

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2012 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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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- 1 (a) Monosaccharides
 single/simple sugars – $C_6H_{12}O_6$ – basic unit – end product of digestion – sweet – soluble in water
 4 points
 2 points = 1 mark [2]
- (b) Examples of monosaccharides
 glucose – fructose – galactose
 2 points = 1 mark [1]
- (c) Disaccharides
 double sugars – $C_{12}H_{22}O_{11}$ – 2 monosaccharides combined – sweet – soluble in water – glucose + 1 other simple sugar – broken down to monosaccharides during digestion
 4 points
 2 points = 1 mark [2]
- (d) Examples of disaccharides
 maltose – lactose – sucrose
 2 points = 1 mark [1]
- (e) Polysaccharides
 made up of many monosaccharides – insoluble in water – not sweet – not all polysaccharides can be digested – complex carbohydrates
 Non Starch Polysaccharide (NSP) adds bulk to diet – prevents constipation/diverticulitis/varicose veins etc. – chain is branched – cannot break – starch can be digested – because molecules are linked together in a simple chain
 4 points
 2 points = 1 mark [2]
- (f) Examples of polysaccharides
 starch – glycogen – pectin – gum – mucilage/cellulose – NSP
 2 points = 1 mark [1]
- 2 Digestion and absorption of starch
- (a) **in the mouth**
 amylase/ptyalin – from salivary glands – acts on cooked starch – converting it into maltose
- (b) **in the duodenum**
 amylase – in pancreatic juice – converts starch to maltose
- (c) **in the ileum**
 maltase – in intestinal juice – converts maltose to glucose – villi – finger-like projections – in walls of small intestine – have walls made of single cells – large surface area – and a network of blood capillaries – glucose passes through walls of blood vessels – into bloodstream – then transported to liver
 12 points
 2 points = 1 mark [6]

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- 3 (a) (i) Importance of calcium**
 building bones/teeth
 maintaining bones/teeth
 clotting blood
 muscle function
 nerve function
 4 points
 2 points = 1 mark [2]
- (ii) Sources of calcium**
 milk – cheese – yoghurt – bones of canned fish (or 1 named e.g. sardines, pilchards, salmon)
 green vegetables (or 1 named e.g. spinach, cabbage, lettuce, Brussels sprouts)
 bread – white flour (by law) – soya
 4 points
 2 points = 1 mark [2]
- (iii) Deficiency disease**
 Rickets/osteomalacia/osteoporosis
 1 mark [1]
- (iv) Symptoms**
 RICKETS – leg bones deformed – bow legs – knock knees – pigeon chest
 OSTEOMALACIA – soft bones – break easily – muscle weakness – pain
 OSTEOPOROSIS – loss of bone density – porous – break easily – brittle bones
 2 points = 1 mark [1]
- (b) (i) Importance of vitamin D**
 absorption of calcium – and phosphorus – formation of bones/teeth
 maintenance of bones / teeth
 4 points
 2 points = 1 mark [2]
- (ii) Sources of vitamin D**
 milk – cheese – eggs – red meat (or named e.g.) – liver – oily fish (or named e.g.) –
 butter – margarine – cod liver oil – UV rays from the sun/sunlight
 4 points
 2 points = 1 mark [2]
- (c) Deficiency diseases**
 Not calcium or vitamin D – in previous questions
 Vitamin A/Retinol Night blindness/Xerophthalmia
 Vitamin C/ascorbic acid Scurvy
 Vitamin B1/Thiamine Beri-beri
 Vitamin B2/Riboflavin Dermatitis/cataracts
 Vitamin B3/Nicotinic acid Pellagra
 Vitamin B12/cobalamin Pernicious anaemia
 Folate/folic acid Anaemia/spina bifida
 Iron Anaemia
 Iodine Goitre
 Protein Kwashiorkor
 Carbohydrate/fat/protein Marasmus (lack of energy foods)
 4 deficiency diseases × 1 point
 4 associated nutrients × 1 point
 8 points 2 points = 1 mark [4]

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- 4 (a) Reasons for reducing sugar intake
tooth decay – bacteria change sugar to acids – dissolve enamel
excess stored as fat – obesity – breathless – low self-esteem – associated with CHD –
varicose veins – hypertension – risk of diabetes – too much glucose in blood for insulin
produced
3 reasons + 3 explanations
6 points 2 points = 1 mark [3]

- (b) Dietary recommendations
Less fat prevents obesity, coronary heart disease, hypertension
Less saturated fat prevents build up of cholesterol
Less salt prevents hypertension
More NSP prevents constipation
More water prevents dehydration
Five portions of fruit/vegetables – for NSP/vitamins/minerals
2 recommendations + 2 reasons
4 points 2 points = 1 mark [2]

- 5 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
folate/folic acid/B9 – prevent neural tube defects/spina bifida
vitamin B – for release of energy
6 nutrients + 6 reasons – 1 points each
12 points 2 points = 1 mark [6]

[Total: 40]

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Section B

- 6 (a) Fatless sponge cake
(3 eggs – given in question)

75g plain flour (allow SR)

