**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

# MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

# 6065 FOOD AND NUTRITION

**6065/01** 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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UNIVERSITY of CAMBRIDGE
International Examinations

## Section A

**1 (a) (i)** Elements in protein
carbon – hydrogen – oxygen – nitrogen – phosphorus – sulphur
6 points 2 points = 1 mark [3]

**(ii)** Functions of protein
Growth
Maintenance
Repair
Energy
Body secretions / enzymes / antibodies / hormones
3 × 1 mark [3]

**(iii)** Definition of HBV protein
Contains **all** essential / indispensable amino acids 1 mark
In correct proportion / in sufficient amounts / enough 1 mark [2]

**(iv)** Examples of HBV protein
meat – fish – milk – cheese – eggs – soya – quorn
4 points 2 points = 1 mark [2]

**(v)** Definition of LBV protein
lacks **at least one** essential / indispensable amino acid
1 mark [1]

**(vi)** Examples of LBV protein
cereals (or 1 named example) – nuts (or one named example) – peas – beans – lentils – gelatine
(only credit 'pulses' if no examples are given)
4 points 2 points = 1 mark [2]

**(vii)** Digestion and absorption of protein

In the stomach, **hydrochloric** acid creates a suitable medium for the digestion of protein to begin. There are two enzymes in the stomach.

Pepsin converts protein to **peptones** / **peptides** / **polypeptides** and **rennin** clots milk.

In the duodenum, the enzyme **trypsin**, produced by the **pancreas** continues to convert protein to **peptones** / **peptides** / **polypeptides**.

In the ileum, the enzyme **erepsin**, from **intestinal** juice, completes the breakdown of protein to **amino acids**.

Absorption takes place in the ileum. Finger-like projections, known as **villi**, provide a large surface area. The end products of protein digestion are absorbed into **(blood) capillaries**. They dissolve in **blood** and are carried around the body.

12 points 2 points = 1 mark [6]

**(viii)** Excess protein
deaminated – in liver – nitrogen removed – to form urea – carried to kidneys – excreted as urine – remainder used for energy – or stored fat – under skin – adipose tissue – or around internal organs – may lead to obesity – CHD
6 points 2 points = 1 mark [3]

**(b) (i)** Functions of calcium
formation of teeth and/or bones
blood clotting
function of nerves
function of muscles
3 × 1 mark [3]

**(ii)** Sources of calcium
milk – cheese – yoghurt – or dairy food × 1 – bones of canned fish (or named example) – nuts (or named example) – hard water – green vegetables (or named example) – pulses (or named example)
4 points 2 points = 1 mark [2]

**(iii)** Deficiency disease
Rickets / Osteomalacia / Osteoporosis / Tetany [1]

**(c) (i)** Functions of vitamin D
absorption of calcium and/or phosphorus
formation of bones and/or teeth
2 × 1 mark [2]

**(ii)** Sources of vitamin D
liver – fish liver oil – oily fish (or named example) – egg – margarine – milk – cheese – butter – red meat
(Do **not** credit 'sunlight' – given in next part of question)
4 points 2 points = 1 mark [2]

**(iii)** Groups who do not benefit from sunlight
People who are house-bound / ill / elderly – not outdoors so not exposed to sunlight
Those who cover their body for religious reasons – although outdoors, sun cannot reach skin
People who live in industrial / polluted areas – sunlight prevented from reaching them by smoky atmosphere
People who live surrounded by high buildings – sun cannot reach them / always in shadow of buildings etc.
2 groups 2 × 1 point
2 explanations 2 × 1 point
4 points 2 points = 1 mark [2]

**(d)** Dietary needs of teenage girls
Protein – rapid growth / production of hormones / repair
Calcium – bones / teeth
Vitamin D – absorption of calcium
Iron – blood loss during menstruation / anaemia
Vitamin C – absorption of iron
Carbohydrate / starch – for energy
Vitamin B / Thiamine / Riboflavine / Nicotinic acid – energy production from carbohydrates / protein / fats
Small amount of fat – concentrated source or energy
6 nutrients from list above 6 × 1 point
6 explanations / reasons 6 × 1 point
12 points 2 points = 1 mark [6]

