

Name:

Date:

Cooking

- A broad range of ingredients, equipment, food skills and techniques, and cooking methods are used to achieve successful results.
- Recipes and cooking methods can be modified to help meet current healthy eating messages.



Why is food cooked?

Some foods can be eaten raw and form an important part of the diet. However, many foods need to be prepared and cooked before they are eaten to:

- make the food safe to eat by destroying pathogenic microorganisms and toxins;
- destroy microorganisms and enzymes that cause food to deteriorate and therefore increase the keeping quality of the food;
- make the food more digestible and easier to absorb.

Food skills

There are a number of food skills which enable a variety of increasingly complex dishes to be prepared and made.

These can include:

- beating, combining, creaming, mixing, stirring and whisking;
- blitzing, pureeing and blending.
- kneading, folding, forming and shaping;
- knife skills;
- rubbing-in and rolling-out;
- use of the cooker: boiling/simmering/poaching, frying, grilling, roasting and baking.

Safety

- Sharp knives: never walk around with a knife. Use the *bridge hold* and *claw grip* to cut safely.
- Grater: hold grater firmly on a chopping board. Grate food in one direction and leave a small amount at the end to prevent injury to knuckles.
- Hot liquid: drain hot liquid carefully over the sink using a colander.
- Saucepans: turn panhandles in from the edge, so they are not knocked.
- Hot equipment: always use oven gloves when placing food in and out of the oven.
- Spills: wipe up immediately.
- Electrical equipment: always follow instructions.

To find out more, go to:
<https://bit.ly/322eSpr>

Food skills are acquired, developed and secured over time.

Bridge hold



Claw grip



Food skill	Food skill	Food skill	Food skill	Food skill
Bake	Fry and sauté	Portion / divide		
Beat	Glaze and coat	Prove		
Blitz, puree and blend	Grate	Roast		
Casserole	Grill	Roll-out		
Chill	Juice	Rub-in		
Core	Knead	Sift		
Cream	Layer	Snip		
Crush	Mash	Spread		
Cut out	Measure	Stir-try		
Cut, chop, slice, dice and trim	Melt, simmer and boil	Weigh		
Decorate and garnish	Microwave	Whisk		
Drain	Mix, stir and combine	Zest		
Fold	Peel			
Form and shape	Pipe			

Heat exchange/transfer

Cooking requires heat energy to be transferred from the heat source, e.g. the cooker hob, to the food. This is called heat transfer or heat exchange. There are three ways that heat is transferred to the food. They are:

- conduction – direct contact with food on a surface, e.g. stir-frying;
- convection - currents of hot air or hot liquid transfer the heat energy to the food, e.g. baking;
- radiation - energy in the form of rays, e.g. grilling.

Many methods of cooking use a combination of these. The amount of heat and cooking time will vary according to the type of food being cooked and the method being used.

Cooking methods

These are based on the cooking medium used:

- moist/water based methods of cooking, e.g. boiling, steaming, stewing, braising;
- dry methods of cooking, e.g. grilling, baking, roasting, toasting, BBQ;
- fat-based methods of cooking – stir, shallow and deep fat frying.

Vegetable cuts



batons – 5-6.5cm long x 1 cm square



dice – 1cm square



julienne/match stick – 5-6.5cm long x 3 mm square



fine julienne – 5-6.5cm long x 1.5mm square

Task

Complete the *Food route Cooking journal*:
<https://bit.ly/3dYUibH>

Key terms

Conduction: The exchange of heat by direct contact with foods on a surface e.g. stir-frying or plate freezing.

Convection: The exchange of heat by the application of a gas or liquid current e.g. boiling potatoes or blast chilling.

Heat transfer: Transference of heat energy between objects.

Radiation: Radiation is energy in the form of rays, e.g. grilling.

Cooking for health

Take into account healthy eating recommendations to ensure that dishes/meals are part of a varied, balanced diet.

- Planning - does the meal meet the nutritional needs and preferences of those it is being cooked for? Base your meals on starchy food.
- Choosing - choose low fat/sugar/salt versions, where possible.
- Preparing - limit the amount of fat added (try a spray oil) and replace salt with other flavourings, such as herbs and spices.
- Cooking - use cooking practices which reduce the amount of fat needed and minimise vitamin losses from fruit and vegetables.
- Serving - serve the meal in proportions which reflect current healthy eating advice.
- Do not forget to include a drink.

Healthier cooking methods

- Grill or BBQ foods rather than fry to allow fat to drain away.
- Drain or skim fat from liquids, e.g. sauces, stews and casseroles.
- Dry fry using non-stick pans, so no need for oil.
- Oven bake rather than fry.
- Steam or microwave vegetables.

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Diet, activity and health



- There are health issues related to dietary excess or deficiency.
- It is important to include a variety of different activity in everyday living, supporting physical, social and mental wellbeing.

A balanced diet

A balanced diet is based on the Eatwell Guide. An unbalanced diet can lead to dietary related diseases.



Malnutrition

Having intakes of energy and/or nutrients below or in excess of needs for long periods of time can affect health.

The risk of **malnutrition** is increased by:

- increased requirements for some nutrients;
- restricted range of foods;
- reduction in available income;
- very low income;
- medical conditions;
- psychological conditions.