75g caster sugar

2 points = 1 mark

[2]

- (b) Method of making and baking

whisk – eggs and sugar – over hot water – with electric hand mixer –

until thick and creamy – leaves a trail – to introduce air –

sieve flour – to aerate – and remove lumps –

fold in flour – with a metal spoon/palette knife – to prevent air loss –

add flour in thirds – weight of flour would press out air – use a cutting action

or figure of eight – to avoid loss of air – continue until no dry flour seen –

to give an even consistency –

pour – into greased and floured/greased and lined tin – do not spread –

air bubbles will break – tilt to give even thickness – bake in preheated oven

so rising can begin immediately –

sponge cake 200°C/400°F/gas mark 6 – for 15–20 minutes

until golden brown – firm to the touch – shrinks from sides of tin – (max. 2)

cool on wire rack – to allow steam to escape

DO NOT credit any cake decoration.

12 points 2 points

[6]

- (c) Changes during baking

air expands – gases rise – push up cake mixture –

protein coagulates – at 60°C – around air bubbles –

sets in risen shape – open texture –

sugar caramelises – Maillard browning – action of protein and sugar –

starch grains absorb water – from egg – swell – gelatinise –

flour on outside dextrinises – effect of dry heat – browns –

dries on outside – forms a crust –

steam – from egg – evaporates – helps cake to rise –

8 points 2 points = 1 mark

[4]

- (d) Reasons for a close texture

insufficient whisking

air knocked out during folding in of flour/addition of flour

did not use a cutting action to add flour – whisked/beat in flour

used wooden spoon/electric mixer for adding flour

did not use metal spoon/palette knife to incorporate flour

continued folding after all flour was incorporated

not baked immediately

oven temperature too low

insufficient baking/undercooked

4 points 2 points = 1 mark

[2]

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(e) Other baked items which can be made with this recipe

Swiss roll – sponge flan – sponge fingers

2 points = 1 mark

[1]

7 (a) Points to consider when meal planning

(N.B. Do NOT credit '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 – e.g. avoid pastry in two courses

meals should be attractive – use garnishes/decorations

consider cost – use LBV protein/eggs/cheap cuts of meat

season – use fruit and vegetables in season

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 – low fat diets

allergies – e.g. nuts/lactose/gluten

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 – e.g. Hindus do not eat beef/Jews do not eat pork

gender – females require additional iron

5 points + 5 examples = 10 points

2 points = 1 mark

[5]

(b) 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

helps to remove toxins – reduces cholesterol –

gives feeling of fullness – limits intake of other nutrients

Sources of NSP

green, leafy vegetables – fruit skins – whole grain cereals – bran –

wholemeal bread – brown rice – pulses – nuts – potato skins –

celery – tomato seeds

Can include a max. 2 sources of NSP – 1 point each

10 points 2 points = 1 mark

[5]

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(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 –
 from saturated fat – in animal foods -
 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 $\frac{1}{3}$ of body weight is fat – usually less active
 less likely to burn off excess by exercise – lethargic –
 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

10 points 2 points = 1 mark

[5]

8 (a) Different uses of sugar in the preparation of family dishes

sweetening	– tea / coffee
aerating	– creaming with margarine for rich cakes
feeding yeast	– bread-making
preserving	– jam has high sugar concentration
flavour	– demerara sugar for coffee
decorating cakes	– royal icing/butter icing
confectionery	– sugar heated to form caramel
glazing	– sugar and water boiled/glaze for sweet breads
brown baked goods	– sprinkled on biscuits before baking
prevents gluten formation	– rich cakes – gives a softer result
retards enzyme action	– frozen fruit
syrup (liquid) in cakes	– melted method e.g. gingerbread / already liquid
to counteract acidity	– in tomato soup and sauce

5 uses of sugar + 5 examples of use

10 points 2 points = 1 mark [5]

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

use a weak/soft flour	– low gluten content
plain flour	– air is raising agent
use lard	– gives shortness
use margarine or butter	– for colour and flavour
mixture of lard and margarine	– gives colour, flavour and shortness
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 $\frac{1}{2}$ fat to flour	– otherwise difficult to rub in
measure / weigh accurately	– to ensure correct proportions
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

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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 missing from one are compensated by the other –

HBV + LBV protein foods eaten together – e.g. soya and cereals

10 points 2 points = 1 mark

[5]

[Total: 45]

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Answer **either** 9(a) or 9(b).

