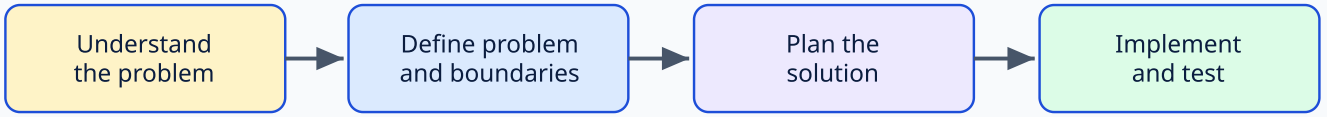
Grade 13 A/L ICT · Lesson 9

9.1 The Problem-Solving Process

Syllabus 9.1. Before writing code, a programmer solves the problem on paper. The four steps are: **understand the problem**, **define the problem and its boundaries**, **plan the solution** and **implement** it.

1. The four steps

Problem-solving process



Input → process → output: list what is given, what is needed and the limits first.

Problem-solving steps

Understand
Read carefully: what is given (input) and what is wanted (output)?

Define and set boundaries
State the exact task and limits, e.g. lengths are positive numbers in metres.

Plan
Choose the steps (algorithm) as a flowchart or pseudocode.

Implement
Write the program, run it with test data, fix errors and evaluate whether it really solves the problem.

Part	Rectangle problem
Input	length, width
Process	area = length × width; perimeter = 2 × (length + width)
Output	area, perimeter
Boundary	length and width > 0

2. Implementing the plan in Python

🐍 Rectangle area and perimeter

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

```
# 1 input  2 process  3 output
length = float(input("Length: "))
width = float(input("Width: "))
area = length * width
perimeter = 2 * (length + width)
print("Area =", area)
print("Perimeter =", perimeter)
```

▶ Output

```
Length: 5
Width: 3
Area = 15.0
Perimeter = 16.0
```

🧱 **Worked example: Test the rectangle program with length 5 and width 3.**
Hand calculation: area = 5 × 3 = **15**, perimeter = 2 × (5 + 3) = **16**. The program printed Area = 15.0 and Perimeter = 16.0, so the plan is correct.

💡 Always work out the expected answer by hand before you run the program.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 AI assistants can write code from a problem statement, but a clear definition and test cases are still the programmer's job.

Key Words

Problem solving – Process of finding a method to reach a goal.

Understanding the problem – Finding what is given and what is required.

Problem definition – Exact statement of the task to be solved.

Boundary – Limit on the scope or allowed values of a problem.

Planning – Designing the steps of the solution before coding.

Implementation – Coding, running and testing the planned solution.

Input – Data given to the solution.

Process – Steps that change input into output.

Output – Result produced by the solution.

Test data – Input values used to check a program.

Expected result – Answer worked out by hand before running.

Algorithm – Finite ordered steps that solve a problem.

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

Sample Q&A

1. List the four steps of problem solving.

> **Answer:** Understand, define with boundaries, plan, implement.

2. What is a boundary of a problem?

> **Answer:** A limit such as “length must be greater than 0”.

3. Inputs of the rectangle problem?

> **Answer:** length and width.

4. Output for 5 and 3?

> **Answer:** Area 15.0, perimeter 16.0.

5. Why plan before coding?

> **Answer:** Fewer errors and a clear, checkable set of steps.

6. What happens in implementation?

> **Answer:** Code is written, run with test data and debugged.

