

Food Studies

Grade 13

Answer Tutorial 1

1(a)(i) pepsin breaks down protein into peptides – in the stomach;

rennin clots milk – in the stomach;

trypsinogen – formed in the pancreas; mixes with enterokinase – in the duodenum; to form trypsin – to break down peptides to peptone / dipeptides / tripeptides;

erepsin – in the ileum – breaks down peptones to amino acids; 6

1(a)(ii) apples / avocado / bananas / potatoes / peaches / pears contain phenols – that are released when cells are damaged / cut; the phenols act as a substrate to the enzyme phenolase that is also present; the phenolase turns the phenols into a new product – called melanin – that is brown in colour; the reaction takes place in the presence of oxygen – when the pH is between 5.0 and 7; 3

1(a)(iii) (rennet / chymosin from) rennin – is used to clot the proteins in milk;

catalase is used in Swiss cheese production to preserve natural flavours;

lipases break down milk fats – used to produce Italian Romano cheese; 1

1(a)(iv) hydrolytic rancidity – occurs in fats and oils that have not been heat treated – and may contain lipases – that catalyse the hydrolysis of triglycerides – to fatty acids and glycerol – in the presence of water – resulting in an ‘off’ flavour and smell; 3

1(b) water taken into the body equals water lost;

the kidneys maintain water balance in our blood stream by making urine of different concentrations;

when the concentration of water in our blood stream is low the kidneys allow more water to be absorbed into the bloodstream; when the water concentration in our bloodstream is high the kidneys remove water from our bloodstream; these actions alter the concentration of urine; the body takes water in from drinks, food and respiration; the body loses water through sweating and urinating; 3

1(c)(i) cabbage / kale / spring greens / collard greens – watercress – spinach – black eyed peas – bok choy / pak choy – dried figs – sardines / pilchards – canned salmon – white beans – okra – tofu – soya beans – bread / fortified flour – almonds – sesame seeds – crabs / lobsters – blackcurrants – apricots – walnuts – chia seeds; 2

1(c)(ii) oxalates in rhubarb and spinach – form insoluble calcium oxalate;

phytates in wholegrains – bind to calcium impeding its bioavailability;

low levels of parathyroid hormone – results in poor metabolism of vitamin D to stimulate calcium absorption;

vitamin D deficiency – will prevent the calcium – protein complex formation necessary for calcium absorption;

kidney disease – will prevent the activation of vitamin D; 3

1(c)(iii) groups of people:

vegans – women wearing a hijab / niqab / burka – the elderly / infirm / housebound – night shift workers / people living in Polar regions / Northern hemisphere / winter months;

symptoms:

rickets – curvature of the bones in children;

osteomalacia – loss of calcium in the bones in adults;

hypocalcaemia – bruising / pins and needles;

tetany – muscle contractions / seizure;

hyperparathyroidism – fragile bones / kidney stones / abdominal pain / joint pain;

myopathy – muscle weakness / pain / exercise intolerance;

depression – difficulty concentrating / feelings of worthlessness / hopelessness

2(a) vitamin A – production of visual purple / rhodopsin;

vitamin D – formation of bones and teeth;

HBV protein – growth / repair;

calcium – muscle contractions – clotting – bone and teeth formation;

vitamin B12 – formation of erythrocytes;

iron – formation of erythrocytes / haemoglobin;

phosphorous – constituent of nucleic acids – formation of bones and teeth;

iodine – synthesis of thyroxine;

(magnesium, potassium, vitamin E, vitamin K, vitamin B1, vitamin B2, vitamin B3, sodium, zinc, copper, manganese, selenium, folate are also present in less significant quantities) 6

2(b)(i) vitamin A / retinol; vitamin D / cholecalciferol; vitamin E / tocopherol;

fat soluble – can be stored by body / stored in liver – possibility of a build up / retention of too much – if diet rich in offal / oily fish liver / vegetable oils; 3

