Exercise walk-through

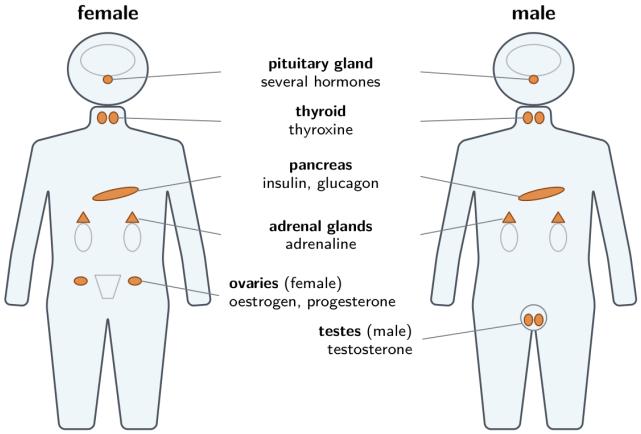
5.3
Hormonal coordination (4.5.3)

AQA · GCSE · Biology

Hormones and blood glucose

- If it is too high, the **pancreas** releases **insulin** . **Insulin** makes glucose move from the blood into cells. In the **liver** and muscles, extra glucose is turned into **glycogen** for storage. Blood glucose falls.
- (HT) If it is too low, the pancreas releases **glucagon** . Glucagon makes the liver turn glycogen back into glucose and release it into the blood. Blood glucose rises.

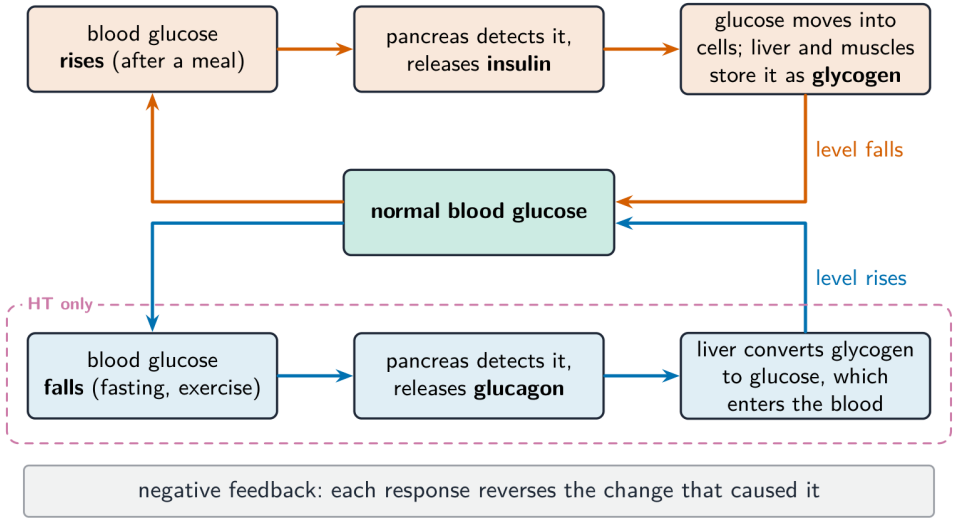
Figure: Hormones and blood glucose



schematic positions, not to scale; kidneys drawn faintly below the adrenal glands

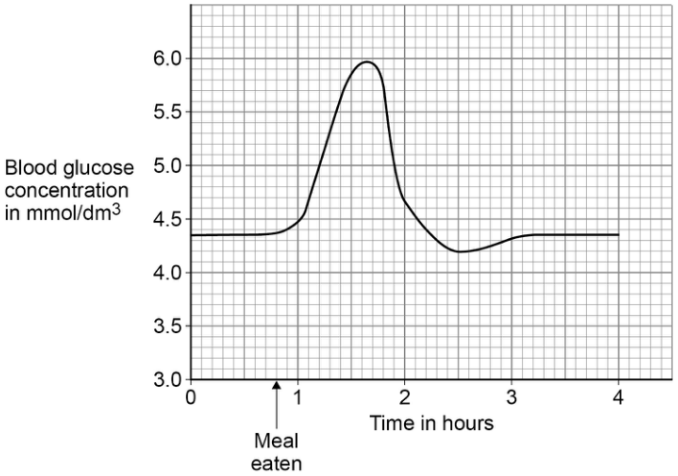
- Where the endocrine glands are, in a female and a male body
- Match each part of the diagram to the text.

