

1. The relationship between diet and health

- 1) Dietary guidelines state eight tips for healthy eating.
- i) Describe how the following tips support healthy eating.
- a) Eat lots of fruit and vegetables.

.....

b) Eat more fish.

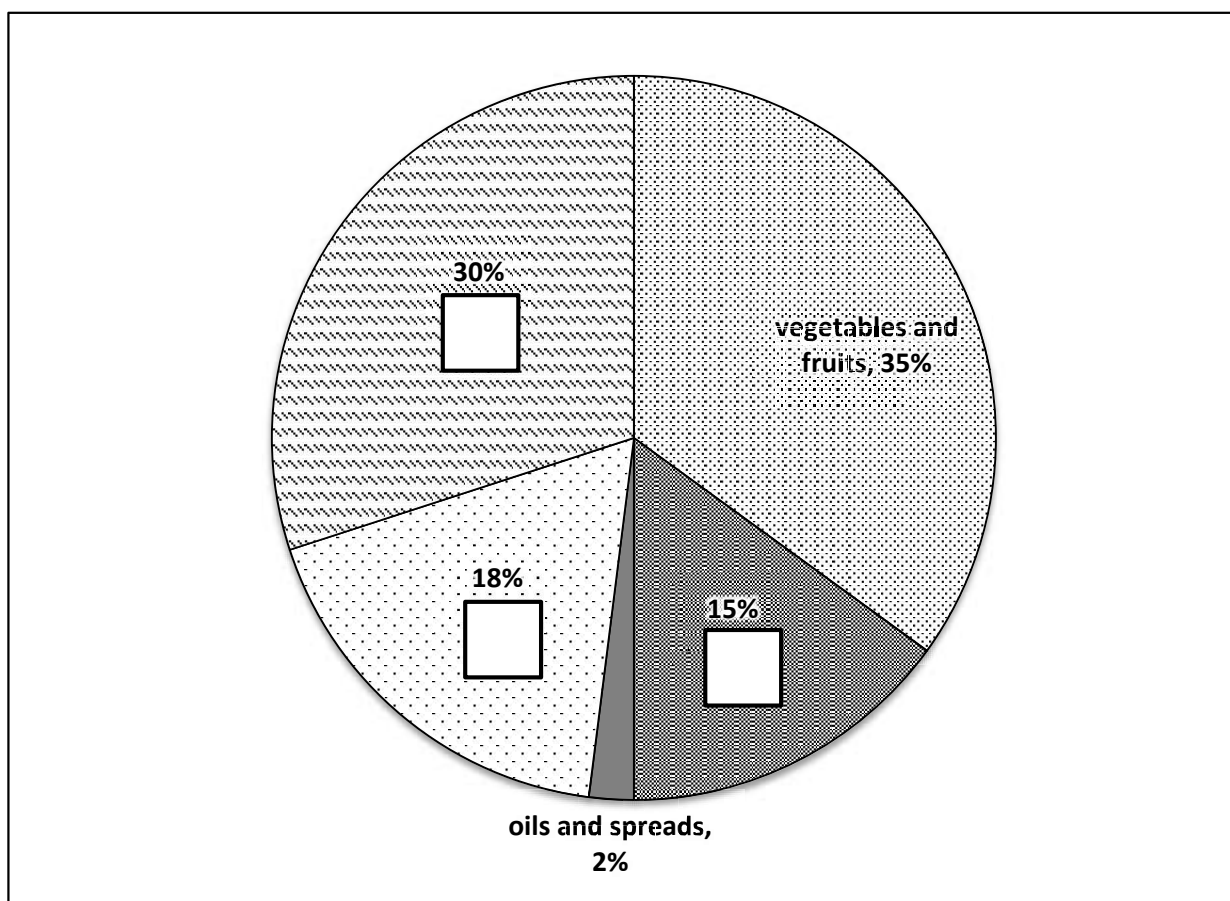
.....

c) Drink plenty of water.

.....

.....

- ii) The Eatwell Guide is a pictorial representation of the proportions of different foods required in the diet. Complete the diagram below to illustrate how major commodity groups contribute to a healthy balanced diet.



A. Potatoes, bread, rice, pasta and other starchy foods

B. Meat, fish, pulses and other protein-rich foods

C. Dairy and alternatives

- 2) Explain what the relationship is between diet, nutrition and health. Use the keywords below to help.

quantity	micronutrients	macronutrients	deficiency	excess	balanced
----------	----------------	----------------	------------	--------	----------

.....

.....

.....

.....

.....

.....

- 3) Sugar consumption in the United Kingdom has been growing rapidly since the end of nineteenth century.

- i) From the options below, tick which health conditions may be caused by high sugar intake.

obesity	☐	osteoporosis	☐	anaemia	☐	tooth decay	☐
coronary heart disease	☐	type 2 diabetes	☐	overweight	☐	diverticulitis	☐

- ii) Give an example of one action that might help lower sugar intake of an individual.

.....

.....

.....

- 4) Colour-code the diseases with their dietary causes, outcomes, and potential dietary and lifestyle changes that have to be made. Note that some of the options can be used multiple times.

Diseases			
Osteoporosis	Coronary heart disease	Type 2 diabetes	Anaemia
Dietary causes			
Lack of iron	Too much saturated fat	Overeating	Lack of vitamin D
Excess of phosphorus	Low physical activity	Folic acid deficiency	Too little calcium
Too much sugar	Too much fat		
Health outcomes			
Heart failure	Limb amputation	Tiredness	Kidney failure
Brittle bones	Tooth loss	Trouble during childbirth	Chest pain
Blindness	Joint and spine problems	Easy bone fractures	
Changes in diet and lifestyle			
Eat more fish	Cut down on sugar	Cut down on fats	Consume more vitamin D
Lose weight (reduce energy intake)	Cut down on saturated fats	Drink more milk	Increase physical activity
Eat more vitamin C	Eat liver	Eat regularly	

5) From the list below, choose products that will be suitable for:

A 70-year-old man
suffering from obesity

.....

.....

.....

A 50-year-old woman
suffering from high
blood pressure

.....

.....

.....

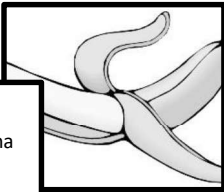
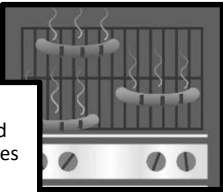
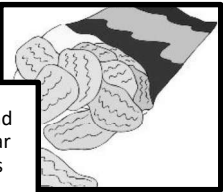
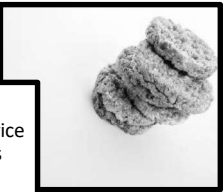
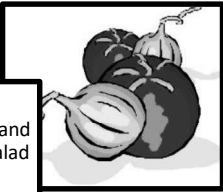
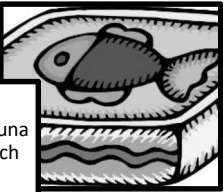
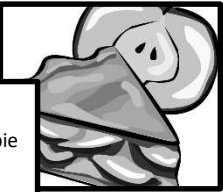
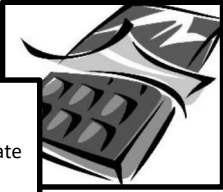
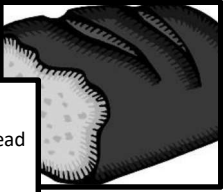
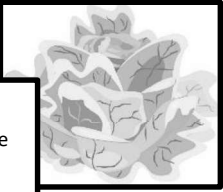
A 14-year-old girl
suffering from bad
tooth decay

.....

.....

.....

Product list:

 banana	 grilled sausages	 salt and vinegar crisps	 brown rice cakes
 fudge	 tomato and onion salad	 tinned tuna sandwich	 apple pie
 mashed potato with cheese	 dark chocolate	 corn bread	 lettuce

6) Jim is a 55-year-old man suffering from diabetes and obesity. He's having fried sausages, deep-fried chips with mayonnaise and half a bar of milk chocolate for lunch. Consider whether the meal is suitable for him. How would you adapt the cooking methods and/or ingredients to make it more appropriate?

.....

.....

.....

.....

.....

- 7) Diverticulitis is a disease in which small pockets of the large intestine become inflamed.
Explain why eating a high-fibre diet may help to alleviate the symptoms of diverticulitis.

.....

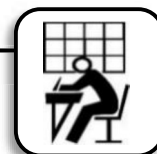
.....

.....

.....

Exam-style Question

Childhood obesity rates in the UK are growing rapidly.
Suggest **four** ways of reducing the rates of obesity of the population.



(4 marks)

Extension Task

Design a poster in which you explain how diet affects a person's health. In your poster:

- Identify a diet-related condition from: diabetes, obesity, cardiovascular disease, tooth decay, bone health (osteoporosis), diverticulitis
- Indicate causes of the condition/disease (those related and unrelated to diet)
- Identify symptoms of the condition/disease
- Point out potential outcomes and health effects
- Explain how a person can change their diet to improve the situation

1. The relationship between diet and health

1) Dietary guidelines state eight tips for healthy eating.

i) List three of the eight tips for healthy eating and describe how each supports good health.

a)

.....

.....

b)

.....

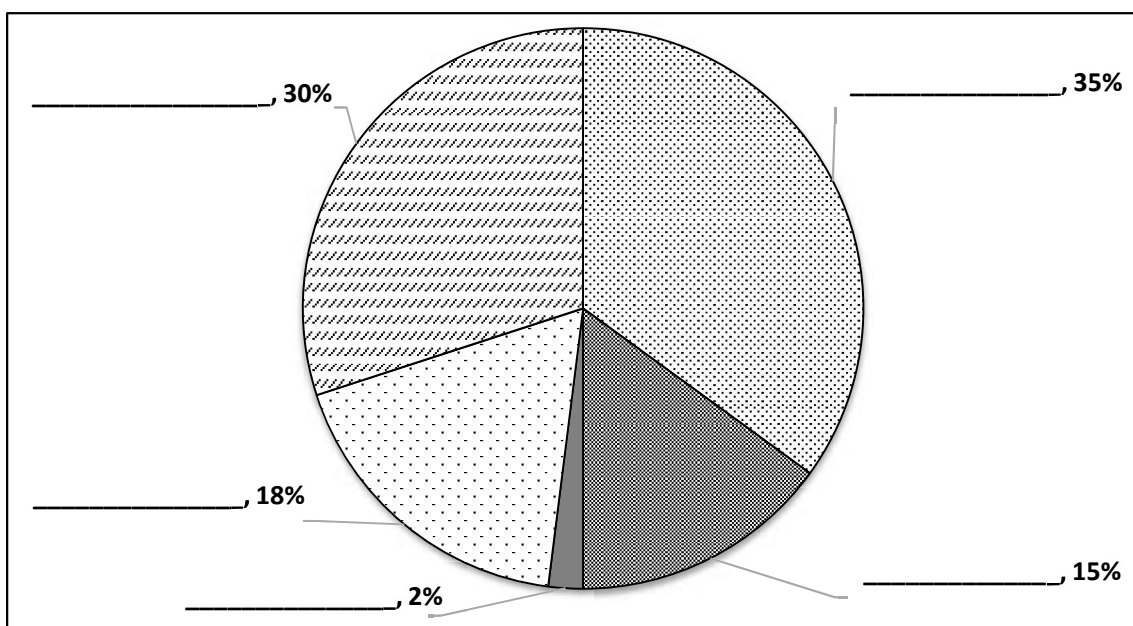
.....

c)

.....

.....

ii) The Eatwell Guide is a pictorial representation of the proportions of different foods required in the diet. Complete the diagram below to illustrate how major commodity groups contribute to a healthy balanced diet



2) Explain the relationship between diet, nutrition and health.

.....

.....

.....

.....

.....

3) Sugar consumption in the United Kingdom has increased by nearly 700% since the end of the nineteenth century – from 8 kg per person in 1840 to 55 kg per person in 1980.

i) List three health conditions that might be caused by high sugar intake.

1.
2.
3.

ii) Give one example of an action that the government could take to help lower sugar intake of the UK population.

.....

.....

4) Complete the table to indicate dietary causes, outcomes, and dietary and lifestyle changes that have to be made to improve the health of individuals suffering from the given conditions.

Health condition	Cause	Symptoms and outcomes	Dietary and lifestyle changes
Osteoporosis			
Coronary heart disease			
Type 2 diabetes			
Anaemia			

5) List at least three products that should be avoided in the given health conditions.

A 70-year-old man
suffering from obesity

A 50-year-old woman
suffering from
hypertension

A 14-year-old girl
suffering from bad
tooth decay

6) Jim is a 55-year-old man suffering from diabetes and obesity. Design a lunch meal which would be appropriate for his conditions, taking into consideration cooking methods and choice of ingredients. Justify your choices.

.....

.....

.....

.....

.....

.....

7) Diverticulitis is a disease in which small pockets of the large intestine become inflamed. Evaluate the importance of diet in the prevention and treatment of diverticulitis.

