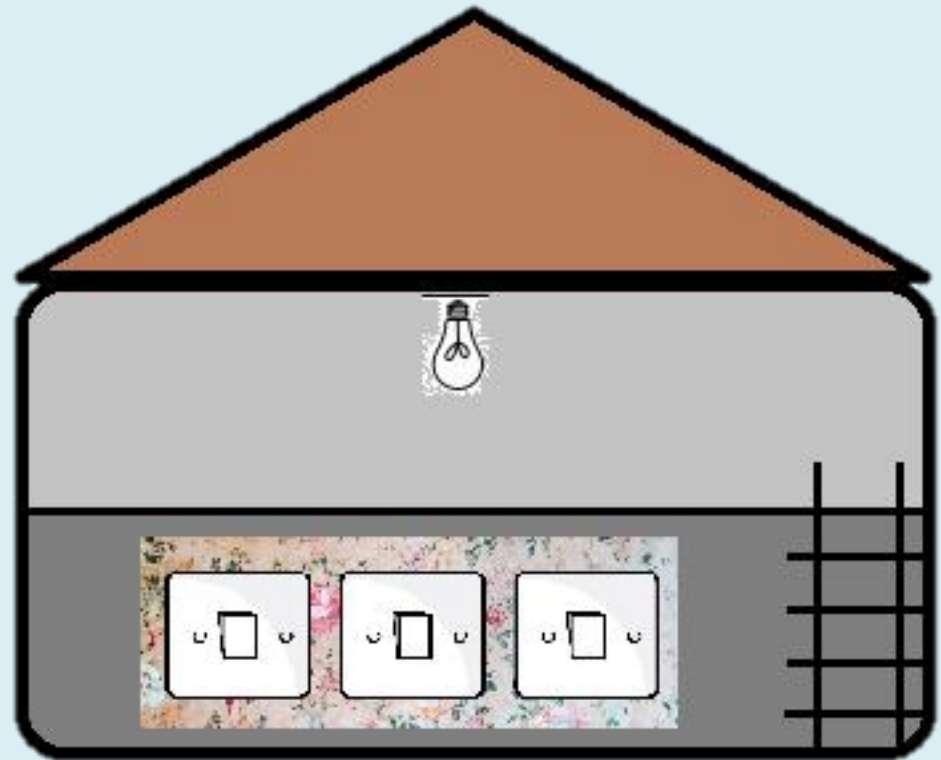# AQA GCSE Computer Science

Objectives of this session:

- To help you understand what the Computer Science course involves

- To discuss why this course might be applicable to you

- To help you make an informed decision about your GCSE options!

Can you solve the following problem?

Three light switches and one lightbulb problem:

- There are three light switches in a room, and one lightbulb in the attic
- One of the light switches relates to the bulb, the other two do nothing
- You can turn the light switches on and off as many times as you like
- You can only enter and view the bulb in the attic once
- *Can you figure out which switch relates to the bulb?*

What is GCSE Computer Science?

- An academic and high-level GCSE course;
- Has been created to get students working with real-world programming and provides a good understanding of the fundamental principles of computing;
- *Developed in a way to ensure students get a well-rounded understanding of various programming concepts to allow them to take their studies further at A-level and beyond*

General misconceptions

- The belief that 'Computing is the future' and therefore it must be studied/must be important!

- 'Only boys choose computer science'

- Computer Science is the same as Maths and Physics

- 'The whole course is programming'

- 'I find ICT lessons easy so this will be easy'

- 'I spend a large amount of time using computers so therefore I will succeed in this subject'