Diet and health

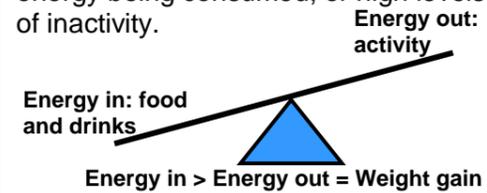
There is a link between a poor diet, and the risk of developing some diseases.

This includes the risk of:

- cancer;
- coronary heart disease (CHD);
- bone health;
- anaemia.

Over nutrition

The most common over nutrition problem is obesity caused by too much energy being consumed, or high levels of inactivity.



Body Mass Index

BMI measures your height and weight to work out if your weight is healthy.

$$\text{BMI} = \frac{\text{weight (kg)}}{(\text{height in m})^2}$$

Recommended BMI range (adults)

Less than 18.5	Underweight
18.5 to 25	Desirable
25-30	Overweight
30-35	Obese (Class I)
35-40	Obese (Class II)
Over 40	Morbidly obese

Under nutrition

Worldwide, Kwashiorkor and marasmus are two common diseases caused by a lack of protein and energy. Fat soluble vitamins (A, D, E and K) are stored in the body so it takes time for deficiency diseases to develop.

Activity recommendations

Pre-schoolers (3 to 4 years): 180 minutes (3 hours) spread throughout the day, including at least 60 minutes of moderate-to-vigorous intensity physical activity

Children and young people (5-18 years): at least 60 minutes of physical activity every day and engage in a variety of types and intensities of physical activity across the week.

Adults (19-64 years): at least 150 minutes each week (moderate intensity), or have 75 minutes of vigorous activity a week and do muscle strengthening activities on two days or more each week.

Moderate activity



Vigorous activity



Muscle strengthening activities



Inactivity

It is also important that the amount of time being sedentary is reduced. Over time, sedentary behaviour can lead to weight gain and obesity, which can increase the risk of developing chronic diseases in adulthood.

1 in 4 women and 1 in 5 men are classified as inactive (<30 mins per week).

Obesity

People who are obese are more likely to suffer from CHD, type 2 diabetes, gall stones, arthritis, high blood pressure and some types of cancers, i.e. colon, breast, kidney and stomach.

Key terms

Deficiency diseases: Adverse bodily conditions caused by a lack of a nutrient.

Iron deficiency anaemia: A condition caused by insufficient iron in the body. Common symptoms include tiredness and lethargy.

Kwashiorkor: A severe type of protein-energy malnutrition.

Malnutrition: When the diet does not contain the right amount of nutrients.

Marasmus: A severe type of energy malnutrition in all forms, including protein.

Moderate activity: Will raise your heart rate, and make you breathe faster and feel warmer.

Obesity: Extreme overweight. Obese adults have a BMI of 30 or above.

Sedentary behaviour: Requires little energy expenditure and includes sitting or lying down to watch television, use the computer, read, work or study, and sitting when travelling to school or work.

Vigorous activity: Makes you breathe hard and fast.

Diet and cancer

The World Cancer Research Fund has released nine cancer prevention recommendations.

- Be a healthy weight.
- Move more.
- Avoid high-calorie foods and drinks.
- Enjoy more grains, veg, fruit and barley.
- Limit intake of red meat and avoid processed meat.
- Don't drink alcohol.
- Eat less salt.
- Don't rely on supplements.
- Breastfeed your baby.

Diet and CHD

It is believed that 80% of CHD and strokes could be prevented by changes to lifestyle factors, such as diet, physical activity and smoking.

Changes to the diet to reduce the risk of CHD include:

- increasing oily fish intake;
- reducing salt intake;
- increasing fruit and vegetables;
- decreasing alcohol consumption.

Bone health

Calcium is important for strong bones. Vitamin D is needed for calcium to be absorbed from food.

Anaemia

Iron is vital for making red blood cells. Iron from the diet forms haemoglobin, which carries oxygen in the blood. Anaemia develops if the body's stores of iron are too low.

Task

Create a poster that contains information on what constitutes a healthy diet and some top tips on how to get active. Include information on how getting active and having a healthy diet can reduce the risk of some health issues and some other tips on how to reduce the risk of these.

For more information, go to: <https://bit.ly/32BF4FJ>

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Digestion



Food as fuel

The body requires energy from food and drink.

Our bodies release energy and nutrients from food through the process of digestion.

Sometimes food can take 2 or 3 days to be fully digested and absorbed by the body.

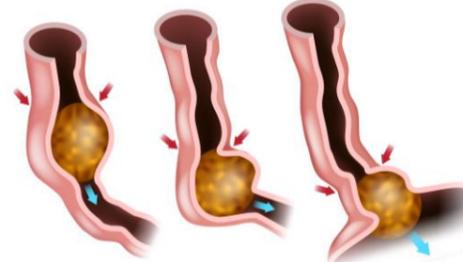


The mouth: Mastication is the action of the teeth and the jaw working together to break food down. Breaking the food down also gives the digestive enzymes a larger surface area which to work.

Saliva: Saliva contains the enzyme amylase which breaks down starch into simple sugars. It also moistens the food to allow easier passage through the body.

Saliva is secreted from salivary glands around the mouth.

