

MPA International School



YEAR 9

COMPUTING

Reference Resources Booklet (1)

Name :

ID :

Class :

2026-2027 Academic Year

YEAR 9

COMPUTING

Reference Resources Booklet (1)

Preface

At MPA International School, we are committed to nurturing learners who are not only knowledgeable but also capable of guiding their own learning journey. This booklet has been carefully prepared to support our students as a confident, curious, and independent learner by providing clear, structured notes that reinforce key concepts and offer guidance across all related topics.

Each section in this booklet connects directly to the topics of the textbook, offering:

- Clear explanations of key ideas
- Concept summaries for quick revision
- Supportive notes that encourage **self-study** and **personal reflection**

This resource is designed to help students’ **review at their own pace**, explore topics more deeply, and strengthen what they’ve learned in class. Whether they’re preparing for a quiz, completing homework, or simply curious to know more—this booklet is here to guide and support them. Most importantly, use it to grow as a **self-directed learner**—someone who learns with purpose, confidence, and curiosity.

This resource is not meant to replace active learning or classroom discussion but to empower students to revisit important content at their own pace—whether reviewing after a lesson, preparing for a quiz, or exploring further out of curiosity.

We hope this booklet empowers you to take ownership of your learning with purpose and pride.

Academic Team

MPA International School

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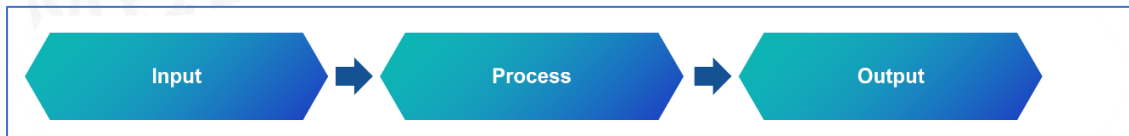
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Computer system

The Computer Input and Output System

A computer system works by:

- Receiving data (Input)
- Processing the data (Process)
- Producing information (Output).



What is an Input Device?

An input device is hardware used to enter data and instructions into a computer.

Examples

- Keyboard
- Mouse
- Scanner
- Microphone
- Webcam
- Barcode Scanner
- Joystick/Game Controller

What is an Output Device?

An output device is hardware that displays or presents information from a computer.

Examples

- Monitor
- Printer
- Speakers
- Headphones
- Projector
- Plotter

Devices That Perform Both Functions

Some devices can both receive and send information.

Example

Touchscreen

- Input: Detects touch.
- Output: Displays images and text.

VR Headset

- Input: Tracks movement.
- Output: Shows images and sound.

Identify the Device Type

Device	Input	Output	Both
Keyboard	✓		
Printer		✓	
Touchscreen			✓
Speakers		✓	
Webcam	✓		
Interactive Whiteboard			✓

Component of Computer

Internal components

The diagram below shows the internal components of a common desktop computer.



The Purpose of Key Component

Hard Drive

Used for long-term storage of the operating system, applications, and user files. device, like a monitor.

Graphics (Video) Card

Connects the computer to a display device, like a monitor.

CPU

Known as the 'brain' of the computer; it processes input signals and sends output.

ROM: Read-Only Memory

stores essential system information.

Power Supply

Converts mains electricity into a level suitable for the computer.

Random Access Memory

acts as short-term memory for current data and processes.

Introduction to RISC and CISC Processors

Processors (CPUs) execute instructions to perform tasks in a computer. Two main processor design approaches are RISC and CISC.

RISC (Reduced Instruction Set Computer)

- Uses a small set of simple instructions
- Instructions execute quickly
- Efficient and power-saving
- Common in smartphones, tablets, and many modern computers

Example:

- ARM processors

CISC (Complex Instruction Set Computer)

- Uses a large set of complex instructions
- One instruction can perform multiple tasks
- Reduces the number of instructions needed
- Common in many desktop and laptop computers

Example:

- x86 processors

What is BIOS?

- BIOS (Basic Input/Output System) is a program stored on the motherboard.
- It helps the computer:
 - Checks hardware when the computer starts
 - Starts the boot process
 - Loads the operating system
 - Allows users to change basic settings

BIOS Settings

It controls the basic settings of a computer before the operating system loads.

