氧化碳水平、全球暖化和氣候變化的關係。

二氧化碳 全球暖化 氣候變化 影片

72 氣候變化 climate change

#### 全球各地應對氣候變化的措施

為舒緩全球暖化的問題，超過200個國家在2015年簽署了《巴黎協定》，同意推行不同措施，使全球氣溫較工業化前（即工業革命開始前）的氣溫上升小於2°C。很多地區都制定了相關措施，以減少溫室氣體的排放，以下是一些例子。

中國

- 增加使用可再生能源（例如風力發電和太陽能）產生的電力比例。
- 進行大規模植林，例如在中國北部。

英國

- 鼓勵民眾改用電動車，例如在路邊設置更多充電站。
- 制定法例，提升新建築物的能源效益，例如規定建築物須安裝雙層玻璃窗。

芬蘭

- 鼓勵民眾以單車代步，例如在主要城市鋪設單車徑網絡，設立更多共享單車出租處等。

韓國

- 推行活動，鼓勵民眾節約能源，例如提倡職員穿著便服上班，以減少使用空調。

澳洲

- 要求溫室氣體年排放量高於標準的企業購買碳排放許可證。

巴黎協定 Paris Agreement 維持 affordability

7.6

#### Grouping of living things

### of vertebrates

Reptiles	Birds	Mammals
Tortoise	Parrot	Cow
Live in water or on land	Live on land	Mainly live on land
Have dry, hard scales for protection	Have feathers	Have fur or hair
Breathe with lungs	Breathe with lungs	Breathe with lungs
Most have four limbs	Have a pair of wings for flying and two other limbs	Have four limbs
Body temperature changes with the environment	Can keep a constant body temperature	Can keep a constant body temperature
Lay shelled eggs on land	Lay shelled eggs on land	Do not lay eggs but give birth to live young
Tortoises, lizards, crocodiles	Parrots, sparrows, penguins	Humans, cows, dolphins

How do major organs in humans differ from those in other vertebrates? Give TWO examples.

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### ④ 實驗設計

運用**更多相片**，顯示實際步驟情況

加入**科技應用**，例如不同**感應器**

#### 第二部分 用連接到pH感應器的數據收集儀量度中和作用發生時pH值的變化（老師示範）

連接到pH感應器的數據收集儀，不但可用作pH計量度溶液的pH值，還可以記錄溶液pH值在一段時間內的變化。

- 老師會按下圖設置儀器，然後逐步地把稀氫氧化鈉溶液加入稀氫氯酸，直至總共加入15 cm<sup>3</sup>的稀氫氧化鈉溶液。

2 觀察電腦屏幕顯示溶液pH值變化的圖表。

#### 回擊

燃點本生燈前必須緊記把氣孔關上。如果燃點本生燈前氣孔沒有關上，火焰可能會在燈管裏燃燒，這個情況稱為**回擊**\*。發生回擊時，本生燈會發出響亮的嘶嘶聲，並會在氣孔裏看到火焰。

萬一發生回擊，應立即關上煤氣掣，並向老師報告。這時燈管和調節環都十分熾熱，切勿觸摸！

3 把點火器的槍口放在燈管口上方，按下點火器的按鈕，然後扭開煤氣掣。

4 保持氣孔關上。這時的本生焰稱為**光焰**\*。仔細觀察光焰，把觀察結果記錄在下頁的表格中。

5 Light another wooden splint. Blow the flame out to get a **glowing splint**\*. Remove the stopper of tube C and put the glowing splint into the tube **immediately**.

Record your observations.

# 內容示例

主要以 **第2課** 為例

## 課堂引入

每節備有 **Flipped classroom 翻轉課堂**

**Let's begin 熱身** 供引入課題

### 2.6 節約用水和水污染

熱身

翻轉課堂  
觀看影片並  
回答問題。

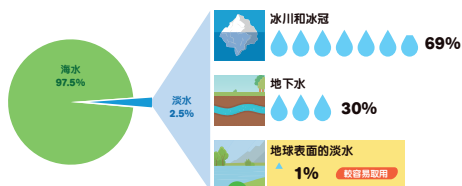
地球表面約70%的面積被水覆蓋。既然地球有大量水，為甚麼我們要節約用水？



#### 節約用水的重要性

我們需要淡水來飲用。雖然地球表面約70%的面積被水覆蓋，但其中只有約2.5%是淡水，其餘的都是海水（圖2.38）。淡水的供應非常有限。

再者，地球上大部分的淡水都分佈在冰川、冰冠和海底深處，難以取用。較容易取用的河水、湖水和地下水等水源，只佔地球淡水總存量的極小部分。



每節備短片  
及問題供學  
生備課

infographics

#### Did you know?

##### Facts about drinking water in the world

In Hong Kong, we can get clean water from the tap easily. However, in some parts of the world, people need to use untreated natural water for drinking, washing clothes, etc. The following shows some facts about drinking water in the world.

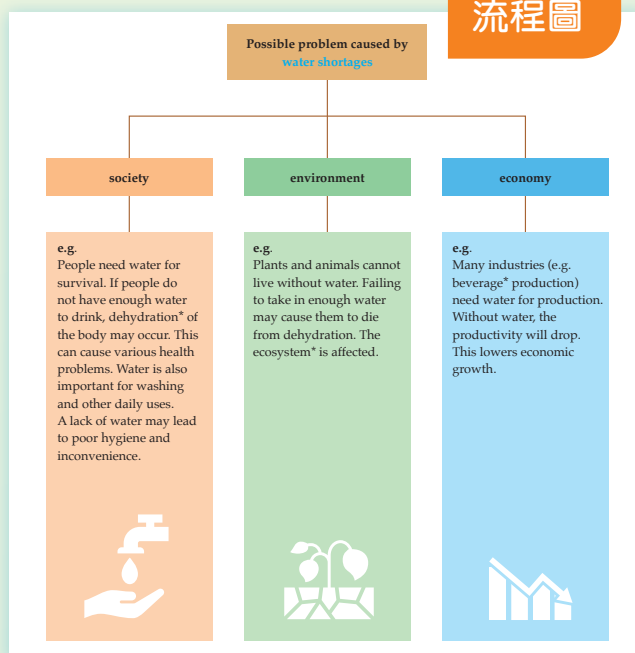


(Source: World Health Organization\* - Drinking water, March 2022)

## 內容編排圖像化

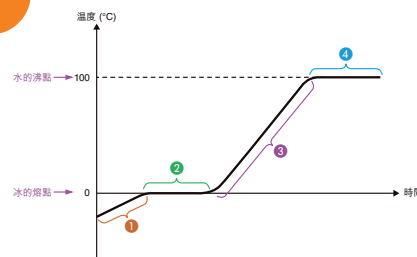
善用 **infographic、流程圖、圖表** 和 **粒子圖** 等闡述概念

### 流程圖



## 圖表分析及 粒子圖解說

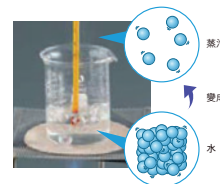
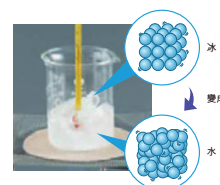
冰和（或）水的溫度隨時間的變化



#### 連繫

你曾在第18冊第5課學習更多關於能量的知識。

- 1 冰的溫度上升。
- 2 冰正在熔化，變成水，溫度會停留在熔點，維持不變。冰熔化時會從周圍環境吸收能量。
- 3 水的溫度上升。
- 4 水正在沸騰，變成蒸汽，溫度會停留在沸點，維持不變。水沸騰時會從周圍環境吸收能量。





## NSE (National Security Education 國家安全教育)

涵蓋 National Security Education 國家安全教育課程框架的**全部**課題

**NSE** Caring about our water source the Dongjiang

**Background**

The Dongjiang originates in the Jiangxi Province\*. It supplies fresh water for more than 40 million people in the Guangdong Province\* and the Hong Kong SAR.

