

Hormonal coordination in humans: practice questions

14 questions • 46 marks • mark scheme at the back

For AQA GCSE Biology 8461 and Combined Science: Trilogy 8464. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 46

1 Which statement correctly describes hormonal coordination compared with the nervous system? [1 mark]

- A. ☐ Hormones travel along neurones and their effects are faster
- B. ☐ Hormones are carried in the blood and their effects are slower but act for longer
- C. ☐ Hormones are carried in the blood and their effects are faster but act for a shorter time
- D. ☐ Hormones travel along neurones and their effects act for longer

2 Two people drank a glucose solution. Their blood glucose concentration was measured over 120 minutes. The results are shown in the table. Person Y has Type 1 diabetes and has not had an insulin injection. Use the data to describe how the results for Y differ from those for X, and explain the difference. [3 marks]

Blood glucose concentration (mmol/dm ³)					
Time (min)	0	30	60	90	120
Person X	5	9	7	6	5
Person Y	8	16	18	17	16

[6 marks]

[illegible]

[3 marks]

Explain how insulin and glucagon interact to control blood glucose concentration.

[illegible]

[2 marks]

(a) State one way, other than in urine, that water leaves the body. (1) (b) Explain why it is a problem if body cells gain too much water. (1)

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6 Triple only

[3 marks]

The table shows the concentration of two substances in a person’s blood before filtration and in their urine. Explain the differences shown in the table.

Concentration (arbitrary units)		
Substance	Blood before filtration	Urine
Glucose	5	0
Urea	2	60

7 Triple only Higher tier

[3 marks]

On a hot day a person sweats a lot and their blood becomes more concentrated. Explain how ADH helps to restore the water level in the body.

8 Triple only Higher tier

[2 marks]

Describe what happens in the liver to excess amino acids.

9 Triple only

[3 marks]

Describe how kidney dialysis works.

10 State the function of each of these hormones in human reproduction. (a) Testosterone (1) **[3 marks]**
(b) FSH (1) (c) LH (1)

[illegible]

11 **Higher tier** **[6 marks]**

Explain how FSH, oestrogen, LH and progesterone interact to control the menstrual cycle.

[illegible]

12 Evaluate the use of the oral contraceptive pill and of condoms as methods of contraception. **[4 marks]**

[illegible]

13 **Higher tier** **[4 marks]**
Describe the main stages of in vitro fertilisation (IVF).

[illegible]

14

Higher tier

[3 marks]

(a) Describe two effects of adrenaline on the body. (2) (b) Thyroxine levels are controlled by negative feedback. Explain what happens when the thyroxine level in the blood is too high. (1)

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: hormones are secreted into the bloodstream; effects are slower but act for longer (1)

2. [3]

- X's glucose rises to a maximum of 9 (at 30 minutes) and returns to 5 by 120 minutes (1)
- Y's glucose starts higher, rises higher (maximum 18) and stays high (16 at 120 minutes) (1)
- Y's pancreas does not produce enough insulin, so glucose does not move from the blood into the cells / is not converted to glycogen (1)
- X's pancreas produces insulin, so glucose moves from the blood into the cells (1)
- Max 3

3. [6]

Level 3 5-6	A clear, detailed comparison of the causes of both types, with the treatment of each correctly explained. Scientific terms are used accurately and the answer is well organised.
Level 2 3-4	The cause or treatment of both types is described, or one type is covered in detail. Some explanation is given but it may lack links.
Level 1 1-2	Simple statements about one or both types, with little or no explanation.

Indicative content

- Type 1: pancreas fails to produce sufficient insulin
- Type 2: body cells no longer respond to insulin produced by the pancreas
- Both lead to high blood glucose concentration (uncontrolled in Type 1)
- Type 1 is normally treated with insulin injections, so glucose can move from the blood into the cells
- Type 2 is treated with a carbohydrate controlled diet, to reduce the glucose entering the blood, and an exercise regime
- Obesity is a risk factor for Type 2 diabetes

4. [3] **Higher tier**

- when blood glucose is too high, the pancreas releases insulin, which lowers it (1)
- when blood glucose is too low, the pancreas releases glucagon, which causes glycogen to be converted into glucose and released into the blood (1)
- this is negative feedback, because each hormone reverses the change and brings the level back to normal (1)

5. [2] **Triple only**

- (a) from the lungs during exhalation / from the skin in sweat (1)
- (b) water enters the cells by osmosis, so the cells do not function efficiently (1)

6. [3] **Triple only**

- glucose is filtered out of the blood in the kidney (1)
- all the glucose is then selectively reabsorbed back into the blood, so none is in the urine (1)
- urea is not reabsorbed (while water is), so it is much more concentrated in the urine (1)

7. [3] Triple only Higher tier

- pituitary gland releases more ADH (1)
- ADH makes the kidney tubules more permeable to water (1)
- more water is reabsorbed into the blood, so less water is lost / urine is smaller in volume and more concentrated (1)

8. [2] Triple only Higher tier

- amino acids are deaminated to form ammonia (1)
- ammonia is toxic, so it is immediately converted to urea (for safe excretion) (1)

9. [3] Triple only

- the patient's blood flows through a dialysis machine, next to a partially permeable membrane with dialysis fluid on the other side (1)
- urea and excess ions diffuse from the blood into the dialysis fluid (1)
- glucose and other useful substances are kept in the blood because the dialysis fluid contains them at the same concentration (1)
- allow: cleaned blood returned to the patient
- Max 3

10. [3]

- (a) stimulates sperm production (1)
- (b) causes maturation of an egg in the ovary (1)
- (c) stimulates the release of the egg (1)

11. [6] Higher tier

Level 3 5-6	A clear explanation of how all four hormones interact, including the sequence of events in the cycle and at least one effect of one hormone on the release of another. Terms are used accurately.
Level 2 3-4	The roles of at least three hormones are described, with some link between them, but the sequence may be incomplete.
Level 1 1-2	The role of one or two hormones is stated, with little or no explanation of the interactions.

Indicative content

- FSH (from the pituitary gland) causes maturation of an egg in the ovary
- FSH stimulates the ovary to release oestrogen
- oestrogen causes the uterus lining to grow and repair, and inhibits FSH
- high oestrogen stimulates the release of LH
- LH stimulates the release of the egg (ovulation)
- progesterone maintains the uterus lining and inhibits FSH and LH
- when progesterone falls, the lining breaks down

12. [4]

- pill: contains hormones that inhibit FSH production so no eggs mature (1)
- pill: hormonal, so may have side effects / does not protect against sexually transmitted infections (1)
- condoms: barrier method that prevents sperm reaching an egg (1)
- condoms: no hormonal side effects, and also help to protect against sexually transmitted infections (1)
- a reasoned judgement, e.g. condoms are better where protection against infection is needed (1)
- allow: condoms must be used correctly each time to be effective
- Max 4

13. [4] Higher tier

- the mother is given FSH and LH to stimulate the maturation of several eggs (1)
- the eggs are collected and fertilised by sperm from the father in the laboratory (1)
- the fertilised eggs develop into embryos (1)
- one or two embryos, at the stage of tiny balls of cells, are inserted into the mother's uterus (1)

14. [3] Higher tier

- (a) increases the heart rate (1)
- (a) boosts the delivery of oxygen and glucose to the brain and muscles (1)
- (b) less thyroxine is released, so the level falls back to normal (1)