UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the November 2005 question paper

0648 FOOD AND NUTRITION

0648/01 Paper 1 maximum raw mark 100

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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Section A

1 (a) Nutrients providing energy
fat - protein - carbohydrate / starch / sugar
3 x 1 point

(b) Energy value of 1 g

fat	9 kcal or 37 kJ
protein	4 kcal or 16 kJ
carbohydrate	4 kcal or 16 kJ

3 x 1 point
points = 1 mark [3]

(c) <u>Uses of energy</u>
heat / maintains body temperature
movement / physical work
nervous impulses / electrical energy
chemical processes within cells / growth
BMR - involuntary processes - breathing, heartbeat, blood circulation etc.
4 x 1 mark [4]

(d) <u>Basal Metabolic Rate</u>
energy required - to maintain body processes - involuntarily - when at rest - normal body temperature - 5 hours after a meal - different for all individuals - breathing - heartbeat - blood circulation - growth etc. (any 2)
6 points 2 points = 1 mark [3]

(e) <u>Energy intake greater than output</u>
converted to fat - stored - around internal organs / under the skin - obesity - lack of self-esteem - breathless - problems during surgery - diabetes - coronary heart disease (CHD)
6 points 2 points = 1 mark [3]

(f) <u>Reasons for different energy requirements</u>
age - energy required for growth
body size - greater surface area requires more energy to maintain body heat
health - energy may be required to replace damaged cells etc.
gender - males have a higher BMR than females
females may be pregnant or lactating - energy for growth of foetus or for production of milk
occupation - manual workers need more energy than sedentary workers
activity - active children or athletes use more energy
weather - energy to maintain body temperature in cold climates
5 well-explained points 5 x 1 mark [5]

2 (a) Sources of iron
liver - kidney - red meat - corned beef - egg -
green vegetables / named example - black treacle - apricots - cocoa
wholemeal bread - curry powder etc.
4 points 2 points = 1 mark [2]

(b) Importance of iron
formation of haemoglobin - red pigment - in blood - picks up oxygen -
oxyhaemoglobin - oxidises glucose - in cells - production of energy
6 points 2 points = 1 mark [3]

(c) Deficiency disease
Anaemia 1 mark [1]

(d) Symptoms
lethargy / lack of energy - pale complexion - dizziness / headaches
2 points 2 points = 1 mark [1]

(e) Absorption of iron
Vitamin C 1 mark [1]

3 (a) Digestion in the duodenum
bile - from gall bladder - in liver - emulsifies fats - breaks into small droplets - increases surface area - neutralises acid from stomach - stops action of pepsin - trypsin - from pancreatic juice - breaks down proteins into peptides / peptones / polypeptides - lipase - converts fats to glycerol - and fatty acid - pancreatic amylase - converts starch to maltose
10 points 2 points = 1 mark [5]

(b) Absorption in ileum
villi - in walls of ileum - m contain blood capillaries - which absorb amino-acids - and glucose - lacteal - absorbs glycerol and fatty acid - which reform into fats - water soluble minerals / vitamins absorbed-
6 points 2 points = 1 mark [3]

4 (a) Importance of fresh fruit and vegetables
colour - flavour - texture - thirst quenching / water - NSP - vitamin C - vitamin A -
6 points 2 points = 1 mark [3]

(b) Ways to encourage children
introduce stewed fruit e.g. apples at an early age - smooth - easy to swallow
banana for snacking - easy to hold and eat - soft texture
fresh fruit juice - instead of high sugar squashes and fizzy drinks
prepare and cut into pieces - easier to manage than a whole apple or orange
include in packed meals - thirst quenching
use to decorate foods - colour encourages children to eat
make fruit salads - cut into small pieces - easy to eat
soups - easy to consume, can liquidise vegetables
include in casseroles and savoury rice - adds colour, introduces new flavours
How to encourage - max. 4 points
Reasons - min. 2 points
6 points 2 points = 1 mark [3]

[*Section A* Total: 40 marks]

Section B

5 (a) Importance of cereals

cheap - easy to grow - easy to store - versatile - energy source -
can be used for sweet and savoury dishes - many varieties - filling - etc.

