UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 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) Elements in fat
carbon – hydrogen – oxygen
3 × 1 mark [3]

(b) Functions of fat
energy
energy reserve
protects vital organs
insulates / preserves body heat / warmth
solvent for fat soluble vitamins / ADEK
increases calorific value of food without adding bulk
provides texture to food
gives flavour to food
gives a feeling of fullness (satiety) after a meal
slows down digestion
formation of cell membranes etc.
3 × 1 mark [3]

(c) Saturated fat
contains maximum amount of hydrogen
molecule has only single bonds / no double bonds
(may show on a diagram)
solid (at room temperature)
usually from animals
contains cholesterol
3 points
e.g. butter – lard – dripping – suet – cocoa butter – coconut – palm oil
1 point [2]

Monounsaturated fat
molecule can accept more hydrogen
molecule has **one** double bond
(may show on diagram)
liquid (at room temperature)
plant origin
3 points
e.g. olive oil – avocado pear – rapeseed oil / canola
1 point [2]

Polyunsaturated fat
molecule can accept more hydrogen
molecule has **more than one** double bond
(may show on diagram)
liquid (at room temperature)
usually plant – or fish origin
3 points
e.g. sesame seed oil – sunflower seed oil – maize oil – palm oil – peanut oil – oily fish (or named e.g.) – fish liver oil (or named e.g.) – soya bean oil – safflower – nut oil (or named e.g.)
1 point [2]

(d) Digestion and absorption of fat

in duodenum – bile – from liver – stored in gall bladder – emulsifies fat – increases area – breaks into small droplets – lipase – from pancreatic juice – converts fat to fatty a and glycerol

in ileum – lipase – from intestinal juice – converts fat to fatty acid – and glycerol

in the ileum – finger-like projections – villi – contain lacteal – connected to lymphatic system – absorbs glycerol and fatty acid – recombine to form fats – mix with lymphatic fluid – join blood circulation – as insoluble fat

10 × 1 point 2 points = 1 mark [5]

(e) Reasons for reducing saturated fat

contains cholesterol – deposited on artery walls – narrows – blocks – may cause CHD / heart attack – hypertension – strokes – excess fat is stored – under skin – as adipose tissue – around internal organs – obesity / weight gain – breathless – problems during surgery – low self-esteem etc.

8 points 2 points = 1 mark [4]

(f) Ways to reduce saturated fat

less red meat / beef / pork / lamb – trim fat from meat – white meat / fish instead

do not fry foods in lard / butter / dripping – grill instead of fry – use plant oils (or named e.g.) to fry – named food e.g. bacon, sausages, chops

reduce consumption of chocolate – eat fewer cakes / biscuits / pastries – avoid avocado

reduce butter / margarine in recipes – eat fewer eggs – consume less butter / cheese – choose low-fat products e.g. yoghurt / cheese – use skimmed milk – spread butter thinly – use low-fat spreads

do not add butter to cooked vegetables etc.

6 × 1 point 2 points = 1 mark [3]

2 (a) Importance of Non–Starch Polysaccharide / NSP (dietary fibre)

absorbs water – in colon – making faeces soft – and bulky – and easy to expel – regularly – helps to clear waste – binds food residues – stimulates peristalsis – gives muscles something to grip – prevents constipation – hernias – haemorrhoids – cancer of colon – diverticular disease – varicose veins etc.

helps to remove toxins – reduces cholesterol – gives feeling of fullness etc.

8 points 2 points = 1 mark [4]

(b) Sources of NSP

green, leafy vegetables – fruit skins – wholegrain cereals – bran – maize – wholemeal bread – wholemeal pasta – brown rice – pulses – nuts – potato skins – dried fruits – oats – oranges – wholemeal flour – celery – tomato seeds etc.

