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## ICT 奪星實戰精讀班

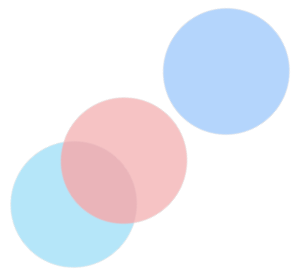
### Lesson 6: Basic Programming Concepts (I)

#### 基礎程式編寫概念 (一)

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***INTENSIVE COURSE***

***ICT 奪星實戰精讀班 – LESSON 6***

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## **Lesson Flow 課堂流程**

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- Introduction to Algorithm Design 算法設計簡介
- More on Boolean Logic 布爾邏輯進階
- IF Statement and Nested IF Statements IF 語句及嵌套 IF 語句

## **Learning Objectives 學習目標**

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- To revisit the ideas of algorithm design and practice IF statements with Boolean expression  
重溫算法設計的概念並練習使用 IF 語句與布爾表達式

## **Exercises 課後練習**

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- Introduction to Algorithm Design 算法設計簡介
- More on Boolean Logic 布爾邏輯進階
- IF Statement and Nested IF Statements IF 語句及嵌套 IF 語句

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## **P.05**

Recap 重溫

## **P.06–10**

Introduction to Algorithm Design 算法設計簡介

## **P.11–18**

Variables and Arithmetic Operations 變量與運算操作

## **P.19–24**

More on Boolean Logic 布爾邏輯進階

## **P.25–26**

Short-circuit Evaluation of Boolean Expressions 布爾表達式的短路求值

## **P.27**

IF Statement and Nested IF Statements IF 語句及嵌套 IF 語句

# CONTENT

## **P.33–36**

IF... ELSE IF... ELSE...

