

# COMPUTER TECHNOLOGY

## 電腦技術

Grade 10 Study Guide & Workbook 十年級學習指南與練習本

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### Contents / 目錄

Unit 1 — Inside the Desktop Computer Tower 電腦主機內部

Unit 2 — Peripheral Devices 周邊設備

Unit 3 — Ports & Connectors 連接埠與連接器

Unit 4 — Networking & Protocols 網路與協定

Unit 5 — Software, OS & Data 軟體、作業系統與資料

Workbook Exercises (Units 1–5) 練習題

Answer Key 解答

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Name: \_\_\_\_\_ 姓名: \_\_\_\_\_

Class: \_\_\_\_\_ 班級: \_\_\_\_\_

Date: \_\_\_\_\_ 日期: \_\_\_\_\_

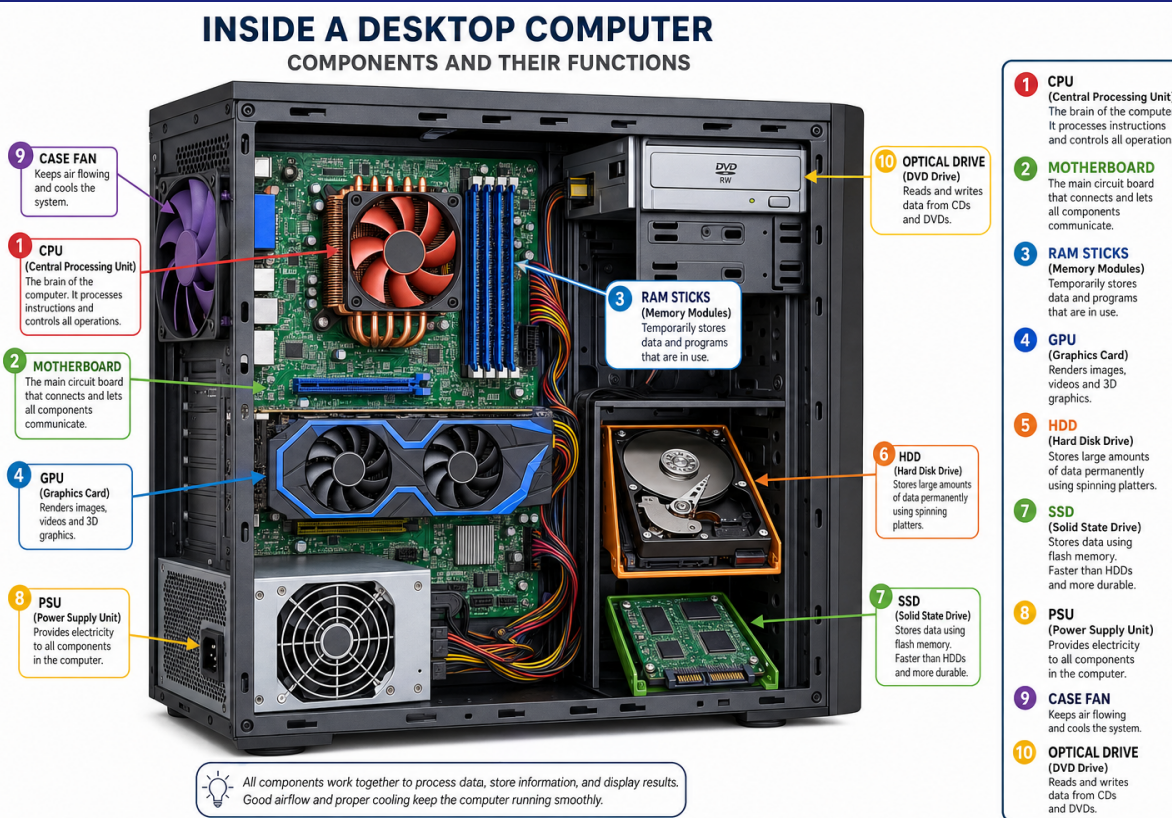
# UNIT 1 Inside the Desktop Computer Tower

## 電腦主機內部

A desktop computer tower houses all the main hardware components. Understanding what each part does is the first step to understanding how computers work. In this unit you will learn the names, functions, and Chinese terminology for every major internal component.

桌上型電腦主機（機殼）包含所有主要硬體元件。了解每個零件的功能是理解電腦運作的第一步。本單元將學習每個主要內部元件的名稱、功能及中文術語。

### Diagram — Computer Tower Interior 電腦主機內部圖解



### Vocabulary Table — Unit 1 第一單元詞彙表

#	English Term	中文名稱	Description / 說明
1	<b>Computer Case / Chassis</b>	機殼	The metal/plastic tower that houses and protects all internal components. / 容納並保護所有內部元件的金屬或塑膠外殼。
2	<b>Motherboard (MB / Mainboard)</b>	主機板	The main circuit board. Connects CPU, RAM, GPU and all other components. / 主要電路板，連接並協調CPU、RAM、GPU等所有元件。

#	English Term	中文名稱	Description / 說明
3	<b>Central Processing Unit</b> (CPU)	中央處理器	The "brain" of the computer. Executes all program instructions and calculations. / 電腦的「大腦」，執行所有程式指令與運算。
4	<b>Heat Sink &amp; CPU Cooler</b>	CPU散熱器與散熱風扇	Draws heat away from the CPU using metal fins and a fan to prevent overheating. / 透過金屬散熱片與風扇將CPU產生的熱量散逸，防止過熱。
5	<b>Random Access Memory</b> (RAM)	隨機存取記憶體	Fast temporary memory for running programs. Data is lost when power is off. / 快速的暫時記憶體，用於執行中的程式。關機後資料消失。
6	<b>Read-Only Memory</b> (ROM)	唯讀記憶體	Permanent memory on the motherboard. Stores the BIOS. Cannot be erased normally. / 主機板上的永久記憶體，儲存BIOS程式，正常情況下無法清除。
7	<b>Hard Disk Drive</b> (HDD)	硬碟	Magnetic spinning disk for permanent storage. Large capacity but slower than SSD. / 使用磁性旋轉碟片的永久儲存裝置，容量大但速度比SSD慢。
8	<b>Solid State Drive</b> (SSD)	固態硬碟	Flash-memory-based permanent storage. Much faster than HDD, no moving parts. / 以快閃記憶體為基礎的永久儲存裝置，比HDD快得多，無移動零件。
9	<b>Graphics Processing Unit</b> (GPU)	繪圖處理器 / 顯示卡	Handles all graphics rendering, video output, and display. Also used in gaming and AI. / 負責圖形渲染、影像輸出與顯示。也用於遊戲運算與人工智慧。
10	<b>Power Supply Unit</b> (PSU)	電源供應器	Converts AC power from the wall to DC power. Measured in Watts (W). / 將市電（交流電）轉換為電腦所需的直流電，以瓦特（W）為單位。
11	<b>Optical Drive</b> (CD/DVD Drive)	光碟機	Reads and writes CDs, DVDs, and Blu-ray discs using laser light. / 使用雷射光讀取或燒錄CD、DVD及藍光光碟的裝置。
12	<b>Chipset</b>	晶片組	Controls data flow between the CPU, RAM, and other components on the motherboard. / 控制CPU、RAM與其他主機板元件之間資料傳輸的晶片群。
13	<b>BIOS / UEFI</b> (Basic Input/Output System)	BIOS / UEFI 韌體	Firmware stored in ROM that runs first at startup and initializes all hardware. / 儲存在ROM中的韌體，電腦開機時首先執行，負責初始化所有硬體。

#	English Term	中文名稱	Description / 說明
14	<b>PCI Express Slot</b> (PCIe)	PCIe擴充插槽	High-speed expansion slot for GPUs, network cards, and sound cards. / 高速擴充插槽，用於安裝顯示卡、網路卡和音效卡等。