**How Dongjiang water is supplied to Hong Kong**

Dongjiang water is first carried through water pipes to the Shenzhen Reservoir\*. The water is then delivered to Muk Wu Pumping Station\* in Hong Kong. Finally, the water is delivered to water treatment works for purification, and into some designated impounding reservoirs for temporary storage.

**Quality control of Dongjiang water**

A number of measures were taken to ensure the quality of Dongjiang water meets the national standard. This is to safeguard the quality of the drinking water supply in Hong Kong to protect public health. Below are some of the measures:

- Removal of polluting factories and farms along the Dongjiang
- Construction of a biological treatment plant at the Shenzhen Reservoir to enhance water quality
- Closely monitoring the situation of water quantity and quality

(Source: Website of Water Supplies Department – Water Conservation – Water: Learn & Conserve, November 2021)

### 課題包括：

- 第2課  
2.6 Water conservation and pollution  
節約用水與水質污染
- 第3課  
3.3 Biodiversity 生物多樣性
- 第5課  
5.3 Energy sources 能源
- 第7課  
7.6 Balance of oxygen and carbon dioxide in Nature  
大自然中氧和二氧化碳的平衡

- 第9課  
9.4 Corrosive nature of acids 酸的腐蝕性
- 第12課  
12.3 Health and diseases 健康與疾病
- 第13課  
13.6 Environmental problems associated with the use of materials 使用物料的環境問題

## 課外知識

加入更多日常生活事例、古今中外的事件和科學發明，**鼓勵自主學習**

**你知道嗎？**

**眼鏡防霧噴霧**

佩戴眼鏡的人常常會遇到以下問題：從有冷氣的地方走到戶外時，眼鏡片上會有一層霧氣，阻礙視線（圖2.8）。這是因為空氣中的水汽接觸到較冷的眼鏡片時，會在眼鏡片上凝結成微細水滴，這些微細水滴形成「霧氣」。

圖2.8 空氣中的水汽在眼鏡片上凝結成微細水滴

市面上大多數眼鏡防霧噴霧都含有特別的化學物質，能使空氣中的水汽遇到這些化學物質時，會在眼鏡片上凝結，形

圖2.9 眼鏡防霧噴霧防止眼鏡起霧的原理

### After-class activity

In Hong Kong, there was a severe drought\* in 1963. Water was supplied to the water history of Hong

hkpl water supply in hong kong

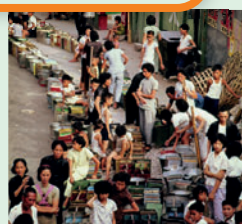


Fig 2.40 People queuing up for water in 1963

### 延伸學習

#### 開拓新水源

香港人口不斷增長，為確保將來有充足的淡水供市民所需，政府一直致力開拓新的水資源。目前在將軍澳興建的海水化淡廠就是其中一個重要項目。

將軍澳海水化淡廠採用一種先進技術，把海水中的鹽和其他雜質去除，從而生產食水。圖2.41簡單描述這種技術的原理。

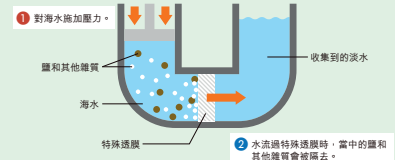


圖2.41 從海水去除鹽和雜質

提供網上搜尋  
的關鍵詞彙

## Skill builder 技能教室 及 Skill practice 技能應用

🐼 教導繪製圖表、表格、生物圖以及分辨變量等技能

🐼 提供即時練習

附有教學影片

### Skill builder 2.1

#### Drawing line graphs

A line graph can show the relationship between two variables. Let us learn how to draw one in the following example.

#### Example

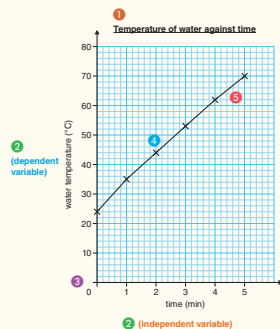
A beaker of water is heated with a Bunsen flame. The temperature of the water is measured at 1-minute intervals. The results are recorded in the table below.

Time (min)	0	1	2	3	4	5
Water temperature (°C)	24	35	44	53	62	70

Draw a line graph of the temperature of water against time.

#### Steps

- 1 Give a title to the graph.
- 2 Put the independent variable on the horizontal axis (x-axis), and the dependent variable on the vertical axis (y-axis). Write down the units.
- 3 Choose a suitable scale which makes full use of the graph paper. The scales should be equally spaced.
- 4 Draw a cross to represent each data point.
- 5 Connect the points with a straight line or a smooth curve.



Video

### Skill practice 2.1

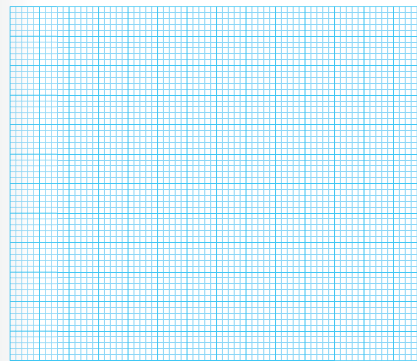
Some water is cooled and changes into ice. The temperature of the water and / or ice is measured at 5-minute intervals. The results are recorded in the table below.

Time (min)	0	5	10	15	20	25	30	35	40	45
Water temperature (°C)	21	16	12	7	3	0	0	0	-2	-7

↑  
water starts to freeze

Draw a line graph of the temperature of water and / or ice against time.

Title: \_\_\_\_\_



Check your answers (p. 162)

## 繪製圖表 (第2課)

### 技能應用 1.2

一名學生把一杯 80 °C 的熱水放在實驗桌上，在 30 分鐘內，他每隔 5 分鐘量度水温一次。下面是他記錄的結果。

80 °C (開始時)、68 °C、59 °C、53 °C、49 °C、45 °C、42 °C

在下面的空位製作表格顯示以上數據。

時間 (min)	0	5	10	15	20	25	30
溫度 (°C)	80	68	59	53	49	45	42

(不同學生的答案可能不同。)

檢查答案 (p. 78)

## 繪製表格 (第1課)



教與學資源中心  
有更多分課練習

### 技能應用 1.2

一名學生把一杯 80 °C 的熱水放在實驗桌上，在 30 分鐘內，他每隔 5 分鐘量度水温一次。下面是他記錄的結果。

80 °C (開始時)、68 °C、59 °C、53 °C、49 °C、45 °C、42 °C

在下面的空位製作表格顯示以上數據。

### 應用練習

1. 繪製一張表格顯示下列數據。表格要有標題，表格要有行和列，表格要有單位，表格要有數據。

0.1 A (一組數據)、0.20 A、0.31 A、0.4 A

在下面的空位製作表格顯示以上數據。

2. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

3. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

4. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

5. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

6. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

7. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

8. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

9. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

10. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

11. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

12. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

13. The figure below shows the price and size of water bottles.

Draw a table to compare the price and size of the bottles in the figure below.

14. Kelvin played chess every week (A, B and C). He recorded their heights over a few days. Use data in the figure below.

Draw a table to compare the price and size of the bottles in the figure below.

# 鼓勵自主學習

## Example 例題解說 及 Follow-up practice 即時訓練

舉例說明與計算相關的題目

運用技能即時練習

附有教學影片

### Example 5.1

#### Efficiency of electric toy boat

Calculate the efficiency of the electric toy boat on p. 111.

