

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

**MARK SCHEME for the June 2005 question paper**

<b>0648 FOOD AND NUTRITION</b>	
0648/01	Paper 1 (Theory), maximum 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 initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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*.

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**Grade thresholds** for Syllabus 0648 (Food and Nutrition) in the June 2005 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	100	64	43	29	25

The threshold (minimum mark) for B is set halfway between those for Grades A and C.  
The threshold (minimum mark) for D is set halfway between those for Grades C and E.  
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.

Grade A\* does not exist at the level of an individual component.

June 2005

IGCSE

MARK SCHEME

MAXIMUM MARK: 100

SYLLABUS/COMPONENT: 0648/01

FOOD AND NUTRITION  
(Theory)

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## Section A

## 1 (a) functions of protein

growth - repair - maintenance/renewal - energy - manufacture of antibodies/enzymes/hormones

4 x 1 mark

[4]

## (b) (i) animal protein

meat - fish - cheese - eggs - milk - gelatine

4 points

2 points = 1 mark

[2]

## (ii) plant protein

pulses (or maximum two examples) - cereals (or maximum two examples) - nuts (or maximum two examples) -  
soya - Quorn

4 points

2 points = 1 mark

[2]

## (c) (i) HBV protein

contains **all** essential/indispensable amino acids

1 mark

[1]

## (ii) LBV protein

lacks **at least one** essential/indispensable amino acid

1 mark

[1]

## (d) complementary proteins

mixture of HBV and LBV protein - e.g. rice pudding, scrambled egg on toast etc. or LBV and LBV protein - e.g. beans on toast, lentil soup and bread roll etc. - in same meal - essential amino acids lacking in one can be compensated by the other - to form HBV protein - improves supply of essential amino acids

6 points

2 points = 1 mark

[3]

## (e) protein deficiency

marasmus - in children under 1 year - muscle wasting - thin arms/legs - weak - death - muscles need energy for basic functions

kwashiorkor - retarded growth - chronic diarrhoea - severely underweight - wasting of muscles and organs - too small/weak to function - thin limbs and face - oedema - swollen abdomen - dry skin - fine, reddish hair - personality change/moodiness

6 points

2 points = 1 mark

[3]

## (f) excess protein

deamination - in liver - nitrogen removed - ammonia - excreted as urea - toxic - protein cannot be stored - remainder used for energy - or stored as fat

6 points

2 points = 1 mark

[3]

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**(g) (i) digestion of protein**

in the stomach - pepsin - with  $HCl$  - from gastric juice - converts proteins to peptides/polypeptides - rennin - clots milk - in the duodenum - trypsin - from pancreatic juice - converts protein to peptones - in the ileum - erepsin - from intestinal juice - converts peptones to amino-acids -

14 points

2 points = 1 mark

[7]

**(ii) absorption of protein**

absorbed in villi - in small intestine/ileum - carried in bloodstream - to liver

2 points

2 points = 1 mark

[1]

**2 (a) sources of vitamin C**

brussel sprouts or green leafy vegetable - tomatoes - oranges/lemons/grapefruit/limes or citrus fruit - kiwi fruit - blackcurrants - strawberries - mango - melon -papaya - guava etc.

4 points

2 points = 1 mark

[2]

**(b) functions of vitamin C**

healing wounds - healthy gums - maintenance of connective tissue - formation of collagen - growth - building bones/teeth - absorption of iron - production of blood - production of walls of blood vessels - building/maintenance of skin - resistance to infection - antioxidant etc.

4 points

2 points = 1 mark

[2]

**(c) deficiency of vitamin C**

scurvy

1 mark

[1]

**(d) symptoms of scurvy**

bleeding gums - loose teeth - slow healing of wounds and fractures - weakness/fatigue - pain in joints/muscles - weight loss etc.

4 points

2 points = 1 mark

[2]

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### 3 choice and cooking of foods for a very active person

1/3 energy from fat - less bulky  
 extra fluids - replace water lost in sweat  
 salt - replace salt lost in sweat  
 cook vegetables - reduces bulk  
 avoid junk food - excess fat/sugar  
 include pasta, rice etc. - carbohydrate for energy  
 nuts, pulses - include starch and fat - variety - additional calories  
 spread energy foods throughout day - energy released throughout the day  
 avoid heavy meals - difficult to digest when working -  
 fry some foods - adds fat without adding bulk -  
 substantial breakfast - begin metabolism - energy released -  
 carbohydrate from starch - sugar linked to diabetes and tooth decay -  
 include B vitamins - to release energy from carbohydrates/fats/amino acids  
 not too much NSP - bulky - filling - may reduce intake of other foods - etc.