### Key Concepts / 重點概念 3949AB

- CPU speed is measured in GHz (GigaHertz). A higher number = faster processing. / CPU速度以GHz（十億赫茲）衡量，數字越大代表處理速度越快。
- RAM is measured in GB. More RAM = can run more programs at once. Typical: 8–32 GB. / RAM以GB衡量，RAM越多可同時執行更多程式，常見容量：8–32 GB。
- HDD vs SSD: SSD is 5–10× faster than HDD but costs more per GB. / HDD與SSD比較：SSD比HDD快5–10倍，但每GB成本較高。
- The PSU is rated in Watts (W). A gaming PC may need 650–850W. / PSU以瓦特（W）為單位，電競電腦通常需要650–850W的電源供應器。

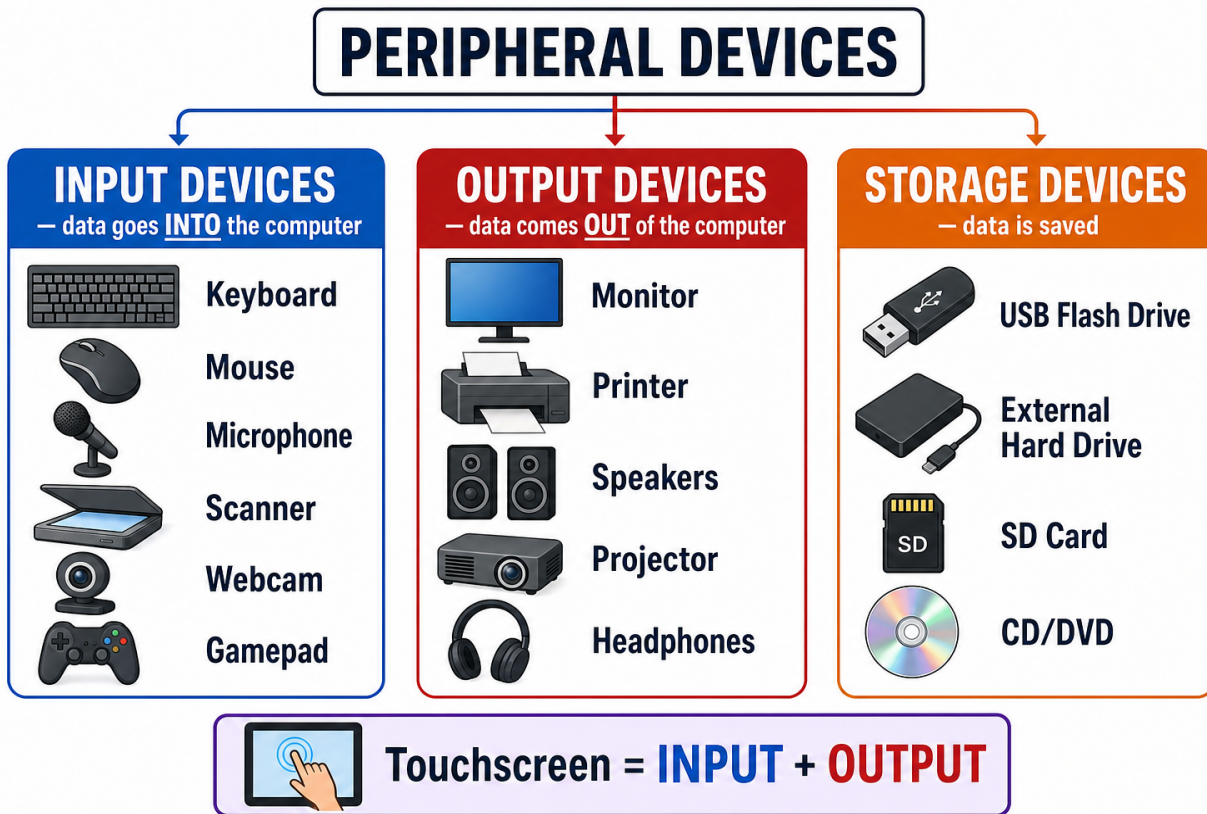
## UNIT 2 Peripheral Devices

### 周邊設備

Peripherals are external devices that connect to a computer. They are divided into three categories: Input (data goes into the computer), Output (data comes out of the computer), and Storage (data is saved). Some devices are both input and output.

周邊設備是連接到電腦的外部裝置，分為三大類：輸入（資料進入電腦）、輸出（資料從電腦輸出）和儲存（資料被保存）。部分裝置同時具有輸入和輸出功能。

### Diagram — Peripheral Classification 周邊設備分類圖



## Vocabulary Table — Unit 2 第二單元詞彙表

#	English Term	中文名稱	Description / 說明
1	<b>Peripheral Device</b>	周邊設備	Any external device connected to a computer (input, output, or storage). / 任何連接至電腦的外部裝置 (輸入、輸出或儲存)。
2	<b>Input Device</b>	輸入裝置	Sends data FROM the user TO the computer. e.g. keyboard, mouse, scanner. / 將資料從使用者傳送到電腦的裝置，例如：鍵盤、滑鼠、掃描器。
3	<b>Output Device</b>	輸出裝置	Sends data FROM the computer TO the user. e.g. monitor, printer, speakers. / 將資料從電腦傳送給使用者的裝置，例如：螢幕、印表機、喇叭。
4	<b>Keyboard</b>	鍵盤	Primary text input device. Sends characters and commands to the CPU. / 主要文字輸入裝置，將字元與指令傳送給CPU。
5	<b>Mouse</b>	滑鼠	Pointing input device. Controls cursor position on screen. / 指標輸入裝置，控制螢幕上的游標位置。

#	English Term	中文名稱	Description / 說明
6	<b>Monitor / Display</b>	螢幕 / 顯示器	Primary output device. Displays images, text, and video from the GPU. / 主要輸出裝置，顯示 GPU 產生的圖像、文字和影像。
7	<b>Printer</b>	印表機	Output device that produces physical paper documents. / 將數位內容輸出為實體紙張文件的輸出裝置。
8	<b>Scanner</b>	掃描器	Converts physical documents or images into digital files (input). / 將實體文件或圖片轉換為數位檔案的輸入裝置。
9	<b>Microphone</b>	麥克風	Captures audio input; converts sound waves to digital signals. / 擷取音訊輸入；將聲波轉換為數位信號。
10	<b>Speakers / Headphones</b>	喇叭 / 耳機	Output audio from the computer; converts digital signals to sound. / 輸出電腦音訊；將數位信號轉換為聲音。
11	<b>Webcam</b>	網路攝影機	Captures live video and still images as input for video calls, streaming. / 擷取即時影像和靜態圖片，用於視訊通話、直播的輸入裝置。
12	<b>Projector</b>	投影機	Output device; projects large display from a computer onto a screen or wall. / 輸出裝置；將電腦畫面投影到螢幕或牆面上放大顯示。
13	<b>Touchscreen</b>	觸控螢幕	Input AND output device. Displays content and accepts touch input simultaneously. / 兼具輸入與輸出功能；顯示內容同時接受觸控輸入。
14	<b>USB Flash Drive</b> (Thumb drive / 隨身碟)	USB隨身碟	Portable flash storage connected via USB. Plug-and-play, no power needed. / 可攜式快閃儲存裝置，透過USB連接，即插即用。

## UNIT 3 Ports & Connectors

### 連接埠與連接器

Ports are the physical sockets on a computer that allow you to connect peripherals and other devices. Each port type has a specific shape, speed, and purpose. Knowing which port to use is essential for setting up a computer correctly.