2(b)(ii) babies – underdeveloped organs unable to cope with excess of all fat soluble vitamins – cause liver / organ damage;

people with low vitamin K / bleeding disorders / haemophiliacs – excess vitamin E may increase bleeding / haemorrhaging / stroke;

people with kidney disease – excess vitamin D can increase blood calcium levels / cause kidney stones;

pregnant women – excess vitamin D / vitamin A can cause harm to foetus / birth defects;

people with liver damage / alcoholics – excess vitamin A can cause increased liver damage;

post-menopausal women – excess vitamin A can lead to increased bone fragility; 3

2(c) likely to have reached menopause at this age – and will have stopped menstruating; before menopause would have lost significant amounts of iron when menstruating – more iron was required on a daily basis to avoid anaemia; 2

2(d) vitamin C aids iron absorption – by converting iron from ferric Fe^{3+} to ferrous form Fe^{2+} ; vitamin C is essential for preventing iron-deficiency anaemia – people with iron-deficiency anaemia may be consuming enough iron but lack vitamin C in their diet; 2

2(e) vitamin C: quickly and easily destroyed – prepare foods just before eating – tear cabbage instead of cutting – to avoid damage to cells – avoid exposure to light – destroyed by dry and moist heat – dissolves in cooking water – in storage, is oxidised – when exposed to air – oxidation is accelerated by heat – and exposure to metal ions like copper – becomes unavailable to the body – alkali / bicarbonate of soda – causes oxidation – oxidation reduced by storage in a weak acid – and storage at low temperatures; 5

2(f) reduce intake of saturated fat – to prevent CHD / obesity;

drink more water – to keep the body hydrated / lubricated / maintain cell concentration / AVP;

eat more fruit and vegetables – for hydration / NSP / provide water soluble vitamins;

eat more NSP – to provide bulk to faeces / aid peristalsis;

eat oily fish at least once a week – to provide vitamin D / omega fatty acids;

reduce sugar intake – to reduce calorie intake / prevent type II diabetes / prevent dental caries;

reduce salt intake – to prevent hypertension;

eat a large breakfast, moderate lunch and small evening meal – to enable energy from calories to be used up over the day / to avoid too many calories being eaten before a period of inactivity / rest;

avoid snacking / grazing between meals – to maintain energy balance / avoid eating too many calories;

4

3(a) BMR basal metabolic rate varies between people – BMR is the amount of energy required by the body when at rest;

state of health – the bed ridden have a lower BMR due to low mobility;

state of health – people recovering from an illness or accident have a higher BMR due to repair and renewal;

activity level – BMR higher in athletes from massive energy use on sport;

activity of the thyroid gland – underactive thyroid results in a lower BMR;

activity of the thyroid gland – overactive thyroid results in a higher BMR;

pregnancy – increase in BMR due to growth of foetus;

lactation – increase in BMR due to milk production;

climate – increase in BMR due to needing more energy in cold climate to maintain body temperature;

thermogenic effect of food – BMR increases as intake of food stimulates metabolism / metabolic rate increases after a meal / meal produces extra energy in form of heat;

personality – BMR lower in calm / placid individuals than nervous / aggressive;

muscle mass – muscle burns more calories than fat;6

3(b) eat ready meals as parent does not cook;

increase in use of ready meals – high fat and sugar;

increase in consumption of junk food – high in saturates – not filling – eat more;

children like the sweet flavour of sucrose – it is addictive – leads to overeating – high in calories – empty calories;

availability of snacks – in vending machines – in accessible places like bus stations / train stations;

advertising; celebrity endorsement – e.g. Walkers crisps;

low cost of fast foods; impulse buys / product placement e.g. hot dogs in IKEA;

Krispy Kremes in service stations;

bargains / deals on snack foods / bog off deals;

new trends in entertainment amongst the young – catch a movie, eat popcorn then go for a pizza;

poor portion control;

lack of exercise – due to poor habits / T.V. / computer games / not playing outside; 4

