UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2006 question paper

0648 FOOD AND NUTRITION

0648/01 Paper 1 (Theory), maximum raw mark 100

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

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1 Balanced diet
contains all nutrients [1 mark]
in correct proportion – in adequate amounts [1 mark] [2]

2 **(a)** Simple sugars
monosaccharide – $C_6H_{12}O_6$ – base unit – end production of digestion – soluble in water [4 points = 2 marks] [2]

(b) Examples
glucose – fructose – galactose
[2 examples @ 1 point each, 2 points = 1 mark] [1]

(c) Double sugars
disaccharides – $C_{12}H_{22}O_{11}$ – 2 monosaccharides combined – soluble in water – glucose + 1 other simple sugar [4 points = 2 marks] [2]

(d) Examples
sucrose – lactose – maltose
[2 examples @ 1 point each, 2 points = 1 mark] [1]

(e) Digestion of starch in mouth
amylase / ptyalin – from salivary glands – acts on **cooked** starch – converting it to maltose

Digestion in duodenum
amylase – in pancreatic juice – converts starch to maltose

Digestion in ileum
maltase – in intestinal juice – converts maltose to glucose
[8 points = 4 marks] [4]

3 **(a)** Functions of calcium
formation / maintenance of bones / teeth
correct function of muscles
correct function of nerves
clotting of blood [3 x 1 mark] [3]

(b) Sources of calcium
milk – cheese – yoghurt – *fortified* flour / bread – bones of canned fish – hard water – almonds – green vegetables (or 1 named example) – wholegrain cereals (or 1 named example)
[4 examples @ 1 points each, 4 points = 2 marks] [2]

(c) Deficiency diseases
rickets – osteomalacia – osteoporosis – tetany [any example = 1 mark] [1]

(d) Absorption of calcium
Vitamin D [1 mark] [1]

(e)(i) Food sources of vitamin D
liver – fish liver oils (or named example) – oily fish (or named example) – egg yolk – margarine – milk – cheese – cream – butter – yoghurt etc.
[any example = 1 point]

(ii) Non-food source
sunlight [1 point, 2 points = 1 mark] [1]

4 **(a)(i)** Reasons for reducing fat

obesity – overweight – get fat – breathlessness – problems during surgery – lack of self-esteem – CHD – cholesterol narrows arteries – blocks – heart attack – extra weight can cause hernia – varicose veins – diabetes – hypertension [2 x 1 mark = 2 marks] [2]

(ii) Reasons for reducing sugar

tooth decay – bacteria change sugar to acids – dissolve enamel – obesity – linked to CHD – risk of diabetes – too much glucose in blood for insulin produced [2 x 1 mark = 2 marks] [2]

(iii) Reasons for reducing salt

can cause high blood pressure – linked to CHD
kidney disease – may cause build up of water in tissues / oedema
[2 x 1 mark = 2 marks] [2]

(b)(i) Ways to reduce fat

avoid frying food – grill – bake – drain fat on absorbent paper – cut visible fat from meat – eat less red meat – less cheese – eat more poultry and white fish – buy canned fish in brine instead of oil – replace full fat milk with semi-skimmed or skimmed – use low-fat versions of cheese, yoghurt, cream, salad dressing etc. – spread butter / margarine thinly – use 'low fat' spreads – avoid serving vegetables with butter – avoid sausages, pies etc. – reduce fat in recipes – eat fewer cakes / biscuits – less chocolate – avoid fatty snacks, e.g. peanuts, crisps – fewer convenience foods etc.
[4 points = 2 marks] [2]

(ii) Ways to reduce sugar

avoid adding sugar to drinks – use artificial sweetener – fewer sweets – reduce sugar in recipes – use canned fruit in fruit juice instead of syrup – do not buy sugar coated breakfast cereal – eat cakes and biscuits less often – drink diet drinks / Diet Coke – avoid fizzy drinks – buy 'sugar-free' products e.g. sweets – fewer convenience foods etc. [4 points = 2 marks] [2]

(iii) Ways to reduce salt

less salt at the table – cook with less salt – use herbs and spices – reduce consumption of salty snacks e.g. peanuts, crisps – few processed foods e.g. sausage, bacon, cheese – use potassium chloride instead of NaCl – use 'Lo-salt' – fewer convenience foods etc. [4 points = 2 marks] [2]