連接埠是電腦上的實體插孔，用於連接周邊設備和其他裝置。每種連接埠有特定的形狀、速度和用途。了解使用哪個連接埠是正確設定電腦的重要基礎。

### Diagram — Computer Ports & Connectors 電腦連接埠圖解

# Computer Ports and Connectors



**TIP:** Not all computers have every port. Availability depends on the device model and purpose.

## Vocabulary Table — Unit 3 第三單元詞彙表

#	English Term	中文名稱	Description / 說明
1	<b>USB Type-A</b> (Universal Serial Bus)	<b>USB Type-A</b>	Rectangular port; the most common USB connector. USB 2.0 = black, 3.0 = blue. / 矩形連接埠，最常見的USB接頭。USB 2.0為黑色，3.0為藍色。
2	<b>USB Type-C</b> (USB-C)	<b>USB-C連接埠</b>	Oval, reversible connector. Can carry data, power, and video. Newest standard. / 橢圓形可正反插接頭，可傳輸資料、電力和影像，為最新標準。
3	<b>Thunderbolt</b> (TB3 / TB4)	<b>雷電連接埠</b>	Uses USB-C shape. Extremely fast data transfer up to 40 Gbps. Also carries video. / 使用USB-C外形，資料傳輸速度極快，最高達40 Gbps，也可傳輸影像。
4	<b>HDMI</b> (High-Definition Multimedia Interface)	<b>HDMI高清晰度多媒體介面</b>	Carries high-definition video AND audio in one cable. Used for TVs and monitors. / 單一纜線同時傳輸高清影像與音訊，用於電視和螢幕連接。
5	<b>DisplayPort</b> (DP)	<b>顯示埠</b>	High-resolution video interface. Common on PCs and gaming monitors. Supports 8K. / 高解析度影像介面，常見於電腦和電競螢幕，支援8K解析度。

#	English Term	中文名稱	Description / 說明
6	<b>VGA</b> (Video Graphics Array)	<b>VGA視訊圖形陣列</b>	Older 15-pin analog video port. Still used for projectors and older monitors. / 舊式15針類比影像連接埠，仍用於投影機和舊型螢幕。
7	<b>Ethernet Port (RJ-45)</b> (LAN Port)	<b>乙太網路連接埠 (RJ-45)</b>	Wired network connection jack. Supports speeds of 100 Mbps to 10 Gbps. / 有線網路連接插孔，支援100 Mbps至10 Gbps的傳輸速度。
8	<b>3.5mm Audio Jack</b> (TRS / TRRS)	<b>3.5mm音源插孔</b>	Green = headphone/speaker out. Pink = microphone in. Blue = line in. / 綠色=耳機/喇叭輸出；粉紅色=麥克風輸入；藍色=線路輸入。
9	<b>SD Card Slot</b> (Secure Digital)	<b>SD記憶卡插槽</b>	Slot for reading SD memory cards from cameras and mobile devices. / 讀取相機和行動裝置SD記憶卡的插槽。
10	<b>PS/2 Port</b>	<b>PS/2連接埠</b>	Legacy round connector. Purple = keyboard, Green = mouse. Mostly replaced by USB. / 舊式圓形連接埠。紫色=鍵盤，綠色=滑鼠。大多已被USB取代。

### Port Speed Comparison / 連接埠速度比較 AD1457

Port / 連接埠	Max Speed / 最高速度	Video? / 影像?	Common Use / 常見用途
USB 2.0	480 Mbps	No	Mouse, keyboard, older drives
USB 3.0 (blue)	5 Gbps	No	Flash drives, external HDDs
USB-C / Thunderbolt 4	40 Gbps	Yes	Laptops, phones, eGPU
HDMI 2.1	48 Gbps	Yes (8K)	Monitors, TVs, projectors
DisplayPort 2.1	80 Gbps	Yes (16K)	Gaming monitors, workstations
Ethernet (Cat6)	10 Gbps	No	Wired internet connection
VGA	N/A (analog)	Yes (1080p)	Old monitors, projectors (legacy)

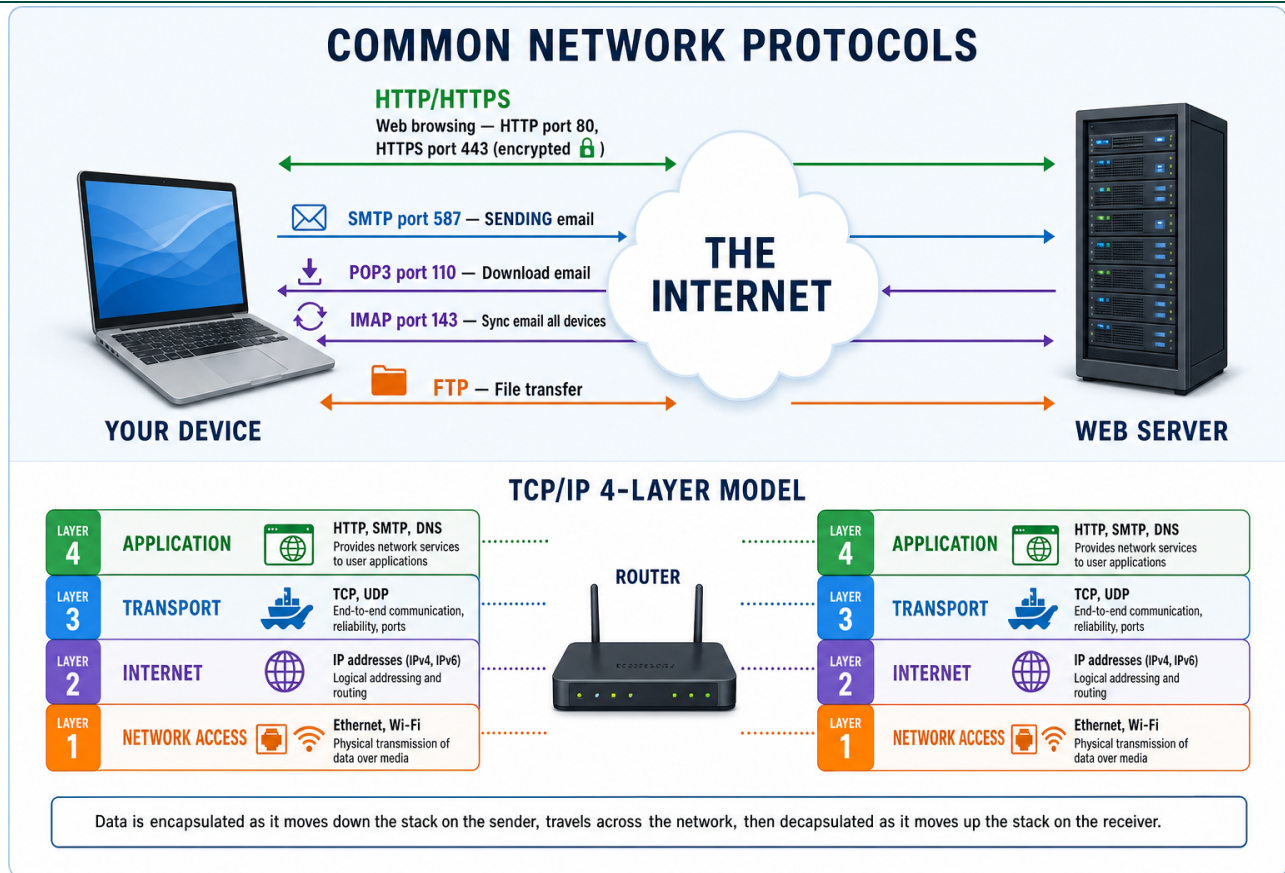
## UNIT 4 Networking & Protocols

### 網路與網路協定

A network protocol is a set of rules that define how data is transmitted over a network. Without protocols, computers cannot communicate. Each protocol has a specific job — HTTP delivers web pages, SMTP sends emails, DNS translates addresses, and so on.