.....

.....

.....

.....

.....

.....

.....

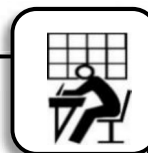
.....

.....

.....

.....

Exam-style Question



An unhealthy diet has caused an increase in the number of related health conditions. Assess the relationship between diet, nutrition and health and the impact this could have on the economy and wider society.

(8 marks)

Extension Task

Plan a daily diet for the following individuals in order to improve their health conditions and justify your meal choices.

- 1) A teenage girl suffering from obesity
- 2) A 70-year-old man suffering from osteoporosis and type 2 diabetes

2. Nutritional and dietary needs of different groups of people: dietary needs for different stages of life, food allergies and intolerances ●

- 1) According to the British Nutrition Foundation, 5532 is the perfect proportion of foods in a diet for toddlers. State what the figures 5532 refer to.

5

5

3

2

- 2) From the foods below, highlight those which are major food allergens.

eggs	oats	prawns	cocoa	lupin
strawberries	milk	lettuce	poppy seed	sesame
wheat	oranges	pumpkin	lobster	seaweed

- 3) Complete the table below to identify the foods which different dietary groups eat or don't eat based on their health conditions.

	Cannot eat...	Can eat...
Coeliac		
Lactose intolerant		
Allergic to milk		

4) Link the grains to the correct boxes.

rye	rice	buckwheat	wheat	oats	quinoa
-----	------	-----------	-------	------	--------



Gluten-free



Contains Gluten

5) What dietary changes should be implemented at different stages of life, and why? Use the key terms provided. Some of them might be used more than once. You can also use your own ideas.

More milk	Less salt	Less fat	Fewer sweets and sugar	To prevent hypertension
Eat more fish	Cut down on fast foods	Increase physical activity	More meat and legumes	To prevent osteoporosis
Drink water	To prevent obesity	Increase variety of foods	To prevent rickets	To prevent tooth decay
To provide enough protein for proper growth	To prevent constipation	To prevent anaemia	More vegetables and fruit	To provide enough fibre

Group	Dietary changes	Reason
Teenagers		
Adults		
Elderly		

- 6) Match the macronutrients with the recommended percentage of energy they should provide in a balanced diet.

Fats

Carbohydrates

Proteins

Sugars

50%

15%

Up to 35%

Up to 5%

- 7) The NHS advises pregnant women to limit their consumption of certain foods. State one reason why the following foods may need to be avoided during pregnancy.

- i) Cheese made from unpasteurised milk

.....
.....

- ii) Liver pâté

.....
.....

- iii) Oily fish

.....
.....

- 8) The latest guidelines state that children younger than one year old should not be given fruit juice to drink. Explain why this might be.

.....
.....
.....
.....

Exam-style Question



A restaurant prepared a vegan pizza using the following ingredients:

- strong wheat flour
- water
- olive oil
- onions
- mushrooms
- yeast
- salt
- tomato sauce
- peppers

Choose one ingredient and explain how you would modify it to make the pizza healthier for school-age children.

(2 marks)

Extension Task

Using the calculator on <http://explorefood.foodafactoflife.org.uk/Calculator/Recipe>

Design and assess a recipe for a meal which will be suitable for a 15-year-old in terms of macro- and micronutrient intake. Justify your choice.

Use the Extension Task worksheet to help you.



What macronutrients does he or she need? In what amounts?

What micronutrients does he or she need the most? In what amounts?

Step 2: Name of my dish:

Ingredients of my dish and why I chose them:

Step 3: Nutritional value of my dish:

Section A: Differentiated Homeworks for OCR GCSE Food Preparation and Nutrition

2. Nutritional and dietary needs of different groups of people: dietary needs for different stages of life, food allergies and intolerances

- 1) i) According to the British Nutrition Foundation, what are the correct proportions of macronutrients/foods in a diet for toddlers?

.....

.....

.....

.....

- ii) Explain why a toddler fed a vegetarian diet may require more portions of protein.

.....

.....

.....

.....

- 2) There are 14 possible major food allergens which, if present in a food, must be shown on the food label. List five of them.

.....

.....

.....

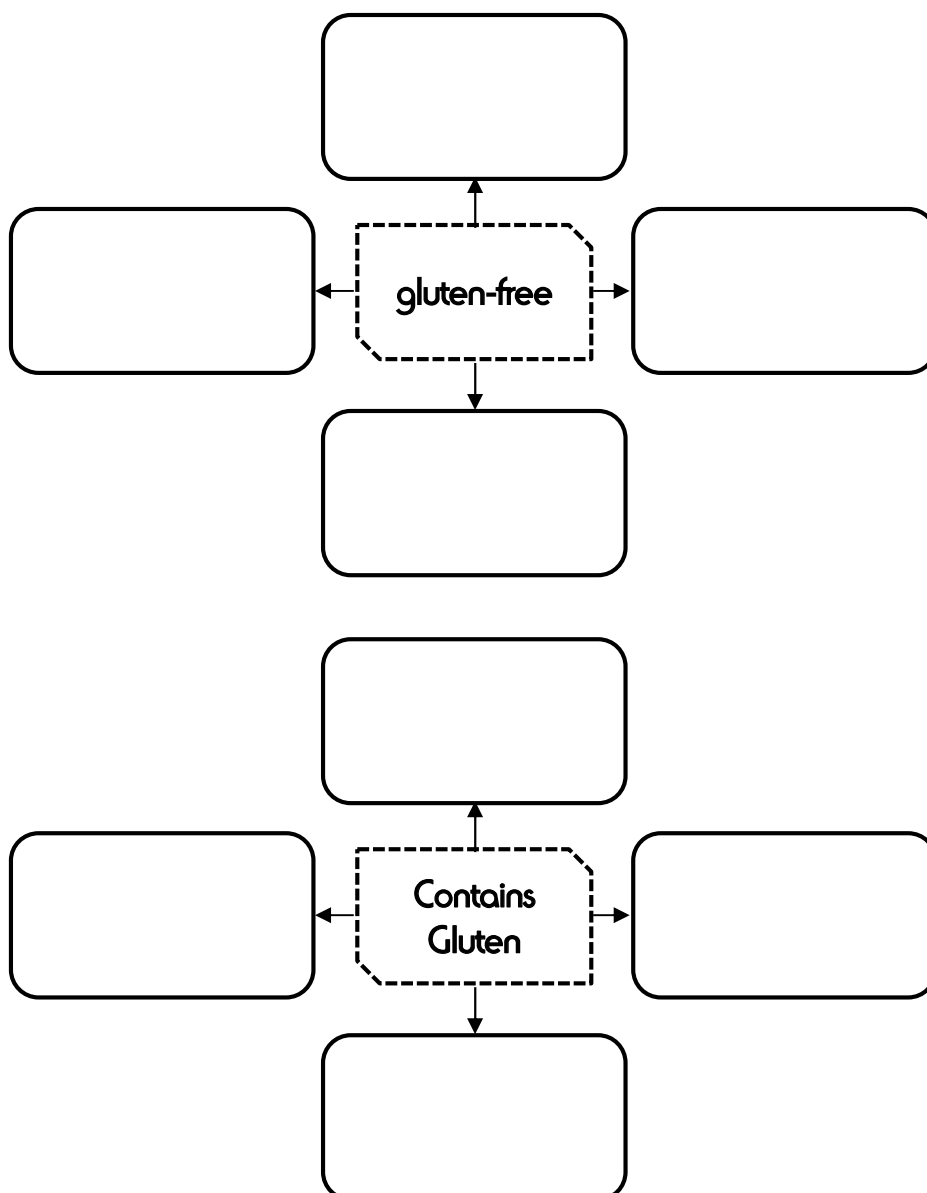
.....

.....

- 3) Suggest how you would modify the recipes for the dishes and groups shown in the table.

Group	Dish	Suggested modification
Coeliac	Rice pudding	
Lactose intolerance	Strawberry milkshake	
Allergic to milk	Hot chocolate with milk	

4) i) Complete the diagrams below to identify four gluten-free and four non-gluten-free grains.



ii) Explain why avoiding gluten is necessary in coeliac disease.

.....

.....

.....

.....

.....

.....

.....

- 5) Complete the table below to explain what dietary changes have to be implemented at different stages of life, and give a reason for such changes.

Group	Should eat less...	Should eat more...	Explanation
Babies and small children			
Teenagers			
Adults			
Elderly			

- 6) Complete the table to indicate the recommended percentage of energy intake from various sources in a balanced diet.

Macronutrient	Percentage
Fats	
Carbohydrates	
of which sugars	
Proteins	

- 7) The NHS advises pregnant women to limit their consumption of certain foods. List three examples of such foods and explain why it might be necessary to avoid them during pregnancy.

- i)
-
- ii)
-
- iii)
-

- 8) Assess whether fruit juices should be a part of a healthy diet for babies and children under one year old.

.....

.....

.....

.....

.....

.....

.....

.....

Exam-style Question



Cottage pie is a classic British dish. It is made from the following ingredients:

- potatoes
- carrots
- butter
- tomatoes
- various seasonings
- onions
- beef mince
- milk
- beef stock

Choose two of the ingredients listed above and explain how you would modify them to make the cottage pie suitable for a person with lactose intolerance.

(4 marks)

Extension Task

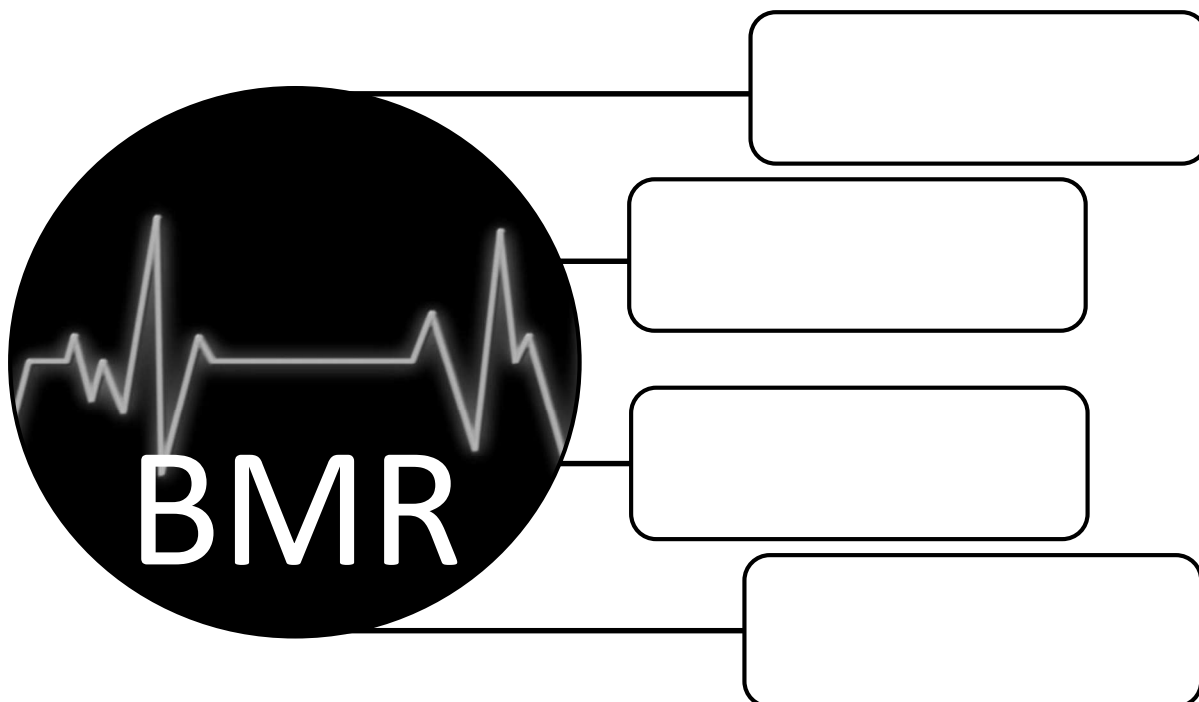
Using the calculator at <http://explorefood.foodafactoflife.org.uk/Calculator/Recipe>

Design and assess a meal which would be suitable for a 15-year-old, and justify your choice. Then indicate how you would modify it so it could be suitable for:

- an elderly person
- a school-age child

3. Energy balance

- 1) i) Indicate four factors which affect basal metabolic rate.



- ii) Physical activity level (PAL) is the amount of energy needed to conduct all actions – *walking, sleeping, working, running, etc.* Explain how PAL affects energy needs of an individual.

.....

.....

.....

.....

.....

.....

- 2) Different macronutrients provide different amounts of energy. Match the nutrients below with the amount of energy they provide in one gram.

Fats	Carbohydrates	Proteins	Alcohol
7 kcal	4 kcal	3.75 kcal	9 kcal

3) 1 kcal equals 4.184 kJ. Calculate how much energy (in joules) will be provided by the following foods.

i) A slice of pizza (480 kcal)

.....

ii) A banana (120 kcal)

.....