4 points 2 points = 1 mark [2]

(b) wheat - barley - oats - rye - rice - maize / corn / mealie meal - millet - sorghum

4 points 2 points = 1 mark [2]

(c) Shortcrust pastry method with reasons

sift flour	to aerate – remove lumps
cut fat into small pieces -	less rubbing in required
rub in fat - with fingertips -	coolest part of hand
lift hands above bowl	to collect air as crumbs fall
should look like breadcrumbs	shake bowl – to bring large pieces to top
add cold water -	to avoid melting fat
mix with round-bladed knife -	keeps everything cool
knead lightly - with fingertips	to avoid pressing out air
do not overhandle -	develops gluten - toughens
form into a firm dough -	too much water gives hard pastry
chill -	hardens fat
time to relax before baking -	easier to roll – avoids shrinkage

10 points **Must include at least 2 reasons.**

2 points = 1 mark [5]

(d) Oven temperature for pastry

gas mark 6 or 7 400°C – 425°F 200°C – 210°C (must give appropriate C or F)

1 mark [1]

(e) Changes during baking

fat melts - starch granules gelatinise - absorb fat - steam produced -
air expands - separates layers - gluten coagulates - because it is protein -
becomes crisp - browns - dextrinisation of starch becomes *crumbly*

10 points 2 points = 1 mark [5]

6 (a) Soya

pulse vegetable - contains all indispensable amino-acids -
only plant source of HBV protein - useful for vegans -
contains fat - iron - calcium - NSP - starch - vitamin A - vitamin D - protein - HBV (1 point for each 2 nutrients) **max. 4**
gives variety to diet - soya oil - soy sauce - soya flour - soya milk - margarine - tofu - (1 point for each 2 soya products) **max. 4**
can be made to resemble meat fibres - Textured Vegetable Protein (TVP) - oil extracted - leaves flour - water added - extruded - coloured - flavoured - dehydrated - long shelf-life - used a meat extender - or meat substitute can mix with LBV protein - e.g. with cereals like pasta or rice - to produce HBV protein - bland - takes on flavour of other foods - needs seasoning / spices / herbs -
used for pie filling, burgers, casseroles, sausages, curries, in convenience foods e.g. Pot Noodles etc. (1 point for each 2 examples) **max. 4**
10 points 2 points = 1 mark [5]

(b) The use of yeast as a raising agent

living organism - plant - requires warmth - blood heat - moisture - food - time - yeast cells multiply - reproduces by budding - in fermentation process - can *be* compressed yeast - dried yeast - or `easy blend' - produces carbon dioxide - and alcohol - cold temperatures slow down ! stop action of yeast - killed at high temperatures - enzymes in yeast cause breakdown of sugar - maltase - converts maltose to glucose - invertase I sucrose - converts sucrose to glucose and fructose - zymase - converts glucose and fructose to carbon dioxide and alcohol - more CO2 evolved - carbon dioxide pushes up dough - expands dough - gluten stretches to trap gas - kneading evenly distributes yeast in dough - but some gas escapes - proving allows more gas to evolve - dough regains shape - yeast killed in hot oven - sets in risen shape - gluten in flour coagulates - alcohol evaporates - used in bread-making etc.
10 points 2 points = 1 mark [5]

(c) Different uses of sugar

sweetener - drinks, cakes sauces
increases energy value of foods - beverages etc.
preservative - high concentration of sugar prevents growth of micro-organisms
e.g. jam (60% added sugar)
improves colour of baked products - cakes with brown sugar,
caramelises sugar in dry heat of oven
retains moisture and prevents baked products drying - rich cakes
helps fat to incorporate air - creamed cake mixtures prevents
development of gluten and gives more crumbly result -
cakes and rich pastries
food for yeast - fermentation of bread dough
delays coagulation of protein in eggs and gluten - more time for gases to expand
in cakes etc.
strengthens protein in beaten egg white - helps to retain air - meringues
retards enzyme action - frozen foods
cake decorations - marzipan, glace icing, butter icing etc.
sugar and water glaze - sticky layer on yeast buns
can make caramel - desserts e.g.. creme caramel, creme brulee
confectionery - toffee, sweets, fudge etc.

