TOPIC 2 - Data Knowledge Organiser

Number Bases
- Binary (Base 2)
- Denary (Base 10)
- Hexadecimal (Base 16)

Using Binary
- Why
  - Converting from binary to denary.
  - Converting from denary to binary.
  - Units.
    - Nibble
    - Byte
    - Kilobyte
    - Megabyte
    - Gigabyte
    - Terabyte

Compression
Need for;
- Lossy
- Lossless

Images
- Stored in binary on a computer.
- Metadata
- Pixel
- Colour depth
- Resolution
- Bitmap images
- Vector images

Characters
- Character set.
  - Definition
  - ASCII
  - Unicode

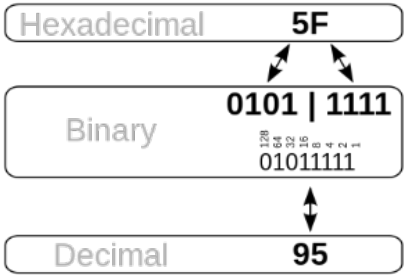
Instructions
- Fetch-Execute cycle
- Op-code
- Operand
- Accumulator

Binary Manipulation
- Addition
- Logical Shifts
- Arithmetic Shifts
- Two's Complement

Sound
- Metadata
- Sample rate
  - Quality of sound
  - File size
- Sample interval
- Bit rate

Hexadecimal (hex) numbers
- Hex – base 16
- Converting between hex and denary.
- Converting between hex and binary.

Binary	Hex	Decimal
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15



Misconceptions

Encryption isn't just used to stop people from seeing information. It is used to only allow people with access to the key to decrypt it to view it, thus stopping unauthorised users from seeing it.

Science Specification:

Subject content	Students should:	
2.1 Binary	2.1.1	understand that computers use binary to represent data (numbers, text, sound, graphics) and program instructions and be able to determine the maximum number of states that can be represented by a binary pattern of a given length
	2.1.2	understand how computers represent and manipulate unsigned integers and two's complement signed integers
	2.1.3	be able to convert between denary and 8-bit binary numbers (0 to 255, -128 to +127)
	2.1.4	be able to add together two positive binary patterns and apply logical and arithmetic binary shifts
	2.1.5	understand the concept of overflow in relation to the number of bits available to store a value
	2.1.6	understand why hexadecimal notation is used and be able to convert between hexadecimal and binary
2.2 Data representation	2.2.1	understand how computers encode characters using 7-bit ASCII
	2.2.2	understand how bitmap images are represented in binary (pixels, resolution, colour depth)
	2.2.3	understand how analogue sound is represented in binary (amplitude, sample rate, bit depth, sample interval)
	2.2.4	understand the limitations of binary representation of data when constrained by the number of available bits
2.3 Data storage and compression	2.3.1	understand that data storage is measured in binary multiples (bit, nibble, byte, kibibyte, mebibyte, gibibyte, tebibyte) and be able to construct expressions to calculate file sizes and data capacity requirements
	2.3.2	understand the need for data compression and methods of compressing data (lossless, lossy)