- 'I haven't really enjoyed ICT at KS3 so I probably won't enjoy this subject'
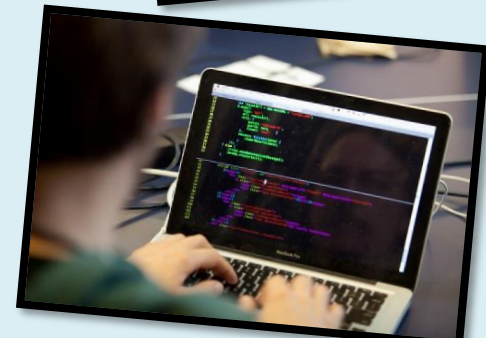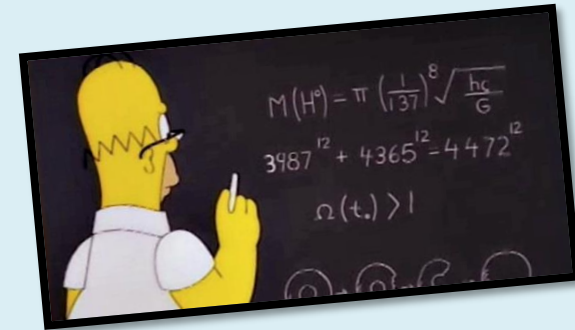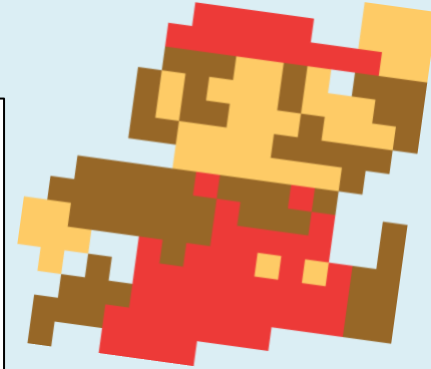
Computer Science drives the world
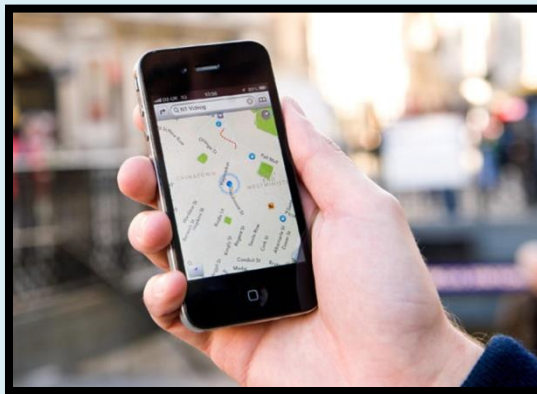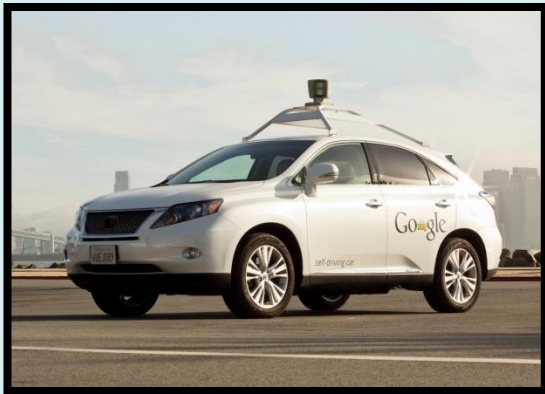
AQA GCE Computer Science

The GCSE course is split into 2 units

Paper 1 – Computational thinking and problem solving

- Worth 50% (90 marks)
- 2 hour exam
- Computational thinking
- Code tracing
- Problem solving
- Programming (Pseudocode and Python)

Paper 2 – Written Assessment

- Worth 50% (90 marks)
- 1hour 45 minute exam
- Written exam
- Short and long answer questions
- Data Representation
- Computer Systems
- Networks
- Cyber Security
- Ethics
- Databases and SQL

Both paper 1 and paper 2 will be taught during year 10 and year 11 with the exams sat in Summer of year 11.