## **P.37–39**

Nested IF Statements 嵌套式 IF 語句

## **P.40–47**

Converting Nested IF Statements into Boolean Expressions 把嵌套式 IF 語句轉換成布爾表達式

## **P.48**

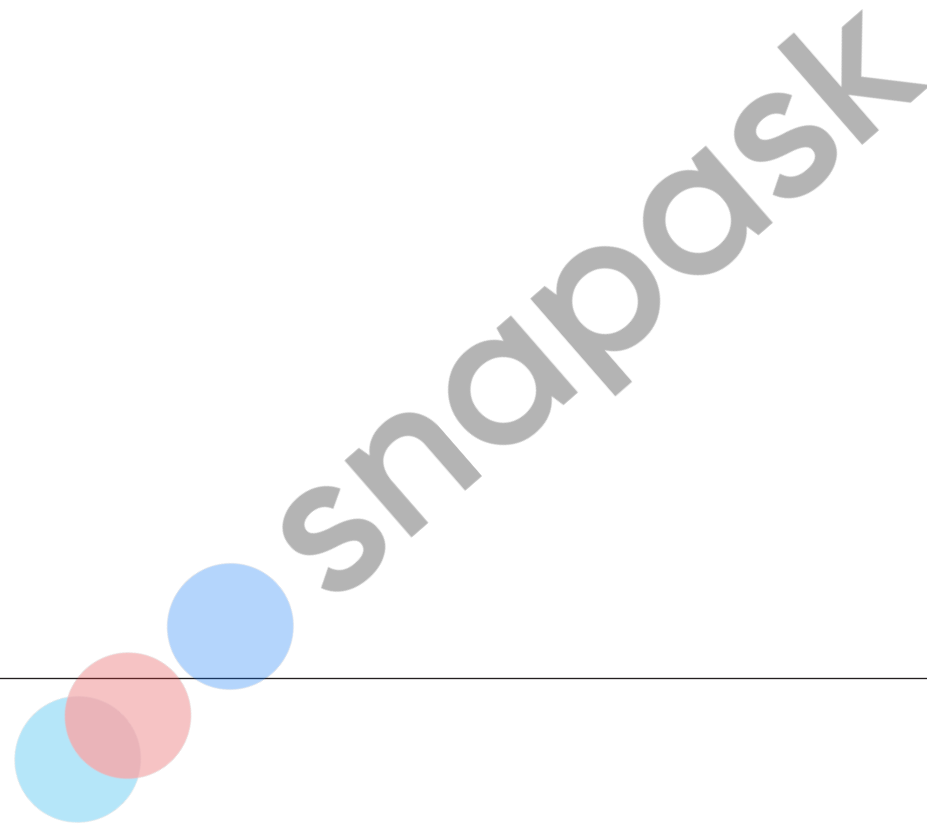
Summary 總結

## **P.49–54**

After-class Exercise 課後練習

## **P.55–63**

Suggested Solution 參考答案



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## **P.64–65**

Appendix I: Using a Cloud Version of Python 附錄一：使用雲端版本的 Python

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## **P.66–71**

Appendix II: Pseudocode Equivalence in Python (I) 附錄二：對應偽代碼的 Python 代碼

## Recap 重溫

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- How do we order the result of a SQL `SELECT` statement?  
我們如何把 SQL `SELECT` 語句的結果排序？
- How do we group the result of a SQL `SELECT` statement?  
我們如何把 SQL `SELECT` 語句的結果組合起來？
- What tools are provided by DBMS to insert, query, and print out, data?  
DBMS 提供了甚麼工具來插入、查詢及打印數據？



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# Introduction to Algorithm Design 算法設計簡介

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## Problem-solving Procedures and Computational Thinking

### 解難程序及計算思維

**Question:** Suppose you want to teach a 6-year-old to make a cup of hot lemon tea. Write down a list of steps which will show him how to make a cup of hot lemon tea.

**問題：** 假設你要教一個六歲的小朋友如何製作一杯熱檸檬茶。寫下一系列的步驟來展示如何製作一杯熱檸檬茶。

**Question:** How good is the list you've produced?

**問題：** 你寫下的步驟有多好？



- Computational thinking is the process of realising a problem, analysing it, and providing a solution to the problem with the use of a computer.

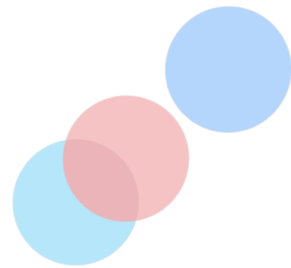
計算思維是指透過電腦找出問題，加以分析，並為問題提供解決方案的過程。

- Logic thinking 邏輯思維
- Algorithmic thinking 算法思維
- Systems thinking 系統思維

- An **algorithm** is a list of finite steps to be performed as a solution to a particular problem.

一個**算法**是一套有限的步驟，執行後會是特定問題的解決方法。

- How do we come up with an algorithm?  
我們如何想到一個算法？



There are 6 steps in the problem-solving procedure:

解難程序中有 6 個步驟：

1. Problem identification 問題定義
2. Problem analysis 問題分析
  - Input-Process-Output (IPO) 輸入—處理—輸出 (IPO)
3. Algorithm design 算法設計
4. Solution development and implementation 解決方案的開發和實施
5. Debugging and testing 除錯及測試
6. Documentation 文件編製
  - User manual 用戶手冊
  - Programme manual 程式手冊

**Question:** Which step is the hardest to remember?

**問題：** 哪個步驟最難記住？

- When developing a solution, there are two main approaches:

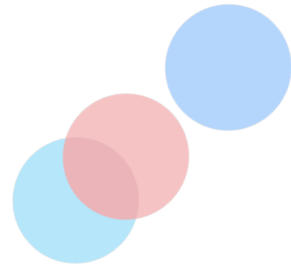
開發一個解決方案時有兩個主要方法：

- Top-down (stepwise refinement) 由上而下 (逐步求精)
- Bottom-up 由下而上

## Exercise 練習

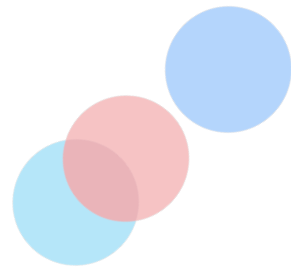
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1. Write down the 6 steps of problem-solving procedures in the logical order of execution.  
把解難程序的 6 個步驟按邏輯執行次序寫下。



2. James finishes writing the source code of a programme. Which of the following should he do next?  
杰明完成了一個程式的源代碼。他應進行下列哪項工作？

- A. Analyse the input required from the users  
分析需要從用戶取得的輸入數據
- B. Test the boundary cases of the programme  
測試程式的邊際個案
- C. Determine the best algorithm for the problem  
決定問題的最佳算法
- D. Redefine the problem precisely  
重新並準確地定義問題



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