Oesophagus: Circular muscles in the wall of the oesophagus relax in front of the bolus (a ball like mixture of food and saliva) while circular muscles behind the food contract, pushing the food bolus onward. This is called peristalsis.



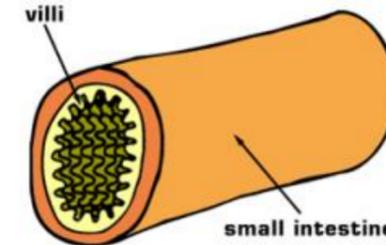
The small intestine

The small intestine is a tube about **6 metres long**.

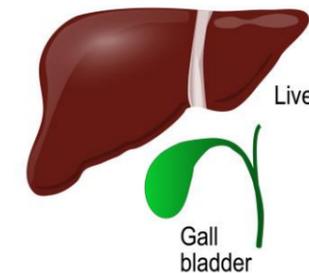
The small intestine is divided into three sections:

- duodenum;
- jejunum;
- ileum.

The inner surface of the small intestine is folded into finger-like structures called villi, which greatly increase the surface area available for absorption.



In the duodenum, chyme is diluted with bile salts (from the gall bladder) and pancreatic juices (from the pancreas).



Colon (Large intestine)

The colon is a tube just over 1.5 metres long and is inhabited by bacteria. The main function of the colon is to absorb water into the bloodstream and to process waste products.

Key terms

Bile: Bile is a fluid produced in the liver and stored in the gall bladder. This contains bile salts which emulsify fat, which is normally insoluble in water.

Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.

Passive absorption: Through the process of osmosis, the nutrients pass through the wall of the small intestine into the blood supply.

Active absorption: A carrier transports nutrients through the wall of the small intestine into the blood supply.

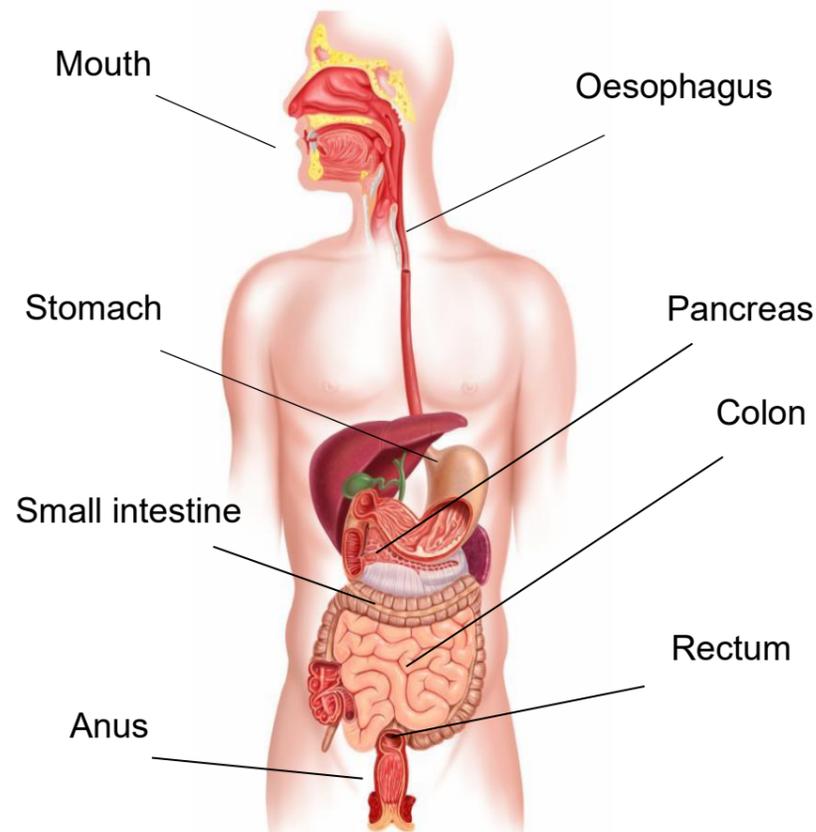
Villi: Finger-like structures along the small intestine, which greatly increase the surface area available for absorption.

Bolus: A ball-like mixture of food and saliva.

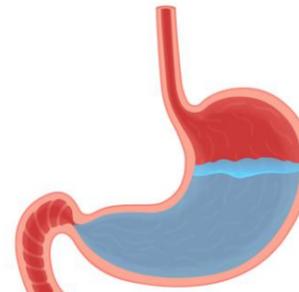
Stages of digestion

- **Ingestion** - the intake of food into the gastrointestinal tract.
- **Digestion** - a series of physical and chemical processes which begin in the mouth, but take place mainly in the stomach and small intestine.
- **Absorption** - the passage of digested food substances across the gastrointestinal lining into the bloodstream and lymphatic system.
- **Elimination** - the excretion of undigested food substances (such as cellulose) or waste in faeces.

The key organs involved in the digestive process



The stomach: The stomach is an expandable sack made up of three different layers of muscles where the bolus will be churned for a few minutes or up to a few hours. The bolus is mixed with hydrochloric acid (HCl) which helps to kill any bacteria present.



Pancreatic juices

The pancreas secretes alkaline pancreatic juices that contain sodium bicarbonate to neutralise the hydrochloric acid mixed into the chyme from the stomach and provide an optimum pH level for the enzymes to work.