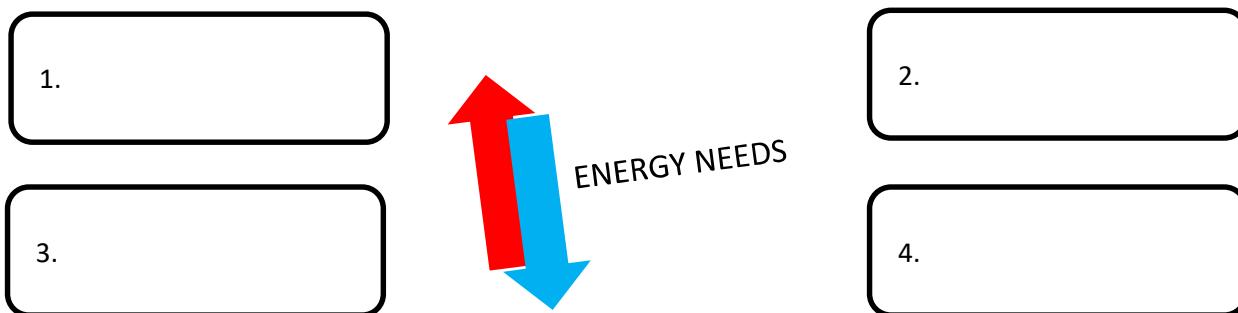
iii) A cup of milk (105 kcal)

.....

iv) One bar of chocolate (525 kcal)

.....

4) i) Complete the diagram to identify four factors that influence an individual's energy needs.



ii) Energy excess can cause a number of health-related conditions and diseases. Name two of them.

.....

.....

5) Indicate what dietary changes might help maintain healthy body weight throughout life. Use the pictures to help you.



.....

.....

.....

.....

.....



Exam-style Question

Bread is one of the staple foods in the UK.

Name the **one** nutrient in bread which provides the most energy.

(1 mark)

Extension Task

Create a fact file to identify the main sources of energy in a balanced diet. In your fact file you should:

- indicate the nutrients which provide energy in the diet
- identify how much energy they should provide every day (as a percentage)
- list or draw food sources of those nutrients

Use the Extension Task worksheet to help you.

Extension Task worksheet



_____ fact file	_____ fact file
Provides _____ kcal (_____ kJ) in 1 gram	Provides _____ kcal (_____ kJ) in 1 gram
_____ % of energy in a balanced diet should come from it!	_____ % of energy in a balanced diet should come from it!
You can find it in:	You can find it in:
_____ fact file	_____ fact file
Provides _____ kcal (_____ kJ) in 1 gram	Provides _____ kcal (_____ kJ) in 1 gram
_____ % of energy in a balanced diet should come from it!	_____ % of energy in a balanced diet should come from it!
You can find it in:	You can find it in:

3. Energy balance



- 1) i) Explain what 'BMR' and 'PAL' are.

BMR stands for

It is

.....

PAL stands for

It is

.....

- ii) Explain how BMR and PAL affect the total energy needs of an individual.

.....

.....

.....

.....

.....

.....

.....

- 2) Indicate how much energy is provided by one gram of:

fat

carbohydrate

protein

alcohol

- 3) 1 kcal equals 4.184 kJ. Using the data in the table below, calculate how much energy (in kcal and kJ) will be provided by each of the meals described on the following page:

wholemeal bread	217 kcal / 100 g	butter	744 kcal / 100 g	sweetcorn	78 kcal / 100 g
tuna	109 kcal / 100 g	olive oil	899 kcal / 100 g	lettuce	11 kcal / 100 g
mozzarella	257 kcal / 100 g	mayonnaise	686 kcal / 100 g	tomato	22 kcal / 100 g

- i) A tuna and sweetcorn sandwich (80 g wholemeal bread, 10 g butter, 50 g tuna, 30 g sweetcorn, 20 g mayonnaise)

Calculation:

Total: kcal; kJ

- ii) A tomato and mozzarella salad (80 g lettuce, 50 g tomato, 50 g mozzarella, 10 g olive oil)

Calculation:

Total: kcal; kJ

- 4) i) Explain how four chosen factors influence an individual's energy requirements.

.....

.....

.....

.....

.....

.....

.....

.....

- ii) List two symptoms of health conditions or diseases caused by energy deficiency.

.....

.....

5) Indicate three factors that can help maintain healthy body weight throughout life, and provide an explanation for your answers.

1.
.....
.....
2.
.....
.....
3.
.....
.....

Exam-style Question



Fish and chips is one of the most popular fast foods in the UK.

i) Name one source of energy in fish and chips from the macronutrients given below.

- Protein
- Carbohydrates
- Fats

(3 marks)

ii) Give **one** example of how the energy content of fish and chips could be reduced.

(1 mark)

Extension Task

Write a journal article about the main factors that influence an individual's energy requirements.

In your article, you can refer to one or more of the following factors: sex, life stage, body size, occupation and lifestyle, state of health state, genetics.

4. Macronutrients: proteins, fats and carbohydrates

1) Fill in the gaps in the text below using the keywords to help.

Words to use:

bowel plant starch unsaturated carbohydrates large saturated sugars

Macronutrients include proteins, fats and _____. They are called macronutrients because people require them in _____ quantities to remain healthy. Proteins can be found in both animal and _____ derived foods. Fats can be divided into two main groups – ones that have single only bonds in the fatty acid chains are called _____, and those which contain double or triple bonds are called _____. Carbohydrates consist of _____, _____ and fibre. Fibre is necessary for the proper functioning of the _____.

2) Identify whether the following foods given below are a main source of fat, protein or carbohydrate.

Cheese 	Bread rolls 	Butter 	Avocados 
Grapes 	Pork chops 	Pasta 	Beans 
Tuna (fish) 	Hazelnuts 	Cottage cheese 	Doughnut 
Carrots 	Potatoes 	Oranges 	Eggs 

3) Match up the functions below to each of the different macronutrients (*fats, carbohydrates and proteins*).

Proteins	Help build hormones and enzymes
	Provide protection of the vital organs
	Provide the main source of energy
	Dietary fibre supports bowel movements
Fats	Help develop antibodies to fight bacteria and viruses and keep us healthy
	Increase satiety
Carbohydrates	Building material of body cells such as muscle
	Help dissolve and absorb vitamins in the body
	Provide insulation from the cold to maintain body heat

4) i) Using the keywords (provided), explain the difference between low biological value proteins and high biological value proteins.

Amino acids	Quantity	Quality	Origin	Animal
-------------	----------	---------	--------	--------

.....

.....

.....

.....

.....

.....

ii) Describe what is meant by 'protein complementation' and give an example of your answer.

.....

.....

.....

.....

.....

.....

iii) Identify two different protein alternatives.

1.
2.

5) i) Mark sources of saturated (S) and unsaturated (US) fats by marking with either S or US.

Avocado	Cod	Salmon	Chocolate	Milk	Ham
Olive oil	Cheese	Butter	Nuts	Beef	Cream

ii) What is the difference between monounsaturated fats and polyunsaturated fats?

.....

.....

.....

.....

.....

.....

6) Complete the table to explain the differences between the different types of carbohydrate.

Type of carbohydrate		Description	Source of food they can be found in...
Starch	Polysaccharides		Wholegrain bread, brown rice
Sugars	Monosaccharides	Group of carbohydrates built from one molecule of sugar only	
	Disaccharides		
Dietary fibre			Wholegrain foods, fresh fruit and vegetables

- 7) Complete the table below to explain the effects of deficiency and excess of each of the macronutrients and identify the dietary reference values for males and females.

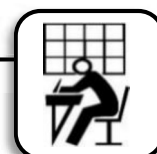
	Proteins	Fats	Carbohydrates
Effects of deficiency		• Loss of body mass • Vitamin deficiency • Hormonal disorders	
Effects of excess			• Overweight and obesity • Coronary heart disease • Hypertension • Type 2 diabetes • Tooth decay
Dietary reference value in % or grams for an average diet of 2,000 kcal	10–15% (50–75 g)		

Exam-style Question

Fat can be found in a variety of food products.

Name **one** animal source and **one** plant source of visible and non-visible fats.

(4 marks)



Extension Task

Design and/or modify a recipe that meets the following criteria:

- is suitable for a vegetarian
- has reduced fat content
- and has high fibre content

When creating your recipe, try to apply various skills. For example:

- knife skills – to cut meat, fish or protein alternative products
- use of various cooking and preparation methods
- use of starch to set a mixture

Use the Extension Task worksheet to help you.

Extension Task worksheet



	What ingredients and cooking methods I CAN use	What ingredients and cooking methods I CANNOT use
Vegetarian		
Reduced fat content		
High fibre content		

Name of my dish:

Ingredients of my dish and why I chose them:

.....

.....

.....

.....

My recipe – how to prepare my dish:

4. Macronutrients: proteins, fats and carbohydrates

- 1) Using the keywords to help, describe what is meant by 'macronutrients'.

Words to use:

bowel	plant	starch	unsaturated
carbohydrates	large	saturated	sugars

.....

.....

.....

.....

.....

.....

.....

.....

.....

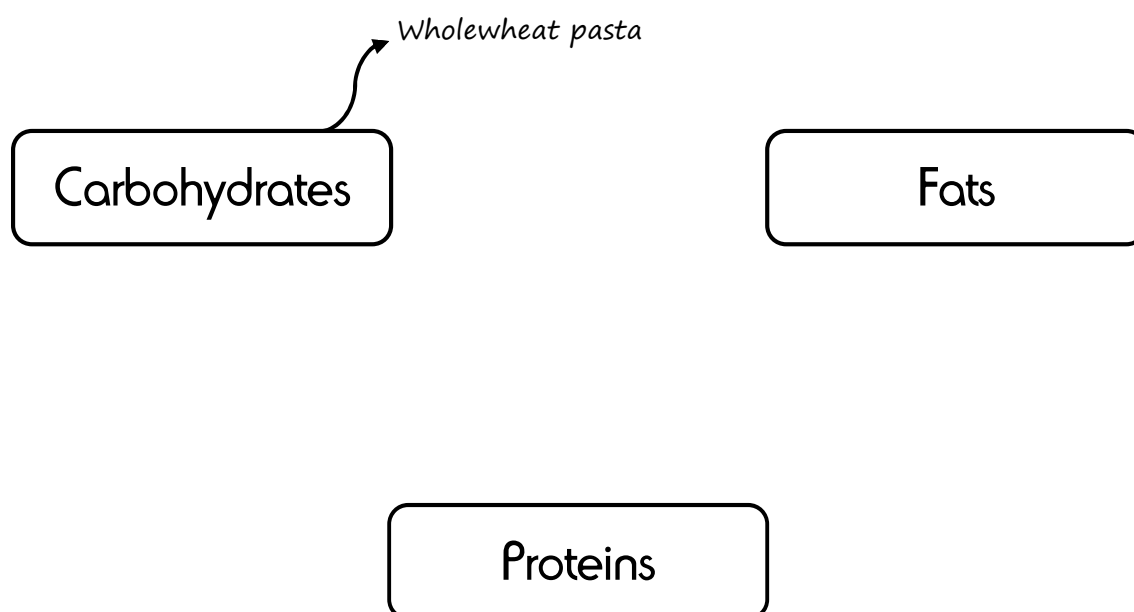
.....

.....

.....

.....

- 2) On each of the spider diagrams below, identify as many foods as you can that provide a main source of fat, protein or carbohydrate.



3) Identify the functions of each macronutrient (*fats*, *carbohydrates* and *proteins*).

Fats	Proteins	Carbohydrates

4) i) Explain the difference between low biological value proteins and high biological value proteins.

.....

.....

.....

.....

.....

.....

.....

ii) Describe what is meant by ‘protein complementation’ and give an example of your answer.

.....

.....

.....

.....

.....

.....

.....

iii) Identify four different protein alternatives.

1.
2.
3.
4.

- 5) There are two types of fats that can be consumed in the diet. Describe the different types of fat that can be found in the diet and give examples in your answers.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- 6) Complete the table to explain the differences between the different types of carbohydrate.

Type of carbohydrate		Description	Source of food they can be found in
Starch	Polysaccharides		
Sugars	Monosaccharides		
	Disaccharides		
Dietary fibre			

- 7) Macronutrients should be consumed in relative proportions as too much or too little can have negative health consequences. Provide the Dietary Reference Values for an average diet of 2,000 kcal and explain the health consequences of a deficiency and an excess of each macronutrient.

Proteins:

.....
.....
.....
.....
.....



Fats:

.....
.....
.....
.....



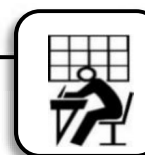
Carbohydrates:

.....
.....
.....
.....



Exam-style Question

A school chef has bought some roast beef, salmon steaks and chickpeas to prepare dinner. Compare the contributions that beef, salmon and chickpeas can make to the nutritional requirements of teenagers.



