These notes explain the **why** behind every concept, not just the what. They include **analogies**, **real-life examples**, and explanations of **common mistakes**. Use these alongside your revision notes for full understanding.

B3 Coordination — How the Body Talks to Itself

The body needs to coordinate the activities of billions of cells simultaneously. Two systems do this: the nervous system (fast electrical signals along neurones) and the endocrine system (slower chemical hormones in the blood). Together they keep the body functioning as one coordinated organism.

Why Nervous Responses are Faster Than Hormonal Responses

Electrical nerve impulses travel at up to 120 metres per second in myelinated neurones. Hormones travel in blood, which flows at about 0.3 metres per second on average. For rapid reactions — like pulling your hand away from heat — the nervous system is essential. For long-term processes like growth, puberty and the menstrual cycle, slower hormonal control is appropriate.

Blood Glucose — A Detailed Look at Negative Feedback

Blood glucose control is a textbook example of negative feedback. The pancreas acts as both the sensor and the control centre. When blood glucose rises above the set point, beta cells in the islets of Langerhans secrete insulin. When it falls below the set point, alpha cells secrete glucagon. These hormones have opposite effects, maintaining glucose in a narrow range.

■ **Why does this happen?** Why is it so dangerous if blood glucose is too high or too low? Too high (hyperglycaemia): glucose is osmotically active — high glucose in blood draws water out of cells, damaging them. Over time it damages blood vessels (leading to blindness, kidney failure, limb amputation). Too low (hypoglycaemia): brain cells are almost entirely dependent on glucose — even brief hypoglycaemia causes confusion, seizures and unconsciousness.

Negative feedback	Control system where a deviation triggers a response that reverses the deviation
Synapse	Gap between neurones — neurotransmitters carry signal across
Hormone	Chemical messenger in blood from endocrine gland to target organ
Insulin	Lowers blood glucose — triggers glucose uptake and glycogen synthesis
Glucagon	Raises blood glucose — triggers glycogen breakdown and glucose release