A-LEVEL COMPUTER SCIENCE • EXERCISE SHEET

5.1 Operating Systems

Name: _____ Class: _____ Date: _____ **Total: 31 marks**

KEY WORDS operating system 操作系统 • program library 程序库 • process 进程 • memory management 内存管理 • process management 进程管理

Objective

Build the skills to answer exam questions on the **operating system** 操作系统 — why it is needed, its management tasks, utility software and program libraries.

You must be able to:

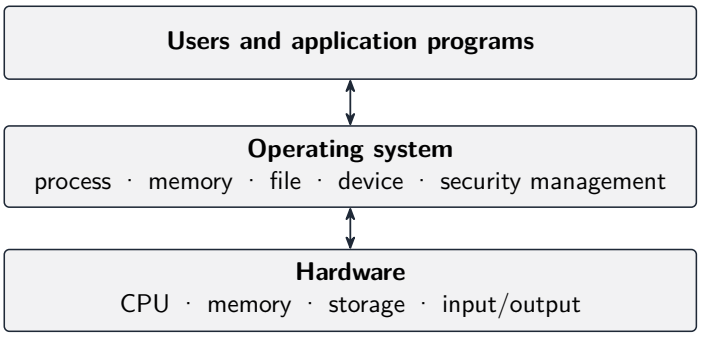
- explain **why** a computer needs an operating system
- describe the key **management tasks** the OS performs
- describe typical **utility software** and the use of **program libraries**

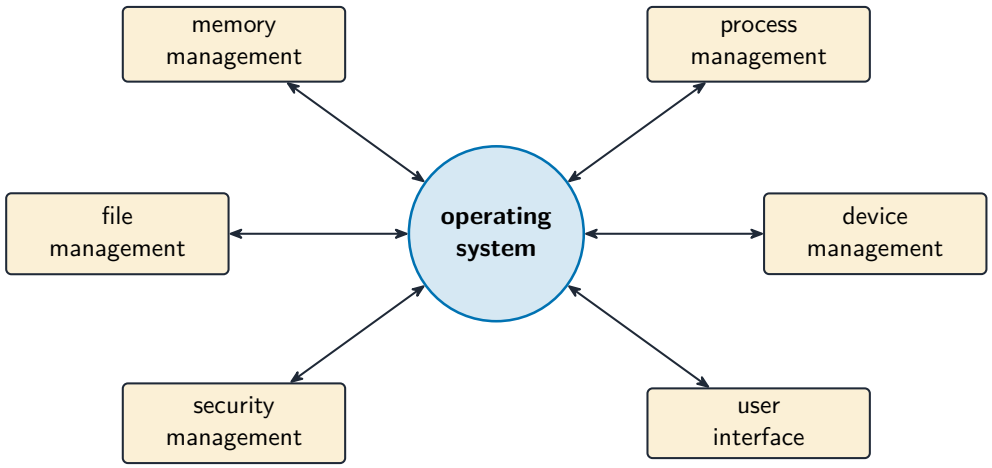
1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ Why an OS, and where it sits

Hardware alone only fetches and runs instructions. The **operating system** is the software layer that manages the hardware and provides services, so programs do not talk to the hardware directly:





The core tasks an operating system manages

The management tasks

Task	What it does
process management	load programs, schedule CPU time, switch between processes
memory management	give each process memory, keep them apart, use virtual memory
file management	organise files/folders, control permissions
device management	handle I/O through device drivers, buffer data
security management	user accounts, permissions, encryption

It also provides the **user interface** and **networking**.

Utility software and libraries

Utility programs maintain the system: disk/file management, **defragmenter** (reorders fragmented files on a hard disk), backup, antivirus, compression. A **program library** is a collection of ready-made, tested routines a programmer can reuse instead of rewriting them.

2 Practice

Now apply the methods above.

2.1 State **two** reasons a computer needs an operating system. [2]

2.2 Name the OS task that gives each running program CPU time and switches between programs. [1]

2.3 State what **memory management** does. [2]

2.4 State one benefit of using a **program library**. [1]

3 Exam-style questions

3.1 Explain why application programs do not access the hardware directly. [3]

3.2 Describe **two** management tasks carried out by an operating system. [4]

3.3 (a) State what a **disk defragmenter** does. [2]

(b) State why a defragmenter is **not** useful on a solid-state drive (SSD). [1]

3.4 Explain how **memory management** keeps two running programs from interfering with each other. [2]

3.5 An operating system manages a shared school computer.

(a) **State** two tasks performed by **hardware management**. [2]

(b) **State** two tasks performed by **security management**. [2]

(c) **Describe** how the operating system's **file management** lets two students save work with the same file name without either losing it. [3]

(d) A programmer building a new attendance system uses **library routines** for the date handling and the encryption. **Describe** one benefit and one drawback of doing so. [4]

(e) **Explain** why a **utility program** such as a disk defragmenter is not part of the operating system kernel itself. [2]