KESTEVEN AND SLEAFORD HIGH SCHOOL

Computer Science Scheme of Learning

Year 10 – Term 1

Intent – Rationale

This term secures students' understanding of binary & hexadecimal numbers from year 9, introduces them to simple Boolean logic circuits and truth tables, and looks at why and how text, images and sound are encoded into binary and compressed

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 9 Term 1	• A-Level Computer Science Computational Mathematics and Encoding
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Mathematics: number systems, powers, carries and logical operations/decision	• N/A
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• Binary, Octal and Hexadecimal for Programming & Computer Science by Sunil Tanna	• See subject links

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Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- **Numbers**: how to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa, how to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur, how to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa, how to convert binary integers to their hexadecimal equivalents and vice versa, binary shifts
- **Units**: the units of data storage: bit nibble (4 bits) byte (8 bits) kilobyte (1,000 bytes or 1 kb) megabyte (1,000 kb) gigabyte (1,000 mb) terabyte (1,000 gb) petabyte (1,000 tb), how data needs to be converted into a binary format to be processed by a computer, data capacity and calculation of data capacity requirements
- **Characters**: the use of binary codes to represent characters, the term 'character set', the relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g. ascii & unicode
- **Images:** how an image is represented as a series of pixels, represented in binary, metadata, the effect of colour depth and resolution on: the quality of the image and the size of an image file
- **Sound:** how sound can be sampled and stored in digital form, the effect of sample rate, duration and bit depth on: the playback quality and the size of a sound file
- **Compression:** understand why it is needed and the difference between lossy and lossless compression
- **Boolean logic:** simple logic diagrams using the operators and, or and not, truth tables, combining Boolean operators using and, or and not, applying logical operators in truth tables to solve problems

Apply

- Be able to process binary and hexadecimal numbers accurately and efficiently
- Be able to convert between different units and calculate estimated file sizes
- Be able to describe how text, Images and sound data is encoded into binary and the need for compression
- Be able to understand and create truth tables and logic circuits to 2 levels using AND OR and NOT gates

Extend

- Understand why computers do not subtract but instead use two's complement addition
- Understand how images and text are compresses using RLE, dictionary and other compression algorithms

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What subject specific language will be used and developed in this topic?		What opportunities are available for assessing the progress of students?
• Denary • Binary • Integers • Overflow • Hexadecimal • Shifts • Unit • Conversion • Metadata • Bit Nibble (4 Bits) Byte (8 Bits) Kilobyte (1,000 Bytes Or 1 Kb) Megabyte (1,000 Kb) Gigabyte (1,000 Mb) Terabyte (1,000 Gb)	• Boolean • Logic Gate • Encoding • Colour Depth • Resolution • Dimensions • Character Set • ASCII • Unicode • Bit Rate • Sample Depth • Sample Rate • Compression • Lossy • Lossless	• Class Notes and in-lesson observation • Kahoot starters/plenaries and verbal questioning • Summative assessment in final week of term

Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
			See P drive for lesson presentations/resources