

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers

0648 FOOD AND NUTRITION

0648/01

Paper 1 (Theory), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, 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, which would have considered the acceptability of alternative answers.

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Section A

- 1 (a) Monosaccharides**
 simple sugars – $C_6H_{12}O_6$ – basic unit – end product of digestion –
 sweet – soluble in water
 (4 points) (2 points = 1 mark) [2]
- (b) Disaccharides**
 double sugars – $C_{12}H_{22}O_{11}$ – 2 simple sugars combined –
 sweet – soluble in water – glucose + 1 other simple sugar –
 broken down to monosaccharides during digestion
 (4 points) (2 points = 1 mark) [2]
- (c) Polysaccharides**
 made up of many monosaccharides – insoluble in water – not sweet –
 not all polysaccharides can be digested –
 non Starch Polysaccharide (NSP) adds bulk to diet –
 prevents constipation/diverticulitis/varicose veins etc –
 chain is branched – cannot break –
 starch can be digested – because molecules are linked together in a simple chain
 (4 points) (2 points = 1 mark) [2]
- (d) Digestion and absorption**
in the mouth
 amylase/ptyalin – from salivary glands – acts on cooked starch –
 converting it into maltose
in the duodenum
 amylase – in pancreatic juice – converts starch to maltose
in the ileum
 maltase – in intestinal juice – converts maltose to glucose –
 villi – finger-like projections – in walls of small intestine –
 have walls made of single cells – and a network of blood capillaries –
 glucose passes through walls of blood vessels – into bloodstream –
 then transported to liver
 (12 points) (2 points = 1 mark) [6]
- (e) Reasons for reducing sugar intake**
 tooth decay – bacteria change sugar to acids – dissolve enamel
 excess stored as fat – obesity – breathless – low self-esteem –
 associated with coronary heart disease (CHD) – varicose veins – hypertension etc. -
 risk of diabetes – too much glucose in blood for insulin produced
 3 reasons + 3 explanations
 (6 points) (2 points = 1 mark) [3]
- (f) Ways of reducing sugar**
 avoid adding sugar to drinks – use artificial sweetener –
 fewer sweets/chocolate – biscuits/cakes – reduce sugar in recipes –
 use canned fruit in fruit juice instead of syrup –
 drink low calorie drinks/Diet Coke – avoid fizzy drinks –
 do not buy sugar-coated breakfast cereal – buy 'sugar free' products –
 fewer convenience foods – study nutritional information on packaging
 (6 points) (2 points = 1 mark) [3]

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- 2 (a) Importance of iron**
formation of haemoglobin – red pigment in blood –
picks up oxygen from lungs – oxyhaemoglobin –
transports oxygen to cells – oxidises glucose – cell respiration –
energy produced – leaving carbon dioxide and water –
CO₂ attaches to haemoglobin – carboxyhaemoglobin –
transported to lungs – for breathing out/disposal
(4 points) (2 points = 1 mark) [2]
- (b) Sources of iron**
liver/kidney – red meat (or one named example e.g. corned beef) - eggs – cocoa/plain
chocolate – curry powder – black treacle –
dried fruit (or named e.g.) – pulses (or named e.g.) – soya beans –
green vegetables (or named e.g.)
(4 points) (2 points = 1 mark) [2]
- (c) Deficiency disease**
Anaemia
(1 mark) [1]
- (d) Symptoms**
pale – tired/lethargic/fatigued – weak – headaches –
feel dizzy/faint – lacks energy – breathless
(2 points = 1 mark) [1]
- 3 (a) Importance of vitamin C**
clear skin – building/maintenance of linings of digestive system –
makes connective tissue – to bind cells together –
for production of blood – and walls of blood vessels –
growth – helps to heal wounds/fractures – immune system –
helps to build strong teeth and gums –
absorption of iron – antioxidant etc.
(4 points) (2 points = 1 mark) [2]
- (b) Sources of vitamin C**
citrus fruit (or named e.g.) – blackcurrants – rose hips –
strawberries – melon – tomatoes – mango – green peppers –
green vegetables (or named e.g.) – new potatoes etc.
(4 points) (points = 1 mark) [2]
- (c) Deficiency disease**
Scurvy
(1 mark) [1]
- (d) Symptoms**
walls of blood vessels weaken/break – blood escapes –
bruises appear under the skin – pain in muscles and joints –
gums bleed – teeth loosen - heart failure –
as blood passes through walls of capillaries etc.
(2 points = 1 mark) [1]