**[Total: 40]**

## Section B

**2** **(a)** protein – fat – iron – vitamin A / retinol – vitamin D / cholecalciferol – phosphorus – sulphur – vitamin B1 / thiamin – vitamin B2 / riboflavin – vitamin B12 / cobalamin (or vitamin B × 1)
6 × 1 point 2 points = 1 mark [3]

**(b)** Reasons for toughness
long muscle fibres – thick muscle fibres – meat from an old animal – muscles have had most movement – e.g. neck / leg – muscles well-developed – animal stressed before slaughter – contains a large amount of collagen / connective tissue – and gristle / elastin – incorrect cooking method sued – e.g. dry method for a tough cut of meat – overcooked – frozen meat not defrosted thoroughly before cooking etc.
4 points 2 points = 1 mark [2]

**(c)** Methods of tenderising meat before cooking
mince / cut into small pieces – score / shorten muscle fibres – slice – beat (with hammer / rolling pin) – hang – marinade / soak in wine / lemon juice / vinegar etc. – use enzymes / papain from papaya / bromalin from pineapple
(Do not credit use of commercial tenderiser.)
4 points 2 points = 1 mark [2]

**(d)** How tough meat becomes tender during cooking
moist method of cooking – e.g. stewing / braising / pressure cooking – moisture penetrates between muscle fibres – connective tissue / collagen – insoluble – converted to gelatine – soluble – muscle fibres fall apart
6 points 2 points = 1 mark [3]

**(e)** Processing soya to replace meat

**Advantages**
soya is HBV protein – contains all indispensable amino acids – only vegetable source of HBV protein – useful for vegans / vegetarians – more healthy than meat – low in fat – meat contains saturated fat – linked to CHD – cheaper than meat – no preparation – cooks quickly – without shrinking – takes flavours from other food – easy to transport – dehydrated – easy to store – light to carry – e.g. sausages / mince / chunks – softer texture than meat – can mix with meat to give a cheaper product – fortified with iron – no need to tenderise – and vitamin from B group – safer / no risk of animal diseases – e.g. BSE / bird flu etc.

**Disadvantages**
processed food – artificial additives may have been used – to preserve – flavour – colour – some people try to avoid additives – long-term effect not known – may not like texture – soak before cooking – no cooking aroma – does not taste like meat etc.

10 points (to include at least 2 points from each area)
2 points = 1 mark [5]

**3 (a)** Method, with reasons, of making and baking the cake.

CREAMING METHOD

beat / cream – fat and sugar – with wooden spoon / electric mixer – until light and fluffy – traps air – beat eggs – add gradually – beat well between each addition – prevents curdling – sift flour – trap air – remove lumps – and impurities – fold into mixture – with metal spoon – a little at a time – to prevent air being knocked out – soft dropping consistency

**OR**

ALL-IN-ONE METHOD

sift flour – trap air – add all other ingredients – beat – with wooden spoon / electric mixer – until smooth – about 2 minutes – to incorporate air

grease and line tin / grease and flour tin – to prevent sticking – preheat oven – so cooking begins immediately – gas mark 4 / 325°C / 160°C – 40–45 minutes – 20 minutes (2 tins) – 160°–180°C / 325°F–350°F – until golden brown / firm to the touch / springs back when pressed / shrunk from sides of tin / skewer comes out clean (max. 2) – cool on a wire cooling rack – to allow steam to escape

(Do not credit points on decoration.)

10 points 2 points = 1 mark [5]

**(b)** Variations

cocoa – coffee – lemon / orange – coconut – cherries – banana – carrot – chopped nuts / ground almonds etc. – currants / raisins / sultanas – vanilla essence – almond essence – pandan leaves etc.

2 points 2 points = 1 mark [1]

**(c)** Changes which take place when the cake is baking

fat melts – sugar melts – absorbed by starch – absorbs moisture – carbon dioxide produced – action of moist heat – softens – swells – on baking powder – gases expand – push up mixture – makes the cake rise – ruptures – open texture – water turns to steam – gelatinises – sugar on outside caramelises – starch dextrinises – Maillard browning – reaction of starch with protein – shape sets – coagulation of protein – shrinks – evaporation of water – crisp / crust / dry outer surface – browns etc.

