

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2008 question paper**

**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.

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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- 1 (a) **Elements in carbohydrate**  
carbon – hydrogen – oxygen  
3 × 1 mark [3]
- (b) **Uses of energy**  
mechanical energy – movement / work (or examples)  
chemical energy – metabolism / digestion / absorption  
heat energy – maintain body temperature  
electrical energy – transmission of nervous impulses  
basal metabolism – heartbeat / blood circulation / breathing, etc.  
credit general use or one example  
4 × 1 mark [4]
- (c) bacteria – act on sugar on teeth – forms plaque –  
sugar converted to acid – dissolves enamel – tooth decay – diabetes  
gum disease – bad breath  
excess sugar converted to fat – stored – under skin – adipose tissue –  
around internal organs – obesity – CHD – low self-esteem – breathlessness – lethargy  
(8 points) (2 points = 1 mark) [4]
- (d) **Digestion in the mouth**  
ptyalin / amylase – from salivary glands – acts on **cooked** starch –  
converts starch to maltose
- In the duodenum**  
amylase – from pancreatic juice – converts starch to maltose
- In the ileum**  
lactase – acts on lactose – converts it to glucose – and galactose  
maltase – acts on maltose – converts it to glucose  
invertase / sucrase – acts on sucrose – converts it to fructose – and glucose  
enzymes secreted by intestinal juice  
(12 points to cover all areas) (2 points = 1 mark) [6]
- (e) **Importance of NSP**  
absorbs water – swells – softens faeces – making it bulky – helps remove waste –  
easier to expel – stimulates peristalsis – absorbs toxins – regularly binds waste –  
lowers cholesterol – prevents constipation – reduces blood sugar  
hernia – cancer of colon – diverticular disease – haemorrhoids  
(max. 2 e.g. from line above)  
(8 points) (2 points = 1 mark) [4]
- (f) **Sources of NSP**  
green vegetables (or named e.g.) – fruit skins and seeds (or named e.g.)  
nuts – pulses (or named e.g.) – rhubarb – celery – potato skins – dried fruit –  
wholegrain breakfast cereal – brown rice – wholemeal pasta – fruit and vegetables –  
wholemeal bread (not brown bread) – wholemeal flour – oats – bran  
(4 examples (avoiding repetition)) (2 examples = 1 mark) [2]

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**2 (a) Vitamin C (Ascorbic acid)**

**FUNCTIONS**

to make connective tissue – heals wounds  
 absorption of iron – antioxidant  
 helps to build strong bones and teeth  
 production of blood / walls of blood vessels  
 build / maintain healthy skin  
 growth  
 (4 points)

**SOURCES**

citrus fruit (or 1 named example e.g. orange – lemon – lime – kiwi fruit, etc.)  
 rose hips – blackcurrants – melon – strawberries – green peppers – tomatoes, etc.  
 green vegetables (or 1 named example e.g. cabbage – spinach – lettuce – broccoli, etc.)  
 (3 points)

**DEFICIENCY DISEASE**

scurvy  
 (1 point)

(8 points) (2 points = 1 mark)

[4]

**(b) Iron**

**FUNCTIONS**

formation of haemoglobin  
 red pigment in blood  
 transport oxygen to cells  
 for production of energy  
 transport carb-oxyhaemoglobin to lungs  
 (4 points)

**SOURCES**

liver – kidney – corned beef – cocoa / plain chocolate –  
 curry powder – treacle – pulses – dried fruit (or named example) –  
 egg yolk – green leafy vegetables (or named example)  
 (3 points)

**DEFICIENCY DISEASE**

anaemia  
 (1 point)

(8 points) (2 points = 1 mark)

[4]

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**3 (a) Reasons for following a vegetarian diet**

religion – Jews do not eat pork / Hindus avoid beef, etc.  
 object to slaughter of animals – animal rights – think it is cruel, etc.  
 uneconomical use of land – expensive to rear animals – more crops could be grown if land was used for cereals, etc.  
 dislike taste / texture of animal flesh  
 believe vegetarian diet is more healthy – animal fat is saturated / contains cholesterol  
 animal products are more expensive than plant products – cereals / pulses cheaper than meat  
 peer pressure – follow trends  
 family upbringing – brought up to follow certain dietary pattern, etc.  
 (6 points) (2 points = 1 mark)

[3]

