

Homeostasis and response practice questions

27 questions • 80 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 / 80

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]**

6 Triple only **[3 marks]**
The cerebral cortex, the cerebellum and the medulla are regions of the brain. Describe one function of each region.

7 Triple only Higher tier **[2 marks]**
Explain why it is difficult to investigate brain function and to treat brain disorders.

8 Triple only **[1 mark]**
A person walks from a bright room into a dim room. What happens in their eye so that they can see better?

- A. ☐ The ciliary muscles contract
- B. ☐ The pupil becomes wider
- C. ☐ The lens becomes thinner
- D. ☐ The pupil becomes narrower

9 Triple only **[3 marks]**
Explain how the eye focuses on a near object.

10 Triple only [3 marks]

A person with myopia (short sightedness) cannot see distant objects clearly. Explain how a spectacle lens can correct this.

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11 Triple only Higher tier [4 marks]

A person walks outside on a very cold day and their body temperature begins to fall. Explain how their body responses raise body temperature.

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Hormonal coordination in humans Spec 4.5.3

12 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

20

Triple only

[3 marks]

Describe how kidney dialysis works.

[illegible]

21

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

[illegible]

22

Higher tier

[6 marks]

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

[illegible]

23

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

[illegible]

24

Higher tier

[4 marks]

Describe the main stages of in vitro fertilisation (IVF).

25

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)

Plant hormones

Spec 4.5.4

Triple only

26

Triple only

[3 marks]

In a required practical, a student grew seedlings in a box with a slit that let light in from one side only. After three days the shoots had bent towards the slit. Explain why.

27

Triple only

Higher tier

[3 marks]

Give three ways in which plant hormones are used in agriculture, horticulture or the food industry.

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. [3] Triple only

- cerebral cortex: consciousness / intelligence / memory / language (1)
- cerebellum: coordinates muscular activity / balance (1)
- medulla: controls unconscious activities, such as heart rate or breathing (1)

7. [2] Triple only Higher tier

- the brain is very complex / made of billions of interconnected neurones with different regions (1)
- the brain is delicate, so investigation or treatment can damage it (1)

8. [1] Triple only

B B: the iris makes the pupil wider so more light enters the eye (1)

9. [3] Triple only

- ciliary muscles contract (1)
- suspensory ligaments loosen (1)
- lens becomes thicker (1)
- so refracts the light rays more strongly / light focuses on the retina (1)
- Max 3

10. [3] Triple only

- in myopia, light rays from distant objects focus in front of the retina (1)
- a concave lens is used (1)
- it refracts / spreads the light rays so that they focus on the retina (1)

11. [4] Triple only Higher tier

- blood vessels constrict / vasoconstriction (1)
- so less blood flows near the skin surface and less energy is transferred to the surroundings (1)
- sweating stops, so less energy is transferred by evaporation (1)
- skeletal muscles contract rapidly / shiver (1)
- respiration in the muscles releases energy, which warms the body (1)
- Max 4

12. [1]

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

13. [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

14. [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

15. [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)

16. [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)

17. [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)

18. [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)

19. [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)

20. [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

21. [3]

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

22. [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

23. [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

24. [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)

25. [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)

26. [3] Triple only

- auxin is unequally distributed / builds up on the shaded side of the shoot (1)
- cells on the shaded side grow (elongate) faster (1)
- so the shoot bends towards the light (1)

27. [3] Triple only Higher tier

- auxins as weed killers / rooting powders / for tissue culture (1)
- ethene to control ripening of fruit during storage and transport (1)
- gibberellins to end seed dormancy / promote flowering / increase fruit size (1)
- allow any three different uses
- Max 3