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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Applied Science 8771/8773/8776/8779

SC14 The Healthy Body

Mark Scheme

2009 examination – June series

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Question 1

(a)(i)	Protein Meat/cheese/milk/pulses/eggs/fish/other correct protein source. Apply list rule if several sources given	(1) (AO1) (1) (AO1)	**2**
(ii)	Reduce **energy** intake overall Consume less fat/named fatty food Consume less carbohydrate/starch/sugar Substitute wholemeal/high fibre foods for refined carbohydrates/named examples (e.g. brown bread instead of white) More fruit and vegetables Smaller portions/eat less/eat regularly Ignore references to salt	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**Max 3**
(iii)	Increased likelihood of diabetes (not necessary to specify type 2) Increased liklihood of heart disease/high blood pressure but ignore "heart problems" Increased liklihood of stroke Ignore "Obesity, high cholesterol, reduced life expectancy"	(1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1)	**Max 2**
(b)	Increased requirement for iron Due to onset of menstruation Increased vitamin C/folic acid *for increased iron absorption* Increased calcium For better bone density Increased vitamin D *for increased calcium absorption* Increased energy intake/more food/bigger portions Greater body mass to maintain Higher BMR during adolescence Increased protein requirement Rapid growth/growth spurt	(1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1)	**Max 4**

Total Mark: 11

Question 2

(a)(i)	ADH/antidiuretic hormone;	(1) (AO1)	**1**
(ii)	(Posterior lobe of) pituitary gland;	(1) (AO1)	**1**
(iii)	(ADH causes) water reabsorption (at the kidneys); Which increases blood volume/more water in the blood; Greater blood volume contained within closed vessels; (Increased blood volume returning to heart) increases cardiac output/EW e.g. heart has to work harder;	(1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1)	**Max 3**
(b)	Muscle cramp, especially after exercise; Cardiac arrest	(1) (AO2) (1) (AO2)	**Max 1**
(c)	0.075 litres/75cm^3 (if units not given, assume litres) ; No unit penalty, but 75 litres/0.075 cm^3 do not gain the mark	(1) (AO2)	**1**
(d)	Reduction in headache; Reduction in breathlessness; Reduced liklihood of heart attack (ignore heart problems/heart healthier); Reduced liklihood of stroke; More active lifestyle possible	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**Max 2**

(e)(i)	**Large** intestine;	(1) (AO1)	**1**
(ii)	More water would be reabsorbed; (As) less water would be in the blood; (So) osmotic gradient/EW is greater;	(1) (AO2) (1) (AO2) (1) (AO2)	**3**

Total Mark: 13

Question 3

(a)(i)	Minimum amount of energy required to keep the body functioning / EW	(1) (AO1)	**1**
(ii)	Feeding increases BMR Digestion requires metabolic energy increase in blood glucose/sugar may cause an increase in metabolic rate If this section includes a correct definition of BMR, and ai did not gain the mark, allow 1 mark.	(1) (AO2) (1) (AO2) (1) (AO2)	**Max 2**
(iii)	Temperature Because change in temperature would alter metabolic rate/increase would raise BMR/converse Activity levels/position (e.g. sitting or standing) Because increase in activity would increase energy consumption/increase BMR/converse/change would change BMR Ignore ".. can affect BMR" and references to surface area	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**4**
(b)	B's weight had increased B's BMR had also increased Higher BMR typical of athletes Data processed to support answer Suggesting increase in muscle mass rather than fat	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**Max 3**

Total Mark: 10

Question 4

(a)	Prevention of normal muscle contraction would reduce physical breakdown (by churning) Obstruction of oesphagus would reduce entry of food into stomach so make both forms of digestion less effective Prevention of normal enzyme activity Covering stomach surface would reduce enzyme secretion Covering stomach surface would interfere with acid release so pH would be unfavourable for enzyme action Cancer may release substances that interfere with enzyme action Maximum 3 marks for either section	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**Max 4**
(b)(i)	Low pH/presence of (hydrochloric)	(1) (AO1)	**1**
(ii)	Regularly investigate /monitor (scan/fibre-optic/endoscope/X-ray) people who are taking the antibiotic (to look for cancerous growths) Use placebo and compare effect with active drug Compare incidence of cancer in the people who took the drug to incidence in those who had the placebo Compare incidence of cancer to known incidence in comparable group Subjects should be of roughly the same age Subjects should be the same sex Subjects should eat the same diet Subjects should not have a family history of stomach cancer Subjects should all have Helicobacter pylori infections Subjects should not have allergy to antibiotic	(1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3)	**Max 4**