Setting	Purpose
Boot Order	Selects which device starts the computer first
Security Settings	Protect BIOS using passwords
Device Settings	Controls hardware devices (USB, keyboard, etc.)
Date and Time	Maintains the system clock

ROM (Read-Only Memory)

- **ROM (Read-Only Memory)** stores important computer instructions.
- Data is **permanent** and kept when power is off.
- Users **cannot easily change or delete** the data.
- ROM is **non-volatile memory (keeps data without power)**.

Key Point:

ROM = Permanent memory that stores essential computer instructions.

RAM (Random Access Memory)

- RAM stands for Random Access Memory.
- It is the computer's short-term memory.
- Stores data and programs currently in use.
- Allows the CPU to access data quickly.
- RAM is **volatile (data is lost when power is off)**.

Key Point:

RAM = Volatile, temporary memory used while the computer is running.

Virtual Memory

- **Virtual Memory** is a feature built into the operating system.
- It is used **when RAM is full** to prevent the computer from crashing.
- Virtual memory is **slower than RAM**, but helps keep programs running.

Key Point:

Virtual Memory = Extra memory on the storage drive used when RAM is full.

Storage Device and Storage Media

Storage Device

Hardware that reads from and writes to storage media.

Examples

- Internal hard drive
- External hard drive
- CD/DVD/Blu-ray drive

Storage Media

The material or place where data is stored.

Examples

- Hard disk
- SSD
- USB flash drive
- CD
- DVD
- Memory card

Difference

Storage Device	Storage Media
Hardware used to read/write data	Stores data permanently

Storage Technologies

Magnetic Storage

- Stores data on magnetic disks.
- Usually large capacity.
- Lower cost.

Examples

- HDD
 - Floppy Disk
 - Cassette Tape
-

Optical Storage

- Uses a **laser** to read and write data.

Examples

- CD
 - DVD
-

Solid-State Storage

- Stores data using **memory chips**.
- Faster than HDD.
- No moving parts.

Examples

- SSD
 - USB Flash Drive
 - Memory Card
-

Cloud Storage

- Stores data online.
 - Files are stored on remote servers.
 - Requires an internet connection.
 - Can access files from different devices.
-

Choosing a Storage Device

When choosing storage, consider:

- Storage capacity
 - Cost
 - Transfer speed
 - Reliability
 - Ease of use
 - Accessibility
 - Portability
 - Rewritability
-

Portable Storage

Portable storage allows users to carry files between computers.

Advantages

- Easy to carry.
- Easy to transfer files.
- Can create backups.
- Can be used without the internet.

Disadvantages

- Can be lost or stolen.
 - Can spread viruses.
 - May have limited storage capacity.
-

Programming Language

What is a Programming Language?

A programming language is a set of instructions used to tell a computer what to do.

There are two main types of programming languages:

1. High-Level Programming Languages
2. Low-Level Programming Languages

High-level programming language

High-level languages are designed to be easy for humans to read, write, and understand.

Examples:

- Python
- Java
- JavaScript
- C#

Low-Level Languages

- Close to the computer's hardware language.
- Difficult for humans to read and write.
- Give programmers greater control over the computer.
- Used for fast and efficient programs.

Examples:

- Assembly Language
 - Machine Code
-

Digital Sound

What is Sound?

- Sound is an **analogue wave**.
 - Computers can only store **digital data** (0s and 1s).
 - Therefore, analogue sound must be converted into digital sound.
-

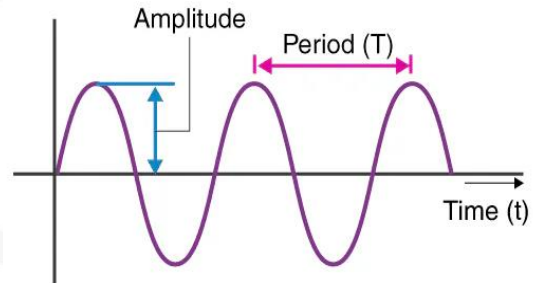
Sampling

What is sampling?

Sampling is the process of measuring the **amplitude** (height) of a sound wave at regular intervals.

Key terms

- **Sample** = one measurement of the sound wave.
- **Amplitude** = the height (loudness) of the wave.
- **Sample rate** = how many samples are taken every second.



Example:

- 44,100 samples per second (44.1 kHz) is the standard for CDs.