Figure: Hormones and blood glucose (2)



- **Insulin** lowers high blood glucose; the HT **glucagon** branch raises low blood glucose.
- Match each part of the diagram to the text.

Figure: Hormones and blood glucose (3)

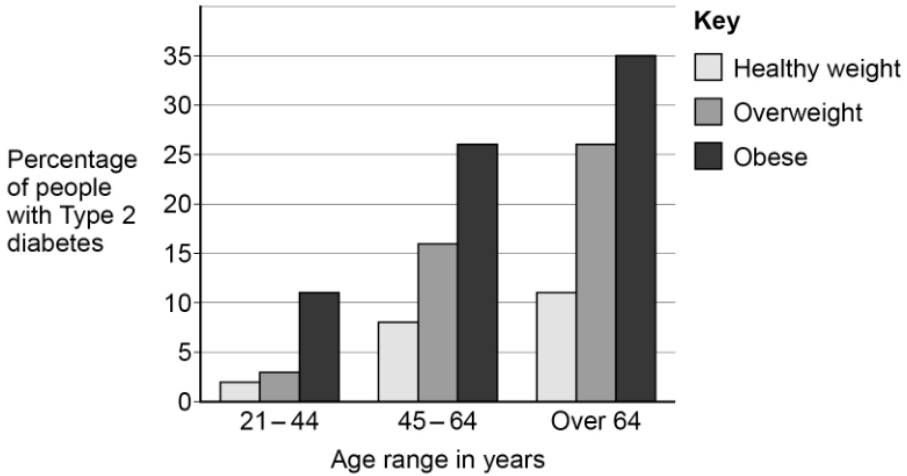


- Blood glucose concentration for four hours after a meal (AQA GCSE Biology Paper 2H, June 2022, Figure 2)
- Match each part of the diagram to the text.

Diabetes

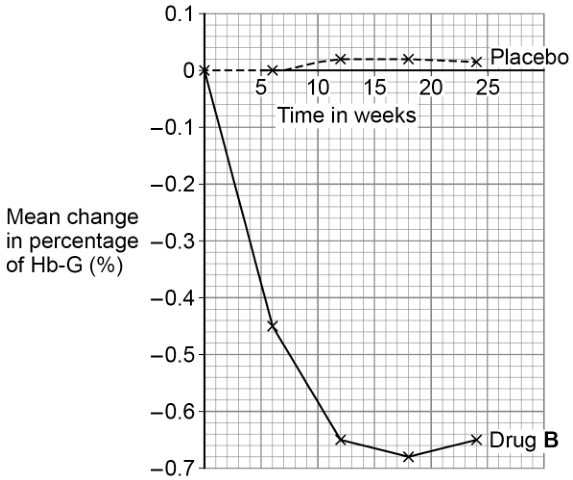
- **Worked example 4.** Person C has a blood glucose concentration of 9.56 mmol/dm^3 (normal mean 4.51) and an **insulin** level of 24.32 arbitrary units (normal mean 14.83).
- Both are higher than normal.
- High glucose despite plenty of insulin suggests that C's cells are not responding to insulin, so C might have **Type 2 diabetes**.
- Further tests would be needed to be sure.

Figure: Diabetes



- Percentage of people with **Type 2 diabetes** by age and weight category (AQA GCSE Biology Paper 2H, June 2025, Figure 10)
- Match each part of the diagram to the text.

Figure: Diabetes (2)



- Change in Hb-G for drug B and a placebo over 24 weeks (AQA GCSE Biology Paper 2H, June 2025, Figure 11)
- Read the axes and units first.

