

Human Nutrition

Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Human Nutrition
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 3

Time Allowed: 87 minutes

Score: /72

Percentage: /100

Question	E Answers	Marks	Additional Guidance
<p>1 (a)</p> <p>1 (fluoride) helps to strengthen tooth <u>enamel</u> ;</p> <p>2 available to all / treats whole population ;</p> <p>3 free (to people) / cheap to supply ;</p> <p>4 AVP ;</p> <p><i>against</i></p> <p>5 ref. to allergies / qualified side effects ;</p> <p>6 bad taste (in water) ;</p> <p>7 dosage not controlled for individuals / no individual choice ;</p> <p>8 mottled / discoloured teeth / fluorosis ;</p> <p>9 AVP ;</p>		[max 3]	<p>NB: Max 2 (argument for)</p> <p>NB: Max 2 (argument against)</p> <p>MP5 ONLY accept these possible side effects: gastric disturbance / AW, cardiovascular problems, headache, fits</p> <p>MP8 A any colour effect here</p>
<p>(b)</p> <p>1 Chile – increased to 1997, decreased (slightly) ;</p> <p>2 Australia – increased to 2000, decreased / decrease till 1995, then steady ;</p> <p>3 any two figures with units and years ; <i>either for the same country or for both countries</i></p> <p><i>tooth decay</i></p> <p>4 Chile – decreases 1977 to 1990, then increases to 1995 ;</p> <p>5 Chile – decreases from 1995 / AW ;</p> <p>6 Australia – keeps decreasing (from 1977) ;</p> <p>7 any two figures with units and years ; <i>either for the same country or for both countries</i></p>		[max 4]	<p>MP1 A peaks in 1997</p> <p>MP2 A peaks in 2000</p> <p>MP3 A units given only once</p> <p>MP4 A peaks in 1995</p> <p>MP7 A units given only once</p> <p>A a difference in tooth decay for any two years</p>

Question	E Answers	Marks	Additional Guidance
1 (c)	<p>1 sugar remains on teeth ; 2 bacteria, grow on teeth / feed on sugar / form plaque ; 3 bacteria respire ; 4 (lactic) acid formed ; 5 wear away <u>enamel</u> ; 6 exposes softer dentine ; 7 AVP ;</p>	[max 4]	
(d)	<p><i>similarities (tooth decay decreases in both countries)</i> 1 decrease in tooth decay is not related to decrease in sugar consumption ; 2 better, oral hygiene / dental care / awareness / AW ; 3 diet contains less sugar / reduction in sugary drinks for children ; 4 fluoride toothpastes ; 5 AVP ;</p> <p><i>differences (tooth decay in Australia decreases before that in Chile / tooth decay in Australia is lower than in Chile)</i> 6 fluoridation (of water supply) in Australia may be responsible ; 7 better dental service / awareness / education in Australia / AW ; 8 AVP ;</p>	[max 3]	<p>NB: All explanations should be qualified</p> <p>MP6 – ORA Chile</p>
[Total: 14]			