5 Uses of water

vital to life – 70% of body of water – to avoid dehydration
body fluids – mucus, blood, saliva, digestive juices etc.
required in metabolic reactions – digestion / absorption in liquid
linings of mucous membranes, bronchial tubes etc. – prevent infection
lubricates joints and membranes – knees, between cells – avoid friction between bones
absorption – nutrients dissolve
maintain body temperature – water evaporates to cool skin
remove waste – in urine, perspiration, faeces etc.
[3 well-explained points = 3 marks] [3]

6 Advice to teenagers on healthy eating

protein – growth spurt – production of hormones
calcium – growth / maintenance of bones and teeth
vitamin D – absorption of calcium
starch – energy
fat – concentrated source of energy / reduces bulk
avoid excess fat – risk of CHD later – may aggravate skin conditions
iron – transport oxygen to release energy / blood formation – prevent anaemia – menstruation
vitamin C – absorb iron / prevent infection / clear skin
water – lost in perspiration if active
salt – lost in perspiration if active
not much sugar – dental decay / obesity / diabetes
avoid snacking – lose appetite for meal
breakfast essential – begin metabolism / give energy
regular meals – regular supply of nutrients / energy foods
healthy snacks – fruit and vegetables – few sweets / chocolate – spoil appetite
few fast foods – too high in fat / salt / sugar / additives – long term effects not good
be aware of peer group pressure – get to know what a healthy diet is

[10 points = 5 marks] [5]

[Section A Total: 40 marks]

7 **(a)** Reasons for serving sauces
add moisture – bind ingredients together – gravy, custard
add nutrients – custard, chocolate sauce, cheese sauce
add colour – attractive – jam sauce, chocolate sauce, parsley sauce
add flavour – palatable – cheese sauce, mint sauce
counteract richness – apple sauce with roast pork
add interest / variety – curry sauce
add contrasting texture – bread sauce with roast poultry, parsley sauce with fried fish [5 reasons + 5 examples, 10 points = 5 marks] [5]

(b) melt fat – add flour – stir – with wooden spoon – over gentle heat – until sandy / crumbly – do not allow to brown – remove from heat – add milk – gradually – stir all the time – return to heat – bring to boil – stir all the time – boil for 3 minutes. NO EXPLANATIONS [10 points – 5 marks] [5]

(c) Reasons for lumps
milk added too quickly – not stirred when milk is being added – milk added when pan is on the stove – not stirred when boiling
"not stirred" – allow once [2 points = 1 mark] [1]

(d) Variations
cheese – mushroom – onion – parsley – capers – sugar – cocoa – brandy – rum. HERBS must be named [2 points = 1 mark] [1]

(e) Changes when sauce is made
fat melts – absorbed by flour – liquid separates starch grains – starch grains soften – swell – rupture – release starch – absorbs liquid – thicken – gelatinisation of starch [6 points = 3 marks] [3]

8 **(a)** Reasons for preserving
food is easier to transport – can enjoy foods from other countries – use later – have foods not grown in that country – gives variety to meals – foods can be preserved in different forms – makes new products e.g. jam – prevents waste – copes with a glut of one particular food – cheaper when plentiful – best quality – keeps longer / prevents decay – have foods out of season – easier to store etc. [4 points = 2 marks] [2]

(b) Causes of food spoilage
yeasts – moulds – bacteria – enzymes – loss of moisture
[4 points = 2 marks] [2]

(c) Conditions needed for food spoilage
warmth (not heat) – moisture – food – time – suitable pH – oxygen
[4 points = 2 marks] [2]

(d)(i) Principles of freezing
bacteria inactive / dormant – temperature too low – water frozen – unavailable for micro-organisms to multiply [2 well-explained points] [2]

(ii) Principles of jam-making
high concentration of sugar – micro-organisms cannot grow – fruit boiled – micro-organisms destroyed – jars sealed – prevents entry of micro-organisms [2 well-explained points] [2]

(e) Reasons for use of preserved food
working wives – more disposable income – less time to cook – freezer ownership – can store a variety of foods – less need to shop – wide variety available – can enjoy foods from other countries – may not have the skill to prepare the dish – same preparation / cooking time – influence of

advertising – pictures on packaging – know what it looks like – less equipment used – less washing up – consistent results – save effort / easier – saves fuel – no need to buy separate ingredients – less need to shop regularly / daily etc. [10 points = 5 marks] [5]

9 **(a)** Importance of cereals

starch / carbohydrate – source of energy – readily available – cheap – easy to grow – easy to transport – easy to store – easy to eat – easy to prepare – staple food – filling – versatile – source of LBV protein etc.

