
Section 2.7 — Assembling an ARM Program (Mazidi)

2025-09-01

Chapter 2 • Section 2.7 — Exercises (Mazidi)

Problems are paraphrased to respect copyright. For workflow/background, see **Mazidi, Ch. 2 §2.7**.

42) Assembly language is a _____ (low, high)-level language while C is a _____ (low, high)-level language.

Answer: low, high.

Why: Assembly maps closely to machine instructions; C abstracts the hardware.

43) Of C and Assembly, which is more efficient in terms of code generation (program memory used)?

Answer: **Assembly** (typically smaller/tighter when hand-optimized).

Why: It gives direct control over instructions. (*Modern compilers may be close, but the textbook expectation is Assembly → smaller code.*)

44) Which program produces the obj (object) file?

Answer: The **assembler** (for `.s/.asm` sources).

Note: For C sources the **compiler** also emits object files.

45) True or False. The source file has the extension “asm”.

Answer: **True** (commonly accepted; many toolchains also use `.s/.S`).

46) True or False. The source code file can be a non-ASCII file.

Answer: **False**.

Why: Source files are **text (ASCII/UTF-8)**; non-text/binary is invalid as source.

47) True or False. Every source file must have an EQU directive.

Answer: **False**.

Why: EQU defines constants; it's **optional**.

48) Do the EQU and END directives produce opcodes?

Answer: **No**.

Why: They are **assembler directives (pseudo-ops)**, not CPU instructions.

49) Why are directives also called pseudocode/pseudo-ops?

Answer: Because they give **instructions to the assembler/linker**, not to the CPU; they **do not generate machine opcodes**.

50) The file with the _____ extension is downloaded into ARM Flash ROM.

Answer: `.hex` (Intel HEX) (*sometimes .bin is also used*).

51) Give three file extensions produced by ARM Keil.

Answer (any three): `.obj`, `.hex`, `.lst` (*also common: .axf, .map, .o*).

Notes for learners

- Typical build: **source** (`.s/.asm/.c`) → **object** (`.obj/.o`) → **executable** (`.axf`) → **image** (`.hex/.bin`).
- **Directives** (e.g., AREA, EQU, END) shape assembly/placement but don't execute on the CPU.
- Keil/MDK often uses **.axf** (ELF/DWARF) for debug and **.hex** for programming the MCU.