<p>2 (a)</p>	<p>A epithelium / (epithelial) lining / single layer of cells ; B lacteal ; A lymph(atic), vessel / duct / tube ; C capillary / blood vessel ;</p> <p style="text-align: right;">[3]</p>	<p>R epidermis R lymph unqualified / lymph(atic) system</p>
<p>(b)</p>	<p><i>microvilli</i> 1 increases / large, surface (area) ; 2 for absorption ; <i>mitochondria</i> 3 (for) respiration ; 4 provide, energy / ATP ; A 'cells need energy' 5 for active, uptake / transport ;</p> <p style="text-align: right;">[4]</p>	<p>A diffusion / active transport (into villus) R produce / make, energy A movement of, vesicles / vacuoles A descriptions of AT e.g. against concentration gradient R microvilli 'sway' or 'waft' / movement of villi</p>
<p>(c) (i)</p>	<p>1 longer, shelf life / storage time ; 2 enhances / improves, flavour / taste ; 3 improves / AW, colour / appearance ; 4 improves, texture / AW ; A ref to emulsifiers / 'free running' 5 AVP ;</p> <p style="text-align: right;">[2 max]</p>	<p>A 'food keeps longer' / preserves food / AW A refs to preventing decay / 'kills bacteria' A prevent / slows, oxidation A 'makes food more attractive' / 'stops food separating', comments on consistency e.g. tenderis</p>
<p>(ii)</p>	<p>hyperactivity / described (in children) ; R 'poor behaviour' tantrums / mood swings ; cancer ; A 'they are carcinogenic' migraines / headaches ; dizziness / nausea / vomiting / diarrhoea ; allergies ; asthma / described as breathlessness or AW ; nettle rash / urticaria / skin rash / eczema / dermatitis ; rhinitis / runny nose / 'sniffing' ; damage to fetus / birth defect ; AVP ;</p> <p style="text-align: right;">[4 max]</p>	<p><i>there are no marks in (i) or (ii) for naming food additives; ignore names look for health risks only</i></p> <p>R obesity, heart disease, tooth decay, circulatory problems, diabetes</p> <p>A difficulty with breathing</p> <p>R 'addiction'</p> <p>e.g. ulcers or liver / kidney / brain / nerve, damage</p>
<p>[Total: 13]</p>		

- 3 (a) (*mycoprotein has accept converse answers for beef*
less protein / figures compared ;
less fat / figures compared ;
fibre / figures compared ; **A** roughage
carbohydrate / figures compared ; [max 2]
- (ii) *assume answers are about mycoprotein*
less fat / 9.2 g compared to 48.6 g / 39.4 g less fat / 5× less fat ;
so less risk of + heart disease / heart attack / blockage of arteries / obesity ;
A 'clogged' / 'furred' / hardening *ignore* diabetes
fibre / 19.5 g compared to 0 g ;
so less risk of, constipation / bowel cancer ;
A faster transit time / helps peristalsis / easier defecation explained [4]
- (b) (*award two marks if correct answer (1.7) is given*
if no answer or incorrect answer award one mark for correct addition to get
98.3
 $49 + 9.2 + 19.5 + 20.6 = 98.3$
 $100 - 98.3 = 1.7$ (g) ;; [2]
- (ii) *accept first answer on the line*
mineral(s) / named mineral / ions / salt(s) / vitamin(s) / named vitamin ;
calcium / potassium / sodium / magnesium / iron / phosphate / iodine / zinc
R nitrate / sulphate / micronutrients [1]

- (c) (glucose / sucrose / lactose / maltose / sugar(s) / molasses / corn steep liquor ; **A** carbon source
minerals / mineral salts / vitamin(s) ;
ammonia / ammonium / amino acids ; **A** nitrogen source [max 2]
- (ii) filter / separate liquid from solid / retain solids / AW ; [1]
- (iii) carbon dioxide ; **A** CO₂ [1]
- (d) (24 °C ; **A** a temperature within range 20 to 30 °C [
- (ii) *ignore refs to the paddle*
heat released / exothermic ;
(during) respiration / metabolism / fermentation ; [2]
- (iii) constant, production / growth ;
A optimum temperature / produce antibiotic as fast as possible
low temperature will slow down, enzyme action / fungal growth ;
high temperature will, denature enzymes ; **R** if 'and too low'
high temperature will kill fungus ; **R** if 'and too low'
high temperature may breakdown, product / antibiotic / penicillin ; [max 2]
- (iv) use a water jacket ; [1]

[Total: 19]

