# Homework 2 The Processor Answers

1. A processor contains the Arithmetic Logic Unit (ALU) and the Control Unit.   
   1. Describe the role of the the Control Unit. [2 marks]

1 mark for each point:

* Coordinates the activity of all other processor components
* Manages the phases of the Fetch-Execute cycle
* Decodes instructions received into the processor

* 1. The following registers are used in the Fetch-Execute cycle:
     + - program counter (PC)
       - memory address register (MAR)
       - memory buffer register (MBR)
       - current instruction register (CIR)

The processor uses these registers as part of the Fetch-Execute cycle.

State how each of them is used within this cycle. [4 marks]

1 mark for each point:

1. PC:

* Holds the address of the next instruction
* (Incremented by one when the instruction is read, ready for the next cycle.)

1. MAR:

* Contains the address of the memory location from which data or an instruction is to be fetched

1. MBR:

* temporarily stores the data being transferred to and from memory. (It acts as a buffer allowing the processor and memory units to act independently without being affected by minor differences in operation.)

1. CIR:

* Holds the instruction currently being decoded or executed

1. The performance of a processor is affected by many different factors. For example, the speed at which the processor is clocked determines how much time is taken to complete instructions. A higher clock rate generally results in the quicker processing of instructions but this is not the only factor.   
     
   Describe other factors that affect the performance of a processor. [6 marks]

[Total 12 marks]

1 mark for each point:

* Number of cores…
* …Multiple processors on the same die means that multiple instructions can be processed at the same time
* Size of processor cache memory…
* …contains frequently used data that the processor requires often shortening the time it takes to retrieve from the usual memory store
* Word length…
* …the number of bits that a processor can process at any one time – the higher the value, the more that can be processed