

4 備課及課堂疑難排解

幫助教師輕鬆上課

Pre-lesson helper 備課筆記

及更多教學資料

多項 e-Learning 工具靈活運用

Teacher's workshop 教師工作坊

Pre-lesson helper 備課筆記

教師可到網站
下載本文件：



附於**每冊開首**的補充資料，為課文的教學資料提供更詳盡的內容。
筆記集合了多年科學科教學的豐富經驗，冀能幫助教師輕鬆上課。

筆記內容包括以下類別：

- **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.
- **基礎知識** 基礎概念和資料，支持課堂上的教學；
- **實驗備忘** 教授實驗課時要注意的要點；
- **課堂管理** 確保課堂順利進行的注意事項；
- **常見問題** 對學生常見問題的正確回應；
- **增潤資料** 為能力較高學生提供的額外資料或活動。

教師可參閱**教師用書樣本 2A**，或到**教與學資源中心**下載：



<https://trc.oupchina.com.hk/science>



Pre-lesson helper 備課筆記部分內容：

英文版

8

Pre-lesson helper Unit 8 (Sample)

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 – Guiding Ss to connect circuits (p. 101)	T7
Practical 8.4 – Troubleshooting guide (p. 107)	T8
Practical 8.5 – Alternative method of demonstrating the heating effect of current (p. 110)	T10
Practical 8.9 – Collaborative learning ideas and notes for technicians (p. 128)	T11
Practical 8.13 – Tips for connecting a series circuit (p. 142)	T12
Practical 8.14 – Tips for connecting a parallel circuit (p. 145)	T13
Practical 8.18 – Alternative method for varying the size of current (p. 162)	T15

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

T1

中文版

8

備課筆記 第 8 課 (樣本)

這筆記提供資深教師的實用建議：

- 基礎知識** 基礎概念和資料，支持你在課堂上的教學；
- 實驗備忘** 教授實驗課時要注意的要點；
- 課堂管理** 確保課堂順利進行的注意事項；
- 常見問題** 對學生常見問題的正确回應；
- 增值資料** 為能力較高學生提供的額外資料或活動。

基礎知識	頁
導電怎樣發生 (p. 96)	T3
使用多於一個紅色端鈕的安培計 (p. 106)	T5
市電 (p. 156)	T6

實驗備忘	頁
實驗 8.3 – 指導學生接駁電路 (p. 101)	T7
實驗 8.4 – 疑難排解 (p. 107)	T8
實驗 8.5 – 示範電流熱效應的構建實驗 (p. 110)	T10
實驗 8.9 – 協作學習建議及實驗室技術員注意事項 (p. 128)	T11
實驗 8.13 – 接駁串聯電路的注意事項 (p. 142)	T12
實驗 8.14 – 接駁並聯電路的注意事項 (p. 145)	T13
實驗 8.18 – 改變電流大小的替代方法 (p. 162)	T15

課堂管理	頁
實驗 8.15 – 安全措施 (p. 155)	T16

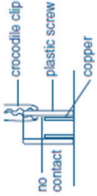
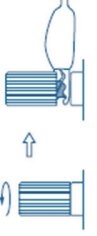
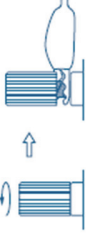
T1

Practical tips

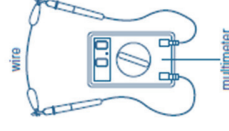
Practical 8.4 – Troubleshooting guide (p. 107)

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 of circuits and their solutions.

Common problem	Solution
The wire inside the crocodile clip is 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 is 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 is not 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**.



問題精要

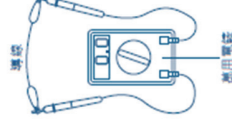
實驗 8.4 – 疑難排解 (p. 107)

A 訓練學生解決問題能力

實驗 8.4 可用來訓練學生解決問題能力。電路不能正常運作時，學生往往會提出很多關於電路的問題。下表顯示了一些電路的常見問題及解決方法。

常見問題	解決方法
鱷魚夾內的導線鬆脫了(有些學生只把鬆脫的導線塞回夾子的橡膠套內，便以為已把導線重新接駁好)。 	拆開導線的橡膠套，確保導線的銅線部分與鱷魚夾的金屬部分穩固接上。
把鱷魚夾插入安培計的端鈕時，夾子和端鈕的銅製部分沒有接觸。 	旋開安培計的塑料旋鈕，以接駁鱷魚夾。 
燈泡沒有完全旋入燈座。	旋緊燈泡。 

