

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2011 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.

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

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Page 2	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

Section A

- 1 (a) Named fats
accept suitable named examples × 4 –
e.g. butter / cream / lard / suet / dripping / ghee / margarine –
- 4 points (2 points = 1 mark) [2]
- Named oils
accept suitable named examples × 4 –
e.g. fish liver oil (or a named example) / nut oil (or a named example) / ground nut / coconut / olive / palm / sesame / soya –
- 4 points (2 points = 1 mark) [2]
- (b) Fats as oils
fats are solid at room temperature and oils are liquid –
- 1 mark [1]
- (c) Functions of fat
energy –
warmth –
insulation –
protection of internal organs / shock absorber –
to convey fat soluble vitamin (or named examples e.g. A D E K) / contains vitamins A D E K
to form a fuel reserve –
forms part of structure of cell membrane –
gives feeling of fullness (satiety) after a meal –
- 4 x 1 mark [4]
- (d) (i) Saturated fat
hard / solid – less reactive fat –
carbon atoms saturated with hydrogen / the fat molecule contains max. number of hydrogen atoms –
no double bonds between carbon atoms – only single bonds –
usually from animals –
(credit information shown on a diagram)
- 2 x 1 mark [2]
- (ii) Polyunsaturated fat
softer fats – more reactive fat –
fat molecule contains more than one double bond in the carbon chain / two or more double bonds in the carbon chain –
does not contain max. number of hydrogen atoms / can accept more H₂ –
the more double bonds the softer the fat –
usually from plants –
(credit information shown on a diagram)
- 2 x 1 mark [2]

Page 3	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

(iii) Essential fatty acids

must be included in the diet – because cannot be manufactured by the body – deficiency causes dry skin / poor hair / diarrhoea (allow 2 max. effects of deficiency)

2 x 1 mark

[2]

(e) (i) (fats digested in) duodenum –

(ii) bile (emulsifies fats) –

(iii) (emulsification is necessary) to break fat into tiny droplets / to increase the total surface area of the fat –

(iv) (fat is broken down by enzyme) lipase –

(v) (fat is broken into) glycerol and fatty acid –

(vi) (1g of absorbed fat produces) 9 kcal – 9 Calories – 37 kJ –

6 x 1 mark

[6]

(f) Problems associated with high fat intake

excess fat stored in the body causes obesity –

high intake of animal fat means high cholesterol in diet –

fat / cholesterol deposited in arteries –

can cause CHD / heart attack / stroke –

obesity may lead to breathlessness / lethargy / lack of self-esteem –

3 x 1 mark each

[3]

(g) Name, function and source of two fat-soluble vitamins

1. Vitamin A (retinol)

1 point

Functions

makes visual purple – in retina of eye –

to enable the eye to perceive things in dim light / at night –

prevents Night Blindness –

required to keep mucous membranes moist – and free from infection

example of mucous membranes e.g. throat / digestive / bronchial / excretory tracts –

any example – 1 point (1 only)

for healthy skin –

required for growth –

4 points

Animal Sources (as retinol)

milk – cheese – eggs / egg yolk – butter – liver – kidney – oily fish / e.g. fish liver oils –

Plant Sources (as carotene)

carrots – spinach – watercress – apricots – parsley – cabbage – pumpkin tomatoes –

prunes – margarine – orange – papaya –

3 points

Page 4	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

2. Vitamin D (cholecalciferol) 1 point

functions

formation / maintenance of bones / teeth –
absorption of calcium / phosphorus –
prevents rickets in children – rickets symptoms –
prevents osteomalacia in adults – soft bones –
growth –

4 points

sources

fish liver oils – oily fish – egg – milk – butter – cream – margarine – cheese – dairy products – yoghurt –
sunlight / ultra violet rays of the sun –

3 points

[4]

3. Vitamin E (tocopherol) 1 point

functions

healthy skin –
protection against heart disease –
fertility / reproduction in some animals –
antioxidant –

4 points

sources

eggs – nuts – seeds – cereal products – vegetable oils –

3 points

[4]

4. Vitamin K 1 point

functions

clotting of blood 1 point

sources

fruit – cereals – meat – liver – (bacteria in large intestine) –

3 points

[4]

For each vitamin, 8 points max. (2 points = 1 mark.)

