



**SuperNovaSchool®**  
L E A R N T O B E D I S T I N C T

# **Computing**

## **Grade 7**

(Instructional Resource)

|                    |                                    |
|--------------------|------------------------------------|
| <b>UNIT/STRAND</b> | <b>4: Computer Systems</b>         |
| <b>TOPIC</b>       | <b>Types of Software</b>           |
| <b>Sub Topics</b>  | <b>Application/System software</b> |
| <b>Session</b>     | <b>2025-26</b>                     |
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## Application Software

- **Definition:**

- Application software is a program or group of programs designed for end-users to perform specific tasks.
- The word **app** is short for application.
- 'Application' is another word we can use for a program or a piece of a software.
- Smartphones and tablet apps are application software.

- **Examples:**

- Writing documents
- Browsing the internet
- Editing photos
- Managing finances

A **software** is a set of instructions, data, or programs used to operate computers and perform specific tasks. It's the opposite of **hardware**, which refers to the physical components of a computer (like the keyboard, hard drive, or screen).



## Application Software

- **Characteristics of Application Software**

- User-oriented
- Easy to use
- Designed for specific purposes
- Can be standalone or web-based

- **Examples of Application Software**

- **Software**

- MS Word
- Excel
- Adobe Photoshop
- Google Chrome
- Zoom

- **Purpose**

Word processing  
Data organization  
Image editing  
Web browsing  
Video conferencing



## System Software

- **Definition:**
- System software is a type of computer program designed to run a computer's hardware and application programs.
- **Key Role:**
- It acts as a bridge between hardware and user applications.

### **Functions of System Software**

- Controls and manages hardware components
- Provides a platform for application software
- Manages system resources
- Facilitates user interaction with the machine



## System Software

### Types of System Software

- **Operating System (OS)**
- Manages hardware and software resources
- Examples: Windows, Linux, macOS
- **Utility Programs**
- Perform maintenance tasks
- Examples: Antivirus, Disk Cleanup, Backup tools



## System Software

- VIDEO BASED ON OPERATING SYSTEM
- <https://youtu.be/fkGCLIQx1MI?si=eSpqXqFDFqJkIWls>
- After this the learners will perform unplugged activity 4.3 on book pg 245.



## Difference between Application and System software

| <u>Application software</u>                         | <u>System software</u>                                                                |
|-----------------------------------------------------|---------------------------------------------------------------------------------------|
| Allows the user to do specific task.                | Enables the system to function. Provides right condition for the application software |
| Not essential for system to run                     | essential for system to run                                                           |
| Only runs when user asks                            | Usually runs when the device is active without any action from the user               |
| User is aware of it. Uses it directly               | User is not aware of it. Runs in the background                                       |
| Interacts with the system software not the hardware | Interacts closely with the hardware.                                                  |



## Difference between Application and System software

- **Video clip of differences between types of software**

[https://www.youtube.com/watch?v=-gVQgyU0Yk4&ab\\_channel=samuellonzaga](https://www.youtube.com/watch?v=-gVQgyU0Yk4&ab_channel=samuellonzaga)

- **Video based on the types of the software and how they are connected with each other and the hardware.**

[https://www.youtube.com/watch?v=gxhxcvBuanU&ab\\_channel=AvantikaNimje](https://www.youtube.com/watch?v=gxhxcvBuanU&ab_channel=AvantikaNimje)

- **Learners will do Question 4.2 and 4.3 given on book pg 244-245 in the booklet.**
- What are two examples of application software?
- What is the purpose of application software?
- What are the two examples of system software?
- What is the purpose of system software?



## Denary number system

- Also called the **Decimal Number System**.
- Based on 10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Base-10 number system
- Most commonly used system in everyday life
- First five place values of denary number system are given below:

|                           |                        |                      |                    |   |
|---------------------------|------------------------|----------------------|--------------------|---|
| $1000 \times 10 = 10,000$ | $100 \times 10 = 1000$ | $10 \times 10 = 100$ | $1 \times 10 = 10$ | 1 |
|---------------------------|------------------------|----------------------|--------------------|---|

- First five place values of number system are given below:

|                    |                   |                  |                  |   |
|--------------------|-------------------|------------------|------------------|---|
| $27 \times 3 = 81$ | $9 \times 3 = 27$ | $3 \times 3 = 9$ | $1 \times 3 = 3$ | 1 |
|--------------------|-------------------|------------------|------------------|---|

