

Answers

3.2 Food Nutrition and Health

TT1 Macronutrients: *Proteins*



1. A) 15% (1 mark)
2. i) False – edamame is another name for fresh soy beans. (1 mark)
ii) False – it can contain egg white or other animal-derived ingredients. (1 mark)
iii) False – kwashiorkor is an effect of chronic (long-term) protein deficiency, so won't develop too quickly. (1 mark)
iv) False – there are nine essential amino acids and 11 non-essential amino acids. (1 mark)
3. i) Proteins are built from **amino acids**. There are 20 types, and if a protein contains them all, it is called a **high biological value** protein. (1 mark)
ii) Proteins are a **secondary** source of energy. One gram of protein provides nearly the same amount of energy as one gram of **carbohydrates**. (1 mark)
iii) Textured vegetable protein is also called **bean curd**. It can be used as an **alternative** to meat. (1 mark)
4. Any two from: (2 marks)
- source of energy
 - building cell membranes
 - building hormones
 - building antibodies
 - building enzymes
 - maintaining oncotic blood pressure
 - maintaining and repairing tissues
5. i) Protein complementation is a process of combining two or more sources of low biological value proteins in order to obtain a high biological value protein. (1 mark)
ii) Soy beans and quinoa (2 marks)
iii) Any two from: (2 marks)
- beans on toast
 - chickpeas and sesame (hummus)
 - peas and rice or bread
 - lentils and rice or bread
 - any other suitable answer
6. Any one from: (1 mark)
- weight gain (this is because excess protein is converted in the body to fat, which then is stored in the form of adipose tissue)
 - kidney failure
 - fatty liver disease
 - any other suitable answer
7. Any two reasons with a possible mechanism behind it; for example: (1 mark for each reason and 1 mark for each correct explanation, max. 4 marks)
- Lack of protein means that there is no building material to build new cells, so the body cannot grow or develop new tissues.
 - Lack of protein means that there is no material to repair old tissues, so the body will use whatever is available to rebuild damaged cells, at the cost of growth and development of new ones.
 - Lack of protein means that growth hormone cannot be built, so growth will be stopped by the lack of hormone.
 - Lack of protein means that the enzymes cannot be built, so the food will not be broken down properly and there will be no energy or building material to build new tissues.
 - Accept any other suitable answer.
8. The answer includes a reference to: (1 mark for each correct statement, max. 4 marks)
- Vegans do not eat meat, milk or eggs, or any animal-derived foods.
 - Animal-derived foods are a source of high biological value protein.
 - Vegans only eat plant-derived proteins, which are sources of low biological value. This may cause a deficiency of certain essential amino acids.
 - If a vegan diet is imbalanced / protein complementation is not applied, the vegans may develop protein deficiency as a result.

TT2 Macronutrients: Fats



1. Salmon, rapeseed oil, walnuts *(1 mark for all correct, max. 1 mark)*
2. Any two from each category: *(1 mark for each correct, max. 4 marks)*
 - Visible fats: lard, suet, butter, cream, bacon, fish oil
 - Non-visible fats: beef, pork, lamb, goose, duck, fish, eggs, milk, cheese, yoghurt, buttermilk, ice creams, biscuits, cakes, sweets, toffee, fudge
 - Accept any other suitable answer. Do NOT accept generic terms such as 'dairy', 'meat', 'poultry'. Do NOT accept plant-derived sources of fats.
3. The answer includes a reference to: *(1 mark for each correct statement, max. 2 marks)*
 - Saturated fats have single bonds only in the fatty acid chains.
 - Unsaturated fats have one or more double bonds in the fatty acid chains.
4. Up to 35% *(1 mark)*
5. i) Any two from: *(1 mark for a function and 1 mark for description, max. 4 marks)*
 - Source of energy – fats are a very good source of energy because 1g provides 9kcal, compared to only 4kcal from 1g of carbohydrates or proteins
 - Keeping the body warm – fat makes the adipose tissue, which is stored in the body and protects it from cold
 - Provides vitamins – fat is a solvent for fat-soluble vitamins (A, D, E and K).
 - Provides essential fatty acids – polyunsaturated fats are a source of omega-3 fatty acids, which are necessary for the proper functioning of the brain and nerves and cannot be built by the human body from scratch.
 - Builds body cells – fat molecules are a part of cell membranes.
 - Builds hormones – fat is necessary to build certain hormones, such as steroid hormones (e.g. testosterone).ii) Any two from: *(1 mark for each correct, max. 2 marks)*
 - weight loss
 - vitamin deficiency
 - dry, flaky, itchy skin
 - night blindness and other eyesight issues
 - susceptibility to infections
 - cognitive problems, dementia
 - any other correct answer
6. i) Hydrogenation is the process of adding hydrogen to unsaturated fats to change their texture from **liquid to solid** at room temperature. *(1 mark)*
ii) Trans fats *(1 mark)*
iii) Margarine / vegetable fat spreads *(1 mark)*
7.
 - LDL – or 'bad cholesterol' – increases the risk of cardiovascular disease.
 - HDL – or 'good cholesterol' – lowers the risk of cardiovascular disease.*(1 mark for identifying each kind of cholesterol, and 1 mark for its role in cardiovascular disease, max. 4 marks)*
8. The answer includes a reference to:
 - Eating too much saturated fats / trans fats / total fat, and too little polyunsaturated fats / omega-3 fatty acids increases the risk of many conditions and diseases, such as (one from):
 - obesity
 - type 2 diabetes
 - atherosclerosis
 - coronary heart disease
 - heart attack
 - stroke
 - cancer
 - Eating adequate amounts of polyunsaturated fats / fats rich in omega-3 fatty acids, and low levels of saturated fats / trans fats / total fat may help to reduce the risk of (one from):
 - coronary heart disease
 - heart attack
 - stroke
 - cancerand support proper functioning of the brain and nervous system.
(1 mark for identifying types of fat and their effect; 1 mark for each correctly linked disease or condition the risk of which they increase/lower; max. 4 marks)

TT3 Macronutrients: Carbohydrates



1. i) Monosaccharides are the type of carbohydrates which are built of a single molecule only. (1 mark)
ii) Glucose, fructose, galactose or any other suitable answer (1 mark for each correct, max. 3 marks)
2. Natural yoghurt, unsweetened orange juice, fresh mango (1 mark for all correct, max. 1 mark)
3. Any two from: milk, table sugar, malt sugar or any other suitable answer (1 mark for each correct, max. 2 marks)
4. i) Carbohydrates are the **primary** source of energy in the human body.
ii) They act as a **protein** sparer, which means that they are used **before** them to provide energy, so that the **protein** can be used for growth and repair of the cells.
iii) Carbohydrates can be divided into three groups: **sugars**, **starches** and dietary fibre.
iv) In a balanced diet, **45%** of energy should be provided by **starch**, and only **5%** of energy should come from the **sugars**. (1 mark for each correct sentence, max. 4 marks)
5. i) True – fibre lowers not only blood cholesterol levels, but also blood sugar levels.
ii) False – a balanced diet should provide around 30g of fibre.
iii) False – large amounts of fibre bind with calcium, which then cannot be absorbed by the intestine.
iv) True – dietary fibre helps to prevent many bowel diseases, such as diverticulitis, constipation, and bowel cancer. (1 mark for each correct, max. 4 marks)
6. Any one from: (1 mark)
 - bulk up the stool in the bowel
 - regulate bowel movements
 - help to pass the undigested food and push it out of the body
 - any other suitable answer
7. i) Any three from: wholegrain products (bread, pasta, cereals), brown rice, fruit, vegetables, nuts, seeds, beans, oats, legumes, dried fruit or any other suitable answer. (1 mark for each correct, max. 3 marks)
ii) Any one from: constipation, calcium deficiency and osteoporosis, iron deficiency and anaemia, bowel cancer or any other suitable answer. (1 mark for any correct, max. 1 mark)
8. The answer identifies and describes at least two health effects of excessive sugar consumption (4 marks) and provides two ways of preventing them (2 marks).
Health effects from:
 - Obesity – excessive sugar consumption will lead to obesity as unused sugar will be transformed into fatty tissue and stored in the body.
 - Type 2 diabetes – excessive sugar consumption will raise blood sugar levels, which will put stress on the pancreas. As the pancreas cannot produce enough insulin to lower the blood sugar level, the sugar will continue to damage the tissues around the body.
 - Tooth decay – sugars feed mouth bacteria, which thrive on them and cause tooth enamel to dissolve.Ways of preventing them:
 - Avoid eating free sugars from sweets, sweetened beverages, etc.
 - Choose foods rich in polysaccharides as they are absorbed more slowly into the bloodstream.
 - Choose foods rich in fibre as they lower blood sugar levels
 - Increase physical activity to burn more calories.
 - Physical activity is also helpful in preventing (or even reversing!) type 2 diabetes as it allows the body to use the extra glucose and lower its amount in the blood.

Accept any other suitable answer. Do NOT accept answers which refer to systematic/ governmental actions – only accept answers that refer to individuals.

TT4 Micronutrients: *Vitamins*



1. Water-soluble vitamins dissolve in water and do not dissolve in fat, cannot be stored in the body and need to be eaten regularly. (1 mark)
Fat-soluble vitamins dissolve in fat and do not dissolve in water, can be stored in the body and need to be eaten in small amounts only as the body can use the stored vitamins. (1 mark)

2. Retinol (vit. A), cholecalciferol (vit. D), phyloquinone (vit. K), tocopherol (vit. E) (1 mark for all correct, max. 1 mark)

3. (1 mark for three correct for each gender, max. 4 marks)

	Vit. B1	Vit. B2	Vit. C	Vit. D	Vit. A	Vit. B9
Boys	1.1mg	1.3mg	40mg	10mcg	700mcg	200mcg
Girls	0.8mg	1.1mg	40mg	10mcg	600mcg	200mcg

4. i) True (1 mark)
ii) False – it is caused by vitamin A deficiency. (1 mark)
iii) True (1 mark)
iv) False – scurvy is caused by vitamin C deficiency; vitamin B2 deficiency may lead to cracked lips, redness and swelling of the mouth and tongue or skin inflammation. (1 mark)

5. Any three from: (1 mark for all correct, max. 1 mark)

- vegetable oils
- wheat germs
- egg yolk
- seeds
- nuts
- fortified products, e.g. cereals
- any other suitable answer.

6. Folate / folic acid deficiency may lead to spina bifida in newborns. (1 mark)

7. The symptoms of pellagra are referred to as 3D syndrome and include:

- diarrhoea
- dermatitis (skin inflammation)
- dementia (confusion, memory loss)

(1 mark for each correct, max. 3 marks)

8. Vitamin K is produced in the gut by probiotic bacteria. (1 mark)

9. Water-soluble vitamins dissolve in water and therefore their excess is easily excreted with body waste. (1 mark)

10. i) Antioxidants are vitamins and other chemical compounds which protect cells and tissues from oxidation caused by free radicals. (1 mark)

They prevent free radicals from 'stealing' electrons from other molecules and, therefore, help prevent cancer and slow down ageing. (1 mark)

- ii) Vitamins A, C and E. (1 mark for all correct, max. 1 mark)

11. i) Any three from:

- oxygen
- light
- high temperature
- high pressure
- fragmentation/diminution

any other suitable answer

(1 mark for each correct, max. 3 marks)

- ii) Any two from:

- vitamin C (ascorbic acid)
- thiamine (vitamin B1)
- vitamin A
- vitamin D
- vitamin E

(1 mark for each correct, max. 2 marks)

12. i) Vitamin B1, also called **thiamine** is necessary for the proper metabolism of **carbohydrates**. Severe deficiency may cause **beriberi** disease. *(1 mark for all correct, max. 1 mark)*
- ii) Vitamin **B12** also called cobalamin, is necessary for building a protective coat around nerve cells. It is found only in **animal**-derived foods. For this reason, **vegans** are at risk of developing a deficiency. *(1 mark for all correct, max. 1 mark)*
- iii) Vitamin **C**, known as ascorbic acid, is necessary for the proper absorption of **iron** from foods. This vitamin is necessary for the production of **collagen**, which is an important protein in the skin. A lack of it can cause **scurvy**. *(1 mark for all correct, max. 1 mark)*

13. The answer includes a reference to two from: *(1 mark for each correct, max. 2 marks)*
- Rickets – because vitamin D is necessary for absorbing calcium, a lack of it will lead to soft bones, which will be malformed, leading to skeletal malformations and posture issues.
 - Osteoporosis – because vitamin D is necessary to absorb calcium, a lack of it in older age will lead to osteoporosis, as calcium will be derived from bones to perform more important life functions (such as muscle contractions and maintaining blood pressure); as a result, the bones will become porous, brittle and easy to break.
 - Tooth decay – as vitamin D helps to absorb calcium, which is used to strengthen the teeth, a lack of it will lead to having weak teeth which will be prone to tooth decay.
 - Depression – there are multiple receptors for vitamin D in the brain cells; lack of vitamin D which could be attached to them is linked to a higher risk of developing depression.
 - Increased risk of cancer – the mechanism is not known yet, but low levels of vitamin D are associated with higher risk of developing bowel cancer.

