

MARK SCHEME for the October/November 2012 series

0648 FOOD AND NUTRITION

0648/12

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Section A

1 (a) carbohydrate – fat – protein

3 x 1 mark [3]

(b) carbohydrate 4 kcal/16 kJ
fat 9 kcal/37 kJ
protein 4 kcal/16 kJ

3 x 1 mark [3]

(c) Energy balance

energy intake = energy output

or

number of kcal taken into the body = number of kcal used

1 well-explained statement = 1 mark [1]

(d) Different individual energy requirements

age	young children require energy for growth
gender	men have larger overall body size – use more energy
activity	physical work/exercise requires more energy – sedentary workers require less energy than manual workers
health	more energy required to repair damages cells after accidents
pregnancy	energy required for growth of baby
lactation	energy for production of milk
weight reducing programmes	uses reserves of fat for energy – require less from food
body size	more surface area needs more energy – greater heat loss from surface – energy to maintain body temperature
climate	energy required to maintain body temperature in cold weather
BMR different for everyone	amount of energy required for breathing, heartbeat, blood circulation etc.

12 points: 2 points = 1 mark [6]

(e) Too much energy-giving food is consumed

excess converted to fat – stored under skin – adipose tissue – or around internal organs – leading to obesity – CHD – tendency towards diabetes – lethargy – breathlessness – high blood pressure – strokes – low self-esteem – problems during surgery etc.

8 points: 2 points = 1 mark [4]

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- 2 (a) Animal sources of iron
liver / kidney
red meat (or named example)
corned beef
eggs

2 points = 1 mark [1]
- (b) Plant sources of iron
cocoa / plain chocolate
curry powder
black treacle
dried fruit (or named example)
pulses
soya beans
green vegetables (or named example) etc.

2 points = 1 mark [1]
- (c) Haemoglobin [1]
- (d) Function of haemoglobin
picks up oxygen from lungs – becomes oxyhaemoglobin
transports oxygen to cells – oxidises glucose – cell respiration
energy released – leaving carbon dioxide and water

4 points: 2 points = 1 mark [2]
- (e) Anaemia [1]
- (f) Symptoms of anaemia
pale
lethargic/tired
weakness
headaches
dizziness

4 points: 2 points = 1 mark [2]

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3 (a) Functions of vitamin C

clear skin / linings of digestive system / gums
to make connective tissue / to bind cells together
for production of blood / walls of blood vessels
to help heal wounds
growth
to build strong teeth/bones
assists vitamin E in preventing CHD
anti-infective / prevents colds

(do not allow absorption of iron – given in question)

3 x 1 mark

[3]

(b) Sources of vitamin C

citrus fruit (or 1 named example)
blackcurrants
rose hips
strawberries
melon
tomatoes
kiwi fruit
papaya
green peppers
green vegetables (or 1 named example)
new potatoes etc.

2 examples – 1 point each: 2 points = 1 mark

[1]

(c) Deficiency disease

Scurvy

[1]

(d) Reason for a daily supply

Vitamin C cannot be stored in the body

or

Vitamin C is water soluble so is easily lost from the body

1 well-explained statement = 1 mark

[1]

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4 (a) Digestion in the small intestine

in the **duodenum** – trypsin – from pancreatic juice – converts protein to (peptones)/peptides/polypeptides

bile – stored in gall bladder – made by liver – emulsifies fat – breaks fat into small droplets – increases surface area

lipase – converts fats to glycerol and fatty acids

amylase – in pancreatic juice – converts starch to maltose

in the **ileum** – erepsin – from intestinal juice – converts (peptones)/peptides/polypeptides to amino-acids

lipase – completes breakdown of fat to glycerol and fatty acids

maltase – converts maltose to glucose

lactase – converts lactose to glucose and galactose

sucrase – converts sucrose to glucose and fructose

(At least **four** points from each part of the small intestine.)