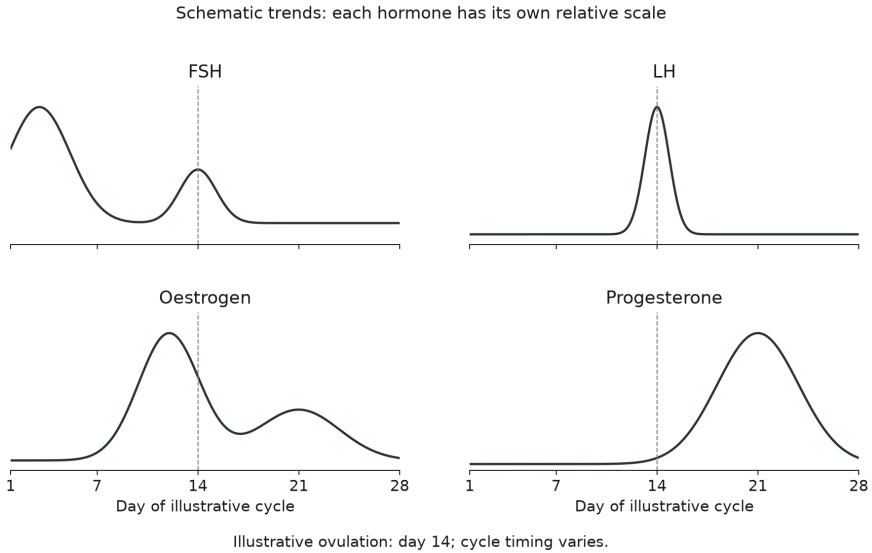
Hormones in human reproduction

- During puberty, reproductive hormones cause secondary sexual characteristics to develop. **Oestrogen** , made by the **ovaries**, is the main female reproductive **hormone**; eggs begin to mature, and about every 28 days one is released by **ovulation** . **Testosterone** , made by the **testes**, is the main male reproductive hormone and stimulates sperm production.
- **The menstrual cycle.**

Hormones in human reproduction (2)

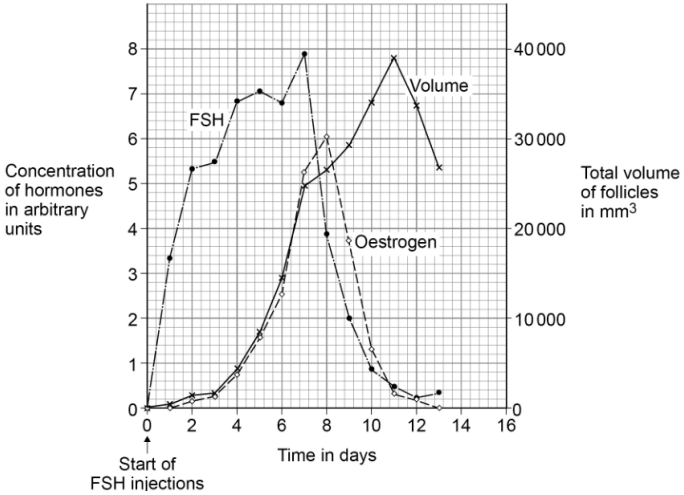
- **How the hormones interact (HT). FSH** makes an egg mature and stimulates the ovary to produce **oestrogen**.
- Oestrogen inhibits FSH and, at high levels, stimulates a surge of LH, which causes **ovulation** on about day 14.

Figure: Hormones in human reproduction



- The four hormones of the menstrual cycle, each on its own scale; **ovulation** happens at about day 14
- Match each part of the diagram to the text.

Figure: Hormones in human reproduction (2)



- **Hormone** concentration (left axis) and total follicle volume (right axis) after daily **FSH** injections (AQA GCSE Biology Paper 2H, June 2023, Figure 12)
- Read the axes and units first.

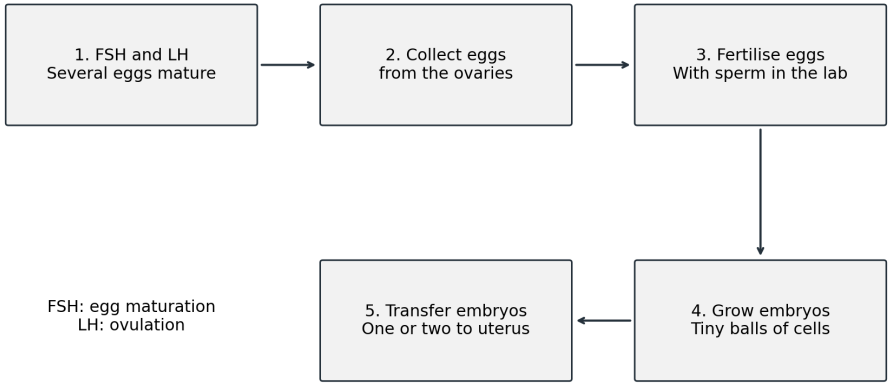
Controlling fertility

- barrier methods, such as **condoms** and **diaphragms**, stop sperm reaching an egg;
- spermicides kill or disable sperm;
- intrauterine devices (coils) prevent the implantation of an embryo or release a **hormone**;

Controlling fertility (2)

- surgical sterilisation is permanent;
- avoiding sex at the time when an egg may be in the oviduct is the least reliable.

