



General Certificate of Education

Applied Science
8771/8773/8776/8779

SC14 The Healthy Body

Mark Scheme

2007 examination – June series

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Question 1

| | | | |
|--------|---|-------------------------------------|----------|
| (a)(i) | 3.5 – 7.5 mmol l ⁻¹ | (1) (AO1) | 1 |
| (ii) | Use dipstick/uristix/clinistix Dip into the urine sample Check colour change on stick against reference chart | (1) (AO1) (1) (AO1) (1) (AO1) | 3 |
| (b) | Glucagon: releases glucose from glycogen muscle/liver stores Insulin: makes cells take up glucose | (1) (AO1) (1) (AO1) | 2 |

Total Mark: 6**Question 2**

| | | | |
|--------|---|------------------------|----------|
| (a)(i) | (Pulse) oximeter | (1) (AO1) | 1 |
| (ii) | She is carrying oxygen normally | (1) (AO2) | 1 |
| (b)(i) | Becoming acidic/acidotic. <i>Reject 'has fallen' owtte</i> | (1) (AO2) | 1 |
| (ii) | Acts as a buffer; To mop up excess H ⁺ ions; | (1) (AO1) (1) (AO1) | 2 |
| (iii) | Haemoglobin gives up oxygen to the tissues at higher concentrations of oxygen than it normally would; the affinity for oxygen is reduced in the presence of carbon dioxide <i>any 2 for 1 mark each</i> | (2) (AO1) | 2 |
| (iv) | Chemoreceptors; In the medulla/brain stem; Detect pH fall/CO ₂ increase; Increase the rate of breathing; Increasing rate of contraction of intercostal muscles; Increasing rate of contraction of diaphragm <i>Any 3 for 1 mark each</i> | (3) (AO1) | 3 |
| (c) | More CO ₂ ; From tissue respiration; | (1) (AO1) (1) (AO1) | 2 |

Total Mark: 12

Question 3

| | | | |
|--------|--|------------------------|----------|
| (a)(i) | 3.5 million x 5 = 17.5 million | (1) (AO2) | 1 |
| (ii) | $(100 \times 3.5)/45 = 7.78$ million meals | (1) (AO2) | 1 |
| (b) | <p><i>Lack of iron</i> Anaemia; reduced red blood cell count; reduced oxygen carrying capacity; increased risk of infection; general developmental delay; tired/fatigue</p> <p style="text-align: right;"><i>Any 2 points for each, 1 mark each</i></p> | (2) (AO1) | 4 |
| | <p><i>Lack of calcium</i> Inadequate skeletal/bone development; inadequate tooth development; problems with blood clotting; problems with muscle activity; problems with nerve activity</p> <p style="text-align: right;"><i>Any 2 points for each, 1 mark each</i></p> | (2) (AO1) | |
| (c)(i) | <p>Increases risk of cardiovascular disease ; Increases risk of atherosclerosis/arteriosclerosis/atheroma; development of narrowed arteries (owtte) Increases risk of stroke; Increases risk of type 2 diabetes ; Increase risk of hypertension ; Increased risk of osteoarthritis/bones and joints wearing out/ painful joints Reduced life expectancy</p> <p style="text-align: right;"><i>Any 4 for 1 mark each</i></p> | (4) (AO2) | 4 |
| (ii) | <p>Not doing enough daily physical activity; Not eating fruit and vegetables; which can help to fill you up</p> | (1) (AO2) (1) (AO2) | 2 |
| (d) | <p>normal diet contains all the salt we need; there is no need to supplement with salt, increased salt [and sodium] linked with hypertension; can lead to a heart attack</p> <p style="text-align: right;"><i>Any 2 for 1 mark each</i></p> | (2) (AO2) | 2 |
| (e)(i) | <p>Kidneys have conserved water; But still need to eliminate waste; When blood water concentration is low; This is detected by osmoreceptors; In hypothalamus; ADH [Anti-diuretic hormone] is released; From pituitary; Acts on collecting ducts; Makes them more permeable to water; More water is reabsorbed; Making urine concentration high</p> <p style="text-align: right;"><i>Any 5 for 1 mark each</i></p> | (5) (AO2) | 5 |
| (ii) | <p>Maintain blood pressure; Maintain appropriate blood concentrations of biochemicals; [owtte] for temperature regulation</p> | (1) (AO2) (1) (AO2) | 2 |

Total Mark: 21

Question 4

| | | | |
|--------|---------------------------|-----------|----------|
| (a) | Glucose | (1) (AO1) | 1 |
| (b)(i) | glycolysis | (1) (AO1) | 1 |
| (ii) | A (chemical) energy store | (1) (AO1) | 1 |
| (c) | Lactic acid/lactate | (1) (AO1) | 1 |

Total Mark: 4**Question 5**

| | | | |
|--------|---|------------------------|----------|
| (a)(i) | <u>Subject fasts for 12 hours;</u> Subject sits at rest; Wears apparatus/respirometer; Total amount of oxygen used by the subject is measured; Oxygen consumed can be used to calculate BMR <i>4 for 1 mark each</i> | (4) (AO1) | 4 |
| (ii) | Subject does not have to stay in one room/could be carried out in subject's home setting/convenience | (1) (AO2) | 1 |
| (b) | has greater surface area; Therefore will lose heat faster; Than the shorter athlete of the same body mass | (1) (AO2) (1) (AO2) | 2 |
| (c)(i) | Older males have lower BMR than the young/ converse; Males have higher BMR than females/converse <i>Any 2 for 1 mark each</i> | (2) (AO2) | 2 |
| (ii) | Children have greater BMR because they are growing; Children have large SA:Vol ratio Men > BMR than women because have > muscle mass ; Therefore have more mitochondria <i>Any 3 for 1 mark each</i> | (3) (AO2) | 3 |

Total Mark: 12**Question 6**

| | | | |
|--------|--|---|----------|
| (a)(i) | Plot points correctly Join points correctly | (1) (AO3) (1) (AO3) | 2 |
| (ii) | 35 °C; highest rate of reaction | (1) (AO3) (1) (AO3) | 2 |
| (b)(i) | Use same amount of substrate ; Use same amount of maltase ; Have selection of pH values ; Incubate for same time ; Measure production of product ; | (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) | 5 |
| (ii) | No product would be produced | (1) (AO3) | 1 |

Total Mark: 10

Question 7

| | | | |
|--------|---|--|----------|
| (a) | Reduction of mucus; Would reduce the protection; Increased acid production; Increased protease production Would damage the lining; <i>Maximum of 4 marks</i> | (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) | 4 |
| (b)(i) | Emulsifies fats | (1) (AO1) | 1 |
| (ii) | Increases surface area for digestion of fats; Helps neutralise stomach acids; | (1) (AO1) (1) (AO1) | 2 |
| (c) | Avoid acidic foods; These will aggravate the problem Consume fatty foods; Provide a protective lining to the stomach; Give stomach lining time to repair itself <i>Maximum of 4 marks</i> | (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) | 4 |
| (d) | Increase energy intake slightly To meet metabolic demand of pregnancy Increase calcium; Contribute to growing <u>skeleton</u> of foetus Increase proteins; Contribute to growing foetus; Eliminate alcohol; Prevent damage to foetal <u>brain</u> Iron consumption <i>Maximum of 4 marks</i> | (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) | 4 |

Total Mark: 15