12 points: 2 points = 1 mark

[6]

(b) Absorption in the small intestine

walls of ileum lined thousands of villi – finger-like projections

each villus is surrounded by a wall of single cells/walls of villi are 1 cell thick

nutrients pass through – to reach centre – where there is a lacteal – connected to the lymphatic system

lacteal surrounded by blood capillaries – connected to larger blood vessels

glucose – and amino-acids – water soluble vitamins and minerals – absorbed into blood

capillaries – dissolve in blood – carried around the body

glycerol and fatty acids – recombine in cells in wall of ileum – absorbed into lacteal – mix with lymphatic fluid – pass around body in lymphatic system – join the blood circulation as

insoluble fat – converted to soluble in the liver

fat-soluble vitamins absorbed with fats – and are taken to the liver

(Can credit information shown on a diagram)

6 points 2 points = 1 mark

[3]

[Section A Total: 40]

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Section B

5 (a) The use of a refrigerator

keeps food longer – slows down rate of deterioration – reduces need for daily shopping – and some foods can be served chilled – e.g. cold desserts, salads etc. but food will still spoil
temperature 1–7 °C – ideally 4 °C – if lower than that, water will freeze – and spoil texture of food – if higher than that, will encourage bacterial growth
cover – to prevent cross-contamination – and surface of food drying – and smell of food being absorbed by other foods – e.g. fish, cheese
clean containers – so bacteria remaining in container do not pass to food
cool food before refrigerating – or will raise temperature in refrigerator – and encourage growth of bacteria
raw meat on bottom shelf – so juices do not drip onto cooked food – contain bacteria and will not be killed by heat if food is already cooked
check ‘use by’ date – refrigerators only slow down food spoilage
use food in rotation – oldest first so safest food kept till later
do not overload/overfill/over-pack – allow cold air to circulate – and maintain a suitable temperature
do not leave door open longer than necessary – cold air escapes – warmth encourages bacterial growth – more electricity needed to cool
follow instructions on packages – to keep food in safest condition
clean refrigerator regularly/wipe up spills – remove risk of bacterial growth
defrost regularly unless automatic defrost – remove build up of ice – and make refrigerator work more efficiently etc.

10 points: 2 points = 1 mark

[5]

(b) Different uses of fats and oils

spreading on bread – butter, margarine
frying – corn oil, sunflower seed oil – high flash point
sauce-making – margarine, butter
aeration – margarine traps air when creaming – cake-making and when rubbing in – in pastry-making – holds layers of pastry apart when rolling and folding – flaky pastry
shortening – crumbly texture of shortcrust pastry, rock buns etc.
for flavour – butter in rich cakes etc.
for colour – in pastry, sauces etc.
improve keeping quality – in rich cakes etc.
sealing – melted butter/margarine on pate to retain moisture
adds calories without adding bulk – fried food
dressings – French dressing – adds moisture – and gloss
forms an emulsion – mayonnaise
basting – adds moisture to meat cooked by dry heat/grilled/roasted
decorating – butter icing
makes foods easier to eat/lubricates – butter on toast
prevents sticking – oiled baking tins
glazes – melted butter on new potatoes, carrots etc.
storing/covering during storage to keep moist – olives etc.
may add nutrients – fat, vitamins A/D

10 points: 2 points = 1 mark

[5]

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(c) The advantages and disadvantages of steaming

Advantages

food not in contact with water – no loss of water soluble vitamins
easy to digest – light texture – suitable for convalescents/elderly
little attention required except to replenish water
food unlikely to overcook
can cook several dishes in different tiers
uses only one burner on stove – saves fuel
low heat required to maintain water temperature
can be carried out in pressure cooker – saves time
healthy method as no fat is used

Disadvantages

food takes a long time to cook – requires more use of fuel
heat destruction of vitamin C more likely to occur
kitchen likely to be filled with moisture
food does not develop colour – can be insipid – fish, puddings etc
food remains soft – no crisp/variety of texture

(at least 2 points from each area)

10 points: 2 points = 1 mark

[5]

6 (a) Reasons for serving sauces

add moisture	gravy, custard etc.
add nutrients	custard, chocolate sauce, cheese sauce etc.
add colour	jam sauce, chocolate sauce, parsley sauce etc.
add flavour	cheese sauce, mint sauce, apple sauce etc.
counteract richness	apple sauce with roast pork, orange sauce with duck etc.
add interest/variety	curry sauce etc.
add contrasting texture	bread sauce with roast poultry, parsley sauce with fried fish etc.
aids digestion	tartare sauce

4 reasons + 4 examples

8 points: 2 points = 1 mark

[4]

(b) (i) melt fat – add flour – stir – with wooden spoon

broader base/does not conduct heat – fits corners of pan
over gentle heat – until sandy/crumbly – do not allow to brown
prevent burning of fat/flour – spoiling colour – and flavour
remove from heat – add milk – gradually – prevent lumps
flour does not gelatinise – stir all time – smooth liquid
return to heat – bring to boil – stir all the time – boil for 3 minutes
to cook starch – to prevent floury/raw flavour
starch gelatinises – should coat the back of wooden spoon – add cheese

8 points: 2 points = 1 mark

[4]

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(ii) Dishes which include cheese sauce

macaroni cheese
lasagna
cauliflower cheese
pasta bake
eggs/fish au gratin etc.