allow only 1 example for each use of sugar

10 points 2 points = 1 mark [5]

7 (a) Types of bacteria which cause food poisoning
E.Coli - Salmonella - Listeria - Bacillus cereus - Clostridium botulinum
Clostridium welchii - Staphylococcus aureus - etc.
2 points = 1 mark [1]

(b)

(i)	-18°C	bacteria dormant - no multiplic ation
(ii)	-4°C	slow multiplication
(iii)	37°C	rapid multiplication
(iv)	70°C	bacteria killed 1 denatured

4 points 2 points = mark [2]

(c) Storage, preparation, cooking and serving of meat
in refrigerator - 4°C - slow down multiplication of bacteria -
store raw and cooked meat separately - raw meat at bottom -
prevent cross-contamination - e.g. Salmonella in poultry –
clean container - prevent cross-contamination –
cover - to prevent cross-contamination - prevent drying of surface
fast freeze at -25°C - small ice crystals within cells - maintain cell structure
in freezer - at -18°C - to stop action of bacteria
airtight - prevent freezer burn
thaw thoroughly - so that heat penetrates during cooking - kills bacteria
do not refreeze - bacteria will have started to multiply - risk of food poisoning
temperature of at least 70°C - for 2 mins - in centre / thickest part -
to kill bacteria - do not keep warm - ideal conditions for multiplication of
bacteria - do not reheat more than once - must reach 70 C for 2 mins.. -
use within 24 hours of cooking unless frozen -etc.
12 points to cover all areas 2 points = 1 mark [6]

(d) Changes brought about by enzymes
oxidation - destroys nutrients - e.g. vitamin C / thiamine / carotene -
found in cell walls - released when cut / bruised - destroyed by high temperature –
e.g. boiling - protein therefore denatured - action slowed down by low temperatures -
ascorbase acts on vitamin C in green vegetables - damaged surface browns - when
exposed to air - e.g. apple - when cut / bruised ripening - starch converted to sugars -
develops sweet flavour - appropriate colour - in fruit and vegetables - unripe bananas
contain starch - change from green to brown - develop sweet flavour - soft texture -
over-ripen if process continues - tissues break down - flesh discolours - very soft - cell
walls rupture and release juice - unappetising etc.
12 points 2 points = 1 mark [6]

[*Section B* Total: 45 marks]

8 (a)	Mark bands	Descriptors	Part marks	
	High	- The candidate is able to give many points to consider when meal planning - can name several nutrients needed by teenagers - can given examples of foods containing them - may discuss problems associated with teenage eating habits - specific terminology is used where appropriate - comments are precise and related topic - candidates a clear understanding of meal - planning and the specific needs of teenagers	11-15	15
	Middle	- The candidate can give a few points to note when meal planning - factual content is sound but explanations of points may not always be given - Information given may be accurate but not all nutrients are considered - some points about teenage eating habits and associated problems may be mentioned	6-10	
	Low	- The candidate can give a few points about meal planning - information is general and lacks specific detail - few points given about teenage diets - limited knowledge of the subject will be apparent	0-5	

The answer may include the following knowledge and understanding.

Points when planning meals

variety of colour	-	use of vegetables, different colours in each course
variety of flavour	-	avoid repetition of flavour in courses
variety of texture	-	not too soft, crispy etc. - not 2 pastry courses
cost	-	consider budget - use cheap cuts of meat, foods in season etc.
time available	-	tough cuts of meat need long, slow cooking may need to consider convenience foods
equipment available	-	microwaves, steamers, electric mixer etc.
availability of food	-	season, proximity of shops, transport
skill of cook	-	should choose only dishes competent to cook
occasion	-	party, packed meal, celebration, Christmas etc.
season	-	hot food in cold weather etc.
courses should be in same plane	-	do not follow an elaborate first course with a pot of yoghurt
time of day	-	breakfast will be different from lunch
health of family	-	consider light meals for convalescents etc,
special diets	-	vegetarian, low fat etc.