網路協定是一組定義資料如何在網路上傳輸的規則。沒有協定，電腦就無法相互通訊。每個協定都有特定的功能——HTTP傳送網頁、SMTP發送電子郵件、DNS翻譯位址等等。

### Diagram — Network Protocols & TCP/IP Model 網路協定與TCP/IP模型



## Vocabulary Table — Unit 4 第四單元詞彙表

#	English Term	中文名稱	Description / 說明
1	<b>Network</b>	網路	Two or more computers connected to share data and resources. / 兩台或兩台以上的電腦連接在一起以分享資料和資源。
2	<b>Internet</b>	網際網路	Global network of networks. Connects billions of devices worldwide. / 全球性的網路聯網系統，連接世界各地數十億台裝置。
3	<b>LAN / WAN</b> <i>(Local/Wide Area Network)</i>	區域網路 / 廣域網路	LAN = small area (home, school). WAN = large area (cities, countries). Internet = largest WAN. / LAN=小範圍 (家庭、學校) ; WAN=大範圍 (城市、國家)。網際網路是最大的WAN。
4	<b>Protocol</b>	網路協定	A set of rules that define how data is sent and received over a network. / 定義資料在網路上傳送和接收方式的一組規則。
5	<b>HTTP</b> <i>(HyperText Protocol)</i>	超文本傳輸協定	Protocol for transferring web pages. Sends HTML from server to browser. Port 80. / 傳輸網頁的協定。將HTML從伺服器傳送到瀏覽器。連接埠80。

#	English Term	中文名稱	Description / 說明
6	<b>HTTPS</b> ( <i>HTTP Secure</i> )	安全超文本傳輸協定	Encrypted version of HTTP using SSL/TLS. Shows padlock in browser. Port 443. / 使用SSL/TLS加密的HTTP。瀏覽器顯示鎖頭圖示。連接埠443。
7	<b>SMTP</b> ( <i>Simple Mail Transfer Protocol</i> )	簡單郵件傳輸協定	Used for SENDING email from a client to a mail server. Port 25 or 587. / 用於從客戶端傳送電子郵件到郵件伺服器。連接埠25或587。
8	<b>POP3</b> ( <i>Post Office Protocol 3</i> )	郵局協定第3版	Downloads email to device and deletes from server. Works offline. Port 110. / 將電子郵件下載到裝置並從伺服器刪除。可離線使用。連接埠110。
9	<b>IMAP</b> ( <i>Internet Message Access Protocol</i> )	網際網路訊息存取協定	Keeps email on server; syncs across all devices. Better for multiple devices. Port 143. / 將電子郵件保存在伺服器上並同步所有裝置。適合多裝置使用。連接埠143。
10	<b>FTP</b> ( <i>File Transfer Protocol</i> )	檔案傳輸協定	Used to upload and download files between computers on a network. Port 20/21. / 用於在網路上的電腦之間上傳和下載檔案。連接埠20/21。
11	<b>DNS</b> ( <i>Domain Name System</i> )	網域名稱系統	Translates domain names (google.com) into IP addresses (142.250.80.46). Port 53. / 將網域名稱 (如google.com) 轉換為IP位址 (如142.250.80.46)。連接埠53。
12	<b>DHCP</b> ( <i>Dynamic Host Configuration Protocol</i> )	動態主機設定協定	Automatically assigns IP addresses to devices when they join a network. Port 67/68. / 當裝置加入網路時自動分配IP位址。連接埠67/68。
13	<b>TCP / UDP</b> ( <i>Transmission Control Protocol / User Datagram Protocol</i> )	傳輸控制協定 / 使用者資料包協定	TCP = reliable, ordered delivery (web, email). UDP = fast, no guarantee (gaming, video streaming). / TCP=可靠有序的傳輸 (網頁、電子郵件) ; UDP=快速無保證 (遊戲、視訊串流)。
14	<b>IP Address</b> ( <i>Internet Protocol Address</i> )	IP位址	Unique number identifying a device on a network. IPv4: 4 numbers (192.168.1.1). IPv6: longer. / 識別網路上每台裝置的唯一數字。IPv4: 4組數字 ; IPv6: 較長的格式。
15	<b>Router</b>	路由器	Directs data packets between networks. Your home router connects LAN to the internet. / 在網路之間轉發資料封包。家用路由器連接區域網路與網際網路。
16	<b>Firewall</b>	防火牆	Hardware or software that monitors and blocks unauthorized network traffic. / 監控並阻擋未授權網路流量的硬體或軟體安全系統。

## Email Protocol Comparison / 電子郵件協定比較 00695C

Protocol	Direction / 方向	How it Works / 運作方式	Best For / 適合用途
SMTP (Port 587)	SENDING / 發送	Pushes email from your app to the mail server for delivery. 將電子郵件從你的應用程式推送到郵件伺服器進行傳送。	Always used to SEND / 永遠用於發送郵件
POP3 (Port 110)	RECEIVING / 接收	Downloads email to device, then deletes from server. 將郵件下載到裝置後從伺服器刪除。	One device only. Works offline. / 單一裝置、可離線
IMAP (Port 143)	RECEIVING / 接收	Keeps email on server, syncs across ALL your devices. 郵件保存在伺服器，同步所有裝置。	Phone + laptop + tablet / 多裝置同步

### TCP vs. UDP — At a Glance TCP 與 UDP — 快速比較

	TCP	UDP
Reliability / 可靠性	Guaranteed delivery 保證送達	No guarantee 不保證送達
Speed / 速度	Slower (checks delivery) 較慢	Faster (no checks) 較快
Order / 封包順序	Arrives in order 按序到達	May arrive out of order 可能亂序
Use Cases / 使用場合	Web (HTTP/HTTPS), Email 網頁、電子郵件	Gaming, live video streaming, VoIP 遊戲、直播、網路電話