Ways to prevent vitamin D deficiency – two from:

(1 mark for each correct, max. 2 marks)

- moderate increase of exposure to sunlight
- increase consumption of sea fish and shellfish
- increase consumption of fish oil
- choose whole milk and dairy products
- choose fortified margarines

TT5 Micronutrients: Minerals; Water

✓

1. D) 1600mg a day (1 mark)
2. A) 800mg for girls, 1000mg for boys (1 mark)
3. C) 2 litres – this is the average amount of water which should be consumed by healthy adults; other people may need more or less, depending on their physical activity or health conditions. (1 mark)
4. Iodine (1 mark)
5. Any two from: (1 mark for each correct, max. 2 marks)
 - high blood pressure / hypertension
 - heart disease / heart failure
 - stroke
 - kidney failure
 - swelling of the body / oedema
 - weakening of the bones and higher risk of osteoporosis (people urinate more and calcium is being washed out of bones)
6. Any two from: (1 mark for each correct, max. 2 marks)
 - pale skin
 - tiredness, lack of energy
 - weak nails and hair
 - short breath
 - heart palpitations
 - any other correct answer
7. Any two from: (1 mark for each correct, max. 2 marks)
 - sodium
 - calcium
 - potassium
 - fluoride
 - any other suitable answer

Accept suitable minerals which are not required by the specification, such as magnesium, sulphur, chloride.

8. i) **Calcium** and vitamin D work together to help grow strong, healthy bones. Their deficiency may cause **rickets** in children and **osteoporosis** in adults. (1 mark for all correct, max. 1 mark)
- ii) Phosphorus mineralises **bones** and is necessary in many chemical reactions in the body. In **excess**, it can lead to their demineralisation. (1 mark for all correct, max. 1 mark)
9. The answer includes a reference to: (1 mark for each correct statement, max. 2 marks)
 - Teenage girls and women undergo **menstruation**.
 - They lose some blood every month so they need more iron to **avoid anaemia**.
10. The answer includes at least one function and one source of each mineral. (1 mark for each row correct, max. 5 marks)

Mineral	Source	Function
Calcium	Milk and dairy, bony fish such as sardines, fortified flour and cereals, nuts and seeds, water	Necessary to maintain strong, healthy bones and teeth
Sodium	Kitchen salt, meat and cold cuts, cheese, snacks, bread	Maintains water balance in the body, helps conduct nerve impulses
Fluoride	Sea fish and shellfish, black tea, toothpaste and mouthwash	Helps tooth growth and development, strengthens enamel
Iodine	Kitchen salt, may be inhaled with air at the seaside or in a salt cave	Necessary to build hormones in the thyroid gland
Iron	Red meat, liver, egg yolk, leafy green vegetables such as kale and spinach, fortified flour and cereals	Builds red blood cells

Accept other suitable answers.

11. The answer includes a reference to: *(1 mark for each correct statement, max. 3 marks)*
- Fluoride helps build strong enamel – the protective layer on teeth.
 - Too little fluoride (deficiency) may result in enamel not being formed at all, which makes the teeth soft and prone to damage.
 - The excess of fluoride can cause fluorosis, in which the enamel develops white stains and becomes very brittle, making it easy to damage (this also increases the risk of tooth decay).
 - The effect is tooth decay and tooth loss.
12. i) The answer includes a reference to any two from: *(1 mark for each correct, max. 2 marks)*
- Keeps a stable temperature – sweat on the skin evaporates and cools the body, which helps maintain stable temperature.
 - Eliminates waste from the body – water dissolves toxins and other substances which need to be excreted from the body, e.g. urea, excess sodium.
 - Aids digestion – water is the main compound of saliva, which aids swallowing of food; water is a part of gastric juice where it helps break down the food; it also helps bowel movements and prevents constipation.
- ii) Any three from: *(1 mark for each correct, max. 3 marks)*
- Body waste – water is lost through excretion.
 - Sweat – as the body overheats, it produces sweat in the sweat glands as a mechanism to cool down.
 - Bleeding – water makes up to 92% of the blood and is lost during excessive bleedings.
 - Tears – a small amount of water can be lost through tears when a person cries.
- iii) Any three from: *(1 mark for each correct plus 1 mark for explanation, max. 4 marks)*
- During hot weather – the body perspires faster and more water is lost with sweat, together with minerals, so it is important to drink water or isotonic drinks to restore the amount of water lost and avoid dehydration and heatstroke.
 - During physical activity – a lot of energy is released and minerals are used in larger amounts, also perspiration is increased; sportspeople need to drink more to avoid overheating, dehydration and micronutrient deficiency, which may cause painful muscle cramps.
 - During fever – in fever body temperature is higher than usual so lukewarm/cold fluids will help decrease the body temperature and avoid side effects, such as overheating.
 - When trying to lose weight – water fills the stomach and decreases the feeling of hunger (gives satiety), so a person eats less, which helps aids weight loss.
 - When on a high-fibre diet – water will help the fibre to swell or increase in volume and pass through the intestines, preventing constipation.

TT6 Nutritional needs and health: Making informed choices; Energy needs; How to carry out nutritional analysis



1.

	Food group	Description	Food source
A.	fruit and vegetables	Five portions of fruit and vegetables to be consumed a day	Any suitable source: carrots, apples, bananas, broccoli, peas, strawberries
B.	meats, beans, fish, eggs and other proteins	Eat less red meat, and two portions of fish (one portion should be oily) per week	Any suitable source: chicken, beans, pulses, minced meat, salmon, tuna, eggs
C.	oils and spreads	Choose unsaturated oils in small quantities	Any suitable source: olive oil, sunflower oil, low-fat spread

(1 mark for each correct food group, max. 3 marks)

2. i) Basal metabolic rate is the amount of energy needed to perform the most basic life processes, such as heartbeat, breathing and keeping a stable body warmth. *(1 mark)*

The answer includes a description of any two factors that affect the BMR from:

- Age – usually the older the person is, the higher the energy needs.
- Sex/gender – usually men require more energy than women.
- Weight – heavier people require more energy than people with a lower body weight.
- Height – taller people require more energy than shorter people.

(1 mark for each correct, max. 2 marks)

- ii) Physical activity level indicates how active a person is during the day / how much energy is needed for daily performance; it includes all everyday actions such as walking, dressing, washing dishes or running. *(1 mark)*
- iii) BMR multiplied by PAL equals Total Energy Expenditure – the higher the BMR/PAL, the higher the energy needs of a person. *(1 mark)*

3. The answer explains any **one** dietary requirement for each life stage from:

- i) Small children: *(1 mark for any correct example and 1 mark for correct explanation, max. 2 marks)*
- Drink a lot of milk and eat dairy products – to provide enough calcium and vitamin D and prevent rickets.
 - Eat a varied diet, regularly try new foods – to develop the taste buds.
 - Avoid sweets and sugary drinks – to prevent tooth decay and weight gain.
 - Eat bony fish – to provide fluoride, necessary for the proper development of tooth enamel.
 - Eat five a day (vegetables and fruit) – choose fruit and vegetables instead of sweets as snacks between meals, to provide vitamins, minerals and dietary fibre.
- ii) Teenagers: *(1 mark for any correct example and 1 mark for correct explanation, max. 2 marks)*
- Eat milk, dairy and other sources of calcium and vitamin D – to help build strong bones and teeth.
 - Eat less sugar and avoid sugary drinks – to avoid tooth decay and obesity.
 - Eat iron-rich products such as liver or egg yolk – necessary to prevent anaemia, especially among teenage girls.
 - Eat regular meals – to help avoid hunger, control satiety and blood sugar levels.
 - Eat five a day (fruit and vegetables) – to develop healthy eating habits and prevent health issues in the future.
 - Choose sources of whole (HBV) protein – to provide enough protein to build muscles and other body tissues.
- iii) Adults: *(1 mark for any correct example and 1 mark for correct explanation, max. 2 marks)*
- Eat dairy and fish – to provide calcium and vitamin D, keep the bones and teeth strong, and prevent osteoporosis.
 - Eat less fat and sugar – to prevent obesity and diabetes, and maintain health for a longer time.
 - Eat less salt – to prevent hypertension.
 - Eat fibre and drink water – to improve the motility of the intestines and prevent constipation.
 - Provide adequate amounts of iron and vitamin C – especially for women, to help prevent anaemia and related health issues.

- iv) The elderly: *(1 mark for any correct example and 1 mark for correct explanation, max. 2 marks)*
- Limit calorie consumption – the elderly do not need as many calories as younger people as their physical activity is usually limited, and the amount of muscle tissue in the body is lower; this will help prevent obesity and related health issues, such as back and joint pains.
 - Avoid energy-dense foods such as sweets and deep-fried foods – to help prevent obesity, type 2 diabetes and cardiovascular diseases.
 - Eat adequate amounts of dietary fibre and drink plenty of water – to help prevent constipation, diverticulitis and bowel cancer.
 - Provide adequate amounts of calcium and vitamin d – to maintain bone health and prevent osteoporosis
 - Choose fresh fruit and vegetables – to provide antioxidant vitamins, which may be helpful in preventing cardiovascular disease.
 - Eat oily fish and other foods rich in omega-3 fatty acids – as they can help to prevent cardiovascular disease
 - Provide adequate amounts of iron and vitamin c – to help prevent anaemia.
 - Provide adequate amounts of vitamin b12 (cobalamin) – to help prevent anaemia and neurodegenerative disorders such as dementia.
 - Lower sodium/salt consumption – to maintain a healthy blood pressure.

Accept other suitable answers.

4. i) Cheese sandwich, scrambled eggs, pizza margherita, fruit smoothie, milkshake *(1 mark for all correct, max. 1 mark)*
 ii) Fruit smoothie *(1 mark)*
5. Proteins 15%, fats 35%, complex carbohydrates 45%, free sugars 5% *(1 mark for all correct, max. 1 mark)*
6. i) Any two from: *(1 mark for all correct, max. 1 mark)*
- sugary and savoury snacks
 - fast foods
 - sweets
 - sweetened beverages
 - highly processed foods
 - deep-fried foods
- ii) Any two from: *(1 mark for all correct, max. 1 mark)*
- fresh fruit and vegetables
 - wholegrain bread
 - brown rice
 - wholegrain pasta
 - legumes
- iii) Any one from: *(1 mark for any correct, max. 1 mark)*
- Be physically active (to increase the amount of energy used, and limit the amount of energy stored in the body).
 - Drink sufficient amounts of water (to increase the feeling of satiety, enable the dietary fibre from food to work properly, and prevent dehydration).
7. i) Lactose intolerance is a condition in which **lactose** (milk sugar) is **not broken down** in the digestive tract **due to lack of the enzyme** lactase. *(1 mark)*
- ii) Any one from: painful gases, bloating, diarrhoea. *(1 mark for any correct, max. 1 mark)*
- iii) Any two from: *(1 mark for each correct, max. 2 marks)*
- milk and dairy, milkshakes, ice creams, pancakes, toasted bread, milk chocolate, some sweets and biscuits, or any other source of milk or lactose
 - Do NOT accept fermented dairy products such as hard cheeses (e.g. Cheddar) or yoghurt as they contain virtually no lactose.
8. Any two from: *(1 mark for each correct, max. 2 marks)*
- when trying to lose weight
 - to prevent or cure constipation and diarrhoea
 - to decrease the symptoms of irritable bowel syndrome
 - to prevent certain types of cancer (e.g. bowel, breast)

9. The answer may include a reference to: *(1 mark for each correct statement, max. 4 marks)*
- Coeliac disease is an inborn disease in which gluten cannot be broken down in the intestine, causing painful bloating, diarrhoea and even bleeding.
 - People suffering from coeliac disease should avoid all sources of gluten for a lifetime.
 - The gluten-free diet may contain rice, potatoes, quinoa, buckwheat, fruit and vegetables, meat, fish, eggs and dairy.
 - On a gluten-free diet, wheat, rye and barley are forbidden – as well as any food that contains them (like breaded ham or fish).
 - Certified oats can be consumed.
 - Uncertified oats should be avoided or eaten in moderation as they could be contaminated with gluten from other types of cereal processed in a given factory.

Accept other suitable answers.

10. The answer provides any one modification from: *(1 mark for each correct, max. 4 marks)*
- i) Exchange haddock and salmon (fish) for a vegan source of protein, e.g. tofu, TVP, soy chunks, beans or lentils.
Exchange Cheddar (cheese) for a vegan alternative, e.g. tofu.
 - ii) The dish doesn't contain any sources of gluten. The dish doesn't have to be modified.
 - iii) The dish is quite low in fibre, as the only sources of it are potatoes and carrots. To increase the amount of fibre: increase the amount of vegetables in the dish (e.g. add onion green peas, courgette, bell pepper); add breadcrumbs or oats on top; add powdered fibre to the mashed potato or sauce; serve with a salad.
 - iv) The portion is quite large (300g) and might be too big for a three-year-old. The portion should be made smaller. No other changes are required as the dish contains large amounts of calcium, protein, vitamin D, which are necessary for children's health.