Sample Rate

The **sample rate** is the number of samples taken each second.

Higher sample rate

- ✓ More samples collected
- ✓ Sound is more accurate
- ✓ Better quality
- ✗ Larger file size

Lower sample rate

- ✓ Smaller file size
 - ✗ Less accurate sound
 - ✗ Lower quality
-

Bit Depth

Bit depth is the number of **bits** used to store each sample.

Examples:

- 8-bit
- 16-bit
- 24-bit

Higher bit depth

- ✓ More possible amplitude values
- ✓ More accurate representation
- ✓ Better sound quality
- ✓ Less quantisation error/noise
- ✗ Larger file size

Lower bit depth

- ✓ Smaller files
- ✗ Fewer amplitude levels
- ✗ Poorer sound quality

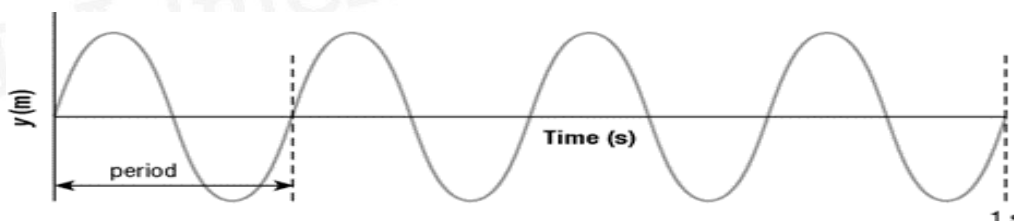
Difference Between Sample Rate and Bit Depth

Sample Rate	Bit Depth
Number of samples each second	Number of bits per sample
Affects how often sound is measured	Affects how accurately each sample is stored
Higher = smoother sound	Higher = clearer sound

Waveforms

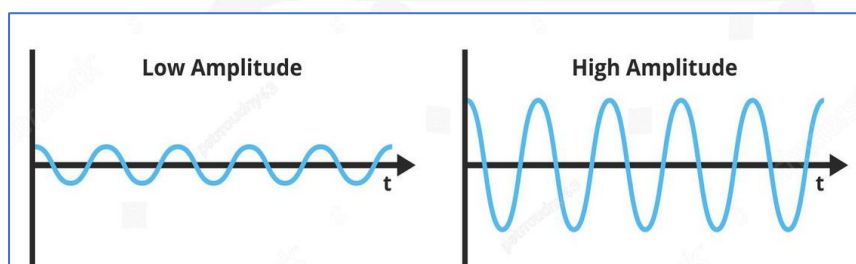
What is a Waveform?

- A waveform is a visual representation of sound.
- X-axis shows time (or frequency).
- Y-axis shows amplitude (loudness).
- Waveforms help us analyse sound.

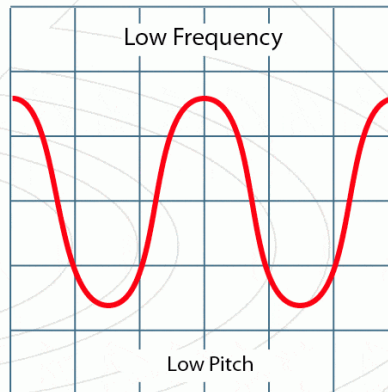
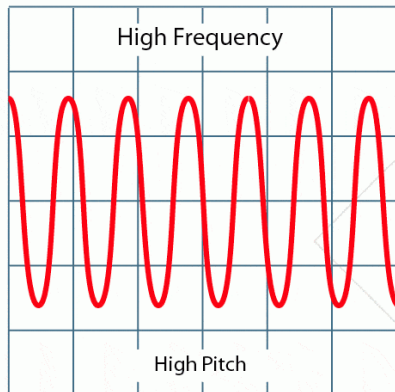


Amplitude (Loudness)

Loud Sound	Quiet Sound
High amplitude	Low amplitude
Taller waves	Shorter waves
Greater volume	Lower volume



High Pitch	Low Pitch
Waves closer together	Waves further apart
Higher frequency	Lower frequency
Sharp sound	Deep sound