(6 marks)

Extension Task

Your task is to design and cook a three-course meal for a group of people who are on a low fat, high fibre diet. Some of the individuals are vegetarian, so remember to take account of their dietary needs. While making your meal, see if you can identify any of the following processes or use any of the following skills:

Process:

- How acids denature/coagulate proteins

Skills:

- Knife skills – to cut protein sources
- Use alternative methods of cooking fat sources – grilling/baking
- Use starch to set a mixture

5. Micronutrients: vitamins and minerals

- 1) i) Colour-code the fat-soluble vitamins given below with four different colours, then match these up with their *functions*, *sources* and *effects of deficiency* given in the table below (note that some may require more than one colour).

Vitamin A

Vitamin D

Vitamin E

Vitamin K

Functions			
Ensures proper growth of sperm cells	Lowers the risk of type 2 diabetes and cancer	Maintains healthy skin, nails and hair	Prevents depression
Crucial for good eyesight	Prevents haemorrhages	Necessary for proper bone and teeth growth and development	Necessary for proper growth and development of the foetus during pregnancy
Necessary for proper blood clotting	Antioxidant		
Effects of deficiency			
Tiredness	Dry and flaky skin	Depression	Rickets
Osteoporosis	Wrinkled, thin skin	Brittle hair and nails	Night blindness
Excessive bleeding	Muscle degeneration	Decreased immunity	Low immunity
Sources			
Fish and fish oil	Broccoli	Carrots	Spinach
Cheese	Liver	Kale	Pumpkin
Sunflower oil	Blueberries	Egg yolk	Gut bacteria

- ii) Complete the table below to identify the different types of water-soluble vitamins, their main functions and sources of micronutrients in the human body, and effects of deficiency in the diet.

Name	Function	Effects of deficiency	Sources
Vitamin B1 (thiamine)			• wholegrains • yeast (including Marmite™) • liver • lean meat
Vitamin B2 (riboflavin)	Important part of enzymes, takes part in creating haemoglobin		• yeast • liver • cheese • green leafy vegetables, such as spinach or cabbage
Vitamin B3 (niacin)		4D syndrome – dermatitis (inflammation of skin), diarrhoea, dementia (loss of memory), death Low concentration (inability to focus), irritability Increased sensitivity of the skin to sunlight	
Folate / folic acid (Vitamin B9)	Important in the process of DNA synthesis, takes part in creating red blood cells, reduces the risk of spinal cord diseases in newborns		• yeast • wholegrains • fortified cereals and flour • spinach • broccoli
Vitamin B12 (cobalamin)			
Vitamin C (ascorbic acid)	Takes part in collagen synthesis, helps with ingestion of iron, increases immunity, strengthens blood vessels		

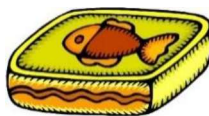
- 2) i) Put a symbol next to the functions, effects of deficiency and sources below to match them to each of the given minerals: calcium (Ca), iron (Fe), sodium (Na), fluoride (F), iodine (I), and phosphorus (P). Some of them may be used more than once.

Functions		Effects of deficiency		Dietary Reference Values	
Helps build red blood cells		Tiredness, pale complexion, anaemia		1 mg	
Balances fluids in the body, keeps the blood pressure stable		Soft enamel, tooth decay, improper growth of teeth		700 mg to 1,000 mg	
Helps build strong bones and teeth		Nausea, diarrhoea, goitre		11 mg for boys, 14 mg for girls	
Builds the thyroid gland hormones and coordinates metabolic rate		Rickets and osteoporosis		130 mcg	
Builds tooth enamel, prevents tooth decay		Low blood pressure, headache, dehydration		Up to 6 g	

milk



sardine



salmon and seafood



salt



red meat



- ii) Identify which main mineral is provided by the sources below.

- 3) Describe a meal that would support bone health in teenagers. For each ingredient used, justify your choice.

.....

.....

.....

.....

.....

.....

.....

Exam-style Question



People who eat a vegan diet do not consume any products of animal origin.
Name **two** micronutrients which might be missing (or present only in very low quantities) in a vegan diet.

(2 marks)

Extension Task

Excessive consumption of sodium can lead to a number of health issues; therefore, specialists recommend limiting consumption of sodium to less than 6 g a day.

- 1) List herbs and spices that could replace salt in recipes.
- 2) Research the Reference Nutrient Intake for all of the fat-soluble and water-soluble vitamins for teenagers. Use the British Nutrition Foundation website as a source. Can you explain why the RNI values for girls and boys differ?

Use Extension Task worksheet to help you.



Extension Task worksheet

Herbs which could replace salt:

.....

.....

Spices which could replace salt:

.....

.....

Reference Nutrition Intake for vitamins

	Teenage boys (14–16-year-olds)	Teenage girls (14–16-year-olds)
Vitamin A		
Vitamin D		
Vitamin E		
Vitamin K		
Thiamine		
Riboflavin		
Niacin		
Folic acid		
Vitamin B12		
Vitamin C		

Why do the RNI values for boys and girls differ?

.....

.....

.....

.....

.....

.....

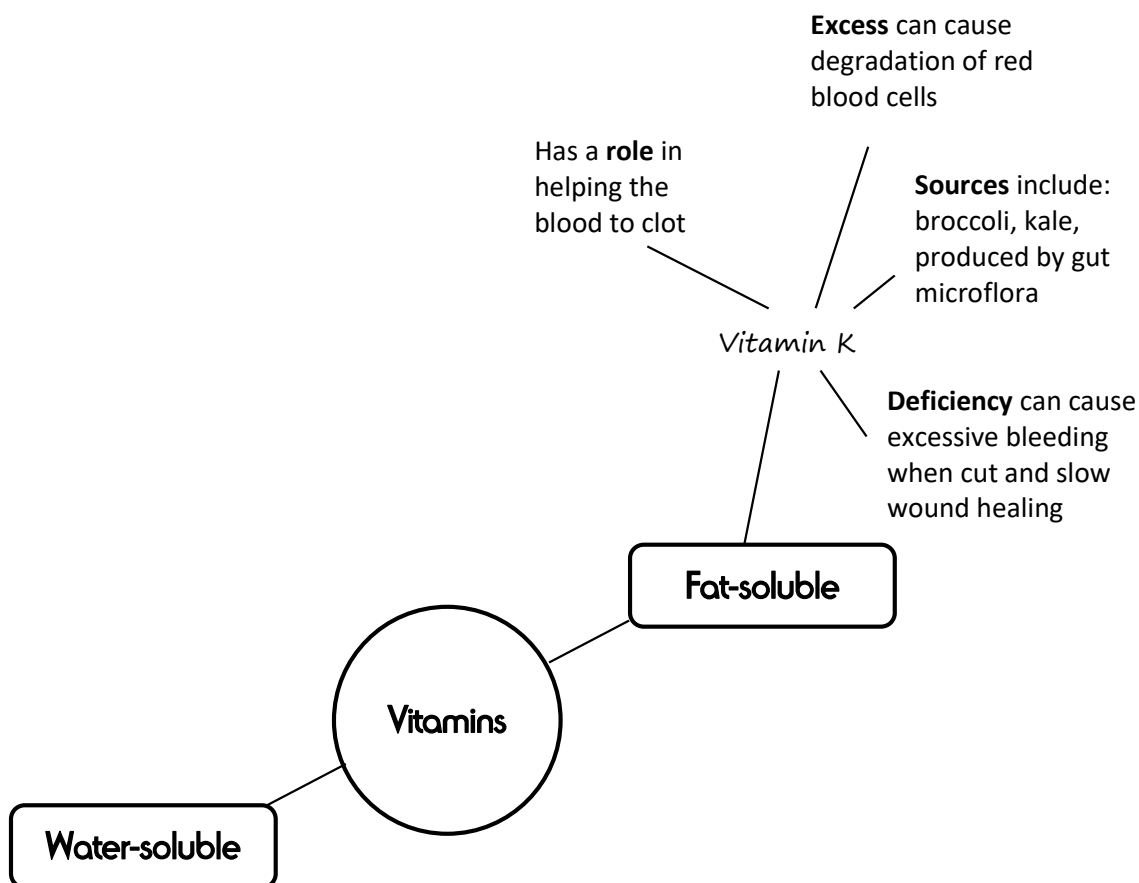
.....

.....

.....

5. Micronutrients: vitamins and minerals

- 1) Complete the spider diagram to identify the different types of vitamins, their main functions, effects of excess and deficiency, and sources in the human body. (One has been given for you.)



- 2) i) Discuss the *functions* of the different minerals found in our body and the *effects of deficiency* of each, stating their *Dietary Reference Values*.

Calcium and Phosphorus:

.....

.....

.....

.....

.....

Fluoride:

.....

.....

.....

.....

.....

Sodium:

.....

.....

.....

.....

.....

Iodine:

.....

.....

.....

.....

.....

Iron:

.....

.....

.....

.....

.....

ii) Identify one source of each of the minerals listed below.

Calcium	Phosphorus	Fluoride	Sodium	Iodine	Iron

3) Assess the impact of diet on bone health. Give examples to support your answer.

.....

.....

.....

.....

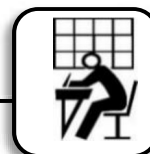
.....

.....

.....

.....

Exam-style Question



People who eat a vegan diet do not eat any products of animal origin.
Give two reasons why a vegan should increase the amounts of vitamin B12 and iron in their diet.

(2 marks)

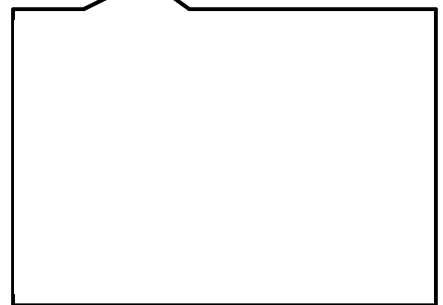
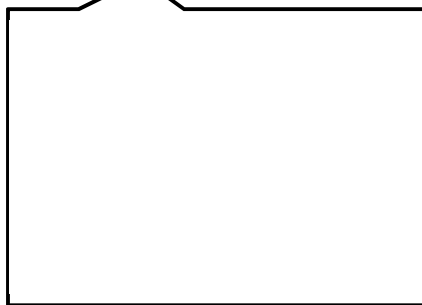
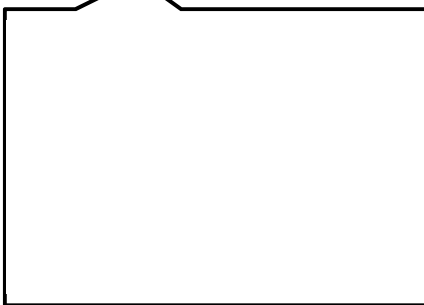
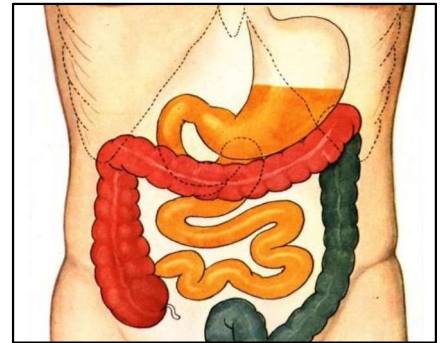
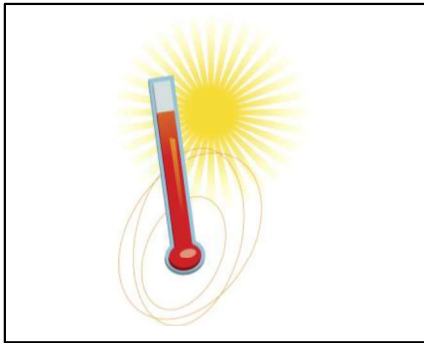
Extension Task

Excessive salt consumption can lead to a number of health issues.

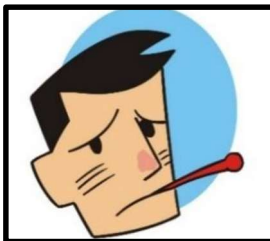
- 1) Research and list various herbs and spices which could substitute salt in recipes for savoury meals.
- 2) Research Reference Nutrient Intake values for all vitamins and minerals you learnt in this chapter. Write an essay in which you explain potential discrepancies between various groups of people.

6. Micronutrients: water

- 1) Complete the diagram to describe the functions of water and the importance of hydration in the human body.



- 2) Dehydration (a harmful reduction in the amount of water in the body) can lead to various health issues. Look at the pictures and identify situations when extra fluids are needed.



- 3) From the foods listed below, choose the five which provide the most water.

bread	lettuce	milk	sausage	potatoes
cucumber	cheese	chocolate	carrots	peanuts

- 4) For each of the given effects of dehydration explain why it happens.

Feeling thirsty:

.....

.....

Dark urine:

.....

.....

A lack of energy:

.....

.....

Increased heart rate:

.....

.....