Accept other suitable answers.

1. The answer may include a reference to: *(1 mark for each correct, max. 2 marks)*
- A diet includes all foods eaten by a given person / the eating habits of a given person.
 - Nutrition refers to the amount of macronutrients and micronutrients consumed by a given individual.
 - A balanced diet provides an adequate amount of all nutrients required by a given individual to maintain health and enable growth and development.
 - A balanced diet ensures energy balance and helps to maintain a healthy body weight.
 - A balanced diet provides a sufficient amount of nutrients to maintain health and prevent certain diseases, such as type 2 diabetes, coronary heart disease, etc.

To gain 2 marks, the answer should refer to all three keywords (diet, nutrition, health). Accept other suitable answers.

2. Dental caries, coronary heart disease, iron deficiency anaemia *(1 mark for all correct, max. 1 mark)*
 Note: measles, mumps and flu are not diet-related diseases – they are caused by microorganisms (bacteria and viruses).

3. i) True – obesity increases the risk of atherosclerosis, CHD, diabetes and cancer. *(1 mark)*
 ii) True *(1 mark)*
 iii) False – hypertension is a disease in which blood pressure is too high. *(1 mark)*
 iv) True *(1 mark)*

4. B) From 18.5kg/m² to 24.9kg/m² *(1 mark)*

5. i) Osteoporosis is a **bone condition** caused by **lack of calcium and vitamin D**, and in which bones lose their density and become **brittle and easy to break**. *(1 mark)*

- ii) Any two from: *(1 mark for each correct, max. 2 marks)*

- Increase consumption of calcium
- Increase physical activity
- Eat more milk and dairy products
- Eat bony fish
- Provide more vitamin D
- Eat oily fish and fish oil
- Include moderate exposure to sunshine to stimulate vitamin D production in the skin
- Accept other suitable answers

6. i) Any two from: *(1 mark for each correct, max. 2 marks)*

- calcium deficiency
- vitamin D deficiency
- excessive consumption of phosphorus
- kidney disease

- ii) Any two from: *(1 mark for each correct, max. 2 marks)*

- increased need for calcium in children
- increased need for vitamin D in children
- less need for phosphorus in children
- eat more milk and dairy
- eat more fish and fish oil
- include moderate exposure to sunshine to stimulate vitamin D production in the skin

Do NOT accept answers that relate to nutrition during pregnancy that could help to prevent rickets.

7. i) Any two from: *(1 mark for each correct, max. 2 marks)*

- high-fat diet
- obesity
- high-sugar diet
- irregular meals
- improper insulin production (not enough of the hormone is produced)
- improper insulin performance (the hormone molecules are faulty or inactive)
- high blood pressure
- sedentary lifestyle

- ii) Any one from: *(1 mark for any correct, max. 1 mark)*
- foods high in sugar such as sweets, chocolate, sweetened beverages
 - white bread
 - high-fat products
 - fast foods
 - any other suitable answer

8. Any two from: *(1 mark for each correct, max. 2 marks)*
- | | |
|---|---|
| <ul style="list-style-type: none"> • obesity • high-sugar diet • high-fat diet / diet rich in saturated fats • high-sodium/salt diet • low physical activity • sedentary lifestyle • high cholesterol intake | <ul style="list-style-type: none"> • high cholesterol blood level • smoking cigarettes • drinking alcohol • stress • kidney disease • any other suitable answer |
|---|---|

9. The answer may include a reference to: *(1 mark for each correct statement, max. 2 marks)*
- High intake of saturated fats increases the risk of cardiovascular diseases.
 - Increasing intake of unsaturated fats may help decrease the risk of cardiovascular diseases.
 - Eating too much saturated fats may cause such diseases / health conditions as: coronary heart disease, atherosclerosis, heart attacks, stroke, hypertension (high blood pressure).
 - Accept other suitable answers.

10. The answer may include a reference to: *(1 mark for each correct statement, max. 4 marks)*
- **Fluoride deficiency** can cause improper growth and development of the teeth and tooth enamel.
 - Fluoride deficiency may lead to **increased risk of tooth decay** and tooth loss.
 - **Fluoride excess** may cause **fluorosis** and cause the tooth enamel to become brittle and susceptible to damage.
 - **Deficiency of calcium** may lead to tooth decay and tooth loss as the teeth cannot be built properly.
 - **Deficiency of vitamin D** may lead to tooth decay and tooth loss as it is necessary to absorb calcium from food and build strong teeth.
 - Accept other suitable answers.

11. The answer includes a reference to: *(1 mark for each correct statement, max. 6 marks)*
- Teenage **girls need more** iron than teenage boys.
 - Teenage girls are at more risk of developing anaemia due to **menstruation**.
 - Iron is necessary to build **haemoglobin** in the **red blood cells** and transport oxygen around the body.
 - To provide the proper amount of iron, girls should eat:

→ red meat and offal (e.g. liver)	→ fortified cereals
→ leafy green vegetables such as spinach or kale	→ eggs
→ broccoli	→ wholegrain bread
 - Folate (folic acid, vitamin B9) and vitamin B12 (cobalamin) are also necessary in the process of building red blood cells, and help to prevent anaemia.
 - Sources of folate include:

→ leafy green vegetables such as spinach, broccoli
→ wholemeal cereal products, e.g. wholegrain bread, brown rice
→ fortified foods, such as orange juice, bread
 - Sources of vitamin B12 include:

→ meat	→ egg yolks
→ poultry	→ milk and dairy
→ fortified foods, such as bread, breakfast cereals	→ fish and shellfish
 - Vitamin C increases iron absorption in the intestines, helping to prevent anaemia.
 - Vitamin-C-rich foods include:

→ potatoes	→ strawberries
→ cabbage and sauerkraut	→ oranges and lemons
→ bell pepper, broccoli, tomatoes	

Accept other suitable answers.

3.3 Food Science

TT8 Cooking of food and heat transfer: *Why food is cooked and how heat is transferred to food* ✓

1. i) True (1 mark for each correct, max. 4 marks)
ii) False – the colour becomes dull as the chlorophyll in the food is destroyed / broken down.
iii) False – it causes water and aromatic compounds to evaporate, so the air is filled with them and they can get to our noses more easily; the smell of hot food is then more pronounced than the smell of cold food.
iv) False – the fats in the food melt during cooking and are responsible for the mouthfeel, not for setting of mixtures.
2. i) Shelf life is the **amount of time** a food product can be **safely stored and eaten** for, **without the risk of food poisoning** or spoilage. (1 mark)
ii) Cooking helps to increase/lengthen the shelf life because it kills microorganisms responsible for food spoilage. (1 mark)
3. Any three from:
i) omelette, scrambled eggs, soufflé, soft-boiled eggs, hard-boiled eggs, stuffed/devilled eggs, egg salad, egg paste or any other suitable answer (1 mark for all correct, max. 1 mark)
ii) burgers, steaks, meatballs, carpaccio, bolognese sauce, chilli con carne, cottage pie, beef stew, or any other suitable answer (1 mark for all correct, max. 1 mark)
4. The answer may include a reference to any from: (1 mark for explanation and 1 mark for example, max. 2 marks)
- During cooking water evaporates and makes the flavours more pronounced. Examples might include stew or goulash.
 - During cooking chemical reactions take place and new flavour compounds are created. Examples might include caramel, crème brûlée, coffee, cocoa, etc.
5. i) Meat will soften and become more tender, and easier to bite, cut and chew. (1 mark)
ii) Tomato-based sauce will become thicker / will have higher viscosity. (1 mark)
iii) Sponge cake will rise and set, creating a sponge-like, soft texture. (1 mark)
Accept other suitable answers.
6. The answer may include a reference to: (1 mark for description and 1 mark for an example of a use in cooking, max. 2 marks)
- Convection currents are the movements of **air, water** or vapour. **Hot** molecules **go up** from the heat source, where they get **cooler** and then **fall down** again.
 - Convection currents are used in: steamers, ovens, when steaming, boiling, simmering, baking and roasting foods.
 - Accept other suitable answers.
7. The answer may include a reference to: (1 mark for each correct, max. 2 marks)
- Conduction is a process in which heat is transferred **directly** from the pan / cooking dish to food in it.
 - In conduction the heat causes the material the dish is made of to vibrate.
 - The **vibrating molecules** then transfer the heat directly to molecules of food that they touch.
 - The molecules of food at the bottom then transfer the heat directly to other molecules of food which surround them, etc.
8. The answer may include a reference to: (1 mark for each correct statement, max. 2 marks)
- In microwave ovens the oven sends waves of heat through radiation.
 - The microwaves heat up water molecules in food.
 - The water molecules begin to vibrate.
 - The vibrating water molecules transfer the heat to the surrounding molecules in the food.
 - Microwaves are not effective in heating/cooking dry foods / foods with low water content.
 - Accept other suitable answers.
9. The answer may include a reference to: (1 mark for each correct description, sub max. 2 marks, and 1 mark for each correct example, sub max. 2 marks. Maximum 4 marks)
- Convection is an **indirect** way of transferring heat.
 - In convection, **water or oil** is needed as a medium to transfer the heat from heat source to food.
 - Examples of foods which use convection include steamed vegetables, baked cakes, simmered stews, etc.
 - Radiation is an **indirect** way of transferring heat through heat waves.
 - Radiation requires **no medium** to transfer the heat from heat source to food.
 - Radiation is used to make grilled steak and vegetables, baked cakes and to microwave foods, for example.
 - Accept other suitable answers.

TT9 Cooking of food and heat transfer: *Selecting appropriate cooking methods*



1. Simmering, poaching, steaming (1 mark for all correct, max. 1 mark)
 Baking, roasting, grilling and dry-frying are examples of dry cooking methods.
 Stir-frying is an example of a fat-based cooking method.
2. i) False – there is no added fat, and the fat from food can leak out so dry-frying decreases the amount of fat in food. (1 mark)
 ii) False – blanching prevents vitamin loss because it stops oxidation and enzymatic browning. (1 mark)
 iii) True – vitamins dissolve in water so will be lost if the water is drained from food. (1 mark)
 iv) True – diminution (cutting into smaller pieces) and contact with air/oxygen accelerates the unfavourable changes in food. (1 mark)
3. C) Vegetables are put into ice-cold water, and then into boiling water. (1 mark)
4. Acid. Accept other suitable examples, such as vinegar, lemon juice, etc. (1 mark)
5. Any three from: (1 mark for all correct, max. 1 mark)
- baking
 - roasting
 - grilling
 - dry-frying
- Accept other suitable answers, e.g. broiling.
6. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks)
- i) At first red cabbage will change colour from purple to red, but then it will lose its colour and become pink and then blue if cooked for too long.
- ii) The rice will absorb water so will increase in volume/size; if cooked for too long it will become mushy as the starch particles will degrade.
- iii) The pasta will soften to become al dente, then will become even softer, and if cooked for too long, it will turn into a sticky mash (because the starch with water will produce a thick, sticky mixture).
7. i) Shredding changes the texture of an apple from hard to soft or even liquid. The colour may change due to oxidation and/or enzymatic browning, which will decrease the nutritional value of the apple. (1 mark for any correct, max. 1 mark)
- ii) Boiling an egg will cause protein denaturation and coagulation and the egg will harden/set. The texture of the egg will change from liquid to solid. The smell might be more pronounced than that of a raw egg. (1 mark for any correct, max. 1 mark)
- iii) Marinating a steak will denature proteins and cause the meat to soften. It will be easier to chew and will take shorter to cook. The flavour of the steak will change depending on the ingredients of the marinade. The amount of fat will rise because marinades usually contain oil. (1 mark for any correct, max. 1 mark)
- iv) Braising a pork shoulder will help seal the surface and close the jus inside of the meat, which will make it juicy. Braising will denature proteins and soften the meat. The amount of vitamins will drop because of the high temperatures applied to the meat. (1 mark for any correct, max. 1 mark)
8. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks)
- Deep-frying increases the amount of fat in food as the fat is absorbed by foods.
 - Deep-frying causes vitamin loss due to high temperatures used (most vitamins are highly sensitive to heat).
 - During deep-frying, harmful substances may be produced (e.g. trans fats, acrolein) as the chemical molecules in food react to heat.
9. The answer may include a reference to: (1 mark for each cooking method and 1 mark for explaining why it is good for health, max. 6 marks)

Method	Reason
Boiling	Low in calories, may help to retain micronutrients (especially if the liquid is used)
Steaming	Low in calories, prevents vitamin loss as the vitamins do not dissolve in liquid
Dry-frying	Low in calories, helps to maintain energy balance
Grilling	Helps to decrease the amount of fat in food as the fat from food melts and leaks out
Stir-frying	Low in calories, prevents vitamin loss due to short cooking time

Accept other suitable answers.