3(c) lipogenesis is the synthesis of triglycerides – in the liver and the adipose tissue – from simple sugars like glucose; it is the body's way of storing energy from carbohydrates as fat – in adipose tissue – for slow release at a later time; the starting point for the synthesis is Acetyl-CoA – which is built onto by two carbons – in the cytoplasm of the liver / adipose tissue cells; 3

3 (d) to 3 (g) see marking scheme Cambridge N18 section A Q3

Q4 See marking scheme N18 Q4

Section B

5(a) 100 g plain flour, 275 ml of milk, 1 egg, ½ tsp salt; sieve flour and salt make a well in the centre; add the egg, add some liquid, mix into the flour; add remaining liquid, mix until smooth, beat for 5 min, fry in a shallow amount of butter / oil; 4

5(b) any leavened bread or cake mixture; yeast will produce carbon dioxide and alcohol; during fermentation; yeast requires a food source / sugar, a warm temperature / 25–29 °C, moisture, time to ferment, and enzymes; during fermentation maltase converts maltose to glucose; invertase converts sucrose to fructose and glucose; zymase converts glucose and fructose to carbon dioxide and ethanol; gas expands in the oven and raises the dough mixture; expansion stops when yeast is killed at high temperature; 6

5(c) choosing: fish is displayed on ice; shellfish should be firmly closed; look for bright eyes, not sunken; firm flesh and moist skin; bright scales that are firmly attached scales; fresh / sea smell; bright red gills, not sunken;

storage: fish decays rapidly so eat or freeze on day of purchase; store wrapped; in a fridge / 5 °C; can be frozen on day of purchase and if not previously frozen; 7

5(d) kitchen should be arranged in a logical order to form a continuous working area for meal preparation; this will save time and avoid wasting energy; user should be able to move easily from food storage, to preparation area, to cooking area, to serving area, to cleaning area; the L-shaped kitchen, U-shaped kitchen or kitchen planned in parallel lines achieves this efficiency; credit the work triangle; maximise use of corner space with corner units and wall units for storage;

waste bin can be stored under the sink to use less floor space; a lid should be fitted to deter flies; bin should be small to facilitate regular emptying and to prevent the accumulation of odours and bacteria;

flooring should be non-slip, easy to clean and not damaged to prevent trips;

lighting should be adequate so the user can see clearly to facilitate cleaning, window provides daylight and ventilation;

window dressing / curtains should not flap near cooker where they are a fire hazard;

all surfaces should be easy to clean and smooth being made from washable, non-porous, non-toxic materials; e.g. stainless steel / food grade plastics; cleaning fluids and other kitchen chemicals should be correctly labelled and should be stored in a high up cupboard, or a locked cupboard where children cannot gain access; surfaces should be cleaned before and after food preparation, spills should be wiped up immediately to prevent slippage; floors should be swept;

food should be stored appropriately, high risk foods in the fridge, dried foods / packets should be in a dry cupboard; animals should be kept out of the kitchen; knives should be stored with blade down / in a knife block and away from children; electrical equipment should not be used near the sink area and should be thrown away if faulty / wires bare;8

6(a) needs of all family members must be met; variety of foods should be eaten each week; avoid fast foods / foods that are high in fats / sugars / salt; they are costly and not filling for long; oily fish provide omega oils; tinned versions may be cheaper than fresh in some countries, e.g.sardines / anchovies / mackerel; cheap cuts of red meat / offal are still nutritious and protein-rich; need cooking for longer / braising; chicken is a cheap protein – legs / wings / feet, not breast, or buy whole bird and make multiple meals from it; minced meat is cheaper than steaks / chops but should only be eaten occasionally as it can be fatty; soya / tofu are protein rich and cheaper than meat; local fish that is abundant is cheaper than imported fish; eggs are nutritious / protein-rich and versatile so are useful in many dishes; staple foods like rice / semolina / pasta / noodles / maize / cassava are filling and provide carbohydrate / energy; local fruits and vegetables provide vitamins and minerals and should be eaten in at least five portions per day; they are cheaper than imported fruits and vegetables; avoid processed foods that have added salt and high fat and are costly, e.g. fish fingers / frozen pies; avoid alcohol / fizzy drinks / sodas, and drink water and milk; 9