2 points = 1 mark

[1]

(c) Ways to reduce fat in cheese

Reduce margarine / use low fat spread
use semi-skimmed / skimmed milk
use less cheese
choose cheese with a stronger flavour and use less
use low fat cheese etc.

3 x 1 mark

[3]

(d) Reasons for lumps in sauce

milk added too quickly
too much milk added at a time
not stirred when milk added
not stirred when boiling

3 x 1 mark

[3]

7 (a) The importance of food packaging

protects food from damage – during transport – and storage
identifies product – gives information – advertises – may give nutritional information/educational
eye-catching for consumer so manufacturer may sell more – allows stores to display goods in an attractive way
saves time in shops – foods do not need to be wrapped – easy to carry
attracts customers – prevents tampering – protects food from pests – preserves – food does not come into contact with bacteria – from hand/equipment/shelves etc. – prevents loss of moisture
makes storage easier – rigid shapes can be stacked
items contain a specific weight – sold at a set price
foods can be put away after shopping in a shorter time etc.

10 points: 2 points = 1 mark

[5]

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(b) The information on food labels

some information is a legal requirement

name of product

description

name of manufacturer

address of manufacturer

ingredients

cooking instructions

storage instructions

serving suggestions/recipes

picture of product

weight

special claims

vegetarian society symbol

wheat ear symbol

recycle symbol

nutritional information

kilocalorie content

sugar content

fat content

salt content

additives identified

may include nuts

price

Halal information

use by / best before dates

portions provided

percentage of R.D.A. of certain nutrients

country of origin

so customer knows what is being bought
further details e.g. tuna in brine / can
identify brand reliability / knows what to
expect etc.

recognise as something seen before
in case of need to contact

in descending order – by weight – may
have allergies etc. so need to avoid

for best results / new product /
inexperienced

to maintain best condition

to give ideas to consumer

to give information on new products

can calculate unit cost / make comparisons

reduced fat / no added sugar / added vit. C

so vegetarians know it is a suitable product

gluten free / coeliacs can consume

to tell how to dispose of packaging

to give nutritive value per 100g

may be counting calories / to lose weight

useful for diabetics

states amount of saturated fat – may have

CHD – or want a healthier diet

to control intake if high blood pressure

may wish to avoid / allergies etc.

allergies etc.

if on special offer / can compare products

suitable for certain religions

ensures that food is still fresh

to know how many can be served

50% of vitamin C etc.

ability to select / boycott products

10 points: 2 points = 1 mark

[5]

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(c) The use of additives in processed food

nutritional – vitamin C in fruit juice, calcium in white flour, vitamins A and D in margarine
 preservative / extend shelf life / preserve / reduce spoilage
 make food more attractive / add colour – flavour – aroma
 to replace colour / flavour / nutrients lost during processing
 can improve texture / consistency – stabilisers in ice cream etc.
 emulsify fat and water – prevent separating – mayonnaise etc.
 antioxidant – prevent rancidity in fats
 can be natural but not found in the food added to
 or synthetic – e.g. vitamin C can be made synthetically
 can be artificial colours and flavours etc. – E numbers have been approved by European
 Community – must be used in the smallest amount possible to give desired effect
 some people are allergic / intolerant to certain additives – cause rashes / asthma / chest
 pains (MSG), hay fever symptoms etc.
 hyperactivity in children – associated with tartrazine – in cordials, sweets
 long-term effect is not known – MSG banned in some countries
 must be stated on packaging if contained in product
 danger of adding nut extracts for those allergic to nuts etc.
 may be used to increase sales – longer shelf-life – prevent waste
 use to help to make new foods – instant desserts etc.

10 points: 2 points = 1 mark

[5]

[Section B Total: 45]

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- 8 (a) Explain why some people choose to follow a vegetarian diet and suggest ways to ensure that vegetarians have enough High Biological Value (HBV) protein in their diet.

Identify and discuss problems that could be associated with vegetarian diets. [15]

Answers may include the following knowledge and understanding.