**(b) HBV protein in a vegetarian diet**

lacto-vegetarians – can have eggs – cheese – milk (max. 2 e.g.)  
 can combine 2 LBV protein foods – pulses – cereals – nuts – (max. 2 e.g.)  
 IAA's missing in one will be compensated by other  
 e.g. beans on toast / lentil soup and bread / rice and peas (1 e.g.)  
 can combine HBV and LBV proteins – quality of LBV protein improved  
 e.g. egg on toast / cereal and milk / cheese scones (1 e.g.)  
 soya – HBV from plant source –  
 soya products – flour – milk (not oil or soy sauce)  
 TVP – meat substitute – texture resembles meat –  
 e.g. mince / sausages / chunks (max. 2 e.g.)  
 (12 points) (2 points = 1 mark)

[6]

**[Section A Total: 40 marks]**

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## SECTION B

### Q4 (a) Points to consider when planning meals

time of year – hot food in cold weather, etc. – religion – special diet/vegetarian  
 foods in season – garden produce –  
 availability of food – food in stock – closeness of shops –  
 ages of those having the meal  
 variety of colour –  
 variety of flavour –  
 variety of texture –  
 occasion – packed meal / Christmas lunch / birthday party, etc. –  
 both courses in same plane – not a complex first course and simple dessert –  
 money available –  
 time available – use of convenience foods – less time but more expensive  
 equipment available – use of labour-saving equipment – microwave –  
 skill of cook –  
 individual likes and dislikes –  
 activities of those eating meal – manual workers need more energy foods  
 state of health of those eating meal, etc.

**NB – do not credit points relating to nutrients**

(6 points) (2 points = 1 mark)

[3]

### (b) Nutritional requirements of elderly

fewer carbohydrate foods – less active  
 protein needed – repair worn out cells  
 iron – to prevent anaemia  
 vitamin C – to absorb iron  
 calcium / phosphorus – maintain bones / teeth – blood clotting – muscle function  
 vitamin D – to absorb calcium  
 reduce fat – reduce risk of obesity / CHD  
 reduce sugar – link to diabetes  
 reduce salt – risk of hypertension / high blood pressure

(12 points) (2 points = 1 mark)

[6]

### (c) Importance of fresh fruit and vegetables

vitamin C – not stored – daily supply needed – for prevention of scurvy / healthy skin /  
 absorption of iron, etc.  
 vitamin A – mucous membranes / visual purple / prevents night blindness, etc.  
 iron – green veg – pulses – prevent anaemia  
 carbohydrate – starch and sugar – energy  
 calcium – bones and teeth – green veg  
 NSP – peristalsis / makes faeces easier to expel / prevents constipation, etc.  
 water – quenches thirst – prevents dehydration / body fluids / keeps body cool / eliminates  
 waste, etc.

**NB – allow only one function of each nutrient**

no fat (except avocado) – filling – helps to avoid sugary / fatty snacks –  
 provide variety of colour – flavour – texture – examples to illustrate –  
 many dishes can be made – soup / drinks / accompaniments / salads, etc.  
 (max. 3 uses of fruit and vegetables)

can be eaten raw or cooked – useful snack foods – easy to carry – easy to eat, etc.

(12 points) (2 points = 1 mark)

[6]

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**5 (a) Coagulation**

heat on protein – begins at 60 °C – cannot be reversed –  
 hardens / sets – chemical structure changes –  
 overheating causes protein to shrink – e.g. syneresis when scrambled egg is overcooked or  
 baked egg custard is overcooked  
 e.g. boiled egg, baked egg custard, quiche, baked bread, skin on boiled milk,  
 coating on fried fish, etc.  
 (6 points (must include **one** example)) (2 points = 1 mark) [3]

**(b) Fermentation**

yeast – produces carbon dioxide – and alcohol – with food / sugar –  
 moisture – warmth – time –  
 enzymes bring about fermentation process –  
 amylase – in flour – changes starch to maltose –  
 maltase – in yeast – changes maltose to glucose –  
 zymase – in yeast – changes glucose to carbon dioxide and alcohol  
 e.g. bread making  
 (6 points (must include **one** example)) (2 points = 1 mark) [3]

**(c) Gelatinisation**

moist – heat – on starch – grains soften – swell – absorb water –  
 some rupture – releasing starch granules – liquid thickens – irreversible –  
 e.g. roux sauce, custard, boiled rice, etc.  
 (6 points (must include **one** example)) (2 points = 1 mark) [3]