[6 points = 3 marks] [3]

(b) Named cereals

wheat – oats – barley – rye – corn / maize / mealie meal – millet – rice – sorghum [4 points = 2 marks] [2]

(c) Storage of cereals

cool – dry – to prevent mould – to prevent germination / growth
check regularly – can be attacked by weevils – covered containers – prevent entry of dust etc. – sealed – prevent clumping together
keep out moisture etc – keep cereal bins the ground - prevent attack by dust etc - use in rotation – do not mix old and new supplies, decay could be spread – wholegrain cereals do not keep as long – fat becomes rancid etc.
NOT keep away from rodents [6 points = 3 marks] [3]

(d) Choice of flour for breadmaking

strong / hard – high gluten content – stretches to hold gases – gives firm structure – gluten becomes elastic when liquid is added – white flour – lighter so rises better – plain flour – wholemeal flour – contains NSP – follows dietary guidelines – not SR flour – contains baking powder – yeast is raising agent [3 well-explained points] [3]

(e) Changes taking place when a loaf of bread is baked

rises – warmth of oven encourages multiplication of yeast – carbon dioxide produced – alcohol evaporates – water evaporates – pushes up dough – yeast is killed – no more carbon dioxide produced – gas in dough expands on heating – protein / gluten coagulates – shape sets – starch dextrinises – forms crust – browns – crust lifts off / oven spring – carbon dioxide continues to expand after shape has set – air replaces gas which has escaped – open texture – Maillard reaction – flour gelatinises – increases in size / doubles / gets bigger etc. [8 points = 4 marks] [4]

[Section B Total: 45 marks]

10 (a) Discuss the nutritive value, storage and uses of eggs in the preparation of meals.

The answer may include the following knowledge and understanding.

Nutritive value
HBV protein – growth, repair, maintenance, hormones, energy
fat – energy, fat soluble vitamins, insulation, protection etc.
vitamin A – visual purple, prevent night blindness, mucous membranes etc.
vitamin D – absorption of calcium, bones and teeth, prevent rickets etc.
vitamin B group – release of energy from carbohydrates, nerve function etc.

Storage
cool / refrigerator – round end uppermost – prevents chalazae from breaking – yolk would move towards shell – bacteria enter – egg deteriorates – away from strong smells – absorbed through porous shell – do not wash shell – removes protective coating – do not freeze – water expands when frozen – cracks shell – bacteria can enter – freeze white and yolk separately – will keep in good condition for 2-3 weeks if stored correctly – etc.

Uses
main meal – scrambled, poached, fried, boiled
coating – with breadcrumbs or in batter – fish, Scotch eggs etc.
thickening – custard sauce etc.
setting – quiche, egg custard tart, etc.
trapping air – egg white whisked for meringues
raising agent – Swiss roll, sponge flan etc.
lightening – whisked egg white folded into mousse etc.
enriching – scones, sweet pastry, mashed potato, rice pudding etc.
emulsifying – mayonnaise, rich cakes, etc.
binding – fishcakes, rissoles, stuffing etc.
glazing – bread roll, scones etc.
garnishing – salads, dressed crab etc.
[Allow max. 1 example to illustrate each use.]

Additional Information
easily digested unless overcooked
protein coagulates on heating – sets shape of product – egg white coagulates at 60 °C – egg yolk at 70 °C – whole egg at 65 °C – if overheated protein shrinks – toughens – squeezes out liquid – syneresis – denatured at high temperature - indigestible – browns – bottom of fried egg – fresh egg white will hold more air than stale – 7x own volume – expands on heating – makes cake rise – protein sets shape – yolk thickens on heating – dries – turns to powder – green-black ring forms around hard-boiled yolk – iron sulphide – reaction between sulphur in egg white and iron in egg yolk – unattractive when sliced – avoid by placing into cold water after boiling etc.