#### Solution

The useful energy output is the 3 J of kinetic energy and the total energy input is the 6 J of electrical energy.

$$\text{Efficiency} = \frac{\text{useful energy output}}{\text{total energy input}} \times 100\% = \frac{3}{6} \times 100\% = 50\%$$

### Follow-up practice 5.1

Calculate the efficiency of the fan on p. 109.



教與學資源中心  
有更多分課練習

## Tips 提示

1 沉澱法

實驗 2.7 以沉澱法淨化水

目的  
以沉澱法淨化泥水

器材及材料  
玻璃或塑膠杯 (250 cm<sup>3</sup>) 2 刮勺 1  
玻璃棒 1 泥水 1  
玻璃紙 1 明礬 \*

1 把約 150 cm<sup>3</sup> 的泥水倒進燒杯。  
2 用玻璃棒輕力攪拌泥水，然後用玻璃紙把燒杯蓋好。

3 讓泥水靜置幾分鐘，然後細心觀察泥水。在下面的空白內繪畫觀察結果。(繪圖應顯示整個裝置的剖面圖，包括燒杯和玻璃紙面。)

技巧小錦囊  
繪畫剖面圖時要注意：  
1 用削尖的 HB 鉛筆繪畫。  
2 用直尺畫直線。  
3 不要在圖上加陰影。  
4 按比例繪畫裝置各個部分。  
5 標示儀器的名稱。

119

### 技巧小錦囊

繪畫剖面圖時要注意：

- 1 用削尖的 HB 鉛筆繪畫。
- 2 用直尺畫直線。
- 3 不要在圖上加陰影。
- 4 按比例繪畫裝置各個部分。
- 5 標示儀器的名稱。

### Results

Substances soluble in water	Substances insoluble in water

### Language tips

'Dissolve' is a verb; 'soluble' is an adjective.

e.g. Sugar can dissolve in water.

Sugar is soluble in water.

Link

You will learn more about the solvents other than water in Unit 13.

There are potential dangers when using organic solvents. For example, thinner is flammable. We should keep it away from flames and sparks.

Fig 2.17 Thinner can be used to dilute oil paints

solvent 有機溶劑 thinner 稀釋劑 (俗稱「天拿水」) dilute 稀釋

### Key point

- When a substance dissolves in a liquid, a solution is formed.
- The substance that dissolves is called a solute. The liquid used to dissolve it is called a solvent.

### Go further

#### Solvents other than water

Water is a good solvent. It can dissolve many kinds of substances. We make use of this property of water to wash and cook. Substances such as oil paints are insoluble in water. They dissolve in organic solvents (e.g. thinner).



Fig 2.17 Thinner can be used to dilute oil paints

## Skill tips 技巧小錦囊

提醒學生做實驗、寫下單位及繪圖等技巧

### Language tips

'Dissolve' is a verb; 'soluble' is an adjective.

e.g.

- Sugar can dissolve in water.
- Sugar is soluble in water.

## Language tips

(只在英文版提供)

列出英文詞彙的詞性，並引例說明

## Section summary 本節重點 及 Section exercise 本節練習

內容總結設於**每節後**，供重溫概念，做練習時可以參考





### Quick check

1 In which of the following conditions will wet clothes dry slowly?

(1) Folding the clothes  
(2) Low humidity  
(3) Exposing to sunlight

A (1) only  
B (1) and (2) only  
C (1) and (3) only  
D (2) and (3) only

2 The following containers hold the same amount of water and are left under the sun. After several hours, which container would have the least amount of water?

A  B   
C  D 

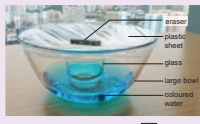
Check your answers (p. 102)

### Section exercise 2.2

**Level 1**

Questions 1 to 3: Refer to the information below. Write 'T' for a true statement and 'F' for a false statement in the boxes provided.

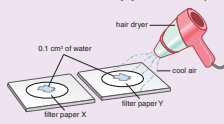
Joe prepares the set-up on the right. The set-up is placed under the sun. After several hours, liquid P is collected in the glass.



1 The formation of liquid P involves boiling and condensation. ☐ + p. 95  
2 Liquid P is colourless. ☐ + p. 95  
3 Liquid P can be collected in the glass more quickly when the coloured water is heated. ☐ + p. 101

**Level 2**

4 Elsa prepares the set-up below to investigate how the air speed affects the rate of evaporation of water. She measures the time needed for the filter paper to become dry.



a Which filter paper needs less time to become dry? (1 mark)

b State the dependent and independent variables in Elsa's experiment. (2 marks)

c The volume of water added to the two pieces of filter paper should be the same. Why? (1 mark)

+ p. 101

### Section summary 2.2

**Evaporation**

Water in the sea, rivers and on land evaporates and becomes water vapour.

**Condensation**

The water vapour cools down and condenses, forming clouds.

**Precipitation**

Water droplets in the cloud fall as rain.

**Transportation**

Clouds may be carried to other places by the wind.

2 The rate of evaporation of water is higher when

- the surface area exposed to air is larger,
- the humidity is lower,
- the temperature is higher,
- the air speed is higher.

## Test your skills 技能評核

設於**每課後**，題目按科學技能分類

透過 **iSolution** 平台  
分析答題表現

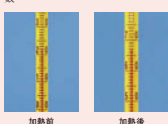
**iSolution**  
自我評核技能測驗

### 技能評核

**甲部**

**進行量度**

1 家琪把一杯水加熱，並用溫度計量度水在加熱前後的溫度。下圖顯示溫度計的讀數。



水的溫度

A 上升了 35°C  
B 上升了 45°C  
C 下降了 35°C  
D 下降了 45°C

+ 2.1, p. 84

**時間量度**

2 家琪進行了一項公平測試，探究空氣溫度對水的蒸發速率的影響。他把兩片濕紙巾放在不同空氣溫度的環境中，然後記錄紙巾乾透所需的時間。

下列哪項是公平測試中的因變量？

A 空氣溫度  
B 紙巾的大小  
C 紙巾上水的分量  
D 紙巾乾透所需的時間

+ 2.2, p. 97

**描述觀察結果**

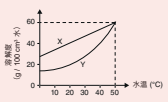
3 劍生把一茶匙糖加入一杯水中，然後攪拌。下列哪項是劍生的觀察結果的最適當描述？

A 糖沉到杯底。  
B 一杯無色溶液形成。  
C 糖是溶質，水是溶劑。  
D 糖在水中散開，變成許多微粒。

+ 2.3, p. 105

**分析數據**

4 下圖顯示物質X和物質Y在不同溫度的水中的溶解度。



下列哪項(些)可從上圖推論出來？

(1) 物質X和物質Y在水中的溶解度都隨水溫上升而增加。  
(2) 在 20 °C 的水中，物質X溶解得比物質Y快。  
(3) 在 50 °C 的水中，物質X和物質Y可溶解的分量相同。


A 只有 (1)  
B 只有 (1) 和 (3)  
C 只有 (2) 和 (3)  
D (1)、(2) 和 (3)

+ 2.3, p. 113

### 比較和分類

**分析圖表**

5 杰朗用以下的裝置淨化泥水。



锥形瓶內的物質Q稱為

A 沉澱物。  
B 殘餘物。  
C 濾液。  
D 酸液。

+ 2.4, p. 125

**比較和分類**

6 下列哪項(些)關於用氯和用臭氧處理食水的比較是正確的？

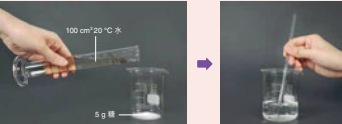
(1) 用氯消毒食水會使水帶輕微刺激的氣味，用臭氧則不會。  
(2) 臭氧比氯更有效殺死水中的微生物。  
(3) 使用氯的成本比使用臭氧低。

