

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

**MARK SCHEME for the May/June 2009 question paper**  
**for the guidance of teachers**

<p style="text-align: center;"><b>0648 FOOD AND NUTRITION</b></p> <p><b>0648/01</b>                      Paper 1 (Theory), maximum raw mark 100</p>
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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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- 1 (a) **Elements in fat**  
carbon – hydrogen – oxygen  
(3 × 1 mark)
- (b) **Other sources of energy**  
Carbohydrate/starch/sugar – protein  
(2 × 1 mark) [2]
- (c) **Uses of energy**  
Mechanical energy/movement/work etc.  
Chemical energy/for metabolic reactions/digestion etc.  
Heat/maintain body temperature/to keep warm etc.  
Electrical energy/transmission of nervous impulses etc.  
Basal metabolism/heartbeat/blood circulation/breathing etc.  
Growth  
(4 × 1 mark) [4]
- 2 (a) **Functions of vitamin A**  
production of visual purple  
helps vision in dim light  
healthy skin  
formation of mucous membranes  
helps to resist infection  
antioxidant  
(3 × 1 mark) [3]
- (b) **Sources of vitamin A**  
milk – cheese – butter – liver – eggs – fish liver oil (or named e.g.) –  
oily fish (or named e.g.) – green leafy vegetables (or named e.g.) –  
papaya – carrot – red meat – margarine etc.  
(4 × 1 point) (2 points = 1 mark) [2]
- (c) **Deficiency of vitamin A**  
night-blindness (1 mark) [1]
- (d) **Functions of vitamin D**  
promotes absorption of calcium/phosphorus  
formation of bones/teeth  
maintenance of bones/teeth  
(2 × 1 mark) [2]
- (e) **Sources of vitamin D**  
oily fish (or named e.g.) – fish liver oil (or named e.g.) – milk –  
cheese – margarine – eggs – sunshine – butter – red meat  
(4 × 1 point) (2 points = 1 mark) [2]
- (f) **Deficiency of vitamin D**  
rickets/osteoporosis/osteomalacia  
(1 mark) [1]

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- 3 (a) Digestion of fat in the duodenum**  
 bile – from liver – stored in gall bladder – emulsifies fat –  
 increases surface area – breaks into small droplets –  
 lipase – from pancreatic juice – converts fat to fatty acid – and glycerol  
 (6 × 1 point) (2 points = 1 mark) [3]
- (b) Absorption of fat in the ileum**  
 lacteal – in villi – connected to lymphatic system –  
 absorbs glycerol and fatty acid – recombine to form fats –  
 mix with lymphatic fluid – join blood circulation – as insoluble fat  
 (4 × 1 point) (2 points = 1 mark) [2]
- 4 (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 – limits intake of other nutrients etc.  
 (8 points) (2 points = 1 mark) [4]
- (b) Sources of NSP**  
 green, leafy vegetables – fruit skins – whole grain cereals – bran –  
 wholemeal bread – brown rice – pulses – nuts – potato skins –  
 celery – tomato seeds – dried fruit – fruit and vegetables etc.  
 (4 points) (2 points = 1 mark) [2]
- 5 (a) Uses of Water**  
 forms part of protoplasm in cells – 70% of body is water  
 constituent of body fluids – saliva/blood/digestive juices/lymph etc.  
 required in metabolic reactions – all processes take place in solution  
 aids absorption – nutrients dissolve in water for easy absorption  
 keeps mucous membranes moist – protect body from infection  
 lubricates joints – prevents ends of bones damaging each other  
 maintain body temperature/cool body – lost in perspiration  
 needed during lactation – for milk production  
 maintain water balance – continually being lost – needs replacing  
 helps to eliminate waste – from kidneys as urine  
 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]
- (b) Water deficiency**  
 Dehydration (1 mark) [1]

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**(c) Symptoms of dehydration**

headache – lethargy – thirst – constipation – dry mouth – dizziness – faint – dry skin etc.  
(2 points) (2 points = 1 mark)

**(d) Groups requiring additional water**

lactating mothers – water required for production of milk for baby  
 manual workers – water lost in perspiration/to keep cool  
 athletes/active people – to keep cool/replace water lost in perspiration  
 those who live in hot climates – water evaporated to keep cool  
 those who have lost blood in accidents/surgery – fluid volume replaced  
 sufferers from diarrhoea/vomiting – water loss must be replaced etc.  
 (3 groups × 1 point + 3 reasons × 1 point)  
 (6 points) (2 points = 1 mark)