Paper 1 – Computational thinking and problem solving

Paper 1 is the more practical exam on the specification and includes:

- **Representing algorithms:**
  - *Learning what an algorithm and how it can made more efficient to solve problems (examples are the merge and bubble sort)*
- **Programming:**
  - Learning how to program efficiently using Python (variables, sequence, selection, iteration, lists, functions, testing and debugging)
  - Being able to complete Python programming questions in an exam environment

GCSE Computer Science

AQA
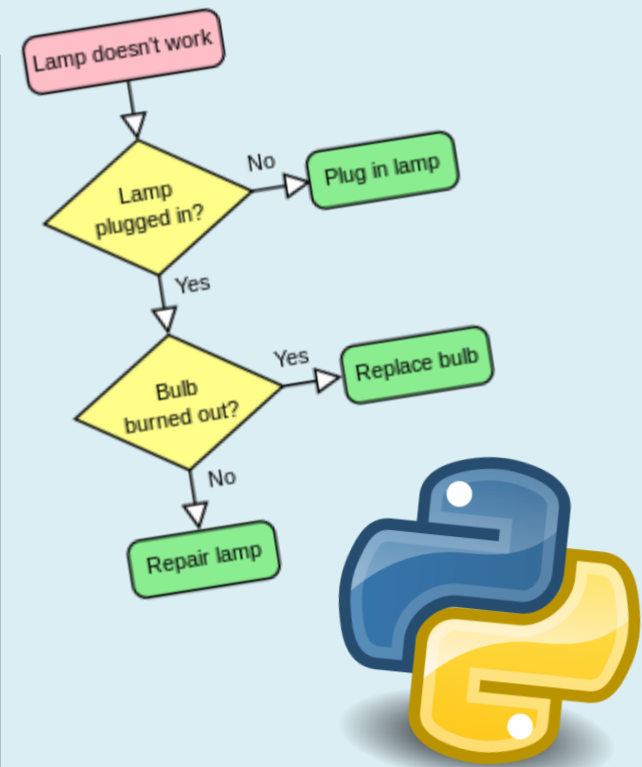
Paper 1 – Example questions

0 2 . 2 A programmer mistakenly tries to shorten the subroutine in **Figure 2** by replacing the lines:

```
c ← a + b
WHILE a < c
```

With the line:

```
WHILE a < (a + b)
```

Explain why this change is a mistake. [2 marks]

_____

_____

_____

_____

0 5 . 4 Shade **one** lozenge which shows the **true** statement about run length encoding:

A It will always make a file smaller. [1 mark]

B It is most effective on data that appears random.

C It will not lose any of the original data.

0 6 Figure 5 shows the start of an algorithm.

Figure 5

```
OUTPUT 'enter the 24 hour number (0-23)'
hour ← USERINPUT
```

The algorithm in **Figure 5** asks the user to enter a number between 0 and 23 that represents an hour using the 24 hour clock. The input is stored in a variable called `hour`.

Extend the algorithm in **Figure 5**, using either pseudo-code or a flowchart, so that it outputs the equivalent time using the 12 hour clock, ie a number between 1 and 12, followed by either `am` or `pm`.

For example:

- If the user enters 0, the program outputs 12 followed by `am`.
- If the user enters 4, the program outputs 4 followed by `am`.
- If the user enters 12, the program outputs 12 followed by `pm`.
- If the user enters 15, the program outputs 3 followed by `pm`.

You can assume that the variable `hour` is an integer and that the value that the user inputs will be between 0 and 23.

[7 marks]

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Paper 2 – Written Assessment

Paper 2 is focuses more on theoretical knowledge and includes:

- **Data representation:**
  Includes Binary logic/arithmetic, character encoding, representing images and sound, and data compression;

- **Computer systems:**
  Hardware/software, Boolean logic (logic gates), classification of software, system architecture

- **Networks:**
  Types of networks and how they work

- **Fundamentals of cyber security**
  Threats to a system and methods to prevent security threats

- **Ethical, legal and environmental issues**
  Hacking, wearable tech, theft, cloud storage