A 只有 (2)  
B 只有 (1) 和 (3)  
C 只有 (2) 和 (3)  
D (1)、(2) 和 (3)

+ 2.5, p. 134

**乙部**

7 海文進行了一項實驗，研究水溫對糖在水中的溶解速率的影響。他在燒杯內加入 5 g 的糖，再加入 100 cm³ 20 °C 的水，然後輕輕攪拌，並記錄糖完全溶解所需的時間。之後，海文分別以 40 °C 和 60 °C 的水重複實驗。



顯示題目所屬  
技能類型



# 培養解難思維

## Further investigation 進一步探究

就實驗目的作進一步探究的活動建議

**Practical 2.8 Purifying water by using a filtration column (Teacher demonstration)**

**Aim**  
To purify muddy water using a filtration column

Apparatus and materials per class		
filtration column	1	stand and clamp
beaker (glass or plastic) (250 cm <sup>3</sup> )	2	muddy water

- Your teacher will set up a filtration column and put a beaker under it as shown.
- Your teacher will slowly pour 50 cm<sup>3</sup> of muddy water into the filtration column.
- Observe the liquid collected in the beaker. This filtered liquid is called the **filtrate**. Is the filtrate clear?

**Caution**  
Do not drink the filtrate.

**Further investigation**

Design and make a filtration column using simple materials, such as plastic bottles, stones and sand. The filtration column should be able to purify 500 cm<sup>3</sup> of muddy water at a reasonable speed.

Present your design to the class. Evaluate the design in terms of:

- how clean the filtered water is,
- time taken to filter 500 cm<sup>3</sup> of muddy water.

## Home lab 在家小實驗

在實驗室課以外熟練科學探究的技巧

**在家小實驗 8.1**

**簡單電動機**  
試試利用電池、銅線和三顆磁鐵來製作電動機，並觀察線圈會發生甚麼變化。

**注意**  
• 使用剪刀時要小心。  
• 銅線可能會變熱，不要讓電路長時間通電。

- 把銅線屈曲成上圖的形狀。
- 把磁鐵放置在電池的負極。
- 把銅線放置在電池的正極，使它保持平衡。

**Home lab 13.1**

**Making your own designed patterns**  
Have you thought of designing your own handkerchiefs or T-shirts? It is simple. Let us try!

**Caution**  
Alcohol is flammable. Keep it away from flames.

- Use an oil-based permanent marker to make your own design on a plain cotton handkerchief.
- Add drops of alcohol on the markings. The markings will spread.
- Let the handkerchief dry in air. Your own designed handkerchief is done!

**Under adult supervision**

## STEM project 專題研習

每冊後設 STEM 活動建議，包括模型製作、3D 打印及編程等活動，訓練學生解難及科技應用的能力

教與學資源中心有  
影片、教師指引及  
工作紙

**STEM project Water-saving device**  
Related content: Unit 2, p. 144

**Problem**  
Tina notices that the other members of her family always take showers for a long time. To save water, Tina decides to make a water-saving device that can remind them to shorten their shower time. She is going to make the device using the pocket-sized computer: micro:bit.

**Objective**  
Design and make a water-saving device using the micro:bit. The device can give warning signals after a person has showered for a certain time.

**Research**  
1 There are various products on the market to help people alert their shower time. Search for information about these products. Note the following when doing research.

- Where are these products attached to?
- How do these products tell how long a person has showered?
- Do these products give warning signals after a person has showered for a certain time? If yes, what signals do they give?

**Design and Make**  
2 In this project, we will make use of the micro:bit. The micro:bit has several input devices (e.g. buttons and microphone). These devices send information about the surroundings to the processor. The processor then sends signals to output devices (e.g. speaker and LEDs) to make responses. We can also add other input and output devices using the pins on the micro:bit.

**Test and Evaluate**  
Design a water-saving device with reference to the guiding questions below. Show your plan to your teacher. Start making the device after getting approval from your teacher.

**Guiding questions**

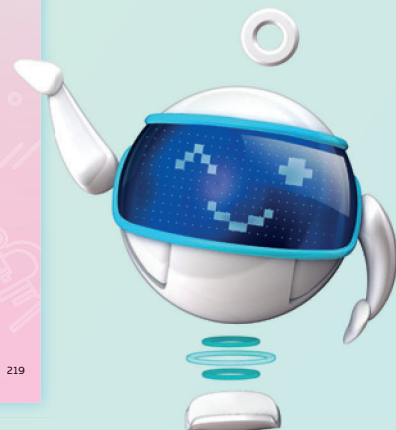
- How can the input devices of the micro:bit be used to tell how long a person has showered?
- How can the output devices of the micro:bit be used to give warning signals?
- Where will you attach your device to? How can you protect your device from water damage?

**Test if your water-saving device works properly and evaluate the result.**

- Can your device tell how long a person has showered?
- Can your device give warning signals after a person has showered for a certain time?
- Is your device easy to use?

**Improve and Redesign**

- Compare your water-saving device with those of your classmates.
  - Which one do you think is the best? Explain briefly.
  - What are the special features of the device in 1?
- In what ways can your water-saving device be improved?



# 作業特色

以 **第2課** 為例

## Practical video assignment 實驗影片題

設於個別 **Section exercise** 分段練習後

就個別實驗設題，在影片指定時間設有問題，以加深學生對實驗步驟的了解

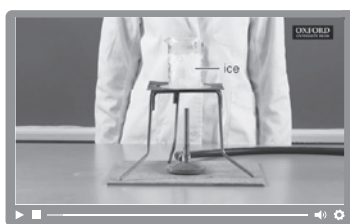
影片連結



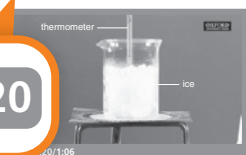
### Practical video assignment

#### Heating ice to steam

Watch the video and answer the questions.



1 ▶ 0:20 A thermometer is inserted into a beaker of ice.



Explain why the thermometer should NOT touch the bottom of the beaker. (2 marks)

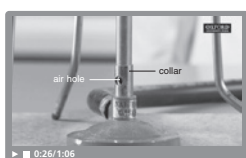
The bottom of the beaker is very hot as it is

heated directly. (1)

The thermometer bulb may break if it is

too hot. (1)

2 ▶ 0:26 The collar of the Bunsen burner is turned so that the air hole is half open.



Explain why we should half-open the air hole of the Bunsen burner. (1 mark)

To get a non-luminous flame. (1)

▶ 0:41 The temperature of the ice / water during heating is recorded in a table.

Time (min)	1	2	3	4	5	6
Temperature (°C)	-1	-1	0	0	5	28
Time (min)	7	8	9	10	11	12
Temperature (°C)	32	36	36	36	36	36

Record the readings in a table.

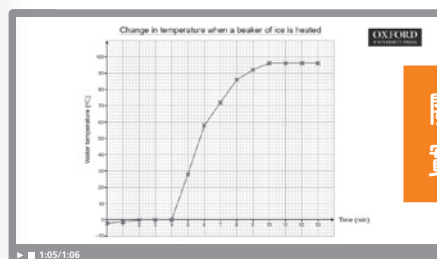
Which of the following statements is / are correct in describing the results obtained? Put a '✓' in the appropriate box. (1 mark)

☐ The temperature kept rising throughout the heating.

☒ The temperature rose in general. But it remained unchanged for some time when it reached 0 °C and 96 °C.

☐ It took 13 minutes to bring the water to boil.