Then the instructor will explain the steps of conversion from base 10 to base 2 and how to proofread the answer with the help of a video clip given below:

[https://www.youtube.com/watch?v=rsxT4FfRBaM&ab\\_channel=TheOrganicChemistryTutor](https://www.youtube.com/watch?v=rsxT4FfRBaM&ab_channel=TheOrganicChemistryTutor)



## Denary number system DRILL QUESTIONS

**Convert the following  
from base 10 to base 2**

- 80
- 150
- 220
- 48
- 148

### **DRILL QUESTIONS OF PLACE VALUES**

- Find the first four place values of octal number systems base 8
- Find the first three place values of senary number system base 6



## Denary number system BOOKLET WORK

- **Convert the following numbers from base 10 to base 2**
- 35
- 65
- 230
- 178
- 205
- 255
- 32
- 40



## Binary number system

- **Definition:** A number system that uses only two digits: 0 and 1
- Also called **Base-2** system
- Used extensively in digital electronics and computing

- **How Binary Numbers Work**
- Each digit represents a power of 2
- **Example Binary:**
- $1011 = (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) = 8 + 0 + 2 + 1$
- = **11 in decimal**



## Binary number system

- Video based on conversion from base 2 to base 10:
- [https://www.youtube.com/watch?v=M41M9ATm49M&ab\\_channel=LearnFree](https://www.youtube.com/watch?v=M41M9ATm49M&ab_channel=LearnFree)

- Conversion drill question from base 2 to base 10
- 1000111
- 01010111
- 11111000
- 1010110
- 00001100



## Binary number system Booklet work

- **RECAP** Video based on conversion from base 2 to base 10:
- [https://www.youtube.com/watch?v=2Z03p3yhGmk&ab\\_channel=PotatoPirates](https://www.youtube.com/watch?v=2Z03p3yhGmk&ab_channel=PotatoPirates)

### **BOOKLET WORK**

- **Convert the following from base 2 to base 10**
  - 1100110
  - 1111000
  - 0111110
  - 0101010
  - 0000001
  - 1011110
  - 0011111
  - 1111000



## ASCII CODE

- **ASCII** stands for: American Standard Code for Information Interchange
- It's a character encoding standard used for representing text in computers
- Each character is assigned a numerical value (in binary, decimal, or hexadecimal)
- Uses 7 bits to represent each character (values from 0 to 127)
- Commonly extended to 8 bits (0–255) in Extended ASCII
- Represents letters, digits, punctuation marks, control characters
- Video clip based on the concept of ASCII is given below:
- [https://www.youtube.com/watch?v=5aJKKgSEUnY&ab\\_channel=TheTechTrain](https://www.youtube.com/watch?v=5aJKKgSEUnY&ab_channel=TheTechTrain).

- **ASCII in Action (Example)**
- **Text Hi**
- **ASCII Codes :**
- **H → 72 → 1001000**
- **i → 105 → 1101001**
- **Binary Representation of “Hi”:**
- **1001000 1101001**



## Unicode

- **Unicode**: A universal character encoding standard
- Designed to support **all characters** in all **languages and scripts**
- Uses **1 to 4 bytes** per character
- Supports over **143,000 characters**
- **ASCII and UNICODE** difference table is given below:

### VIDEO BASED ON UNICODE:

[https://www.youtube.com/watch?v=pJC8gmKa4hA&ab\\_channel=EE241S6D](https://www.youtube.com/watch?v=pJC8gmKa4hA&ab_channel=EE241S6D)

| Feature          | ASCII           | Unicode                 |
|------------------|-----------------|-------------------------|
| Bit Size         | 7 bits          | 8, 16, or 32 bits       |
| Characters       | 128             | 143,000+                |
| Language Support | English only    | All languages (global)  |
| Emoji Support    | ✗ Not supported | ✓ Supported             |
| Compatibility    | Older systems   | Modern systems/internet |



## Pixels

- A **pixel** (short for “picture element”) is the smallest unit of a digital image or display.
- Each pixel holds color and brightness information.
- Millions of pixels form an image.
- Example: A screen with 1920×1080 has 2,073,600 pixels.
- **Pixel video clip:**
- [https://www.youtube.com/watch?v=wsFROq2jVSQ&ab\\_channel=TechUpbeat](https://www.youtube.com/watch?v=wsFROq2jVSQ&ab_channel=TechUpbeat)



