iGCSE Computer Science

An Introduction to Pearson Edexcel
International GCSE Computer Science

Outline

- What you will learn

- Who should take CS?

- International GCSE Exam Information

What You Will Learn

- Grade 9
  - Computational Thinking
  - Data Representation
  - Computers
  - **Programming**
    - Java

- Grade 10
  - Computers
  - Communication and the Internet
  - Social Impact
  - **Programming**
    - Python

Computational Thinking

Computational Thinking

- Algorithms
  - Unambiguous steps to accomplish a task
  - Important algorithms:
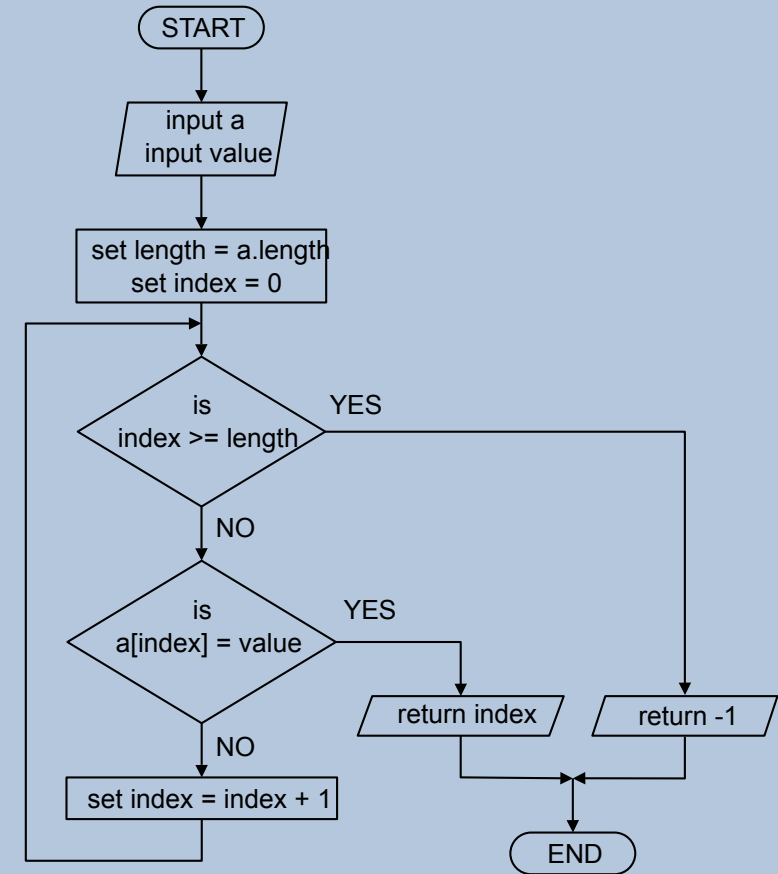   - Searching
    - Sorting

Computational Thinking

- Decomposition
  - Breaking down into simpler components.

Computational Thinking

- Decomposition
  - Breaking down problems into simpler components.