Pancreatic juices also contain digestive enzymes to break down nutrients:

Protein → Peptides + Amino acids
Trypsin and Chymotrypsin

Starch / Glycogen → Maltose
Pancreatic amylase

Fat → Fatty acids + glycerol
Pancreatic lipase

For more information, go to: <https://bit.ly/36KUnji>

Task

Draw the digestion process and label each part of the body. List the stages of digestion, giving information on which part of the body is used for each stage.

The Eatwell Guide

- When choosing food and drinks, current healthy eating guidelines should be followed.



Fruit and vegetables

- This group should make up just over a third of the food eaten each day.
- Aim to eat at least five portions of a variety each day.
- Choose from fresh, frozen, canned, dried or juiced.
- A portion is around 80g (3 heaped tbs).
- 30g of dried fruit or 150ml glass of fruit juice or smoothie count as a max of 1 portion each day.

Potatoes, bread, rice, pasta or other starchy carbohydrates

- Base meals around starchy carbohydrate food.
- This group should make up just over a third of the diet.
- Choose higher-fibre, wholegrain varieties.

Dairy and alternatives

- Good sources of protein and vitamins.
- An important source of calcium, which helps to keep bones strong.
- Should go for lower fat and lower sugar products where possible.

To find out more, go to:
<https://bit.ly/2QzUMfe>

The Eatwell Guide

- Comprises 5 main food groups.
- Is suitable for most people over 2 years of age.
- Shows the proportions in which different groups of foods are needed in order to have a well-balanced and healthy diet.
- Shows proportions representative of food eaten over a day or more.

Beans, pulses, fish, eggs, meat and other protein

- Sources of protein, vitamins and minerals.
- Recommendations include to aim for at least two portions of fish a week, one oily, and;
- People who eat more than 90g/day of red or processed meat, should cut down to no more than 70g/day.

Oil and spreads

- Unsaturated fats are healthier fats that are usually from plant sources and in liquid form as oil, e.g. olive oil.
- Generally, people are eating too much saturated fat and need to reduce consumption.

Foods high fat, salt and sugar

- Includes products such as chocolate, cakes, biscuits, full-sugar soft drinks, butter and ice cream.
- Are high in fat, sugar and energy and are not needed in the diet.
- If included, should be had infrequently and in small amounts.

8 tips for healthier eating

These eight practical tips cover the basics of healthy eating, and can help you make healthier choices.

- Base your meals on starchy carbohydrates.
- Eat lots of fruit and veg.
- Eat more fish – including a portion of oily fish.
- Cut down on saturated fat and sugar.
- Eat less salt (max. 6g a day for adults).
- Get active and be a healthy weight.
- Don't get thirsty.
- Don't skip breakfast.

Hydration

- Aim to drink 6-8 glasses of fluid every day.
- Water, lower fat milk and sugar-free drinks including tea and coffee all count.
- Fruit juice and smoothies also count but should be limited to no more than a combined total of 150ml per day.

Fibre

- Dietary fibre is a type of carbohydrate found in plant foods.
- Food examples include wholegrain cereals and cereal products; oats; beans; lentils; fruit; vegetables; nuts; and, seeds.
- Dietary fibre helps to: reduce the risk of heart disease, diabetes and some cancers; help weight control; bulk up stools; prevent constipation; improve gut health.
- The recommended average intake for dietary fibre is 30g per day for adults.

Composite/combination food

Much of the food people eat is in the form of dishes or meals with more than one kind of food component in them. For example, pizzas, casseroles, spaghetti bolognese and sandwiches are all made with ingredients from more than one food group. These are often called 'combination' or 'composite' foods.



Meals and snacks can be sorted into The Eatwell Guide food groups.

Composite/combination food - Lasagne



Pasta (lasagne sheets): **Potatoes, bread, rice, pasta or other starchy carbohydrates**

Onions, garlic and chopped tomatoes: **Fruit and vegetables**

Lean minced meat (or meat substitute): **Beans, pulses, fish, eggs, meat and other protein** –

Cheese sauce made with milk and cheese: **Dairy and alternatives**

Olive/vegetable oil used to cook onions and mince: **Oil and spreads**



Key terms

The Eatwell Guide: A healthy eating model showing the types and proportions of foods needed in the diet.

Hydration: The process of replacing water in the body.

Dietary fibre: A type of carbohydrate found in plant foods.

Composite/combination food: Food made with ingredients from more than one food group.

Task

Plan a menu for a day that applies the principles of The Eatwell Guide and the 8 tips for healthier eating. Make one of the dishes, complete a sensory evaluation and calculate the energy and nutrients provided using nutritional analysis.



Energy and activity



Energy is the power to do work. Energy is essential for life, and is required to fuel many different body processes, growth and activities.

