

2.3 ALGORITHMS · 2.3.1(A)(B)

Analysis & design of algorithms

Define the problem, plan the solution, pick the best-fit algorithm. Spec 2.3.1(a)(b).

01 Analysis — the WHAT

I/O	Inputs & outputs.
Process	How inputs → outputs.
Criteria	Measurable success criteria.
Tests	Normal · boundary · erroneous data.

02 Design — the HOW

Decompose Into sub-problems (structure diagram).

Choose Data structures + algorithm.

Express Pseudocode · flowchart · structure diagram.

Plan Test data for each part.

03 Suitability (2.3.1b)

Time	Execution time (matters most for big data).
Space	Memory used (matters on limited hardware).
Data	Small → simple OK; large → efficiency wins.
Precond.	Binary search needs sorted data.

04 Time–space trade-off

Idea More memory can buy speed (& vice versa).

Example Caching: extra memory → faster repeats.

Choose Balance by which resource is scarcer.

FINAL PASS BEFORE THE EXAM

Rapid exam tips

Six slips on analysis & design questions.

01

Analysis = **WHAT** (I/O, criteria); design = **HOW** (structures, algorithm).

02

Success criteria are **measurable** — how you'll know it works.

03

Judge suitability on **time AND space** — not speed alone.

04

Justify the choice **for the data set**: small/large, sorted/unordered.

05

Binary search needs **sorted** data — state the precondition.

06

Test data = **normal · boundary · erroneous**.