Reasons for choosing a vegetarian diet

religious beliefs – Hindus and Buddhists are vegetarian etc.
 follow traditions of family – brought up to follow vegetarian diet etc. – peer group pressure
 object to the slaughter of animals – think it is cruel – believe that animals have a right to life – object to the way animals are reared, kept in overcrowded conditions etc.
 expensive to rear animals – land could be used for crops – more people could be fed from the same area
 dislike animal flesh – taste/texture etc.
 meat is expensive to buy – difficult to store without refrigeration
 belief that vegetarian diet is more healthy – animal fat has cholesterol – associated with CHD
 recent health scares – bird ‘flu, BSE, Salmonella from eggs / chickens etc. / allergies
 green issues – methane from cows

Types of vegetarian diet

vegan / strict vegetarian	consumes nothing of animal origin
lacto-vegetarian	no animal flesh but consumes milk and its products
ovo-vegetarian	no animal flesh but eats eggs
lacto-ovo-vegetarian	no animal flesh but consumes milk, eggs and products

Ways to include HBV protein in vegetarian diets

lacto-vegetarians, ovo-vegetarians and lacto-ovo-vegetarians will get HBV – protein from milk, cheese and eggs
 Quorn – mycoprotein – made to resemble meat – sausages / cutlets / mince
 sliced meat substitutes for sandwiches etc. – not suitable for vegans – fibres stuck together with egg albumen
 vegans – soya beans – contain all indispensable / essential amino-acids – only HBV from a plant source – soya products
 flour – milk – tofu – tempeh etc. (not oil) – TVP
 oil removed from beans – remainder is extruded into fibres – made to resemble meat – used in sausages / pies / curries etc.
 combine LBV protein foods – in same meal – complementary protein
 IAAs missing in one food can be supplied by the other
 forms HBV protein – improves quality of protein in meal – e.g. nuts / pulses / cereals – beans on toast / lentil soup and bread etc.

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Problems which could occur for those who follow a vegetarian diet

shortage of vitamin A / retinol – add red/orange vegetables – green vegetables – margarine fortified with vitamin A supplied as beta-carotene – converted to vitamin A in body

shortage of vitamin B2 / riboflavin – include nuts / cereals / pulses / potatoes

may lack vitamin B12 – deficiency causes pernicious anaemia supplied by yeast extract – added to breakfast cereals

vitamin D – to absorb calcium – fortified margarine – sunshine

calcium – fortified breakfast cereals – nuts / pulses / cereals

iron – fortified breakfast cereals / soya / green vegetables etc. – iron supplied as non-haem

iron to vegans converted from ferric to ferrous form – by vitamin C – and stomach acid

changes from non-haem iron to haem iron

vitamin C – to ensure absorption of iron – named fresh fruit and vegetables

may be low in energy – high in water content/fruit and vegetables

bulky due to cellulose – cannot eat enough to supply all nutrients – cook some fruit and vegetables to reduce bulk eat snacks – cereals / nuts / fruit / vegetables – energy dense

lack of variety – use herbs and spices – vary cooking methods

packaged / processed foods may contain ‘animal’ products

check ingredients list – know E numbers to avoid

may cause upset to digestive system – too much cellulose etc.

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8 (a) Mark Bands	Descriptors	Part Mark	Total
High	<p>can probably identify 2 or 3 types of vegetarian diet</p> <p>usually describes each of those named</p> <p>can give several reasons for choosing vegetarian diet</p> <p>mentions several ways of including HBV in diet</p> <p>illustrates answer with examples</p> <p>is aware of several possible problems for vegetarians</p> <p>explains how many of them can be addressed</p> <p>information usually accurate</p> <p>uses technical terms appropriately</p> <p>all parts of the question addressed</p> <p>answers are specific</p> <p>points are usually explained well</p> <p>sound knowledge of the topic will be apparent</p>	11–15	15
Middle	<p>can identify 1 or 2 types of vegetarian diet</p> <p>usually describes at least one type</p> <p>can give 2 or 3 reasons for choosing vegetarian diet</p> <p>information is not always accurate</p> <p>can identify several possible HBV foods</p> <p>probably gives examples to illustrate</p> <p>is aware of some of the possible problems</p> <p>may indicate how they could be addressed</p> <p>answers may be general</p> <p>detail lacking in some areas</p> <p>information tends to be superficial</p> <p>technical terms not always appropriately used</p> <p>not all points are explained well</p> <p>some parts of question answered at length</p> <p>at least one part will be considered briefly</p> <p>gaps in knowledge will be obvious</p>	6–10	
Low	<p>can identify at least one type of vegetarian diet</p> <p>may not be able to define</p> <p>can give 1 or 2 reasons for following vegetarian diet</p> <p>may list sources of HBV protein</p> <p>little attempt to explain their suitability</p> <p>formation is general</p> <p>may consist of lists of facts</p> <p>little use of technical terms</p> <p>not all information given is accurate</p> <p>may not consider all parts of question</p> <p>response to the question will probably be brief</p> <p>limited knowledge of the topic will be apparent</p>	0–5	

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- 8 (b) Cows milk is important in the diet but it does not keep long unless it is treated or made into another dairy product.