Page 5	Mark Scheme: Teachers' version	Syllabus	er
	IGCSE – October/November 2011	0648	

2 (a) Nutritional needs of elderly women

calcium and phosphorus – prevent osteoporosis / for strengthening bones –
less carbohydrate / reduced energy giving food – less active –
vitamin C – to resist infections / absorb iron –
less fat – difficult to digest or increase risk of CHD / obesity (as less active) –
less salt – hypertension –
NSP – prevent constipation –
4 nutrients + 4 reasons

8 points (2 points = 1 mark)

[4]

(b) Nutritional needs of very active teenagers

more carbohydrate / high energy food – more energy needed –
at least a third of energy from fat – higher calorific value / less bulky –
more protein – growth spurt / body building –
more calcium / phosphorus – bones and teeth –
more vitamin D – absorption of calcium –
more water – to replace water lost in perspiration –
more NaCl / sodium chloride / salt – to replace salt lost in perspiration –
more vitamin B thiamin – to release energy from carbohydrate –
more iron – carries oxygen for cell respiration / energy release –
more vitamin C – absorption of iron –
4 nutrients + 4 reasons

8 points (2 points = 1 mark)

[4]

[Section A Total: 40]

Page 6	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

Section B

- 3 (a) Gelatinisation
 moist – heat – on starch – grains soften / swell – absorb water – some rupture – liquid thickens –
 e.g. custard / roux sauce / cooking cakes / rice / macaroni –
- 6 points (must include an example) (2 points = 1 mark) [3]
- (b) Coagulation
 heat – on protein – denatures – from 40 °C – coagulation begins at 60 °C – cannot be reversed – hardens / sets –
 chemical structure changes
 e.g. boiled egg / egg custard / roast meat / baked bread –
- 6 points (must include an example) (2 points = 1 mark) [3]
- (c) Fermentation
 yeast – produces carbon dioxide – and alcohol / ethanol – with food / sugar / glucose –
 moisture – warmth –
 enzymes / named (e.g. maltase / invertase / zymase)
 e.g. bread-making –
- 6 points (must include an example) (2 points = 1 mark) [3]
- (d) Pasteurisation
 heat – destroys harmful bacteria – and souring bacteria –
 does not prevent decay – keeps longer –
 72°C / 162°F – for 15 seconds – HTST or Flash –
 145°C – for 30 minutes – Holder method –
 cool rapidly – to prevent bacterial growth to below 10°C
 e.g. milk –
- 6 points (must include example) (2 points = 1 mark) [3]
- (e) Hydrogenation
 H₂ added makes fat solid – from liquid oil – e.g. sunflower / soya – unsaturated fats – can take up hydrogen to make oil saturated – uses a nickel catalyst – can be stopped at any time to achieve degree of hardness required
 e.g. margarine –
- 6 points (must include example) (2 points = 1 mark) [3]

Page 7	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

4 (a) Purpose of ingredients in Victoria sandwich cake

(i) Self-raising Flour

- | | | |
|--------------------------|---|-----------------------------------|
| adds bulk | – | main ingredient |
| carbohydrate | – | provides energy |
| gluten | – | forms framework / sets on heating |
| contains baking powder | – | raising agent |
| traps air during sieving | – | raising agent |

6 points (2 points = 1 mark)

[3]

(ii) Sugar

- | | | |
|------------------------|---|---|
| | – | softens crumb / sweetens / adds flavour / taste |
| traps air when creamed | – | raising agent / lightens texture |
| caramelises | – | dry heat during baking / browns / colour |
| preserves | – | high sugar concentration / helps to retain moisture |

