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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2009 question paper

for the guidance of teachers

6065 FOOD AND NUTRITION

6065/01 Paper 1 (Written), 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.

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1 (a) (i) Elements in fat
carbon – hydrogen – oxygen
(3 × 1 mark)

(ii) Other sources of energy
Carbohydrate/starch/sugar – protein
(2 × 1 mark) [2]

(iii) 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]

(b) (i) 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]

(ii) 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]

(iii) Deficiency of vitamin A
night-blindness (1 mark) [1]

(iv) Functions of vitamin D
promotes absorption of calcium/phosphorus
formation of bones/teeth
maintenance of bones/teeth
(2 × 1 mark) [2]

(v) 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]

(vi) Deficiency of vitamin D
rickets/osteoporosis/osteomalacia
(1 mark) [1]

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(c) (i) 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]

(ii) 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]

(d) (i) 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]

(ii) 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]

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(e) (i) 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/cools 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]

(ii) Water deficiency

Dehydration (1 mark) [1]

(iii) Symptoms of dehydration

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

(iv) 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]

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2 (a) (i) 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.
(6 points (including 1 example)) (2 points = 1 mark) [3]

Convection

through liquids – and gases – molecules become less dense – rise –
colder molecules fall – they are heated – convection currents –
until a constant temperature is reached –
heat energy is transferred by the movement of the gas or liquid molecules
e.g. boiling potatoes/steaming fish/baking a cake etc.
(6 points (including 1 example)) (2 points = 1 mark) [3]

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 needs to be turned etc.
e.g. grilled steak/spit-roasted chicken – barbecued sausages etc.
(6 points (including 1 example)) (2 points = 1 mark) [3]

(b) Advantages and disadvantages of cooking in a microwave oven

Advantages

quick – fuel saved – no pre-heating necessary – no mess in oven –
sides stay cool so 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 etc.

Disadvantages

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.
(12 points (at least 2 points from each area))
(2 points = 1 mark) [6]

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3 (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) [5]

(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]

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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 –
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]

4 (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) [5]

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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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5 (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]

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6 (a) Fatless sponge cake

(3 eggs – given in question)

75 g plain flour (allow SR)
75 g (caster) sugar
(4 points) (2 points = 1 mark) [2]

(b) 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 – to 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 – cutting action –
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 –
Swiss roll – 225°C/425°F/gas mark 7 for 7–10 minutes
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 a wire rack – to allow steam to escape

DO NOT credit rolling Swiss roll or any cake decoration.
(12 points) (2 points = 1 mark) [6]

(c) Changes during baking

air expands – gas rises – pushes up cake mixture –
protein coagulates – at 60°C – around air bubbles –
sets risen shape – open texture –
sugar caramelises – Maillard browning – reaction 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 to raise cake –
(8 points) (2 points = 1 mark) [4]

(d) Reasons for a close texture

insufficient whisking
air knocked out during folding in of flour
did not use a cutting action to add flour – whisked/beat in flour
used wooden spoon or electric mixer for adding flour/did not use metal spoon to incorporate flour
continued folding after all of flour was incorporated
not baked immediately
oven temperature too low
insufficient baking etc.
(4 points) (2 points = 1 mark) [2]

(e) Uses

Swiss roll – sponge flan – chocolate sponge cake – sponge fingers etc.
(2 points) (2 points = 1 mark) [1]

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7 (a) Causes of food spoilage

yeast – moulds – enzymes – moisture loss
(4 points) (2 points = 1 mark)

(b) (i) bacteria dormant/unable to reproduce (1 mark)

(ii) bacteria reproduce slowly (1 mark)

(iii) bacteria reproduce rapidly (1 mark)

(iv) bacteria killed/destroyed (1 mark) [4]

(c) Use of refrigerator

cover food	to prevent drying – cross-contamination absorption of smells
do not over-pack	must allow cold air to circulate
clean containers	reduce risk of cross-contamination
raw meat at bottom	so juices cannot drip onto other foods
raw and cooked foods separate	– prevent cross-contamination
keep temperature 1°C – 7°C	slow down bacterial growth
temperature must not be below 1°C – water freezes – spoils texture of food	
do not freeze food in ice-box	temp. not low enough – large ice crystals
fruit and vegetables in crisper	not too cold – retain moisture/crispness
use in rotation	food should be used when in best condition
check expiry dates	food unsafe if beyond 'use by' date
do not mix old and new foods	bacteria from old pass to new – reduces shelf-life of newer food etc.

(10 points) (2 points = 1 mark) [5]

(d) Ways to avoid transfer of bacteria during food preparation

clean surfaces – free from bacteria – wash with hot soapy water –
clean equipment – dry in open air – or with clean tea towel –
wash food/clean thoroughly before cooking –
different equipment for raw and cooked food –
to prevent cross-contamination – different coloured chopping boards etc. –
high standard of personal hygiene –
wash hands after visiting toilet/handling raw meat/rubbish etc.
clean apron – hair tied back/covered short/clean fingernails –
no nail polish – cut covered with waterproof plaster –
do not cook if suffering from infectious illness – no smoking –
no coughing/spitting over food – do not lick fingers –
wash tasting spoon before using again – no flies in kitchen –
do not allow animals in kitchen – dogs to have own bowls, not family's –
no cracked or chipped equipment – no left-over food lying around –
wrap food waste – dispose of regularly – cover bin – disinfect –
boil/sterilise dish cloths and tea towels –
make sure frozen food is thoroughly thawed –
so bacteria are destroyed by heat during cooking –
do not defrost then re-freeze food – cover food – etc.
(8 points) (2 points = 1 mark) [4]

[Section B Total: 60]