- **Databases and SQL**

GCSE Computer Science
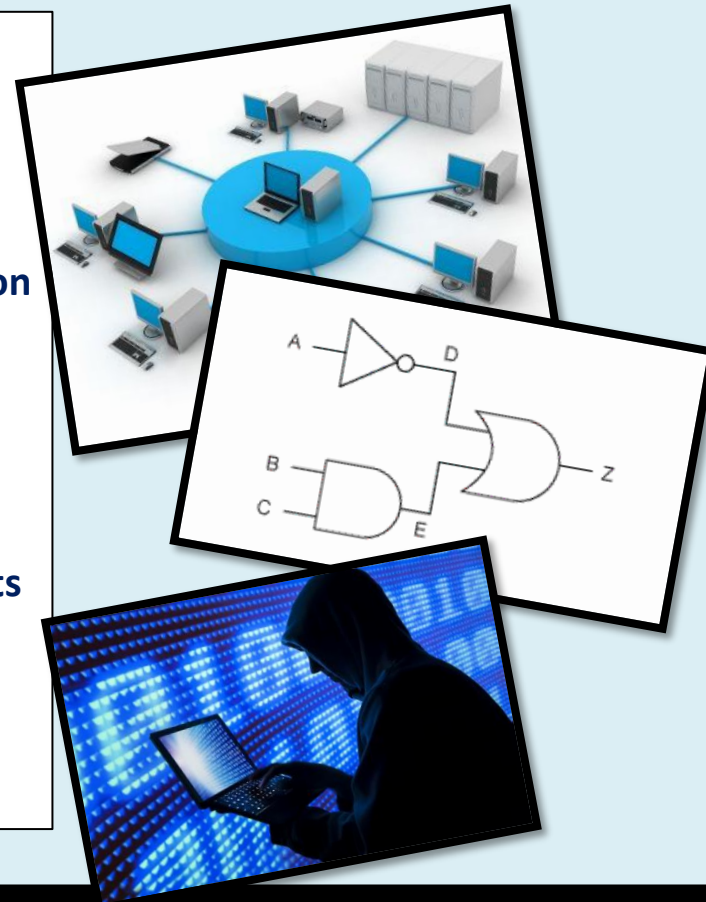
Paper 2 – Example Questions

0 1 A bit pattern is shown in **Figure 1**.

Figure 1

01001110

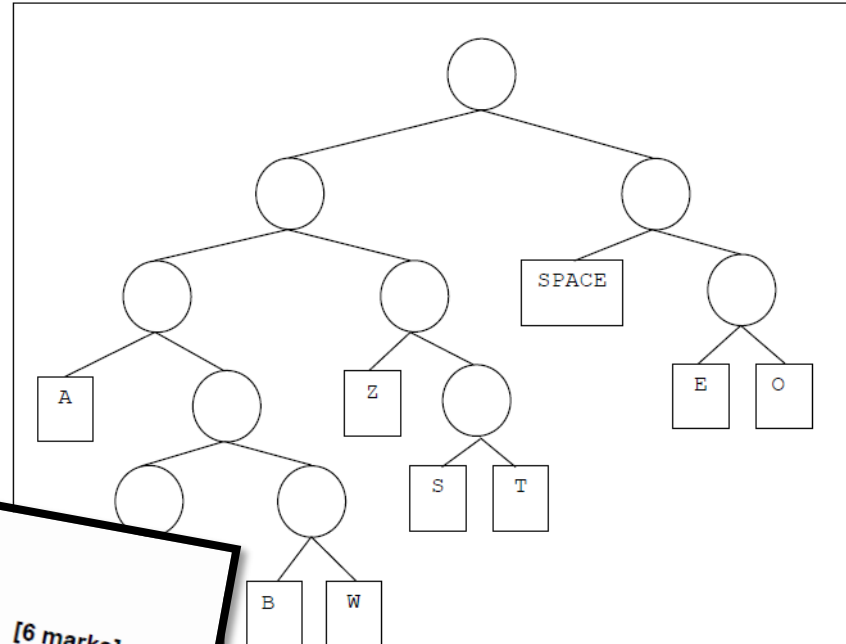**0 1 . 1** Convert the bit pattern in **Figure 1** into decimal.