## Resolution

- **Resolution** refers to the number of pixels in an image or display, usually given as width × height.
- Higher resolution = more detail and clarity.
- **Example:**
- HD = 1280×720
- Full HD = 1920×1080
- 4K = 3840×2160
- **Resolution video clip:**
- [https://www.youtube.com/watch?v=3kz2GAof9tI&ab\\_channel=AMD](https://www.youtube.com/watch?v=3kz2GAof9tI&ab_channel=AMD)



## Bitmaps

- A **bitmap** is a type of image file where the image is made up of a grid of individual pixels, each storing color values.
- Also called a raster image.
- Common bitmap formats: .bmp, .jpg, .png
- **Bitmap video clip:**
- [https://www.youtube.com/watch?v=2mWc3YqIM7c&ab\\_channel=JonathanMolson](https://www.youtube.com/watch?v=2mWc3YqIM7c&ab_channel=JonathanMolson)



- **In colored (RGB) images:**  
Each pixel has **3 channels**: Red, Green, and Blue.  
Bit depth is usually per channel.
- **Bit depth** refers to the **number of bits used to represent the color of a single pixel**.
- It determines how many **colors** an image can display.
- **Video based on colored images:**
- [https://www.youtube.com/watch?v=V63LXT\\_hQHk&ab\\_channel=KshitijVivanInstituteAhmedabad](https://www.youtube.com/watch?v=V63LXT_hQHk&ab_channel=KshitijVivanInstituteAhmedabad)



## Amplitude

- **Amplitude** is the height of a sound wave, representing its loudness.
- Higher amplitude = louder sound
- Measured in decibels (dB)
- **Video of a sound wave:**
- [https://www.youtube.com/watch?v=TsQL-sXZOLc&ab\\_channel=ScienceSauce](https://www.youtube.com/watch?v=TsQL-sXZOLc&ab_channel=ScienceSauce)



## Frequency

- **Frequency** is the number of sound wave cycles per second.
- It determines the pitch of a sound.
- Measured in Hertz (Hz)
- High frequency = High pitch (e.g., whistle)
- Low frequency = Low pitch (e.g., drum)
- **Video clip of frequency:**
- [https://www.youtube.com/watch?v=XLfQpv2ZRPU&ab\\_channel=MED-EL](https://www.youtube.com/watch?v=XLfQpv2ZRPU&ab_channel=MED-EL)



## Sample + Sampling Rate

- A **sample** is a snapshot of the amplitude of a sound wave at a specific point in time
- In digital audio, the sound wave is divided into many samples for storage and processing
- **Sampling rate** is the number of samples taken per second from a sound wave
- Measured in Hertz (Hz)
- Example: CD-quality audio = 44,100 samples/second (44.1 kHz)
- Higher sampling rate = better sound quality
- **Video based on how MIC works:**
- [https://www.youtube.com/watch?v=vRmEeNNXSfk&ab\\_channel=HowItWorks%3F](https://www.youtube.com/watch?v=vRmEeNNXSfk&ab_channel=HowItWorks%3F)



## Booklet work

- **Question 4.6 (Book pg 261 will be done in the booklet)**
  1. How do you think sample rate affects the size of digital sound file?
  2. Why do you think a low sample rate can be used for voice calls, but a much higher one is needed for music?



