**HUMAN BIOLOGY YEAR 12 ATAR**

**Task 1 UNIT 3**

**ASSESSMENT: SCIENCE INVESTIGATION TASK WEIGHTING 3%**

***Receptors and our ability to respond to our environment.***

**Responding to a stimulus**

A stimulus is a change in the environment of an organism. Human respond to a stimulus in order to keep themselves in favourable conditions. *Example -* *Moving to somewhere warmer if they are too cold*.

Receptors respond to a stimulus and send impulses along sensory neurons to the CNS which figures out the correct response. Some receptors are found in the skin. Other receptors can form part of complex organs, such as:

* Light receptor cells in the retina of the eye
* Hormone-secreting cells in a gland
* Muscle cells
* Position receptors in the inner ear
* Sound receptors in the ear
* Touch, pressure, temperature and pain receptors in skin
* Chemical receptors in the nose and tongue

Effector organs carry out the body's responses to stimuli. Effectors in humans are either glands or muscles. Stimuli will bring about a response from a muscle or gland. A nerve impulse may cause a muscle to contract. This is a rapid, brief response.

Reaction time is a measure of how quickly an organism can respond to a particular stimulus. Reaction time has been widely studied, as its practical implications may be of great consequence, e.g. a slower than normal reaction time while driving can have grave results. Many factors have been shown to affect reaction times, including age, gender, physical fitness, fatigue, distraction, alcohol, personality type, and whether the stimulus is auditory or visual. The model for information flow within an organism can be represented in this way:

Stimulus - Receptor - Sensory Neuron- Spinal Cord or Brain- Motor Neuron – Effector – Response/Effect

**TASK**

Your task is to design, plan, conduct and evaluate an investigation based on the way receptors enable the body to respond to changes in the internal or external environment.

The investigation should be based on the following concept:

* receptors can be affected by external or internal factors which can affect their ability to respond appropriately to a stimulus.

Receptors that could be studied, but not limited to, are:

Pain, touch, pressure, temperature, visual, auditory, chemoreceptors (taste, smell, gas).

**Plan the investigation – one week** (page limit 2 sides of A4, Calibri Font 12) (15 marks)

Things to consider when planning your investigation:

* research and provide background information on the receptor, its purpose, factors that affect it etc
* devise a hypothesis
* describe dependent and independent variables for your investigation
* identify variables to control and variables that are beyond control
* decide upon the appropriate sample size, trials and data collection methods (what would be optimum)
* describe the experimental method you will use during your investigation
* describe how data will be collected and analysed.

**Conduct the investigation – one hour**

* set up times and places for the measurements to be taken,
* carry out data collection from test subjects

**Scientific report** (9 marks)

* include the introduction/research, hypothesis, variables and method.
* include design features of the investigation that ensured reliability and validity
* include any safety and/or ethical considerations
* table of results (show processing of raw data by identifying any outliers and working out averages)
* plot appropriate graphs by hand to show results

**Analysis and evaluation** (17 marks)

* describe the trend and/or pattern in your data
* state how your data relates to your hypothesis
* use your knowledge and understanding to explain the trend and/or pattern of your results
* comment on the accuracy of the data collected
* state one limitations in the data collection strategy that may have affected the reliability of your data and comment on how they would have affected it
* state one improvements you could make to the data collection strategy to improve your investigation

**Conclusion** (4 marks)

* summarise your findings and comment on the reliability and validity of the outcome of the investigation