4 points 2 points = 1 mark [2]

3 Uses of water

absorbed by NSP – removes waste
forms part of protoplasm in cells – 70% of body is water
constituent of body fluids – saliva / blood / digestive juices / lymph
required in metabolic reactions – all processes take place in solution
aids absorption – nutrients dissolve in water for easy absorption
keeps mucous membranes moist – protects body from infection
lubricates joints – prevents ends of bones damaging each other – knees, elbows
maintains body temperature / cools body – lost in perspiration
needed during lactation – for milk production
maintains water balance – continually being lost – needs replacing – prevents dehydration
helps to eliminate waste – from kidneys as urine – makes food easier to eat / swallow
helps to keep faeces soft – prevents constipation etc.
4 uses – 1 point each + 4 pieces of additional information
8 points 2 points = 1 mark [4]

4 Good eating habits in children

eat meals with rest of family – do not allow to leave table – cut food if necessary – to encourage independence – small portion – encourage to eat everything – regular mealtimes – should begin day with breakfast – start metabolism – no snacking between meals – will not be hungry for meal – do not use sweets as a reward – or punish by not giving certain foods – serve attractively – variety of colours – variety of flavours – easy to eat – no strong flavours – variety of foods – variety of textures – avoid sweet drinks before meals – avoid sugar – avoid salt
spoils appetite – water with meal – include fresh fruit and vegetables
should include 500mls / 1 pint milk daily – introduce new foods – for wide variety of nutrients – avoid oily foods
so they will grow up liking different foods – and will not be fussy – may be difficult to digest – encourage to use cutlery properly – avoid overfeeding – risk of obesity in later life etc.
(may illustrate with examples)
12 points 2 points = 1 mark [6]

[Section A total: 40]

Section B

5 (a) Choice of flour and fat for shortcrust pastry

Flour

plain – air is raising agent – not SR – has chemical raising agent
white – lighter texture – rises more easily
soft – low gluten content – for more crumbly pastry
wholemeal flour – or mix with white flour – adds NSP – iron – rougher texture – produces a heavier result – nutty flavour

Fat

hard fat – does not melt when rubbing in – fat should be cold / chilled – not easily melted before baking – margarine – butter – good colour – and flavour – butter is more expensive – lard – crumbly / short result – because it does not contain water – poor colour – and flavour – mixture of lard and margarine – has qualities of both fats etc.

10 points to cover both ingredients 2 points = 1 mark [5]

(b) Method of making shortcrust pastry

sieve flour – trap air – remove lumps – impurities
cut fat into small pieces – easier to rub in
rub fat into flour – thumbs over fingertips – coolest part of hand
lift hands high – to incorporate air – keep mixture cool
mixture should look like fine breadcrumbs – add cold water – all at once – measure accurately – mix with round-bladed knife – cool – draw pastry together with fingertips – stiff dough – not sticky
knead lightly – to avoid pressing out air – to form a smooth dough – leave in a cool place before rolling – to allow gluten to relax

12 points 2 points = 1 mark [6]

(c) Named dishes

meat / fruit pie – Cornish pasties – curry puffs – savoury slice – fruit flan – lemon meringue pie – jam tarts – quiche – sausage rolls – cheese straws etc.

4 points 2 points = 1 mark [2]

(d) (i) Pastry shrinks during baking

pastry stretched during rolling out
stretched during shaping / lining flan ring etc.
not allowed to rest before baking
2 points

(ii) Hard, tough pastry
conditions for making pastry not cool enough
fat not hard enough
fat melted during rubbing in
not enough air incorporated during preparation
heavy handling / kneading heavily / pressed too much when rolling
too much kneading developed gluten
pastry re-rolled too many times
too much water added to rubbed-in mixture – wrong proportions
too much flour for rolling out
pastry turned over during rolling etc.
2 points

4 points 2 points = 1 mark [2]

6 (a) Reasons for cooking
to make it safe to eat – bacteria in meat killed by heat
to destroy toxins – in red kidney beans – improve appearance
give hot food in cold weather – soup in winter etc.
reduces bulk of food – cooked green vegetables etc.
makes food more digestible – cooked starch digested more readily than raw
changes colour of food – meat from red to brown / brown crust
changes texture – egg sets on heating etc. – tenderises meat
change of flavour – meat extractives developed during cooking
add variety of foods – eggs can be poached, fried, boiled etc.
make new products – jam, pickles, condensed milk etc.
mix together different foods – cakes, sauces, casseroles etc.
preserves food – milk scalded, fruit made into jam etc.
smell stimulates digestive juices – curry, fried bacon etc.
removes excess fat
develops aroma
10 points 2 points = 1 mark [5]

(b) Advantages and disadvantages of frying
Advantages
quick method of cooking
saves fuel
food browns
deep frying gives even colour to foods
crisp surface
flavour developed
appetising smell
different types of frying – 2 methods – 1 point
- sautéing
- dry
- shallow
- deep
- stir-frying

if foods are coated juices are sealed in – prevents absorption of fat
coating holds fragile foods in shape – prevents breaking up etc.
high satiety value