TT10 Functional and chemical properties of food: *Proteins*



1. i) Protein denaturation is a process of damaging the chemical structure of proteins (quaternary, tertiary or secondary). (1 mark)
- ii) Any three from: (1 mark for each factor with a suitable example, max. 3 marks)
- acids – e.g. lemon juice in meringue; malt vinegar or spirit vinegar in poached eggs or any other
 - high temperature – e.g. when boiling eggs; baking a quiche; roasting chicken; grilling beef steaks or any other
 - mechanical action – e.g. when whisking eggs; making a meringue or any other
 - enzymes – e.g. when making cheese with the use of rennet
2. Any three from: (1 mark for each reason with a suitable example, max. 3 marks)
- to bind ingredients together (eggs, egg whites, milk)
 - to increase nutritional value (eggs, egg yolk, cheese, milk, dairy, meat, fish...)
 - to set the mixture (eggs or gelatine)
 - to add flavour and colour (egg yolk, cheese, yoghurt)
 - to change the texture (e.g. cheese on pizza, cream in soup)
 - to thicken the mixture (e.g. Greek yoghurt, cream)
 - to make the mixture lighter (e.g. whipped cream or whisked egg white)
 - as a glaze (egg wash, milk)
 - to emulsify the mixture (e.g. egg yolk in mayonnaise or hollandaise sauce)
- Accept other suitable answers.
3. i) Protein coagulation is a process in which protein molecules aggregate (form a cluster), which changes a liquid protein into a solid one. (1 mark)
- ii) Any one from: (1 mark for any correct, max. 1 mark)
- heat
 - high salt concentration
4. The answer includes a reference to: (1 mark for a correct definition and 1 mark for indicating when the process happens, max. 2 marks)
- Syneresis is the process of pushing out / leaking water from protein-rich mixtures.
 - It takes place when a protein is overcoagulated/overcooked (that is because the protein fibres in food shrink due to heat and push out water).
5. i) The answer may include a reference to: (1 mark for each correct, max. 2 marks)
- Flour contains two types of protein – glutenin and gliadin.
 - When the flour is mixed with water, the two proteins bind together.
 - The two proteins form a net-like structure known as gluten.
 - Accept other suitable answers.
- ii) Any three from: wheat, spelt, rye, barley, uncertified oats, triticale. (1 mark for all correct, max. 1 mark)
Accept other suitable answers. Accept 'non-certified oats'.
Do NOT accept 'oats' or 'certified oats' as oat is naturally gluten-free.
- iii) Shortcrust, puff pastry, rough puff, or any other suitable answer. (1 mark)
6. The answer may include a reference to: (1 mark for each correct statement, max. 2 marks)
- Foams are made when a **protein-rich mixture** such as egg white is **whisked or beaten**.
 - During whisking the **proteins stretch out**.
 - As the protein fibres stretch out, they make a net structure in which **air bubbles can be trapped**.
 - This causes the mixture to increase in volume and create a foam.
7. The answer may include a reference to: (1 mark for each correct statement, max. 2 marks)
- Corn starch contains no gluten.
 - Bread made with it would be crumbly and easy to break instead of soft and springy.
 - (Corn starch cannot substitute all the flour, but can be used in part of the recipe to modify the nutritional value, colour, texture and flavour of the bread.)
8. Any four from: (1 mark for each correct, max. 4 marks)
- Acids denature the proteins in meat.
 - Acids make the meat softer.
 - Acids make the meat more tender.
 - Acids improve the flavour of the meat.
 - Acids enable the flavour to penetrate the meat, so not only the surface is flavoured.
 - Acids help to keep the meat moist and juicy.
 - Acids make the meat tastier.
 - Acids make the meat easier to chew.
 - Acids make the meat easier to digest.
- Accept any other suitable answer.

TT11 Functional and chemical properties of food: Carbohydrates

✓

1. C) At least 160°C (1 mark)

2. Croissants, bread rolls (1 mark for all correct, max. 1 mark)
Pasta, rice and béchamel sauce use gelatinisation.
Tomato sauce uses reduction method and/or gelatinisation if starch is used as a thickener.

3. Starch (1 mark)

4. The answer may include a reference to: (1 mark for each correct, max. 2 marks)
 - Gelatinisation is cooking of starch in presence of **water**.
 - Dextrinisation is cooking of starch in **dry conditions**.

5. The answer may include a reference to: (1 mark for each relevant statement, max. 2 marks)
 - Starch does not dissolve in water.
 - The starch falls to the bottom of the saucepan.
 - If not stirred, the starch at the bottom could burn or/and make the sauce lumpy.

6. i) The starch granules begin to soak up water and swell. (1 mark)
ii) The starch granules swell even more and begin to break open. (1 mark)
iii) The starch is released from the starch granules and the sauce is thickened / gelatinisation is finished. (1 mark)

7. The answer may include a reference to: (1 mark for each correct, max. 2 marks)
 - Dextrinisation helps to make the food **sweeter**.
 - That's because starch breaks down into smaller chains of dextrin, and finally into single molecules of sugars.
 - The taste can become **bitter** if the food is overcooked.
 - That's because as water evaporates, only the bitter carbon molecules are left in the mixture.

8. Any four from: (1 mark for each correct function and 1 mark for each example, max. 8 marks)
 - Gives a sweet flavour (e.g. in cakes or beverages).
 - Adds bulk to the mixture / adds volume (e.g. cakes, muffins).
 - Gives texture by making aeration possible (e.g. ice creams).
 - Improves the flavour (e.g. tomato sauce).
 - Speeds up fermentation (e.g. in bread or wine).
 - Extends the shelf life (e.g. in jam).
 - Preserves the food by disabling microorganisms' growth (e.g. in jam).
 - Changes the colour of the food (e.g. by caramelisation in crème brûlée or toffee sauce).

Accept any other suitable answer.

1. *(1 mark for each correct, max. 4 marks)*
- i) False – saturated fats will be solid at room temperature.
 - ii) False – for example, fish oil and cream are liquid.
 - iii) False – it means that each fat has its own melting temperature, at which it will become liquid.
 - iv) True – the fatty acids are hydrophobic, while the glycerol is hydrophilic.
2. *(1 mark for each correct sentence, max. 5 marks)*
- i) Emulsification is a process of mixing **water** and **oil** together.
 - ii) To **stabilise** the mixture and prevent it from **separating**, an **emulsifier** can be used.
 - iii) One of them is **lecithin**, which naturally occurs in egg yolk.
 - iv) For this reason, egg yolk is added to **mayonnaise**, which is an example of **water-in-oil** emulsion.
 - v) An example of **oil-in-water** emulsion is **milk**.
3. It means that fat does not dissolve in water and instead forms a suspension/emulsion. *(1 mark)*
4. Any two from: *(1 mark for each correct, max. 2 marks)*
- to make the cake lighter
 - to improve the texture of the cake
 - to incorporate air into the mixture
 - to make the mixture smooth
 - to make the cake springy
 - to allow the cake to rise
 - any other suitable answer
5. The answer may include a reference to: *(1 mark for each correct, max. 4 marks)*
- Fats are built from a glycerol head and three chains of fatty acids.
 - If all the chemical bonds in the fatty acid chains are single (saturated fats), the fat will have a solid texture at room temperature.
 - If a fat has one double chemical bond in the fatty acid chain (monounsaturated fats), it will be liquid at room temperature, but will solidify in a fridge.
 - If a fat has more than one double bond in the fatty acid chain (polyunsaturated fats), it will be liquid both in the fridge and at room temperature.
 - The more double chemical bonds, the more liquid the fat will be (it will be then called an oil).
 - Accept other suitable answers.
6. i) The answer may include a reference to: *(1 mark for each correct statement, max. 4 marks)*
- Shortening happens when we add **fat to flour**.
 - Fat molecules coat starch granules.
 - Fat molecules are hydrophobic, which means that they will prevent the starch from contact with water.
 - As the flour has no contact with water, gluten cannot be formed.
 - Because of that, the pastry is crumbly instead of soft and elastic.
- ii) Any one from: shortcrust, flaky pastry, puff pastry, rough puff, or any other correct answer (1 mark for any correct, max. 1 mark)
7. The answer may include a reference to: *(1 mark for stating which of the two pastries will be crumblier, and 1 mark for explanation why, max. 2 marks)*
- Plain flour and lard will be crumblier.
 - Butter contains around 15% of water, so some (little) amount of gluten will be developed.
 - As a result, the buttery pastry will be less crumbly (and more elastic) than the one made with lard.
 - Lard is almost 100% of fat so the flour will have no contact with water at all.

TT13 Functional and chemical properties of food: Fruit and vegetables; Raising agents ✓

1. Oxygen, copper and iron tools, chopping them finely (1 mark for all correct, max. 1 mark)
2. Air, steam (vapour), carbon dioxide (1 mark for each correct, max. 3 marks)
3. Self-raising (1 mark)
4. Vitamins A, C and E (1 mark for all correct, max. 1 mark)
5. The answer may include a reference to: (1 mark for each correct, max. 2 marks)
 - Bicarbonate of soda is an alkali so it has a soapy taste.
 - Acid is needed to neutralise the soapy taste.
 - In combination with acid, baking soda will produce substances that are neutral in flavour, such as carbon dioxide.
 - Thanks to this reaction baking soda with acid can be used as an effective leavening agent.
6. Any three from: (1 mark for each correct, max. 3 marks)
 - whisking
 - beating
 - folding
 - sieving
 - creaming
 - rubbing-in
 - any other suitable answer
7. Any two from: (1 mark for each correct, max. 2 marks)
 - Yorkshire pudding
 - choux
 - puff pastry
 - flaky pastry
 - any other suitable example
8. The answer may include a reference to: (1 mark for each correct, max. 2 marks)
 - Enzymes are biologically active molecules built of **proteins**.
 - Acid **denatures** proteins, and so prevents the enzymes from acting.
 - Thanks to the acids, enzymes are inactive and cannot transform the white/yellow pigments in fruits/vegetables into melanine.
9. Only one raising method is required for each point: (1 mark for each correct, max. 4 marks)
 - i) Mechanical – whisking
 - ii) Mechanical – beating and steam
 - iii) Mechanical – folding and steam
 - iv) Mechanical – beating and sieving, chemical – baking powder might be used (depending on the recipe)
10. The answer may include a reference to: (1 mark for each correct, max. 3 marks)
 - The cells in plants (fruit, vegetables) are being damaged.
 - The enzymes in cells come in contact with oxygen and become active.
 - The active enzyme turns white/yellow pigment in cells into brown melanine.
11. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks,
and 1 mark for a suitable example, max. 1 mark)
 - Yeast uses sugar present in food (ferment) for energy.
 - As a result **carbon dioxide** and alcohol are produced.
 - Carbon dioxide expands within the mixture (e.g. cake batter) and causes it to increase in volume.
 - Examples could include: bread, wine, beer, panettone, or any other suitable answer.