_____

0 5 . 4 "Schools should use a wireless network instead of a wired network".

Discuss this statement.

_____

_____

_____

[6 marks]

A Huffman tree for the text ZOE SAW A ZEBRA AT THE ZOO is shown in **Figure 3**.

Figure 3

GCSE Computer Science

Course facts:

- Worth one GCSE using the 1 – 9 scale

- 100% exam (over 2 papers)

- A high-level course designed to test pupils' abilities – challenging but rewarding!

- Programming language taught - Python

- Large amounts of practical knowledge and theory required which will be taught over the 2 years – *pupils needs to be motivated, willing to problem solve and work independently to ensure success*

- *You do not need to have studied any of the content prior to KS4*

- Goes well with subjects such as Maths and Physics due to the logical nature of the course
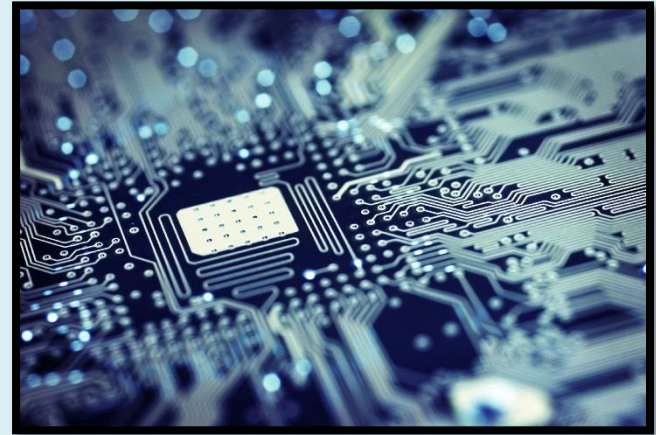
Personal qualities:

- Problem solver
- Independent
- Motivated
- Keen interest in computer science
- Willing to adapt

Next Steps…

- At Hardenhuish we also offer an A-level Computer Science course which has been running for a long time at our centre

- The A-level course is also AQA and maps well with the GCSE (as they have been redesigned with progress in mind)

- The jump from KS3 to KS4 is huge: however, the jump from KS4 to KS5 has lessened due to the course developments at KS4

- *Note – If you choose to not study Computer Science at KS4 this does not mean you cannot study the course at KS5.*
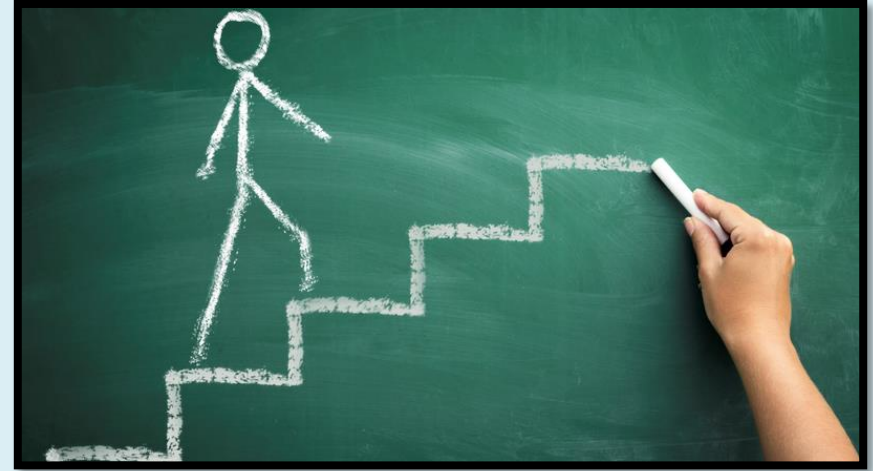
You need to ensure that your GCSE subjects are right for you now, and that you will enjoy them for the next 2 years!