Disadvantages
adds fat to product
increases calorific value of food
needs constant attention during cooking
can be a dangerous process
can be expensive to buy enough oil for deep fat pan
cannot cook large amounts at once
cannot leave unattended
fried food difficult to digest
unhealthy method of cooking – linked to CHD / obesity
can be difficult to judge temperature of fat
if too hot food will be overcooked on outside – raw inside
if too cool food will absorb oil – unappetising
needs skill for successful results
must strain oil when cool to remove crumbs of food
decomposing / burnt food gives bitter flavour to fried foods
burnt crumbs leave dark specks on food
10 points 2 points = 1 mark [5]

(c) Saving time when preparing and cooking family meals
collect ingredients and equipment required before starting to cook
read recipe carefully – wastes time constantly referring to books
use some raw dishes / courses – fruit salad / vegetable salad
make use of electrical equipment – mixer / blender etc.
microwave oven – pressure cooker – frying and grilling are quick methods
make use of convenience foods – e.g. frozen puff pastry
use soft margarine for creaming – quicker and easier
tenderise meat before cooking – use tender cuts – less cooking time – prepare and cook food in bulk – freeze some – saves time another day
make stews and casseroles – require little attention – fewer pans to wash
do not peel vegetables e.g. carrots, potatoes – scrub to remove soil
cook and serve in same dish – saves washing up
do not cook too much food – cook when required – no time spent on re-heating
one-stage method of making rich cakes
cut potatoes etc. into smaller pieces – cook quicker
lids on pans – cook quicker etc.
10 points 2 points = 1 mark [5]

7 (a) Meat is cooked by a moist method
fat melts – meat shrinks – muscle fibres contract – protein denatures
squeeze out extractives – pass into cooking water – flavour gravy – colour changes from red to brown – oxymyoglobin to haemochrome – B vitamins dissolve in cooking liquid – thiamin destroyed by heat – collagen – insoluble – changes to gelatine – soluble – easy to eat / chew
muscle fibres loosen – meat becomes tender – becomes firm – protein coagulates on heating – at 60°C etc.
10 points 2 points = 1 mark [5]

(b) A loaf of bread is baked

rises – warmth of oven encourages fermentation – carbon dioxide produced – [illegible] 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 – gluten stretches – forms crust – browns – crust lifts off / 'oven spring' – framework formed

as carbon dioxide continues to expand after shape has set – air replaces gas which has escaped – open texture – starch gelatinises – Maillard browning – reaction between protein and sugar etc.

10 points 2 points = 1 mark [5]

(c) Changes taking place when a roux sauce is made

fat melts – flour stirred into fat – fat is absorbed by starch grains – mixed to a paste – gentle heat cooks starch – sandy appearance – liquid added – absorbed by cooked starch – add gradually – to prevent formation of lumps – add liquid off heat – prevent lumps – becomes thin liquid when milk has been added – when heated – starch grains soften – swell – absorb liquid – boil – to cook starch – some starch grains rupture / burst – starch gelatinises – sauce thickens

10 points 2 points = 1 mark [5]

[Section B total: 45]

Section C

8 (a) <u>The answer may include the following knowledge and understanding.</u>

Principles of raising agents
gases expand when heated – mixture enlarges / expands / swells – steam has a larger volume than water – hot gases rise – push up mixture – heat sets risen shape – protein in other ingredients coagulates – e.g. egg, gluten in flour etc.

Air
gives a light texture – no change in colour – or flavour – must be introduced before cooking – expands on heating – sieving flour – air trapped between grains of flour – creaming fat and sugar – traps air as tiny bubbles – rubbing-in fat and flour – air trapped as mixture falls – whisking egg white – meringues – ovalbumin stretches – entangles 7 × own volume of air – whisking whole egg and sugar – traps less air – due to fat in egg yolk used in cakes
e.g. Swiss roll etc.
folding and rolling – flaky pastry / puff pastry – air trapped between layers – sealed to prevent air loss – expands on heating – pushes layers apart etc.