3]

**[Section A Total: 40]****6 (a) Points to consider when meal planning**

(N.B. Do NOT credit 'well balanced' or points on nutrition.)

climate/time of year – hot meals in cold weather –  
 e.g. soup in Winter/salads in Summer  
 equipment available – may need freezer for dessert/baking tins etc.  
 vary colour – e.g. not mince and potatoes followed by chocolate dessert/tomato soup then  
 tomatoes in main course  
 vary flavour – do not repeat flavours in courses –  
 e.g. fish with lemon sauce followed by lemon meringue pie  
 vary texture – avoid pastry in two courses etc.  
 meals should be attractive – use garnishes/decorations  
 consider cost – use LBV protein/eggs/cheap cuts of meat  
 season – use fruit and vegetables in season – cheaper  
 availability of food – use left-overs/garden produce/local produce  
 shopping facilities – may need to buy fresh produce daily  
 skill of cook – may not know how to make choux pastry etc.  
 time available – may need to use quick methods e.g. frying/grilling  
 likes and dislikes – avoid food not enjoyed – waste  
 special requirements – consider vegetarians/diets etc.  
 ages of people taking meal – e.g. old may need easily digested food –  
 manual workers may need greater quantity of food  
 occasion – birthday party/packed meal/Christmas lunch  
 consider whole meal – not an elaborate first course then simple dessert  
 number to serve – quantity required – to have enough food/to avoid waste  
 religion – Hindus do not eat beef/Jews do not eat pork etc.  
 (5 points + 5 examples = 10 points)  
 (2 points = 1 mark)

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**(b) Dietary needs of pregnant women**

- sufficient HBV protein – growth of foetus
  - calcium and/or phosphorus – building bones/teeth
  - vitamin D – to absorb calcium
  - iron – for baby's first six months –  
– prevent anaemia in mother
  - vitamin C – to absorb iron
  - vitamin A – for baby's eyesight
  - NSP – prevent constipation
  - reduced fat – difficult to digest
  - reduced sugar – less active so less energy used
  - folate/folic acid – prevent neural tube defects/spina bifida
- (5 nutrients + 5 reasons – 1 point each)  
(10 points) (2 points = 1 mark)

[5]

**(c) Problems associated with a diet high in fat****Heart Disease**

- causes coronary heart disease (CHD) – hypertension – strokes –
- poor blood circulation – linked to high levels of cholesterol –
- cholesterol deposited on artery walls – narrows arteries – blocks –
- flow of oxygen in blood stopped – angina occurs if arteries are narrow –
- reduced oxygen supply – chest pain – during exercise/exertion –
- heart attack – if coronary arteries blocked –
- stroke – if blocked blood vessels in brain

**Obesity**

- may be caused by over-eating – eating more than body needs –
  - excess stored as fat – under skin – adipose tissue – around internal organs
  - known as obesity if more than 1/3 of body weight is fat – usually less active
  - less likely to burn off excess by exercise –
  - inactivity may lead to more weight gain – puts a strain on the heart – hypertension – CHD –
  - diabetes – arthritis –
  - problems during surgery – lack of self-esteem – breathless etc.
- (10 points) (2 points = 1 mark)

[5]

**7 (a) Different uses of sugar in the preparation of family meals**

- sweetening – tea/coffee etc.
  - aerating – creaming with margarine for rich cakes
  - feeding yeast – bread-making
  - preserving – jam has high sugar concentration
  - flavour – demerara sugar for coffee etc.
  - decorating cakes – royal icing/butter icing etc.
  - confectionery – sugar heated to form caramel etc.
  - glazing – sugar and water boiled/glaze for sweet breads
  - brown baked goods – sprinkled on biscuits before baking etc.
  - prevents gluten formation – rich cakes – gives a softer result
  - retards enzyme action – frozen fruit etc.
  - syrup (liquid) in cakes – melted method e.g. gingerbread/already liquid
- (5 uses of sugar points + 5 examples of use)  
(10 points) (2 point = 1 mark)

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**(b) Rules, with reasons, for successful shortcrust pastry**