Figure: Controlling fertility



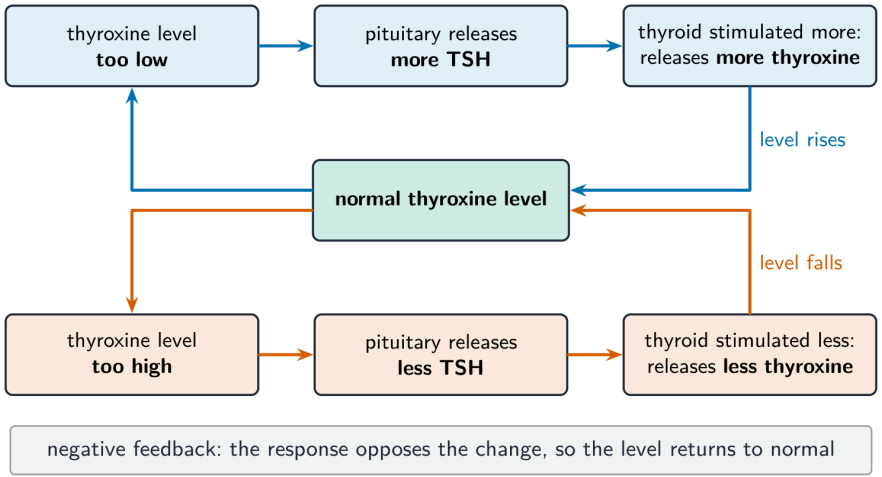
Fertilisation happens in the laboratory; embryos are transferred.

- IVF stages from **hormone** treatment to embryo transfer.
- Match each part of the diagram to the text.

Adrenaline and thyroxine (HT)

- **Adrenaline** is made by the **adrenal glands** in times of fear or stress.
- It increases the heart rate, which delivers more oxygen and glucose to the brain and muscles, preparing the body for "fight or flight".
- **Thyroxine** is made by the **thyroid** gland.
- It increases the basal metabolic rate, the speed of the chemical reactions in the body, and is important for growth and development.

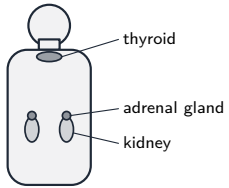
Figure: Adrenaline and thyroxine (HT)



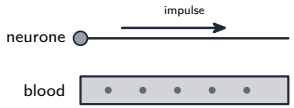
- The pituitary's TSH stimulates the **thyroid**; each response opposes the change, so thyroxine returns to normal.
- Match each part of the diagram to the text.

Exercises 2.1·2.2

2.1 Name the hormone made by each gland: the thyroid and the adrenal glands. [2]

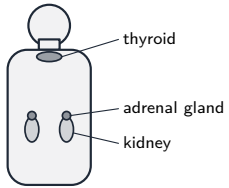


2.2 Give **two** differences between a response caused by hormones and a response caused by nerves. [2]



Exercises 2.1·2.2

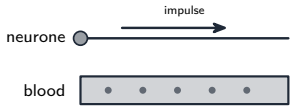
2.1 Name the hormone made by each gland: the thyroid and the adrenal glands. [2]



2.1

- thyroid: **thyroxine**; adrenal glands: **adrenaline**

2.2 Give **two** differences between a response caused by hormones and a response caused by nerves. [2]



2.2

- any two: hormones are slower; their effects last longer; they travel in the blood, not along neurones

Exercises 2.3·3.1

2.3 Name the hormone that causes an egg to be released in the menstrual cycle, and the gland that makes it. [2]



3.1 A person eats a meal and their blood glucose rises. Explain how it is brought back to normal. [3]



Exercises 2.3·3.1

2.3 Name the hormone that causes an egg to be released in the menstrual cycle, and the gland that makes it. [2]



2.3

- **LH** (luteinising hormone); the **pituitary** gland

3.1 A person eats a meal and their blood glucose rises. Explain how it is brought back to normal. [3]



3.1

- the pancreas releases insulin into the blood
- insulin makes cells take in glucose from the blood
- the liver and muscles store glucose as glycogen