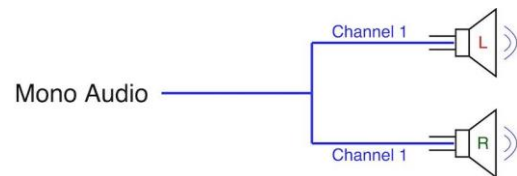
Key Points

- Amplitude determines loudness.
- Frequency determines pitch.
- High amplitude = Loud sound
- Low amplitude = Quiet sound
- High frequency = High pitch
- Low frequency = Low pitch

Mono and Stereo Audio

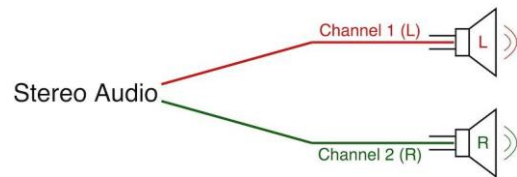
Mono Audio

- Contains **one audio channel**.
- Smaller file size.
- Used in older recordings.



Stereo Audio

- Contains **two audio channels** (left and right).
- Better and more realistic sound.
- Larger file size than mono.



Audio Recording Quality

- Record audio at the **highest quality possible**.
- Lost audio quality **cannot be recovered**.
- Higher quality audio **uses more storage space**.

File Size

Larger file size happens when:

- Sample rate increases
- Bit depth increases
- Recording is longer
- More channels are used (stereo instead of mono)

Calculating Audio File Size

Audio File Types

Uncompressed Audio (WAV)

- Stores sound exactly as recorded.
- High sound quality.
- Large file size.

Compressed Audio (MP3)

- Uses compression to reduce file size.
- Smaller file size.
- Some sound quality may be lost.

Uncompressed Audio File Size Formula

File Size (bits) = Sample Rate × Bit Depth × Number of Channels × File Length
(seconds)

Remember

- **Sample Rate** = Number of sound samples taken each second (Hz).
 - **Bit Depth** = Number of bits used for each sample.
 - **Channels**
 - Mono = 1
 - Stereo = 2
 - **File Length** = Recording time in seconds.
-

Example 1 – Mono Recording

- Sample Rate = **44,100 Hz**
- Bit Depth = **16 bits**
- Channels = **1**
- Length = **60 seconds**

File Size = $44,100 \times 16 \times 1 \times 60 = 42,336,000$ bits

Example 2 – Stereo Recording

- Sample Rate = **44,100 Hz**
- Bit Depth = **16 bits**
- Channels = **2**
- Length = **60 seconds**

File Size = $44,100 \times 16 \times 2 \times 60 = 84,672,000$ bits

Key Points

- WAV = High quality, large file size.
- MP3 = Smaller file size, lower sound quality.
- Mono = 1 channel.
- Stereo = 2 channels.
- Increasing sample rate, bit depth, channels, or recording time increases the file size.

Computer Networks

What is a Computer Network?

A **computer network** is a group of **two or more connected devices** that communicate and share data, files, and resources using **wired or wireless connections**.

Types of Networks

LAN (Local Area Network)

- Covers a small geographical area.
- Used in homes, schools, and offices.

Advantages

- Shares Wi-Fi and resources.
- Good for teamwork in one location.

Disadvantages

- Limited to one location.
 - Internet failure affects all connected devices.
-

WAN (Wide Area Network)

- Covers a large geographical area.
- Connects multiple LANs together.

Advantages

- Connects different locations.
- Suitable for large organisations.

Disadvantages

- More difficult to set up.
 - Viruses can spread between locations.
-

PAN (Personal Area Network)

- Connects a person's own devices.
- Usually uses **Bluetooth**.

Examples

- Smartphone connect the wireless headphone.

Advantages

- Easy to use.
- Good for personal devices.

Disadvantages

- Short range.
 - Devices can be expensive.
-

Comparison of Network Types

Network	Coverage	Example
PAN	Personal devices	Phone ↔ Smartwatch (Bluetooth)
LAN	Small area	School, Home, Office
WAN	Large area	Connects multiple LANs

Network Layouts (Topologies)

Point-to-Point

- Connects **two devices directly**.



Example: Laptop ↔ Smartphone

Advantages

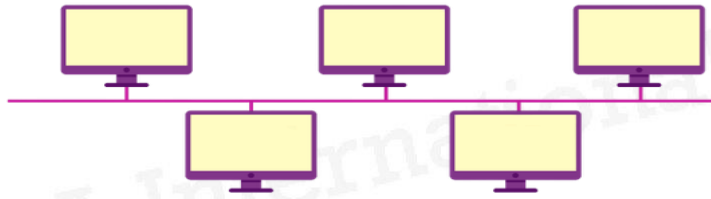
- Simple.
- Low cost.