- sieve dry ingredients – to aerate – to remove lumps  
 lift hands out of bowl – aerates – keeps fat cool  
 use fingertips – coolest part of hand – avoid melting fat  
 use hard fat – can rub into small pieces without melting  
 no more than ½ fat to flour – otherwise difficult to rub in  
 measure/weigh accurately – to ensure correct proportions  
 weak/soft flour – low gluten  
 plain flour – air is raising agent  
 not too much water – soft dough would need more flour –  
 – alters proportion of fat to flour  
 keep everything cool – cold air expands more than warm air  
 – prevents melting of fat  
 use cold equipment/cold fat/cold water for mixing –  
 – to keep everything cool  
 not too much flour for rolling out – alters proportions – makes pastry dry  
 avoid re-rolling – additional handling develops gluten – toughens  
 handle lightly – to avoid pressing out air  
 do not turn pastry over – more flour would be needed – toughens pastry  
 do not stretch pastry when rolling – shrinks during baking  
 roll with short, sharp strokes in a forward direction – avoid stretching pastry  
 use light, even pressure – to avoid stretching pastry and pressing out air  
 allow pastry to relax in a cool place before baking –  
 gluten relaxes, cools trapped air, prevents shrinkage  
 bake in a hot oven/gas mark 7/210°C/425°F –  
 – cooks starch so that fat can be absorbed  
 if oven too cool – fat melts and runs out before starch is ready to absorb it  
 if oven too hot – overcooked on outside before inside is cooked  
 (10 points (including at least 2 reasons))  
 (2 points = 1 mark)

[5]

**(c) HBV protein for vegans**

- soya beans – only plant product with HBV protein –  
 soya products – flour – tofu – milk – tempeh – (**not** soya oil) (max. 2 e.g.)  
 TVP – spun to make fibres – resembles texture of meat –  
 e.g. sausages – mince – chunks – burgers (max. 2 e.g.)  
 mixture of LBV protein foods – cereals/nuts/pulses – in same meal –  
 e.g. beans on toast – lentil soup and bread etc. (max. 2 e.g.)  
 complementary proteins – improves overall quality of protein –  
 essential amino acids lacking in one are compensated by the other –  
 HBV + LBV protein foods eaten together – e.g. soya and cereals etc.  
 (10 points) (2 points = 1 mark)

[5]

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8 (a) **Nutrients in fish**

protein – fat – vitamin A – vitamin D – iodine – vitamin B –  
calcium – fluorine – sodium/salt  
(6 points) (2 points = 1 mark)

(b) **Methods of preserving fish**

Freezing	– bacteria cannot multiply at low temperatures water frozen/unavailable
salting	– water removed by osmosis – unavailable to bacteria
drying	– water evaporated – bacteria need water to multiply
pickling	– pH unsuitable for bacterial growth
smoking	– chemicals from wood smoke destroy micro-organisms
canning	– bacteria destroyed by heat air-tight seal prevents entry of more bacteria
vacuum packing	– air removed from packaging – bacteria cannot thrive etc.

(3 methods 3 × 1 point)  
(3 explanations 3 × 1 point)  
(6 points) (2 points = 1 mark) [3]

(c) (i) **Reasons for coating**

to protect food from intense heat of fat/to prevent over-cooking  
to prevent loss of moisture/juices from food  
to prevent food breaking up  
to avoid absorption of fat  
(3 × 1 mark) [3]

(ii) **Coatings**

batter  
egg and seasoned flour  
egg and breadcrumbs  
beaten egg and oatmeal  
(2 × 1 mark) [2]

(iii) **Safety points when frying**

pan for deep frying not more than half full of oil –  
so fat does not overflow when food added  
lower food gently into fat – to avoid splashing fat  
do not overfill pan with food – danger of overflowing  
do not overheat fat – may ignite  
make sure food is dry – water turns to steam and splutters  
make sure equipment is dry – danger from splashing  
pan handle turned in – in case it is knocked over  
back burner if possible – less chance of being knocked over  
flat base on frying pan – so it sits securely on hotplate  
do not leave unattended – may ignite/overflow  
turn heat off if fat begins to smoke – fat is near flash point  
(4 safety points + 4 reasons)  
(8 points) (2 points = 1 mark) [4]

[Section B Total: 45]



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- 9 Explain the steps you would take when preparing, cooking and serving food to ensure it is safe to eat.

The answer may include the following knowledge and understanding.