3.4 Food Safety

TT14 Food spoilage and contamination: *Microorganisms and enzymes; The signs of food spoilage; Microorganisms in food production*

✓

1. *(1 mark for each correct sentence, max. 4 marks)*
- Enzymes are biological **catalysts** usually built from **protein**.
 - This means that they can **speed up** chemical reactions.
 - Enzymes naturally occurring in plants help them to **ripen** and develop flavour.
 - If fruits are left for too long at **room** temperature, they can become brown.
2. Any two from: *(1 mark for each correct, max. 2 marks)*
- use of acid (vinegar, lemon juice)
 - use of high temperature (cooking, blanching)
 - use of low temperature (freezing, refrigerating)
3. i) High-risk foods are foods that are ready to eat, high in moisture and protein, and do not require further heat treatment, which makes them more susceptible to microorganisms' growth. *(1 mark)*
- ii) Any three from: *(1 mark for each correct, max. 3 marks)*
- poultry
 - meat and offal
 - fish and seafood
 - milk and dairy
 - cheese
 - vegetables
 - ready-to-eat foods (e.g. pizza, sushi)
 - reheated foods
 - any other suitable example
4. Any two from: *(1 mark for each correct, max. 2 marks)*
- blue cheese (e.g. Stilton, Gorgonzola, Roquefort)
 - soy sauce
 - Quorn™
 - oncom or tempeh (characteristic of Japanese cuisine)
 - soft cheese such as Brie or Camembert
 - any other suitable answer
5. The answer indicates at least one for each point from: *(1 mark for each correct, max. 3 marks)*
- Ripening of bananas, browning of fruits such as apples, pears or avocados.
 - A green, black or white furry mould coat is growing on bread, cheese or fruits.
 - Yeast ferments sugar in fruit and juices and turns them sour, fizzy and foamy, e.g. grapes, strawberries, tomatoes. Accept other suitable answers.
6. i) The answer includes a reference to: *(1 mark for each correct, max. 2 marks)*
- Bacteria **ferment** sugar (**lactose**) into **lactic acid**.
 - The lactic acid makes the yoghurt sour in flavour.
 - Lactic acid also changes the **pH** of milk to become more acidic.
 - The low pH causes three **proteins** in yoghurt to **denature and coagulate**.
 - Coagulation and denaturation cause yoghurt to thicken (change in texture).
- ii) Any two from: *(1 mark for each correct, max. 2 marks)*
- cheese (e.g. Cheddar, Gouda, Parmesan)
 - sauerkraut
 - gherkins
 - sausages (e.g. salami, pepperoni, chorizo)
 - vinegar
 - fermented milk beverages (e.g. buttermilk, kefir)
 - any other suitable answer

7. i) The answer may include a reference to: *(1 mark for each correct statement, max. 4 marks)*
- Yeast ferments sugar in dough/flour.
 - Yeast produces carbon dioxide as an effect of fermentation.
 - The more sugar, the more gas can be produced.
 - Carbon dioxide causes the dough to rise and become soft and sponge-like.
- ii) Any one from: *(1 mark for any correct, max. 1 mark)*
- wine
 - beer
 - cider
 - Marmite
 - stock cubes
 - any other suitable answer
8. Only one effect / control method is needed for each factor, from: *(1 mark for each correctly filled cell, max. 10 marks)*

Factor	Effect	Control method
Temperature	<ul style="list-style-type: none"> • Microorganisms usually grow faster at room/body temperature (between 20°C and 37°C). • Microorganisms become dormant at low temperatures. • Microorganisms are killed at high temperatures. 	<ul style="list-style-type: none"> • Heating (over 65°C), refrigerating (0°C to 5°C) and freezing (below 0°C) will stop microorganisms' growth.
Moisture	<ul style="list-style-type: none"> • Microorganisms grow faster in moist conditions. • Microorganisms grow more slowly (or cannot grow at all) in dry conditions. 	<ul style="list-style-type: none"> • Storing food in dry conditions or drying/freeze-drying it will prevent food spoilage.
Food	<ul style="list-style-type: none"> • Microorganisms such as bacteria grow faster in protein-rich environments. • Yeast and moulds may grow faster in sugar-rich environments. 	<ul style="list-style-type: none"> • Pack foods in sterile conditions. • Prevent foods from being contaminated. • Apply food hygiene and safety rules. • Use modified atmosphere to package foods. • Check date marks on foods, especially high-risk foods.
Time	<ul style="list-style-type: none"> • Bacteria can duplicate their number as often as every 20 minutes. • The longer the time, the higher the risk that food becomes spoilt. 	<ul style="list-style-type: none"> • Cook thoroughly. • Check date marks on food products. • Do not eat foods after their use by date. • Do not store foods for too long. • Allow stock rotation.
pH	<ul style="list-style-type: none"> • Most microorganisms grow the fastest in neutral pH. • Most microorganisms will die or become inactive in acidic or alkaline pH. 	<ul style="list-style-type: none"> • Add acid, such as lemon juice or vinegar. • Preserve foods in vinegar. • Marinade foods.

Accept other suitable answers.

TT15 Food spoilage and contamination: *Bacterial contamination*

✓

1. *Campylobacter* (1 mark)
2. *Salmonella* (1 mark)
3. Dirty/unwashed hands (1 mark)
4.
 - i) True (1 mark)
 - ii) False – *Staphylococcus aureus* is a common bacterium living on the skin, in the respiratory system and in the gut lining. (1 mark)
 - iii) True (1 mark)
 - iv) True – the toxin is produced by the *Clostridium botulinum* bacterium, and can cause very severe health issues, and even death. (1 mark)
5. Cross-contamination is a process in which **pathogenic or poisonous microorganisms** are **unintentionally transferred** to food, either from a different food product, or from equipment or the hands of the cook. (1 mark)
6. Any two from: (1 mark for each correct, max. 2 marks)
 - raw eggs
 - poultry/chicken
 - milk and cream
 - any other suitable example

7. Any three from: (1 mark for each source and 1 mark for each way of prevention, max. 6 marks)

Source of contamination	Method of prevention
Other contaminated foods	Keeping foods separately, using different tools and equipment or another reasonable answer
Work surfaces and equipment	Using only dedicated equipment, cleaning equipment thoroughly after use or another reasonable answer
The people cooking	Personal hygiene, changing of clothes and use of aprons, use of head covering or another reasonable answer
Pests	Covering food, storing it in closed containers or rooms or another reasonable answer
Waste food and rubbish	Keeping personal hygiene, washing hands after dealing with rubbish or another reasonable answer

8. Any three from: (1 mark for each correct, max. 3 marks)
 - vomiting
 - diarrhoea
 - stomach cramps
 - nausea
 - headache
 - fever
 - any other suitable answer
9. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks)
 - Milk pasteurisation is a process in which milk is heated to over 70°C.
 - The high temperature helps to kill most bacteria in milk.
 - *Listeria* is an example of a bacterium found in raw milk.
 - As a result, there are no live pathogens in the milk, so people can drink it safely.
 - Accept other suitable answers.

TT16 Principles of food safety: *Buying and storing food*

✓

1. C) Room temperature (1 mark)
2. Shelf life is the **amount of time** the food can be **stored or eaten** for before becoming spoiled or poisonous. (1 mark)
3. B) -18°C (1 mark)
4. A) on the bottom shelf of the fridge, covered (1 mark)
5. 75°C (1 mark)
6.
 - i) It is important to keep food below danger zone temperatures, prevent microorganism growth and prevent spoilage. (1 mark)
 - ii) It is important to keep air circulating and cool foods properly, without leaving 'hot spots' in them. (1 mark)
 - iii) Covering food helps prevent tainting of food, prevents other foods from any possible leaking juices, prevents contact with other foods and cross-contamination, and protects from any possible pests. (1 mark)
7. (1 mark for each correct, max. 10 marks)
 - i) In a fridge, on the top shelf, covered or in an airtight container
 - ii) In a dark, cool, dry room or cupboard, not covered or in a container which lets fresh air in and out
 - iii) In a fridge, in the door
 - iv) In a fridge, on the middle shelf, covered or in an airtight container
 - v) In a dark, cool, dry room or cupboard, in an airtight container
 - vi) In a fridge, on the bottom shelf, covered or possibly sealed
 - vii) In a fridge, on the middle shelf, covered or in an airtight container
 - viii) In a fridge or in a dark, cool, dry room or cupboard, usually uncovered or in containers which let fresh air in and out
 - ix) In a fridge, on the middle shelf, covered or in an airtight container
 - x) In a dark, cool room or cupboard
8.
 - 'Use by' date applies to **fresh or chilled** foods and it applies to **food safety**. The food **cannot be eaten after** that date. (1 mark)
 - 'Best before' date applies to **processed or dry foods** and it applies to food **quality**. The food **can be eaten** after the date but its features might be affected. (1 mark)
9. The answer may include a reference to: (1 mark for each correct, max. 3 marks)
 - Foods should be placed on a tray or in a box to catch all the leaking water/juices and prevent contamination of other foods.
 - Defrosting should ideally take place in a fridge to let the food defrost evenly.
 - Defrosting should be conducted thoroughly to avoid cold spots which will then not cook properly and could pose a risk of food poisoning.
10. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks)
 - Defrosted foods come into the range of danger zone temperatures.
 - Microorganisms can replicate faster in these temperatures.
 - Freezing the food again will not kill the microorganisms, and so they will be able to multiply even faster after a second defrosting.
11.
 - i) From 5°C to 63°C (1 mark)
 - ii) The answer may include a reference to: (1 mark for each correct, max. 2 marks)
 - At danger zone temperatures, bacteria and other microorganisms **multiply very fast**.
 - Therefore, the **risk** of food spoilage/food poisoning is **increased**.
 - iii) At temperatures above 63°C, enzymes become inactive and bacteria cannot multiply any more. (1 mark)

TT17 Principles of food safety: *Preparing, cooking and serving food*

✓

1. i) False – it increases the risk of food poisoning. (1 mark)
ii) True – it helps prevent cross-contamination. (1 mark)
iii) True (1 mark)
iv) False – raw fruits aren't considered high-risk foods. (1 mark)
2. D) 75°C (1 mark)
3. Any one from: (1 mark for any correct, max. 1 mark)
• alcohol/ethanol
• chloramine
• phenols
• iodine / tincture of iodine
Accept other suitable answers
4. D) Blue (1 mark)
5. i) Any three from: (1 mark for each correct, max. 3 marks)
• poultry/chicken
• raw meat
• raw eggs
• unpasteurised milk
• any other suitable answer
ii) Any three from: (1 mark for each correct, max. 3 marks)
• Wash hands before and after preparing/cooking high-risk foods.
• Use dedicated, colour-coded tools and utensils.
• Clean the tools and utensils thoroughly with hot, soapy water.
• Disinfect tools if necessary/possible.
• Store the foods separately, in closed/sealed containers.
• Accept any other suitable answer.
6. The answer may include a reference to: (1 mark for a correct explanation and 1 mark for a suitable example, max. 2 marks)
• Correct cooking time is the time needed to obtain the **desired texture, flavour and appearance** of a food; for example, when cooking scrambled eggs it is important to control the cooking time to obtain the desired texture (fluffy and moist) and appearance.
• Correct cooking time helps to ensure that the food is **safe to eat** (bacteria and other microorganisms are killed, enzymes are deactivated), e.g. when cooking meat it is necessary to ensure it is cooked through.
• Correct cooking time helps to ensure that the food is **not overcooked or raw**, e.g. when cooking potatoes for too short a time they will be still hard, while overcooking them will make them mushy and difficult to drain from the liquid.
• Accept other suitable answers.
7. Any three from: (1 mark for each correct, max. 3 marks)
• Tie back or cover hair.
• Use a hairnet.
• Wash hands before working.
• Use disposable gloves when dealing with high-risk foods.
• Don't sneeze or cough near food.
• Don't touch head, hair or face when preparing or cooking food.
• Use a clean apron.
• Change clothes before beginning work.
• Don't brush hair in the kitchen.
• Cover wounds and scratches with a waterproof plaster.
• Don't prepare food if feeling unwell.
• Accept any other suitable answer.

8. The answer may include a reference to: *(1 mark for each correct, max. 7 marks)*
- **Reset** the food probe.
 - Sterilise before use.
 - Insert the probe into the **thickest part** of the food measured, **without touching the pan**.
 - Leaving the probe in place until it reaches **75°C or more**.
 - Sterilise the probe after use.
 - The answer indicates that the test should be **repeated** if the required **temperature** is **not acquired** the first time.
 - The answer indicates that the probe should **not be used with different foods without disinfecting** it between tests.
9. The answer may include a reference to: *(1 mark for each correct statement, max. 5 marks)*
- Anaphylactic shock is a life-threatening reaction of the immune system to an allergen, e.g. food ingredient.
 - Major allergens include: eggs, milk, peanuts, tree nuts, soy beans, wheat and other cereals containing gluten, fish, crustaceans, molluscs, lupin, mustard, sulphur dioxide.
 - Applying food safety principles can help to avoid cross-contamination of foods.
 - Cross-contamination means that a food has been contaminated with / spoilt by another food's particles or microorganisms.
 - If a food is contaminated with particles of an allergen, it can cause allergy symptoms, such as anaphylactic shock.
 - Examples of food safety principles which help to avoid that are: dealing with foods separately, storing them in closed containers, washing hands and utensils before and after dealing with high-risk foods, using colour-coded tools.
 - Accept other suitable answers.