6 points (2 points = 1 mark)

[3]

(iii) Margarine

- | | | |
|------------------------|---|---|
| retains moisture | – | keeps cake fresh longer |
| high energy | – | fat concentrated source of energy |
| traps air when creamed | – | raising agent / lightens |
| adds colour | | |
| adds flavour | | |
| adds nutrients | – | vitamins A and D added during manufacture |

6 points (2 points = 1 mark)

[3]

(iv) Eggs

- | | | |
|-----------------------|---|--|
| protein | – | growth / repair |
| iron | – | haemoglobin |
| gives shape | – | protein coagulates on heating |
| colour | – | depends on brightness of yolk |
| emulsifies | – | holds fat and water separate / prevents curdling |
| traps air when beaten | – | raising agent / lightens |
| flavour | | |
| water | – | (steam) raising agent |

6 points (2 points = 1 mark)

[3]

Page 8	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

- (b) (i) The cake has risen to a peak then cracked
oven temperature too high –
too much mixture for the size of tin –
too high oven shelf –
- (ii) Close textured cake
too much liquid in mixture –
too little raising agent used –
not enough creaming –
mixture has curdled –
oven temperature too low –
cake not cooked for long enough –
overbeating when adding flour – causes loss of air –
overbeating after adding liquid –
not sieved –
wrong proportions –
opens oven door too much before cake sets –

6 points (must be at least 1 from each section) (2 points = 1 mark)

[3]

5 (a) Advantages and disadvantages of frying

advantages

quick – food browns / colour – crisp surface – adds nutrients without adding bulk – develops flavour – develops aroma – fat / vitamins A / D added –

disadvantages

uses a lot of fat – expensive outlay – against 'healthy eating' guidelines – fat may be difficult to digest – dangerous method of cooking – if overheated could cause fire – needs constant attention – food could be greasy and unappetising – heat sensitive nutrients lost –

10 points (covering both areas) (2 points = 1 mark)

[5]

(b) Care and choice of saucepans

choice of saucepans

must suit cooking stove – thick base for electric cooker – retain heat –
well balanced – to prevent tipping over –
insulated handles and knobs – to prevent burning –
well-fitting lids – to prevent loss of heat and steam –
base should cover hotplate – prevents waste of heat – more economical –
non-stick coating – easier to clean –
enamel outside – to match kitchen decor –
buy the best that can afford – less need to replace frequently –
copper bases – good conductor of heat – more efficient –
glass – can see what is cooking –
stainless steel – hard wearing / easier to clean –
iron – cheaper – stains –
aluminium – lightweight – dents when dropped – not balanced on stove –
choose a variety of sizes – to suit uses / size of family –

Page 9	Mark Scheme: Teachers' version	Syllabus	er
	IGCSE – October/November 2011	0648	

care of saucepans

- soak – to remove burnt on food –
- wash in hot soapy water – removes grease –
- dry thoroughly – prevents rusting – discourages smells and growth of bacteria –
- do not stack – prevents scratching –
- do not use steel wool or metal spoons on non-stick pans – removes coating –
- store in dry place – prevents rusting –

10 points (covering both areas) (2 points = 1 mark)

[5]

(c) Disposal of kitchen waste

- empty bin daily – wash daily – dry thoroughly / in the sun –
- do not leave water in bin – attracts mosquitoes – disinfect regularly –
- line with plastic bin liner – easier to empty – keeps bin cleaner –
- wrap all waste – tie bags – pour away liquid – wrap broken glass –
- clear up spills and mess around bin – prevents attraction of flies / insects –
- cover bin tightly – prevents flies / insects –
- rinse out and flatten tins – removes smell of food – takes up less space –
- recycle paper / glass / aluminium cans if possible – peelings for compost –
- stand the outside bin on bricks – allows air to circulate underneath –
- keep outside bin away from house and away from open windows –
- so flies do not get into the house easily –
- do not pour fat down drains – blocks drains when it hardens –
- make sure U-bend contains clean water – disinfect at night –
- leave no scraps lying about on benches or floor – encourages vermin –
- do not allow bin to overflow – encourages vermin / insects –

