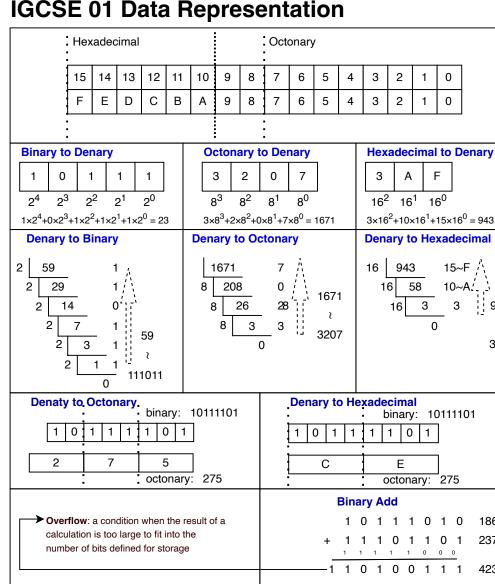
IGCSE 01 Data Representation



unit of measurement	abbreviation	conversion
bit	b	1 bit
nibble		4 bits
Byte	В	8 bits
Kilobyte	kB	1024 bytes
Megabyte	MB	1024 kB
Gigabyte	GB	1024 MB
Terabyte	TB	1024 GB

HTML Color

#FFFFFF	#333333	#FF00000	#00FF00	#0000FF	#00FFFF	#9324FC

color depth: the number of bits used to represent each pixel

black and white, 1bit per pixel

4 color, 2 bits per pixel 8 color, 3 bits per pixel

Image resolution: the number of

pixels that make up an image. 400*600 pixels

400 * 600 image, RGB 3 * 16 * 16 color depth, file size:

- 400 * 600 * 3 * (log₂256) bits
- = 240000 * 3 * 8 bits = 720000 byte
- = 720000 / 1024 kB = 703 kB
- = 703 / 1024 MB = 0.68MB

\times									
	R	G	В	range					
hexadecimal	93	24	FC	00~FF					
denary	147	35	252	0~255					
binary	10010101	00100100	11111100						

Calculation of file size:

image file size:

image resolution(in pixels) * colour depth (in bits) sound file size:

sample rate(in HZ) * sample resolution (in bits) * length of sample (in seconds)

binary usages: register, memory, Logic Gates, Boolean Algebra, Machine Language, Data Representation hexadecimal usages: color in HTML, MAC address, assembly languages, machine code, IPv6. why use binary store data?

- 1. a computer can only work with binary data
- 2. computers use switches/ logic gates
- 3. only use 2 states, On or Off, 1 or 0. why use hexadecimal?
- 1. more convenient to use
- 2. one hex digit represent four binary digits
- 3. hex number is far easier for humans to remember, copy and work with

why designer use hexadecimal?

- 1. Uses fewer characters // shorter
- 2. Easier to read / write / understand
- 3. Less likely to make mistakes // less error prone
- 4. Easier to debug

Logical shift:

left logical shift: multiplying by 2 for each shift right logical shift: dividing by 2 for each shift multiple shift

Bits shifted from the end of the register are lost and zeros are shifted in at the opposite end of the register

two's complement: represent positive and negative 8-bit binary integers

positive number:

sign bit 0, positive binary value negative number:

sign bit 1

- 1. write positive binary value
- 2. invert each binary value
- 3. add 1 to the number

ASCII code

8 bit length

Standard ASCII code character set consists of 7-bits codes Extended ASCII use 8 bit codes give another 128 codes to allow for non-English alphabets.

Unicode

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- 1. represent non-Western languages, such as Chinese or Japanese characters.
- 2. up to 32 bits per character

sampling resolution: the number of bits per sample. sampling rate: the number of sound samples taken per

The greater the number of bits used to represent the amplitude, the greater the accuracy of the sampled sound.

Lossy and Lossless Compression why compression?

- 1. save storage on devices
- 2. reduce the time taken to stream a music or video file
- 3. reduce the time taken upload, download or file across
- 4. reduce file size also reduce costs.

Lossy compression: The original file cannot be reconstructed once it has been compressed.

How lossy compression: the algorithm used int the lossy technique have to decide which parts the file need to be retained and which can be discarded JPFG

- 1. reducing resolution or color depth
- 2. reducing sample rate or resolution

Lossless compression:

all the data from the original uncompressed file can be

Run-length encoding:

- 1. reducing the size of a string of adjacent, identical data
- 2. the repeating unit is encoded into two values: first value represents number of identical data items I, second value represents code (such as ASCII) of data item. usages: image, text, code.