Binary, Denary and Hexadecimal

* Binary is used by computers as they can only process two ‘states’, on or off
* A binary number of length n can represent 2n different numbers, from 0 to 2n‑-1
* Hexadecimal is used as it can represent binary numbers in a quarter of the digits, filling less screen space, allowing fewer errors, and making code patterns easier
* Each character of ASCII uses 8 bits of space

*Convert these decimal numbers into binary:*

10 🡪 1010

12 🡪 1100

15 🡪 1110

65 🡪 1000001

165 🡪 10100101

*Convert these hexadecimal numbers into binary:*

10 🡪 0001 0000

12 🡪 0001 0010

1F 🡪 0001 1111

F1 🡪 1111 0001

*Convert these hexadecimal numbers into decimal:*

E 🡪 14

21 🡪 35

17 🡪 23

*AB 🡪 171*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Binary* | | | *Denary* | | |
| *Kibibyte* | *KiB* | *210* | *Kilobyte* | *KB* | *103* |
| *Mebibyte* | *MiB* | *220* | *Megabyte* | *MB* | *106* |
| *Gibibyte* | *GiB* | *230* | *Gigabyte* | *GB* | *109* |
| *Tebibyte* | *TiB* | *240* | *Terabyte* | *TB* | *1012* |

1. How many permutations can 6 bits hold?

26 / 64

2. What is the maximum value that can be represented by: a) 4 bits | b) 5 bits | c) 8 bits

a) 24-1 / 15 | b) 25-1 / 31 | c) 28-1 / 255

3. If one byte can hold one ASCII character, how many characters can be represented using: a) 32 bits | b) 40 bits

a) 232 / 4 294 967 296 | b) 240 / 1 099 511 627 776

4. How many ASCII characters can be stored using 2 kilobytes?

2000 in 1KB, 2048 in 1KiB

Prep – Common storage capacities

Hard disk: ~1-2TB

Main Memory / RAM: 4-64GB

Memory Stick: 8-128GB

SD Card: 2-128GB

Floppy Disk: 79.75KB – 2.88MB

CD-ROM: 200-900MB

DVD-ROM: 1.36-15.90GiB

Blu-Ray Disc: 25-128GB

Prep – Java’s Int

Java’s “int” primitive represents a 32-bit signed two’s compliment number – this means that 32 bits are used to store it, and it can store between -231 and 231-1. The first bit specifies whether it is positive