**(d) Hydrogenation**

makes fat solid – from liquid oil – e.g. sunflower / soya – unsaturated fats –  
 become saturated fats – can take up hydrogen – breaks double bond – using a nickel  
 catalyst – can stop at any time –  
 to achieve degree of hardness required – hard margarine more saturated –  
 soft / spreading margarine less saturated –  
 e.g. margarine, cooking fats  
 (6 points (must include **one** example)) (2 points = 1 mark) [3]

**(e) Pasteurisation**

heat – destroys harmful bacteria – e.g. those causing tuberculosis – and souring bacteria –  
 lasts longer –  
 does not prevent decay –  
 72 °C / 162 °F – for 15 seconds **or**  
 62 °C–65 °C / 145 °F – for 30 minutes  
 rapid cooling – to prevent bacterial growth – little change to nutritive value – e.g. milk  
 (6 points (must include **one** example)) (2 points = 1 mark) [3]

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- 6 (a) (i) Kneading**  
develops gluten – protein – in flour – forms elastic dough –  
stretches during rising – traps carbon dioxide – smooth dough –  
distributes yeast – aerates dough – stimulates action of yeast –  
breaks down large bubbles of gas – for even texture of finished dough –  
use knuckles / heel of hand for large amounts – fingertips for small pieces –  
(6 points) (2 points = 1 mark) [3]
- (ii) Proving**  
warm place – just before baking – after dough has been shaped –  
too much heat kills yeast – dough will not rise – left for some time –  
cold place / refrigerator does not kill yeast – slows down process –  
but can prove overnight in refrigerator –  
replaces carbon dioxide – lost during kneading – dough doubles in size –  
avoid over-proving – dough will collapse – cannot recover  
(6 points) (2 points = 1 mark) [3]
- (b) Choice of flour for bread making**  
strong / hard flour – high gluten content – from spring wheat –  
e.g. Canadian – more than 10% protein – allows dough to stretch –  
plain flour – yeast is raising agent –  
wholemeal flour – adds colour – ‘nutty’ flavour – B vitamins – NSP –  
has less gluten – gives closer texture – more difficult for yeast to raise –  
(8 points) (2 points = 1 mark) [4]
- (c) Changes when bread is baked**  
rapid rising – enzymes work quicker with heat –  
more carbon dioxide produced – warmth encourages fermentation –  
alcohol produced – water changes to steam – more raising action –  
gluten stretches – gases expand when heated – heat kills yeast –  
no further carbon dioxide produced – gases continue to expand –  
with continued heat – gluten coagulates – around bubbles of gas –  
at 73 °C – gluten is protein – alcohol evaporates –  
vaporises below boiling point of water – carbon dioxide diffuses out –  
heat causes gases to rise on expansion – starch gelatinises –  
action of moist heat on starch – crust forms on outside –  
dry heat on starch – crust lifts off as gases continue to expand –  
‘oven spring’ – browns on outside – dextrinisation of starch –  
caramelisation of sugar – Maillard browning  
(10 points) (2 points = 1 mark) [5]

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### Section C

#### 7 High levels of bacteria in food can cause food poisoning.

Discuss ways of preventing food poisoning when storing, preparing and cooking food.

[15]

The answer may include the following knowledge and understanding.

#### Conditions for growth of bacteria

warmth – moisture – food – time – suitable pH – some require oxygen

#### Symptoms of food poisoning

vomiting – diarrhoea – headache – tiredness / exhaustion – abdominal pain – fever – double vision –

#### Storing food

clean containers – cool place / refrigerator – covered – especially high risk foods – e.g. meat / fish / milk / eggs – to prevent cross contamination – use in rotation – check ‘use by’ dates – fresh meat / fish – use on day of purchase – follow storage instructions – cool leftover food rapidly – use within 24 hours – keep raw and cooked food separate – raw meat at bottom of fridge – so drips do not fall onto other foods – check containers regularly – weevils / rats / mice, etc. – grain off floor – dry place – prevent multiplication of bacteria – check cans for bulges – indicates seal has been damaged – bacteria entered – food still spoils in refrigerator – action of bacteria slower – do not thaw then refreeze food – bacteria will have multiplied in warmth – bacteria dormant in freezer – spoilage halted, etc.