Computational Thinking

- Abstraction
  - Hide the details and focus on the important aspects

Representing Data

- Binary and Hexadecimal

- Text
  - ASCII
  - Unicode

Binary

$$1011$$
$$+101$$
$$\overline{10000}$$

Hexadecimal

$$B$$
$$+5$$
$$\overline{10}$$

Representing Data

- Images
  - raster images
  - vector graphics

- Sound
  - digital samples
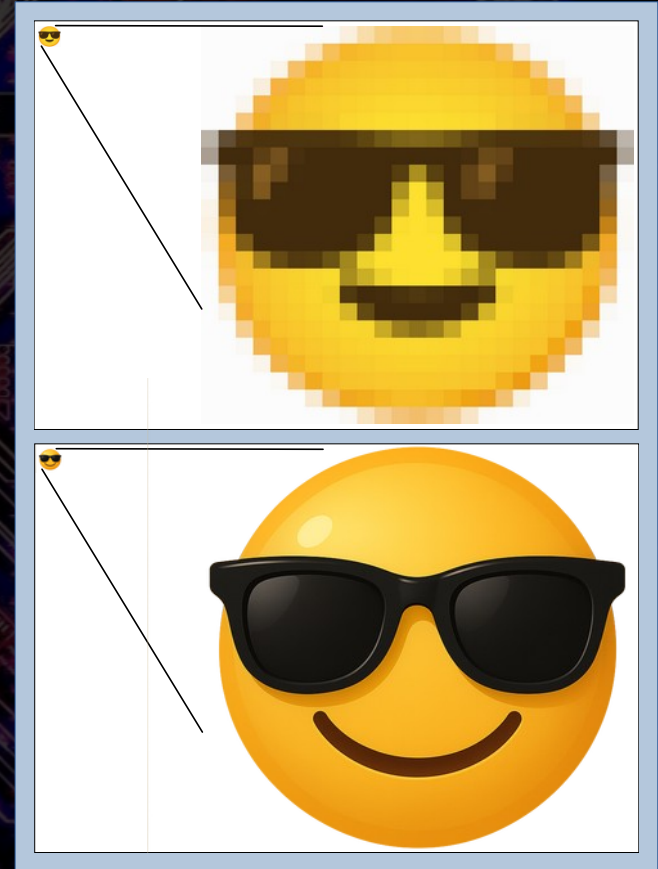
Representing Data

- Encryption
  - ensuring the privacy of your information

Representing Data

- Encryption
  - ensuring the privacy of your information

Computers

Computers

- Logic
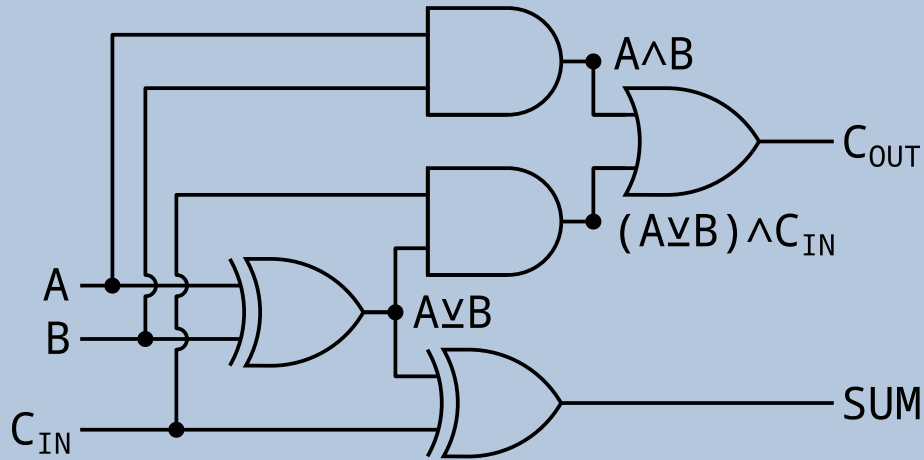
Binary Carry Adder

Truth Table

A	B	C_{IN}	$A \veebar B$	$A \wedge B$	D	C_{OUT}	SUM
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	1
0	1	0	1	0	0	0	1
0	1	1	1	0	1	1	0
1	0	0	1	0	0	0	1
1	0	1	1	0	1	1	0
1	1	0	0	1	0	1	0
1	1	1	0	1	0	1	1