6 well-explained points    6 x 1 mark    [6]

Total: 40 marks

### Section B

#### 4 (a) nutrients in eggs

protein - fat - iron - vitamin A - riboflavin - cobalamin/vitamin B<sub>12</sub> - niacin - (allow vitamin B once) - vitamin D

6 points    2 points = 1 mark    [3]

#### (b) uses of eggs

main dish - boiled, scrambled, fried, poached, omelette  
 setting - quiche, baked egg custard  
 thickening - lemon curd, egg custard  
 coating - fish, Scotch egg  
 decorating - royal icing  
 emulsifying - mayonnaise, rich cakes  
 raising agent/trapping air - whisked sponge  
 lightening - mousse, soufflé, meringues  
 browning surface - bread, pastry  
 glazing - pastry, bread  
 binding - rissoles, fish cakes, croquettes, rich pastry, marzipan  
 enriching - sauces, milk pudding, mashed potatoes  
 garnishing - hard boiled egg in salad, egg in soup

5 uses + examples    5 x 1 mark    [5]

#### (c) storage of eggs

cool - round end upwards - away from strong smells - not washed before storage - freeze yolk and white separately - 5° C

4 points    2 points = 1 mark    [2]

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**(d) changes during boiling**

egg white/albumen sets - protein coagulates - 60° C (140° F) - becomes opaque - yolk thickens - 70° C (15° F) - becomes dry/rubbery - when overcooked - less digestible - green/black ring forms around yolk - iron sulphide - sulphur in white + iron in yolk

10 points

2 points = 1 mark

[5]

**5 (a) flaky pastry method with reasons**

sift flour	to aerate - remove lumps
cut fat into quarters	each quarter added separately
rub in quarter of fat	fingertips - coolest part of hand
lift hands above bowl	aerate - cool fat
add cold water all at once	to make an even texture - soft dough
mix with round-bladed knife	keeps everything cool
knead	to develop elasticity of gluten
roll to oblong 3 x width	leaves a square when folded
keep corners square	to form same number of layers throughout
dot 1/4 fat onto 2/3 pastry	
fold bottom 1/3 up and top 1/3 down	to form a double 'sandwich'
keep corners square	same number of layers throughout
seal edges	prevent loss of air
turn pastry half a turn to right so rolling will be in opposite direction	
repeat rolling and folding	adding another 1/4 fat each time - increase number of layers
chill pastry	allows fat to harden - cools trapped air gluten relaxes - regains elasticity - easier to roll

any 12 points

2 points = 1 mark

[6]

**(b) choice of fat and flour for flaky pastry**

plain flour/do not use self raising flour	air is raising agent
strong flour	high gluten content - elastic dough
wholemeal/brown flour	adds NSP - fat - flavour vitamin B - calcium
hard margarine	for colour - flavour - does not melt - cheaper
butter	for colour - flavour - does not melt
lard	gives shortness - but lacks colour and flavour
mixture of lard and margarine	combines shortening power with colour and flavour

10 facts (names of ingredients and qualities)

1 mark for each 2 facts

[5]

**(c) dishes using flaky pastry**

meat pie, sausage rolls, Eccles cakes, cream horns, vanilla slices, apple turnovers etc.

any 4

1 mark for each 2 uses

[2]

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**(d) rules for rolling pastry**

do not turn pastry over  
roll in one direction  
turn pastry round for even rolling  
do not overhandle  
not too much flour for dredging  
use short, forward strokes  
avoid pressing down on pastry  
do not stretch pastry  
lift pastry on rolling pin to turn  
do not roll too many times  
roll to an even thickness

4 points

2 points = 1 mark

**[2]****6 (a) saturated fats**

hold maximum hydrogen atoms - molecule has only single bonds - (can include diagram) - usually animal fat - (e.g. butter, cheese, cream, red meat - maximum 2 examples) - hydrogenated vegetable oils - hard fats - solid at room temperature - stable - better to avoid animal fats - may contain cholesterol - deposited in arteries - narrows lumen - strokes - hypertension - CHD (coronary heart disease) - etc.

10 points

2 points = 1 mark

**[5]****(b) non-starch polysaccharide (NSP)**

cellulose - insoluble - cell walls of plants - 30 g per day - indigestible - (e.g. wholegrain cereals, fruit skins, leafy vegetables, etc. - maximum 2 examples) - absorbs water - adds bulk to faeces - softens - easier to eliminate - stimulates peristalsis - prevents constipation - cancer of colon, diverticular disease, haemorrhoids, varicose veins, hernia etc. (maximum 2) - reduces cholesterol - binds food residues - aids removal of toxins - gives feeling of fullness - limits intake of other nutrients etc.