MCQ

1. The first step of problem solving is

A. printing output
B. writing code
C. understanding the problem
D. choosing a language
E. testing

2. “Length must be positive” is a

A. process
B. test result
C. output
D. comment
E. boundary of the problem

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

3. Choosing the steps as a flowchart happens in

A. planning
B. understanding
C. maintenance
D. output
E. implementation

4. For length 5 and width 3 the area printed is

A. 16.0
B. 8.0
C. 2.0
D. 15.0
E. 30.0

5. For length 5 and width 3 the perimeter printed is

A. 30.0
B. 8.0
C. 16.0
D. 15.0
E. 10.0

6. Running the program with sample values is part of

A. boundary setting
B. implementation
C. planning only
D. understanding
E. defining

7. In the rectangle problem, length and width are the

A. inputs
B. outputs
C. comments
D. constants only
E. boundaries

8. An answer worked out by hand before running is the

A. boundary
B. actual output
C. expected result
D. syntax error
E. variable

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

9. Which term means: “Process of finding a method to reach a goal”?

A. Problem definition
B. Expected result
C. Process
D. Implementation
E. Problem solving

10. Which term means: “Finding what is given and what is required”?

A. Boundary
B. Understanding the problem
C. Input
D. Algorithm
E. Output

11. Which term means: “Exact statement of the task to be solved”?

A. Test data
B. Process
C. Problem solving
D. Planning
E. Problem definition

12. Which term means: “Limit on the scope or allowed values of a problem”?

A. Output
B. Understanding the problem
C. Expected result
D. Boundary
E. Implementation

13. Which term means: “Designing the steps of the solution before coding”?

A. Test data
B. Input
C. Algorithm
D. Planning
E. Problem definition

14. Which term means: “Coding, running and testing the planned solution”?

A. Implementation
B. Process
C. Expected result
D. Problem solving
E. Boundary

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

15. Which term means: “Data given to the solution”?

A. Input
B. Algorithm
C. Planning
D. Understanding the problem
E. Output

16. Which term means: “Steps that change input into output”?

A. Test data
B. Problem definition
C. Implementation
D. Problem solving
E. Process

17. Which term means: “Result produced by the solution”?

A. Input
B. Output
C. Expected result
D. Understanding the problem
E. Boundary

18. Which term means: “Input values used to check a program”?

A. Problem definition
B. Planning
C. Test data
D. Algorithm
E. Process

19. Which term means: “Answer worked out by hand before running”?

A. Problem solving
B. Expected result
C. Output
D. Implementation
E. Boundary

20. Which term means: “Finite ordered steps that solve a problem”?

A. Test data
B. Input
C. Understanding the problem
D. Algorithm
E. Planning

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

Structured Questions

1. Describe the four steps of problem solving. *(4 marks)*

> Understand; define and boundaries; plan; implement and test.

2. Identify input, process and output for the rectangle problem. *(3 marks)*

> Input length, width; area = l × w and perimeter = 2(l + w); output both.

3. State two boundaries for a marks-entry problem. *(2 marks)*

> Marks 0–100; whole numbers only.

4. Why should expected results be found before running? *(2 marks)*

> Compare actual output; detect logic errors.

5. Write a Python program to find area and perimeter of a rectangle. *(3 marks)*

> input with float; area and perimeter formulas; print both.

Summary

- Understand the problem first.
- Define the task and its boundaries.
- Plan the steps before coding.
- Implement and test with data.
- Compare output with the expected result.

MCQ answer key – 9.1

1. **C** – Understand first.
2. **E** – Limit.
3. **A** – Plan.
4. **D** – 5 × 3.
5. **C** – 2 × 8.
6. **B** – Implement and test.
7. **A** – Inputs.
8. **C** – Expected.
9. **E** – Problem solving – Process of finding a method to reach a goal.
10. **B** – Understanding the problem – Finding what is given and what is required.
11. **E** – Problem definition – Exact statement of the task to be solved.
12. **D** – Boundary – Limit on the scope or allowed values of a problem.
13. **D** – Planning – Designing the steps of the solution before coding.
14. **A** – Implementation – Coding, running and testing the planned solution.
15. **A** – Input – Data given to the solution.

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

16. **E** – Process – Steps that change input into output.
17. **B** – Output – Result produced by the solution.
18. **C** – Test data – Input values used to check a program.
19. **B** – Expected result – Answer worked out by hand before running.
20. **D** – Algorithm – Finite ordered steps that solve a problem.

© 2026 schoolict.net (Ruwan Mangala Suraweera). All rights reserved.