Computers

- Logic
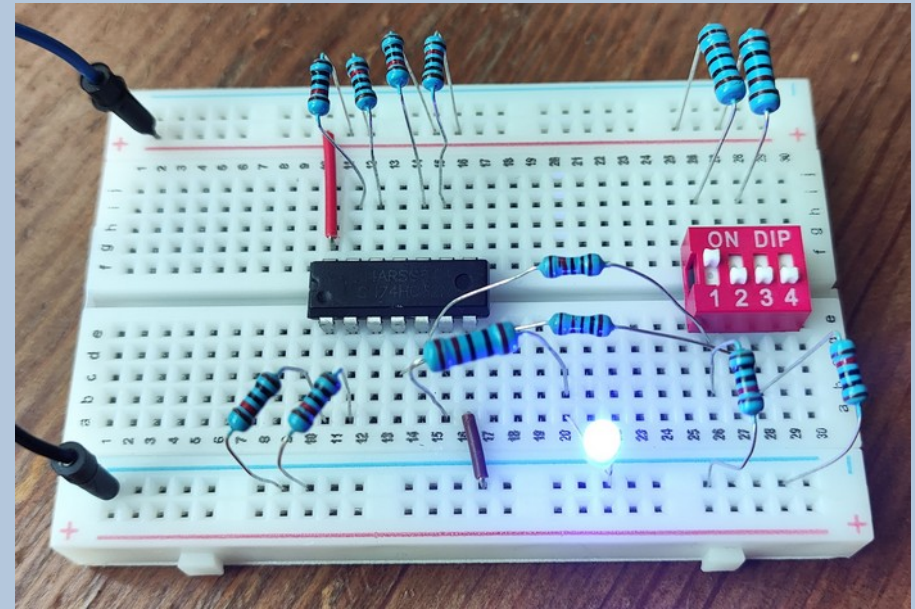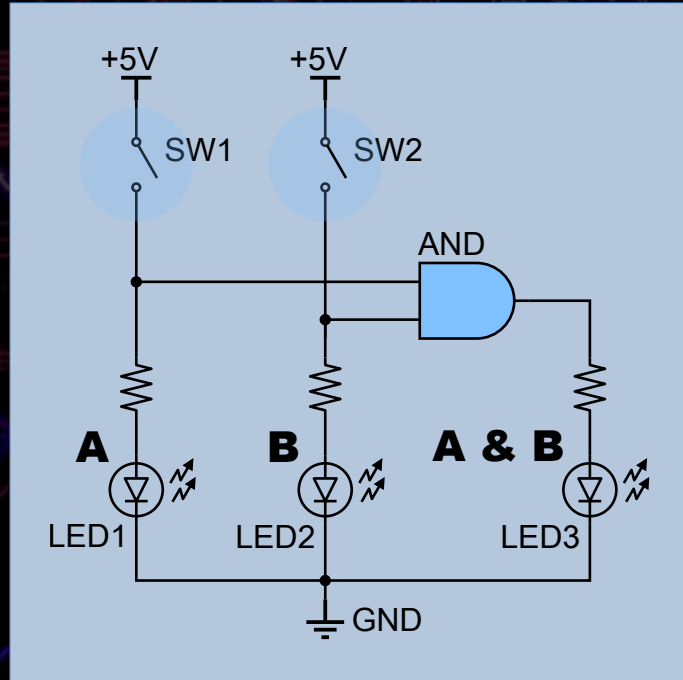
Computers

- ## Hardware

Machine Code:

funct7	rs2	rs1	funct3	rd	opcode
0000000	00010	00001	000	00011	0110011
31 .. 25	24 .. 20	19 .. 15	14..12	11 .. 7	6 .. 0

Assembly Code: ADD x1 x2 x3   **Hexadecimal:** 0x0020_81B3

REGISTERS
(hexadecimal values)

| x31: | 0x00000000 |
| : |
| : |
x7:	0x00000000
x6:	0x00000000
x5:	0x00000000
x4:	0x00000000
x3:	0x00000000
x2:	0x00000000
x1:	0x00000000
x0:	0x00000000

0x00000000

00001
rs1(4:0)

00011
rd(4:0)