Carbon dioxide
bicarbonate of soda – with moist heat – gives off carbon dioxide – residue of sodium carbonate – washing soda – yellow colour – bitter flavour – used in dishes where this would be hidden – e.g. gingerbread etc.
bicarbonate of soda and cream of tartar – moist heat – produces CO_2 – colourless and tasteless residue – Rochelle salt – e.g. scones
bicarbonate of soda and sour milk – as above – acid + alkali – baking powder – contains correct proportion of bicarb. and cream of tartar
e.g. suet pastry, scones, cakes etc.
self-raising flour – plain flour + baking powder – as above – yeast – feeds on sugar – moisture – warmth – ferments sugar – produces alcohol – and CO_2 – continues under favourable conditions
heat of oven kills yeast – fermentation stops – e.g. bread etc.

Steam
used in mixtures with a high proportion of liquid – e.g. choux pastry, Yorkshire puddings etc. – hot oven – water changes to steam – larger volume than water – mixture rises etc. [15]

Mark Band	Descriptor	
High	– Candidate is able to name all gases – Candidate demonstrates a clear understanding of how gases are introduced – Good examples used to illustrate – Correct terminology used where appropriate – Candidate can state clearly how raising occurs and how shape is set – Comments are precise and are related to named examples – A clear understanding of the topic will be apparent	1
Middle	– The Candidate can name at least 2 gases – Can give a few examples of how gases are introduced – Factual information is sound but not always linked to specific examples – Information may be accurate but not all issues are considered – Scientific explanations rarely attempted	6–10
Low	– Candidate can give 1 or 2 examples of gases – Action of gases may be considered in simple terms – Fails to use correct terminology – Information will be general and lacking in specific detail – Limited knowledge of the topic will be apparent	0–5

(b) <u>The answer may include the following knowledge and understanding.</u>

<u>Reasons for following a vegetarian diet</u>
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.
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.

<u>Ways to ensure</u> <u>that vegetarians have enough HBV protein in their diet.</u>
may be able to eat HBV protein foods from animals – if lacto-vegetarian (eggs – milk – cheese – yoghurt etc.)
can 'complement' (or pair) protein foods – essential amino acids missing from one are supplied by the other
combine LBV protein foods in same meal – cereals / nuts / pulses e.g. beans on toast – lentil soup and bread etc.
combine HBV and LBV proteins in same meal e.g. scrambled egg on toast – egg fried rice
soya is only vegetable source of HBV protein
available in many forms – tofu – milk – flour – tempeh etc. (not oil)
TVP – spun to resemble meat fibres – shaped – chunks – sausages – mince
Quorn – mycoprotein – BUT contains egg white – not for vegans – available as mince – fillets – burgers – chunks etc.

Problems associated with vegetarian diets
may lack vitamin A – carotene in carrots / green vegetables etc.
vitamin D may be lacking – obtain from sunlight – vitamins A and D added to margarine
calcium – from pulses / nuts / green vegetables etc.
iron – green vegetables / pulses / dried fruit / cocoa etc.
B vitamins – bread / whole grain cereals / yeast extract
B_{12} lacking – yeast extract or tablets
fat – vegetable oil or nuts
bulky – may need more meals – reduce bulk of vegetables by cooking
monotonous – vary cooking methods – use herbs and spices
high NSP content – digestive problems etc. [15]

Mark Band	Descriptor	Part mark
High	– can probably identify 3 or 4 reasons for following a vegetarian diet – usually gives details of each reason – mentions several ways of including HBV in diet – illustrates answer with examples – is aware of several possible problems for vegetarians – explains how many of them can be addressed – information usually accurate – uses technical terms appropriately – all parts of the question addressed – answers are specific – points are usually explained well – sound knowledge of the topic will be apparent	11–15
Middle	– can identify 2 or 3 reasons for vegetarian diet – usually gives some detail of reasons – information is not always accurate – can identify several possible HBV foods – probably gives examples to illustrate – is aware of some of the possible problems – may indicate how they could be addressed – answers may be general – detail lacking in some areas – information tends to be superficial – technical terms not always appropriately used – not all points are explained well – some parts of question answered at length – at least one part will be considered briefly – gaps in knowledge will be obvious	6–10
Low	– can identify at least one reason for vegetarian diet – may not be able to give details – may list sources of HBV protein – little attempt to explain their suitability – information is general – may consist of lists of facts – little use of technical terms – not all information given is accurate – may not consider all parts of question – response to the question will probably be brief – limited knowledge of the topic will be apparent	0–5

[Section C total: 15]