4 ▶ 1:05 The results are plotted in a line graph.



a According to the graph, state the time period in which each of the following processes was taking place. (2 marks)

i Melting: 2nd-4th minutes (1) ii Boiling: 10-13th minutes (1)

b What is the variable represented by the x-axis? Is it the dependent variable or independent variable? (2 marks)

Time. (1) It is the independent variable. (1)

關於  
實驗結果

指定影片時間

關於步驟



## Skill practice 技能應用

- 設於個別 **Section exercise 分段練習** 後
- 呼應課本 **Skill builder 技能教室** 的內容

**Skill practice 2.1** → Textbook p. 86

**Drawing line graphs**

Note these skills:

- Give a title to the graph.
- Put the variables on the axes and write down the units.
- Choose a suitable scale which makes full use of the graph paper. The scales should be equally spaced.
- Draw crosses to represent the data, then connect them with a straight line or a smooth curve.

**Question**

Some ice made from sea water is heated. The table below shows how the temperature of the sea water ice changes with time.

Time (min)	0	2	4	6	8	10	12
Temperature (°C)	-20	-12	-4	-4	-4	6	16

a Draw a line graph of the temperature of sea water ice against time. (5 marks)

Title: **Temperature of sea water ice against time**

Correct title (1)  
Correct axes and labels (2)  
Correct data points (1)  
Correct line to connect the points (1)

b From the graph, determine the melting point of the sea water ice. (1 mark)

**-4 °C. (1)**

附有教學影片

列出技能重點

提供練習題，讓學生進一步熟習科學技能



## High-order thinking question 高階思維題

- 每課最後設有一題，以照顧學習差異

可按學生能力選用

**高階思維練習** (8分)

以前的人會以蒸餾法淨化海水來取得食水。但由於此技術的成本高昂，因此它並不普及。

隨着科技的進步，一種名為「逆滲透」(reverse osmosis) 的新技術可從海水取得食水。透過壓力使海水通過一層特製的濾膜後，便能取得淡水。右圖顯示該濾膜的原理。

1 解釋為甚麼利用蒸餾法淨化海水來取得食水的成本昂貴。 (2分)

蒸餾法牽涉把海水加熱至水沸騰。(1)  
過程需要大量能量 / 燃料 / 電力。(1)

可選答

## Video tutor 解題影片

- 針對 **Unit exercise 單元練習** 中較高難度的問題提供解題教學影片

**Skill Problem-solving** STSE

★ ★ 4 There is a big farm in the midstream of a river.

Three water samples A, B and C are taken at different locations along the river. The following graphs show the amounts of algae and dissolved oxygen in these samples.

**Video tutor**



影片解說  
答題技巧

# 教師用書特色

以 **第 8 課** 為例

## 備課用

NEW

### Pre-lesson helper 備課筆記

附於**每冊開首**的補充資料，為課文的教學資料提供補充內容

Pre-lesson helper  
Background concept (p. T3)  
How conduction occurs

Fig 8.7 shows some common examples of electrical conductors and insulators.



Fig 8.7 Some examples of electrical conductors and insulators

### Pre-lesson helper Unit 8

This contains practical advice from experienced teachers:

- Background concept** Concepts and information to support your teaching in the lesson;
- Practical tips** Points to note before you do the practicals in the lesson;
- Class management tips** Points to note to ensure the lesson run smoothly;
- FAQ** Proper responses to FAQs from students;
- Enrichment** Extra information or activities for more able students.

Background concept	Page
How conduction occurs (p. 96)	T3
Using ammeters with more than one red knobs (p. 106)	T5
Mains electricity (p. 156)	T6

Practical tips	Page
Practical 8.3 – Guide in connecting circuits (p. 101)	T7
Practical 8.4 – Troubleshooting guide (p. 107)	T8
Practical 8.5 – Alternative method and notes (p. 110)	T10
Practical 8.9 – Collaborative learning ideas and notes (p. 128)	T11
Practical 8.13 – Guiding tips and additional step (p. 142)	T12
Practical 8.14 – Tips in connecting circuits (p. 145)	T13
Practical 8.18 – Alternative method (p. 162)	T15

Class management tips	Page
Practical 8.15 – Safety precautions (p. 155)	T16

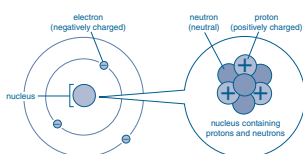
T1

#### Background concept

#### How conduction occurs (p. 96)

##### A Atomic structure

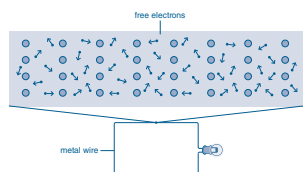
In Unit 6, Ss have learnt that all matter is made up of tiny particles called atoms. An atom consists of a **nucleus** and **electrons**. The nucleus is made up of **protons** and **neutrons**. Electrons move fast around the nucleus.



##### B How do metals conduct electricity?

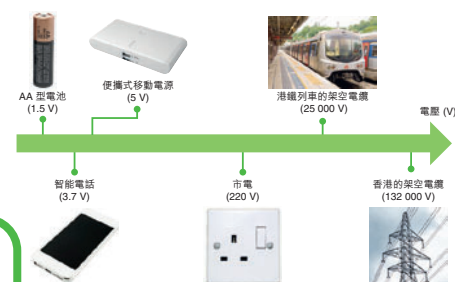
In metals, the outermost shell electron(s) of the atoms is / are loosely held and so can move freely between the atoms. These electrons are called **free electrons**.

- When the metal is **not** connected to a cell, the free electrons move freely in random directions in the wire. There is **no net flow** of free electrons.



T3

下圖顯示日常生活中不同電源和電器的電壓。

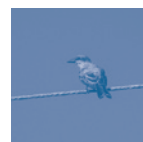


備課筆記  
常見問題 (p. T17)  
為甚麼小鳥站在電纜上不會觸電致死？

8.31 日常生活中不同大小的電壓（並非按比例繪畫）

#### 常見問題 問：為甚麼小鳥站在電纜上不會觸電致死？ (p. 122)

答：小鳥可站在高壓電纜上而不會觸電致死，原因是牠們沒有連接到另一個較低的電壓點。牠們兩隻腳的電壓相同，因此沒有電流通過牠們的身體，不會觸電。





## 實驗相關

NEW

### Practical tips 實驗備忘

包括：

- 👍 確保實驗順利進行的竅門
- 👍 學生常犯的錯誤
- 👍 實驗課堂管理技巧
- 👍 更多安全指引

**Practical 8.4** Measuring currents with an ammeter

**Aim**  
To measure the current in a circuit with an ammeter

Apparatus and materials per group			
circuit board	1	ammeter	1
cell	3	bulb	1
connecting wire	2	switch	1

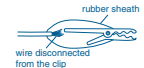
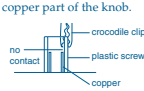
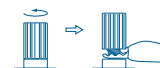

**Pre-lesson helper**  
Practical tips (p. T8)  
Troubleshooting guide

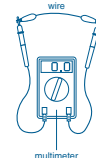
1 Draw a circuit diagram for the following circuit in the space below.

**Practical 8.4 – Troubleshooting guide (p. 107)**

**A Training Ss problem-solving skills**

Practical 8.4 can be used to train Ss' problem-solving skills. Ss tend to ask a lot of questions about the circuit if it is not working. The table below shows some common problems and their solutions.

Common problem	Solution
The wire inside crocodile clips may be broken (some Ss simply stuff the broken wire back into the rubber sheath of the clip). 	Remove the rubber sheath of the clip. Ensure that the copper part of the wire is firmly connected to the metal part of the clip.
When a crocodile clip is forced into the knob of the ammeter, there may be no contact between the clip and the copper part of the knob. 	Unscrew the plastic screw of the knob for connection with crocodile clips. 
A bulb may not be screwed in all the way.	Tighten the screw of the light bulb. 

