Your notes

GCSE Computer Science: revision notes

Binary, denary and hexadecimal

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Why computers use binary

- Computers are made of switches (transistors) that are either on or off, so data is stored as 1s and 0s called bits.
- 4 bits = 1 **nibble**. 8 bits = 1 **byte**.

Binary place values

- For 8 bits the place values are 128, 64, 32, 16, 8, 4, 2, 1.
- 1011 0101 = 128 + 32 + 16 + 4 + 1 = 181.
- The largest 8-bit number is 255, so 8 bits can store 256 different values (0 to 255).

Denary to binary

- Start with the largest place value that fits, subtract it, and repeat.
- 100 = 64 + 32 + 4, so 100 = 0110 0100.

Hexadecimal

- **Hexadecimal** is base 16. It uses 0–9 and A–F (A = 10, B = 11 ... F = 15).
- Each hex digit represents one **nibble**: 1010 1111 = AF.
- Hex is easier for people to read and write than long **binary** numbers, with fewer mistakes.

Units of data

- bit → **nibble** (4 bits) → **byte** (8 bits) → kilobyte (1000 **bytes**) → megabyte → gigabyte → terabyte → petabyte, each ×1000.

- (Edexcel) Edexcel uses **binary** prefixes instead: 1 **kibibyte** (KiB) = 1024 **bytes**, 1 mebibyte (MiB) = 1024 KiB, then gibibytes (GiB) and tebibytes (TiB), each × 1024.

Your notes

Key terms

Bit	A single binary digit: 0 or 1.
Nibble	4 bits.
Kibibyte	1024 bytes (KiB), the binary prefix that Edexcel uses. (Edexcel)
Byte	8 bits.
Binary	Base 2: numbers written using only 0 and 1.
Denary	Base 10: the everyday number system.
Hexadecimal	Base 16, using 0–9 and A–F.
Overflow	When a calculation's result needs more bits than are available.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. How many bits are there in a byte?
2. What is binary 1010 in denary?
3. What is 1111 1111 in denary?
4. What is denary 9 in 4-bit binary?
5. Which hex digit represents 12?
6. What is hex F in binary?
7. Why do computers use binary?
8. What is hex 2F in denary?

Answers

1. 8
2. 10
3. 255
4. 1001
5. C
6. 1111
7. Their switches only have two states: on and off
8. 47

What to do next

Practise 13 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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