These include:

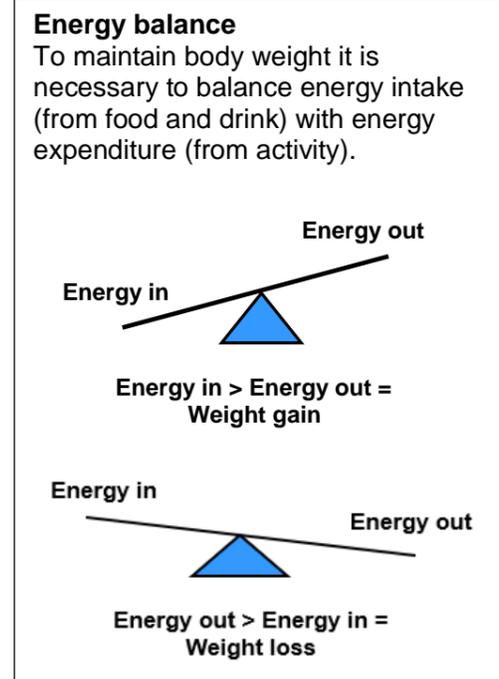
- keeping the heart beating;
- keeping the organs functioning;
- maintenance of body temperature;
- muscle contraction.

Different people need different amounts of dietary energy depending on their:

- age;
- gender;
- body size;
- level of activity;
- genes.



The figures determined are known as Estimated Average Requirements (EAR) for energy.



Body Mass Index (BMI) can be used to identify if an adult is a correct weight for height.

BMI = $\frac{\text{weight (kg)}}{(\text{height in m})^2}$

Recommended BMI range (adults)	
Less than 18.5	Underweight
18.5 to 25	Desirable
25-30	Overweight
30-35	Obese (Class I)
35-40	Obese (Class II)
Over 40	Morbidly obese

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).
- Different macronutrients, and alcohol, provide different amounts of energy.

	Energy per 100g
Carbohydrate	16kJ (3.75 kcals)
Protein	17kJ (4 kcals)
Alcohol	29kJ (7kcals)
Fat	37kJ (9 kcals)

Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).

1 kilojoule (kJ) = 1,000 joules
 1 megajoule (MJ) = 1,000,000 joules
 1 kilocalorie (kcal) = 1,000 calories

To convert from one unit to another: 1 kcal = 4.184 kJ

For more information, go to: <https://bit.ly/36KUnij>

Basal metabolic rate (BMR)
Basal metabolic rate (BMR) is the rate at which a person uses energy to maintain the basic functions of the body when it is at complete rest, such as:

- breathing;
- keeping warm;
- keeping the heart beating

Physical activity level (PAL)
In addition to their BMR, people also use energy for movement of all types, expressed as PAL. The amount of energy a person uses to perform daily tasks varies.

Energy requirements vary from person to person, depending on BMR and PAL.

Total energy expenditure = BMR x PAL

Undernutrition and obesity
Managing energy intake and expenditure, and maintaining energy balance can help reduce the risk of overweight/obesity and being underweight.

People who are obese are more likely to suffer from coronary heart disease, type 2 diabetes, gall stones, arthritis, high blood pressure and some types of cancers, i.e. colon, breast, kidney and stomach.

Being underweight is also linked with health problems, such as osteoporosis (low bone mass), infertility (difficulty to conceive) and even heart failure.

Benefits of physical activity
Physical activity is beneficial because it can:

- help to manage the balance between energy in and energy out, to maintain a healthy weight;
- improve heart health and strengthen muscles and bones;
- improve sleep, relieve stress and lift mood.

Moderate activity



Vigorous activity



Muscle strengthening activities



Activity recommendations
We are all advised to minimise inactivity. In addition, there are specific age-related recommendations.

Pre-schoolers (3 to 4 years): 180 minutes (3 hours) spread throughout the day, including at least 60 minutes of moderate-to-vigorous intensity physical activity.

Children and young people (5-18 years): At least 60 minutes of physical activity every day and engage in a variety of types and intensities of physical activity across the week.

Adults (19-64 years): At least 150 minutes each week (moderate intensity), or have 75 minutes of vigorous activity a week and do muscle strengthening activities on two days or more each week.

Tasks

1. Create an infographic on either energy or physical activity.
2. Keep a food diary for four days and calculate the energy provided per day. <http://explorefood.foodafactoflife.org.uk>

Key terms

Basal metabolic rate (BMR): The rate at which a person uses energy to maintain the basic functions of the body when it is at complete rest.

Body Mass Index (BMI): An equation that can be used to identify if an adult is a correct weight for their height.

Dietary reference values: Estimated dietary requirements for particular groups of the population.

Energy: The power the body requires to stay alive and function.

Physical activity level (PAL): The amount of energy a person uses to perform daily tasks varies.

Estimated Average Requirements (EAR): An estimate of the average requirement of energy or a nutrient needed by a group of people.

Physical activity
Physical activity should be an important part of our daily energy expenditure.

Many different types of activity contribute to our total physical activity, all of which form part of everyday life.

Inactivity
It is also important that the amount of time being sedentary is reduced.

Over time, sedentary behaviour can lead to weight gain and obesity, which can increase the risk of developing chronic diseases in adulthood.

1 in 4 women and 1 in 5 men are classified as inactive (<30 mins per week).