10 points

2 points = 1 mark

**[5]****(c) water**

70% body - vital to life - protoplasm in cells - important constituent of body fluids - blood, saliva, lymph, sweat, digestive juices (maximum 2 examples) - required in metabolic reactions - keeps mucous membranes moist - nutrients dissolve for absorption - lubricates joints and membranes - cool - needed to maintain body temperature - prevents dehydration - which can cause headaches - lethargy - needed during lactation for milk production - lost when temperature is high/fever - or when level of activity is high - or when weather is hot - 2 or 3 litres needed daily - to maintain water balance - e.g. fruit, beverages, soups etc. - flushes out toxins - need to replenish - water balance - osmoregulation - maintain cell concentration - prevents constipation - absorbed by NSP (maximum 2) etc.

10 points

2 points = 1 mark

**[5]****Total: 45 marks**



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7 (a)	Mark bands	Descriptors	Part mark
	High	<ul style="list-style-type: none"> <li>- The candidate is able to give reasons for spoilage</li> <li>- can give conditions for multiplication of micro-organisms</li> <li>- is able to give precise information on food storage</li> <li>- many methods of preservation described</li> <li>- named examples given to illustrate methods</li> <li>- specific terminology is used where appropriate</li> <li>- explanations for methods usually included</li> <li>- demonstrates a sound understanding of some of the processes described</li> </ul>	11-15
	Middle	<ul style="list-style-type: none"> <li>- The candidate can give some of the reasons for food spoilage</li> <li>- may be able to state some of the conditions required for multiplication of micro-organisms</li> <li>- a few examples of methods of preservation named</li> <li>- factual information is sound but not always linked to examples to illustrate methods</li> <li>- information given may be accurate but not all issues are considered</li> </ul>	6-10
	Low	<ul style="list-style-type: none"> <li>- The candidate may give one or two causes of food spoilage</li> <li>- may be able to give at least one condition for multiplication of bacteria</li> <li>- possible facts on storage of food</li> <li>- the information will be general and lack specific detail</li> <li>- few examples will be given to illustrate methods</li> <li>- limited knowledge of the topic will be apparent</li> </ul>	0-5

The answer may contain the following knowledge and understanding.

#### causes of food spoilage

yeasts - moulds - bacteria - enzyme action named bacteria e.g. salmonella - listeria - botulism - e.coli etc.

#### conditions for food spoilage

warmth - moisture - time - suitable pH - oxygen (N.B. **not** 'food' - given in question)

#### storage of dry goods

cool - dry - prevents growth of moulds - weevils - moisture causes lumps - airtight - covered to prevent insects - use in rotation - follow expiry dates etc.

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### storage of foods in refrigerator

cover	prevents drying - prevents absorption of smells
do not over-pack	must allow cold air to circulate
clean containers	reduce risk of cross-contamination
raw meat at bottom	so juices cannot drip onto other foods
raw and cooked foods separate	prevent cross-contamination
keep temperature 1° C - 7° C	slow down bacterial growth
temperature must not be below 1° C	water would freeze and spoil texture of food
do not freeze food in ice-box	temperature not low enough - large ice crystals
fruit and vegetables in crisper	not too cold - will retain moisture/crispness
use in rotation	food should be used when in best condition
check expiry dates	food unsafe if beyond 'use by' date etc.
do not mix old and new foods	bacteria pass to new foods - reduce keeping time

### storage of food in freezer fruit, vegetables, fish, cakes, bread

freeze quickly - formation of small ice crystals - do not damage cell walls  
 airtight packaging - prevents evaporation of water - dries surface  
 seal tightly - keep air out  
 must be below -18 C - bacteria dormant  
 store in useable quantities - no need to defrost more than required etc

### chilling ready meals

products cooked and sealed in packages - stored below 4° C - slows down growth of bacteria -  
 listeria can still thrive - danger to pregnant women - e.g. ready meals

### jam-making fruit

high sugar content - 60% added sugar - water withdrawn from cells - by osmosis - cell contents  
 too concentrated for bacterial activity - heat destroys bacteria - e.g. fruit

### pickling vegetables, fruit, fish

salt to cover food - draws water from cells - by osmosis - use of acid - to replace water removed  
 from cells - inhibits bacterial growth - unsuitable pH - e.g. vegetables and fruit

### pasteurisation milk

72° C (162° F) - 15 seconds      **OR**    63° C (145° F) - 30 minutes  
 cooled rapidly - to not more than 10° C - destroys harmful bacteria - e.g. milk

### ultra heat treatment (UHT) milk

heated to 132° C - for not more than 1 second - packed in foil-lined containers - sealed