8 points 2 points = 1 mark [4]

**(d)** Transfer of heat by convection and conduction

**Convection**

through gases – e.g. air in oven – air heated by gas or electricity – molecules become less dense – rise – colder molecules fall – they are then heated – create convection currents – until a constant temperature is reached – heat energy is transferred by the movement of the gas molecules – oven is heated – and heat is maintained – heat passes to solid cake tin – or oven shelf – which heats by conduction – etc.

**Conduction**

through solids – e.g. oven shelf – cake tin – or liquids – e.g. cake mixture becomes liquid when heated – by contact between molecules – molecules vibrate rapidly – neighbouring molecules vibrate – generate heat – pass heat to adjoining molecules – heat passes to all parts of cake – beginning at outside – where mixture touches tin –

10 points (at least 2 from each area) 2 points = 1 mark [5]

**4 (a)** Types of convenience food

frozen – peas – ice cream – fish fingers etc.
canned – peaches – salmon – baked beans etc.
dried – instant dessert – custard powder – stock cubes etc.
ready to eat – biscuits – potato crisps – meat pies etc.

3 types × 1 point 3 points
3 examples × 1 point 3 points
6 points 2 points = 1 mark [3]

**(b)** Advantages and disadvantages of convenience foods

**Advantages**

saves time – saves fuel – saves effort – easy to prepare – some of the preparation / cooking already done – easy to store – can shop less often – useful for emergencies – easy to carry – wide variety available – little waste – readily available in many stores – require little skill – may have extra nutrients added – may include cooking instructions – some products would be too complicated to prepare – less equipment needed – less washing up – can enjoy food from other countries – foods out of season – no need to buy each separate ingredient – longer storage – easier to store – compact / saves space etc.

**Disadvantages**

can be expensive – need to pay for packaging – small portions – may need to buy extra – or add other dishes to meal – increases cost – can be high in sugar – high in fat – high in salt – low in NSP – contain artificial additives – e.g. colourings – flavourings – preservatives – long term effects not known – some people allergic to certain additives – loss of cooking skills – nutrients lost may not be replaced – e.g. vitamin C – vitamins B and C may be destroyed by heat during processing etc. / nutritive value decreased

10 points (at least 2 points from each area) 2 points = 1 mark [5]

**(c)** Labour-saving equipment

| | | |
|---|---|---|
| electric hand mixer | creaming, whisking, making batter | |
| blender / liquidiser | batter, fruit puree, soup, baby food, breadcrumbs | |
| free-standing mixer | creaming, shortcrust pastry, whisking, dough | |
| processer | creaming, shortcrust pastry, yeast dough | |
| grinder | spices, chopping herbs | |
| hand-chopper | herbs, onions, mushrooms | |
| stick blender | soup, sauces | |
| mandolin | slicing vegetables | |
| dishwasher | cutlery, glass, crockery | |
| electric knife | slicing bread, meat | etc. |
| rice cooker | | |
| non-stick pans/tins | | |
| steamer | | |

**Not** microwave, deep fryer, pressure cooker, kettle

3 examples 3 × 1 point
3 uses 3 × 1 point
6 points 2 points = 1 mark [3]

**(d)** Safe use of electrical equipment

choose a reliable brand – covered by safety checks – have equipment serviced regularly – avoid twisting flex – may damage wires – dry hands – in case of electric shock – switch off at socket before removing plug – shock from pins as they are pulled out – switch off at socket before removing blades / beaters – switch off at appliance before removing blades / beaters – switch off after use – no trailing flexes – danger of tripping – read instructions for use / make sure of how to use – check that plugs are wired correctly – no bare wires exposed – plugs should not be broken / have screws missing – do not try to mend – needs a qualified electrician – do not overload sockets – danger of fire – damage to appliance – no fraying flexes – danger of fire – and electric shock – handle processor blade with care – extremely sharp – do not leave in washing up bowl – store safely – in protective cover – make sure fuse is correct size – or motor may be burnt out – do not leave electric deep-fat pan near edge of work-surface – child could pull at flex and overturn pan etc.