Ts may ask technicians to prepare a multimeter on the teacher's bench. Switch to 'resistance' mode to check whether a connecting wire is conducting. A functioning connecting wire should have **zero resistance**.  


T8

### Edpuzzle 互動實驗

👍 讓學生明白實驗步驟

**牛津網站**  
互動實驗 8.14 (Edpuzzle)

**實驗 8.14** 研究並聯電路中的電流和電壓

**目的**  
量度並聯電路中的電流和電壓

每組儀器及材料			
電路板	1	開關	1
電池	2	燈泡 (相同的)	2
導線	數條	安培計	3
插片	數片	伏特計	3

**備課筆記**  
實驗備忘 (p. T13)  
接駁並聯電路的注意事項

**第一部分 量度電流**

1 觀察所示的電路，在電路圖上繪畫箭號，以顯示開關閉合後電流的流動方向。

安培計  $A_1$ 、 $A_2$  和  $A_3$  量度的是甚麼？

**牛津網站**  
PhET 模擬程式連工作紙  
電路組裝套件：直流電  
→ 工作紙樣本見備課筆記 (p. T22)

**PhET 模擬程式工作紙**

**第 8 課** 課題：串聯電路和並聯電路 (p. 145)

這個活動會使用 PhET 模擬程式「電路組裝套件：直流電」。  
[https://digital.oupchina.com.hk/junsci/video/jsct\\_phet\\_u8dcircuit\\_c.html](https://digital.oupchina.com.hk/junsci/video/jsct_phet_u8dcircuit_c.html)

Simulation by PHET Interactive Simulations, University of Colorado Boulder, licensed under CC-BY-4.0 (<https://phet.colorado.edu>).

1 敏兒根據以下電路圖把電路接好，每枚電池的電壓是 1.5 V，燈泡 X 的電阻是 10  $\Omega$ 。

電路 1

在模擬程式接駁電路，找出電路閉合時，安培計的讀數。 (1分)

### PhET 模擬實驗工作紙

👍 供學生按題目指引進行網上模擬實驗

## 課堂進行 UP!

### Set 課堂引入

提供引入課堂的不同方法

**Set** Show Ss this video to arouse interest. Ask Ss why is silver added to the ink. (Silver conducts electricity. It is added to make the ink conductive.) Silver ink pen can draw electrical circuits.

**Electrical conductors and insulators**

In *Practical 8.1*, we used connecting wires to build a circuit to make a bulb light up. The connecting wires **conduct** electricity. Let us find out what materials conduct electricity in *Practical 8.2*.

**Practical 8.2** Testing which materials conduct electricity

**Aim**  
To test which materials conduct electricity

**Apparatus and materials per group**

circuit board	1	connector	1	pencil lead*	2
D-cell	2	connecting wire	several	distilled water	
PP3-cell	1	iron nail	1	sodium sulphate* solution	
bulb	1	aluminium foil	1	alcohol	
LED	1	rubber band	1	vinegar	
beaker (glass or plastic) (100 cm <sup>3</sup> )	1	wooden chopstick	1	lemon juice	

不同的電阻。

由於銅具有低電阻，因此常用於製造導線（圖 8.36）。

銅

圖 8.36 用銅製成的導線

**提問** 問學生：為甚麼圖 8.36 中的電線由這麼多幼細的銅線組成？  
答案：使電線較容易屈曲。

除了材料以外，還有甚麼因素會影響金屬線的電阻？讓我們在下頁實驗 8.11 探究一下。

### Questioning 提問

- 促進師生互動
- 判斷學生知識水平
- 鼓勵學生開放性思考，培養高階思維

## 電子平台

課本內練習備有 QUIZZZ、Google Forms、Microsoft forms

NEW

教與學資源中心有 Kahoot! 簡短搶答題

**Let's begin**

Have you noticed that there are labels like '1.5 VOLTS', '3 VOLTS' and '9 V' on cells? What do these values mean?

**What is voltage?**

1.5 VOLTS

3 VOLTS

9 V

**短測**

細閱以下句子，正確的在空格內加上「✓」，不正確的加上「✗」。

1 電流是電能的流動。 ☐

2 通過導線的電流增加時，導線會變得較熱。 ☒

檢查答案 (p. 188)

**Section exercise 8.5**

**Level 1**

Questions 1 to 3: Refer to the circuit diagram given. Write 'T' for a true statement and 'F' for a false statement in the boxes provided.

1 Bulbs X and Y are connected in series when the switch is open. ☐ T

← p. 141

**綜合練習**

Google Forms MS Forms

作業 單元練習 8 牛津網站 單元測驗 8

**A 選擇題**

指引：參考下圖，回答題 1 和 2。

5 下列關於連接到市電電源的家電的敘述，哪個（些）是正確的？

**Test your skills**

**Section A**

**Making measurements**

1 The photo below shows the readings of two electrical devices.

**Understanding scientific terms**

3 A student stated that the current in a wire decreased as its temperature increases. She went on to test it using a circuit. What term

善用多個電子平台及 iSolution，促進教與學



# 輔助教材特色

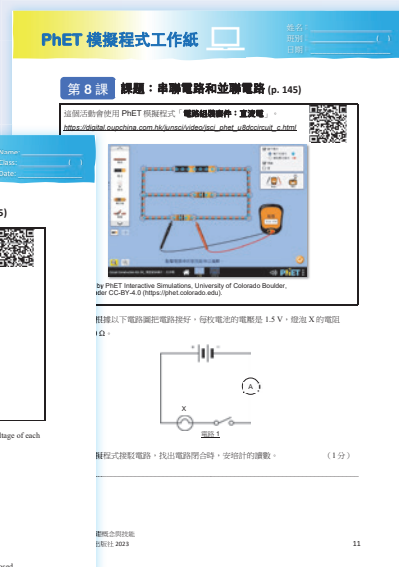
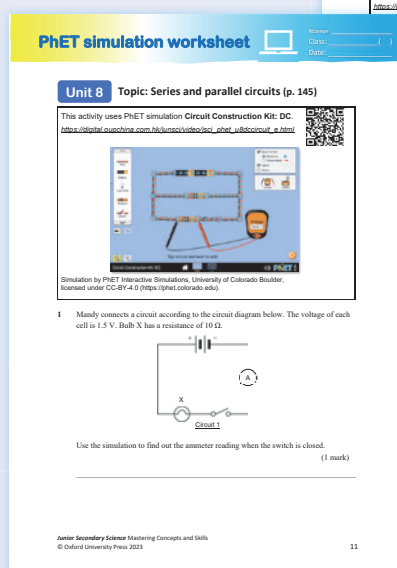
# 提升科學過程技能

## Practical resources 實驗資源

### ① Interactive practicals & simulation worksheets 互動實驗 及 模擬實驗工作紙



😊 高清影片及問題載於 **Edpuzzle**，並附**工作紙**



😊 配合 **PhET 模擬實驗** 使用的**工作紙**

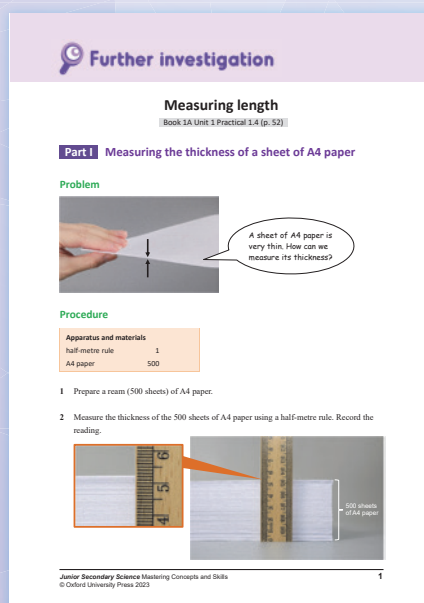
### ② Practical assessment handbook 實驗評核手冊

😊 提供**實驗評估試卷**、**評分準則**，及**教師與實驗室技術員備忘**

### ③ Further investigation worksheet 進一步探究工作紙

😊 提供實驗的替代方法，例如**運用智能電話**和**App**

😊 就實驗目的**更深入探究**的活動建議



### ① Home lab 在家小實驗

😊 運用日常工具和材料  
做實驗


😊 在課堂外熟習應用實驗技巧

#### Home lab 2.1

##### 'Snowy' ornament (Unit 2 p. 114)

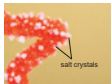
Difficulty: ★★★★★ Time required: 15 minutes (+ waiting time)

Shiny crystals are often used as decorations. Do you know we can make our own crystals with salt solution? Let's try and use the crystals to make a 'snowy' ornament (吊飾).