### Preparing food

clean hands – bacteria from skin pass to food –  
short, clean nails – bacteria collect under nails – no nail varnish – no jewellery –  
hair tied back – may touch hair when cooking – could fall into food –  
cover cuts with waterproof dressing – prevent transfer of bacteria –  
clean apron – so bacteria from clothing does not pass to food –  
no coughing/smoking/spitting – bacteria pass to food –  
do not cook if ill – bacteria pass to others – food poisoning etc. –  
do not lick fingers – or put spoons back after tasting – pass bacteria to food –  
different knives/chopping boards for raw and cooked food – cross-contamination –  
wash equipment after using on raw food – prevents spread of bacteria –  
cover food – prevent flies etc. reaching food – bring bacteria –  
do not allow animals in kitchen – bacteria on fur –  
do not use same dishes for family and animals food – animals lick plates – bacteria –  
wash equipment which falls on floor – throw away food which falls on floor –  
clean equipment – clean surfaces – clean dishcloths and tea towels –  
wash in hot, soapy water – boil – to sterilise – destroy bacteria –  
do not use food cloths for cleaning – cross-contamination –  
store food in a clean place – cover – cool place/refrigerator – check 'use by' date do not mix old  
and new food – use in rotation –  
wash vegetables before storing in refrigerator – remove soil – bacteria – pesticides  
note 'use by' date  
red kidney beans – boil to remove toxins etc.

### Cooking food

Must be completely thawed before cooking – to allow heat to cook centre of food –  
Must be held at 72°C – for at least 2 minutes – to kill bacteria –  
And prevent food poisoning – food must be thoroughly cooked etc.

### Serving food

Serve immediately after cooking – clean serving dishes – do not keep food warm –  
ideal temperature for growth of bacteria – Salmonella – in eggs and poultry –  
do not reheat more than once – make sure 72°C for 2 minutes etc.



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Band	Descriptor	Pa
High	<ul style="list-style-type: none"> <li>– candidate will give information on all parts of the question</li> <li>– can state a wide range of ways to prevent contamination</li> <li>– gives reasons for many points made</li> <li>– uses correct terminology</li> <li>– comments are precise</li> <li>– examples given to illustrate points</li> <li>– information given is accurate</li> <li>– correct terminology used</li> <li>– understanding of the topic is apparent</li> <li>– little or no repetition</li> </ul>	(11–15)
Middle	<ul style="list-style-type: none"> <li>– can give information on at least two sections of the question</li> <li>– gives several ways to ensure food safety when preparing food</li> <li>– can give reasons for some points</li> <li>– some gaps in range of issues considered</li> <li>– some examples given to illustrate points</li> <li>– few facts on cooking and serving</li> <li>– terminology not always correct</li> <li>– information sometimes very general</li> <li>– tends to concentrate on one or two areas</li> <li>– some repetition in answers</li> <li>– facts not always supported by examples</li> <li>– candidate shows general understanding</li> </ul>	(6–10)
Low	<ul style="list-style-type: none"> <li>– gives a few ways to prevent contamination</li> <li>– information tends to be a list of facts</li> <li>– explanations not always given</li> <li>– few examples to illustrate points</li> <li>– covers one or two parts only</li> <li>– information not always accurate</li> <li>– general information given</li> <li>– concentrates on few areas of the topic</li> <li>– not always specific to area discussed</li> <li>– poor overall knowledge of topic</li> <li>– brief or little information given</li> </ul>	(0–5)

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- 10 Discuss methods of heat transference when cooking and the advantages and disadvantages of each method.

The answer may include the following knowledge and understanding.

### Conduction

through solids – or liquids – by contact – molecules vibrate rapidly – neighbouring molecules vibrate – generate heat –  
pass heat to adjoining molecules – rate varies according to medium  
e.g. metal spoon in hot liquid – frying bacon in pan – cake in cake tin etc.

#### Advantages and disadvantages of conduction

quick – e.g. frying – needs constant attention –  
boiling can be left – several dishes can be baked at once –  
heat from all oven shelves passes to baking tins –

#### **but**

nutrients may be lost in liquids – e.g. boiling green vegetables –  
cooking tins/pans may be too hot to handle – safety –  
need wooden spoons to stir – metal conducts heat and would burn hands  
oven gloves required to handle hot trays etc.  
some metals better conductors than others –  
more efficient at transferring heat – e.g. copper is good etc.

