



**Knowledge and Understanding to be developed**

This topic gives a brief overview of nervous and hormonal control in humans.

Regulation is discussed with regard to blood glucose and temperature.

The work on the treatment of diabetes allows learners to appreciate the power of science and explain the application of science. The lifestyle choices section allows the discussion of the personal and social implications of alcohol and drug abuse. The investigation into reaction time will allow the development of investigative skills in the cycle of collecting, presenting and analysing data.

There are a number of opportunities for the development of mathematical skills from data which is available on the content of this topic. This includes the extraction and interpretation of data from graphs, charts and tables and the translation of information between numerical and graphical forms.

**Key Terms to be learned this topic:**

Receptor      stimuli (stimulus)  
neurons      reflex arc      synapse  
homeostasis      hormones      insulin  
glucagon      glycogen  
negative feedback

**Learning Objectives and Outcomes:**

**Students should be able to :**

- (a) sense organs as groups of receptor cells which respond to specific stimuli: light, sound, touch, temperature, chemicals and then relay this information as electrical impulses along neurones to the central nervous system
- (b) the brain, spinal cord and nerves forming the nervous system; the central nervous system consisting of the brain and spinal cord
- (c) the properties of reflex actions: fast, automatic and some are protective, as exemplified by the withdrawal reflex, blinking and pupil size
- (d) **the components of a reflex arc: stimulus, receptor, coordinator and effector; be able to label a diagram of a reflex arc to show: receptor, sensory neurone, relay neurone in spinal cord, motor neurone, effector and synapses**
- (e) the reasons why animals need to regulate the conditions inside their bodies: to keep them relatively constant and protected from harmful effects - homeostasis
- (f) hormones as chemical messengers, carried by the blood, which control many body functions
- (g) the need to keep glucose levels within a constant range: so that when the blood glucose level rises, the pancreas releases the hormone insulin, a protein, into the blood, which causes the liver to reduce the glucose level by converting glucose to insoluble glycogen and then storing it
- (h) diabetes as a common disease in which a person has a high blood glucose level; type 1 diabetes caused by the body not producing insulin; type 2 diabetes caused by the body cells not properly responding to the insulin that is produced; the causes of both types of diabetes; treatments for diabetes
- (i) the structure of a section through the skin: hair, erector muscle, sweat gland, sweat duct, sweat pore, blood vessels; be able to label these structures on a diagram
- (j) the role of the structures in the skin in temperature regulation: change in diameter of blood vessels, sweating, erection of hairs; shivering as a means of generating heat
- (k) **the principles of negative feedback mechanisms to maintain optimum conditions inside the body as illustrated by the control of blood glucose levels by insulin and glucagon and by the control of body temperature**
- (l) the fact that some conditions are affected by lifestyle choices; the effects that alcohol and drug abuse have on the chemical processes in people's bodies; the incidence of diabetes (type 2) and the possible relationship with lifestyle