#### Port Numbers Quick Reference / 連接埠號碼快速參考

**HTTP=80 | HTTPS=443 | SMTP=25/587 | POP3=110 | IMAP=143 | FTP=20/21 | DNS=53 | DHCP=67/68**

提示：連接埠號碼就像建築物的門牌——它指定了資料應送往哪個應用程式或服務。

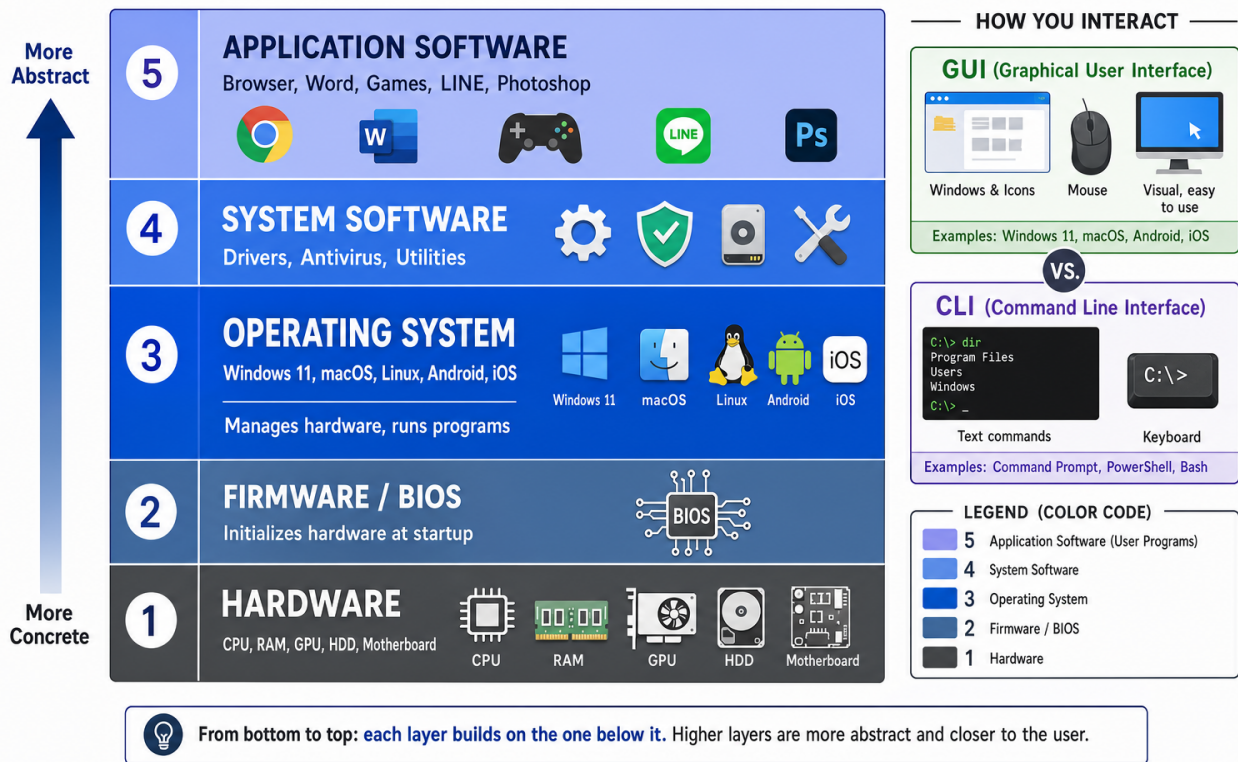
## UNIT 5 Software, Operating Systems & Data

### 軟體、作業系統與資料

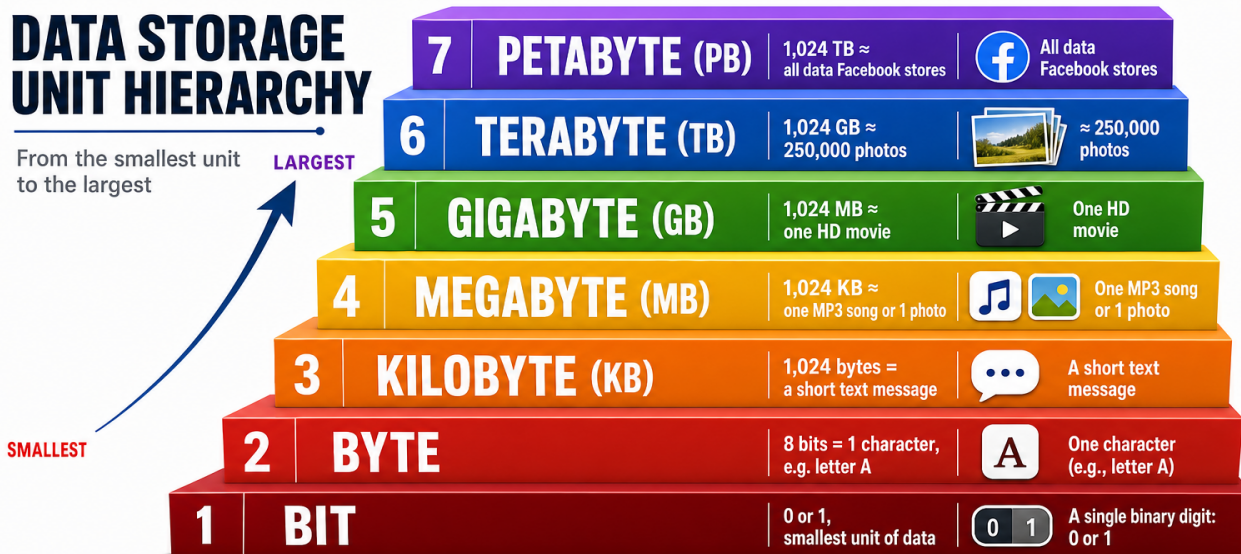
Software is the set of instructions that tells hardware what to do. There are two main categories: System Software (which runs the computer itself) and Application Software (which users run for specific purposes). Understanding storage units (bits, bytes, KB, GB) is essential for all areas of computing.

軟體是告訴硬體做什麼的指令集。軟體主要分為兩類：系統軟體（運行電腦本身）和應用軟體（使用者為特定目的執行的程式）。理解儲存單位（位元、位元組、KB、GB）對電腦各領域都至關重要。

### Diagram — Software Layers & OS Comparison 軟體層次與作業系統比較



**Diagram — Data Storage Units** 資料儲存單位



**BINARY vs DECIMAL NUMBER COMPARISON**

DECIMAL (Base 10)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BINARY (Base 2)	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111

Each step is 1,024 times larger than the previous step (2<sup>10</sup>).

**Vocabulary Table — Unit 5** 第五單元詞彙表

#	English Term	中文名稱	Description / 說明
1	<b>Operating System</b> (OS)	作業系統	Software that manages hardware and provides a platform for running applications. / 管理硬體並為應用程式提供執行平台的系統軟體。
2	<b>System Software</b>	系統軟體	Software that operates the computer hardware directly: OS, drivers, utilities. / 直接操作電腦硬體的軟體：作業系統、驅動程式、工具程式。
3	<b>Application Software</b>	應用軟體	Programs used for specific tasks by users: Word, browsers, games, LINE, YouTube. / 使用者用於特定任務的程式：Word、瀏覽器、遊戲、LINE等。
4	<b>GUI</b> (Graphical User Interface)	圖形使用者介面	Uses icons, windows, and menus. Easy for beginners. Example: Windows desktop. / 使用圖示、視窗和選單，適合初學者，例如：Windows桌面。
5	<b>CLI</b> (Command Line Interface)	命令列介面	User types text commands. Powerful but requires memorizing syntax. / 使用者輸入文字指令，功能強大但需要記憶語法。
6	<b>Driver</b> (Device Driver)	驅動程式	Software allowing the OS to communicate with hardware devices like printers, GPUs. / 讓作業系統與硬體裝置（如印表機、顯示卡）通訊的軟體。
7	<b>Algorithm</b>	演算法	A step-by-step procedure to solve a problem or complete a task. / 解決問題或完成任務的逐步程序。
8	<b>Source Code</b>	原始碼	Human-readable programming instructions written in languages like Python, Java. / 以Python、Java等程式語言撰寫的人類可讀程式指令。
9	<b>Compiler</b>	編譯器	Translates entire source code to machine code (0s and 1s) before running. / 在執行前將整個原始碼轉換為機器碼（0和1）的程式。
10	<b>Bit / Byte</b> (b / B)	位元 / 位元組	Bit = smallest unit (0 or 1). Byte = 8 bits. Stores one character. / 位元=最小單位（0或1）；位元組=8個位元，儲存一個字元。
11	<b>KB / MB / GB / TB</b>	千位元組 / 百萬位元組 / 十億位元組 / 兆位元組	1 KB=1024 B   1 MB=1024 KB   1 GB=1024 MB   1 TB=1024 GB. / 1 KB=1024 B   1 MB=1024 KB   1 GB=1024 MB   1 TB=1024 GB。