- 4 (a) (i) accept other valid responses – must be long-term and not behavioural / social
- 1 liver, damage / failure / disease / cirrhosis ; **R** destroys **A** hardens
 - 2 brain damage / loss of brain cells / loss of neurones / loss of memory / AW ;
 - 3 cancer of correct named part of body ;
mouth / pharynx / oesophagus / gut / pancreas / liver / breast
 - 4 stomach ulcers ;
 - 5 heart disease / stroke / AW ;
 - 6 high blood pressure / hypertension ;
 - 7 alcoholism / addiction / dependence / tolerance ;
 - 8 (risk of) damage, to fetus / pregnant woman's baby / fetal alcohol syndrome / AW ;
e.g. low birth weight / poor mental developme
 - 9 increased risk of miscarriage ;
 - 10 malnutrition / named deficiency disease(s) ;
 - 11 obesity / weight gain ;
 - 12 loss in weight / wasting ; [max. 2]
- (ii) $(500 \times 2 =) 1000 \text{ (cm}^3\text{)} ;$ [1]
- (b) (nutrients are) large molecules / need to be small molecules ;
A complex / simple, molecules
(some nutrients are) insoluble / need to be soluble ;
must pass through, intestine wall / capillary wall ;
R ref. to absorption unqualified by wall(s) [max. 2]
- (ii) small intestine / ileum / villi ; **A** duodenum
- (iii) fatty acids / glycerol / maltose / peptides / AW ; **R** fat / lactose / sucrose [1]

(c) (x) 9.0 (%) ; [1]

(ii) as blood alcohol content of blood increases, so does risk of accident / AW ;
relevant comment on part of graph ;
use of figures ;
little increase in risk up to, 0.05 / 0.075, g 100 cm⁻³
greater increase in risk above, 0.05 / 0.075, g 100 cm⁻³
comparative use of figures – must use figures from both axes [max. 2]

(iii) 1 depressant ;
2 slows down nerve impulses ; R 'signals' / 'messages'
3 slows down / increases, reaction / response, time(s) ;
A ref to reflexes R reaction time decreases
4 e.g. for stimulus or response – traffic lights / braking / swerving / stopping / AW ;
5 blurred / double / impaired / poor, vision AW ;
6 poor / lack of, co-ordination / AW ; A dizziness
7 overconfidence / poor decision making / memory impaired ;
8 poor judgment (of distances) ;
9 sleep / drowsiness / less conscious / AW ;
10 poor concentration / less aware ; [max. 3]

[Total: 13]

- 5 (a) (i) root(s) ; 1
- (ii) molar ; **R** premolar
ref. to the presence of (a number of) cusps / description of cusps ;
A refs to bumps / dents **R** ridges
ref. to presence of three roots / more than two roots ; 3
- (iii)
- i. ref. to crown ;
 - ii. ref. to (upper part has) enamel / lower part does not have enamel ;
 - iii. root / lower part + covered with cement / dentine ;
 - iv. enamel is harder than + dentine / cement ; **A** stronger
 - v. root AW is more soluble / less resistant to acid / more easily penetrated AW ; **A** converse answer max. 3
- (b)
- i. (the toothpaste) has an alkaline pH / pH 8.5 ; **R** high pH
 - ii. which neutralises acids in the mouth / maintains alkaline conditions / so pH in mouth is raised ; linked to i.
 - iii. ref. to (the toothpaste contains) fluoride ; **R** fluorine
 - iv. fluoride hardens enamel AW : linked to iii.
R fluoride hardens tooth unqual.
 - v. ref. to (the toothpaste contains) anti-bacterial agent ;
 - vi. kills bacteria + that produce acid AW ; linked to v. max. 4
- (c)
- i. regular visits to the dentist AW ; **A** ref. to doctor qual.
 - ii. use of dental floss / tooth pick ;
 - iii. avoiding + eating sugary food / eating between meals ;
 - iv. ref. to fluoride + drinking water / mouthwash ;
 - v. use (antibacterial) mouthwash / (antiseptic) mouthwash ;
 - vi. eat + apples / crisp fruit ;
 - vii. eat foods containing calcium / phosphate / vitamin D / vitamin C ;
 - viii. do not open bottles / crack open nuts + with teeth
 - ix. rinse mouth with water after eating ;
 - x. brush or massage gums ; **R** brushing teeth
 - xi. have teeth coated with protective coating ; max. 2
- total max. 13**