Disadvantages

- Connects only two devices.

Bus

- All devices connect to **one main cable**.



Advantages

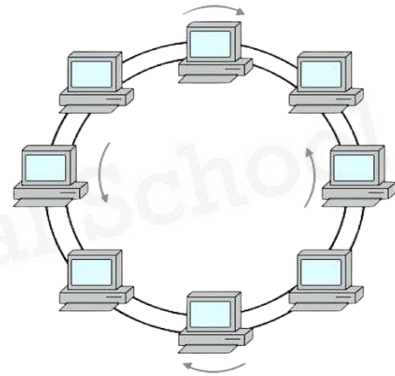
- Easy to install.
- Uses one main cable.

Disadvantages

- Main cable failure stops the network.
 - Slower with many devices.
-

Ring

- Devices form a **closed loop**.
- Each device connects to two neighbouring devices.



Advantages

- Easy to add devices.
- Stable performance.

Disadvantages

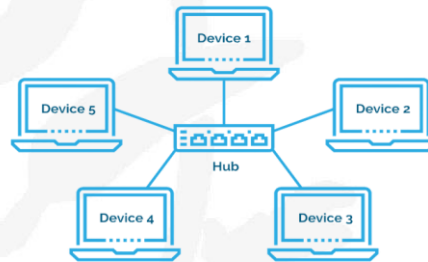
- One cable or device failure can stop the network.
 - Faults are difficult to find.
-

Star

- Every device connects to a **central hub or switch**.
- **Most common** network layout.

Advantages

- Easy to manage.
- Secure.
- One device failure does not affect the rest of the network.



Disadvantages

- If the hub/switch fails, the whole network stops.
 - More expensive because it uses more cables.
-

Mesh

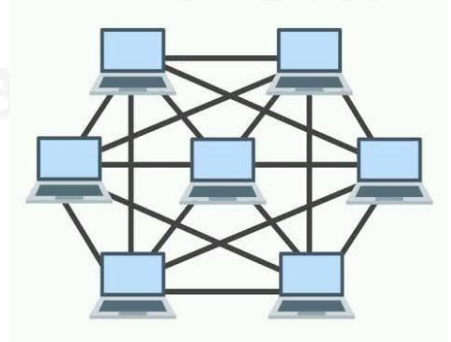
- Devices connect to **many or all other devices**.

Advantages

- Very reliable.
- Easy to expand.
- No major performance drop.

Disadvantages

- Expensive.
- Complex to set up and maintain.



Key Points

- **Network** = Two or more connected devices that share data and resources.
- **LAN** = Small area (Home, School, Office).
- **WAN** = Large area (Connects multiple LANs).
- **PAN** = Personal devices using Bluetooth.
- **Point-to-Point** = Two devices only.
- **Bus** = One main cable.
- **Ring** = Devices connected in a loop.
- **Star** = Central hub or switch (**most common**).
- **Mesh** = Many connections (**most reliable**).

Software Ownership & Software Licences

Software Ownership

Software ownership explains **who owns the software and what users are allowed to do with it.**

There are **three main types** of software ownership:

- **Freeware**
- **Open-Source**
- **Proprietary**

Comparison of Software Ownership

Feature	Freeware	Open-Source	Proprietary
Free to use	Free to use	Free to use	Usually paid
Source code available	Cannot modify	Can modify	Cannot modify
Can modify software	Source code not available	Source code available	Source code not available
Can share with others	Can share	Can share	Cannot share without permission

What is a Software Licence?

A **software licence** is a **legal agreement** that explains **how software can be used, copied, shared, or modified.**

Types of Software Licence

Licence Type	Key Point
Concurrent Use Licence	Limited number of users can use the software at the same time.
EULA (End User Licence Agreement)	Users cannot copy, modify, or share the software.
GNU General Public Licence (GPL)	Free to use, modify, and share the software.
Non-Perpetual Licence	Subscription licence that must be renewed.
Perpetual Licence	One payment allows permanent use.
Proprietary Licence	Software owned by a company with restricted use.
Site Licence	One licence covers many computers in one organisation.
Workstation Licence	Valid for one specific computer only.