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4 Deficiency diseases

Not iron or vitamin C – in previous questions

Vitamin A/Retinol

Night blindness/Xerophthalmia

Vitamin D/Cholecalciferol

Rickets/osteomalacia

Vitamin B1/Thiamine

Beriberi

Vitamin B2/Riboflavin

Dermatitis/cataracts

Vitamin B3/Nicotinic acid

Pellagra

Vitamin B12/Cobalamin

Pernicious anaemia

Folate/folic acid

Anaemia/spina bifida

Calcium

Rickets/osteomalacia/tetany/osteoporosis

Iodine

Goitre

Protein

Kwashiorkor

Carbohydrate/fat/protein

Marasmus (lack of energy foods)

4 deficiency diseases x 1 point

4 associated nutrients x 1 point

(8 points) (2 points = 1 mark)

[4]

5 Planning meals for the elderly

small portions – appetite reduces with age

remove bones/skin etc – eyesight may be poorer – food needs to be easy to eat/chew

may need to cut into small pieces/mince – elderly may have few teeth

fewer carbohydrate foods – elderly may be less active

need protein foods – to repair worn out cells

iron – to prevent anaemia

vitamin C – to absorb iron – immunity

calcium/phosphorus – to maintain bones and teeth – for blood clotting – muscle function

vitamin D – to absorb calcium

soft foods – easier to eat

low in fat – easier to digest – reduces risk of CHD – obesity

reduce salt – reduces risk of hypertension/high blood pressure

reduce sugar – reduces risk of tooth decay – obesity – higher sugar intake is linked to diabetes

fruit and vegetables – NSP – less risk of constipation

variety of colour – flavour – texture – to add interest – make appetising

reduce spices and strong flavours – these are less easily tolerated

snack foods should be nutritious – include milk daily etc.

(12 points) (2 points = 1 mark)

[6]

[Section A Total: 40]

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Section B

6 (a) Food additives

nutritional – vitamin C in fruit juice, calcium in white flour,
 vitamins A and D in margarine
 improve keeping quality/preserve/reduce spoilage – used in processed foods
 make food more attractive/add colour – flavour – smell –
 can improve texture/consistency – stabilisers
 emulsify fat and water – prevent separating – ice cream, mayonnaise
 anti-oxidant – prevent rancidity in fats
 can be natural but not found in particular food added to
 or synthetic – e.g. vitamin C can be made synthetically –
 can be artificial colours and flavours etc.
 E numbers have been approved by the European Community –
 must be used in smallest amount possible to produce desired effect –
 some people are allergic/intolerant to certain additives
 long-term effect is not known
 must be stated, by law, if contained in the product
 danger of adding nut extracts for those allergic to nuts etc.
 may be used to increase sales – longer shelf-life – reduce waste etc.
 (10 points) (2 points = 1 mark)

[5]

(b) Different uses of fats and oils

spreading on bread – butter, margarine
 frying – corn oil, sunflower seed oil, dripping
 sauce-making – margarine, butter
 aeration – margarine traps air when creamed with sugar in cakes
 pastry-making – holds layers apart in flaky pastry – cake-making
 shortening – crumbly texture of shortcrust pastry, rock buns etc.
 adding flavour – butter in cake-making
 improve keeping quality – butter used in rich cakes etc.
 sealing – melted butter/margarine on pate to retain moisture – flavour/colour
 adds calories without adding bulk – fried food
 dressings – French dressing
 form an emulsion – mayonnaise
 basting – adds moisture to meat cooked by dry heat/grilled/roasted
 decorating – butter icing
 make foods easier to eat/lubricates – butter on toast
 prevent sticking – oiled baking tins
 retains moisture – rich cakes
 glazes – melted butter on new potatoes, carrots etc.
 (10 points) (2 points = 1 mark)