10 points (2 points = 1 mark)

[5]

Page 10	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

Section C

6 (a) (i) Reasons for preserving food

- kills bacteria – e.g. milk
- to keep longer / prevents decay – e.g. canned meat, dried fruit
- give variety – e.g. jam, pickles
- reduces transport cost – e.g. convenience foods
- less bulky – e.g. dried milk
- easier to transport – e.g. frozen meat from New Zealand, canned corned beef from Argentina, dried fruit from Greece etc.
- enjoy food from other lands – e.g. pineapples from South Africa etc.
- enjoy foods out of season – e.g. frozen strawberries
- make use of food when cheap and plentiful – e.g. seasonal fruit
- to avoid waste – e.g. named seasonal fruit or vegetable
- cope with a glut – e.g. cannot use all produce at once
- good for emergencies – e.g. dried milk, frozen meat

8 points (2 points = 1 mark) (must include example for each)

[4]

(ii) Methods of preserving food

- Jam-making e.g. plum / strawberry –
 - 60% added sugar prevents multiplication of bacteria –
 - boiled to destroy micro-organisms – and enzymes –
- Freezing e.g. fish / fruit, –
 - frozen at -24°C – to make small ice crystals –
 - bacteria dormant at -18°C –
 - water frozen – unavailable for bacterial growth –
- Drying / Sunning e.g. currants / prunes / fish / milk –
 - water removed – unavailable for bacterial growth –
- Pickling e.g. chutney / onions –
 - water removed by osmosis – replaced by acid / vinegar –
 - micro-organisms cannot multiply in acid conditions –
- AFD e.g. strawberries / coffee / herbs –
 - food frozen – moisture removed by sublimation –
 - microbes need water to multiply –
- Bottling / Canning e.g. peaches / pears –
 - boiling destroys bacteria – and enzymes –
 - airtight seal prevent further entry of bacteria –
- Irradiation e.g. strawberries –
 - gamma rays / beams of electrons pass through food –
 - bacteria destroyed –
- Salting and Drying e.g. plums / mango / apples –
 - water removed by osmosis – drying removes more water –
 - micro-organisms need water to multiply –
- Salting e.g. fish –
 - water removed by osmosis – water needed by microbes –
- Smoking e.g. bacon / fish –
 - leaves a layer on surface of food – prevents growth of microbes –
- Pasteurising e.g. milk –
 - heat destroys bacteria –
- Sterilising e.g. milk –
 - heat destroys bacteria –
- Chemical additives e.g. sausage / convenience foods –
 - unsuitable pH for bacterial growth –

Page 11	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

(iii) Storage of food in a refrigerator

- | | |
|---|--|
| <ul style="list-style-type: none"> do not overload – raw meat at bottom – do not mix raw and fresh foods – clean containers – cover –
 note 'use by' date – food should be clean – use food in rotation – do not mix old and new milk – fresh foods at back – eggs in egg rack / egg box – milk away from cheese etc. – no hot food –
 keep temperature at about 4 °C – clean regularly – defrost regularly – keep door closed – | <ul style="list-style-type: none"> must allow cold air to circulate – avoid dripping onto other food / cross-contamination – cross-contamination – no bacteria to transfer to fresh food – to avoid bacteria reaching food/prevent absorption of smells e.g. fish – prevent surface of the food from drying – so food is used when safe – avoid contamination of other foods – to prevent waste – bacteria from old pass to new – use oldest first to prevent waste – to prevent falling – to prevent tainting – raises temperature – causes bacteria to multiply – slow rate of multiplication of bacteria – remove spills – remove build ice / more efficient – prevent warm air entering – raises temperature / bacteria multiply – |
|---|--|