#### Preparing food

wash hands – after toilet / raw meat / vegetables with soil – avoid cross-contamination – no coughing / sneezing over food – do not cook if ill – so bacteria are not passed to others – tie back / cover long hair – bacteria from hair could get into food – no long fingernails – dirt and bacteria collect underneath – clean apron – no outdoor clothes – avoid transfer of bacteria from outside – do not touch face during food preparation – handle food as little as possible – cover cuts with waterproof dressings – bacteria will be on skin – no licking spoons / fingers – bacteria from mouth transferred to food – separate chopping board / knife for raw and cooked food – equipment clean – work surfaces clean – wash up in hot soapy water – clean tea towel / allow to dry in air – no chipped plates used – avoid introducing bacteria from dirty cloths – dish cloth not to be used for cleaning floor, etc. – boil / bleach dish cloth regularly – kill bacteria – cover waste bin – clean up spills / pools of water – to avoid attracting mosquitoes – avoid insects / vermin – wrap waste tightly – bin outside kitchen – no animals in kitchen – animals must not use family’s meal plates – dispose of rubbish / waste regularly – throw away / wash food dropped on floor – no flies, etc. in kitchen – carry bacteria – etc.



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### **Cooking food**

thoroughly cook foods – especially meat / eggs –  
should reach 72 °C in centre – maintain for 2 minutes – to kill bacteria –  
e.g. Salmonella – do not keep warm – reinfected with bacteria from air –  
know source of food – danger of BSE, etc. – clean water supply –  
should reheat until piping hot – use food probe –  
do not reheat after 24 hours – only reheat once – danger of barbecues –  
food overcooked on outside but not hot enough in centre –  
warmth encourages bacterial growth – cook just before eating if possible –  
serve immediately –  
do not use raw eggs if possible – in mayonnaise / marzipan –  
danger of Salmonella – do not use cracked eggs – etc.

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<b>7</b>	<b>Band</b>	<b>Descriptor</b>	<b>Part mark</b>	<b>Total</b>
	<b>High</b>	<ul style="list-style-type: none"> <li>– can identify conditions for bacterial growth</li> <li>– some symptoms of food poisoning identified</li> <li>– is able to identify and discuss several points on preventing spread of bacteria during storing, preparing and cooking food</li> <li>– gives examples to illustrate points made</li> <li>– understanding of the topic is apparent</li> <li>– information is specific and generally accurate</li> <li>– all areas of question addressed</li> <li>– answers are detailed where appropriate</li> <li>– some scientific facts included</li> </ul>	(11–15)	[15]
	<b>Middle</b>	<ul style="list-style-type: none"> <li>– some conditions for bacterial growth given</li> <li>– may give some symptoms of food poisoning</li> <li>– is able to identify several points on preventing the spread of bacteria during storing, preparing and cooking food</li> <li>– some discussion or explanations given</li> <li>– gives a few examples to illustrate points made</li> <li>– shows a basic understanding of the topic</li> <li>– information is basic and generally accurate</li> <li>– some areas of question addressed</li> <li>– gaps in knowledge will be apparent</li> <li>– may be a few scientific facts</li> <li>– answer will be detailed in parts and superficial in others</li> <li>– overall lack of detail</li> </ul>	(6–10)	
	<b>Low</b>	<ul style="list-style-type: none"> <li>– may give conditions for bacterial growth</li> <li>– little information on food poisoning</li> <li>– mentions some points on preventing spread of bacteria during storing, preparing and cooking</li> <li>– may give examples to illustrate</li> <li>– answer tends to be a list of statements</li> <li>– not always accurate</li> <li>– information is brief</li> <li>– answers not specific</li> <li>– little or no scientific information</li> <li>– emphasis on one part of the question</li> <li>– lack of knowledge will be apparent</li> </ul>	(0–5)	

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**8 The kitchen should be a safe place in which to work.**

**Discuss the causes and prevention of accidents in the kitchen.**

**[15]**

**The answer may include the following knowledge and understanding.**

**Knives**

store out of the reach of children  
store in sheath or knife block, or with cork on point  
keep separate – not mixed with other cutlery  
keep well sharpened  
use on a chopping board – do not cut into palm of hand  
cut away from the body  
use size appropriate to task  
carry with blade pointing down towards floor  
wash individually – do not put into washing up water with other cutlery  
wash with back of knife towards hand (also dry this way)