[5]

(c) Reasons for choosing a vegetarian diet

religious beliefs
 object to slaughter of animals – think it cruel
 expensive to rear animals – land could be used for crops –
 more people could be fed from same area of land
 dislike of animal flesh – texture/taste etc – family custom
 meat is expensive to buy
 belief that vegetarian diet is more healthy –
 animal fat has cholesterol – associated with CHD
 recent health scares – BSE/bird 'flu etc./salmonella
 (10 points) (2 points = 1 mark)

[5]

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7 (a) Reasons for the importance of cereals

readily available – easy to transport – easy to grow – cheap –
 carbohydrate/starch – source of energy – staple food – filling – easy to store – source of
 (LBV) protein – NSP in wholegrains –
 versatile – can be used for sweet and savoury dishes –
 easy to prepare – easy to eat etc.
 (6 points) (2 points = 1 mark)

[3]

(b) Named cereals

wheat – oats – barley – rye – corn/maize/mealie meal –
 millet – rice – sorghum
 (4 points) (2 points = 1 mark)

[2]

(c) Storage of cereals

cool – dry – to prevent germination/growth – away from smells
 to prevent mould – and formation of lumps –
 check regularly – can be attacked by weevils –
 covered containers – to prevent entry of dust etc. –
 sealed – to keep out moisture etc. –
 keep bins off the ground – prevent attack by rats etc. –
 use in rotation – do not mix old and new supplies – inspect regularly
 decay could spread from old to new – wasteful -
 wholegrain cereals do not keep as long – fat becomes rancid etc.
 (6 points) (2 points = 1 mark)

[3]

(d) Choice of flour for making bread

strong/hard flour – high gluten content – becomes stretchy/elastic with moisture – and
 kneading – stretches to hold gases –
 gives firm structure –
 white flour – lighter – so rises better –
 plain flour – no chemical raising agent required –
 wholemeal flour – contains NSP – follows dietary guidelines –
 not SR flour – contains baking powder – yeast is raising agent
 (6 points) (2 points = 1 mark)

[3]

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

rises/increases in size –
 warmth of oven encourages fermentation of yeast –
 carbon dioxide produced – gives open texture –
 alcohol evaporates – water evaporates – pushes up dough – fat melts – light texture
 yeast is killed by heat – no more carbon dioxide produced –
 gas in dough expands when heated – protein/gluten coagulates –
 shape sets – starch dextrinises – forms crust – browns –
 crust lifts off/‘oven spring’ –
 as carbon dioxide continues to expand after shape has set –
 air replaces escaped gas – flour gelatinises –
 Maillard browning – action of protein and sugar – etc.
 (8 points) (2 points = 1 mark)

[4]

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8 (a) Creaming

e.g. Victoria sandwich cake, queen cakes, Eve's pudding etc.
 equal quantities – fat and sugar – with wooden spoon/electric mixer-
 until light and fluffy – traps air – to help raise the mixture –
 butter or soft margarine – good colour – and flavour –
 caster sugar – finer grains – easier to cream
 (6 points to include 1 example) (2 points = 1 mark)

[3]

(b) Basting

e.g. roast beef, grilled steak etc.
 pour/spoon – hot fat – over surface of food – from time to time
 to prevent drying – or burning – adds flavour of fat –
 and extractives
 (6 points to include 1 example) (2 points = 1 mark)

[3]

(c) Making a roux

e.g. base for sauce, soup or named e.g. – cheese sauce
 equal quantities – fat and flour – usually margarine/butter/dripping
 for colour – and flavour – melt fat – do not brown – stir in flour – wooden spoon
 resembles a paste – cook over gentle heat – for 1 minute –
 stir constantly – to prevent sticking/burning – starch absorbs fat –
 looks 'sandy'/like marzipan (or other description)
 (6 points to include 1 example) (2 points = 1 mark)