00010
rs2(4:0)

funct7 0000000
funct3 000

0x00000000

0x00000000

ALU

0x00000000
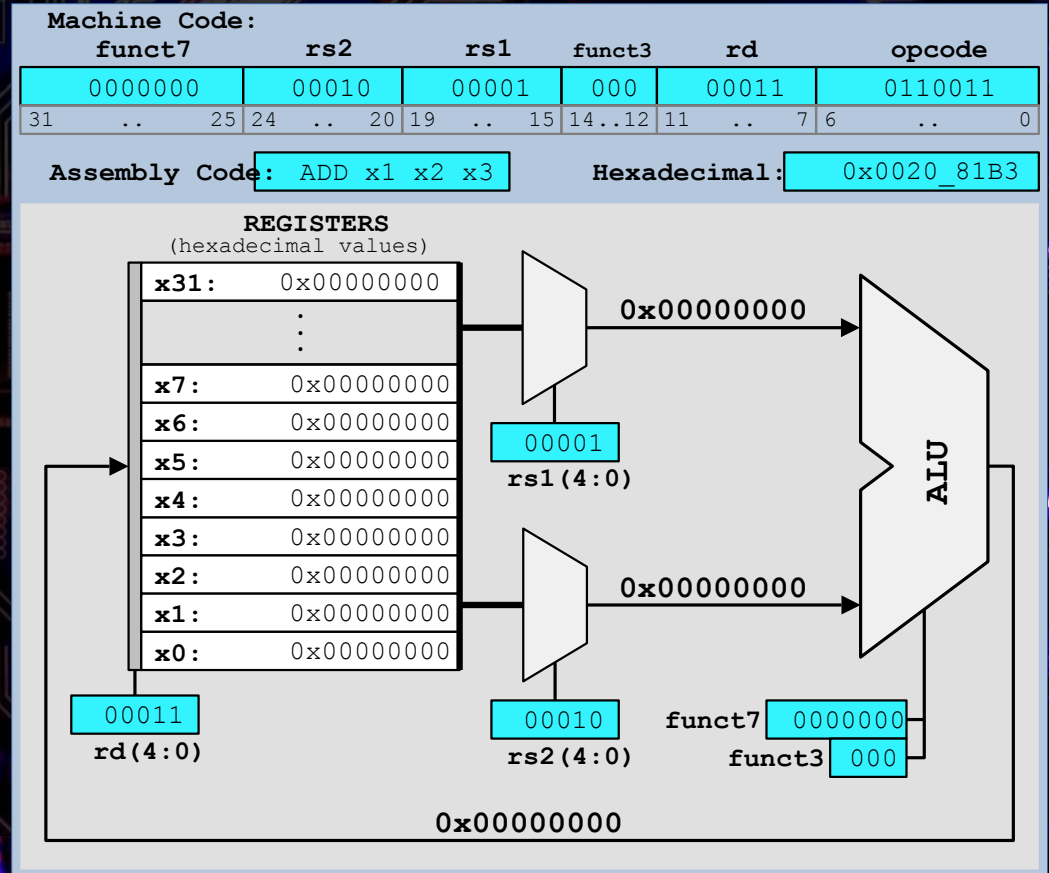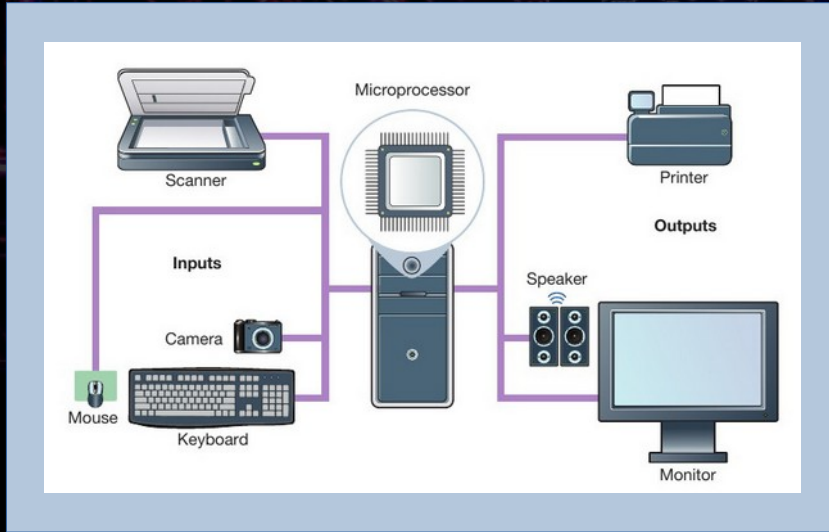
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Communication and the Internet