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Exercise 3.2

3.2 Compare type 1 and type 2 diabetes. Give the cause and the main treatment for each. [3]



insulin pen



diet and exercise

Exercise 3.2

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diet and exercise

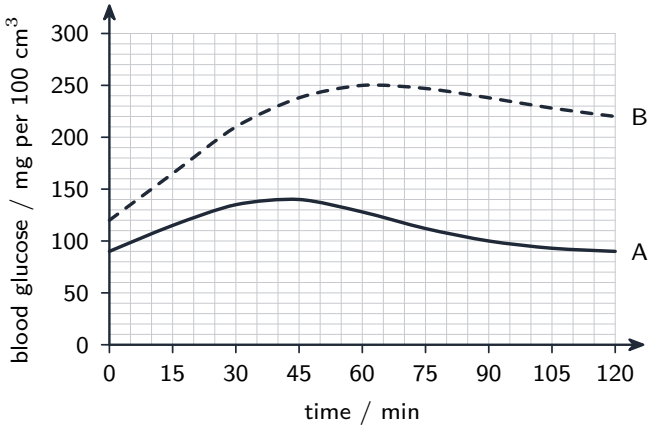
3.2

- type 1: the pancreas makes too little insulin or none
- type 1 is treated with insulin injections; type 2 with a low-sugar diet and exercise
- type 2: the body cells stop responding to insulin; obesity is a risk factor

Exercise 3.3 (a)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

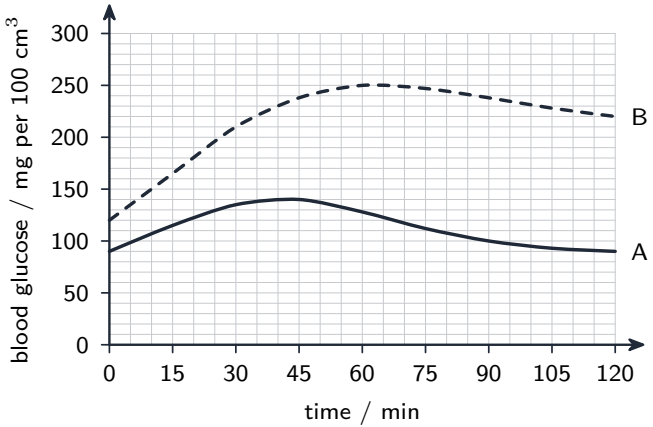
(a) Describe **three** differences between the results for person A and person B. [3]



Exercise 3.3 (a)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(a) Describe **three** differences between the results for person A and person B. [3]



(a) any three: B starts higher; B rises much higher (250 against 140); B peaks later; B stays high, A falls back to 90

Exercise 3.3 (b)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(b) Calculate the mean rate of fall in blood glucose for person A between 45 and 120 minutes. [3]

Exercise 3.3 (b)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(b) Calculate the mean rate of fall in blood glucose for person A between 45 and 120 minutes. [3]

(b) fall $= 140 - 90 = 50$ mg per 100 cm^3; time $= 75$ min; rate $= 50 \div 75 =$ **0.67** mg per 100 cm^3 per minute

Exercise 3.3 (c)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(c) Person B has type 1 diabetes. Explain why their blood glucose stays high. [3]

Exercise 3.3 (c)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(c) Person B has type 1 diabetes. Explain why their blood glucose stays high. [3]

(c) B's pancreas makes little or no insulin; so cells do not take in glucose; and the liver does not store it as glycogen

Exercise 3.3 (d)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(d) Explain how hormones control the menstrual cycle, and how hormones are used in contraception and in IVF. [6]

Exercise 3.3 (d)

3.3 Two people, A and B, each drink a glucose solution at 0 minutes. The graph shows their blood glucose afterwards.

(d) Explain how hormones control the menstrual cycle, and how hormones are used in contraception and in IVF. [6]

(d) points to include:

- FSH from the pituitary matures an egg; the ovaries make oestrogen
- oestrogen thickens the lining, stops FSH and starts LH; LH causes ovulation
- progesterone keeps the lining thick
- contraceptive pills and implants contain hormones that stop FSH, so no eggs mature
- IVF: FSH and LH mature several eggs, which are fertilised in the lab and put into the uterus as embryos

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.