

## Key Stage 4 Overview

|               | Module 1   | Module 2   | Module 3   | Module 4   | Module 5  | Module 6   |
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|               | <b>University Challenge:</b><br>Creative Engineering   | <b>University Challenge:</b><br>Charlie Chaplin, History of Film   | <b>University Challenge:</b><br>Local teams and groups   | <b>University Challenge:</b><br>South Bank   | <b>University Challenge:</b><br>Healthy lifestyles  | <b>University Challenge:</b><br>Community/Charity  |
|               | <b>Context:</b><br><b>Computer Systems:</b> The students design a revision app for computer systems.   | <b>Context:</b><br><b>Data Representation:</b> The students create an animation to explain how data is stored in computers.  | <b>Context:</b><br><b>Software Engineering:</b> The students design and create a sports simulation.  | <b>Context:</b><br><b>Data Representation:</b> The students create an exhibition of text, sound and image.   | <b>Context:</b><br><b>Software Engineering:</b> The students create an app to help the members of their town improve their health.  | <b>Context:</b><br><b>Problem Solving:</b> The students use problem solving techniques to design solutions to local problems.  |
| <b>Year 9</b> | <b>Skills:</b><br>Explain the difference between systems software and application software. Identify different types of application software. Identify different types of systems software. Identify the functions of an operating system. Discuss the functions of an operating system. Identify devices that could be considered computers. Identify two types of computer architecture. Describe the two types of computer architecture. Identify the components of computer architecture. Describe the components of computer architecture. Compare the two different types of computer architecture. Explain the role and operation of main memory. Discuss the differences between RAM and ROM. Identify different types of secondary storage. | <b>Skills:</b><br>Convert binary numbers into hexadecimal numbers. Explain the process of converting hexadecimal numbers into binary. Convert hexadecimal numbers into binary. Explain the process of converting denary numbers into hexadecimal. Convert denary numbers into hexadecimal. Explain the process of converting hexadecimal numbers into denary. Convert hexadecimal numbers into denary. Add two-bit binary numbers together. Add four-bit binary numbers together. Add eight-bit binary numbers together. Add three eight-bit binary numbers together. Explain what happens when overflow occurs after addition. Subtract one two-bit binary number from another. | <b>Skills:</b><br>Describe the Boolean operators. Explain the purpose of the iteration structure. Describe the three types of the iteration structure. Design algorithms that use pre-condition iteration. Create programs that use pre-condition iteration. Design algorithms that use post-condition iteration. Create programs that use post-condition iteration. Design algorithms that use definite iteration. Create programs that use definite iteration. Design algorithms that use nested iteration. Create programs that use nested iteration. Design and create programs that manipulate strings. Design and create programs that utilise random numbers. Design and create programs that validate data input by users. | <b>Skills:</b><br>Identify different character sets for storing text on computers. Describe the ASCII character set. Describe the Unicode character set. Explain the difference between ASCII and Unicode character sets. Calculate the size of text files stored on storage devices using ASCII. Calculate the size of text files stored on storage devices using Unicode. Explain what a bitmap is. Explain what a pixel is. Explain what metadata is. Explain how colour depth works for a bit map. Discuss the impact of colour depth on image quality. Explain what resolution is. Discuss the impact of number of pixels on image quality. Calculate the size of an image file based on image size and colour depth. | <b>Skills:</b><br>Design and create programs that authenticate user names and passwords. Trace algorithms using trace tables. Create trace tables to determine the outcome of the algorithm. Identify the four cornerstones of computer Science. Explain what computational thinking is. Describe the process of abstraction. Describe the process of decomposition. Describe the process of pattern recognition. | <b>Skills:</b><br>Explain what a subroutine is. Design and create programs using subroutines. Design and create programs using subroutines and return values. Design and create programs using subroutines, return values and parameters. Discuss different environmental impacts for computer systems. Discuss different ethical impacts for computer systems. Discuss different legal impacts for computer systems. Discuss different social impacts for computer systems. Discuss different cultural impacts for computer systems. Analyse problems using gathered information. |

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|  | <p>Explain how different types of secondary storage work. Compare different types of secondary storage. Discuss the difference between main memory and secondary storage. Explain how cloud storage works. Compare cloud storage and secondary storage. Compare embedded and non-embedded systems. Identify the stages of the process for executing instructions on computer systems. Describe the stages of the process for executing instructions on computer systems.</p> | <p>Subtract one four-bit binary number from another. Subtract one eight-bit binary number from another. Explain what happens when underflow occurs. Explain how computers subtract. Convert a positive binary number into a negative binary number using two's complement. Subtract a positive binary number from another positive binary number. Subtract a negative binary number from another positive binary number. Subtract a negative binary number from another negative binary number. Explain how binary multiplication works. Explain the difference between logical shift and arithmetic shift. Multiply two binary numbers using logical shift. Multiply a binary number by powers of two using arithmetic shift. Divide binary numbers by powers of two using arithmetic shift.</p> |  | <p>Discuss the impact of image size and colour depth on image file size. Identify alternatives to bitmaps. Explain what compression is. Explain the difference between lossy and lossless. Discuss the differences between different image file formats. Discuss the difference between analogue and digital. Explain how sound is converted into digital data. Explain how an analogue to digital converter works. Explain what sample rate is. Explain what bit depth is. Explain what bit rate is. Calculate the bit rate for a sound file. Calculate the size of a sound file using sample rate, bit depth and bit rate. Identify different file formats for storing sound files. Discuss the differences between different sound file formats.</p> |  | <p>Define problems using gathered information. Discuss the benefits of solving problems. Analyse problems by answering key questions. Identify the root causes of problems. Select appropriate solutions to problems based on analysis. Justify the selection of solutions based on analysis. Identify the components needed to turn solutions into design. Identify different design methods for designing computer systems. Discuss different design methods for designing computer systems. Design solutions to problems using a design method. Design and create solutions to a problem using a design method and a programming language. Test solutions to problems using one design method and programming language. Evaluate solutions to problems using one design method and programming language.</p> |
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