Discuss this statement under the following headings:

- (a) nutritive value of milk;
 (b) different methods of treating milk to extend its shelf-life;
 (c) dairy products.

[15]

Answers may include the following knowledge and understanding.

(a) Nutritive value of milk

HBV – protein – casein – lactalbumin – lactoglobulin – fat – vitamin A – vitamin D – calcium – phosphorus – thiamin – riboflavin – little nicotinic acid – lactose – no NSP – no vitamin C
 high proportion of water
 functions of named nutrients

(b) Methods of treating to prevent souring

Pasteurised 72 °C (162 °F) – 15 seconds

OR 63 °C (145 °F) – 30 minutes

cooled rapidly – to not more than 10 °C – destroys harmful (pathogenic) bacteria

Sterilised homogenised – 113 °C (235 °F) – 15 to 40 minutes

UHT 132 °C (270 °F) – 1 second – cooled rapidly – sealed – foil-lined containers – store at room temperature if unopened

Dried homogenised – may be skimmed – water removed – by spray drying – fine jet into chamber of hot air – water evaporates – powder falls to bottom

OR roller drying – spread onto heated rollers – water evaporates – film of dry milk scraped off

Condensed homogenised – heated to 80 °C (176 °F) – 15 minutes – sugar added – heated in vacuum – some water removed – cooled – sealed in cans

Evaporated as condensed milk – no addition of sugar – sealed cans – sterilised – 20 minutes – 115.5 °C (240 °F)

Frozen – pasteurised homogenised milk – in polythene bags – up to 1 year – pasteurised milk not suitable – separates on thawing

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(c) Dairy products

Butter

cream separated from milk – pasteurised – held at 4 °C – to develop acidity – cooled to 7 °C – churned – fat globules stick together – buttermilk drained off – fat chilled – washed – hardened – salt added – for flavour – and to preserve – worked until smooth

Cream

milk left to stand for 24 hours – cream forms a layer on surface – skimmed off – cooled – pasteurised – single/double/whipping – can be acted upon by lactic acid bacteria – soured cream

Cheese

many varieties – pasteurised milk used (usually) – bacteria culture added – converts lactose to lactic acid – acid helps to preserve cheese – heated – 30 °C – rennet added – milk clots – caseinogen coagulates with acid – left for 45 minutes – curds and whey formed – curd cut – whey drained off – curd scalded to 30 °C – 45 minutes – stirred – cut into blocks – piled up – drained – cut into chips – salt added – packed into moulds – pressed for 24 hours – sprayed with hot water – to form rind – ripens – at 110 °C – for 4 months – develops flavour – smell – texture – mature cheeses ripened longer – cottage/blue-veined/cream/

Yoghurt

made from all types of milk – homogenised – pasteurised – at 85-95 °C – cooled – bacteria added – lactobacillus bulgaricus – streptococcus thermophilus – incubated 4 – 6 hours – becomes acidic – flavours develop – proteins coagulate – cooled – flavours etc. added

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Mark Bands	Descriptors	Part marks	Total
High	<p>candidate can name several nutrients with functions</p> <p>can state at least 3 methods of treating milk and can give details of methods</p> <p>can name at least 3 dairy products gives details on their production</p> <p>comments are precise and related to specific examples</p> <p>information given is accurate</p>	11–15	15
Middle	<p>can name many of the nutrients in milk</p> <p>some functions are stated</p> <p>can state at least 2 methods of treating milk and can give some details of methods</p> <p>can name at least 2 dairy products and can give some information on production</p> <p>some gaps in knowledge</p> <p>terminology not always accurate</p> <p>information given in not always precise</p>	6–10	
Low	<p>can name a few nutrients</p> <p>functions not always known</p> <p>1 or 2 brief notes on methods of treating milk</p> <p>1 or 2 dairy products mentioned</p> <p>information not always accurate</p> <p>general information</p> <p>poor knowledge of production</p> <p>limited knowledge of the topic apparent</p>	0–5	