# Introduction

OK – you should have some idea what a CPU does, and how it does it by now. (If not, go read some of the Von Neumann stuff and other CPU basics, then come back here!)

In a nutshell, there are **three factors that will determine the performance of a CPU**. (Well, three that we need to know about at GCSE, anyway!)

## *Clock speed*

Clock speed is measured as a frequency, nowadays usually in gigahertz, or billions of cycles per second. This relates to the number of fetch-execute cycles the processor can fetch, decode and execute in a second.

The higher the clock speed, the faster the processor, and thus the more it can get done in a given amount of time.

## *Number of cores*

Many modern CPUs (indeed, almost every processor in a modern PC laptop or workstation) have multiple cores. That is to say more than one processor on the same chip.

So, at any given clock speed, a four-core CPU will be twice as fast as a two-core model, while an eight-core chip will be four times faster than a two-core model at the same clock speed.

(OK, these are approximations – in real life there are factors which make it "not quite twice as fast" or "not quite four times as fast", but we don't need to worry about these at GCSE.)

## *Amount of cache*

Cache is a small amount of very fast (and therefore very expensive) memory on the CPU chip. It is used to store instructions and data likely to be needed very quickly, and can help the processor run faster. Because it is on the main CPU chip, the processor cores can transfer data to and from cache very, very quickly. Because it is so fast, it is expensive. So… a CPU with 8MB of cache will outperform a CPU with 4MB of cache, assuming both have the same number of cores and the same clock speed.

### Levels of cache

If you look up the spec. of modern CPUs, you will see cache is further divided into different grades or **levels** – again, a compromise between cost and performance where the manufacturers are trying to deliver the best possible trade-off between performance and price. You do not need to worry about cache levels at GCSE, just that more cache will make a CPU run faster (as one of the three factors you need to know about).

# In short

Get your head around this sheet; get familiar with the kind of numbers used for each factor, and you'll be talking like a pro (and walking the CPU question in the exam!)