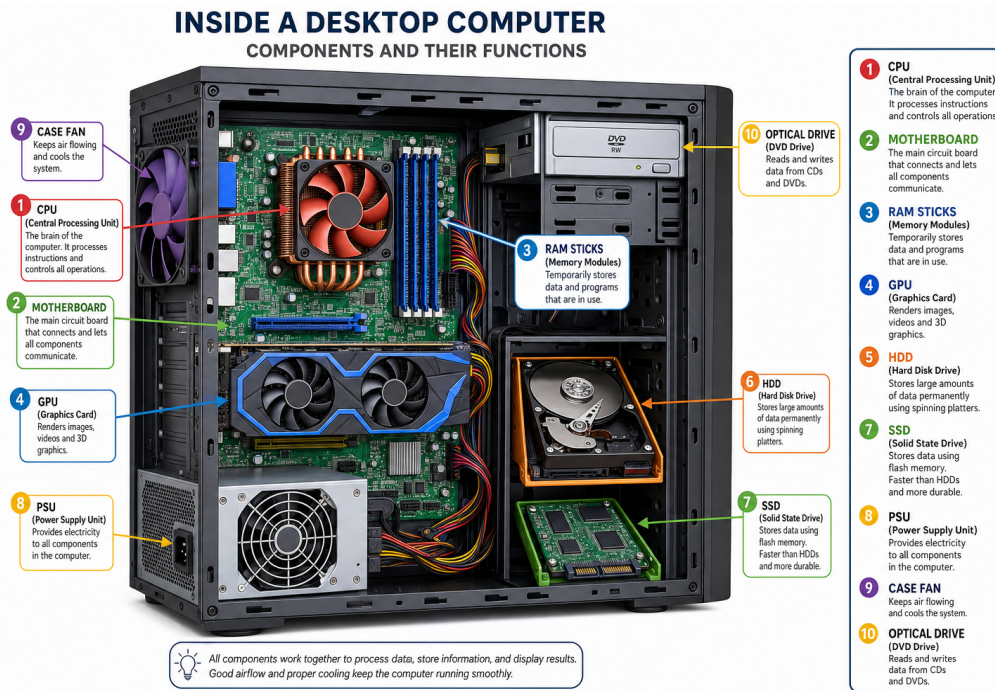
#	English Term	中文名稱	Description / 說明
12	<b>Binary Number System</b> (Base-2)	二進位數字系統	Uses only 0 and 1. Foundation of all digital computing. 8 bits = 1 byte. / 只使用0和1，是所有數位運算的基礎。8個位元等於1個位元組。
13	<b>Cloud Computing</b>	雲端運算	Using remote servers via the internet for storage, computing, and software. / 透過網際網路使用遠端伺服器進行儲存、運算和軟體服務。
14	<b>Encryption</b>	加密	Converting data into unreadable code to protect it from unauthorized access. / 將資料轉換為不可讀格式，防止未授權存取的安全技術。

# WORKBOOK EXERCISES — UNIT 1: Computer Internals

## 練習題 — 第一單元：電腦主機內部

### Exercise 1A — Label the Diagram 練習1A — 圖表標示

Write the correct component name next to each number. Use the word bank below. / 在每個數字旁邊寫上正確的元件名稱，使用下方的詞庫。



**Word Bank / 詞庫:** CPU | Motherboard | RAM | GPU | HDD | SSD | PSU | Optical Drive | Case Fan | PCIe Slot | Chipset | Heat Sink

- ① \_\_\_\_\_
- ② \_\_\_\_\_
- ③ \_\_\_\_\_
- ④ \_\_\_\_\_
- ⑤ \_\_\_\_\_
- ⑥ \_\_\_\_\_
- ⑦ \_\_\_\_\_
- ⑧ \_\_\_\_\_
- ⑨ \_\_\_\_\_
- ⑩ \_\_\_\_\_

### Exercise 1B — Matching 練習1B — 配對

Match each term on the left with its correct description on the right. Write the letter in the blank. / 將左側每個術語與右側正確的說明配對，將字母寫在空白處。

1. CPU / 中央處理器

\_\_\_\_\_ **A. Fast flash storage, no moving parts / 快速快閃儲存，無移動零件**

2. RAM / 隨機存取記憶體	___	<b>B.</b> Converts AC power to DC / 將交流電轉換為直流電
3. ROM / 唯讀記憶體	___	<b>C.</b> Handles graphics and video rendering / 處理圖形與影像渲染
4. HDD / 硬碟	___	<b>D.</b> Magnetic disk permanent storage / 磁性碟片的永久儲存
5. SSD / 固態硬碟	___	<b>E.</b> Temporary memory for running programs / 執行程式的暫時記憶體
6. GPU / 繪圖處理器	___	<b>F.</b> The "brain" — runs all instructions / 「大腦」執行所有指令
7. PSU / 電源供應器	___	<b>G.</b> Permanent memory; stores BIOS / 永久記憶體；儲存BIOS
8. Motherboard / 主機板	___	<b>H.</b> Main circuit board connecting everything / 連接所有元件的主電路板

**Exercise 1C — Fill in the Blank** 練習1C — 填空

Complete each sentence with the correct term. / 用正確的術語完成每個句子。

- The \_\_\_\_\_ is called the "brain" of the computer because it executes all program instructions. \_\_\_\_\_ 被稱為電腦的「大腦」，因為它執行所有程式指令。
- When you turn off your computer, all data stored in \_\_\_\_\_ is lost. 關閉電腦時，儲存在 \_\_\_\_\_ 中的所有資料都會消失。
- An \_\_\_\_\_ is faster than a \_\_\_\_\_ because it has no moving parts. SSD比HDD速度快，因為它沒有 \_\_\_\_\_。
- The \_\_\_\_\_ converts AC electricity from the wall outlet into DC power for the computer. \_\_\_\_\_ 將牆上插座的交流電轉換為電腦所需的直流電。
- The \_\_\_\_\_ is the main circuit board that connects all components. \_\_\_\_\_ 是連接所有元件的主電路板。
- The \_\_\_\_\_ handles all graphics, video rendering, and display output. \_\_\_\_\_ 負責所有圖形、影像渲染與螢幕輸出。
- BIOS firmware is stored in \_\_\_\_\_, which cannot be erased in normal use. BIOS韌體儲存在 \_\_\_\_\_ 中，正常使用下無法清除。
- CPU performance is measured in \_\_\_\_\_ (GHz), and RAM capacity is measured in \_\_\_\_\_ (GB). CPU效能以 \_\_\_\_\_ 衡量，RAM容量以 \_\_\_\_\_ 衡量。

**Exercise 1D — True or False** 練習1D — 是非題

Write T (True) or F (False) in the blank. / 在空白處寫 T (正確) 或 F (錯誤)。

#	T / F	Statement / 敘述
1	___	RAM permanently stores all your files even when the computer is turned off. RAM在電腦關機後仍然永久保存所有檔案。

#	T / F	Statement / 敘述
2	___	A GPU is primarily responsible for processing graphics and video output. GPU主要負責處理圖形和影像輸出。
3	___	An SSD uses spinning magnetic disks to store data. SSD使用旋轉磁性碟片來儲存資料。
4	___	The motherboard is the main circuit board that connects all components. 主機板是連接所有元件的主電路板。
5	___	The PSU rated in MHz determines CPU speed. 以MHz為單位的PSU決定了CPU的速度。
6	___	BIOS is stored in ROM and cannot be erased by normal means. BIOS儲存在ROM中，正常情況下無法清除。
7	___	PCIe slots are used to add components like GPUs and sound cards. PCIe插槽用於添加顯示卡和音效卡等元件。
8	___	The CPU cooler/heat sink is needed to prevent the CPU from overheating. CPU散熱器是防止CPU過熱所必需的。
9	___	The CPU (Central Processing Unit) is often called the "brain" of the computer because it processes all instructions. CPU (中央處理器) 常被稱為電腦的「大腦」，因為它處理所有指令。
10	___	GPU stands for "General Processing Unit" and is used mainly for internet browsing and email. GPU代表「一般處理單元」，主要用於瀏覽網路和電子郵件。
11	___	An SSD is faster than an HDD because it contains no moving mechanical parts. SSD比HDD速度快，因為它不含移動機械零件。
12	___	The PSU (Power Supply Unit) converts AC power from the wall outlet into DC power for internal components. PSU (電源供應器) 將牆上插座的交流電轉換為電腦內部元件所需的直流電。

