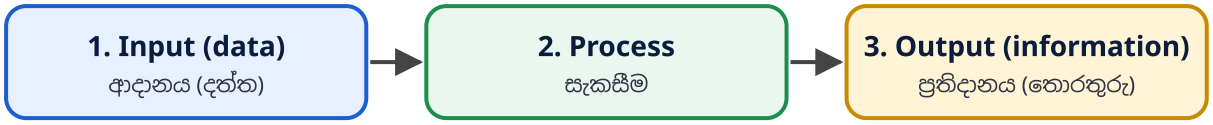
Grade 12 A/L ICT · Lesson 1

1.3 The Input–Process–Output Model and Systems

Syllabus 1.3. Every kind of information is made in the same simple way: we take something in (**input**), do something to it (**process**) and give something out (**output**). This is the **abstract model of information creation**, also called the **IPO model**. In this part you use it to define a **system**, study real systems, and match it to the main functions of a computer.

1. The abstract model of information creation



Storage and feedback support every step

Input → Process → Output.

Input
The data that go into the model.

Process
The actions that change data (calculate, sort, compare).

Output
The information that comes out.

“Abstract” means we keep only the main idea and hide the details. The same three boxes describe a calculator, a school report system or a cash register.

> 🧱 **Worked example: Apply the IPO model to a student’s marks**
> **Input:** 72, 85, 64. **Process:** add them (221) and divide by 3; compare with the grade scale.
> **Output:** average **73.67**, grade **B**.

2. What is a system?

A **system** is a set of related parts (components) that work together to achieve a common goal, by taking inputs, processing them and producing outputs. A system has a **boundary** (what is inside it) and an **environment** (what is outside it). Many systems also have **feedback** – some output is sent back to control the input or process – and **storage**.

System	Input	Process	Output	Goal
ATM	Card, PIN, amount	Check PIN and balance	Cash, receipt	Give cash safely

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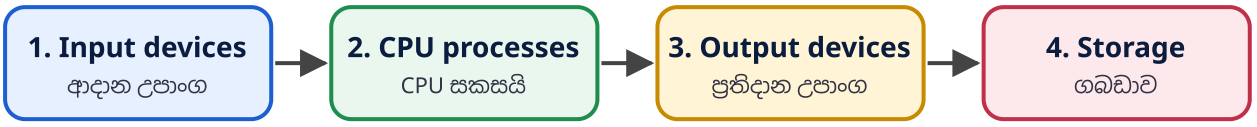
Supermarket POS	Bar codes	Find prices, add total	Bill	Sell goods quickly
Human digestive system	Food	Digestion	Energy, waste	Keep the body alive
Air conditioner	Room temperature	Compare with set value	Cool air	Keep the room at 24 °C

> 💡 An air conditioner shows feedback: the output (cooler room) is measured again and becomes new input, so the machine knows when to stop.

3. Information systems

An **information system** is a system whose input is data and whose output is information. Its components are hardware, software, data, procedures and people. Example: a school examination system – input: marks; process: totals, averages, ranks; output: report cards.

4. The model and the computer



The main functions of a computer follow the same model.

Model part	Computer function	Devices
Input	Accept data	Keyboard, mouse, scanner, sensors
Process	Process data (ALU and CU)	CPU
Output	Produce information	Monitor, printer, speaker
Storage	Store data and programs	RAM, SSD, hard disk

5. The role of ICT in the model

- **Input** – ICT collects data automatically (bar codes, sensors, online forms).
- **Process** – the computer processes very fast and accurately.
- **Output** – information is shown on screens, printed, or sent over networks at once.
- **Storage and communication** – data are kept safely and shared with many users.

> 🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* **Generative AI in the IPO model.** A chatbot also fits the model: input = your prompt; process = a large language model predicts words using billions of learned values; output = generated text, images or code. Because the process is statistical, the output can be wrong (a “hallucination”), so it must always be checked.

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Key Words

Input – Data that enter a system.	**Process** – Actions that change inputs into outputs.
Output – Results that leave a system.	**Abstract model** – A simple model that shows the main idea and hides details.
System – Related parts working together to reach a common goal.	**Boundary** – The line that separates a system from its environment.
Environment – Everything outside a system that affects it.	**Feedback** – Output sent back to control the input or process.
Information system – A system that turns data into information.	**CPU** – The part of a computer that processes data.
Storage – Keeping data and programs for later use.	**Component** – One part of a system.

Sample Q&A

1. Name the three parts of the abstract model of information creation.

> **Answer:** Input, process and output.

2. Define a system.

> **Answer:** A set of related components working together to achieve a common goal by taking inputs, processing them and giving outputs.

3. What is feedback? Give an example.

> **Answer:** Output sent back to control the system. Example: a thermostat measures the room temperature it produced and switches the cooler off.

4. Match the IPO model to computer functions.

> **Answer:** Input devices accept data, the CPU processes it, output devices give information, and storage devices keep data.

5. Give the input, process and output of an ATM.

> **Answer:** Input: card, PIN, amount. Process: check PIN and balance, update the account. Output: cash and receipt.

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6. What is an information system?