[3]

(d) Sautéing

e.g. mushrooms, potatoes, onions
 toss – small/thin pieces of food – or cooked food –
 in small amount – of hot fat – over low heat – type of frying – lid on pan – until fat absorbed –
 quick method – browns food
 (6 points to include 1 example) (2 points = 1 mark)

[3]

(e) Making a stock

e.g. vegetable, chicken, beef, fish
 boil – bones/small pieces of food – for a long time – strain
 to gain flavour/extractives – to add to soup/sauces/casseroles –
 instead of water – can use commercial stock cube
 (6 points to include 1 example) (2 points = 1 mark)

[3]

[Section B Total: 45]

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Section C

- 9 (a) Discuss the reasons for preserving food and explain how food spoilage is prevented in named methods of preservation. [15]

The answer may include the following knowledge and understanding.

Reasons for preserving

enjoy food out of season
 buy food when plentiful to use when scarce
 to cope with a glut
 to prevent waste
 to give variety – food can be frozen, dried
 new products made – jam, pickles etc.
 to enjoy foods produced in other countries
 to have a store of food
 useful in emergencies etc.
 to prevent the growth of yeast – mould – bacteria
 to prevent loss of water/dehydration of fresh foods

Methods of preserving:

Freezing

water in cells frozen – unavailable for growth of bacteria –
 bacteria cannot grow at low temperatures – dormant –
 e.g. fish, vegetables, meat etc.

Jam-making

high sugar content /60% added sugar –
 water withdrawn from cells – too concentrated for bacteria to thrive
 sealed in jars – to prevent entry of micro-organisms
 e.g. plums, strawberries, guava etc.

Pickling

salt to cover food – withdraw water from cells (by osmosis)
 acid/vinegar to replace water –
 micro-organisms cannot thrive in high acidic conditions
 e.g. onions, gherkins, cabbage etc.

Pasteurisation

heated to 72°C (162°F) – 15 seconds **or** 63°C (145°F) – 30 minutes
 cooled rapidly – destroys harmful bacteria
 e.g. milk, fruit juice etc.

Ultra Heat Treatment (UHT)

heated to 132°C – for not more than 1 second –
 destroys harmful bacteria – prevents souring
 e.g. milk, cream etc.

Bottling and Canning

heat destroys bacteria – sealed to prevent further entry of bacteria
 e.g. fruit, milk, vegetables, fish etc.

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Drying

water removed – bacteria cannot multiply without water
e.g. fruit, meat, fish, herbs, spices etc.

Salting

water removed by osmosis – micro-organisms need water to thrive
e.g. fish, beans etc.

Smoking

salt removes water – phenols from smoke deposited on food surface
inhibits growth of micro-organisms
e.g. fish, meat

Accelerated Freeze Drying (AFD)

water sublimates in vacuum – structure remains same –
micro-organisms need water to thrive
e.g. coffee, vegetables, strawberries

Vacuum packing

air removed – entry of micro-organisms prevented –
no oxygen for bacterial growth
e.g. meat, fish, coffee etc.

Irradiation

packages irradiated – no change to appearance of food –
cannot detect that process has taken place –
micro-organisms destroyed by gamma rays –
e.g. spices, strawberries etc.

Artificial additives

sulfur dioxide – nitrates – inhibit growth of micro-organisms
e.g. sausages, bacon etc.

