Unit 5 Human Biology Synoptic Question

**Content / 16 – You should include at least 25 relevant points**16 /16 = Material accurate and of a high standard throughout, reflecting a sound understanding of the principles involved and a knowledge of factual detail fully in keeping with a programme of A-level study. In addition, there are some significant references to material that indicates greater depth or breadth of study.

**Structure / 3**3/3 = Material is logically presented in clear English. Technical terminology has been used effectively and accurately throughout.

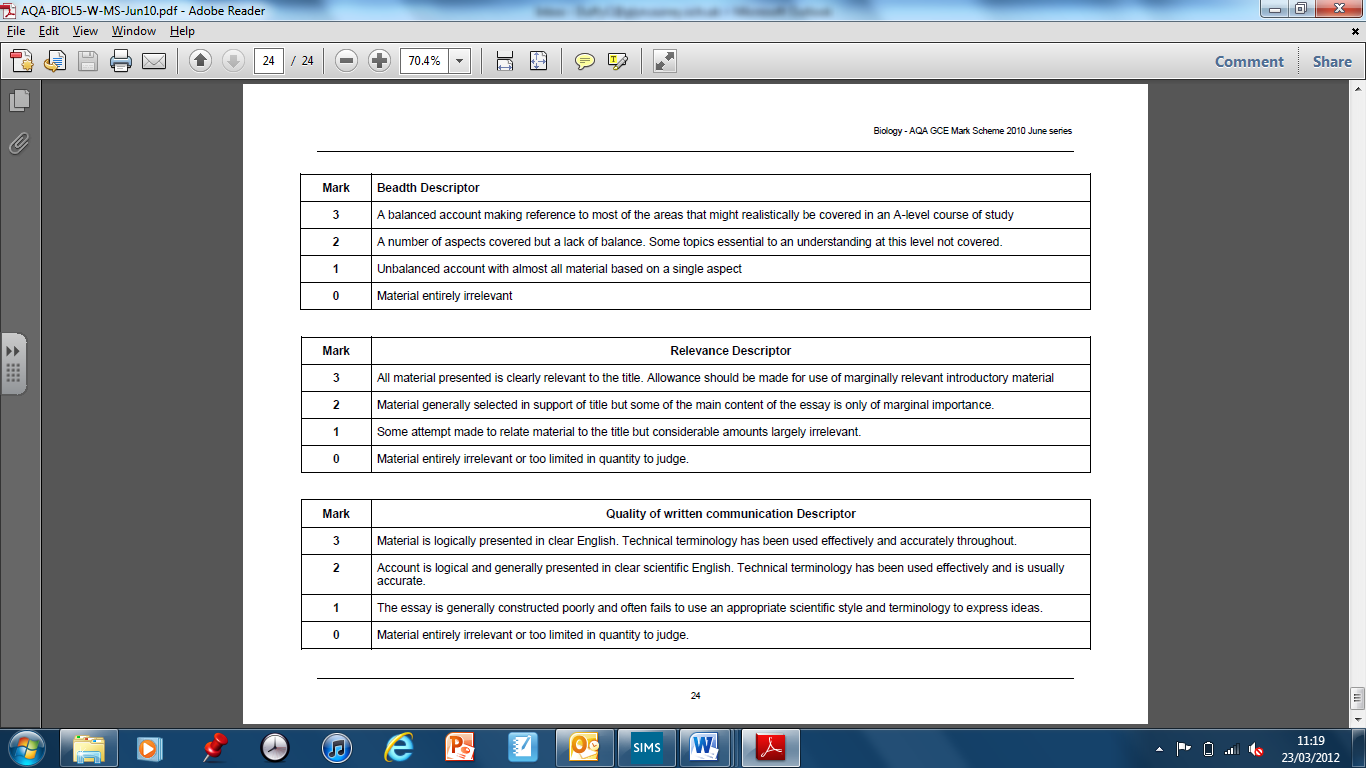
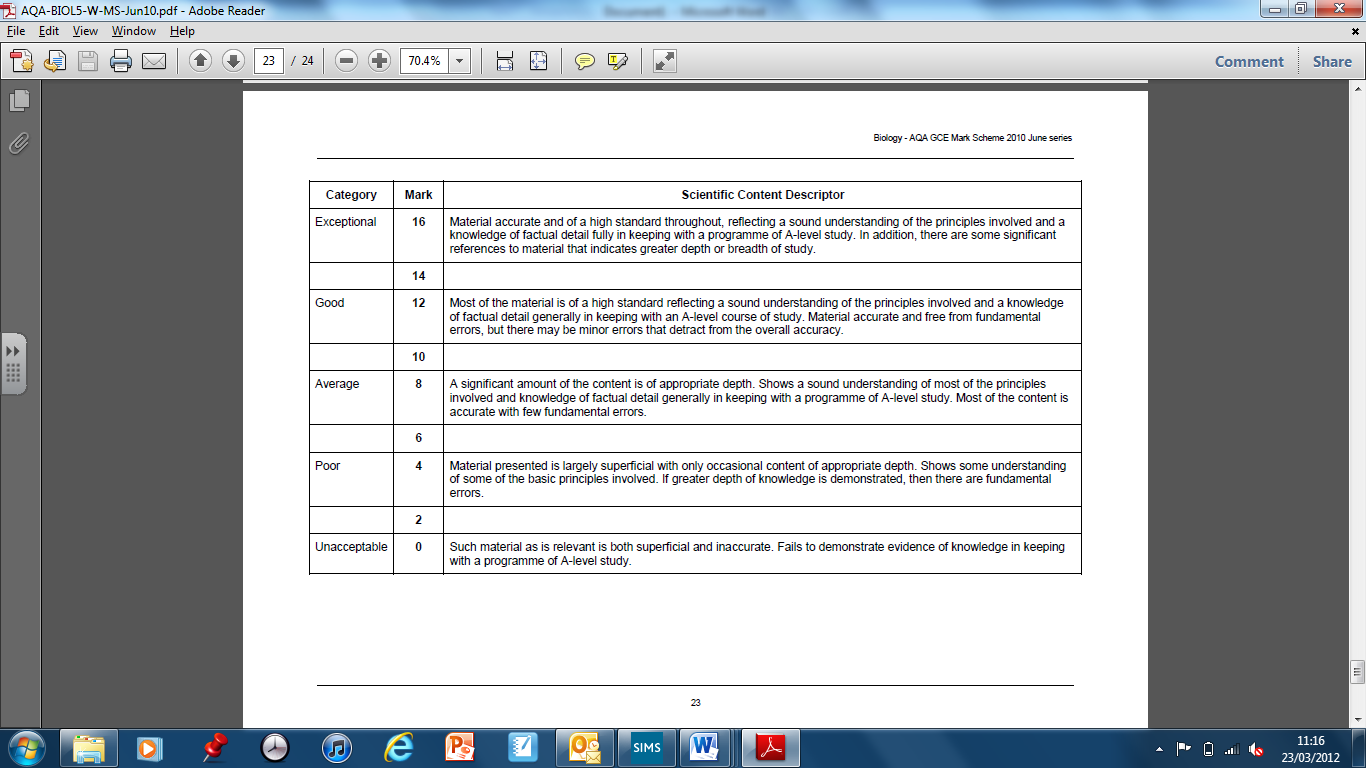
**Relevance / 3**3/3 = All material presented is clearly relevant to the title. Allowance should be made for use of marginally relevant introductory material