Key Points

- **Freeware** = Free to use but **cannot be modified**.
- **Open-Source** = Free to use and **can be modified**.
- **Proprietary** = Owned by a company; **licence required**.
- A **software licence** is a legal agreement that explains **how software may be used**.
- **GPL** allows users to **use, modify, and share** software.
- **EULA** restricts **copying, modifying, and sharing**.
- **Site Licence** = Many computers.
- **Workstation Licence** = One computer.
- **Concurrent Use Licence** = Limited number of users at the same time.
- **Perpetual Licence** = Pay once, use forever.
- **Non-Perpetual Licence** = Subscription; renew to continue.

Programming Basic

Your First Python Program

Display (output)

Code

```
1 print("My name is Alex")
2 print("I am 13 years old")
3 print("I study Computing")
4
```

Output

```
My name is Alex
I am 13 years old
I study Computing
```

Using Variables

- A variable stores data.
- The value of a variable can change during a program.
- Variables have a name and a value.

Code

```
1 name = "Alex"
2 age = 13
3 print(name)
4 print(age)
```

Output

```
Alex
13
```

Common Data Types in programming

Data Type	Description	Example
str	Text (String)	"Alice"
int	Whole number	13
float	Decimal number	1.55
bool	True or False	TRUE

Arithmetic Operators in programming

Operator	Meaning	Example	Result
+	Addition	5 + 3	8
-	Subtraction	8/2/2026	6
*	Multiplication	4 * 5	20
**	Power (Exponent)	4**2	16
/	Division	10/2/2026	5
%	Modulus (Remainder)	10 % 3	1

Code

```
1 num1 = 12
2 num2 = 4
3 print("Addition =", num1 + num2)
4 print("Subtraction =", num1 - num2)
5 print("Multiplication =", num1 * num2)
6 print("Division =", num1 / num2)
```

Output

```
Addition = 16
Subtraction = 8
Multiplication = 48
Division = 3.0
```

User input

User input is **data entered by the user** into a program while it is running.

The program receives the input and uses it to perform a task.

Code

```
1 name = input("Enter your name: ")
2
3 print("Hello", name)
4
5
6
```

Input

Alice

Output

Hello Alice

Integer Input

Code

```
1 age = int(input("Enter your age: "))
2
3 print("Next year you will be", age + 1)
4
5
6
```

Input

12

Output

Next year you will be 13

Example program- Simple Calculator

```
1 num1 = int(input("First number: "))
2 num2 = int(input("Second number: "))
3
4 print("Addition =", num1 + num2)
```

input

5

6

Output

Addition = 11

Introduce the Pseudocode Keywords

Pseudocode is a simple way of **planning a program** using plain English and programming-like statements.

Pseudocode

```
1 BEGIN
2 INPUT Name
3 OUTPUT "Hello"
4 OUTPUT Name
5 END
```

Python Code

```
1 name = input("Enter your name: ")
2 print("Hello")
3 print(name)
```

Introduce the Pseudocode Keywords

Keyword	Meaning
BEGIN	Start
INPUT	Ask the user
OUTPUT	Display information
SET	Store or calculate a value
END	Finish

Pseudocode Keywords and Python

Pseudocode	Python
INPUT Name	name = input()
OUTPUT Name	print(name)
SET Total TO A + B	total = a + b

Make Power Calculator Program

Input

- Asks the user to enter their student name. (Input)
- Asks the user to enter a number. (Input)
- Asks the user to enter the power. (Input)

Calculation

- Calculate the result using the following calculation: Result = Number ** Power

Pseudocode of calculator Program

- BEGIN
- INPUT *student_name*
- INPUT *number*
- INPUT *power*
- SET *result* TO *number* ** *power*
- OUTPUT *student_name*
- OUTPUT *result*
- END

Code

```
1  # Power Calculator
2
3  student_name = input("Enter your student name: ")
4  number = int(input("Enter a number: "))
5  power = int(input("Enter the power: "))
6  result = number ** power
7
8  print("Student Name:", student_name)
9  print("Result =", result)
10
```

Input

Enter your student name: Alex
Enter a number: 5
Enter the power: 3

Output

Student Name: Alex
Result = 125

References

- <https://pearson.com>
- **Teacher made worksheet**

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