

4. Processor Fundamentals

Starter Quiz · 课前小测

A-Level Computer Science

Name: _____ Score: _____

1. The stored-program (Von Neumann) idea means that:

- ☐ a single memory holds both the program instructions and the data
- ☐ programs are stored only in the CPU
- ☐ data and instructions use separate memories
- ☐ the program cannot be changed

2. Select **all** the factors that affect CPU performance.

- ☐ clock speed
- ☐ number of cores
- ☐ cache size
- ☐ the colour of the case

Tick every correct option.

3. Assembly language is:

- ☐ a readable form of machine code, with one instruction per machine instruction
- ☐ a high-level language like Python
- ☐ the same as binary data
- ☐ only used for web pages

4. The 8-bit value '00001011' (11) is shifted left by 1 ('LSL #1'). What is the new denary value?

5. The ALU is responsible for:

- ☐ arithmetic and logic operations
- ☐ decoding instructions
- ☐ storing the next instruction's address
- ☐ generating the clock pulses

6. A multi-core CPU is especially helpful for:

- ☐ running several threads/tasks at the same time (parallel work)
- ☐ a single task that cannot be split up
- ☐ reducing the clock speed
- ☐ storing more files

7. What does pass 1 of a two-pass assembler do?

- ☐ builds a symbol table recording each label's address
- ☐ runs the program
- ☐ generates all the machine code
- ☐ optimises the code

8. Shifting an unsigned number left by 3 places multiplies it by what number?

9. The _____ unit decodes each instruction and sends the control signals that carry it out.

10. _____ memory is a small, fast store next to the processor that holds recently used instructions and data, so fewer slow trips to RAM are needed.

1. a single memory holds both the program instructions and the data

One memory holds instructions and data together; changing the stored program changes what the computer does, with no rewiring.

2. clock speed; number of cores; cache size

Clock speed, cores and cache (plus word size, RAM, storage and bus width) all affect performance. The case colour does not.

3. a readable form of machine code, with one instruction per machine instruction

Assembly uses mnemonics and maps one-to-one to machine code; an assembler translates it.

4. 22

A left shift by 1 multiplies by 2: $11 \times 2 = 22$ ('00010110').

5. arithmetic and logic operations

The Arithmetic and Logic Unit performs calculations and logic/comparisons. Decoding is the control unit's job.

6. running several threads/tasks at the same time (parallel work)

Extra cores run tasks in parallel. A purely single-threaded job benefits more from higher per-core speed.

7. builds a symbol table recording each label's address

Pass 1 records where each label is (the symbol table); pass 2 then generates code, using the table to resolve label references.

8. 8

Shifting by n places multiplies by 2^n , so by 3 places is $2^3 = 8$.

9. control

The control unit decodes and signals; the ALU does the arithmetic and logic; the clock keeps them in step.

10. Cache

More cache means more of the working set sits next to the processor, which is the reason it appears in every performance comparison.