4.1 – Homeostasis	
Homeostasis	**Maintenance** of a **constant internal environment** in response to **changes** in **internal** and **external environments**.
Stimulus	A **change** in the **environment**, e.g. **temperature change**, **blood glucose**.
Receptor	**Detects** a **stimulus,** e.g. **temperature receptors** in the **skin**.
Co-ordination centre	**Processes information** and **coordinates** a **response**, e.g. **brain**, **spinal cord.**
Effector	A **muscle** or **gland** that carries out the **response**.
Negative feedback	When a **change** occurs, negative feedback **automatically** causes a **corrective mechanism** to **reverse** the **change**.
4.2 – Nervous System	
Nervous system	Made up of the **central nervous system** or **CNS** (**brain** and **spinal cord**) and **neurones** -> **responds** to our **surroundings quickly**.
Neurones / nerve cell	**Specialised cells** of the **nervous system** -> carry electrical impulses. **Long axon** and many **branches** (**dendrites**).
Sensory neurones	Carry **impulses** from **receptors** to the **CNS**.
Relay neurones	Found in the **CNS**. Carry **impulses** from **sensory** to **motor neurones**.
Motor neurones	Carry **impulses** from the **CNS** to **effectors**.
Synapses	**Gap** between **two neurones**. An electrical impulse meets the synapse then **chemicals** called **neurotransmitters diffuse** across the **gap**.
Reflexes	**Rapid**, **unconscious responses** to a **stimulus** -> can **prevent injury**.
Reflex arc	**Stimulus** -> receptor -> **sensory neurone** -> **relay neurone** -> **motor neurone** -> **effector** -> **response**
Reactions	**Reactions** are **different** to **reflexes** as they are conscious actions (e.g. catching a ball).
Required practical: Reaction times	Measured using **simple ruler drop test**. Different **variables** such as the **effect** of **caffeine** can be investigated.

4.3 – Endocrine System	
Hormones	**Chemical messengers** that travel in the **blood**.
Glands	**Organs** that **secrete hormones.**
Pituitary gland	Makes **many hormones** -> control many other **glands**.
Pancreas	Makes **insulin** and **glucagon** -> controls **blood sugar**.
Thyroid	Makes **thyroxin** -> controls **basal metabolic rate**.
Adrenal gland	Makes **adrenaline** -> controls '**fight and flight'** response.
Ovaries (female)	Makes **oestrogen** -> **puberty, menstrual cycle.**
Testes (male)	Makes **testosterone** -> **puberty, sperm production.**
4.4 – Control of Blood Glucose	
Glucose too high	**Insulin** converts **glucose** -> **glycogen**. Stored in **muscle** and **liver cells**.
Glucose too low	**Glucagon** converts **glycogen** -> **glucose**. Released into **blood**.
Type 1 diabetes	**Pancrea**s does **not** produce **insulin**.
Type 2 diabetes	**Pancreas** produces **insulin** but cells do **not respond**.
4.5 – Menstrual Cycle and Contraception	
Menstrual cycle	**28 day cycle**. Day **1** -> **uterus lining shreds** (**menstruation**). Day **14** –> **release** of **egg** (**ovulation**).
Oestrogen (ovaries)	**Uterus lining thickens**. **Inhibits FSH**, **stimulates LH**.
Progesterone (ovaries)	**Maintains uterus lining**. Remains **high** during **pregnancy**.
FSH (pituitary gland)	Causes an **egg** to **mature** in the **ovaries.**
LH (pituitary gland)	Stimulates **release** of an **egg** from **ovaries (ovulation**).
Hormonal contraception	**Oral contraceptives**, **contraceptive implant**, **injections** and **skin patch**.
Non-hormonal contraception	**Barrier methods** (**condoms**, **diaphragm**), **spermicidal agents**, **IUDs**, **abstaining** from sex, **surgical sterilisation**.

GCSE Science

Biology B5 – Homeostasis and Response