**Using the whole specification / 3**3/3 = A balanced account making reference to most of the areas that might realistically be covered in an A-level course of study

An exceptional essay

reflects the detail that could be expected from a comprehensive knowledge and understanding of relevant parts of the specification is free from fundamental errors maintains appropriate depth and accuracy throughout includes two or more paragraphs of material that indicates greater depth or breadth of study

1. Proteins and people
2. Human impact on biodiversity
3. The environment affects all aspects of human life
4. The importance of movements of substances and cells
5. The functions of proteins are linked to their shape
6. What causes humans to become ill
7. Polymers have different structures. They also have different functions. Describe how the structures of different polymers are related to their function
8. Heat and many different substances are transferred within the body and between the body and the environment. Explain how surface area is linked to this transfer
9. Carbon dioxide in organisms and their ecosystems
10. Why offspring produced by the same parents are different in appearance
11. Humans and microorganisms
12. The biological importance of plants to humans



Example essay

Globally, mean temperatures are rising. This will have a knock on physiological and ecological effect on all living organisms. In this essay I am going to write about the effects of temperature on living organisms. Temperature controls where a species lives, how it lives and most importantly how it survives.

The growth and survival of an organism is controlled by enzyme based reactions. At low temperatures the enzymes and substrates do not have enough kinetic energy to collide and react. As temperature increases, they gain kinetic energy and collide more. This is proposed by the Q10 theory of enzyme reactions- increasing the temperature by 10 degrees, doubles the rate of enzyme reaction. However, once an enzyme’s optimum temperature, the temperature at which an enzyme works best, is passed, the tertiary bounds holding an enzyme in shape become denatured, altering the active site of an enzyme and hence severely reducing the rate of reaction. If global temperatures were to rise above enzyme optimum temperatures, the vast majority of chemical reactions carried out by living organisms would not be able to happen.

An example of an enzyme based reaction is respiration. If the rate of respiration were to reduce, less ATP would be produced for an organism. This would mean it would not be able to perform simple functions such as digestion, active transport and homeostasis.

Homeostasis is the maintenance of the internal environment of an organism. One of the main aspects of homeostasis is thermoregulation. The hypothalamus controls thermoregulation and ensures that organisms maintain a constant temperature at which enzymes work best. Endotherms regulate their internal temperature by using complex mechanisms. If the temperature increased, organisms would have to vasodilate their arteries more regularly to increase heat loss by radiation. They would also sweat more, reducing internal water and ion levels and potentially effecting all of the cells in their bodies. Ectotherms would need to alter their behaviour if the temperature increased, spending more time in the shade or in water bodies. This could potential put them in danger of predation from aquatic species

Diffusion, the movement of molecules, such as ions, glucose and amino acids, from a high concentration to a low concentration is essential to ensure that all cells gain sufficient molecules for the production of proteins, carbohydrates and new cells. The rate of diffusion, and osmosis (the movement of water) is increased by an increase in temperature.

Plants would also be dramatically effected by temperature. Photosynthesis, another enzyme based reaction, is limited by temperature. Too high an increase would denature the enzymes responsible for the light independent stage of photosynthesis, reducing the production of essential sugars. It would also reduce the amount of oxygen produced. This would in turn have a knock on effect on all organisms and their ability to respire.

Transpiration is the movement of water through a plant. Temperature will affect the rate of transpiration. An increase in temperature will increase the rate at which water is evaporated from the surface of the leaf, reducing the water potential outside of the leaf and causing more water to leave through osmosis. If too much water is lost through transpiration, plant cells will become plasmolyed and the rate of photosynthesis will be reduced. Xerophytes are adapted for high temperature and low water levels. If global temperatures continue to rise, their will be an increase in xerophytic plants as they will be better adapted for survival and hence will have more chance of passing on their genes.

Microbial reproduction will also increase if global temperatures increase. This could lead to an increase in pathogens and a greater spread of disease. If microbial reproduction increases, it is more likely that a mutation will occur, perhaps leading to the development of a resistance to certain antibiotics. An increase in bacteria reproduction could also lead to eutrophication of water bodies, reducing biodiversity.

Microbes are essential for decay and decomposition and the return of essential nutrients to the soil. Temperature increases the rate of decay, increasing the return of carbon, nitrates, magnesium and other nutrients to the soil.

I have mainly spoken about the physiological effects that an increase in temperature will have on living organisms. It will also have a dramatic ecological effect. An increase in temperature leads to a change in the structure of an organism due to a change in enzyme based reactions. This could result in a plant species becoming adapted to an environment or becoming less suited to an environment. A change in the population or diversity or plant species will alter the environment. Succession could then occur to change a habitat substantially. A change in habitat will produce new niches that did not exist before. These new niches could be favoured by different species, causing them to flourish in the new conditions.

A change in the environment or a physiological change will result in a change in an organisms behaviour. For instance an organism may change its foraging behaviour or how it preserves energy.

I have discussed in this essay the potential dramatic effects that an increase in temperature will have on living organisms. From a change in enzyme rates of reaction, to a change in the behaviour of an organism, changes in temperature could cause some organisms to become extinct whilst others may become better adapted to an increase in temperature, causing them to thrive.