Special needs of teenagers

HBV protein	growth spurt	meat, fish, cheese, milk, eggs
iron	menstruation	red meat, egg, liver, cocoa
	increases volume of blood	green vegetables, raisins etc.
vitamin C	absorption of iron	citrus fruit, blackcurrant, kiwi, tomatoes, green vegetables etc.
calcium	bone growth	milk, cheese, green vegetables white bread, canned fish bones
vitamin D	absorption of calcium	cheese, margarine, oily fish etc.
starch / fat	energy	cereals, potatoes milk, margarine etc

not too much fat difficult to digest - obesity - if in excess of needs
saturated fat from animals - e.g. butter, red meat (1 example) -
associated with cholesterol - deposited in arteries - narrows - blocks –
coronary heart disease (CHD) - hypertension - strokes
problems later in life - peer pressure -
tend to consume junk food - high in fat - sugar - diabetes - tooth decay - salt
hypertension - should avoid snacking - unless on fruit -

8 (b)	Mark bands		Descriptors	Part marks	
	High	-	The candidate is able to give many advantages and disadvantages of convenience foods - the candidate 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 - many different examples are given to show the use of convenience foods - facts are supported by explanations - an understanding of the topic will be apparent	11-15	15
	Middle	-	The candidate can give a few advantages and disadvantages of convenience foods - factual content is sound but is not always linked to examples to support facts or illustrate points - information given may be accurate but not all issues are considered - many issues are dealt with superficially - some examples are given to show the use of convenience foods	6-10	
	Low	-	The candidate can give some advantages and disadvantages of convenience foods but does not consider a wide range - the information is general and lacks specific detail - additional detail not given to clarify points made few examples of the use of convenience foods in family meals will be given - limited knowledge of the topic will be apparent	0-5	

The answer may include the following knowledge and understanding.

Types of convenience food

tinned	beans, corned beef, tuna, peaches
dried	milk, fruit, custard powder, herbs
frozen	fish, peas, ice cream, sausages
ready to eat	biscuits, yoghurt, crisps, 'take away' food etc.

Advantages of convenience foods

save time
easy to prepare
some or all of the preparation has been done
save fuel
easy to store
food available for emergencies
longer shelf life than fresh
readily available
buy foods out of season
food available from other countries
easy to transport
no waste
little washing up
large variety available
rook may not have the ability to make the product e.g. puff pastry
no need for individual ingredients to be bought
portion control
consistent product
nutrients may have been added
e.g. of foods to illustrate points can be given

Disadvantages of convenience foods

expensive
packaging may cause pollution
can be high in fat - problems of high fat diet
can be high in salt - problems of high salt diet
can be high in sugar - problems
can be low in NSP - highly refined - problems of low NSP diet
contain additives - types of additives - e.g. artificial colourings and flavourings
allergies - hyperactivity - long term effects not known
small portions
loss of vitamins B and C
loss of skills

Use of convenience foods in family meals
e.g. cleaned, filleted and frozen fish
frozen puff pastry for pies etc.
canned red kidney beans
biscuits and bread ...
tomato puree
bottled sauces, flavourings
pots of yoghurt for dessert
frozen desserts e.g. ice cream
custard powder, blancmange
UHT milk - dried milk - for cooking sauces etc
canned fruit in desserts e.g. pineapple upside down pudding
dried fruit - currants, sultanas - in cake making
cake mixes - pastry mix
dried herbs - stock cubes etc.

Uses in family meals should be expected from named examples of convenience foods.
A list of convenience foods in not acceptable since the question asks how they can be incorporated into family meals.