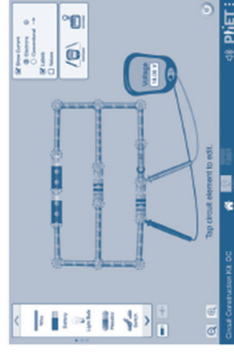
教師可請實驗室技術員在老師桌上放置萬用電錶，並調到「電阻」模式，以讓學生檢查導線能否導電。正常導線的電阻應為零。



另備有 PhET simulation worksheet 模擬程式工作紙，讓學生可以按工作紙內容使用模擬程式學習，提高學習成效。

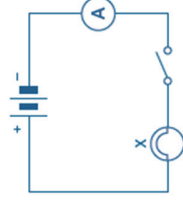
PhET simulation worksheet

Unit 8 Topic: Series and parallel circuits (p. 145)



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

- 1 Mandy connects a circuit according to the circuit diagram below. The voltage of each cell is 1.5 V. Bulb X has a resistance of $10\ \Omega$.



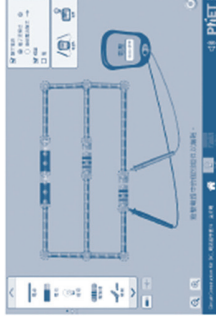
Circuit 1

Use the simulation to find out the ammeter reading when the switch is closed.

(1 mark)

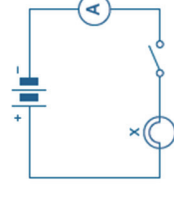
PhET 模擬程式工作紙

第 8 課 課題：串聯電路和並聯電路 (p. 145)



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圖接好，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)

教師用書的教學資料也更為豐富，包括：

- OUP web** – 牛津網站 – 列出教與學資源中心上的項目，例如課本 PDF 檔、PPT、筆記、作業、試卷等等
- Set** – 課堂引入
- Practical tips** – 實驗備忘
- Pre-lesson helper** – 備課筆記 – 指示補充資料的所在頁數
- Common mistakes** – 常見錯誤
- Questioning** – 提問
- Teaching notes** – 教學資料
- Reference website / video** – 參考網站 / 影片
- Unifying concepts** – 統一概念
- NOS notes** – NOS (科學本質) 資料
- QR code** (Quizizz, Google Forms, Microsoft Forms)

8.1 Simple circuits

Flipped classroom

Watch a video and answer the questions.

Video

Google Forms

MS Forms

OUP web

- Interactive PDF Unit 8
- Lesson worksheet Unit 8
- Short notes for revision Unit 8
- PowerPoint 8.1

Electricity is essential to modern living. All electrical appliances need electricity to work. They greatly improve our quality of life.

Conditions for electrical appliances to work

Below we use the word 'appliances' to mean all products that use electricity.

How can we make an appliance work? In *Practical 8.1*, let us use a bulb as an example to study the conditions required to make an appliance work.

Practical 8.1 Conditions for a bulb to light up

Aim

To find the necessary conditions for a bulb to light up

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

Teaching notes

Before the practical, ask Ss to predict if the bulb in each diagram will light up.

1 Make each of the connections shown below in turn.

90 electrical appliance 電器

Set

Show Ss this video to arouse interest. Ask Ss why silver is 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
D-cell	2
PP3-cell	several
bulb	1
LED	1
beaker (glass or plastic) (100 cm ³)	1
connector	1
connecting wire	1
iron nail	1
aluminium foil	1
rubber band	1
wooden chopstick	1
pencil lead	1
distilled water	2
sodium sulphate* solution	1
alcohol	1
vinegar	1
lemon juice	1

Common mistakes

So many think that electric charges always start from the cell, pass through the appliance, and return to the cell. They find it difficult to understand why the bulb turns on once the switch is closed - it seems that no time has passed for the electric charges to 'travel' from the cell to the bulb. The accepted concept is: once the circuit is closed, almost all charges flow at the same time due to the 'push' from the cell.

Misconception

✗ When an appliance is connected in a circuit, the current stops after passing through the appliance.

Measuring current

1 Ammeter

We measure the size of current with an ammeter. Fig. 8.15 shows its

Smaller current can be measured in milliamperes (mA).
 $1 \text{ mA} = 0.001 \text{ A}$

Studying currents and voltages in a parallel circuit

Practical 8.14

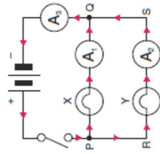
Aim

To measure currents and voltages in a parallel circuit

Apparatus and materials per group	
1 circuit board	1 switch
2 cell	2 bulb (same rating)
several connecting wire	several ammeter
several connector	several voltmeter

Part I Measuring currents

1 Study the circuit as shown. In the circuit diagram, draw arrows to show the direction of current in the circuit when the switch is closed.