### Exercise 1E — Short Answer 練習1E — 簡答題

Answer in English. Chinese notes are welcome. / 用英文回答，可加中文筆記。

1. List TWO differences between an HDD and an SSD. (列出HDD和SSD的兩個差異。)

2. In your own words, explain what the motherboard does. Use the word "connects" in your answer. (用自己的話解釋主機板的功能，回答需包含「connects」一詞。)

3. Why does a gaming computer need a more powerful GPU than a regular office computer? Explain your reasoning. (為什麼遊戲電腦需要更強大的GPU？請解釋理由。)

## WORKBOOK EXERCISES — UNIT 2: Peripheral Devices

### 練習題 — 第二單元：周邊設備

#### Exercise 2A — Classify the Devices 練習2A — 裝置分類

Sort each device into the correct column: Input / Output / Storage / Both (I+O). Write the device name in the correct column. / 將每個裝置分類到正確的欄位：輸入 / 輸出 / 儲存 / 兩者 (I+O)。

**Devices: Keyboard • Mouse • Monitor • Printer • Scanner • Microphone • Speakers • Webcam • USB Flash Drive • Touchscreen • Headphones • Projector • SD Card • External HDD**

INPUT / 輸入	OUTPUT / 輸出	STORAGE / 儲存	BOTH (I+O) / 兩者

#### Exercise 2B — Matching 練習2B — 配對

Match each peripheral with its correct function. / 將每個周邊設備與其正確功能配對。

1. Monitor / 螢幕	___	A. Converts physical documents to digital files
2. Printer / 印表機	___	B. Portable flash storage connected via USB
3. Scanner / 掃描器	___	C. Captures live video for calls and streaming
4. Webcam / 網路攝影機	___	D. Displays large images on wall or screen
5. Microphone / 麥克風	___	E. Primary visual output device for the computer
6. Projector / 投影機	___	F. Both displays content AND accepts touch input
7. Touchscreen / 觸控螢幕	___	G. Captures sound and converts it to digital signal
8. USB Flash Drive / USB隨身碟	___	H. Outputs physical paper documents

#### Exercise 2C — Short Answer 練習2C — 簡答題

Answer the following questions in English. / 用英文回答以下問題。

1. What is the difference between an INPUT device and an OUTPUT device? Give one example of each.

2. Why is a touchscreen considered BOTH an input and output device? (中文可以)

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3. Give TWO examples of storage devices. For each one, explain when you would use it.

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4. What happens when you scan a document? Which direction does the data flow (input or output)?

---

5. A printer is which category of peripheral device — input or output? Describe in one sentence what it does. (印表機屬於哪類周邊設備？請用一句話描述其功能。)

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6. Name TWO devices that can capture (record) video. For each one, state whether it is an input device, output device, or both. (說出兩種可以錄製影片的裝置，說明各是輸入還是輸出裝置。)

## WORKBOOK EXERCISES — UNIT 3: Ports & Connectors

### 練習題 — 第三單元：連接埠與連接器

#### Exercise 3A — Match the Port 練習3A — 配對連接埠

Match each port to its description. / 將每個連接埠與其描述配對。

1. USB Type-A (Blue)	___	A. Wired internet / network connection
2. HDMI	___	B. Headphone/speaker audio output
3. RJ-45 Ethernet	___	C. Legacy keyboard connector (old standard)
4. 3.5mm Green Jack	___	D. High-res video; common on gaming monitors
5. VGA	___	E. Carries video AND audio to TVs/monitors
6. USB Type-C	___	F. Older analog 15-pin video port
7. DisplayPort	___	G. USB 3.0 SuperSpeed data (up to 5 Gbps)
8. PS/2 (Purple)	___	H. Reversible connector; data, power & video

#### Exercise 3B — Fill in the Blank 練習3B — 填空

Complete each sentence. / 完成每個句子。

1. A \_\_\_\_\_ port is blue and supports speeds up to 5 Gbps, while a \_\_\_\_\_ port is black and supports up to 480 Mbps.
2. The \_\_\_\_\_ cable carries BOTH high-definition video AND audio in a single connection.
3. If you want to connect a monitor with maximum resolution for gaming, you should use \_\_\_\_\_ or \_\_\_\_\_.
4. A \_\_\_\_\_ (green) audio jack is for headphones/speakers, while a \_\_\_\_\_ (pink) jack is for a microphone.
5. The fastest port listed in Unit 3 is \_\_\_\_\_, which can reach speeds of up to 40 Gbps.
6. To connect a wired internet cable to a computer, you need an \_\_\_\_\_ (RJ-45) port.

**Exercise 3C — Port Scenario Questions** 練習3C — 情境題

For each scenario, write the correct port name. / 針對每個情境，寫出正確的連接埠名稱。

1. You want to connect your gaming monitor for maximum resolution (8K). Which port should you use?  
Answer: \_\_\_\_\_
2. You need to transfer files from your camera SD card to the computer. Which slot do you need?  
Answer: \_\_\_\_\_
3. You bought a new keyboard that uses the old "legacy" round connector. What port is that?  
Answer: \_\_\_\_\_
4. You want to connect your laptop to a TV using ONE cable for both video and audio. Which port is best?  
Answer: \_\_\_\_\_
5. You need a fast, wired internet connection. Which port do you plug the network cable into?  
Answer: \_\_\_\_\_
6. Your new phone uses a small, oval-shaped reversible connector. What connector type is that?  
Answer: \_\_\_\_\_

**Exercise 3D — True or False** 練習3D — 是非題

#	T / F	Statement / 敘述
1	___	A blue USB Type-A port is USB 3.0 and faster than a black USB 2.0 port. 藍色USB Type-A連接埠是USB 3.0，比黑色USB 2.0連接埠更快。
2	___	VGA carries both video and audio signals, just like HDMI. VGA像HDMI一樣，同時傳輸影像和音訊信號。
3	___	USB Type-C is reversible — you can plug it in either way. USB Type-C是可反向插拔的——兩面都可以插入。
4	___	The green 3.5mm audio jack is for microphone input. 綠色3.5mm音源插孔用於麥克風輸入。
5	___	An Ethernet/RJ-45 port is used for a wired internet connection. 乙太網路/RJ-45連接埠用於有線網路連接。
6	___	Thunderbolt 4 uses the same physical shape as USB Type-C. 雷電4使用與USB Type-C相同的物理外形。

**WORKBOOK EXERCISES — UNIT 4: Networking & Protocols**

## 練習題 — 第四單元：網路與網路協定

**Exercise 4A — Protocol Matching** 練習4A — 協定配對

Match each protocol to its purpose. / 將每個協定與其用途配對。

1. HTTP	___	A. SENDING email from client to mail server
2. HTTPS	___	B. Downloads email and deletes it from server
3. SMTP	___	C. Transfers files between computers on a network
4. POP3	___	D. Translates domain names to IP addresses
5. IMAP	___	E. Keeps email on server; syncs multiple devices
6. FTP	___	F. Automatically assigns IP addresses to devices
7. DNS	___	G. Transfers web pages; not encrypted (Port 80)
8. DHCP	___	H. Fast but no delivery guarantee (gaming, streaming)
9. TCP	___	I. Encrypted, secure web browsing (Port 443)
10. UDP	___	J. Reliable, ordered data delivery (web, email)

**Exercise 4B — Short Answer / In Your Own Words** 練習4B — 簡答題

Answer in English (you may add Chinese notes). / 用英文回答 (可加中文筆記)。

1. Explain the difference between HTTP and HTTPS. Why is HTTPS important? (解釋HTTP和HTTPS的區別，為什麼HTTPS很重要?)

2. What is the job of DNS? Use an analogy (比喻) to explain it clearly.

3. Your friend uses POP3 for their email. They notice their emails disappear from their phone after reading them on their laptop. Explain why this happens and what they should use instead.