**A Science concepts**

- When no more solute can dissolve in a solvent, a saturated solution is formed.
- Crystals can be formed by cooling a hot saturated solution. A hot solvent can usually dissolve more solute than a cool solvent. If we allow a hot saturated solution to cool down, the solvent can no longer dissolve all the solute in it. The 'extra' solute comes out from the solution as crystals.
- In this activity, when the solvent (water) in salt solution evaporates, the 'extra' solute (salt) comes out from the solution as crystals. The salt crystals are formed on the chemille stem (棉毛線) as 'snow'.



Junior Secondary Science Marking Concepts and SBA  
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#### 在家小實驗 8.1

##### 簡單電動機 (第 8 課 p. 153)

難度: ★★★★★ 所需時間: 30 分鐘

電動機用途廣泛，常應用於洗衣機、電風扇等家庭電器。你知道我們在家也可以自製簡單的電動機嗎？讓我們來試試製作，並用它來創建一個走馬燈！



**A 科學概念**

- 電流只在閉合電路中流動。在這個活動中，銅線、圓形磁鐵和電池形成閉合電路。電流從電池的正極通過銅線和磁鐵，流向電池的負極。



- 把有電流通過的導線放在磁場時，會有一道力作用於導線。

STEM 資源  
© 牛津大學出版社 2020

每課都有簡單小實驗：

第 1A 冊	1.1 Making a water clock 製作水滴鐘	
	2.1 'Snowy' ornament 「飄雪」吊飾	
	3.1 Rainbow flowers 彩虹花	
第 1B 冊	4.1 Water droplet microscope 水滴顯微鏡	
	5.1 Lemon-powered light 檸檬電池燈	
	6.1 Making your own bi-material strip 自製「雙層物料片」	
	6.2 Cartesian diver 浮沉玩具	
第 2A 冊	7.1 Modelling greenhouse effect 模擬溫室效應	
	8.1 Simple electric motor 簡單電動機	
第 2B 冊	9.1 Revealing the secret message 揭示秘密信息	
	9.2 Making a bouncy egg 製作「無殼蛋」	
	10.1 Musical bottles 玻璃琴	
	10.2 Measuring sound levels 量度音量	
第 3A 冊	11.1 Balloon rocket 氣球火箭	
	12.1 Demonstrating emulsification 乳化的示範	
	12.2 Simulating blood flow in a cholesterol-clogged vessel 模擬血液在被膽固醇堵塞了的血管內流動	
第 3B 冊	13.1 Making your own designed patterns 自家設計圖案	
第 3C 冊	14.1 Jelly optical fibre 啫喱光纖	
	14.2 Mixing red, green and blue light 混合紅、綠、藍光	
	14.3 Seeing objects in different colours of light 觀察不同色光下的物體	



# 善用科技學科學

## ② STEM project STEM 專題研習

☺ 備詳盡教學計劃及設計指引

☺ 包括應用 micro:bit 的活動

STEM 專題研習 1A 省水裝置 (教師指引)

建議教學計劃				課堂																								
<p><b>建議資料 (續)</b></p> <ul style="list-style-type: none"> <li>介紹 micro:bit 的輸入和輸出設備，並請學生完成學生工作紙 p. 3 的活動。</li> <li>建議答案：</li> </ul> <table border="1"> <thead> <tr> <th>零件</th> <th>答案</th> <th>零件</th> <th>答案</th> </tr> </thead> <tbody> <tr> <td>繼電標誌</td> <td>1</td> <td>2 個按鈕</td> <td>1</td> </tr> <tr> <td>單邊跳</td> <td>1</td> <td>25 個 LED 燈</td> <td>1 及 0</td> </tr> <tr> <td>按鈕</td> <td>1 及 0</td> <td>溫度傳感器</td> <td>1</td> </tr> <tr> <td>指南針和加速計</td> <td>1</td> <td>無線電和藍牙</td> <td>1 及 0</td> </tr> <tr> <td>攝像頭</td> <td>0</td> <td>天線</td> <td></td> </tr> </tbody> </table> <p>註：這個研習使用新版 micro:bit (V2)。舊版 micro:bit 沒有以上顏色標識的零件。</p> <ul style="list-style-type: none"> <li>請學生瀏覽以下網站，深入了解 micro:bit： <ul style="list-style-type: none"> <li>micro:bit 介紹 (英文網站) <a href="https://microbit.org/get-started/first-steps/introduction/">https://microbit.org/get-started/first-steps/introduction/</a></li> <li>micro:bit 的元件 (英文網站) <a href="https://microbit.org/get-started/user-guide/overview/">https://microbit.org/get-started/user-guide/overview/</a></li> </ul> </li> </ul>				零件	答案	零件	答案	繼電標誌	1	2 個按鈕	1	單邊跳	1	25 個 LED 燈	1 及 0	按鈕	1 及 0	溫度傳感器	1	指南針和加速計	1	無線電和藍牙	1 及 0	攝像頭	0	天線		(課前活動)
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<p><b>設計及製作模型</b></p> <ul style="list-style-type: none"> <li>請學生帶出省水裝置的設計意念，並完成學生工作紙 p. 4-5： <ul style="list-style-type: none"> <li>列出會使用的 micro:bit 輸入和輸出設備；</li> <li>寫出省水裝置怎樣運作；和</li> <li>畫出省水裝置的草圖。</li> </ul> </li> </ul>				課堂 1																								

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STEM project 1A Water-saving device (Teacher's guide)

Suggested teaching plan	Lesson
<p><b>Teacher's evaluation</b></p> <ul style="list-style-type: none"> <li>It may refer to the guidelines on p. 25-26 of the Teacher's guide to evaluate 5s's products and performance.</li> </ul>	1

**3 Suggested design and constructing steps**

The following water-saving device helps remind a person if the time taken for taking a shower is too long. It is mounted on the single-handed shower faucet in a bathroom. The following diagram shows how it works.

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精心設計有趣生活化題材：

第 1A 冊 Water-saving device 省水裝置  
第 1B 冊 Hydraulic helping hand 液壓小幫手  
第 2A 冊 Watering alert system 澆水警報系統  
第 2B 冊 Marble run 彈珠軌道

第 3A 冊 Crowd control system 人羣管制系統  
第 3B 冊 Plastic smartphone stand 塑料智能電話座  
第 3C 冊 Smartphone projector 智能電話投影機

## ③ Guide to 3D printing and coding in Science 科學科 3D 打印與編程指引

☺ 3D 打印技術和編程的基本資料

☺ 科學教育中 3D 打印和編程的應用建議

☺ 免費資源的網站推介

科學科 編程指引

**1 用 micro:bit 學習編程**

micro:bit 是一個微型電腦，我們可以用它來簡單地學習編程。透過編寫程式，我們可以把 micro:bit 變成實用工具，例如作為通訊工具、遊戲機等。

觀看影片 *Introducing the BBC micro:bit*，認識更多有關 micro:bit 的知識：  
<https://youtu.be/3a7u7UJ9R0g> (英文)

**2 micro:bit 的元件**

讓我們了解一下新版 micro:bit (V2) 的主要部分，把以下 micro:bit 中不同元件的名稱寫在適當的空格內。

A 25 個 LED 燈	B 2 個按鈕	C micro USB 接口	D 繼電標誌*
E 接腳 0-1 和 2	F 接地接腳	G 3V 電源接腳	H 麥克風*

(\* 舊版 micro:bit 沒有這些元件)

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3D Printing in Science

3D printing was invented in the 1980s. It is a useful tool in STEM education. This book introduces the basics of 3D printing technology and how this technology can be applied in STEM.