3.5 Food Choice

TT18 Factors affecting food choice: *Factors which influence food choice*



1. (1 mark for each correct sentence, max. 4 marks)
- PAL stands for **physical activity level**.
 - PAL helps to assess how much **energy** a person needs every day.
 - Low PAL means that a person leads a **sedentary** lifestyle.
 - If a person eats more than he or she needs, all the excess **calories** will be stored in the body in the form of the **adipose** tissue.
2. i) Disposable income is the amount of money left after all taxes are deducted from the family's income. Disposable income can be spent on rent, bills, goods (such as food or clothing), as well as for saving. Accept other suitable answers. (1 mark)
- ii) Any two from: (1 mark for each correct, max. 2 marks)
- The larger the income, the more food a person/family can buy (the consumption in general rises).
 - The larger the income, the more healthy food a person/family can buy (the consumption of healthy food rises).
 - The lower the income, the larger the possibility that a person/family will buy cheap, low-quality food.
 - Healthy food, like fresh fruit and vegetables, is usually more expensive so only the people with higher incomes can afford to buy it.
 - Cheap food is usually high in fats and sugars, so people with lower incomes will more often choose these products to satisfy their most basic needs (hunger).
 - The lower the income, the less food people can afford to buy (which poses a risk of malnutrition or even hunger).
 - Accept any other suitable answer.
3. Any four from: (1 mark for each correct, max. 4 marks)
- The amount of locally produced food – the more food can be produced, the more of it will be available for sale; also the prices are likely to be lower, increasing affordability for the customers.
 - The amount of imported foods – the more food can be imported, the more of it will be available for sale, and the wider choice the consumers will have.
 - Seasonality – foods in season are usually available in abundance and at lower prices; out-of-season foods may be unavailable at all or available at very high prices, which makes them unaffordable for many people.
 - Price of food – the lower the price, the more affordable the food will be for customers.
 - Disposable income (or the amount of money a family wants to spend on food) – the higher the disposable income, the more money people may spend on food, increasing its availability for themselves and their families.
 - Highly developed transport – well-developed transport links help to ensure that food is available everywhere around the country, and not only where it is produced; it also helps to ensure that the food can be transported quickly, without losing its freshness or quality.
 - New technologies which allow food to be stored for longer without losing nutritional value – this allows foods to be stored for a long time and increases their availability throughout the year, e.g. potatoes are only harvested in autumn but can be safely stored and made available throughout the year.
 - Accept any other suitable answer.
4. Any three from: (1 mark for each correct, max. 3 marks)
- During celebrations people eat more food, e.g. there is a starter, main meal and dessert.
 - People eat more sugar-rich foods, such as cakes.
 - People eat more fatty foods, such as cakes, cheese or roasted vegetables.
 - People choose special festive meals, e.g. roasted turkey, mince pies.
 - People drink more alcohol, e.g. wine or champagne.
 - Calorie intake is larger than on an average day.
 - Accept any other suitable answer.
5. i) To calculate the cost of one pasty: (1 mark for the calculation and 1 mark for the correct answer, max. 2 marks)
- a) calculate the cost of a whole batch
- To do this, calculate how much each ingredient will cost, and then add this up.
- 500g flour will cost $£0.90 \times 0.5\text{kg}/1.5\text{kg} = £0.30$
 - 125g lard will cost $£0.40 \times 0.125\text{kg}/0.250\text{kg} = £0.20$
 - 125g butter will cost $£1.20 \times 0.125\text{kg}/0.250\text{kg} = £0.60$
 - 200ml water will cost $£0.20 \times 0.2\text{l}/2\text{l} = £0.04$
 - 500g beef will cost $£18.00 \times 0.5\text{kg}/1\text{kg} = £9.00$
 - 500g potatoes will cost $£1.50 \times 0.5\text{kg}/1\text{kg} = £0.75$
 - 250g swede will cost $£4.00 \times 0.25\text{kg}/1\text{kg} = £1.00$
 - 200g onion will cost $£0.80 \times 0.2\text{kg}/1\text{kg} = £0.16$
- The sum of these equals the cost of one batch (excluding the cost of work, energy, gas, etc.) and is £12.03.
- b) divide the cost of the batch by the number of pasties made from one batch:
 $£12.03/6 = £2.00$

- ii) Any one from: (1 mark for identifying an ingredient to change and 1 mark for a suitable justification, max. 2 marks)
- Replace some or all of the flour with wholemeal flour – wholemeal flour contains more dietary fibre.
 - Replace lard and butter with a vegetable oil – for example, a margarine or coconut oil as they are rich in polyunsaturated fatty acids and are cholesterol-free.
 - Replace beef with a meat-free alternative, e.g. lentils, tofu or Quorn™ – red meat is associated with higher risk of bowel cancer so it is best to lower its consumption.
 - Use more vegetables – to include a wider variety / to make the diet more varied, and to include more vitamins, minerals and fibre.
 - Sprinkle with seeds or nuts – to include polyunsaturated fatty acids and vitamin E, and to add more fibre.

Accept any other suitable answer.

6. Any two from: *(1 mark for each correct, max. 2 marks)*

- The preferences may be affected by genetic factors – e.g. people will naturally prefer sweet things to bitter ones; some people will prefer less salty items, and others will prefer saltier foods due to their natural sensitivity to saltiness.
- The preferences may be based on comfort and safety – e.g. people will prefer foods which they are familiar with, and will be reluctant to try new, strange things.
- Preferences may be affected by personal experiences – e.g. people may avoid foods which they have tried in the past and didn't like.
- Preferences may be affected by the texture of food – e.g. some people will prefer crunchy foods, while others will prefer softer items which may be easier for them to chew or bite.
- Preferences may be affected by the people we spend time with – e.g. people will tend to prefer foods which they associate with home or childhood (such as foods typical of their family home).
- Preferences may be affected by ethical views and beliefs – e.g. some people may prefer to buy only free-range eggs as they want to support animal welfare.

Accept any other suitable answer.

7. The answer may include a reference to: *(1 mark for each correct statement, max. 6 marks)*

- Physical activity – people with low levels of physical activity should eat less in general, while people who are physically active can afford to eat more without gaining weight; low levels of physical activity together with high calorie consumption may lead to weight gain and obesity.
- Type of job performed – people who work in an office usually need less energy than physical workers, so should eat fewer calories; the type of job performed will also decide all the other components, such as time available to eat (some people will only have a 20-minute break, while others can have an hour-long lunch break, so they will be able to choose healthier food instead of ready-to-eat, fast food).
- Working hours – usually decide what a person chooses to eat for a meal; starting work early in the morning means that a person will be more likely to choose something quick and easy to make (e.g. cereal), while working an afternoon or night shift will mean that a person will be more likely to choose something more substantial (depending on the time of day).
- Whether a person walks or drives to work – walking requires more energy than driving, so walkers can choose to eat more without gaining weight.
- How much time a person has to cook/shop/eat – usually, the more time available, the healthier the food choice, as a person can spend more time choosing food in the shop (planning the shopping, reading labels), cooking at home (so fast foods are avoided) and eating (it is healthier to properly chew the food rather than swallowing it quickly because the lunch break is too short).
- If a person eats out a lot – eating out means that a person doesn't have a real impact on what's in the food he/she is eating; even choosing 'healthy' foods such as salads can be unhealthy as they may be served with greasy, high-fat, high-salt dressings.
- Enjoyment as an important part of a lifestyle – people who often eat out, go to cinemas, etc. may eat unhealthy foods and snacks more frequently as often only these are available at public venues.
- Enjoyment – taking part in parties and other social activities may also cause people to eat sweets, sugar- and fat-rich foods more often; people may also more often reach for alcohol.
- Accept other suitable answers.

TT19 Factors affecting food choice: *Food choices*

✓

1. Pork chops, prawn cocktail, cheeseburger* *(1 mark for all correct, max. 1 mark)*
*Jews do not eat pork or shellfish, and do not mix meat with dairy, so couldn't eat a cheeseburger.

2.
 - i) False – in Hinduism beef cannot be eaten, but milk can be drunk because no animal was killed for it. *(1 mark)*
 - ii) True – Sikhs believe that cows are sacred, just like Hindus. *(1 mark)*
 - iii) True – they avoid killing animals on purpose. *(1 mark)*
 - iv) True – but they won't be considered local in the UK! *(1 mark)*

3. Lent *(1 mark)*

4. Any three from: *(1 mark for each correct, max. 3 marks)*
 - Not eating pork or any pork product (such as gelatine).
 - Not drinking alcohol.
 - Halal meat only.
 - Blood cannot be eaten (meat has to be drained properly, blood pudding would not be accepted).
 - Accept any other suitable response.

5. Any two from: *(1 mark for each correct, max. 2 marks)*
 - Ital means natural, clean, pure, from the earth.
 - The answer indicates that Rastafarians eat large amounts of vegetables, fruit and natural fruit juices, because they come from the earth.
 - Rastafarians do not eat meat or drink milk because they do not come from the earth.
 - No chemically modified foods can be eaten.
 - Artificial food additives are avoided.
 - They do not eat pork.
 - They do not eat fish which are longer than 12 inches.
 - Coconut oil is used for cooking.
 - They do not drink alcohol.
 - They can drink herbal tea.
 - Accept any other suitable answer.

6.
 - Food intolerance is **a response of the digestive tract** against a given food ingredient. *(1 mark)*
 - An example is gluten intolerance or lactose intolerance. *(1 mark for any correct, max. 1 mark)*
 - Food allergy involves the reaction of the immune system in response to a given food. *(1 mark)*
 - Examples are nut allergy, milk protein allergy, egg allergy, wheat allergy, shellfish or fish allergy. *(1 mark for any correct, max. 1 mark)*

7. The answer may include a reference to: *(1 mark for each correct statement and 1 mark for a suitable description, max. 6 marks)*
 - Animal welfare – people will buy only foods which have proper quality marks, and free-range eggs or meat to make sure the animals didn't suffer / were treated humanely.
 - Fairtrade – people will choose foods labelled as Fairtrade, e.g. bananas with a Fairtrade logo, to make sure that their food choices do not negatively affect other people.
 - Local produce – people will choose local, seasonal products, e.g. pumpkins in autumn and strawberries in spring only, to support the local community and farmers, decrease food miles and carbon footprint, and decrease human impact on climate change.
 - Organic – people will choose foods labelled as organic, e.g. organic eggs, to avoid chemicals, pesticides, antibiotics or other potentially harmful factors.
 - Genetically modified foods (GM foods) – people will look for foods labelled as GM-free, e.g. chicken fed with GM-free feed only, to avoid potential health hazards connected with GM foods.
 - Accept any other suitable answer.

TT20 Factors affecting food choice: Food labelling and marketing influences

✓

1. Use by date, origin of food, allergens, the net quantity, list of ingredients (1 mark for all correct, max. 1 mark)
2. The ingredients are put in a descending order – from the ones used in the largest quantity to the ones used in the smallest quantity. (1 mark)
3. Celery, lupin, mustard, nuts, milk (1 mark for all correct, max. 1 mark)

4. i) BOGOF stands for **buy one get one free**. It is a popular **marketing** strategy used by **supermarkets**. (1 mark for each correctly filled place, max. 3 marks)

- ii) Any three from: (1 mark for each correct answer, max. 3 marks)

- price reductions
- special offers
- free samples
- free gifts
- product placement
- displays
- points of sale
- any other suitable answer

5. i) (1 mark for all correct, max. 1 mark)

Red – high level of a given nutrient (fat, saturates, sugar, salt) per 100g or 100ml

Amber – medium level of a given nutrient (fat, saturates, sugar, salt) per 100g or 100ml

Green – low level of a given nutrient (fat, saturates, sugar, salt) per 100g or 100ml

- ii) The answer may refer to: (1 mark for each correct, max. 2 marks)

- The colours green and amber may persuade a person to choose healthier foods and snacks that contain lower levels of fats, saturates, sugars and salt.
- Foods and snacks which are labelled as red should be avoided due to high content of fats, saturated fats, sugar or salt.
- Accept other suitable answers.

6. i) (1 mark for each pair correct, max. 3 marks)

	Nutritional claim	Health claim
Sugar-free	✓	
Copper contributes to normal hair pigmentation		✓
Low salt	✓	
Essential fatty acids are needed for normal growth and development in children		✓
Calcium and vitamin D are needed for normal growth and development of bone in children		✓
Source of vitamin D	✓	

- ii) The answer may refer to: (1 mark for each correct, max. 2 marks)

- Nutritional claim states that there is a nutrient content in a food.
- Health claim shows the link between a given nutrient in food and its benefit for health.

7. The answer may include a reference to: (1 mark for each correct, max. 3 marks)

- Pester power is the ability of children to pressurise their parents into buying things.
- Pester power is used by marketing specialists to make people buy products for their children / increase sales of chosen items.
- Examples could include: placing items at the eye level of children, making packaging very colourful and eye – catching for children, placing children’s heroes on the packaging.
- Accept other suitable answers.

8. i) The labelling helps to protect the consumers by: *(1 mark for each correct statement and 1 mark for an explanation, max. 2 marks)*
- **providing date marks ('use by' and 'best before')** – this helps people to ensure the food they eat is fresh, and therefore helps to prevent food poisoning
 - **providing a list of allergens** – this helps people to avoid foods which may be dangerous to them, avoid allergic reactions and/or anaphylactic shock
 - **providing storage instructions** – this helps people to identify how a given product has to be stored, so that they can store it properly and prevent bacteria multiplication (and food poisoning as a result)
- ii) The labelling helps to educate consumers by: *(1 mark for each correct statement and 1 mark for an explanation, max. 2 marks)*
- **providing them with the information about food provenance** – this helps people to learn where the food they eat comes from; this is also useful in making informed choices as some people may prefer to buy foods from a given country only, e.g. Brie cheese made in France only
 - **providing health and nutritional claims** – this helps people to learn what is the nutritional value of the food they eat and plan their meals and diets accordingly; this also helps to make informed choices as people are able to identify products which may be suitable or unsuitable for them, e.g. a diabetic may easily identify foods with low sugar content
- Accept other suitable answers. *(2 marks)*

9. Any two from: *(1 mark for each correct, max. 2 marks)*
- Showing advertisements of sugary snacks and beverages may cause children to crave these products more, and, therefore, consume more of them.
 - Showing the specific habits of actors / TV series characters / movie characters – e.g. if children see that their favourite character chooses salad for lunch, they may be keener to try salads themselves.
 - Showing programmes related to food and healthy eating – e.g. this may encourage children to try new things more eagerly; it may also help to encourage them to cook food themselves rather than buy ready-made products.
 - Displaying healthy eating campaigns – e.g. if children watch TV often, they may learn the campaigns' slogans or songs, and then choose foods which the slogans/songs are about.
 - Accept other suitable answers.