4. What is the difference between TCP and UDP? Give one real-world example for each.

5. What is an IP address? What is the difference between IPv4 and IPv6? (IP位址是什麼? IPv4和IPv6有什麼不同?)

**Exercise 4C — True or False** 練習4C — 是非題

#	T / F	Statement / 敘述
1	___	HTTP is the encrypted, secure version of HTTPS. HTTP是HTTPS的加密安全版本。
2	___	DNS translates domain names (like google.com) into IP addresses. DNS將域名 (如google.com) 轉換為IP位址。
3	___	TCP guarantees that all data packets arrive correctly and in the right order. TCP保證所有資料封包正確且按順序到達。
4	___	UDP is preferred for live video streaming because speed matters more than perfect delivery. UDP更適合即時視訊串流，因為速度比完美傳輸更重要。
5	___	DHCP automatically assigns IP addresses to devices when they join a network. DHCP在裝置加入網路時自動分配IP位址。
6	___	FTP is the protocol used to send and receive email messages between users. FTP是使用者之間傳送和接收電子郵件的協定。
7	___	IMAP keeps your emails on the server, allowing access from any device at any time. IMAP將電子郵件保存在伺服器上，讓您隨時從任何裝置存取。
8	___	POP3 is better than IMAP for syncing email across your phone, laptop, and tablet. POP3比IMAP更適合在手機、筆電和平板電腦之間同步電子郵件。
9	___	HTTPS uses port 443 for encrypted web connections. HTTPS使用443埠進行加密網路連接。
10	___	A device using DHCP receives a permanent IP address that never changes. 使用DHCP的裝置會收到永久不變的IP位址。

**WORKBOOK EXERCISES — UNIT 5: Software, OS & Data**

## 練習題 — 第五單元：軟體、作業系統與資料

**Exercise 5A — Storage Unit Calculations** 練習5A — 儲存單位計算

Use the conversion chart: 1 KB = 1,024 B | 1 MB = 1,024 KB | 1 GB = 1,024 MB | 1 TB = 1,024 GB

1. A photo file is 4.5 MB. How many bytes is that? Show your working.

2. A USB flash drive holds 32 GB. How many 4 MB photos can it store?

3. An HD movie is 8 GB. How many movies can fit on a 2 TB hard drive?

4. Convert 5,120 MB into GB.

5. Write the number 13 in binary (二進位). Show your work.

**Exercise 5B — Classify the Software** 練習5B — 軟體分類

Sort each item into *SYSTEM SOFTWARE* or *APPLICATION SOFTWARE*. / 將每個項目分類為系統軟體或應用軟體。

Items: Windows 11 • Google Chrome • Printer Driver • Microsoft Word • Linux • Antivirus Software • LINE • Adobe Photoshop • macOS • GPU Driver • Python • Android

SYSTEM SOFTWARE / 系統軟體	APPLICATION SOFTWARE / 應用軟體

**Exercise 5C — Short Answer** 練習5C — 簡答題

1. What is the difference between GUI and CLI? Which is easier for beginners and why? (GUI和CLI有什麼不同？哪個對初學者更容易，為什麼？)

2. Explain what a "driver" does. Why do you need to install a printer driver before you can print? (解釋「驅動程式」的作用。為什麼在列印前需要安裝印表機驅動程式？)

3. What is an algorithm? Write a simple algorithm (step-by-step) for making a cup of instant noodles (泡麵). Use at least 5 steps.

4. What is the difference between RAM and a hard drive? Why do computers need BOTH?

5. Why is HTTPS better than HTTP for online shopping or banking? Mention the word "encryption" (加密) in your answer.

## ANSWER KEY / 解答

(Teacher/Student Reference — 教師/學生參考)

### Unit 1 Answers 第一單元解答

#### Exercise 1A — Label the Diagram (refer to numbered diagram):

- ① Computer Case ② Optical Drive ③ Motherboard ④ CPU + Heat Sink ⑤ RAM ⑥ GPU ⑦ HDD ⑧ SSD  
⑨ PSU ⑩ Case Fan

#### Exercise 1B — Matching: 1-F 2-E 3-G 4-D 5-A 6-C 7-B 8-H

1→F	2→E	3→G	4→D
5→A	6→C	7→B	8→H

#### Exercise 1C — Fill in the Blank:

1. CPU 2. RAM 3. SSD / HDD (no moving parts) 4. PSU 5. Motherboard 6. GPU 7. ROM 8. GHz / GB

#### Exercise 1D — True or False:

1. F 2. T 3. F 4. T 5. F 6. T 7. T 8. T 9. T 10. F (GPU = Graphics Processing) 11. T 12. T

### Unit 2 Answers 第二單元解答

#### Exercise 2A — Classification:

INPUT: Keyboard, Mouse, Scanner, Microphone, Webcam

OUTPUT: Monitor, Printer, Speakers, Headphones, Projector

STORAGE: USB Flash Drive, SD Card, External HDD

BOTH (I+O): Touchscreen

#### Exercise 2B — Matching: 1-E 2-H 3-A 4-C 5-G 6-D 7-F 8-B

1→E	2→H	3→A	4→C
5→G	6→D	7→F	8→B

### Unit 3 Answers 第三單元解答

#### Exercise 3A — Port Matching: 1-G 2-E 3-A 4-B 5-F 6-H 7-D 8-C

1→G	2→E	3→A	4→B
5→F	6→H	7→D	8→C

#### Exercise 3B — Fill in the Blank:

1. USB 3.0 (blue) / USB 2.0 (black) 2. HDMI 3. DisplayPort / HDMI 4. Green / Pink 5. Thunderbolt 4 6. Ethernet/RJ-45

#### Exercise 3C — Scenario Answers / Exercise 3D — True or False:

3C: 1. DisplayPort 2. SD Card 3. PS/2 4. HDMI 5. Ethernet/RJ-45 6. USB Type-C | 3D: 1. T 2. F (VGA is video only) 3. T 4. F (green = headphones/speakers) 5. T 6. T

## Unit 4 Answers 第四單元解答

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### Exercise 4A — Protocol Matching: 1-G 2-I 3-A 4-B 5-E 6-C 7-D 8-F 9-J 10-H

1→G	2→I	3→A	4→B
5→E	6→C	7→D	8→F
9→J	10→H		

### Exercise 4C — True or False:

1. F (HTTP is unencrypted; HTTPS is secure) 2. T 3. T 4. T 5. T 6. F (FTP transfers files, not email) 7. T 8. F (IMAP is better for multi-device) 9. T 10. F (DHCP assigns temporary addresses)

## Unit 5 Answers 第五單元解答

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### Exercise 5A — Storage Calculations:

1.  $4.5 \text{ MB} \times 1,024 \times 1,024 = 4,718,592 \text{ bytes}$  2.  $32,768 \text{ MB} \div 4 \text{ MB} = 8,192 \text{ photos}$  3.  $2,048 \text{ GB} \div 8 \text{ GB} = 256 \text{ movies}$  4.  $5,120 \text{ MB} \div 1,024 = 5 \text{ GB}$  5.  $13 = 8+4+1 \rightarrow \text{binary: } 1101$

### Exercise 5B — Software Classification:

SYSTEM: Windows 11, Linux, macOS, Android, Printer Driver, Antivirus Software, GPU Driver

APPLICATION: Google Chrome, Microsoft Word, LINE, Adobe Photoshop, Python (interpreter/IDE)

恭喜完成練習！ Good work! 繼續努力！