> **Answer:** A system that takes data as input and produces information as output, using hardware, software, data, procedures and people.

MCQ

1. In a supermarket POS, scanning bar codes is the:

A. Process
B. Input
C. Feedback
D. Output
E. Environment

2. Calculating a bill total is the:

A. Output
B. Input
C. Process
D. Storage
E. Boundary

3. Marks 72, 85, 64 are processed. The output average is:

A. 74.33
B. 221
C. 72
D. 73.67
E. 64

4. With A 75+, B 65–74, C 50–64, what grade is an average of 73.67?

A. C
B. B
C. S
D. W
E. A

5. Which part of the computer matches “process” in the IPO model?

A. Keyboard
B. Printer
C. Speaker
D. Monitor
E. CPU

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6. A thermostat switching off the cooler when the room reaches 24 °C shows:

A. Obsolete data
B. Piracy
C. Batch processing
D. Duplication
E. Feedback

7. Everything outside a system that affects it is the:

A. Environment
B. Component
C. Boundary
D. Output
E. Process

8. Which is the best definition of a system?

A. A printed report
B. Any single computer
C. Related parts working together for a common goal
D. A list of data
E. Only software

9. “Abstract” in the abstract model means:

A. Showing the main idea and hiding details
B. Hand drawn
C. Only for computers
D. Very detailed
E. Impossible to use

10. A report card printed by a school system is:

A. Input (data)
B. Output (information)
C. Boundary
D. Process
E. Hardware only

11. Which device is used for storage?

A. SSD
B. Mouse
C. Speaker
D. Microphone
E. Scanner

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12. The human digestive system’s output is:

A. Teeth
B. Digestion
C. Food
D. The stomach
E. Energy and waste

13. Which term means: “Data that enter a system”?

A. Boundary
B. Output
C. Feedback
D. Input
E. Storage

14. Which term means: “Actions that change inputs into outputs”?

A. Environment
B. Information system
C. Component
D. Process
E. Abstract model

15. Which term means: “Results that leave a system”?

A. CPU
B. Input
C. Output
D. System
E. Feedback

16. Which term means: “A simple model that shows the main idea and hides details”?

A. Abstract model
B. Storage
C. Process
D. Boundary
E. Information system

17. Which term means: “Related parts working together to reach a common goal”?

A. Environment
B. Component
C. System
D. Output
E. CPU

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18. Which term means: “The line that separates a system from its environment”?

A. Input
B. Feedback
C. Storage
D. Boundary
E. Abstract model

19. Which term means: “Everything outside a system that affects it”?

A. System
B. Environment
C. Process
D. Information system
E. Component

20. Which term means: “Output sent back to control the input or process”?

A. Boundary
B. Output
C. Input
D. CPU
E. Feedback

Structured Questions

1. Draw and label the abstract model of information creation and explain each part. *(4 marks)*

> Input → Process → Output with arrows; input is data entering; process changes data by calculating, sorting or comparing; output is the information produced

2. Define a system and analyse an ATM using the definition (goal, input, process, output). *(5 marks)*

> Related parts working for a common goal; goal – give cash safely; input – card, PIN, amount; process – verify PIN, check balance, update account; output – cash, receipt

3. A student’s marks are 72, 85 and 64. Using the IPO model, show the input, the process steps and the output (average and grade). Use A 75+, B 65–74, C 50–64. *(5 marks)*

> Input 72, 85, 64; add = 221; divide by 3 = 73.67; compare with scale; output grade B

4. Match the IPO model to the main functions of a computer, naming one device for each. *(4 marks)*

> Input – accept data – keyboard; process – CPU (ALU and control unit); output – produce information – monitor; storage – keep data – SSD

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5. Explain feedback using an automatic air conditioner. *(5 marks)*

> A sensor measures the room temperature (input); it is compared with the set value (process); the cooler runs (output); the new temperature is measured again and fed back; the cooler stops when the set value is reached

Summary

- Abstract model of information creation: input → process → output.
- A system is related parts working together for a common goal.
- Systems have a boundary, an environment, and often feedback and storage.
- Computer functions match the model: input devices, CPU, output devices, storage.
- An information system turns data into information.

MCQ answer key – 1.3

1. **B** – Data enter the system.
2. **C** – Data are changed.
3. **D** – 221 ÷ 3.
4. **B** – 65 ≤ 73.67 ≤ 74.
5. **E** – The CPU processes.
6. **E** – Output controls the system.
7. **A** – Outside the boundary.
8. **C** – Parts + goal + IPO.
9. **A** – Abstraction hides detail.
10. **B** – It is the result.
11. **A** – An SSD keeps data.
12. **E** – Food is input; digestion is process.
13. **D** – Input – Data that enter a system.
14. **D** – Process – Actions that change inputs into outputs.
15. **C** – Output – Results that leave a system.
16. **A** – Abstract model – A simple model that shows the main idea and hides details.
17. **C** – System – Related parts working together to reach a common goal.
18. **D** – Boundary – The line that separates a system from its environment.
19. **B** – Environment – Everything outside a system that affects it.
20. **E** – Feedback – Output sent back to control the input or process.

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