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

   ☐ a single memory holds both the program instructions and the data

   ☐ data and instructions use separate memories

   ☐ the program cannot be changed

   ☐ programs are stored only in the CPU

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

   ☐ the colour of the case

   ☐ clock speed

   ☐ number of cores

   ☐ cache size

   Tick every correct option.

3. Assembly language is:

   ☐ a high-level language like Python, compiled to bytecode

   ☐ a readable form of machine code, with one instruction per machine instruction

   ☐ the same as binary data, written as 0s and 1s

   ☐ a markup language used only 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:

   ☐ reducing the clock speed

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

   ☐ a single task that cannot be split up

   ☐ storing more files

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   ☐ generates all the machine code

   ☐ builds a symbol table recording each label’s address

   ☐ optimises the code

   ☐ runs the program

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.

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