6(b) size and capacity required, under counter / tall; storage arrangements inside the refrigerator, shelving, freezer at top or bottom; space available in the kitchen; star rating for frozen food compartment; practicability of a larder fridge; budget available; energy rating; brand loyalty / manufacturer preference; colour and style, American fridge; ratings and reviews / blogs; special features, water dispenser, ice dispenser, wine racks; automatic defrosting; quality and after service available; easy to clean 8

6(c) can be used to reheat precooked food, cook foods from raw, defrost frozen foods, soften / melt butter / jelly cubes; choose cake recipes that use a dark coloured ingredient as cakes do not brown or use a browning dish to brown food; no metal dishes and no aluminium foil as it may cause damage to the oven; check that plastic containers are microwave friendly; cover the food during cooking to avoid drying out; use food safe cling film to avoid chemical transfer into the food; know the heating category of the microwave being used and read the packaging carefully selecting the appropriate amount of time to cook foods for; stir foods half way through cooking and check temperature of the food is over 72 °C after cooking; time carefully to avoid overcooking / burning; do not cook eggs in their shell as they will explode; do not cook any food in a membrane or skin, e.g. potato needs to be pricked to allow steam to escape; avoid excessively fatty foods; allow 10% standing time after cooking before consuming the food; read the instruction booklet; clean between uses, especially on the ceiling of the microwave;

8

7 (a) all types of vegetarians refuse to eat animal flesh and animal products that mean the death of the animal – lacto vegetarian – allows milk and milk products (but not eggs) – ovo vegetarians – allows eggs – but not milk / milk products – lacto-ovo vegetarians – will eat milk, cheese, eggs –

all types of vegetarians may lack HBV protein – may obtain HBV protein by complementation – when two LBV proteins are eaten together so that the EAA / IAA missing in one food is made up in the other

– e.g. cereal and pulse / lentil soup and bread / baked beans on toast – cereals lack lysine – pulses lack methionine –

all vegetarians may eat soya – HBV protein – only plant source that contains all of the IAA – found as tofu / tempeh / soya milk / soya flour / TVP – all vegetarians may lack iron as it is most plentiful in red meat – need to eat dark green leafy vegetables / cocoa / curry powder – all vegetarians may lack vitamin D – may obtain from sunlight – all types of vegetarian need a variety of foods – to obtain all nutrients – all types of vegetarians should drink approximately two litres of water per day – as their intake of NSP tends to be higher – all vegetarians should cut down on salt – flavour foods with herbs /

spices – all types of vegetarians may need to supplement their diets with omega-3 capsules and vitamin B12 – ovo- and lacto-ovo vegetarians may eat mycoprotein – vegans or lacto vegetarians may not eat mycoprotein if bound with egg albumin – lacto and lacto-ovo vegetarians should avoid eating too much hard cheese to get HBV protein – too much saturated fat – lacto and lacto-ovo vegetarians may eat dairy products / margarines / breakfast cereals / soya milk brands which have all been fortified with vitamin D – vegans lack retinol as it is only available from animal sources – can get carotene from fruit and vegetables – body converts carotene to retinol in the gut – six times as much carotene required as retinol – [12]

(b) soya beans – are crushed – their oil is extracted – soya flour with the fat removed remains – it is blended – heated under pressure – at 100°C – extruded through a nozzle – into a lower pressure environment – causing it to expand – it is dried – cut into pieces – colours and flavours may be added – [3]

(c) a convenience food – just needs rehydrating/water adding versatile – shaped into chunks