**Not** storage "out of reach of children"

8 points 2 points = 1 mark [4]

**5 (a)** Air as a raising agent

gives a light texture – no change in colour – or flavour – must be introduced before cooking – expands on heating – cold air expands more than warm air – sieving flour – air trapped between grains of flour – creaming fat and sugar – traps tiny bubbles of air – rubbing in fat and flour – air trapped as mixture falls into bowl – 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 – Swiss roll – folding and rolling – flaky pastry / puff pastry – air trapped between layers – sealed to prevent air loss – trapped air expands on heating – pushes layers apart etc.

10 points 2 points = 1 mark [5]

**(b)** Different uses of eggs

trapping air – whole eggs with sugar – in Swiss roll etc.
egg white – traps 7 x volume – ovalbumin stretches – meringue etc.
lightening – whisked egg white in mousse etc.
thickening – custard / sauce / soup – protein coagulates at 60°C
emulsifying – lecithin in egg yolk is emulsifying agent – mayonnaise etc.
binding – rissoles / fish cakes etc. – coagulation of protein
coagulation / setting – quiche / baked cake
coating – with breadcrumbs or flour – forms a seal around food – fish etc. – prevents absorption of fat / breaking up / protects from hot fat
glazing – white / yolk / whole egg – on pastries / bread – to give shine – and browns on heating – denaturation of protein
enriching – to sauces / soups / milk pudding – adds HBV protein
decorating / garnishing – hard-boiled egg in salads – separated egg white and egg yolk on dressed crab etc.
breakfast / main dish – boiled / poached / scrambled / omelette etc. – easily digested – quick to cook – source of HBV protein – clarifying – whisked egg white in consommé / mint jelly etc.
adding colour – sauces, potato, bread, etc.

10 points 2 points = 1 mark [5]

**(c)** Different uses of fats and oils
spreading on bread – lubricates food – easier to eat – butter etc.
frying – corn oil / sunflower oil / dripping
roux sauce-making – margarine / butter
aeration – margarine traps air when creamed with sugar in rich cakes – and when rubbing in with flour for shortcrust pastry
cake-making / pastry-making – hard fat holds layers apart in flaky / puff pastry
shortening – gives crumbly texture to shortcrust pastry
adding flavour – butter in rich cakes – dripping to baste meat etc.
improve keeping quality – rich cakes e.g. Christmas cake remain moist
sealing – melted butter / margarine on pate – to retain moisture – hard fat for rubbing in
adds calories without adding bulk – fried food
dressings – French dressing – moisture and flavour – colour – texture
forms and emulsion – mayonnaise
basting – adds moisture to meat cooked by dry heat / grilled / roasted etc.
glaze – on vegetables e.g. new potatoes / carrots / Brussels sprouts etc.
prevents sticking – cake tins / baking trays etc.
decorating – butter icing when mixed with icing sugar etc.
10 points 2 points = 1 mark [5]

**6 (a)** Reasons for preserving food
to extend shelf life / lasts longer / prevents spoilage
gives variety / different products made with one fruit / vegetable
easier to transport
enjoy food from other countries
use foods out of season
make uses of food when cheap
cope with a glut
prevents waste etc.
useful for emergencies
4 × 1 mark [4]

**(b)** Causes of food spoilage
yeast – moulds – bacteria – enzymes – loss of moisture
4 points 2 points = 1 mark [2]

**(c) (i)** Pasteurisation
milk heated to at least 72°C (162°F) – for at least 15 seconds – cooled rapidly – to not more than 10°C
**or**
heated to 63°C (145°F) – for 30 minutes – cooled rapidly
both { delays souring – makes safe to drink – destroys (harmful) bacteria
flavour not altered much

4 points 2 points = 1 mark [2]

**(ii)** UHT – Ultra Heat Treatment
milk heated to 132°C (270°F) – for not more than 1 second – cooled rapidly – packed into foil-lined containers – sealed – little change to colour – and nutritional value – kills bacteria – and spores – can be stored at room temperature – will keep for approx. 6 months – if unopened
4 points 2 points = 1 mark [2]

**(d)** Varieties of cheese

Cheddar – Cheshire – Wensleydale – Stilton – Lancashire – Cottage – cream cheese – Brie – Roquefort – Parmesan – Gouda – Edam etc.