**1 What is 3D printing?**

3D printing is a type of additive technology manufacturing. It means that an object is "printed" by adding one layer of material at a time.

Compared with the traditional manufacturing process, 3D printing has the following advantages:

- (i) Faster production speed (models are not needed)
- (ii) Lower cost (fewer manufacturing steps)
- (iii) Easy to customize

Nowadays, 3D printing has been widely used in different fields such as:

<p><b>Medical field</b></p> <p>For making prototypes of tissues and organs; making prosthetic body parts</p>	<p><b>Food industry</b></p> <p>For making foods with unique looks</p>
<p><b>Aerospace</b></p> <p>For making prototypes of spacecraft parts</p>	<p><b>Architecture</b></p> <p>For making architectural models</p>

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## Concepts and Skills Assessment Pack 概念與技能評核資源

備影片及工作紙

提供不同形式的練習、測驗及試卷，持續評核學生所學：

- ① Skill builder & Skill practice  
技能教室及技能應用
- ② Example & Follow-up practice  
例題解說及即時訓練

**技能教室 1.2 製作表格記錄數據**

做實驗時，我們常常要收集數據，製作表格能幫助我們有系統地記錄和組織數據，方便進一步分析結果。從以下的例子，我們會學到製作表格的技巧。

**步驟**

- 想想應有多少個欄，多少個行，用圓尺繪畫表格。
- 在第一欄列出變量，先寫出變量，再寫出單位。
- 寫下單位。
- 在其他欄記錄數據，不用重複寫單位。

**技巧小錦囊**  
表格中的數據也可打直排列，第一列列出變量，其他列記錄數據。

時間 (min)	0	0.5	1	1.5
溫度 (°C)	25	28	32	36

**Skill practice 1.2**

A student left a glass of hot water (80 °C) at room temperature. He measured the temperature of the water every 5 minutes for 30 minutes. The results are shown below:

80 °C (start), 68 °C, 59 °C, 53 °C, 49 °C, 45 °C, 42 °C

Draw a table in the space below to organize the above data.

**Further practice**

1 Alan connects a dry cell to an electrical circuit and measures the current in the circuit. He adds dry cells to the circuit and measures the current again after adding each cell. The results are shown below.

0.11 A (1 cell), 0.20 A, 0.31 A, 0.44 A, 0.52 A

Draw a table in the space below to organize the above data.

練習按課次分類，方便選用

- ③ Flipped classroom

翻轉課堂

- 每節課文備影片及工作紙 (全系列共 81 個)
- 題目經 Google Forms 及 Microsoft Forms 發放

- ④ 5-min Short quiz

5分鐘短測

- ⑤ 15-min Section quiz

15分鐘分段小測

題目經 Google Forms 發放

- ⑥ Unit test

單元測驗

- ⑦ First term exam

上學期考試

- ⑧ Final exam

期終試

備有多份試卷

持續更新

- ⑨ Question bank 試題庫

題目數量  
+70%



共超過  
**10000** 條題目!  
(以單一語文版計)

## Language and Bridging Resources 語文及銜接資源

- ① PowerPoint
- ② Lesson worksheet
- ③ Short notes for revision

簡報

課堂工作紙

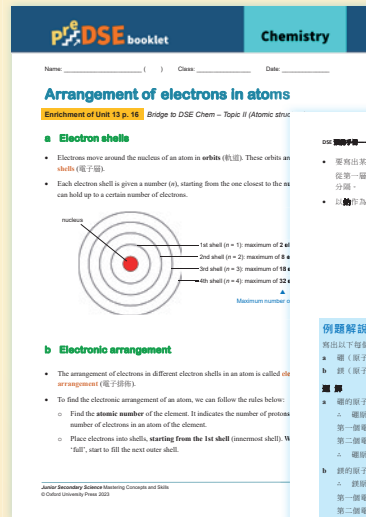
簡易溫習筆記

提供中英對照版

## ④ Pre-DSE booklet DSE 預備手冊

載有中三課題的補充資料，供銜接文憑試課程

備有例題、練習及答案



**例題解法**

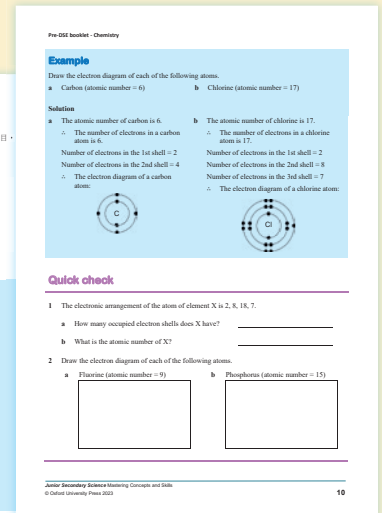
寫出以下每個原子的電子排布：

a 碳 (原子序 = 5)  
b 鎂 (原子序 = 12)

**解題**

a 碳的原子序是 5。  
 碳原子的電子數目是 5。  
 第一層電子層的電子數目 = 2  
 第二層電子層的電子數目 = 3  
 碳原子的電子排布是 2, 3。

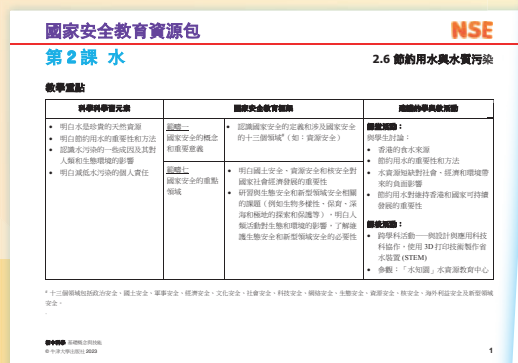
b 鎂的原子序是 12。  
 鎂原子的電子數目是 12。  
 第一層電子層的電子數目 = 2  
 第二層電子層的電子數目 = 8  
 第三層電子層的電子數目 = 2  
 鎂原子的電子排布是 2, 8, 2。



## ⑤ NSE Teaching resources pack 國家安全教育資源包

全部課題齊備

每個課題包括：  
建議教學計劃表、  
詳盡補充資料、  
課堂討論指引及  
課堂用簡報



- ⑥ Mini science dictionary
- ⑦ Science in English
- ⑧ Bridging Book (P6 to S1 / S3 to S4)

課本小詞典

NEW Excel 表格形式，方便篩選

銜接手冊 (升中一 / 升高中)



系列介紹網站

Teaching and Learning  
Resources Centre  
教與學資源中心



系列簡介



電子教學資源簡介



如有查詢，歡迎聯絡本社服務 貴校的客戶主任或致電本社營業及服務熱線2516 3126。

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蔣炳文 Johnson Chiang	6208 6027	中西區、灣仔區、觀塘、藍田、油塘、秀茂坪
林可欣 Alice Lam	6208 6017	東區、南區
羅金英 Eagle Law	9856 3860	屯門區、深水埗區
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