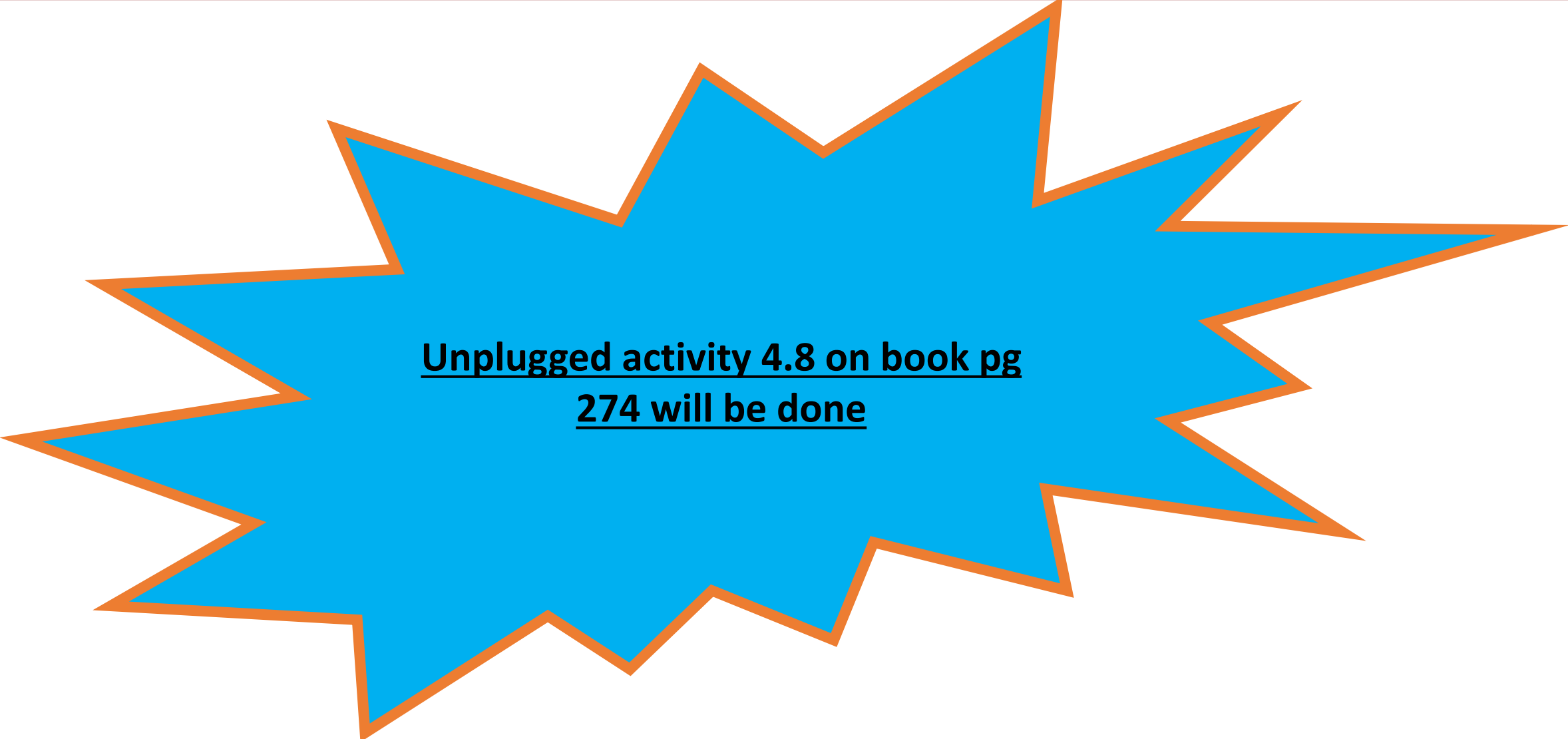
## Automated systems in manufacturing

- **Artificial Intelligence (AI)** is the ability of machines to perform tasks that typically require **human intelligence**, such as decision-making, learning, and problem-solving.
- **An automated system** uses machines and control systems to perform tasks without continuous human intervention.
- Includes mechanical, electrical, and computerized systems.

- **Real-World Examples:**
- Smart factories with AI-driven robots
- Automated inspection systems
- Predictive analytics for machine maintenance
- Autonomous guided vehicles (AGVs) in warehouses