- 9 (a)** Discuss the reasons for cooking food and explain different methods of transferring heat when cooking. **[15]**

The answer may include the following knowledge and understanding:

Reasons for cooking food:

to kill harmful bacteria/make food safe to eat – e.g. meat
to destroy natural toxins – e.g. red kidney beans
to preserve – e.g. making fruit into jam
to aid digestion – cooked starch easier to digest – begins in mouth
to aid absorption – e.g. raw starch in potatoes and flour cannot be absorbed easily
to make food easier to eat – e.g. meat is tenderised
to make food more attractive – e.g. meat changes from red to brown
to develop extractives/flavour – e.g. grilled steak, toasted cheese
smell stimulates appetite/flow of digestive juices – e.g. curry
to provide hot food in cold weather – e.g. soup in winter
to reduce bulk/allow more to be eaten – e.g. cabbage
create new dishes – e.g. quiche, chocolate cake
add variety to diet – e.g. eggs can be cooked in many different ways
necessary for some cooking processes – e.g. thickening sauces, baking

Methods of transferring heat

Conduction – through solids – by contact – molecules vibrate rapidly – adjoining molecules vibrate

heat transferred within foods by conduction in microwave cooking
e.g. metal spoon in hot liquid, pan standing on hotplate

Convection – through liquids – and gases molecules rise when heated – colder molecules fall – convection currents created

e.g. boiling water In pan, heating an oven etc.

Radiation – no medium – through space or vacuum rays from source of heat – fall on food in their path – food needs to be turned

e.g. grill, barbecue

Microwave cooking

electromagnetic waves given off – by magnetron – water molecules in food vibrate – generated heat passes to adjoining molecules by conduction – quick method – oven does not need to be preheated – stays cool – so food does not burn on sides of oven – suitable for small, thin pieces of food – easy to overcook – cannot judge when food is cooked – container does not get hot – glass, china, certain plastics can be used – no metal/metal decoration – causes arcing and will damage the microwave oven

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Band	Descriptor	Part marks	Total
High	<ul style="list-style-type: none"> – Can give several reasons for cooking. – Can give named examples to illustrate reasons. – Correctly named methods of heat transfer. – Is able to give scientific explanations of methods. – Can give suitable examples of methods of heat transfer. – May name dishes cooked by methods identified. – Can give advantages and disadvantages. – Understanding of the topic is apparent. – Information is specific and generally accurate. – All areas of the question well addressed. 	11–15	15
Medium	<ul style="list-style-type: none"> – Will probably give at least three reasons for cooking. – A few named examples to illustrate reasons. – Some named methods of heat transfer given. – Some scientific explanations may be given. – Some dishes may be named to illustrate methods. – Gives a few advantages and disadvantages. – Information not always precise. – Has sound knowledge of some aspects. – Information lacking in detail. 	6–10	
Low	<ul style="list-style-type: none"> – One or two reasons for cooking mentioned. – Few examples to illustrate reasons. – Mentions methods of heat transfer. – Little scientific knowledge to explain methods. – One or two advantages and disadvantages given. – Information is brief. – Not always accurate. – Emphasis is on one part of the question. – Lack of knowledge will be apparent. 	0–5	

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- 9 (b) Identify, and give examples of different types of convenience foods. Discuss the advantages and disadvantages of convenience foods and suggest ways of using them in family meals [15]

The answer may include the following knowledge and understanding:

Types of convenience foods

frozen – e.g. peas, ice cream, beef burgers, fish, chips
dried – e.g. stock cubes, milk, custard powder, soup
canned – e.g. fish, baked beans, corned beef, peaches
ready to eat – e.g. biscuits, potato crisps
ready to cook – e.g. pasta, prepared vegetables, filleted fish
bottled – e.g. ketchup, fruit juice, pasta sauces
preserved – e.g. jam, chutney, pickle onions

Advantages of convenience foods

quick to prepare easy to prepare
save fuel easy to store
easy to transport can be kept for emergencies
wide variety available little waste
may have extra nutrients added
 cook may have limited skill
can use foods from other countries/out of season
e.g. to illustrate the above points may be given

Disadvantages of convenience foods

more expensive than fresh equivalent
small servings nutrients lost during processing
low in dietary fibre high in fat
high in salt high in sugar
artificial colourings artificial flavourings
use of additives long-term effects not known

Use in family meals

frozen desserts – ice cream
dried herbs, stock cubes
frozen pastry
cake mixes, pastry mix
canned fruit in desserts e.g. pineapple upside down pudding
dried fruit – currants, sultanas – in cake making
frozen fish
bottled sauces, flavourings
custard powder, blancmange

Uses in family meals should be expected for named examples of convenience foods.

NB A list of convenience foods is not acceptable since the question asks how convenience foods can be included in family meals.

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9 (b) Band	Descriptor	Part mark	Total
High	<ul style="list-style-type: none"> – Can give many advantages and disadvantages of convenience foods. – Demonstrates a clear understanding of the nature and types of convenience foods. – Comments are precise and are related to named examples. – Specific terminology is used where appropriate. – Most advantages and disadvantages considered. – Many different examples are given to show the use of a variety of named convenience foods. 	11–15	15
Middle	<ul style="list-style-type: none"> – Can give a few advantages and disadvantages of convenience foods. – Factual content is sound but is not always linked to examples to illustrate points. – Some types and examples of convenience foods given – Information given may be accurate but not all issues are considered. – Some examples are given to show the use of convenience foods. 	6–10	
Low	<ul style="list-style-type: none"> – Can give some advantages and disadvantages of convenience foods but does not consider a wide range. – Some types are identified and examples given. – Information will be general and will probably lack specific detail. – Few examples of the uses of convenience foods in family meals will be given. – limited knowledge of the topic will be apparent. 	0–5	