Total Mark: 9

Question 5

(a)(i)	Attached to haemoglobin/as oxyhaemoglobin **In** red blood cells *Reject* haemoglobin as single word answer;	(1) (AO1) (1) (AO1)	**Max 1**
(ii)	95-99% allow credit for a single number within this range	(1) (AO1)	**1**
(iii)	SaO_2%	(1) (AO1)	**1**
(b)(i)	Line drawn to the right of the printed curve Finishing below printed line at 12kNm^{-2}	(1) (AO2) (1) (AO2)	**2**
(ii)	Bohr effect/shift CAO	(1) (AO1)	**1**
(iii)	Cells require oxygen for **respiration** Without oxygen brain tissue will die/be damaged	(1) (AO2) (1) (AO2)	**2**
(c)	Increase in temperature moves curve to the right (i.e decreases saturation/decrease in temperature moves curve to the left i.e. increases saturation) Final maximum saturation is lower	(1) (AO2) (1) (AO2)	**2**

Total Mark: 10

Question 6

(a)(i)	4.0-6.5 mmol/l (accept any single value within this range, and range + or – 1.0 of the values given (several centres quote 3.5-7.5)	(1) (AO1)	**1**
(ii)	Any two of: Increased likelihood of heart attack atherosclerosis diseased blood vessels CVD aneurism blockage atheroma DVT Hypertension Increased liklihood of stroke Ignore "heart/circulatory problems/disease" as this answer could encompass conditions that were not linked to cholesterol	(2) (AO1)	**2**
(b)	That the volunteers ate the **same or similar** diet during the trial That the volunteers took **similar** levels of exercise None of the volunteers was taking medication to reduce cholesterol Other sensible points acceptable Reject "Their diet/age/activity" without qualification that these must be the same	(1) (AO3) (1) (AO3) (1) (AO3)	**Max 3**
(c)	Use digital meters (quantitative) rather than dipsticks Ensure blood sampling equipment totally clean (to avoid contamination of result) Measure at the same time of day each time Repeat and take mean Other sensible points acceptable	(1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3) (1) (AO3)	**Max 3**

Total Mark: 9

Question 7

(a)(i)	Calcium / correct symbol	(1) (AO1)	**1**
(b)	36.8mg/l Calculation partly correct gains one mark e.g.184g absorbed = 80% of 230 Ignore units	(2) (AO2)	**2**
(c)	Increased intake of appropriate food N.B apply list rule if candidate has given several food suggestions Increased exposure (of skin) to sunlight Do not credit any answer that implies sunshine contains vitamin D	(1) (AO2) (1) (AO2)	**2**
(d)	Dose would be dangerously high/EW Calculation eg 15µg higher/4 times more than RDA She would be likely to sustain bone abnormalities/kidney damage/raised blood pressure Excess not excreted/fat soluble/ accumulates	(1) (AO2) (1) (AO2) (1) (AO2) (1) (AO2)	**Max 3**

Total Mark: 8

Question 8

(a)	Thyroid (gland)	(1) (AO1)	**1**
(b)	Control of metabolic rate	(1) (AO1)	**1**
(c)	Low levels of thyroxine are detected by the **hypothalamus** Pituitary releases **TSH** (thyroid stimulating hormone) TSH causes thyroid to release thyroxine Low levels detected: more thyroxine produced/high levels detected: less thyroxine produced/correct use of the term negative feedback	(1) (AO1) (1) (AO1) (1) (AO1) (1) (AO1)	**5**
(d)(i)	13.25ml calculation partly correct gains one mark e.g. 265mg twice a day required; one dose is 5/100 x 265	(2) (AO2)	**2**
(ii)	To ensure dose was maintaining her levels of thyroxine at an appropriate level / ensure the dose is correct for her	(1) (AO2)	**1**

Total Mark: 10