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Energy, nutrients and digestion



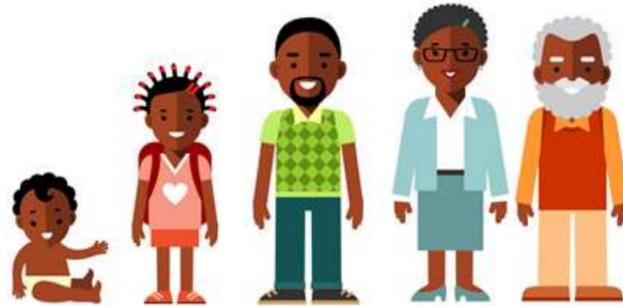
- A variety of food is needed in the diet because different food contains different substances that are needed for health. These are nutrients, water and fibre.
- The nutrients provided by the diet are released through the process of digestion.

Different types of food provide different amounts of energy.



Different people need different amounts of energy and nutrients.

The amount of energy they need depends on their age, job, how active they are and their health.



Energy is provided by carbohydrate, fat and protein.

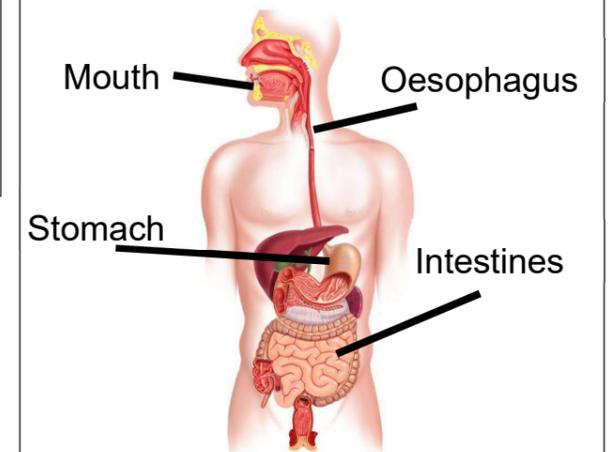
Carbohydrate is the main source of energy for the body.

Fat is needed for health, but in small amounts.

Protein is needed for growth and repair.

Digestion

Energy and nutrients are absorbed from food by the body in a process called digestion.



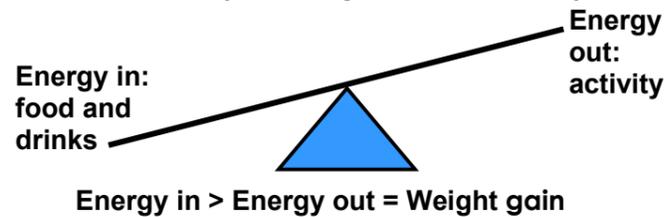
Different amounts of food and drink provide different amounts of energy.



A variety of food from different food groups is needed to get the range of nutrients needed by the body.

Food Group	Nutrient (main)
Fruit and vegetables	Vitamins, e.g. vitamin A and vitamin C
Potatoes, bread, rice, pasta and other starchy carbohydrates	Carbohydrate
Beans, pulses, fish, eggs, meat and other proteins	Protein
Dairy and alternatives	Minerals, e.g. calcium
Oil and spreads	Fat

To be healthy, energy balance should be achieved (over a period of time).



Different amounts of energy are needed by the body for different activities.



Food and drinks provide nutrients, fibre and water.

The amount of a nutrient or fibre provided by a food or drink, depends on the serving size consumed.

Vitamins and minerals are needed for general good health.

Some have special jobs:

- vitamin A is needed for night vision;
- vitamin C is needed for the maintenance of healthy skin;
- iron is needed for healthy blood;
- calcium is needed for the growth and maintenance of strong bones and teeth.

Tasks:

1. Write a healthy eating report for the school newsletter or website.
2. Produce a presentation about the nutrients provided by food.

To find out more, go to: <https://bit.ly/3eU8dRw>

Energy, nutrients and digestion



- Food and drinks provide energy and nutrients in different amounts, they have important functions in the body and people require different amounts during their life.
- Digestion involves different parts of the body, each having an important role.

Energy

Energy is essential for life, and is required to fuel many different body processes, growth and activities. These include:

- keeping the heart beating;
- keeping the organs functioning;
- maintenance of body temperature;
- muscle contraction.

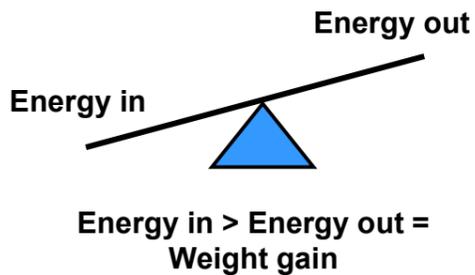
Different people need different amounts of dietary energy depending on their:

- age;
- gender;
- body size;
- level of activity;
- genes.



Energy balance

To maintain body weight it is necessary to balance energy intake (from food and drink) with energy expenditure (from activity).



Tasks

1. Create an infographic on either macronutrients or micronutrients. Focus on the definition of each nutrient, recommendations and sources.
2. Draw the digestive system and label each of the body parts and the stages of digestion that occur at each part.
3. Calculate the energy and nutrients provided by a food diary for one or two days using <http://explorefood.foodafactoflife.org.uk> - reflect on the results.

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with the term calories (kcal).
- Different macronutrients provide different amounts of energy.

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Nutrients

There are two different types of nutrients:

- macronutrients;
- micronutrients.

There are three macronutrients that are essential for health:

- carbohydrate;
- protein;
- fat.