GCSE Computer Science

Summary:

- A well respected, academic subject

- 100% exam

- Suitable for students with a passion for Computing, Maths and Physics

- Challenging yet highly rewarding

- Great subject for students looking to peruse a career in Computing (e.g. software development), Engineering, Physics, data analysis and network management

- Large amounts of motivation, independence and perseverance required

- Matching course at A-level

GCSE / Computer Science (8525)

GCSE Computer Science

This is our updated GCSE Computer Science specification – first teaching September 2020.

For our current specification see: GCSE Computer Science (8520)

**Teaching from: September 2020**

Exams from: June 2022

Specification code: 8525

QAN code: 601/8301/9

This specification has been updated slightly for first teaching from September 2020 and, unlike our other specification (8520), assesses programming skills by exam.

It retains the popular aspects of our other specification (8520), such as computational thinking and real-world programming, and provides a challenging specification for students of all ability levels. As before, you can choose from a range of programming languages to suit you and your students.

We've worked collaboratively with teachers and the computer
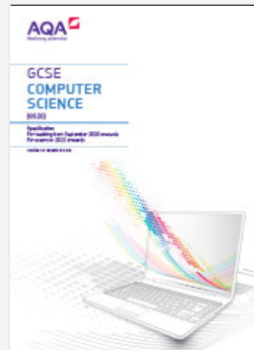
⬇ Download specification

Any Questions

Can you solve the following problem?

Three light switches and one lightbulb problem:

- There are three light switches in a room, and one lightbulb in the attic
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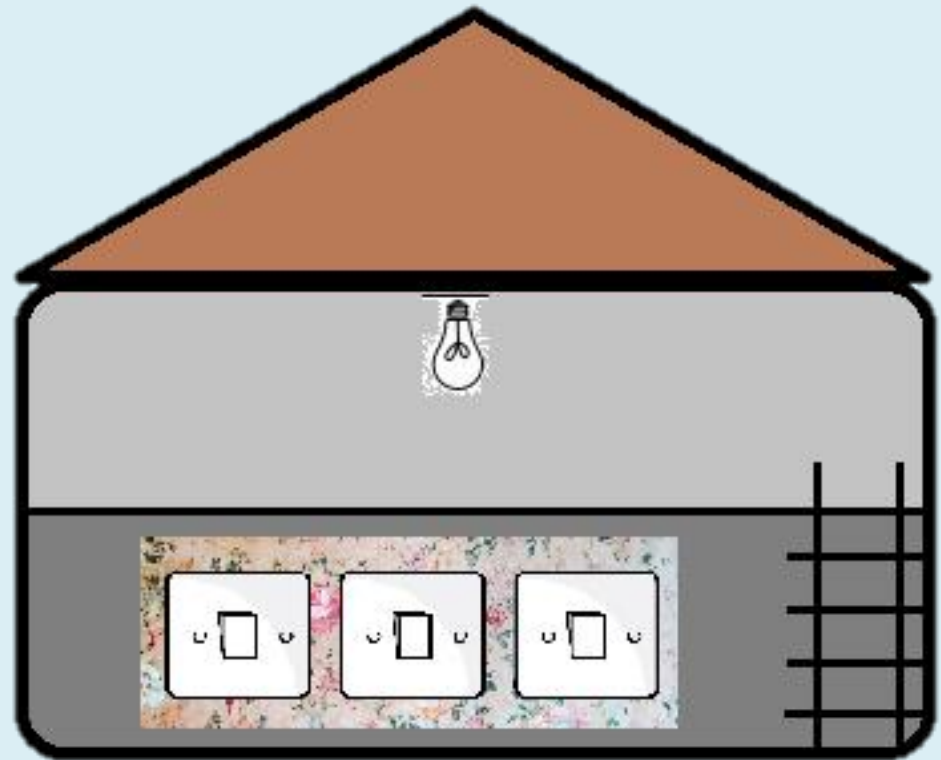
The solution logic

SwitchA = ON

SwitchB = ON

SwitchC = OFF

Wait(60 seconds)

SwitchB = OFF

IF Light == ON: Answer = SwitchA

ELSE IF Light = OFF AND Bulb = WARM: Answer = SwitchB

ELSE: Answer = SwitchC