

Animal coordination, control and homeostasis practice questions

25 questions • 80 marks • mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 80

Hormones and the endocrine system **Spec 7.1-7.3**

1 Which row correctly matches a gland with a hormone it produces? [1 mark]

- A. ☐ Testes and insulin
- B. ☐ Ovaries and oestrogen
- C. ☐ Pituitary gland and thyroxine
- D. ☐ Thyroid gland and adrenalin

2 Describe how a hormone gets from an endocrine gland to its target organ. [2 marks]

3 **Higher tier** [4 marks]

A person is startled by a loud noise and the adrenal glands release adrenalin. Explain how adrenalin prepares the body for fight or flight.

4

Higher tier

[4 marks]

The level of thyroxine in a person's blood falls below normal. Explain how the body returns the level of thyroxine to normal.

The menstrual cycle and fertility control

Spec 7.4-7.8

5

Describe the stages of the menstrual cycle, including the roles of oestrogen and progesterone.

[4 marks]

6

Higher tier

[6 marks]

Explain how the interactions of FSH, LH, oestrogen and progesterone control the menstrual cycle, including the repair and maintenance of the uterus wall, ovulation and menstruation.

7 The contraceptive pill contains oestrogen and progesterone. Explain how the pill prevents pregnancy. **[3 marks]**

8 A couple are choosing between the contraceptive pill and condoms. Evaluate the two methods. **[4 marks]**

9 **Higher tier** **[4 marks]**
(a) Explain how hormones are used in IVF treatment. (2) (b) Explain how clomifene therapy helps a woman who does not ovulate to become pregnant. (2)

Homeostasis and temperature control **Spec 7.9-7.12B**

10 Explain why it is important for the body to maintain a constant internal environment when conditions outside the body change. **[2 marks]**

11

[3 marks]

Explain why core body temperature must not rise far above 37°C.

[illegible]

12

[2 marks]

A person drinks a large amount of water and the blood becomes too dilute. Explain the effect this could have on animal cells.

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13

[3 marks]

Describe the roles of the hypothalamus and the dermis in controlling body temperature.

[illegible]

14

[6 marks]

A person walks from a warm building into very cold air. Explain how the body responds to keep core body temperature constant.

[illegible]

Blood glucose and diabetes Spec 7.13-7.17

15 Explain how insulin controls blood glucose concentration after a meal. **[3 marks]**

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16 **Higher tier** Explain how glucagon increases blood glucose concentration. **[3 marks]**

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17 Describe the causes of type 1 diabetes and type 2 diabetes and how each is controlled. **[4 marks]**

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18 A woman has a mass of 72 kg and a height of 1.60 m. Her waist is 88 cm and her hips are 100 cm. (a) Calculate her BMI. Give your answer to 1 decimal place. (2) (b) Calculate her waist:hip ratio. (1) **[3 marks]**

Answer =

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- 19** The table shows practice figures for the percentage of adults with type 2 diabetes in three BMI groups. Evaluate the evidence that a higher BMI causes type 2 diabetes. **[3 marks]**

Type 2 diabetes in three BMI groups (practice figures)

BMI group	Adults with type 2 diabetes (%)
Below 25	2
25 to 29.9	6
30 and above	15

The urinary system and the kidneys Spec 7.18B-7.22B Triple only

- 20** Triple only [1 mark]

Which tube carries urine from the kidney to the bladder?

- A. ☐ Urethra
B. ☐ Renal vein
C. ☐ Ureter
D. ☐ Renal artery

- 21** Triple only [2 marks]

State where urea is produced and what it is produced from.

- 22** Triple only [3 marks]

Describe how the kidney filters blood in the glomerulus and Bowman's capsule.

23

Triple only

[3 marks]

Glucose is filtered at the glomerulus, but the urine of a healthy person contains no glucose. Explain why.

24

Triple only

Higher tier

[4 marks]

On a hot day a person sweats a lot and the water content of the blood falls. Explain how ADH helps to return the water content to normal.

[illegible]

25

Triple only

[3 marks]

Describe two treatments for kidney failure.

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [2]

- the gland secretes / releases the hormone into the blood (1) allow bloodstream
- the blood (plasma) carries the hormone to the target organ (1) do not accept nerves

3. [4] **Higher tier**

- increases heart rate (1)
- increases blood pressure (1)
- increases blood flow to the muscles (1)
- so more oxygen and glucose are delivered for respiration (1)
- stimulates the liver to change glycogen into glucose (1)
- raising blood sugar (glucose) level (1)
- Max 4

4. [4] **Higher tier**

- low thyroxine stimulates the hypothalamus to produce TRH (1)
- TRH causes the pituitary gland to release TSH (1)
- TSH acts on the thyroid gland to produce thyroxine (1)
- when thyroxine is back to normal it inhibits the release of TRH and the production of TSH (1) allow negative feedback

5. [4]

- the uterus lining breaks down / menstruation happens around days 1 to 5 (1) allow bleeding
- oestrogen causes the repair / growth of the uterus lining (1)
- an egg is released (ovulation) around day 14 (1)
- progesterone maintains the uterus lining (1) allow until around day 28

6. [6] Higher tier

Level 3 5-6	A detailed and logical explanation that links all four hormones to the correct effects, including how some hormones stimulate or inhibit others, and covers repair and maintenance of the lining, ovulation and menstruation.
Level 2 3-4	Some explanation linking at least two hormones to correct effects. Some interactions are given but one stage, such as menstruation, may be missing or unclear.
Level 1 1-2	A few simple statements about hormones or stages with little or no explanation of how they interact.

