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SPECA

GCSE Combined Science (AQA Trilogy) · Biology

Homeostasis and Response · Mark Scheme

For use with the Tiered Worksheet. Marking points are indicative, not exhaustive: award equivalent correct answers.

Section A: Foundation (Q1 to 13)

1) The regulation of a cell's or organism's internal conditions to maintain optimum conditions for function (1), in response to internal and external changes (1) [2]

2) Blood glucose concentration (1); body temperature (1); water levels (1) [3]

3) Receptors: detect a stimulus (1); coordination centre (e.g. brain, spinal cord, pancreas): receives and processes information from receptors (1); effectors (muscles or glands): bring about a response that restores optimum conditions (1) [3]

4) Reflex action (1); it is automatic and very fast, protecting the body from harm before the brain has time to consciously process the danger (1) [2]

5) Sensory neurone (1); relay neurone (1); motor neurone (1); synapse (1) [4]

6) To reduce the effect of anomalous/random results (1) and produce a more reliable/representative value (1) [2]

7) The endocrine system is made up of glands that secrete hormones directly into the blood (1), which carries them to a target organ (1); hormonal responses are slower to start but longer-lasting than nervous responses (1) [3]

8) Pituitary gland (1); because it releases hormones that direct other glands to release their own hormones (1) [2]

9) The pancreas releases insulin (1), which causes glucose to move from the blood into cells (1), and causes liver and muscle cells to store excess glucose as glycogen (1) [3]

10) Type 1: the pancreas does not produce enough insulin (1), normally treated with insulin injections (1); Type 2: body cells stop responding properly to insulin (1), typically managed with a carbohydrate-controlled diet and exercise (1) [4]

11) Oestrogen: produced in the ovary (2); testosterone: produced in the testes (2) [4]

12) FSH: matures an egg in the ovary (1); LH: triggers egg release (1); oestrogen: maintains the uterus lining (1); progesterone: maintains the uterus lining (1) [4]

13) Hormonal method, e.g. the oral contraceptive, inhibits FSH so no eggs mature (1); barrier method, e.g. a condom, physically blocks sperm reaching an egg (1); because contraception decisions also involve social and ethical considerations that science alone cannot resolve (1) [3]

Section B: Higher (Q14 to 21)

14) The pancreas releases glucagon (1), which converts stored glycogen back into glucose (1), which is released into the blood, raising blood glucose concentration back towards normal (1) [3]

15) Insulin lowers blood glucose concentration when it is too high, and glucagon raises it when it is too low (1); the two hormones act as an antagonistic pair (1), each countering a change in blood glucose concentration to bring it back towards a normal level (1) [3]

16) FSH causes an egg to mature in the ovary and stimulates the ovary to release oestrogen (1); rising oestrogen level itself stimulates the release of LH (1); the resulting LH surge triggers ovulation, the release of the mature egg (1) [3]

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17) Giving her FSH and LH stimulates egg maturation and release in the ovary (1), making it possible for her to conceive naturally (1) [2]

18) The woman is given FSH and LH to stimulate the maturation of several eggs (1); the eggs are collected from the ovary and fertilised with sperm in a laboratory (1); the fertilised eggs are grown into early embryos (1); one or two embryos are inserted into the woman's uterus (1) [4]

19) Any two of: high emotional/physical stress; comparatively low success rate; increased risk to babies and mother from multiple births (1 mark each, max 2) [2]

20) Adrenaline is released from the adrenal glands (1) in situations of fear or stress, and raises heart rate (1), boosting the delivery of oxygen and glucose to the brain and muscles for a 'fight or flight' response (1) [3]

21) Thyroxine, from the thyroid gland, stimulates the basal metabolic rate and supports growth and development (1); 'controlled by negative feedback' means that if thyroxine level moves away from normal, the body acts to bring it back towards normal, whether the level was too high or too low (2) [3]

Total: 39 marks (Section A) + 23 marks (Section B) = 62 marks

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