4 points 2 points = 1 mark [2]

**(e)** Cheese-making process

milk heated – to 30°C (86°F)
bacteria added – to convert lactose to lactic acid / add lactic acid bacteria
reheated after 30 minutes
enzyme rennin (as rennet) added
curdles / milk clots – caseinogen coagulates with acid and rennet
forms curds and whey
curds cut – whey drained off
curd scalded to 30°C (86°F) – for 45 minutes – stirred
cut into small pieces
salt added to preserve
packed into moulds – sprayed with hot water
pressed hard for 24 hours
left to ripen – at 10°C (50°F)
develops flavour – smell – texture – colour

6 points 2 points = 1 mark [3]

**7 (a)** Accident prevention in the kitchen

carry sharp knives with point towards floor – keep arm at side of body – knife would fall to floor if knocked – pass scissors and knives with handle towards person receiving – all knives stored with blades facing in same direction – out of children's reach – in sheath – or knife block – point in cork – keep knife blades sharp – blunt knives more likely to slip – do not run – small area so difficult to avoid other people – wipe up spills immediately – in case of slipping and falling
turn pan handles towards back of stove – prevent knocking down – keep equipment within reach – avoid climbing – well lit kitchen – do not keep heavy items in tall cupboards – injuries if they fall
oven gloves for hot dishes – may drop and burn feet etc. – do not use tea towel instead of oven cloth – thin / dampness scalds
no trailing flexes from equipment – to prevent tripping – keep kettles, mixers etc. away from edge of bench – so children cannot pull them down – do not allow steam from kettle to point towards edge of bench – may be at face level for children
do not handle electrical equipment / plugs with wet hands – electric shock – do not wear open sandals etc. – no protection from knives / hot liquids etc. – no loose sleeves – may catch fire from gas flames – well-ventilated kitchen – long hair tied back – could catch fire / get tangled in mixer etc.
do not turn on gas before striking match – could be an explosion if delayed – do not overheat oil / have flames too high – can ignite – no flowing curtains near cooker – could catch fire from gas flames
do not store poisons in unlocked cupboards – or in kitchen – label all containers – do not store e.g. paraffin in lemonade bottle
nothing e.g. toys / bags on floor – no matches near flames
do not leave hot fat unattended etc.
(Can credit statements and explanations / reasons)

10 points 2 points = 1 mark [5]

**(b)** Personal hygiene

wash hands in hot, soapy water / before touching food – after visiting toilet – after touching raw meat / food etc. – or touching waste bin

dry on paper towel if possible – roller towels harbour bacteria – cross-contamination from towel to food

hair tied back – bacteria on hair / may fall into food

short, clean fingernails – bacteria collect underneath long nails – no nail varnish – chips and falls into food

do not lick fingers / touch face / or nose – bacteria pass to food

no coughing / sneezing over food – bacteria from mouth pass to food

clean apron / overall – bacteria breed on food left on clothing

no smoking – do not cook if ill – pass bacteria to others

cover cuts with waterproof dressing – bacteria from blood to food

no outdoor clothing / shoes in kitchen – do not touch pets in kitchen

no jewellery – bacteria collect – difficult to remove – pass to food

(Can credit statements and explanations / reasons)

10 points 2 points = 1 mark [5]

**(c)** Storage of perishable foods

meat / fish in cool place – refrigerator – 1°C–7°C – cover – clean container – dry container – to prevent cross-contamination – raw meat at bottom of refrigerator – to prevent blood dripping onto other (cooked) food

keep left-overs covered and in a cool place – ideal temperature for bacteria – use within 24 hours

cold temperature / refrigerator slows down growth of bacteria – but does not destroy – food will still become dangerous – and unfit to eat – note 'use by' dates on packaging – use in rotation

store eggs with rounded end up – keeps chalazae in place – away from strong-smelling food – absorbs odour through porous shell

do not mix old and new milk – bacteria from old pass to new – sours more quickly – bacteria breed quickly in liquid foods

freeze meat / fish etc. – growth of bacteria stopped – at –18°C – wrap / cover in waterproof material – to prevent drying of surface – label with name and date – use in rotation

green vegetables wrapped in paper – cool place – to prevent wilting – root vegetables in ventilated place – prevents moulds – potatoes in dark place – to prevent sprouting etc.

(Can credit statements and explanations / reasons)

10 points 2 points = 1 mark [5]

**[Total: 60]**