

Homeostasis and response practice questions

14 questions • 45 marks • mark scheme at the back

For AQA GCSE Combined Science: Trilogy 8464. **Higher tier** is only on the Higher paper.

Name

Total / 45

Homeostasis Spec 4.5.1

1 Which of these is an effector in a control system of the human body? [1 mark]

- A. ☐ Temperature receptors in the skin
- B. ☐ The spinal cord
- C. ☐ Skeletal muscle that contracts
- D. ☐ Sensory neurones

2 State what is meant by homeostasis. [2 marks]

The human nervous system Spec 4.5.2

3 A person touches a hot object and their hand moves away without them thinking. [3 marks]
Describe the path taken by the nerve impulse in this reflex action.

4 A student measured her reaction time five times using a computer test. The results were [2 marks]
0.26 s, 0.24 s, 0.31 s, 0.27 s and 0.28 s. Calculate her mean reaction time.

Answer =

- 5** Describe how you could investigate the effect of a distraction, such as music, on a person's reaction time using a ruler. **[4 marks]**

Hormonal coordination in humans Spec 4.5.3

- 6** 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

- 7** 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

Higher tier

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

[illegible]

[4 marks]

[illegible]

Higher tier

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]

C C: effectors are muscles or glands (1)

2. [2]

- regulation of the internal conditions of a cell or organism (1)
- to maintain optimum conditions for function (1)
- in response to internal and external changes (1)
- Max 2

3. [3]

- impulse travels along the sensory neurone (from the receptor) to the CNS / spinal cord (1)
- impulse crosses a synapse to the relay neurone (1)
- impulse passes (across another synapse) to the motor neurone (1)
- motor neurone carries the impulse to the effector / muscle, which contracts (1)
- Max 3

4. [2]

- $0.26 + 0.24 + 0.31 + 0.27 + 0.28 = 1.36$ (1)
- $1.36 \div 5 = 0.272$ s (1) allow 0.272 s
- allow 1 mark for dividing their total by 5 if the addition is wrong

5. [4]

- partner holds ruler vertically and drops it without warning; the person catches it and the distance is read from the ruler (1)
- repeat with and without the distraction (1)
- control variables stated, such as the same person, the same hand and the same drop height (1)
- repeat several times and calculate a mean (for each condition) (1)
- allow: a shorter distance means a faster reaction

6. [1]

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

7. [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

8. [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

9. [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)

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)