Extension Task

Hydration is very important for maintaining health. Every person needs different amounts of water, depending on his or her activity levels, the weather, health, etc.

Design a poster to explain how water is lost from the body and how much a person needs to drink in order to keep it balanced.

6. Micronutrients: water



- 1) i) Explain why water is necessary for health.

.....

.....

.....

.....

.....

.....

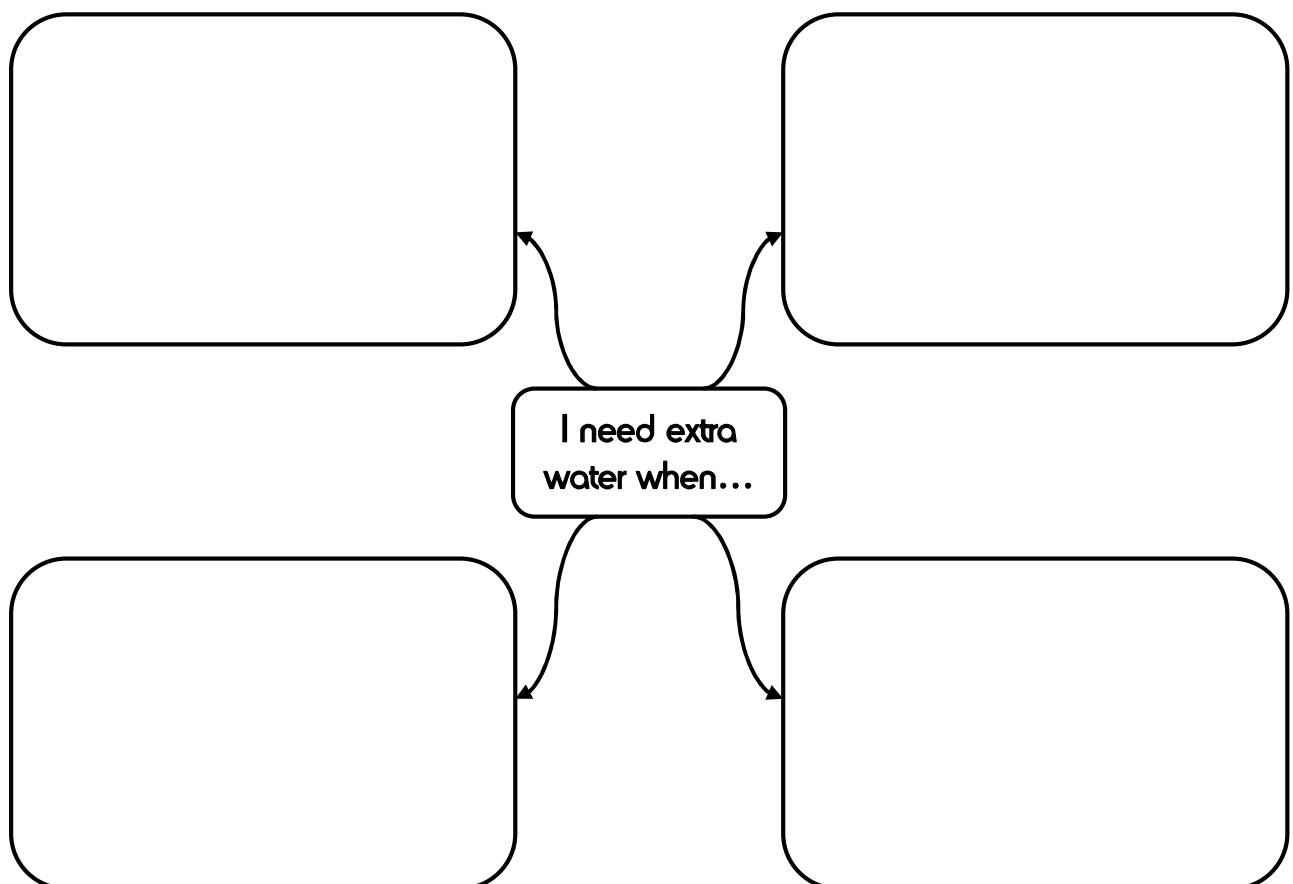
.....

- ii) Give an example of a situation where dehydration may occur.

.....

.....

- 2) Dehydration (a harmful reduction in the amount of water in the body) can lead to various health issues. Complete the diagram about situations where extra fluid is needed to prevent dehydration.



3) i) List five food products which provide significant amounts of water in the diet.

.....

.....

.....

.....

.....

ii) Indicate how much water an adult should drink per day to prevent dehydration.

.....

.....

4) Identify four symptoms of dehydration and explain why they occur.

1.
-
-
2.
-
-
3.
-
-
4.
-
-

Extension Task

Hydration is very important for maintaining health. Create a leaflet that includes the following information:

- 1) three functions of water in the human body
- 2) how water is lost from the body
- 3) how much water is needed by a healthy, moderately active person
- 4) how much water is needed by a marathon runner on a hot day

Answers

1. The relationship between diet and health

- 1) ●■ Higher ability to provide any three of the below
- **Base your meals on starchy foods**
 - they are the main source of energy
 - provide complex carbohydrates (starch) and dietary fibre (e.g. to support bowel movements, slow down absorption of sugar in the intestine, prevent constipation)
 - they provide a range of vitamins and minerals (such as calcium, which supports bone health, vitamin B1 to prevent beriberi, and iron to prevent anaemia)
 - they ensure a feeling of satiety for a long time, helping to maintain a healthy body weight
 - a) ●■ **Eat lots of fruit and vegetables**
 - fruit and vegetables are sources of minerals (e.g. potassium, which lowers blood pressure, magnesium, which supports muscle performance, iron to prevent anaemia and support blood health)
 - they are sources of vitamins (e.g. beta carotene to support proper vision, vitamin C to boost immunity)
 - they provide water (to prevent dehydration and ensure proper functioning of all cells in the body)
 - they provide antioxidants (to prevent diseases caused by free radicals, e.g. cancer, and to slow down ageing)
 - they provide dietary fibre which gives the feeling of satiety for a long time and slows down absorption of sugar from the fruit, preventing type 2 diabetes and obesity
 - b) ●■ **Eat more fish**
 - fish is a source of whole (HBV) protein necessary for growth and development of cells and tissues
 - it is a source of vitamins (e.g. vitamin D to support bone health)
 - it is a source of minerals (e.g. iodine to prevent thyroid dysfunction, calcium to support bone health, iron to prevent anaemia)
 - oily fish provide omega-3 fatty acids, necessary for the proper development and functioning of the brain - **Cut down on saturated fat and sugar**
 - to lower blood cholesterol level and prevent cardiovascular disease
 - to lower the risk of tooth decay
 - to lower the risk of obesity and related diseases, such as type 2 diabetes - **Try to eat less salt**
 - to reduce sodium intake and decrease the risk of hypertension
 - to lower the risk of heart attack and stroke - **Get active and try to be a healthy weight**
 - physical activity helps a person to burn surplus calories, stay fit and maintain a healthy body weight
 - lack of physical activity can increase a person's risk of becoming overweight or obese, and result in diseases such as type 2 diabetes and cardiovascular disease
- c) ●■ **Drink more water**
 - to prevent dehydration and heat stroke
 - to ensure proper bowel movements
 - to maintain correct body temperature
 - to maintain a healthy body weight- **Don't skip breakfast**
 - to boost metabolism
 - to maintain a healthy body weight
 - to support proper functioning of the brain
 - to improve learning and memory
- ii) The Eatwell Guide states that:
 - 35% of daily intake should be made up of vegetables and fruits
 - 30% of it should be wholegrains and starchy foods●
 - 18% is meat and other protein-rich foods●
 - 15% is dairy and alternatives●
 - 2% is fats

- 2) ●■ Higher ability to provide similar answer to lower-ability worksheet
A **balanced** diet should provide **macronutrients** and **micronutrients** in correct **quantities**. Both **excessive** and insufficient intake of macro- and micronutrients is negative and causes health issues. A balanced diet provides proper amounts of nutrients and, therefore, helps to maintain health. (Or any other relevant answer.)
- 3) ● i) Tooth decay, obesity, overweight, type 2 diabetes
ii) Exchange sugary drinks for spring water; eat fewer sweets; cook from scratch instead of buying ready-to-use foods
- 3) ■ i) Tooth decay, obesity, overweight, type 2 diabetes
ii) • increase taxes on sugary drinks and snacks
• promote water and natural unsweetened juices instead of sugary drinks
• promote and grant manufacturers that don't sweeten their products
- 4) ●■ Higher ability to provide similar answer to lower-ability worksheet

Diseases			
Osteoporosis	Coronary heart disease	Type 2 diabetes	Anaemia
Dietary causes			
Lack of vitamin D	Too much saturated fat	Too much saturated fat	Lack of iron
Excess of phosphorus	Overeating	Overeating	Folic acid deficiency
Too little calcium	Low physical activity	Low physical activity	
Low physical activity	Too much sugar	Too much sugar	
	Too much fat	Too much fat	
Health outcomes			
Brittle bones	Heart failure	Limb amputation	Heart failure
Tooth loss	Chest pain	Kidney failure	Tiredness
Joint and spine problems		Blindness	Trouble during childbirth
Easy bone fractures			
Changes in diet and lifestyle			
Eat more fish	Cut down on sugar	Cut down on sugar	Eat more vitamin C
Consume more vitamin D	Cut down on fats	Cut down on fats	Eat liver
Drink more milk	Lose weight (reduce energy intake)	Lose weight (reduce energy intake)	
Increase physical activity	Cut down on saturated fats	Cut down on saturated fats	
	Increase physical activity	Increase physical activity	
		Eat regularly	

- 5) ●
- 70-year-old obese man: banana, brown rice cakes, tomato and onion salad, tinned tuna sandwich, corn bread, lettuce
 - 50-year-old woman with hypertension: banana, brown rice cakes, tomato and onion salad, dark chocolate, corn bread, lettuce
 - 14-year-old girl with bad tooth decay: grilled sausage, salt and vinegar crisps, brown rice cakes, tomato and onion salad, mashed potato with cheese, corn bread, lettuce
- 5) ■
- 70-year-old obese man should avoid: sweets, sweetened beverages, high-sugar products, high-fat products, fast foods
 - 50-year-old woman with hypertension should avoid: salt, salty snacks, salty sausages and meats, cheese
 - 14-year old-girl with bad tooth decay should avoid: sweets, chocolate, sugar, sweetened beverages, fruit and fruit juices (because of high content of fructose)
- Or any other suitable answer.
- 6) ●
- Frying and deep-frying increases the amount of fat in the food, which is not suitable for an obese person. Frying and deep-frying should be replaced with other cooking methods, e.g. like boiling, roasting, baking or grilling.
 - Milk chocolate is not suitable because of high amount of sugar, not suitable for diabetics. It is better to replace it with fresh fruit or a piece of dark chocolate.

- 6) ■ Students must apply their knowledge of healthy eating and cooking methods to select and justify lunch items which will be suitable for a person suffering from diabetes and obesity.
- Exemplary meal would include a source of polysaccharides (e.g. wholegrain bread or brown rice), dietary fibre (e.g. vegetables, preferably raw), source of unsaturated fats (e.g. olive oil) and source of HBV proteins (lean meat or soy) or two sources of LBV proteins complementing each other.
 - The ingredients should be described in detail, i.e. 'wholegrain rye bread' instead of just 'bread'
 - Some cooking techniques should be indicated, such as steaming, dry frying, stir-frying or boiling, as those which produce low fat, healthier meals than other cooking methods.
- 7) ● Students must provide at least one of the following answers:
- dietary fibre improves bowel movements, helping to remove waste products and rid the intestines of harmful substances and pathogenic bacteria which could cause inflammation
 - dietary fibre acts as a prebiotic, supporting the growth of probiotic bacteria (which in effect help to fight off pathogens which cause inflammation)
 - dietary fibre helps to remove the waste products, which, therefore, will not be filling the diverticula (pouches) in the intestines
- 7) ■ The answer includes a reference to:
- diverticulitis develops when food waste / waste products lie in the diverticula (pouches) in the intestines
 - pathogenic bacteria and fungi can thrive on these waste products, leading to inflammation of the intestine
 - a healthy diet can prevent the disease and help to treat it
 - people who eat little dietary fibre are at a higher risk of developing diverticulitis than those who eat the correct amount of dietary fibre
 - this is because fibre stimulates bowel movements, helping to remove the waste products and preventing them from lying in the pouches in the intestine
 - this is also because fibre acts as a prebiotic, supporting the growth of probiotic bacteria (which, in effect, help to fight off pathogens which cause inflammation)
 - it might also be helpful to reduce the amount of sugar in the diet, as sugar provides perfect conditions for the growth of fungi in the intestines
 - α healthy diet can also help to alleviate symptoms of the disease; for example, by providing probiotic bacteria (e.g. from yoghurt) which might help to inhibit growth and development of pathogens in the diverticula
- Or any other suitable answer.