**Deep-frying**

pan not more than half full – prevent overflowing when food is added –  
dry food thoroughly before putting into fat – water turns to steam – spits –  
put food into pan carefully / do not throw food into pan – to avoid splashing –  
dry utensils – wooden handles on pans / kitchen tools – poor conductor –  
prevents burning hands – pan handle turned in – avoid knocking over –  
pan should have flat base – sits firmly on hot plate – avoid wobbling –  
do not overfill pan with food – fat may overflow –  
do not overheat fat / oil – could ignite – have lid nearby – cover if ignites –  
prevent oxygen reaching flames – do not move pan if on fire –  
no water nearby – e.g. kettle – water may splash into fat –  
cause spitting of fat – do not leave pan unattended –  
do not allow children to deep fry food – make sure dangers are understood –  
turn off heat after use – do not move pan until fat / oil is cold

**Electrical equipment**

plugs should be wired correctly  
do not attempt to wire plugs unless sure of method  
should be no bare wires  
do not use near flames  
do not stretch / put strain on flex during use  
keep appliances to back of bench / out of reach of children  
do not leave flexes hanging where they could be tripped over  
use of coiled flexes prevents dangling wires  
use correct fuse for appliance  
plug should not be broken e.g. no screws missing  
do not touch with wet hands  
switch off appliance at socket before removing plug  
do not overload socket by using adapters  
follow manufacturer's instructions  
do not put motor near water when washing up  
wipe with a damp cloth when unplugged  
keep hands well away from beaters / blades when using  
keep hands away from blades when washing up – use a brush

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### **Other points**

pan handles turned in  
 steam from kettle pointing towards wall  
 oven gloves to remove items from oven  
 keep face away from pan / tilt lid when removing lid of steamer  
 sleeves rolled up / ties tucked in / no flowing skirts, etc.  
 hair tied back / covered  
 avoid high heels / open sandals / slippers  
 wipe up spills immediately  
 no loose mats in kitchen / broken floor tiles to cause tripping  
 keep cleaning materials away from food  
 make sure tops cannot be removed by children  
 do not place other liquids in empty soft drink bottles  
 do not store heavy items on high shelves  
 avoid stacking equipment where it could fall  
 do not store items used frequently where they can be reached easily  
 use kitchen stool or chair to reach high cupboards  
 do not hang tea towels near cooker  
 no curtains near cooker  
 do not run  
 know exactly what you are doing at all times  
 put a guard around fires  
 do not dry clothing around fires  
 no tablecloths hanging – small children can pull them down, etc.

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<b>8</b>	<b>Band</b>	<b>Descriptor</b>	<b>Part mark</b>	<b>Total</b>
	<b>High</b>	<ul style="list-style-type: none"> <li>– can identify many causes of accidents</li> <li>– suggests ways to avoid accidents</li> <li>– is able to identify and discuss several areas where accidents occur</li> <li>– gives examples to illustrate points made</li> <li>– understanding of the topic is apparent</li> <li>– information is specific and generally accurate</li> <li>– all areas of question addressed</li> <li>– answers are detailed where appropriate</li> <li>– some specific facts included and the topic is addressed in its widest application</li> </ul>	<b>(11–15)</b>	<b>[15]</b>
	<b>Middle</b>	<ul style="list-style-type: none"> <li>– some causes of accidents identified</li> <li>– may give some advice on avoiding accidents</li> <li>– is able to identify a few areas where accidents occur</li> <li>– some discussion or explanations given</li> <li>– gives a few examples to illustrate points made</li> <li>– shows a basic understanding of the topic</li> <li>– information is basic and generally accurate</li> <li>– some areas of question addressed</li> <li>– gaps in knowledge will be apparent</li> <li>– may be a few specific facts</li> <li>– answer will be detailed in parts and superficial in others</li> <li>– overall lack of detail</li> </ul>	<b>(6–10)</b>	
	<b>Low</b>	<ul style="list-style-type: none"> <li>– may give a few causes of accidents</li> <li>– little information on avoiding</li> <li>– mentions some areas where accidents occur</li> <li>– may give examples to illustrate</li> <li>– answer tends to be a list of statements</li> <li>– not always accurate</li> <li>– information is brief</li> <li>– superficial treatment of topic</li> <li>– answers not specific</li> <li>– little or no detailed information</li> <li>– emphasis on one part of the question</li> <li>– lack of knowledge will be apparent</li> </ul>	<b>(0–5)</b>	