

# Human Nutrition

## Mark Scheme 3

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

**Time Allowed:** 87 minutes

**Score:** /72

**Percentage:** /100

Question	E Answers	Marks	Additional Guidance
1 (a)	<p><i>for</i></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><b>NB:</b> Max 2 (argument for)</p> <p><b>NB:</b> Max 2 (argument against)</p> <p><b>MP5 ONLY</b> accept these possible side effects: gastric disturbance / AW, cardiovascular problems, headache, fits</p> <p><b>MP8 A</b> any colour effect here</p>
(b)	<p><i>sugar consumption</i></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 <b>two</b> figures with units <b>and</b> 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 <b>any</b> two figures <b>with</b> units and years ; <i>either for the same country or for both countries</i></p>	[max 4]	<p><b>MP1 A</b> peaks in 1997</p> <p><b>MP2 A</b> peaks in 2000</p> <p><b>MP3 A</b> units given only once</p> <p><b>MP4 A</b> peaks in 1995</p> <p><b>MP7 A</b> units given only once</p> <p><b>A</b> a difference in tooth decay for any two years</p>

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

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

- 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  
 $49 + 9.2 + 19.5 + 20.6 = 98.3$   
 $100 - 98.3 = 1.7 \text{ (g) ;}$  [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]

CHEMISTRY ONLINE  
— TUITION —

- (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** CO<sub>2</sub> [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]**

CHEMISTRY ONLINE  
— TUITION —

- 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<sup>-3</sup>

greater increase in risk above, 0.05 / 0.075, g 100 cm<sup>-3</sup>

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]

CHEMISTRY ONLINE  
— TUITION —



- 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 unequal.  
 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**