## Automated systems in manufacturing



**Unplugged activity 4.8 on book pg  
274 will be done**

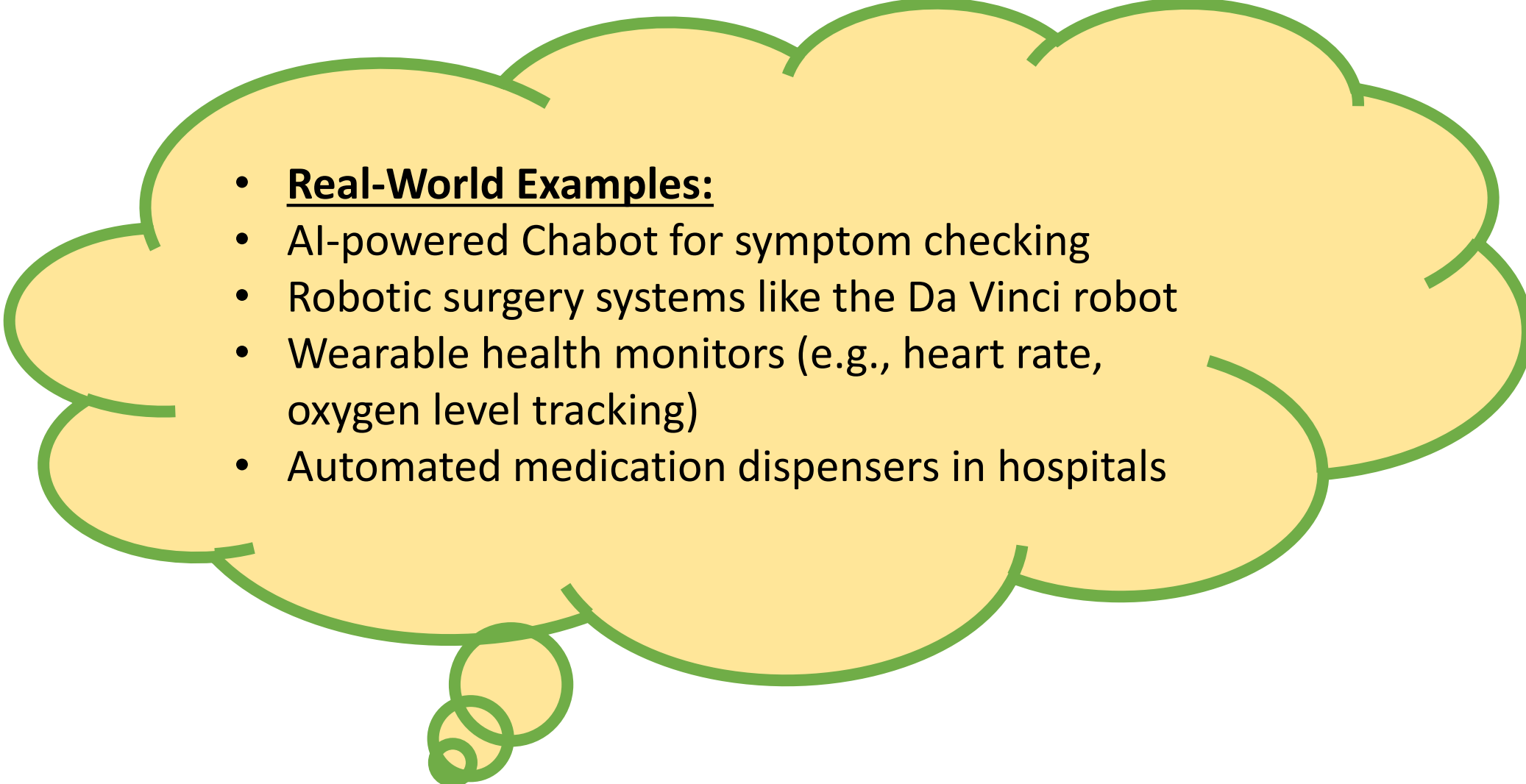


## Automated systems in health

- **Automated systems in healthcare** use technology and machines to perform tasks with minimal human intervention, improving efficiency, accuracy, and safety.
- These systems can handle monitoring, diagnosis, treatment, and administrative tasks.
- **Benefits of Automation in Healthcare:**
  - Faster diagnosis and treatment
  - Improved accuracy and patient safety
  - Reduces human workload
  - Enables 24/7 patient monitoring
  - Streamlines administrative tasks



## Automated systems in health

- 
- **Real-World Examples:**
  - AI-powered Chabot for symptom checking
  - Robotic surgery systems like the Da Vinci robot
  - Wearable health monitors (e.g., heart rate, oxygen level tracking)
  - Automated medication dispensers in hospitals



## AI in image recognition

- **AI in image recognition** uses machine learning and deep learning algorithms to analyze and interpret images automatically.
- **Real-World Applications**
- Facial recognition (e.g., phone unlocking)
- Medical imaging (e.g., detecting tumors in X-rays)
- Self-driving cars (recognizing road signs and obstacles)