10(a)	Band	Descriptors	Part mark
	High	- can name several nutrients in eggs - can give some functions of nutrients named - points about storage given - is able to mention many uses of eggs in cooking - can give examples to illustrate uses of eggs - is able to give scientific explanations for uses - information specific and generally accurate - understanding of the topic is apparent - all areas of question addressed	[11-15]
	Middle	- can name a few of the nutrients in eggs - a few of the functions noted - some information about storage - several uses of eggs mentioned - many dishes using eggs listed - not always related to uses mentioned - may attempt to explain scientific principles - information not always precise - some information inaccurate - has sound knowledge of some aspects - information sound but lacking detail	[6-10]
	Low	- one or two nutrients mentioned - little reference to functions of nutrients - may not refer to storage of eggs - lists many dishes containing eggs - does not always relate to uses eggs - little or no attempt to explain scientific principles - information general - not always accurate - emphasis is on one aspect of question - lack of knowledge will be apparent	[0-5]

10 (b) Discuss the causes and prevention of food poisoning when storing, preparing and cooking food.

The answer may include the following knowledge and understanding.

Causes of food poisoning
bacteria – microscopic life forms –
found in air, water, soil, sewage, food, plants, animals, humans and dust
examples are streptococci – cause fevers, tonsillitis etc.
staphylococci – cause boils, septic wounds, food poisoning
bacilli – typhoid, food poisoning
clostridium – food poisoning, may cause death
may be caused by contamination from chemicals – household cleaners, insecticides etc.
bacteria need food – moisture – warmth – and time to grow –
cannot thrive in high sugar, salt, acid – food preserved by using these facts – some do not need oxygen – anaerobic bacteria – can grow in intestines – double their numbers every 20 mins if conditions are favourable
not harmful in small numbers – cause problems when they multiply – form a colony – visible to naked eye – e.g. as a culture on a Petri dish
may form spores if conditions for growth are unfavourable – resistant to heat – cannot detect their presence in food – no change of colour, flavour, texture – can cause diarrhoea, vomiting, headaches, high temperature, death

Safe storage
clean containers – avoid spread of bacteria already present in debris in dirty container – cool place – refrigerator – slow down growth of bacteria – raw meat at bottom – prevent dripping onto food which may not need further cooking – store raw and cooked food separately – cover – avoid bacteria from air – from other foods contaminating – use in rotation – refrigeration does not prevent bacterial growth – follow manufacturers' instruction – clean up spills – clean refrigerator regularly – attracts bacteria – spread to the food – do not mix old and new food – will allow newer food to be contaminated – lids on containers – prevent entry of dust / bacteria – avoids moisture – encourage multiplication of bacteria – away from vermin – insects – pets – carry bacteria – away from dustbins – bacteria multiply in suitable conditions – kitchen bin is an ideal medium for growth – keep away from pesticides etc. – do not store these in empty lemonade bottles etc. – cover all foods – avoid cross-contamination – do not keep left-overs for more than 24 hours etc.

Preparation and cooking
Importance of personal hygiene – clean hands – hair tied back – not licking fingers – touching face – do not lick spoon and put back in food
clean surfaces – equipment – dish cloths and tea towels – sterilise cloths regularly – bleach – destroy bacteria – killed by heat – thoroughly clean work surfaces – very hot, soapy water for washing up – change water often – different knives etc. for raw and cooked food – cook at high enough temperature to destroy bacteria – defrost thoroughly – reheat until piping hot – Salmonella – thorough cooking all the way though – 72 °C for 2 minutes in centre – destroy bacteria etc.

10(b)	Band		Descriptors	Part mark
	High	-	identifies bacteria as cause of food poisoning	[11-15]
		-	can give conditions for growth	
		-	knows effects of food poisoning	
		-	may name bacteria	
		-	may name high risk foods	
		-	gives detailed information	
		-	information is accurate	
		-	some explanations for statements given	
		-	a sound knowledge of the topic is apparent	
		-	covers all parts of the question	
		-	illustrates statements with examples	
	Middle	-	can state that bacteria cause food poisoning	[6-10]
		-	states some of conditions for growth	
		-	knows some of effects of food poisoning	
		-	can name potentially dangerous foods	
		-	information not always accurate	
		-	little attempt to give explanations for statements	
		-	information is of a general nature	
		-	gaps in knowledge	
		-	not all areas covered in detail	
		-	may list facts without relating to topic	
		-	information may not be presented well	
	Low	-	can relate food poisoning to bacteria	[0-5]
		-	may not give all conditions for growth	
		-	know one of two effects of food poisoning	
		-	information is of a general nature	
		-	may list statements / facts	
		-	few, if any, explanations given for statements	
		-	does not address all parts of the question	
		-	information given is brief	
		-	not always accurate	
		-	limited knowledge of topic will be apparent	