**Outline and evaluate the working memory model.** (*12 marks*)

According to the working memory model (WMM), short-term memory (STM) is an active store made up of three key components: The central executive, the phonological loop and the visuospatial sketch pad. The central executive is the organisational system and controls two slave systems, the phonological loop and the visuo-spatial sketchpad. A fourth component, the episodic buffer, was added in 2000 to address shortcomings of the model.

The central executive filters information, and decides which information received by the sense organs to attend to at any one time. It then directs information to the other two ‘slave’ components to process, and receives the responses. It has no storage capacity so therefore relies on the episodic buffer to provide temporary storage.

The phonological loop processes auditory information, and so processes the information that we hear, and this information is saved in the phonological store, our “inner ear”. The phonological loop is divided into sub-parts: the primary acoustic store, and the articulatory process, which allows us to sub-vocally (silently to oneself) process information, i.e. to use our “inner voice” to articulate information, such as when reading.

The visuo-spatial sketchpad processes visual and spatial information and is also known as our “inner scribe”. It is a temporary store for visual and spatial information.

A key strength of the WMM is that there is considerable empirical research support for it. Hitch and Baddeley (1976) demonstrated that when participants performed two STM tasks using the same modality (i.e. both phonological) performance slowed, whereas two tasks using different modalities (i.e. visual and phonological tasks) did not affect each other. This shows that WM must have separate components. This is corroborated by the case study of KF, who suffered brain damage to his left occipital lobe after a motorcycle accident. His short-term memory for verbal materials was very poor, but his short-term memory for visual materials was more or less normal, suggesting that there are multiple areas of the brain responsible for different short term memory information, rather than just one.

Further evidence to support the WMM is provided by PET scans. It has been shown that when people are doing visual and verbal tasks, two different areas of the brain are active. This shows that there are separate components of the PL and the VSS in the brain.

A further advantage of the model is that it has practical applications, especially for children with ADHD. Based on the model methods have been developed to help ADHD focus on tasks, and to write computerised training based on improving WMM.

Despite the substantial scientific evidence however, there are some problems with the model. Some of the components of the WMM are vague and unsatisfactorily explained. For example the central executive is seen as equivalent to 'attention'. However, it is not clear how this operates or could be tested. It is claimed to be the most important component of the WMM, yet little is known about it, and it has yet to be well researched.

Also, the WMM is limited to working (short-term) memory. It gives little detail about LTM, nor about the processes with which information is moved between working memory and LTM.

Finally, a key problem with the WMM is that it does not make it clear how we deal with information from smell and touch senses. It focuses only on acoustic and visual information.