There are two types of micronutrients:

- vitamins;
- minerals.

Carbohydrate

Free sugars include all sugars added to foods, plus sugars naturally present in honey, syrups and unsweetened fruit juice.

Fibre is a term used for plant-based carbohydrates that are not digested in the small intestine.

Sugars include a variety of different sugar molecules such as sucrose

Starchy foods are the main source of carbohydrate for most people and are an important source of energy. We should be choosing wholegrain versions of starchy foods where possible.

Protein

Protein is made up of building blocks called amino acids. There are 20 amino acids found in protein. For adults, eight of these have to be provided by the diet (this is higher in children). These are called essential amino acids, which cannot be made by the human body.

Fat

Sources of fat include:

- saturated fat;
- monounsaturated fat;
- polyunsaturated fat.

A high saturated fat intake is linked with high blood cholesterol levels.

Micronutrients

Vitamins

There are two groups of vitamins:

- fat-soluble vitamins, e.g. vitamins A and D.
- water-soluble vitamins, e.g. B vitamins (thiamin, riboflavin, niacin, folate, vitamin B12) and vitamin C.

Minerals

Minerals are inorganic substances required by the body in small amounts for a variety of different functions. Examples include: calcium, sodium and iron. Most micronutrients are mostly provided by the diet. An exception is vitamin D which can be synthesised by the action of sunlight on the skin.

Calcium is essential for a number of important functions such as the maintenance of bones and teeth, blood clotting and normal muscle function.

Sodium is needed for regulating the amount of water and other substances in the body.

Iron is essential for the formation of haemoglobin in red blood cells. Red blood cells carry oxygen and transport it around the body. Iron is also required for normal metabolism and removing waste substances from the body.

Stages of digestion

Ingestion - the intake of food into the gastrointestinal (GI) tract.

Digestion - a series of physical and chemical processes which begin in the mouth, but take place mainly in the stomach and small intestine.

Absorption - the passage of digested food substances across the gastrointestinal lining into the bloodstream and lymphatic system.

Elimination - the excretion of undigested food substances (such as cellulose) or waste in faeces.

Key terms

Energy: The power the body requires to stay alive and function.

Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.

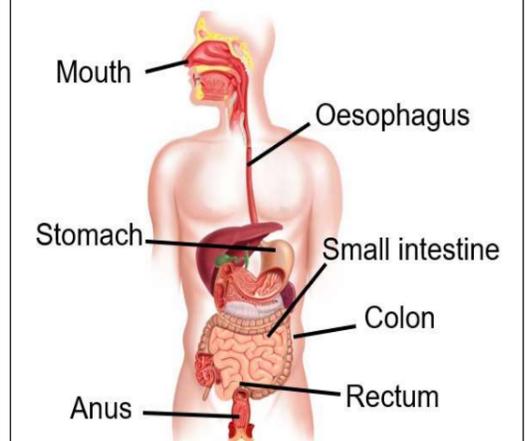
Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.

Micronutrients: Nutrients which are needed in the diet in very small amounts.

Digestion

The body requires energy from food and drink. Our bodies release the energy and nutrients from food.

The food passes down the Gastrointestinal tract (GI) tract as shown below.



To find out more, go to:

<https://bit.ly/31CBjke>

Food commodities: Fish and shellfish



Fish in the diet

Fish is a popular food in many cultures, although many people in the UK do not consume as much fish as is recommended.

Eating a wide variety of fish and buying fish from sustainable sources ensures there are enough fish to eat now and in the future.

Recommendations

Fish is part of the Beans, pulses, fish, eggs, meat, and other proteins food group in the Eatwell Guide.

Around one-sixth of the food that people consume should come from this group in the diet. It is recommended to consume two portions (one portion is 140g) of sustainably sourced fish per week.

Beans, pulses, fish, eggs, meat and other proteins

Eat more beans and pulses, 2 portions of sustainably sourced fish per week, one of which is oily. Eat less red and processed meat.



Nutrients provided by fish

Fish provides a range of nutrients, including:

- Omega-3 fats (in some fish);
- protein;
- vitamin D (in some fish);
- B vitamins;
- iodine.



Salmon is high in Omega-3 fats and vitamin D, as well as protein and B vitamins.

Cod is lower in Omega-3 and vitamin D than salmon, but still contains other nutrients, and is also higher in iodine.

Types of fish and shellfish

There are over 33,000 fish species in the world, but people often prefer to eat a few species that are easier to catch and eat.

The 'big five' are the most common seafood items that are eaten in the UK. They are:

- cod;
- haddock;
- tuna;
- salmon;
- prawns.

5

Oily fish

The UK Eatwell Guide states that one of the recommended two portions of fish a week should be oily.

Salmon and trout are classified as 'oily fish', which means they contain a type of healthy fat called Omega-3. **Mackerel, herring, and sardines** are types of small oily fish that are mostly sold in cans.

White fish

Cod and haddock are the most popular fish in the UK. They are flaky, white fish when cooked. Most of the cod and haddock eaten in the UK is breaded or battered.

Plaice, sole, halibut and turbot are all types of flatfish that are classed as white fish.

Shellfish

Shrimp and prawns are a wide group of small shellfish. The words 'shrimp' and 'prawn' are used to describe many different species.

