

B5 Homeostasis and response

Biology Paper 2 | AQA Combined Science Trilogy | Key ideas to remember

Nervous coordination

1 Homeostasis and control

Homeostasis: regulates internal conditions for cells and enzymes.
Controls blood glucose, temperature and water levels.



Stimulus: a detected change.

CNS: brain and spinal cord.

Effectors: muscles contract; glands secrete substances.

Nerves: rapid electrical signals.

Hormones: chemicals in blood; usually slower, longer-lasting effects.

Hormones and glucose

4 Endocrine system and blood glucose

Gland positions: pituitary in brain; thyroid in neck; adrenals above kidneys; pancreas in abdomen; ovaries in pelvis; testes in scrotum.

Pituitary hormones can stimulate other glands.
Hormones travel in **blood** to targets.

High blood glucose → pancreas releases insulin → cells take up glucose. Liver and muscles store excess as **glycogen**; blood glucose falls.

Type 1: insufficient insulin; normally treated with insulin injections.

Type 2: cells respond poorly to insulin; carbohydrate control and exercise help. Obesity is a risk factor, not a certainty.

Reproduction

2 Reflexes and synapses

Reflex: rapid, automatic and protective. No conscious decision is needed first.



Synapse: gap between neurones.

Impulse arrives → chemical released → chemical diffuses across gap → binds to next neurone → new electrical impulse.

Sensory: towards CNS. Motor: to effector. The brain can also receive information.

5 Reproduction and contraception

Testes: testosterone → sperm production.

Ovaries: oestrogen. Puberty hormones cause secondary sex characteristics.

FSH: egg matures. **LH:** egg released.

Oestrogen / progesterone: support uterus lining. Ovulation ≈ day 14 in a 28-day model; real timing varies.

Menstruation: lining is shed.

Contraception: hormonal methods inhibit egg maturation / release; barriers stop sperm reaching eggs; spermicides disable sperm; devices act in uterus; surgery blocks tubes.

Compare effectiveness, use and side effects. Condoms also reduce many STI risks.

Higher: feedback and IVF

3 Required practical 6: reaction time

1. Ruler vertical; zero at catching fingers.
2. Release without warning or pushing.
3. Catch; record distance fallen.
4. Repeat; calculate a mean.

Shorter fall → shorter reaction time.

Distance is not time: use a suitable conversion table if seconds are needed.

Test one factor, e.g. a safe distraction. Keep hand, catcher, ruler, starting position and posture the same. Practise first; vary release delay; vary condition order.

Mean = total ÷ number of readings.

Example: $(18 + 20 + 16) \div 3 = 18$ cm.

More participants help test a wider claim.

6 Higher only: four key processes

Low glucose: pancreas → glucagon → liver glycogen becomes glucose → blood level rises → less glucagon released.

Cycle: FSH → oestrogen → inhibits FSH, promotes LH surge. LH → ovulation. Progesterone supports lining, inhibits FSH / LH; its fall allows menstruation.

IVF: mature eggs → collect and fertilise in lab → embryos divide → transfer to uterus. Risks: stress, failure, multiple births.

Adrenaline: faster heart; more glucose / oxygen for muscles.

Thyroxine: raises metabolic rate. Rising level reduces further stimulation: **negative feedback**.