TT21 British and international cuisines

✓

1. Cuisine is a style of cooking in a given country or region that has distinctive ingredients, preparation and cooking methods, presentation styles and/or serving techniques. (1 mark)
2. B) Spanish cuisine (1 mark)
3. A) Serving meats and puddings with thick sauces, e.g. stews, casseroles or Sunday roasts (1 mark)
4. i) False – tandoor is a clay oven characteristic of Indian cuisine. (1 mark)
ii) False – wok is a deep frying pan from China. (1 mark)
iii) False – tapas are eaten in Spain. (1 mark)
iv) False – antipasto comes from Italy. (1 mark)

5. (1 mark for each correct, max. 8 marks)

Foods	Country of origin
Gazpacho	Spain
Bruschetta	Italy
Onion soup	France
Spring rolls	China
Tagine	Morocco
Helva	Turkey
Lentil dahl	India
Baklava	Greece

Other suitable answers may be accepted (e.g. baklava may be seen as both a Greek and Turkish dish).

6. a) Any three British cheeses, from: Cheddar, Stilton, Red Leicester, Wensleydale, or any other suitable answer. (1 mark for all correct, max. 1 mark)
b) Any three non-British cheeses and their country of origin, e.g. Brie, Camembert and Comté for France, or feta, halloumi and anthotyros for Greece, or any other suitable answer. (1 mark for all correct, max. 1 mark)

7. The answer may include a reference to: (1 mark for each correct, max. 2 marks)

- A traditional breakfast in the UK is very filling.
- In the UK lunch is eaten around noon / early afternoon and usually consists of sandwiches, salads, soups or other light dishes.
- In the UK the dinner is eaten in the late afternoon / late evening, and usually consists of a hot dish (such as a stew or pie).
- In Spain breakfast is usually quite light and sweet, and eaten later in the morning than in the UK.
- In Spain after lunch people enjoy a siesta (resting period).
- In Spain dinner is often eaten late in the evening, and may include a selection of small dishes called tapas.

Accept other suitable answers.

8. The answer may include a reference to: (1 mark for each correct, max. 4 marks)

- The word Mediterranean refers to the countries in the Mediterranean Sea region such as Italy, Greece, France, Spain, etc.
- The ingredients characteristic of the region include: olive oil and olives, wine and grapes, seafood, vegetables such as tomatoes, aubergine, bell pepper, specific herbs such as rosemary or thyme.
- The meals are often enjoyed in a larger group, e.g. family or friends, and shared between people.
- There are various eating patterns, e.g. in Italy a traditional meal consists of several courses served one after another, while in Morocco all dishes may be served together.
- There may be specific pieces of equipment used, e.g. special stone ovens to bake pizzas in Italy, clay tagines to stew foods in Morocco, paellera to make paellas in Spain, etc.
- There may be specific ways of presenting and serving the food, e.g. in Italy pasta is garnished with grated cheese, in Spain paella is usually served in the pan (paellera), in France a selection of cheeses and meats may be served on wooden boards, etc.

Accept other suitable answers.

9. The answer may include a reference to: *(1 mark for each correct, max. 4 marks)*

- Traditional English breakfast contains fried bacon, sausages, eggs, baked beans, toast with butter, hash browns, grilled tomatoes and/or mushrooms.

To make the breakfast more modern or healthier:

- Bacon can be grilled instead of fried to let some of the fat leak out OR a low-fat bacon can be chosen.
- Sausages should be chosen so that they contain more meat than other ingredients (cheap sausages have only about 60% of meat), also low-salt sausages may be chosen instead of traditional ones.
- Free-range eggs may be chosen to follow modern ethical beliefs about animal welfare.
- Beans can be exchanged for a low-fat, low-sugar or low-salt alternative product.
- For vegetarians, bacon and sausages may be exchanged for an alternative, e.g. soy chunks, Quorn™, or other product.
- Butter should be exchanged for unsalted butter or a cholesterol-lowering margarine.
- Tomatoes can be served raw instead of grilled to preserve their nutritional value.
- Accept any other suitable example.

TT22 Sensory evaluation



1. Sweet, salty, sour and bitter (1 mark for all correct, max. 1 mark)
Additional mark for umami (1 mark)

2. C) Aroma (1 mark)

3. (1 mark for each correct point, max. 3 marks)
 - i) Paired preference and **hedonic** are types of acceptance tests. They are designed to find out whether a food is **acceptable** for the consumer. In the paired preference test, the tester is given **two** samples and selects the preferred one. In the **hedonic** test, a tester can be given **two** or more samples and ranks them on a **scale**.
 - ii) The triangle test is an example of **discrimination** tests. The test is designed to identify the **odd one out** from **three** samples given.
 - iii) The grading tests include **ranking, rating** and profiling. Profiling tests help assess a food on a **star** diagram. **Ranking** tests are used to measure the **strength** of a given feature of a food. The **rating** test helps judge **one** feature of many foods or **many** features of one food.

4. Only one type of test is required for each point, from: (1 mark for each correct, max. 4 marks)
 - i) paired preference test
 - ii) hedonic rating test, rating test or profiling test
 - iii) hedonic rating test, ranking test or rating test
 - iv) triangle test, hedonic rating test, ranking test or rating test

5. The answer may include a reference to: (1 mark for each correct, max. 5 marks)
 - Any one the four senses: sight, taste, touch and smell.
 - The answer indicates that the look of the food makes it more or less **appetising** for the tester.
 - The answer indicates that touch helps assess the **texture and consistency** – whether a food is creamy, crunchy, soft, spongy, etc.
 - The answer indicates that taste helps decide whether a person likes the food or whether it is, for example, too salty, too sweet, too bitter or too sour for them (or not salty/sweet/bitter/sour enough).
 - The answer indicates that smell helps to decide whether we like the food or not even before trying it, so a person will be more likely to try a new food if she/he likes the smell of it.
 - Accept other suitable answers.

6. The answer may include a reference to: (1 mark for each correct statement, max. 3 marks)
 - Taste buds only recognise basic flavours: umami, sweet, sour, bitter and salt.
 - The aroma of the food is recognised by the receptors in the nose.
 - The palatability of food depends on both the taste and the aroma.
 - When the nose is blocked, the olfactory receptors cannot receive the chemicals given off from food, so the message cannot be sent to the brain to recognise the aroma.
 - Smelling no aroma will decrease/worsen the overall flavour of food, or make the food taste bland.
 - Accept other suitable answers.

7. The answer may include a reference to: (1 mark for each correct, max. 6 marks)
 - To obtain reliable results a test should be conducted in **controlled conditions**.
 - In a testing room all **distractions** should be removed, e.g. smells, noises.
 - The **lighting** should be controlled to hide visual discrepancies between samples.
 - Testers should be **isolated** from each other.
 - All the **samples** should be of the same size, shape, temperature, etc.
 - If a **carrier** is used, it has to be neutral in taste.
 - The **samples** must be served at the correct temperature, e.g. ice creams should be frozen, soups should be served hot, etc.
 - The dishes used should be neutral in appearance and identical to all testers.
 - **Clean water** has to be provided to all testers.
 - All testers should be provided with a **score sheet** and/or instructions on how to use it.
 - Accept other suitable answers.

3.6 Food Provenance

TT23 Environmental impact and sustainability of food: Food sources



1. Oranges, lettuce and corn (1 mark for all correct, max. 1 mark)
Chicken and eggs may be considered reared ingredients. Stinging nettles are a gathered ingredient.
2. Mushrooms, stinging nettle, seaweed (1 mark for all correct, max. 1 mark)
Cheese is a product of secondary processing, not a produce.
Apples are usually a grown ingredient. (However wild species which could be gathered can be found.)
3. Any three from: cows, sheep, pigs, chickens, turkeys, geese, ducks or any other suitable answer (1 mark for all correct, max. 1 mark)
4. Any three from: boar, deer, rabbit, pheasant, grouse, salmon, trout, oyster or any other suitable answer (1 mark for all correct, max. 1 mark)
5. C) 'They cause overfishing' is untrue. (1 mark)
6. i) False – venison is the meat of the deer. (1 mark)
ii) False – organic means that the hen must have been fed organic feed; free-range hens do not have to be fed organic feed but have to be let outside for part of the day. (1 mark)
iii) False – oranges are grown in Spain and other countries and are imported to the UK. (1 mark)
iv) True (1 mark)
7. Any three from: (1 mark for each correct, max. 3 marks)
 - artificial fertilisers
 - pesticides
 - herbicides
 - antibiotics (can be used for treatment only, not for prevention of diseases)
 - GM feed for animals
 - GM seeds used to plant vegetables and fruit

Accept any other suitable example.

8. Any two from each list: (1 mark for each correct for each category, max. 4 marks)

Animal produce	Plant produce
Duck	Potatoes
Turkey	Carrots
Goose	Parsnips
Rabbit	Beetroots
Venison	Kale
Cod	Cabbage
Dover sole	Brussel sprouts
Queen scallops	Onions
Haddock	Oranges
Halibut	Artichoke
Lobster	Butternut squash
Oysters	Celeriac
Hare	Kohlrabi
Partridge	Leeks
Lemon sole	Cranberries
Turbot	Any other suitable answer
Any other suitable answer	

9. Any four different factors with an explanation from: *(1 mark for each correct factor with an explanation, max. 4 marks)*
- Weather conditions – the temperature and rainfall help to determine what kind of plant can be planted in a given area to ensure success.
 - Soil quality – well-nourished soil is better for growing food plants, while poorer quality soil can be used to make pastures.
 - Soil pH – some plants will grow in acidic conditions only, while others will prefer alkaline pH.
 - Pests – are usually specific to a given region and a given plant, e.g. Colorado beetle will only attack potatoes, not other plants.
 - Vermin – if the field is in close proximity to a wood, there is a possibility that wild animals will damage the crops or harm livestock, so it is best to fence the field or protect it from them in other ways (e.g. sheep can be protected by a sheepdog from foxes and wolves).
 - Climate in the region – whether there are four seasons of the year or only two affects plants' life cycle and may make growing impossible.
 - Amount of sunlight available during the day – some plants prefer to be grown in the shade, while others require very sunny conditions.
 - Landform – as usually fields cannot be planted on mountain slopes (but these can sometimes be used for pastures, e.g. for goats).

The answer must provide a short description/explanation of why a given factor has to be taken into consideration.
Accept other suitable answers.

10. The answer may include a reference to: *(1 mark for each correct, max. 4 marks)*

Advantages may include:

- Intensive farming helps obtain larger crops / amounts of meat or milk for people to eat.
- In intensive farming less land is used; it is less costly to rear hundreds of animals in one place.
- Proportionally fewer people are needed to run a large farm.
- Intensive farming lowers food prices.

Disadvantages may include:

- Keeping many animals in one place increases the risk of a disease spreading.
- Increased risks of fights and injuries between animals.
- Animal welfare standards are often not being met.
- Antibiotics are often used in large amounts, which increases the risk of developing antibiotic resistance in bacteria
- Accept any other suitable answer.

- An example of an intensively farmed animal is hens (especially in cage egg production) or cows (production of milk).
- An example of an intensively farmed plant is maize as it is grown for food, feed, biofuel and fertiliser, and, therefore, high-yield crops are of benefit.

Accept other suitable answers.

(1 mark for each correct, max. 2 marks)

11. The answer may include a reference to: *(1 mark for each correct statement, max. 6 marks)*

- *Genetically modified* means that some genes in the plants' or animals' DNA have been changed or replaced in order to obtain the desired feature.
- Advantages of GM may include:
 - decreasing the need for herbicides
 - increasing nutritional value of food
 - increasing crops
 - any other suitable answer
- The disadvantages of GM may include:
 - unknown health effect
 - extinction of naturally occurring species
 - contamination of non-GM farms/fields
- Examples of GM could include golden rice, soybean, beef (cattle), etc.
- Accept other suitable answers.