### bottling and canning fruit, milk, vegetables, fish

heat destroys bacteria - sealed to prevent further entry of bacteria

### drying fruit, meat, fish

water removed - bacteria cannot multiply without water

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**salting**

water removed by osmosis - micro-organisms need water to grow

**smoking**

salt removes water - phenols from smoke deposited on surface of food - inhibits growth of micro-organisms

**accelerated freeze drying (AFD)** e.g. coffee, fruit, vegetables etc.

**Irradiation** spices, strawberries etc.

**vacuum packed** no air

**artificial additive** preservatives, nitrates, SO<sub>2</sub>

**modified atmosphere packaging (MAP)**

7	(b)	Mark bands	Descriptors	Part mark	Total
		High	<ul style="list-style-type: none"> <li>- The candidate is able to mention different methods of frying</li> <li>- usually illustrates methods with examples</li> <li>- can give some advantages and disadvantages</li> <li>- may mention health risk associated with frying</li> <li>- can explain how to carry out the process</li> <li>- comments are precise and are related to examples</li> <li>- dangers of frying</li> <li>- safety points discussed</li> <li>- specific terminology used where appropriate</li> <li>- demonstrates a clear understanding of the nature of frying</li> </ul>	11-15	15
		Middle	<ul style="list-style-type: none"> <li>- can mention at least one method of frying</li> <li>- a few advantages and disadvantages stated</li> <li>- factual content is sound but not always linked to examples of methods</li> <li>- information given may be accurate but not all issues are considered</li> <li>- can give some safety points</li> <li>- may not consider health risks</li> </ul>	6-10	
		Low	<ul style="list-style-type: none"> <li>- The candidate can give one or two methods but does not always give examples</li> <li>- information is general and lacks specific detail</li> <li>- may not consider all factors linked to frying</li> <li>- few explanations, if any, to support facts</li> <li>- limited knowledge of the topic will be apparent</li> </ul>	0-5	

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The answer may include the following knowledge and understanding.

### types of frying

dry frying - no fat added - for foods containing fat - may coat with flour/oatmeal - to absorb fat as it is released - food needs to be turned - etc. e.g. bacon, sausage, herring, tuna, salmon etc.

shallow frying - fat comes half way up food - needs turning - used for thin pieces of food - not necessary to coat - food with water splatters so may need lid - e.g. liver, fish cakes, mushrooms, eggs, chops, butter etc.

deep frying - fat covers food - needs coating - dry food first - to prevent splashing - no turning - e.g. Scotch eggs, fish, chips, doughnuts, fritters, onion rings etc.

### reasons for coating with batter, egg and breadcrumbs, pastry

holds shape of food/prevents breaking  
prevents absorption of fat  
protects food from heat of fat/prevents burning

### advantages of frying

quick - adds calories without bulk - adds flavour - browns - crisp texture

### disadvantages of frying

more difficult to digest - needs constant attention - more dangerous

### health problems which may be associated with frying

animal fat e.g. lard is saturated - contains cholesterol - sticks to inner walls of arteries - narrow - blocks - linked to coronary heart disease/heart attacks - strokes - excess fat stored as body fat - obesity - hypertension - loss of self-esteem - breathlessness - complication during surgery - lethargy etc.

### safety rules

never leave unattended  
not more than 1/2 full  
do not overheat fat  
do not put too much food in pan  
dry pan/equipment/food  
pan handle turned in  
back burner if possible  
lower food gently  
do not overheat fat  
have a lid ready  
do not move pan until fat is cold  
no kettle or other water nearby

oil may catch fire  
so fat will not overflow when food is added  
may ignite  
may overflow/difficult to turn without spilling oil  
prevent 'spitting' - splashing oil causes burns  
so will not be knocked when passing  
less chance of knocking over  
to avoid splashing if dropped  
may ignite  
to extinguish flames  
may catch fire again  
water will make fat spit etc.

### fat temperature too hot

outside cooks quickly - inside not properly cooked - unattractive if outside over browned - danger of food poisoning if inside not thoroughly cooked - must reach 70° C - bitter flavour when overcooked etc.

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**fat temperature too low**

outside surface not sealed - protein not coagulated - in egg - starch in flour - not gelatinised  
soon as food enters oil - oil absorbed by food - unappetising - difficult to digest etc.

**other points to consider when frying**

absorbent paper after frying - to soak up surplus fat  
use fat with high smoke point - will not decompose before correct temperature is reached  
must be able to be heated to 200° C (400° F) without burning  
test temperature with sugar thermometer  
vegetable oils and lard are suitable  
butter and margarine can be used for shallow frying - frying temperature lower  
use strong pan with flat base - steady on stove  
thermostatically controlled electric fryer can be used - controls temperature automatically etc.  
replace oil from time to time  
sieve out crumbs - decompose - black specks affect flavour