What do ammeters A_1 , A_2 and A_3 measure?

A_1 measures the current that flows through branch PQ / branch RS / (the cells / branch RS) (I_1).

A_2 measures the current that flows through branch RS / (the cells / branch PQ) (I_2).

A_3 measures the current that flows through the cells (I_3).

Predict whether there is any relationship between the currents to be measured.

Choose A, B or C below or write your own prediction in D.

A $I_1 > I_2 > I_3$

B $I_1 + I_2 = I_3$

C $I_1 = I_2 = I_3$

D Others: _____

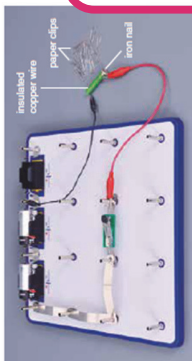
3 Connect the circuit and have it checked by your teacher.

4 Close the switch.

a Record the currents on the next page.

b Do bulbs X and Y have the same brightness? Yes.

3 Wind 30 turns of insulated copper wire around an iron nail to make a coil. Connect the coil to a circuit as shown.



Caution
Do not close the circuit for a long period of time as this may cause overheating of the wire.

Practical tips

- The wire that is wound around the nail must have an insulating coating. Otherwise, the wire will be short-circuited.
- The magnetic effect is the strongest at the sharp tip of the nail. This part can attract the most paper clips.

4 Put the coil near the paper clips. Close the switch. What happens to the paper clips?

They are attracted by the coil.

5 Open the switch. What happens to the paper clips now?

They are not attracted by the coil and fall down.

Practical tips

Sometimes the iron nail may be magnetised by the current. After the switch is closed, the nail becomes a magnet. It would still attract the paper clips after the switch is opened. To may use a soft iron rod instead.

In Part I of Practical 8.6, when a current flows through a wire, the needle of the compass changes direction. This shows the magnetic effect of the current.

The magnetic effect becomes stronger if a coil of wire is wound around an iron core (e.g. iron nail). In Part II, when a current flows through a coil of wire wound around an iron nail, the coil works like a magnet and attracts paper clips. We call this coil of wire an **electromagnet**.

Key point

- When a current flows through a wire, the needle of a compass changes direction.
- When a current flows through a coil of wire, the coil becomes an **electromagnet**.

These observations show that a current produces a **magnetic** effect.

Pre-lesson helper

Enrichment (p. T19)
Factors affecting the strength of an electromagnet

electromagnet 電磁鐵

e-Learning 工具靈活運用

靈活運用不同的電子學習工具，輔助教與學。

電子學習工具	新功能 / 應用
iSolution	✓ 支援多個平台：iOS、Android、Windows、MacOS ✓ 最新加入備有網頁版，使用更方便，更靈活 
Teaching and Learning Resources Centre 教與學資源中心	加入個人化功能： ✓ 「我的最愛」資源書籤，供稍後下載 ✓ 資源搜尋功能，使用更方便 
e-Resource list 電子學習資源表	✓ 學生可掃描每冊課本第一頁的 QR code，進入資源表網站，獲取筆記和影片等資源
Online Question Bank 線上試題庫	✓ 毋須安裝或下載，桌面版 login 即用 https://questionbank.oupchina.com.hk ✓ 可按題型選題 ✓ 備收藏功能，可標記題目備用 ✓ 提供題目使用次數，有助避免重複使用題目
Textbook, Workbook Interactive PDF 課本、作業互動 PDF	✓ 課本及作業 PDF 檔，可逐一顯示答案，並附影片及網頁連結
Google Forms 及 Microsoft Forms	✓ 課本全部練習提供 Google Forms 及 Microsoft Forms，可發放給學生使用
Quizizz	✓ 課本 Quick check 短測 也提供 Quizizz，可用作堂上即時考核
Kahoot!	✓ 教與學資源中心提供簡短搶答題，增加課堂氣氛
Edpuzzle	✓ 實驗影片附有問題，讓學生加深了解實驗步驟
YouTube Channel 牛津初中科學	✓ 不同類型影片持續更新 
Padlet 牛津科學教師關注組	✓ 發佈最新科學科教材及資訊 

Teacher's workshop 教師工作坊

我們按照不同教學情況需要，舉辦網上分享會及教師工作坊，邀請資深教師和教育學者分享他們的工作和經驗。



敬請留意我們經電郵、WhatsApp、Padlet 及網站發佈的最新消息！