TT24 Environmental impact and sustainability of food: Food and the environment;
Sustainability of food



1. Oranges, strawberries, potatoes *(1 mark for all correct, max. 1 mark)*
2. B) Supports organic farming *(1 mark)*
3. i) The answer includes a reference to at least three from: *(1 mark for any 3 correct, max. 1 mark)*
- Food is provided to all people.
 - The food is available in sufficient amounts for each person.
 - The food is healthy (not toxic, poisonous, spoilt).
 - The food is nutritious (all micro- and macronutrients are provided in the proper proportions).
 - The food is available all the time.
 - The food is affordable (the price is low enough for people to buy it).
 - The food provides enough energy to ensure an active, healthy life).
 - No people are starving, whether it is in a family, community or globally.
 - Accept any other suitable answer.
- ii) Any three from: *(1 mark for each correct, max. 3 marks)*
- Less land for growing/rearing food
 - Climate change impact on abilities to grow food
 - Droughts which make growing food impossible
 - Floods which destroy crops
 - More people to feed, requiring more and more resources
 - Limited resources of water and fossil fuels may cause disruption in production processes
 - Intensive farming decreases the quality of soil and makes farming in future more difficult and demanding
 - Environmental damage caused by pollution diminishes the area of land useful for growing food
 - Damage to the crops caused by pests, rodents and animals (e.g. wild boars)
 - Any other suitable answer
4. Any three from: *(1 mark for each correct, max. 3 marks)*
- lowering the carbon footprint
 - lowering the need for transportation
 - local foods are fresher
 - local foods are higher in nutrients
 - local foods are often cheaper
 - local foods are sold unpackaged so there is no need for recycling
 - local foods may be tastier as they are usually riper
 - any other suitable answer
5. Any three from: *(1 mark for each correct, max. 3 marks)*
- fair wages for farmers and workers
 - improving working conditions of farmers and workers
 - empowering farmers and their families
 - making education possible in developing countries
 - any other suitable answer
6. Any three from: *(1 mark for each correct, max. 3 marks)*
- GM plants usually grow faster and larger so more food can be produced and hunger can be eradicated.
 - GM plants are often resistant to pests so no pesticides are used and the food is healthier (less contaminated).
 - GM animals have more muscle tissue so more meat can be produced for consumption (both for people and for carnivorous animals).
 - GM cows can produce more milk so more food can be produced.
 - GM plants can have more nutrients, e.g. vitamins, so help to prevent malnutrition and deficiencies.
 - Accept any other suitable answer.
7. Any three from: *(1 mark for each correct, max. 3 marks)*
- using leftovers to cook other meals
 - buying only as much as needed
 - storing properly to prevent food spoilage
 - only putting on a plate as much as is needed
 - any other suitable answer

8. i) Any three from: paper, glass, plastic, cardboard, aluminium, metal or any other suitable answer (1 mark for all correct, max. 1 mark)
Do not credit foil as it is usually not recycled.
- ii) The answer may include a reference to: (1 mark for each correct, max. 2 marks)
- Some food packaging takes a **very long time to decompose** and, therefore, creates **pollution** of the environment.
 - Pollution may lead to **mass death of animals**, e.g. fish or birds, which ate the rubbish by mistake.
 - Pollution ruins the **balance** in the **ecosystem**.
 - **Recycling** most of the food packaging helps to protect the environment
 - **When making packaging**, a lot of natural resources, such as water and fossil fuels, are used, and a lot of greenhouse gases are emitted, so it contributes to global warming.
 - Accept other suitable answers.
9. The answer includes a reference to: (1 mark for each correct statement, max. 7 marks)
- Sustainability means the ability to produce foods without damaging the environment.
 - It is necessary to fulfil the demands of a growing population while less land is available to grow foods.
 - Sustainable farming helps to avoid waste of resources, such as land, water and fossil fuels.
 - Sustainable farming protects plant and animal species from extinction.
 - Sustainable farming may prove more costly than factory farming as the use of chemicals (such as pesticides and antibiotics) may be restricted, therefore the harvest may be lower.
 - Sustainable farming has to be regularly adjusted to the changing climate conditions.
 - Examples of sustainable farming could include fish farms, sustainable fishing in natural fisheries, organic fruit orchards, free-range and organic egg farms, or any other suitable answer.
 - Accept other suitable answers.
10. i) Carbon footprint is the amount of greenhouse gases released into the atmosphere due to food production and transportation. (1 mark)
- ii) Food miles is the distance the food has to travel from the farm to the consumer's house. (1 mark)
- iii) The answer may include a reference to: (1 mark for each correct statement, max. 5 marks)
- **Transportation** uses **fossil fuels** to run and, therefore, create more **greenhouse gases** and **increases** the carbon footprint.
 - The increased amount of carbon dioxide **enhances** global warming.
 - Explain the **mechanism** behind global warming: that carbon dioxide creates a coat around the Earth and traps the warmth inside instead of releasing it to space.
 - Global warming is an example of **human-driven** climate change.
 - Various aspects of climate change, such as glaciers melting, fierce hurricanes, drought and floods, or any other **direct effect** of global warming.
 - Climate change is dangerous and can lead to mass extinction of species, famine, damage to crops or any other **indirect effect** of global warming.
 - Accept other suitable answers.

TT25 Food processing and production: Food production

✓

1. Washing, draining, milling, gutting (1 mark for all correct, max. 1 mark)
2. Wheat (1 mark)
3. Fermentation, boiling, adding colourants (1 mark for all correct, max. 1 mark)
4. Bread (1 mark)
5.
 - i) True (1 mark)
 - ii) False – bran is the outer part of the grain. (1 mark)
 - iii) True (1 mark)
 - iv) True (1 mark)
6.
 - i) Any two from: (1 mark for each correct, max. 2 marks)
 - tuna
 - salmon
 - herring
 - sardines
 - anchovies
 - trout
 - mackerel
 - eel
 - any other suitable example
 - ii) Any two from: (1 mark for each correct, max. 2 marks)
 - salting
 - smoking
 - cooking (grilling, frying, stir-frying, poaching, baking, roasting, deep-frying, shallow-frying, boiling...)
 - canning
 - pickling (e.g. pickled herring is popular in Eastern European countries)
 - fermenting (popular in Sweden)
 - any other suitable example
7. The answer may include a reference to: (1 mark for each statement correct, max. 2 marks)
 - Pasteurisation takes place at **72°C, lasts 15 minutes** and kills **most** microorganisms, but doesn't affect the nutritional value of food or its features.
 - Sterilisation takes place at **over 130°C, lasts 30 minutes** and kills **all of the microorganisms and spores**, and might affect the nutritional value or features of food.
8. Any two from: (1 mark for each correct, max. 2 marks)
 - to tenderise the meat (by denaturation of proteins in muscle fibres conducted by enzymes)
 - to make the meat softer
 - to improve the aroma (production of ammonia)
 - to improve the taste of the meat
 - to improve the mouthfeel
 - to improve the flavour
 - to mature the meat
 - to overcome natural changes which take place in muscles after death*
 - any other suitable answer

*rigor mortis – students do not have to know the term or the chemistry behind it
9. The answer includes at least four steps (in correct order) from: (1 mark for each correct, max. 4 marks)
 - pasteurisation of milk
 - adding starter cultures
 - fermentation of the milk / turning lactose into lactic acid
 - adding rennet
 - coagulation of milk
 - cutting the curd
 - draining the whey
 - Cheddaring the curd / putting in piles and flipping to allow further fermentation and coagulation
 - adding salt
 - forming cheese in hoops
 - ageing the cheese

10. *(1 mark for a basic description, 2 marks for a detailed description, max. 6 marks)*
- i) Milling – turns wheat into flour; during the process bran is thrown away / separated from the endospores (the internal part of the grains), and vitamins (e.g. thiamine) and minerals (e.g. folic acid, iron) are lost, as well as dietary fibre.
 - ii) Drying – evaporates water from foods, so can lead to vitamin loss if water-soluble vitamins are evaporated with it. Also the high temperature of the process may affect the amount of vitamins and quality of the protein.
 - iii) Fermentation – turns sugar (e.g. lactose) into acid and therefore makes the food more appropriate for different dietary requirements, e.g. in lactose intolerance. Lowers the amount of sugar in food. Changes pH of food, and acidic pH may damage the proteins and certain vitamins.
11. The answer includes a reference to at least four from: *(1 mark for each correct statement, max. 4 marks)*
- Sterilisation is carried out at high temperatures over 110°C for a long time.
 - Pasteurisation is carried out at lower temperatures (around 72°C) for a short time only.
 - High temperature causes the lactose to react with proteins in milk.
 - Products of these chemical reactions change the colour and flavour of milk.
 - The temperature of pasteurisation is too low for these reactions to take place so the features of milk are not affected.
 - High temperature in sterilisation may also cause the proteins to coagulate and denature.
 - At high temperatures (sterilisation) lactose can begin to caramelize, also changing the colour of the milk.
 - The temperature of pasteurisation is too low for lactose to caramelize.
 - The time of pasteurisation is too short for proteins to denature.
 - Accept other suitable answers.

TT26 Food processing and production: Technological developments associated with better health and food production ✓

1. i) False – fortification is optional. (1 mark)
 ii) False – it has to be fortified with vitamin A. (1 mark)
 iii) False – niacin doesn't prevent beriberi; thiamine does. (1 mark)
 iv) False – it may be fortified by law in other countries. (1 mark)

2. i) Plant sterol / phytosterol or plant stanols / phytostanols. (1 mark for any correct, max. 1 mark)
 ii) Any two from: (1 mark for each correct, max. 2 marks)
- atherosclerotic
 - coronary heart disease
 - hypertension
 - heart attack
 - stroke
 - heart failure
 - vascular dementia
 - aortic aneurism*
- *not required by the specification

3. (1 mark for each correct row, max. 3 marks)

Fortified food	Substances added
plain wheat flour	thiamine (vit. B1), niacin (vit. B3), iron and calcium
skimmed and semi-skimmed milk	vitamin A (retinol)
margarine / vegetable fat spreads	vitamin A (retinol) and D (cholecalciferol)

4. Any two from: (1 mark for each correct, max. 2 marks)
- Fortification increases the intake of important micronutrients.
 - Fortification prevents nutrient deficiencies.
 - Fortification prevents diseases caused by nutrient deficiencies.
 - Fortification helps to balance the diet.
 - Fortification improves health.
 - Fortification lowers the risk of food-borne diseases.
- Accept any other correct answer.

The answer includes relevant examples, such as: (1 mark for each correct, max. 2 marks)

- Iron added to bread helps to prevent anaemia.
- Thiamine added to bread helps to prevent beriberi.
- Niacin added to bread improves energy release from food.
- Calcium added to bread prevents osteoporosis and rickets, improves muscle contractions and lowers blood pressure.
- Vitamin A added to milk and margarine supports proper eyesight, healthy skin and membranes, and is an antioxidant.
- Vitamin D added to margarines supports bone health, prevents osteoporosis, rickets, tooth decay, depression, cancer.

Accept any other suitable explanation.

5. Any four from: (1 mark for each correct, max. 4 marks)
- Provide more protein – prevent malnutrition and hunger
 - Provide more fat – prevent malnutrition and hunger
 - Provide more omega-3 fatty acids – prevent malnutrition and deficiency (food-borne diseases)
 - Provide more vitamins – prevent malnutrition and deficiency (food-borne diseases)
 - Provide vitamins – cure effects of deficiencies
 - High in antioxidants – help to prevent cancer and cardiovascular diseases
 - Produced in large amounts – helps to prevent or alleviate hunger
- Accept any other suitable answer.

6. The answer may include a reference to: *(1 mark for each correct statement, max. 6 marks)*
- Three food additives from: colourants, preservatives, emulsifiers, flavourings, antioxidants, sweeteners or any other suitable answer
 - Advantages of using food additives from:
 - Colourants are used to improve/enhance/change the colour of a food and make it more appealing/appetizing to consumers, increase sales and consumption.
 - Preservatives extend the shelf life of food, and prevent spoilage caused by bacteria, yeast or moulds.
 - Emulsifiers and stabilisers prevent the food from separating, improve its appearance, texture and mouthfeel, and prevent crystallisation of sugars.
 - Thickeners improve the texture and improve the mouthfeel of food.
 - Flavourings improve, strengthen or change the aroma and taste of food products, and make food more appetising/appealing to consumers.
 - Accept any other suitable answer.
 - Disadvantages of using food additives from:
 - Colourants can be used to hide poor quality of a food, and can cause allergies, asthma attacks and thyroid tumours.
 - Preservatives such as sulphur can cause allergies and increase the risk of stomach cancer, dermatitis (skin inflammation).
 - Emulsifiers can be used to hide poor quality or consistency of ingredients used, can cause bloating and flatulence, and can damage the lining of the intestine and cause leaky gut syndrome.
 - Flavourings and sweeteners can be used to trick consumers into buying things even if they are not healthy, can contribute to obesity if too much food is consumed, can cause allergic reactions, swelling of the throat and itching, and can be harmful to people suffering from certain diseases (e.g. aspartame for phenylketonuria).

Accept other suitable answers.