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<u>Band</u>	<u>Descriptor</u>	<u>Part mark</u>	<u>Total</u>
High	<ul style="list-style-type: none"> – Can identify many reasons for preserving food – Is able to identify and discuss several methods of preservation – Gives examples to illustrate points made – Understanding of the topic is apparent – Information is specific and generally accurate – All areas of question addressed – Answers are detailed where appropriate – Some specific facts included and the topic is addressed in its widest application 	11–15	[15]
Middle	<ul style="list-style-type: none"> – Some reasons for preserving food – Is able to identify a few methods of preservation – Some discussion or explanations given – Gives a few examples to illustrate points made – Shows some understanding of the topic – Information is basic and generally accurate – Some areas of question addressed – Gaps in knowledge will be apparent – May be a few specific facts – Answer will be detailed in parts and superficial in others – Overall lack of detail 	6–10	
Low	<ul style="list-style-type: none"> – May give a few reasons for preserving food – Mentions some methods of preservation – May give examples to illustrate – Answer tends to be a list of statements – Not always accurate – Information is brief – Superficial treatment of topic – Answers not specific – Little or no detailed information – Emphasis on one part of the question – Lack of knowledge will be apparent 	0–5	

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- 9 (b) Discuss the nutritive value of eggs and explain how they can be used in the preparation of dishes. [15]

The answer may include the following knowledge and understanding.

Nutritive value of eggs

protein (or named e.g. ovalbumin/mucin/vitellin) –
 growth/repair/maintenance/energy/hormones/enzymes etc.
 fat – saturated – energy/warmth/ absorb vitamins A,D,E and K etc,
 vitamin A/retinol – prevent night blindness/healthy skin/mucous
 membranes etc.
 vitamin D/cholecalciferol – absorption of calcium/bones and teeth etc,
 vitamin B2/riboflavin (or vitamin B) – release energy from
 carbohydrates/growth/clear skin
 iron – haemoglobin/transport oxygen/release energy from glucose/
 prevent anaemia etc.
 phosphorus – works with calcium/formation of bones and teeth/
 formation of protoplasm/component of protein
 sulfur – formation of protoplasm/component of protein

Uses of eggs

main dish/breakfast/snack –	omelette, scrambled egg, boiled egg etc.
trapping air/making mixtures rise –	Swiss roll, sponge flan etc.
lightening	mousse, meringue, soufflé
thickening	custard, sauces, soup etc.
setting	quiche, rich cakes, baked egg custard etc.
emulsifying	mayonnaise, rich cakes etc.
binding	croquettes, fish cakes, stuffing etc.
coating	Scotch eggs, fish fillets etc.
glazing	pastry, bread etc.
enriching	sauces, milk pudding, soup etc.
garnishing	salad, dressed crab, omelette strips etc.
colour	pastry, cake etc.

egg white can hold 7 × its own volume of air – protein entangles air
 must be no fat in bowl/no egg yolk etc. – will not whisk
 protein coagulates/sets/solidifies/hardens when heated –
 forms a seal around foods to be fried – fat cannot penetrate –
 egg white at 60°C – egg yolk at 66°C –
 egg white thickens – changes from transparent to opaque –
 becomes firm – then rubbery if overcooked –
 yolk thickens – becomes powdery when overheated –
 protein denatures when heated – changes cannot be reversed
 indigestible if overcooked – protein denatures etc.

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<u>Band</u>	<u>Descriptor</u>	<u>Part mark</u>	<u>Total</u>
High	<ul style="list-style-type: none"> – Candidate can name more than 4 nutrients and can state functions – Can state at least 3 uses of eggs and give examples to illustrate – Can give some explanations of methods – Comments are precise and are related to specific examples – Information given is accurate – Knowledge of the topic will be apparent 	11–15	[15]
Middle	<ul style="list-style-type: none"> – Can name at least 3 nutrients in eggs – Gives some of the functions – Can state no more than 3 uses of eggs – Gives some examples to illustrate uses – May attempt to give explanations of methods – Some gaps in knowledge – Terminology not always accurate – Information is not always precise – Little scientific information – Limited knowledge will be apparent 	6–10	
Low	<ul style="list-style-type: none"> – Can name a few of the nutrients in eggs – Functions not always known – Can give 1 or 2 uses of eggs – May not always give examples to illustrate uses – Information not always accurate – No scientific explanations – General information – Basic facts – Lack of knowledge will be apparent – Weak candidates may list ways of cooking eggs with little further information 	0–5	

[Section C Total: 15]