Exam-style Question

- 1) ● (4 marks)
- Any four from:
- promote physical activity among children
 - introduce a sugar tax / lower the amount of sugar in foods commonly eaten by children, such as breakfast cereals, fruit beverages, yoghurts, sugary snacks
 - lower the amount of saturated fats in foods commonly eaten by children, such as crisps
 - plan school meals so that they reflect the current dietary guidelines
 - teach children and their parents how to make a healthy breakfast/lunch/dinner
 - promote healthy snacks such as fresh fruit rather than crisps or chocolate bars
 - remove vending machines with sweets from schools
 - give the children whole fresh fruit rather than fruit juices / limit the amount of fruit juice drunk
- Or any other suitable answer.

1) ■ (8 marks)

Response shows excellent understanding of nutrition and health, and detailed knowledge of eating patterns in the United Kingdom. Response shows thorough analysis, explanation and assessment of the relationship between diet and health, and the impact a poor diet can have on the wider society and the economy. Student gives a well-balanced rationale with relevant and validated information.	Band 3 8–12 marks
Response shows good understanding of nutrition and health, and accurate knowledge of eating patterns in the United Kingdom. Response shows good analysis, explanation and assessment of the relationship between diet and health, and the impact a poor diet can have on the wider society and the economy. There is a line of reasoning presented with some structure which is, for the most part, relevant.	Band 2 4–7 marks
Response shows limited understanding of nutrition and health, and some basic knowledge of eating patterns in the United Kingdom. There is some analysis of the relationship between diet and health, and the impact a poor diet can have on the wider society and the economy. The information is basic and communicated in an unstructured way.	Band 1 1–3 marks
No answer given or answer incorrect/irrelevant.	0 marks

Indicative content:

Students recognise unhealthy diet as imbalanced, lacking in micronutrients and excessive in macronutrients.

Students analyse which aspects of diet contribute the most to the increase in diet-related diseases rates from:

- high saturated fats / trans fats intake
- high sugar intake
- high fast food consumption
- high salt intake
- high fat consumption
- overeating in general

Students indicate diet-related diseases linked to the factors mentioned above from:

- overweight and obesity – as a result of increased fat, saturated fat / trans fat and sugar consumption, or general overeating
- type 2 diabetes – as a result of high fat, saturated fat and sugar intake
- hypertension – as a result of high fat, saturated fat and sodium consumption from highly processed foods
- atherosclerosis and coronary heart disease – as a result of high fat and saturated/trans fat and sugar consumption
- heart attack – as a result of CHD and hypertension
- stroke – as a result of atherosclerosis and hypertension
- bowel or breast cancer – as a result of low fibre consumption and high saturated/trans fat consumption

Students indicate impact a poor diet can have on a wider society and economy:

- people may fall ill more often, and take more time off work, contributing to lower economy
- as people may more often suffer from various diseases/conditions, they will use the NHS more, using up the valuable resources (e.g. medicines, doctors appointment)
- more money may be needed to run the healthcare system to provide for all the ill people
- more doctors and other medical staff will be needed to help treat all the patients
- as there could be more patients, people with other diseases may have to wait longer for their treatment, or may not receive it at all due to shortages in staff/medicines, etc.
- there may be more people requiring dental treatment as diets high in sugar will lead to higher rates of tooth decay and related issues in the population
- an unbalanced diet often leads to obesity – furniture manufacturers may need to redesign their products to cater for the needs of larger, heavier people
- as deficiency in iron may lead to anaemia, more medicine will be needed to treat it; in more serious cases, more blood donors may be needed to ensure there is enough blood for those requiring blood transfusions to treat anaemia, etc.

Other relevant answers may be accepted.

2. Nutritional and dietary needs of different groups of people: dietary needs for different stages of life, food allergies and intolerances

- 1) i) ●■ Higher ability to provide similar answer to lower-ability worksheet
The 5532 guideline means:
- 5 portions of food per day
 - 5 portions of fruit and vegetables per day
 - 3 portions of milk and dairy products per day
 - 2 portions of protein-rich food per day
- ii) ■ only
Toddlers who are fed a vegetarian diet require more protein because most plant foods contain only low biological value protein – this poses a risk of protein deficiency, which could affect young children's growth and development.

- 2) ●
eggs, prawns, lupin, milk, sesame, wheat, lobster

- 2) ■
Any five from:
- cereals containing gluten (wheat, rye, barley, oats)
 - crustaceans (prawns, crabs, lobsters, crayfish)
 - molluscs (clams, mussels, oysters)
 - fish
 - eggs
 - milk
 - peanuts
 - tree nuts (almonds, hazelnuts, walnuts, Brazil nuts, pistachios)
 - soybeans
 - celery
 - mustard
 - sesame
 - lupin
 - sulfur dioxide

- 3) ● (Other correct responses possible)

	Cannot eat...	Can eat...
Coeliac	Gluten, wheat, rye, barley, oat products, bread, pasta, dumplings, pancakes, breaded fish, ham	Corn and cornstarch, potatoes and potato starch, rice, quinoa, buckwheat, milk and dairy, fruit and vegetables, meats and fish, eggs
Lactose intolerant	Milk and dairy, pancakes, some meats, sauces which contain milk or added lactose, milk chocolate and milk desserts, rice puddings, fudge, some bread and bakery products	All foods that do not contain lactose, such as bread, fruit and vegetables, meat, fish, eggs, rice, honey, fermented dairy products such as cheese and yoghurt
Milk allergic	Milk or dairy in any form, including fudge, milk chocolate, some biscuits, pancakes	All foods made without milk in any form, such as some bread and bakery products, fruit and vegetables, meat, fish, eggs, rice, honey

- 3) ■

Group	Meal	Suggested modification
Coeliac	Rice pudding	Doesn't need changes
Lactose intolerant	Strawberry milkshake	Exchange milk for a plant milk such as soy, rice or almond milk
Allergic to milk	Hot chocolate with milk	Exchange milk for a plant milk such as soy, rice or almond milk; exchange milk chocolate for plain cocoa powder or dark chocolate

Or any other relevant answer.

- 4) i) ●■ Higher ability to provide similar answer to lower-ability worksheet
- Gluten-free grains include: rice, quinoa, buckwheat, amaranth, millet, sorgo, teff, certified oats
 - Non-gluten-free grains include: wheat, rye, barley, spelt and non-certified oats
- ii) ■ only
- In coeliac disease, gluten cannot be ingested properly in the intestines.
 - Instead, inflammation occurs and the immune system attacks the gut, causing pain, bloating, and diarrhoea.
 - Also, intake of gluten and inflammation will lead to cilia damage which will affect ingestion in general.

5) ●■ Higher ability to provide similar answer to lower-ability worksheet

Group	Dietary changes	Reason
Babies and small children ■ only	Increase variety of foods, increase physical activity, drink milk, eat fish, cut down on sugars and sweets	To prevent obesity, to prevent rickets, to prevent tooth decay
Teenagers	Eat more fish, increase physical activity, more meat and legumes, drink water, increase variety of foods, drink more milk, eat fewer sweets and sugar, eat more fruit and vegetables	To prevent obesity, to prevent rickets, to prevent tooth decay, to provide enough protein for proper growth, to prevent anaemia, to provide enough fibre
Adults	Cut down on fast foods, drink milk, eat more fish, eat less salt, less fat, fewer sweets and sugar, increase physical activity, drink water, more fruit and vegetables Cut down on alcohol	To prevent osteoporosis, to prevent obesity, to provide enough fibre and avoid constipation, to prevent hypertension To prevent addiction, liver disease, stroke or heart attack, obesity, hypertension
Elderly	Cut down on fast foods, drink milk, eat more fish, eat less salt, less fat, fewer sweets and sugar, increase physical activity, drink water, more fruit and vegetables	To prevent osteoporosis, to prevent obesity, to provide enough fibre and avoid constipation, to prevent hypertension

6) ●■ Higher ability to provide similar answer to lower-ability worksheet

- Fats should provide up to 35% of energy
- Proteins 15%
- Carbohydrates 50%
- of which sugars 5%

7) ●■ Higher ability to provide similar answer to lower-ability worksheet

- unpasteurised cheese is not recommended due to the increased risk of listeriosis and salmonellosis, which could cause miscarriage or stillbirth
- liver pâté is not recommended due to very high levels of vitamin A, which, in excess, can be harmful to the foetus
- oily fish is not recommended in large amounts due to high mercury levels, which can affect the development of the nervous system in the foetus
 - Other examples could include:
 - all types of pâté, including vegetable pâté due to the high risk of listeriosis
 - raw and undercooked meat (e.g. rare steak) and cured meats due to increased risk of toxoplasmosis, which can affect the development of the foetus (e.g. cause deafness)
 - raw shellfish, due to increased risk of many diseases (including listeriosis)
 - liquorice, as it may affect the development of the nervous system and the brain in the foetus

8) ●

Fruit juices contain no dietary fibre, but they are high in sugar; this can contribute to the development of tooth decay and obesity in children.

8) ■

Fruit juices are not part of a healthy diet for babies and children under one year old. This is because fruit juices contain no dietary fibre, but are they high in sugar; this can contribute to the development of tooth decay and obesity in children.

Exam-style Question

- 1) ● 1 mark for stating whether an ingredient should be changed/modified, and 1 mark for explaining how (max. 2 marks)

To make the pizza more suitable for school-age children, one could modify the following ingredients:

- strong wheat flour – can be replaced with wholemeal flour to include more fibre in the dish; the pizza base in general can be substituted with a vegetarian alternative, e.g. cauliflower pizza
- salt – the amount could be reduced, e.g. by using herbs and spices
- tomato sauce – could be made healthier by adding puréed vegetables (such as carrots) to increase the fibre content
- mushrooms – could be substituted with another ingredient as children may find it difficult to digest mushrooms; also, mushrooms from unknown sources may be poisonous, posing a threat to health (and, possibly, life), tofu, or vegetables such as aubergine
- olive oil – does not need to be replaced as it is a healthy oil containing poly- and monounsaturated fats
- onions – do not have to be changed for health reasons; however, some children may not like the taste of onions, in which case the onions could be either puréed and incorporated into the tomato sauce, or caramelised to provide a sweeter flavour, more acceptable for children

Other suitable answers may be accepted.

- 1) ■ 1 mark for stating whether an ingredient should be changed/modified, and 1 mark for explaining how (max. 4 marks)

Indicative content:

- butter – is made from fresh milk, and, therefore, may contain traces of lactose; it could be substituted with a vegetable fat spread to make the mashed potato topping, and with lard or vegetable oil to fry the vegetables and mince
- milk – is a natural source of lactose; in the pie it is used to make mashed potato topping, and, therefore, could be substituted with soy milk, oat milk, or another plant-based milk that is neutral in flavour
- potatoes / onions / carrots / beef mince / tomatoes / beef stock / seasonings – do not need to be changed

3. Energy balance

- 1) ●
 - i) gender/sex, age, height, weight
 - ii) The higher the PAL, the more energy a person needs. The lower the PAL, the less energy a person needs.
- 1) ■
 - i) ●
 - BMR – basal metabolic rate – the amount of energy needed to stay alive, e.g. for breathing, maintaining body warmth and heart beat; BMR depends on sex, age, height and weight
 - PAL – physical activity level – an indicator of how active a person is during the day; depends on lifestyle, type of work performed, sports, etc.
 - BMR multiplied by PAL equals total energy expenditure (TEE) which indicates total energy needs of an individual; TEE is amount of energy necessary to perform all actions and maintain healthy body weight and health
- 2) ●■ Higher ability to provide similar answer to lower-ability worksheet
 - 1 g of fat provides 9 kcal of energy
 - 1 g of carbohydrates provides 3.75 kcal of energy
 - 1 g of protein provides 4 kcal of energy
 - 1 g of alcohol provides 7 kcal of energy
- 3) ●
 - i) 2008.32 kJ
 - ii) 502.08 kJ
 - iii) 439.32 kJ
 - iv) 2196.6 kJ
- 3) ■
 - i) The calories provided should be calculated as follows:
First, calculate how many calories are provided by a portion of each ingredient:
 - 80 g wholemeal bread → $80 \text{ g} \times 217 \text{ kcal} / 100 \text{ g} = 174 \text{ kcal}$
 - 10 g butter → $10 \text{ g} \times 744 \text{ kcal} / 100 \text{ g} = 74 \text{ kcal}$
 - 50 g tuna → $50 \text{ g} \times 109 \text{ kcal} / 100 \text{ g} = 54 \text{ kcal}$
 - 30 g sweetcorn → $30 \text{ g} \times 78 \text{ kcal} / 100 \text{ g} = 23 \text{ kcal}$
 - 20 g mayonnaise → $20 \text{ g} \times 686 \text{ kcal} / 100 \text{ g} = 137 \text{ kcal}$
Add the calories provided by all ingredients:
 - The sandwich would provide $174 + 74 + 54 + 23 + 137 = 462 \text{ kcal}$
Calculate the equivalent in kilojoules:
 - $462 \text{ kcal} \times 4.184 = 1933 \text{ kJ}$
 - ii) The calories provided should be calculated as follows:
 - First, calculate how many calories are provided by a portion of each ingredient:
 - 80 g lettuce → $80 \text{ g} \times 11 \text{ kcal} / 100 \text{ g} = 9 \text{ kcal}$
 - 50 g tomato → $50 \text{ g} \times 22 \text{ kcal} / 100 \text{ g} = 11 \text{ kcal}$
 - 50 g mozzarella → $50 \text{ g} \times 257 \text{ kcal} / 100 \text{ g} = 129 \text{ kcal}$
 - 10 g olive oil → $10 \text{ g} \times 899 \text{ kcal} / 100 \text{ g} = 90 \text{ kcal}$
Add the calories provided by all ingredients:
 - The salad would provide $9 + 11 + 129 + 90 = 239 \text{ kcal}$
Calculate the equivalent in kilojoules:
 - $239 \text{ kcal} \times 4.184 = 999 \text{ kJ}$
- 4) i) Any four from: (■ also to provide explanation)
 - sex – men usually need more energy than women due to higher amounts of muscle tissue
 - life stage / age – children need more energy in relation to body mass than adults or the elderly; also, teenagers need more energy than adults due to growth spurts
 - pregnancy/lactation – a pregnant woman needs more energy to provide for the growing foetus, while a lactating woman need more energy to produce milk
 - body weight/height – tall people usually need more energy than short people; also, heavier people usually need more energy than leaner people due to higher amount of tissue to maintain
 - occupation – people who are very active at work (e.g. builders, physical workers) need more energy than people who work in an office; also, professional sportspeople and athletes need more energy
 - lifestyle – people who have a sedentary lifestyle usually need less energy than those who are physically active
 - genetics – genetic factors may have an influence on one's energy requirements, due to the way different genes are expressed

