

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.

## Topic 7 Animal Coordination — The Chemistry of Control

### The Endocrine System vs the Nervous System

These two systems are complementary. The nervous system is like a telephone network — fast, specific, short-lived. The endocrine system is like broadcasting a radio signal — slower, reaches everywhere, longer-lasting. The hypothalamus in the brain sits at the interface, linking the two systems. It produces hormones and controls the pituitary gland, which controls most other endocrine glands.

### Kidney Function — More Than Just Filtering

The kidneys perform three essential functions: removing urea (a waste product of protein breakdown), regulating water balance, and regulating ion concentrations. Understanding the kidney's structure — nephrons, glomeruli, Bowman's capsules, tubules and collecting ducts — reveals a beautifully designed filtration system.

Step 1	Ultrafiltration	Blood enters the glomerulus (a knot of capillaries) at high pressure. Water, glucose, urea, salts and other small molecules are filtered into the Bowman's capsule. Red blood cells and proteins are too large and stay in the blood.
Step 2	Selective reabsorption	As the filtrate travels down the tubule, ALL glucose is reabsorbed (by active transport) and most water is reabsorbed. Essential ions are selectively reabsorbed. The body never wastes glucose.
Step 3	Urine production	What remains — excess water, urea, and excess salts — continues to the collecting duct and then to the ureter as urine.
Step 4	ADH regulation	If blood water content is low, the pituitary releases ADH (antidiuretic hormone). ADH makes the collecting duct more permeable to water, so more water is reabsorbed and urine becomes more concentrated.

*"The kidneys only make urine."*

✓ **Actually:**  
concentric  
blood cell p

<b>Endocrine system</b>	System of glands that produce hormones — slower but longer-lasting than nervous system
<b>ADH</b>	Antidiuretic hormone — makes kidney tubules more permeable to water — conserves water
<b>Ultrafiltration</b>	High-pressure filtration of blood in the glomerulus
<b>Selective reabsorption</b>	Return of useful substances (especially glucose and water) from kidney filtrate to blood
<b>Dialysis</b>	Artificial kidney — filters blood across a partially permeable membrane
<b>Negative feedback</b>	Control system where a change triggers a response that reverses the change