Page 12	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

Band	Descriptor	
High	<ul style="list-style-type: none"> - Can identify many reasons for preserving food - Suggests ways to use refrigerator - 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 	(22–30 points)
Middle	<ul style="list-style-type: none"> - Some reasons for preserving food - May give some advice on use of refrigerator - Is able to identify a few methods of preservation - Some discussion or explanations given - Gives a few examples to illustrate points made - Shows a basic 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 (12–20 points)
Low-	<ul style="list-style-type: none"> - May give a few reasons for preserving food - Little information on use of refrigerator - 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 (0–10 points)

Page 13	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

(b) The answer may include the following knowledge and understanding.

(i) Nutrients in red meat and their functions

HBV – protein – growth / repair / maintenance / energy / hormones –
 Fat – saturated – energy / protection / insulation –
 Vit. A / retinol – prevents night blindness / mucous membranes / visual purple –
 Vit. D / cholecalciferol – absorb calcium / bones and teeth / prevents rickets –
 Thiamin / Vit. B1 – release of energy from carbohydrate / nerve function –
 Riboflavin / Vit. B2 – release of oxygen from fat / protein –
 Iron – haemoglobin / transport oxygen / prevents anaemia –
 Phosphorus – bones and teeth / release of energy –
 Water – body fluids / lubrication of joints / maintains body temperature –

(ii) Reasons for toughness

long muscle fibres – thick muscle fibres – meat from an old animal –
 muscles which have had most movement – e.g. neck / leg –
 muscles well developed – contains a large amount of collagen / connective tissue –
 and gristle –
 incorrect cooking method used – e.g. dry method for tough cut –
 frozen meat not defrosted thoroughly before cooking –

Methods of tenderising meat before cooking

mince – cut into small pieces – score – to shorten muscle fibres –
 beat – with hammer / rolling pin – to separate fibres – slice against grain –
 hang – marinade / soak – in wine / acid / lemon juice / vinegar –
 use of enzymes / papain (from papaya) / bromelin (from pineapple) / ficin (from figs) –

(iii) Changes during moist method of cooking

collagen – insoluble – converted to gelatine – soluble –
 moisture penetrates between muscle fibres – e.g. stewing / braising –
 elastin softens slightly – protein coagulates – at 40 °C to 60 °C –
 meat becomes firmer –
 fibres fall apart – meat becomes tender – easier to chew –
 muscle fibres shrink – extractives squeezed out –
 fat melts – colour changes from red to brown –

Page 14	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0648

Band	Descriptor	
High	<ul style="list-style-type: none"> - Can identify at least 4 nutrients in meat, some reasons for toughness and many changes during cooking - Can describe changes logically - Discusses points in detail - Uses scientific terms correctly - Understands the effect of moist heat on meat - Understands the functions of nutrients mentioned - Knows several ways to tenderise meat - Can give some explanations on tenderising - Sound knowledge of the topic is apparent - All areas of the question addressed - Details given in all parts of the question 	(22–30 points)
Middle	<ul style="list-style-type: none"> - Can identify 2 or 3 nutrients in meat, a few reasons for toughness and some changes during cooking - Some of changes logically described - Knows some functions of nutrients - Detail in some areas but not all - Answers lack precision - Not all terms used accurately - Some scientific information given - Not all parts of question addressed in same amount of detail - Knows a few ways to tenderise meat - Does not always explain methods of tenderising - Some knowledge evident but with gaps - Superficial answers in some areas 	6–10 (12–20 points)
Low-	<ul style="list-style-type: none"> - Can identify 1 or 2 nutrients in meat, 1 or 2 reasons for toughness and possibly changes during cooking - General points made - Little precise information in any area - Little or no scientific information - Answer may consist of a list of facts - Information not always accurate - Some parts of question have brief or no response - Answer short and superficial - May give 1 or 2 examples to illustrate points - Limited knowledge of subject will be apparent 	0–5 (0–10 points)

[Section C Total: 15]

[Paper Total: 100]