Indicative content

- FSH from the pituitary gland causes an egg to mature in the ovary
- FSH stimulates the ovaries to produce oestrogen
- oestrogen causes repair and growth of the uterus lining
- high oestrogen inhibits FSH and stimulates the release of LH
- LH causes ovulation (around day 14)
- after ovulation progesterone is produced, which maintains the uterus lining
- progesterone inhibits FSH and LH so no more eggs mature
- if there is no pregnancy progesterone falls, the lining breaks down and menstruation happens

7. [3]

- the hormones stop eggs maturing / stop ovulation (1)
- so there is no egg to be fertilised (1)
- progesterone makes the mucus at the cervix thicker (1)
- so sperm cannot get through to the egg (1)
- Max 3

8. [4]

- the pill is very effective if taken correctly (1)
- the pill does not protect against sexually transmitted infections / can cause side effects / must be taken at the right time every day (1)
- condoms protect against sexually transmitted infections / have no hormone side effects (1)
- condoms can split or slip / are less effective if not used correctly (1)
- a justified conclusion, e.g. condoms are better if protection from infection is needed, or the pill if the most reliable contraception is wanted (1)
- Max 3 if only one method is evaluated
- Max 4

9. [4] Higher tier

- (a) the woman is given FSH and LH (1)
- to make several eggs mature in the ovaries (1)
- (b) clomifene stimulates the release of FSH and LH (1)
- so that eggs mature and ovulation happens (1)

10. [2]

- enzymes work best at their optimum conditions / within narrow limits (1)
- so cells can function properly / reactions continue at a suitable rate (1)

11. [3] Triple only

- high temperature denatures enzymes / changes the shape of the active site (1)
- the substrate no longer fits the active site (1)
- so reactions in the cells slow down or stop (1)

12. [2] Triple only

- water enters the cells by osmosis (1)
- the cells swell and may burst (1)

13. [3] Triple only

- the hypothalamus monitors blood temperature / receives impulses from skin temperature receptors (1)
- the hypothalamus coordinates the response / sends nerve impulses to effectors (1)
- the dermis contains the sweat glands / blood vessels / temperature receptors (1)

14. [6] Triple only Higher tier

Level 3 5-6	A detailed explanation that links detection by the hypothalamus to at least two responses, including shivering and vasoconstriction, and explains how each helps keep body temperature constant.
Level 2 3-4	Some explanation with at least one response linked to its effect on body temperature. Detection or a second response may be missing or incomplete.
Level 1 1-2	Simple statements about the body responding to cold, with little or no explanation.

Indicative content

- temperature receptors in the skin and the hypothalamus detect the fall in temperature
- the hypothalamus sends nerve impulses to effectors
- shivering: muscles contract rapidly
- respiration in the muscles releases heat, warming the body
- vasoconstriction: blood vessels supplying the skin surface narrow
- less blood flows near the skin surface so less heat is lost
- sweating is reduced
- temperature returns to about 37°C, which is negative feedback

15. [3]

- the pancreas secretes insulin into the blood (1)
- insulin causes cells to take up glucose from the blood (1)
- the liver converts glucose into glycogen for storage (1)
- so blood glucose concentration falls to normal (1)
- Max 3

16. [3] Higher tier

- glucagon is secreted by the pancreas when blood glucose is low (1)
- glucagon acts on the liver (1)
- the liver changes glycogen into glucose (1)
- glucose is released into the blood (1)
- Max 3

17. [4]

- type 1: the pancreas does not produce enough insulin (1)
- type 1 is controlled by insulin injections (1) allow monitoring blood glucose and controlling carbohydrate in the diet
- type 2: body cells no longer respond to insulin (1)
- type 2 is controlled by diet and exercise / weight loss (1) allow medication

18. [3]

- (a) height squared = $1.60 \times 1.60 = 2.56$ (1)
- BMI = $72 \div 2.56 = 28.1$ (1) allow 28.125
- (b) $88 \div 100 = 0.88$ (1)

19. [3]

- as BMI increases the percentage with type 2 diabetes increases / positive correlation (1) allow use of figures
- a correlation does not prove that high BMI causes diabetes (1)
- other factors, such as diet, exercise or age, may be involved / BMI does not show fat compared with muscle (1)

20. [1] Triple only

C C (1)

21. [2] Triple only

- in the liver (1)
- from the breakdown of excess amino acids (1)

22. [3] Triple only

- blood in the glomerulus is at high pressure (1)
- small molecules such as water, glucose, urea and ions are forced into the Bowman's capsule (1)
- large molecules such as proteins and blood cells stay in the blood (1)

23. [3] Triple only

- all the glucose is reabsorbed (1)
- back into the blood (1)
- by active transport, using energy from respiration (1)

24. [4] Triple only Higher tier

- more ADH is released (from the pituitary gland) (1)
- ADH makes the collecting duct more permeable to water (1)
- more water is reabsorbed into the blood (1)
- a small volume of concentrated urine is produced (1)

25. [3] Triple only

- dialysis: blood passes through a machine, separated from dialysis fluid by a partially permeable membrane (1)
- urea (and excess ions) pass out of the blood into the dialysis fluid (1)
- transplant: a healthy kidney from a donor is put into the patient (1)
- the donor kidney must be a good tissue match / the patient takes drugs to stop the immune system rejecting it (1)
- Max 3