/mince – different flavours added – cheap to grow – provides a high yield per acre of land – when compared to farming animals – no waste from production –

easy to digest – is low in saturated fat – low in cholesterol – contains all essential amino acids – excluding methionine – high in vitamin B12 – low sodium – high fibre – low calories / kilojoules –

cheap to buy – for people on low income –

[5]

(d) name of product – for identification – the treatment food has had – e.g. UHT milk – so the consumer is aware of processes – may need to consult for religious / personal reasons /

– list of ingredients – to identify for allergies – in descending order of weight – to show ratio of quantities – additives – for allergy purposes / – net quantity – so consumer knows how much to buy

/ for fairness / checking – cooking instructions – health and safety / – storage instructions – for health and safety / – use by date/shelf life – for health and safety / – name and address of manufacturer for complaints / queries – place of origin – for traceability – cost – for budgeting – picture – for personal choice / to appeal – serving suggestion – to encourage purchase – nutritional information – for dietary purposes –5

8 (a) (i) Ways of saving money when purchasing food buy foods in season – cheaper when plentiful – buy in bulk – buy direct from producer – freeze for a time when unavailable / too expensive – buy fresh vegetables / fruit – less wastage (of outer leaves) – not too many perishables at once – save wastage – plan ahead and know what is required – make a shopping list / avoid impulse buys – use ‘money off’

coupons – look for special offers – compare unit prices of different brands – use store’s own brand – shop at end of day when fresh foods are reduced in price – cheaper cuts of meat – local produce – saves transport costs – avoid convenience foods – packaging and processing costs – don’t take children shopping if possible – use cash rather than cheques / credit cards

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

(ii) Suggest and explain ways of saving fuel microwave oven – shorter cooking time – no preheating time – pressure cooker – raises boiling point of water, food cooks quicker – many foods at same time – saves use of several hotplates – little water used so cooking can begin quickly – quickly tenderises foods which need long, slow cooking – slow cooker – minimum fuel – large capacity – meat and veg. together – fill all oven shelves – same heat for many dishes – use zones of heat – preheat oven for minimum time – use residual heat – electric cookers retain heat – well insulated – fan oven – has many shelves – all at same temperature – circulates heat – can fill oven – uses a setting lower than a conventional oven – batch baking – many dishes from same basic mixture – tenderise meat before cooking – cooks quicker – grill / fry foods quickly – keep lid on pan – steam cooks food – cut meat into small pieces – choose tender cuts as less cooking time – only boil the amount of water needed for drinks – electric kettle more efficient – no loss of heat from flames – base of pan should be same size as hot plate – to save waste of heat – do not have gas flame too high – heat wasted around sides of pan – pans with thick base – to retain heat – flat base – good contact with hotplate

12 points (2 points = 1 mark) [6]

(iii) Saving time when preparing and cooking food make use of raw foods – quick methods of cooking – frying, grilling etc. foods which cook quickly – tender cuts of meat / thin pieces of meat – foods which require little preparation or cooking – convenience foods – foods / dishes prepared in advance – batch baked products / foods prepared in bulk – long, slow cooking methods which require little attention – pressure cooker – microwave oven – slow cooker – automatic timer on stove – use ingredients available at home – check available food – saves shopping time use labour-saving equipment – electric mixer / food processor / blender – prepare dishes which are familiar – dishes prepared using little equipment – saves washing up time – make dishes which can be cooked and served in same equipment – soak pulses – cook faster –

12 points (2 points = 1 mark) [6]

(b) Factors which affect food choice locally climate – extreme weather (or examples of) war – unavailability of food type of land – suitability for particular crops / suitability for animals – expensive to import food from other countries – availability of equipment e.g. freezers for long-term storage – may be near town with supermarket – canned and packaged foods available – may not be close to town so choice limited – may only be able to buy basic commodities – may grow food in garden – or rear animals / poultry – advertising influences choice – magazines / television etc. – peer pressure – opening of fast food restaurants –

16 points (2 points = 1 mark) [8]