- ii) ● Any two from:
 - overweight/obesity
 - cardiovascular disease
 - hypertension
 - type 2 diabetes
 - joint pains
 - depression
 - or any other suitable example
 - ii) ■ Any two from:
 - underweight / weight loss
 - tiredness/fatigue
 - fainting and loss of consciousness
 - loss of muscle tissue
 - weakness
 - impaired growth and development
 - lower immunity / falling ill more often and more easily
 - or any other suitable example
- 5) ●■ Higher ability to also provide explanation
- Physical activity helps burn fat tissue, preventing overweight and obesity
 - Drinking sufficient amounts of water gives the feeling of satiety, decreases hunger and helps remove toxins
 - Eating fresh vegetables provides micronutrients and fibre
 - Choosing wholegrain products such as bread, pasta or rice to provide starch and fibre
- Other relevant responses possible.

Exam-style Question

- 1) ● (1 mark)
Starch / complex carbohydrates
- 1) ■ i) (3 marks)
- Protein – fish
 - Carbohydrates – potatoes, breadcrumbs/batter
 - Fats – oil, fish
- ii) (1 mark)
Examples could include:
- dry-fry or shallow-fry the fish instead of deep-frying it
 - roast the chips instead of deep-frying them
 - use a lean type of fish, e.g. cod
 - blanch potatoes before frying (this will prevent them from absorbing too much oil and shorten the cooking time)
- Other suitable answers can be accepted.

4. Macronutrients: proteins, fats and carbohydrates

- 1) ●■ Higher ability to provide similar answer to lower-ability worksheet

Macronutrients include proteins, fats and **carbohydrates**. They are called macronutrients because people require them in **large** quantities to remain healthy. Proteins can be found in both animal and **plant** derived foods. Fats can be divided into two main groups – ones that have single only bonds in the fatty acid chains are called **saturated**, and those which contain double or triple bonds are called **unsaturated**. Carbohydrates consist of **starch**, **sugars** and fibre. Fibre is necessary for the proper functioning of the **bowel**.

- 2) ●■ Higher ability to provide similar sources to ones given below, on their spider diagrams

Fats	Cheese, butter, avocados, pork chops, doughnut
Proteins	Hazelnuts (nuts and seeds), tuna (fish), eggs, pork chops, cottage cheese
Carbohydrates	Grapes (berries), pasta, carrots, potatoes, oranges, bread rolls, beans

- 3) ●■ Higher ability to provide similar functions

	Functions
Fats	• Provide protection of the vital organs • Help dissolve and absorb vitamins in the body • Provide insulation from the cold to maintain body heat
Proteins	• Help build hormones and enzymes • Help develop antibodies to fight bacteria and viruses and keep us healthy • Building material of body cells such as muscle
Carbohydrates	• Provide the main source of energy • Increase satiety • Dietary fibre supports bowel movements

- 4) i) ●■
- Low biological value (LBV) proteins and high biological value (HBV) proteins differ in the quality and quantity of amino acids they contain.
 - LBV proteins don't contain enough essential amino acids or contain them in a low **quantity** and are usually from plant sources.
 - HBV proteins contain all the essential amino acids and are usually those of **animal origin**.
- ii) ●■
- Protein complementation is a process in which low biological value proteins are combined together to form a high biological value protein meal.
 - An example of this is beans on toast, when lysine-low bread is balanced by lysine-high beans.
- iii) ●■ Lower ability to provide two alternatives, higher ability to provide four alternatives
- Protein alternatives include:
- Soybeans and all soy-derived products such as tofu, tempeh, soy chunks
 - Quinoa
 - Quorn™ (mycoprotein)
 - Various legume-based products such as hummus (which is made from chickpeas and sesame seeds)

- 5) i) ●

Avocado (US)	Cod (US)	Salmon (US)	Chocolate (S)	Milk (S)	Ham (S)
Olive Oil (US)	Cheese (S)	Butter (S)	Nuts (US)	Beef (S)	Cream (S)

- ii) ●
- Monounsaturated fats have only one double bond in the fatty acid chains while polyunsaturated fats have more than two of them.
 - Monounsaturated fats begin to solidify at low temperatures while polyunsaturated fats become liquid.

- 5) ■
- Depending on the chemical structure, we can differentiate two kinds of fats: saturated and unsaturated.
 - Unsaturated fats may be further split into monounsaturated and polyunsaturated fats.
 - In saturated fats all the chemical bonds in fatty acid chains are single. An example of this is lard.
 - In monounsaturated fats there is one double bond in the fatty acid chain, and in the polyunsaturated fats there is more than one double bond in the fatty acid chain. An example of an unsaturated fat is olive oil.
 - The other way of categorising fats is by dividing them into visible and non-visible fats.
 - Visible fats include lard, suet, butter, cream and the white visible fatty tissue in meats such as bacon.
 - Non-visible fats include fats which are present in food products, but can't really be seen, such as in avocados, olives, milk and cheese, meat and cold cuts (other than the white visible part), fish, etc.

6) ●■

Type of carbohydrate		Description	Source of food they can be found in
Starch	Polysaccharides	Is built from many sugar molecules bound together into long chains; can be broken down by enzymes in the human digestive tract. Also known as complex carbohydrates.	Wholegrains, such as wholewheat flour, brown rice, etc. contain starch and dextrin. Bread contains starch and dextrin.
Sugars	Monosaccharides	Group of sugars built from one molecule of sugar only	Fruit and vegetables contain glucose and fructose. Honey contains a mixture of various mono- and disaccharides.
	Disaccharides	Group of sugars built from two sugar molecules	Table sugar contains sucrose, honey contains a mixture of various mono- and disaccharides, milk contains lactose. Cereals such as barley contain maltose.
Dietary fibre		Is built from many sugar molecules bound together into long chains; cannot be broken down in the human digestive tract	Wholegrains and vegetables contain insoluble fibre, i.e. cellulose. Fruit, vegetables and seeds such as flaxseed contain soluble fibre, such as pectin. Cereals, such as oats, are rich in soluble and insoluble fibre.

7) ● Higher ability to provide similar information with explanations.

	Proteins	Fats	Carbohydrates
Effects of deficiency	Swelling – proteins are responsible for maintaining the so-called oncotic blood pressure, so if there is too little protein, the water will be retained in the body and this will cause swelling. Hormonal disorders – many hormones are made of protein, so if there is not enough, the hormones could not be built Growth arrest – protein is necessary to build all cells around the body, so if there is no protein, the body cannot build new cells and cannot grow or develop. Kwashiorkor – this is the effect of long-term, chronic protein deficiency. Lack of protein will lead to retention of water in the intestines, and this will cause them to swell, so the stomach will look big and swollen.	Loss of body mass – fat is used to build cell walls and forms fatty tissue around the body to insulate it and store energy for later. If there is not enough fat, the body will use the reserve and in effect you will lose weight. Vitamin deficiency – fat is a solvent of many vitamins, so not eating enough fat means that you are also eating too few vitamins, and this may cause further health problems. Hormonal disorders – many hormones require fat to be built, so lack of fat means that they could not be built.	Hypoglycaemia – too few carbohydrates means that there will be too little sugar available in the bloodstream. Weight loss – cutting down on carbohydrates means that your body will use other sources of energy such as fatty tissue. In extreme cases it may also break down muscles to make energy, and in effect you will lose weight. Loss of consciousness – glucose is the only substance which can be used by the brain as a source of energy. If there is not enough glucose, you may faint or lose consciousness (this is also common in people treated with insulin, who use too much of it).
Effects of excess	Depression, low mood Kidney and liver disorders – protein is processed in the liver which breaks it down into urea, so too much protein will overburden the liver. The kidneys filter the blood to form urine; if there is too much protein they will be overburdened and won't filter the blood properly, which might cause them to fail.	Overweight and obesity – excess fat is stored in the body as fatty tissue. This accumulates around the internal organs, and in the hips, arms and thighs, so eating too much fat will lead to weight gain. Coronary heart disease – fat, especially saturated fat, increases levels of LDL cholesterol in the blood. This can bond with calcium and accumulate in blood vessels as plaque. The plaque may build up and block the blood vessels around the body and in the heart, and may increase the risk of a heart attack or stroke. Hypertension – excessive consumption of fat, especially saturated fat, causes plaque to accumulate in blood vessels. The more plaque, the less space available in the vessels for blood, so the blood pressure will rise, as the amount of blood remains stable. Type 2 diabetes – obesity increases the risk of type 2 diabetes. Type 2 diabetes occurs more often in obese people than in people with a healthy body weight.	Overweight and obesity – excess sugar will be turned into fatty tissue by the body and stored, so you will gain weight. Coronary heart disease – a diet high in sugar increases blood cholesterol levels, and this may lead to plaque accumulation in the blood vessels leading to atherosclerosis, CHD and hypertension. Type 2 diabetes – if you're eating too many carbohydrates (especially sugars), they are absorbed into the bloodstream rapidly, which causes a peak in blood glucose levels. To lower this, the pancreas needs to produce more and more insulin, and eventually may fail. There will be no more insulin to lower blood sugar levels and these will stay permanently high, leading to damage of the nerves and body organs. Tooth decay – sugar is a food for bacteria living in your mouth, if you are eating too much of it, bacteria will reproduce more rapidly and damage the enamel on your teeth.
Dietary reference value in % or grams for an average diet of 2,000 kcal	10–15% (50–75 g)	25–35% (55–77 g)	Around 50% 250 g

Exam-style Question

1) ● 4 marks

- **Animal source of visible fat:** bacon, lard, suet, butter
- **Animal source of non-visible fat:** milk, cheese, meat, egg
- **Plant source of visible fat:** olive oil, sunflower oil, coconut oil, cocoa butter
- **Plant source of non-visible fat:** seeds (e.g. pumpkin seeds), nuts (e.g. almonds, hazelnuts), peanuts, avocado, olives

Other suitable answers may be accepted.

1) ■ 6 marks

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated, showing a clear understanding and comparison of the contribution that beef, salmon and chickpeas can make to the nutritional requirements of teenagers. Specialist terms are used appropriately and correctly.	5–6 marks
There is a line of reasoning presented with some structure that is, for the most part, relevant and supported by some evidence showing an understanding and comparison of the contribution that beef, salmon and chickpeas can make to the nutritional requirements of teenagers. Some specialist terms are used, although these may not always be used appropriately..	3–4 marks
The information is basic and communicated in an unstructured way. The candidate shows limited understanding and only some comparison of the contribution that beef, salmon and chickpeas can make to the nutritional requirements of teenagers. Answer may be ambiguous or disorganised.	1–2 marks
Student doesn't provide any relevant answer.	0 marks

Indicative content:

Specific requirements of teenagers:

- complete (high biological value) protein to support growth and development of tissues around the body
- complex carbohydrates to provide energy throughout the day
- fats to provide energy and to help absorb vitamins from food
- calcium and phosphorus to support growth of bones and teeth
- iron to help prevent anaemia (in girls)
- vitamins A, C and E to boost immune system and prevent disease
- vitamin B12 to prevent anaemia
- essential fatty acids to support brain development
- fluoride to help build tooth enamel and prevent tooth decay

Beef contributes:

- high biological value protein
- haem iron which is absorbed better than non-haem iron, so can be used by the body more easily
- vitamins A and B12
- some calcium and phosphorus
- saturated and unsaturated fats

Salmon contributes:

- high biological value protein
- haem iron
- vitamins A and B12
- calcium and phosphorus
- essential fatty acids
- some fluoride

Chickpeas contribute:

- low biological value protein, so may not be sufficient on their own for teenagers
- some carbohydrates (including dietary fibre)
- non-haem iron
- some vitamins C and E

Conclusion:

- salmon may be the most suitable food for teenagers as it meets almost all of their requirements
- beef should be the food of second choice as it lacks essential fatty acids and may be too high in saturated fats
- chickpeas must be eaten in combination with other foods to provide high biological value protein

Other correct responses may be accepted.