### Convection

through liquids – and gases – liquid become less dense – rise –  
colder liquid molecules fall – they are heated again – convection currents –  
until a constant temperature is reached –  
heat energy is transferred by the movement of the gas or liquid  
e.g. boiling potatoes/steaming fish/baking a cake etc.

#### Advantages and disadvantages of convection

may cook several dishes at once – tiered steamer – oven shelves filled –  
no added fat if steam or water used – more healthy –  
does not need constant attention –

#### **but**

some methods take a long time – steaming  
boiled and steamed dishes lack colour – have a soft texture –  
some water soluble nutrients lost  
zones of heat  
temp of middle shelf = setting

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### Radiation

no medium – i.e. no heated molecules – through space or vacuum –  
 rays from source of heat – travel in straight lines –  
 fall onto food in their path –  
 because of electro-magnetic waves – e.g. heat rays are infra-red rays –  
 absorbed by food – space between heat source and food is not heated –  
 food need to be turned etc.  
 e.g. grilled steak/spit-roasted chicken – barbecued sausages etc.

#### Advantages and disadvantages of radiation

quick method – grill – barbecue – extractives developed on surface –  
 attractive brown surface – crisp – fat drips off – more healthy –

#### **but**

needs careful attention – easy to overcook – dries surface –  
 food needs to be turned – and basted –  
 only suitable for thin pieces of food –  
 would be overcooked before inside was cooked etc.

### Microwaves

electro-magnetic waves – produced by magnetron – penetrate food –  
 agitate molecules in food – produce heat (thermal energy) –  
 penetrate to depth of 5–7.5 cm – used on thin pieces of food –  
 heated molecules transfer heat to adjoining molecules by conduction – may have a 'stirrer' –  
 to spread rays – for more even heating –  
 works best on foods with high water content –

#### Advantages and disadvantages of cooking in a microwave oven

quick – fuel saved – no pre-heating necessary – no mess in oven –  
 spills do not burn on – saves cleaning time –  
 same dish can be used for cooking and serving – less washing up –  
 micro-organisms destroyed – by heating of water molecules –  
 minimum loss of water-soluble vitamins – little or no cooking liquid –  
 maintains colour of vegetables – quick cooking –  
 heat produced immediately – can be used for defrosting –  
 safer than leaving food in a warm kitchen –  
 re-heats food very quickly – less destruction of nutrients –  
 easy to use – for children – elderly – disabled etc.

#### **but**

no browning – no crispness of outside – no dry heat – no cooking smells –  
 food enclosed by hermetically sealed door –  
 not suitable for large pieces of food/joints of meat/chicken etc. –  
 depends on an appropriate electricity supply – rays only penetrate 4 cm –  
 no metal dishes or metal decorations on china – causes arcing –  
 can damage magnetron – easy to overcook – because of speed of cooking  
 cannot easily judge when cooked – not brown/crisp to guide –  
 standing time allows cooking to continue – therefore may overcook –  
 bones may conduct heat – different thickness of food cook unevenly –  
 may get dry areas – food needs to be turned/moved round frequently –  
 may need more attention than other methods of cooking –  
 liquids need to be stirred – for even cooking – otherwise 'hot spots' occur –  
 only small amounts of food can be cooked at once – usually only 1 shelf –  
 when cooking for a group other methods may be required in addition etc.

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Middle	<ul style="list-style-type: none"> <li>– can give detailed information on at least two sections of the question</li> <li>– gives two or more ways to heat food</li> <li>– can give explanations for some points</li> <li>– some gaps in range of issues considered</li> <li>– some examples given to illustrate points</li> <li>– few advantages and disadvantages of some methods</li> <li>– terminology not always correct</li> <li>– information sometimes very general</li> <li>– tends to concentrate on one or two areas</li> <li>– some repetition in answers</li> <li>– facts not always supported by examples</li> <li>– candidate shows general understanding</li> </ul>	(6–10)
Low	<ul style="list-style-type: none"> <li>– gives one or two ways to heat food</li> <li>– information tends to be a list of facts</li> <li>– explanations rarely given</li> <li>– few examples to illustrate points</li> <li>– covers one or two areas only</li> <li>– information not always accurate</li> <li>– general information given</li> <li>– concentrates on few areas of the topic</li> <li>– not always specific to area discussed</li> <li>– poor overall knowledge of topic</li> <li>– brief or little information given</li> </ul>	(0–5)