### **How It Works (Simplified Process):**

**Input:** Image is fed to the system

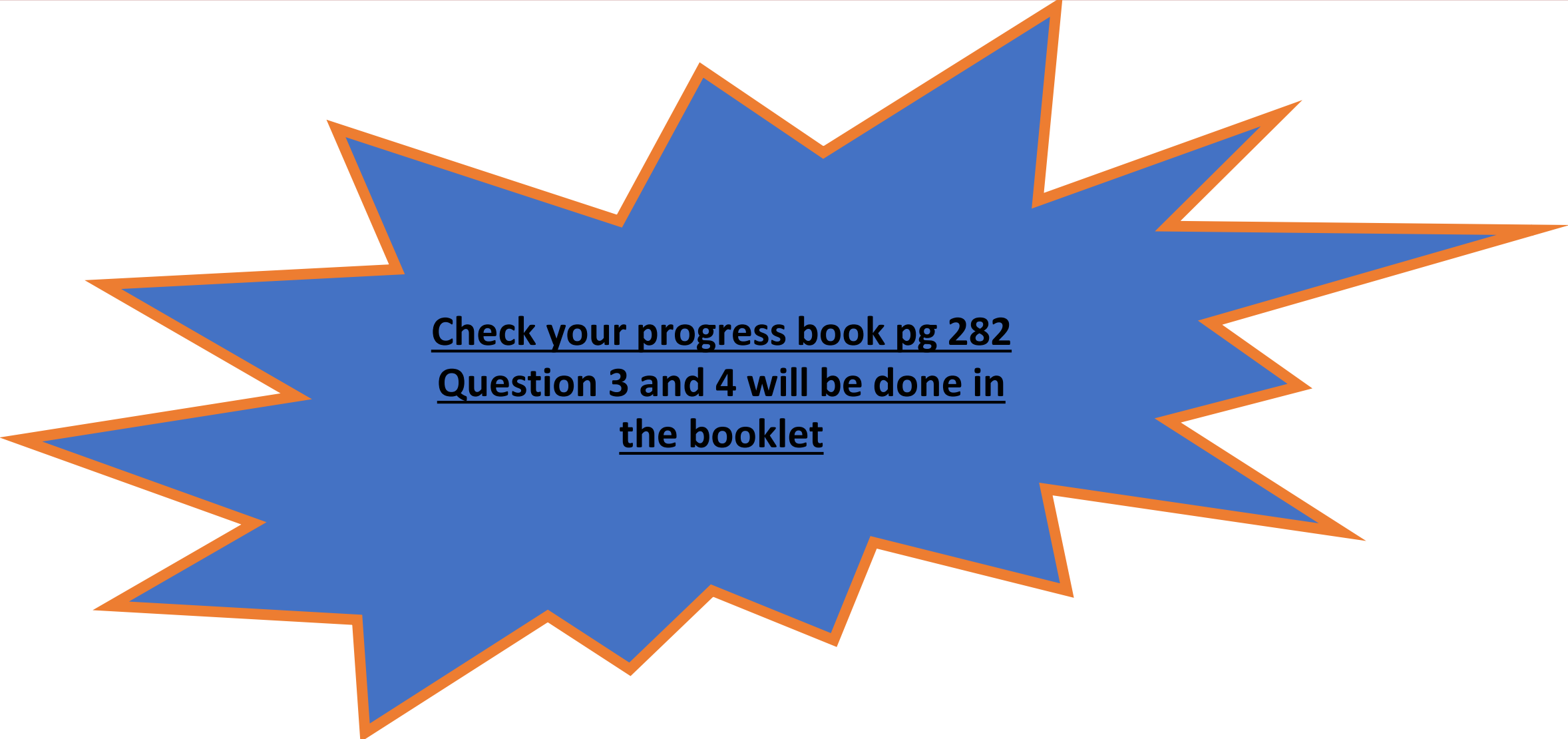
**Preprocessing:** Image is resized, filtered

**Feature Extraction:** Key elements (edges, shapes, colors) are detected

**Classification:** AI model identifies the object (e.g., dog, car, face)



## Booklet work



**Check your progress book pg 282**  
**Question 3 and 4 will be done in**  
**the booklet**



## AI in computer games

- **AI in computer games** refers to the simulation of intelligent behavior in non-player characters (NPCs) or game systems to make the game more challenging, interactive, and realistic.

- **Real-World Examples:**
- **Pac-Man** – ghosts follow smart chase patterns
- **FIFA** – AI-controlled players act like real teammates
- **Chess games** – AI learns and challenges players



## AI in computer games

- **Activity 4.7 will be done in the lab.**



## Booklet work

**Question 4.8 will be done in the booklet.**

1. What is artificial intelligence?
2. What is an automated system?
3. What are two ways an automated system can be used in health?
4. How are automated systems are used in retail?