Social Impact

Communication and the Internet

- Connecting Computers
  - Wired / Wireless
  - Protocols
    - TCP/IP
    - HTTP
  - Security

Social Impact

- Environmental Impact

- Privacy

- Digital Inclusion

- Professionalism

- Legal Impact

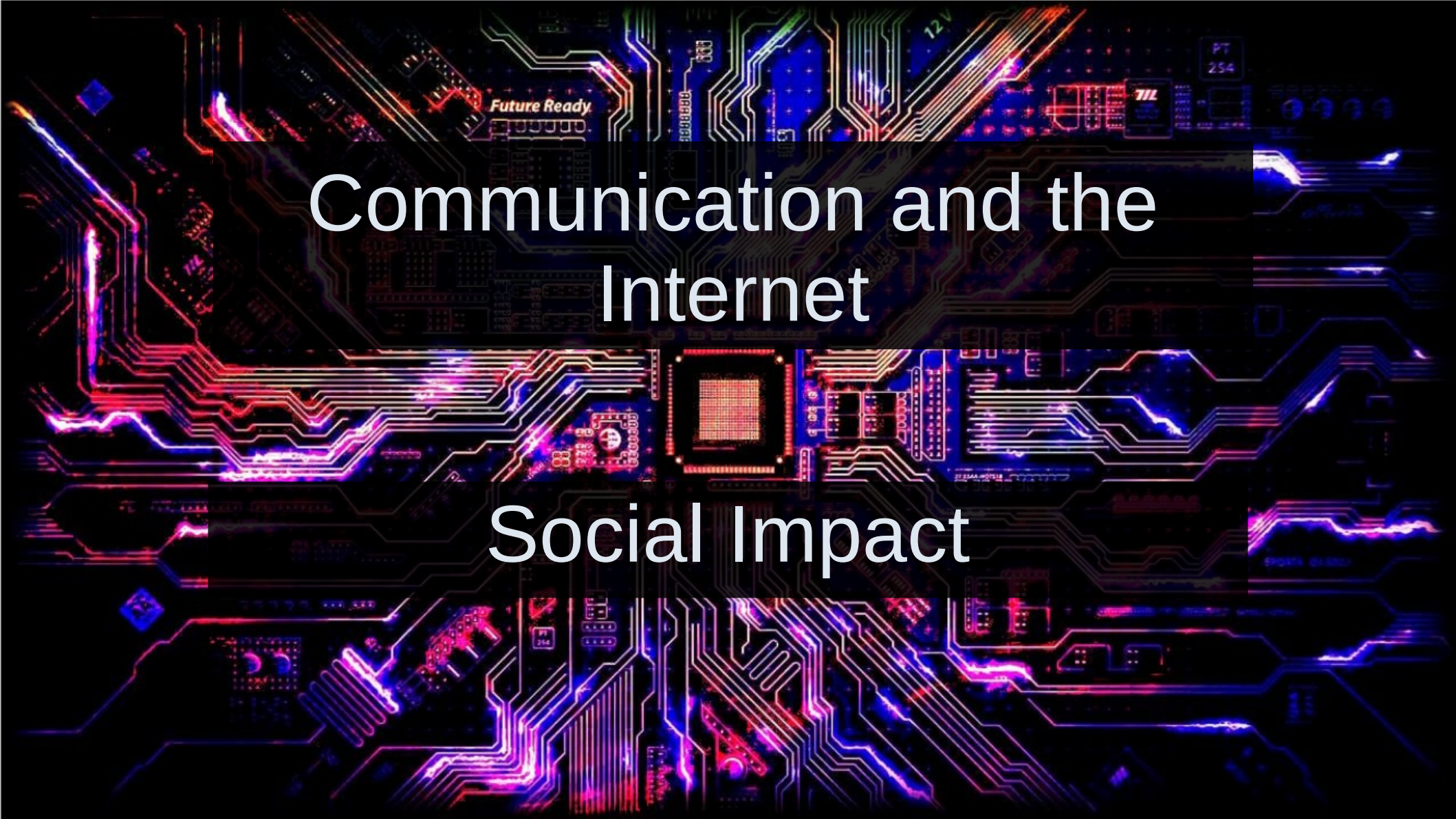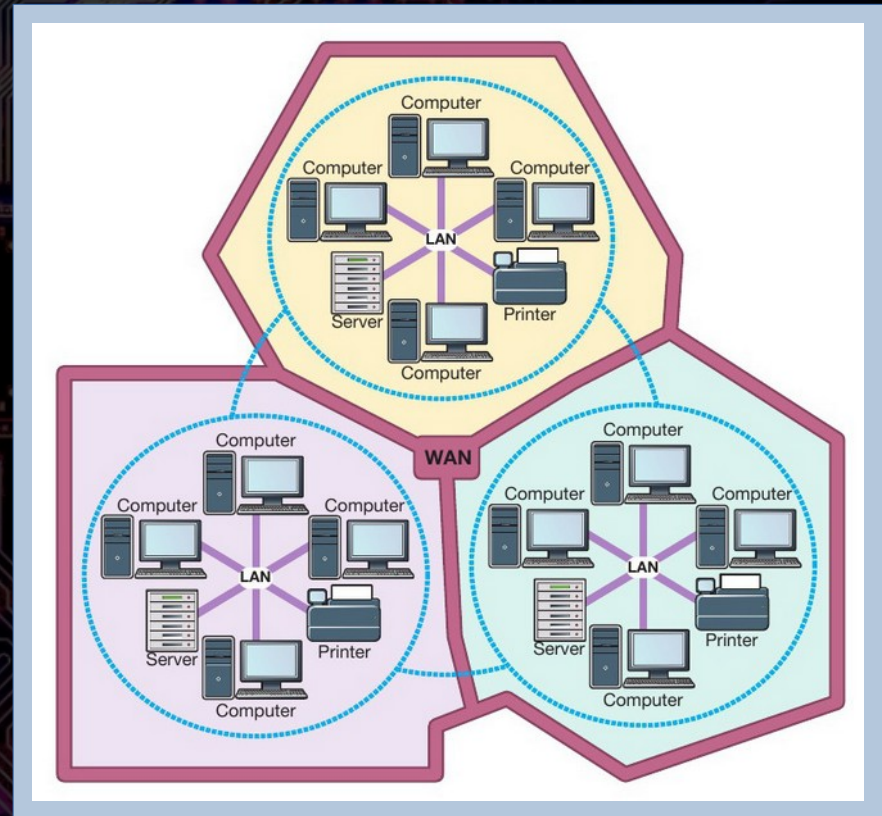- Emerging Trends
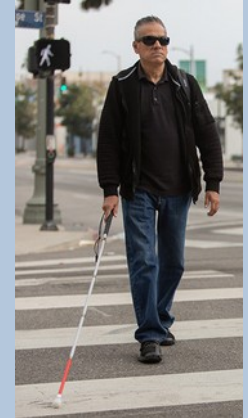
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Programming