5. Micronutrients: vitamins and minerals

1) i) ●

Functions			
E: Ensures proper growth of sperm cells	D: Lowers the risk of type 2 diabetes and cancer	A: Maintains healthy skin, nails and hair	D: Prevents depression
A: Crucial for good eyesight	K: Prevents haemorrhages	D: Necessary for proper bone and teeth growth and development	E: Necessary for proper growth and development of the foetus during pregnancy
K: Necessary for proper blood clotting	A and E: Antioxidant		
Effects of deficiency			
E: Tiredness	A: Dry and flaky skin	D: Depression	D: Rickets
D: Osteoporosis	E: Wrinkled, thin skin	A: Brittle hair and nails	A: Night blindness
K: Excessive bleeding	E: Muscle degeneration	A, E and K: Decreased immunity	D: Low immunity
Sources			
A and D: Fish and fish oil	A and K: Broccoli	A: Carrots	A and K: Spinach
D: Cheese	A: Liver	K: Kale	A and E: Pumpkin
E: Sunflower oil	A and E: Blueberries	A and D: Egg yolk	K: Gut bacteria

1) i) ■

Fat soluble vitamins A, D, E and K

Name	Function	Effects of deficiency	Sources
Vitamin A (retinol and beta carotene)	- Maintains healthy skin, nails and hair - Crucial for good eyesight - Antioxidant	- Night blindness - Brittle hair and nails - Dry and flaky skin - Decreased immunity	- Fish and fish oil - Liver - Carrots, pumpkin, spinach, broccoli - Blueberries - Egg yolk
Vitamin D (cholecalciferol)	- Necessary for proper bone and teeth growth and development - Prevents depression - Lowers the risk of type 2 diabetes and cancer	- Rickets - Osteoporosis - Depression - Decreased immunity	- Fish, fish oil - Liver - Cheese - Egg yolk
Vitamin E (tocopherol)	- Antioxidant - Necessary for proper growth and development of the foetus during pregnancy - Ensures proper growth of sperm cells	- Tiredness - Wrinkled, thin skin - Muscle degeneration - Low immunity	- Spinach, kale, blueberries - Vegetable oils such as sunflower oil - Pumpkin (especially seeds)
Vitamin K	- Necessary for proper blood clotting - Prevents haemorrhages	- Excessive bleeding - Slow wound healing - Decreased immunity	- Produced by gut bacteria - Kale, spinach, broccoli

1) ii) ●

Water soluble vitamins B group and C

Name	Function	Effects of deficiency	Sources
Vitamin B1 (thiamine)	Takes part in carbohydrate metabolism; is an important part of numerous enzymes	Beriberi disease, which shows as nerve and muscle cell degeneration	- wholegrains - yeast (including Marmite™) - liver - lean meat
Vitamin B2 (riboflavin)	Important part of enzymes; takes part in creating haemoglobin	Cracked and dry lips (especially in the corners of the mouth), dry skin	- yeast - liver - cheese - green leafy vegetables, such as spinach or cabbage
Vitamin B3 (niacin)	Helps release energy from food, takes part in red blood cells production, has a positive effect on the performance of the nervous system, extends blood vessels which helps deliver oxygen to the tissues	4D syndrome – dermatitis (inflammation of skin), diarrhoea, dementia (loss of memory), death Low concentration (inability to focus), irritability Increased sensitivity of the skin to sunlight	- meat - nuts and seeds - wholegrains - fortified cereals and flour - fish (e.g. tuna, mackerel) - eggs - cottage cheese - yeast - broccoli
Folate / folic acid (vitamin B9)	Important in the process of DNA synthesis, takes part in creating red blood cells, reduces the risk of spinal cord diseases in the newborns	A disease called spina bifida in newborns Anaemia (lack of red blood cells)	- yeast - wholegrains - fortified cereals and flour - spinach - broccoli
Vitamin B12 (cobalamin)	Together with folic acid takes part in creating red blood cells	Anaemia (lack of red blood cells) might occur in vegans if not supplemented	- liver - milk - meat - eggs - cheese - fish (e.g. salmon or cod)
Vitamin C (ascorbic acid)	Takes part in collagen synthesis, helps with the ingestion of iron, increases immunity, strengthens blood vessels	Decrease in immunity A disease called scurvy, which shows as bleeding, receding, weak gums leading to the loss of teeth Anaemia (due to impaired iron ingestion) Slow wound healing, excessive bleeding	Fruits and vegetables, such as: - potatoes - bell peppers - tomatoes - strawberries - blackcurrants - citrus (oranges, lemons, etc.) - parsley - cabbage and sour cabbage

- 2) i) ● Lower ability to match up
 i) ■ Higher ability to construct sentences with main points included.

Mineral	Functions	Effects of deficiency	Dietary Reference Values
Calcium (Ca) and phosphorus (P)	Helps build strong bones and teeth	Rickets and osteoporosis	700 mg to 1,000 mg
Fluoride (F)	Builds tooth enamel, prevents tooth decay	Soft enamel, tooth decay, improper growth of teeth	1 mg
Sodium (Na)	Balances fluids in the body, keeps the blood pressure stable	Low blood pressure, headache, dehydration	Up to 6 g
Iodine (I)	Builds the thyroid gland hormones and coordinates metabolic rate	Nausea, diarrhoea, goitre	130 mcg
Iron (Fe)	Helps build red blood cells	Tiredness, pale complexion, anaemia	11 mg for boys, 14 mg for girls

- ii) ● ■ Any of the following sources or suitable alternatives:

- Calcium and phosphorus – milk, sardines
- Fluoride, sodium – sardines
- Sodium – kitchen salt
- Iodine – salmon and seafood, kitchen salt
- Iron – red meat, salmon and seafood

- 3) ● Students should apply their knowledge and understanding of the functions of vitamins and minerals for bone health. The designed meal should include:

- at least one source of calcium, e.g. milk, cheese, sardines, almonds
- at least one source of vitamin D, e.g. eggs, oily fish
- at least one source of phosphorus, e.g. wholemeal bread, cereals
- at least one source of vitamin K, e.g. green leafy vegetables (spinach, kale)

- 3) ■ Students apply their knowledge and understanding to assess the role of a balanced diet for bone health.

- A balanced diet provides all the required macronutrients and micronutrients in the correct amounts. It is crucial to support growth and development, and to perform all bodily functions.
- An imbalanced diet can provide either too many or too few nutrients. Neither of these is beneficial as it can impair absorption and affect health.
- The most important nutrients for bone health are calcium, phosphorus, vitamin D and vitamin K. Vitamin D is necessary for the absorption of calcium in the intestine – vitamin D deficiency will, therefore, affect calcium absorption and lead to its deficiency. Vitamin D can be produced in the skin, but is also provided by oily fish, fish oil, some types of mushroom, egg yolk, milk and dairy products. It is important to provide sufficient amounts of vitamin D to prevent calcium deficiency.
- Eating too little calcium can cause health issues. Calcium is necessary for building strong bones, controlling muscle contractions and regulating blood pressure. We can obtain calcium from various foods, such as milk and dairy, fish, almonds and leafy green vegetables.
- Phosphorus is required for the absorption of calcium. It can be found in various foods, such as meat and cold cuts, bread and cereals. Phosphorus deficiency affects mineralisation of bones, causing them to become soft – this is known as osteopenia.
- Vitamin K is needed for the mineralisation of bones, increasing their density and strengthening them. It can be found in egg yolks and leafy green vegetables, but can also be produced by probiotic bacteria in the gut.
- An imbalanced diet could provide too many or too few of any of these micronutrients, and result in poor bone health. Deficiency of calcium and vitamin D is especially important, as it can lead to osteoporosis – a condition in which bones lose their density, become porous and fracture-prone.

Other suitable answers can be accepted.

Exam-style Question

- 1) ● 2 marks

The answer could include any two from:

- vitamin D (although it can be manufactured in the skin, it is usually not sufficient)
- vitamin B12
- iron (plant foods only provide non-haem iron, which is difficult to digest and absorb for humans)
- calcium (although many plants are rich in calcium, a large amount of dietary fibre affects its absorption)

Do NOT accept protein as an answer (since it is not a micronutrient).

2) ■

Indicative content:

- A vegan diet provides no **vitamin B12**, which is present only in products of animal origin. Vitamin B12 is necessary for building red blood cells. Vitamin B12 deficiency will affect red blood cell production, leading to pernicious anaemia, so vegans must supplement this vitamin in the form of pills, and choose fortified foods to prevent anaemia.
- A vegan diet provides little **iron**. Although iron is present in plant foods, it is in the non-haem form, which is absorbed less effectively by the body. Iron is necessary for building haemoglobin, which binds and carries oxygen around the body. Without iron, haemoglobin cannot be built, and oxygen cannot be transported in the body. Also, red blood cells cannot be built, and the number of them in the blood drops drastically. Vegans should increase the amount of iron they consume, and seek ways of improving its absorption (in order to absorb as much as is needed by the body).

Other suitable answers may be accepted.

6. Micronutrients: water

- 1) ●■ Higher ability to provide similar answer to lower-ability worksheet

Water is necessary for:

- Maintaining stable body temperature, preventing the body from overheating, cooling the body, i.e. by sweating
- Proper digestion and bowel movements, e.g. by dissolving substances, being a part of digestive juices (such as saliva or stomach acid), making swallowing easier, bulking up the food waste in the intestines and making defecation easier, helping to transport nutrients around the body by making up a large part of the blood
- Elimination of waste products and toxins, e.g. by excretion of stools and urine
- Keeping the mucous membranes moist, allowing them to function properly (i.e. in the respiratory system and lungs, in the mouth and stomach)
- Taking part in many chemical reactions in the cells around the body
- ■ Dehydration may occur, e.g. after a marathon, where runners are sweating excessively and not drinking enough. Other relevant responses possible.

- 2) ●■ Higher ability to provide similar answer to lower-ability worksheet

Extra fluid has to be provided:

- During diseases with high fever or when you are ill and lose water, e.g. diarrhoea
- During sport and high physical activity – to replace water lost as sweat
- When it's very hot weather – to replace water lost as sweat
- When somebody wants to lose weight – water helps to bulk up the fibre, which in turn increases the feeling of satiety and, therefore, a person needs to eat less

- 3) ●■ Higher ability to provide similar answer to lower-ability worksheet
cucumber, lettuce, milk, carrots, potatoes (or any other suitable answer)

ii) ■ only

Adult people should drink from 1.5 to 2 litres of water a day.

- 4) ●■ Higher ability to provide similar answer to lower-ability worksheet

- Feeling thirsty – this is the first symptom of dehydration. Lack of water means that the body will use the available water for the most important processes. This leads to less water being used, e.g. to produce saliva, so a person will have a dry mouth and feel thirsty.
- Dark urine – this is because water dissolves the waste products filtered in the kidneys. The less water available, the more water will be retained by the body, so the urine will be more concentrated and darker in colour.
- Lack of energy – water makes up a large part of the brain (around 75%) so having less water means that the brain cannot work properly, and, as a result, you might feel tired, have less energy and experience problems with concentration and headaches.
- Increased heart rate – water makes up approximately 90% of the blood volume. If there is not enough water, the blood becomes thicker and the heart needs to work harder to pump it around the body.

Higher-ability students may also indicate other symptoms of dehydration, such as:

- Passing urine less often – as there is less water in the body, it will retain most of it, so there will be less need to use a toilet.
- Constipation – water helps to bulk up the food waste in the intestine and moistens the lining of the bowel. If there is no moisture, and the food waste is not bulked up, the bowel will struggle moving it forward, and as a result constipation may occur.
- Dry, inelastic skin – water makes up a large part of body fluids, including the insides of the cells. If there is little water, it will move from the cells to the blood to equal their concentration, so the cells – including skin cells – will be less moist and become inelastic and dry.
- Fever – water helps to cool the body, so, if there is not enough water, the body will stop producing sweat and eventually will raise its temperature, which may be fatal.
- Low blood pressure – water makes up around 90% of the blood volume, so if there is less blood, the blood vessels will not be 'filled', and the blood pressure will drop, leading to fainting or loss of consciousness.

Other relevant responses possible.