Programming

- Java
  - Strongly-typed, compiled language
    - understanding data representation
  - Object-Oriented
  - AP Computer Science A

- Python
  - High-level, concise, abstract
  - Most popular language
    - Huge ecosystem and libraries
    - Scientific computing
    - Machine learning

Who Should Take CS?
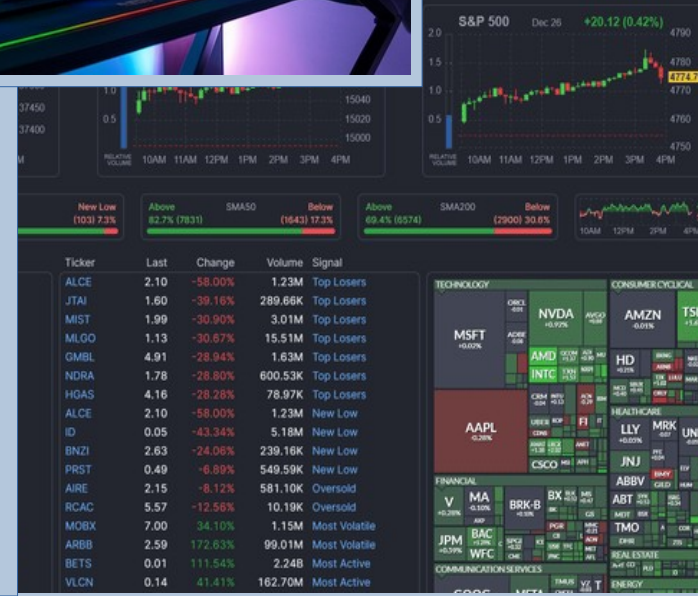
Who should take CS?

Who should take CS?

- Preparation for other courses:
  - Advanced Placement Computer Science A
    - Only Java Programming
    - Students benefit greatly from understanding algorithms and data representation
  - Advanced Level Information Technology
    - Full-stack web design (HTML, CSS, Javascript, Database)
    - A lot of overlap in content (encryption, networking, ...)

International GCSE Computer Science
Exam Information

Exam Information

- Multiple Choice (~5%)

Access to data must be controlled.

(i) Identify **one** reason that encryption is used.

☒ **A** To compress the file so it takes up less storage space

☒ **B** To make sure both sender and receiver use the same key

☒ **C** To make sure data is only understood by the intended receiver

☒ **D** To stop malicious hackers getting into a computer network

Exam Information

- Vocabulary (8-10%)

(iii) Phishing is a type of social engineering.

State what is meant by the term **social engineering**.

....

....

(ii) Some people confuse Ethernet® and Wi-Fi.

Describe what is meant by the term **Ethernet**®.

....

....

Exam Information

- Short Answer (25-30%)

(ii) Increasing the colour depth of an image leads to an increase in the image file size.

Describe the reason for the increase in file size.

(2)

Exam Information

- Long Answer (6 / 160 marks = 3.75%)

(d) Cloud storage has become an increasingly popular service.

Discuss the benefits and drawbacks of using cloud storage.

(6)

Exam Information

- Simple Calculations (15-20%)
  - No calculator needed

(e) Construct an expression to convert 13 kilobytes to kibibytes.

You **do not** need to do the calculation.

(2)

(c) Complete the table by adding these two 8-bit binary integers.

(2)

0	0	1	1	0	1	0	0
0	0	0	1	0	1	1	0

Exam Information

- Logic Problems and Diagrams (15-20%)

(i) Complete the diagram by adding directional arrows between the components to show the flow of communication.

(3)

| Speaker | | CPU | | Mouse |

USB device

Exam Information

- Analyzing Code (10-15%)

(c) **Figure 2** shows an algorithm that manipulates arrays.

The algorithm works with any number of scores.

```
1   SET oldScores TO [10, 20, 30, 40, 50]
2   SET newScores TO [0, 0, 0, 0, 0]
3   SET newIndex TO 0
4
5   FOR oldIndex FROM (LENGTH (oldScores) - 1) TO 0 STEP -1 DO
6       SET newScores[newIndex] TO oldScores[oldIndex]
7       SET newIndex TO newIndex + 1
8   END FOR
```

Figure 2

(i) Describe what happens to the variable **oldIndex** when line 5 is executed.

(2)

Exam Information

- Writing Code (20-25%)

6 Carlos wants you to create a **guess the animal** game.

Open **Q06** in the code editor.

The code contains an array of animals.

It also contains a function that randomly selects an animal from the array. This is the secret word the user needs to guess.

Carlos wants the program to:

- generate the number of attempts the user has to guess the secret word. The maximum number of attempts is the length of the secret word +3. For example, the user has 8 attempts to guess when the secret word is **tiger**

- keep track of letters from incorrect attempts that are in the secret word and those that are not. There should be no duplicated letters

- display a message telling the user:

  - the number of letters in the secret word

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Thank you!

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