Mussels and oysters are 'bivalve molluscs'. Bivalve means that they have two shells that close around the soft body inside. Cockles, whelks, and winkles are small shellfish that are common around the UK.

Task

Create a poster featuring facts and figures about the 'big five'. Include ideas about how they can be used in meals.

Catching fish

Fish can be found in freshwater (rivers and lakes) or saltwater (seas and oceans). Fish can be caught in the wild or farmed. Fish can be caught in many different ways, using rods, lines or nets.

Fishing at sea

Most fishers go out to sea in boats and use nets to catch a large number of fish at one time. When the boat is in the right position, the fishers drop their nets. Once dropped, the boat then tows the net around, scooping up fish. This is known as trawling.

Some fish are caught on lines, rather than nets. Some other fish, like mackerel, can also be caught on lines by a method called 'trolling'. Trolling is similar to trawling, but instead of dragging a net, the boat drags many lines with hooks to catch the fish.

Wild fishing

Advantages

- Wild fish have a more varied diet than farmed fish and therefore may taste different.

Disadvantages

- Can be less sustainable due to overfishing and may become more expensive.
- Nets can damage the seabed.

Farming fish

Advantages

- Prevents wild fish from being overfished.
- Can provide fish to communities where wild fish is scarce.
- Can allow for fish to be farmed that are hard to catch.

Disadvantages

- Disease can be more common if many fish are kept close together.
- Farmed fish may harm wild fish if they escape.
- If waste from the fish farm is not disposed of correctly it can cause pollution.

To find out more, go to: <https://bit.ly/3erbBIU>

Preparing fish

Whole fish usually require preparation before they can be eaten.

This could include: descaling, gutting, filleting and pin boning.

Cooking with fish

Fish can be cooked in a variety of ways, such as being grilled, baked, sautéed, fried, or barbecued.

Grilling and baking are usually healthier cooking methods, and they can also help to bring out the flavour of many fish.

Key terms

Oily fish: A fish that contain a type of healthy fat called Omega-3.

Omega-3: A type of polyunsaturated fatty acid found in fish.

Shellfish: An aquatic shelled mollusc or crustacean that is edible.

MSC: Marine Stewardship Council logo, a logo that means fish has been caught sustainably.

Filleting



Sustainability

Because of the popularity of some fish, the numbers of some species have decreased. The MSC logo means that this fish has been caught in a way that is more sustainable.



Logo© Marine Stewardship Council

Food commodities: Fish and shellfish

Types of fish and shellfish

There are over 33,000 fish species in the world, but people often prefer to eat a few species that are easier to catch and eat.

The 'big five' are the most common seafood items that are eaten in the UK. They are:

- cod;
- haddock;
- tuna;
- salmon
- prawns.



Recommendations

Fish is part of the Beans, pulses, fish, eggs, meat and other proteins food group in the Eatwell Guide.

Around one-sixth of the food that people consume should come from this group in the diet.

It is recommended to consume two portions (one portion is 140g) of sustainably sourced fish per week.



Nutrients provided by fish

Fish provides a range of nutrients, including:

- Omega-3 fats (in some fish);
- protein;
- vitamin D (in some fish);
- B vitamins;
- iodine.

Oily fish

The UK Eatwell Guide states that one of the recommended two portions of fish a week should be oily.

Salmon and trout are classified as 'oily fish', which means they contain a type of healthy fat called Omega-3. Omega-3 is important for brain development and heart health.

Mackerel, herring and sardines are types of small oily fish that are mostly sold in cans. Kippers are herring that have been filleted, salted and smoked. The skin and bones of whole sardines are soft and edible and can provide extra calcium.

White fish

Cod and haddock are the most popular fish in the UK. They are flaky, white fish when cooked. Most of the cod and haddock eaten in the UK is breaded or battered.

Plaice, sole, halibut and turbot are all types of flatfish that are classed as white fish.

Tuna

Fresh tuna used to be classed as an oily fish but new research shows that there are not enough healthy Omega-3 fatty acids in tuna for it to be called oily.

Shellfish

Shrimp and prawns are a wide group of small shellfish. The words 'shrimp' and 'prawn' are used to describe many different species.

Mussels and oysters are 'bivalve molluscs'. Bivalve means that they have two shells that close around the soft body inside. Cockles, whelks and winkles are small shellfish that are common around the UK.

Squid and octopus

Squid and octopus are not fish but cephalopods, along with cuttlefish and some other species. Squid is often called 'calamari' when it is used in dishes.

To find out more, go to: <https://bit.ly/3DHag9>

Catching fish at sea (trawling)

Most fishers go out to sea in boats and use nets to catch a large number of fish at one time.

When the boat is in the right position, the fishers drop their nets. Once dropped, the boat then tows the net around, scooping up fish. This is known as trawling.

Catching fish at sea (trolling)

Some fish are caught on lines, rather than nets.

Some other fish, like mackerel, can also be caught on lines by a method called 'trolling'.

Trolling is similar to trawling, but instead of dragging a net, the boat drags many lines with hooks to catch the fish.

Preparing fish

Whole fish usually require preparation before they can be eaten.

This could include: descaling, gutting, filleting and pin boning.

To **descale** a fish, the knife should be run along the scales of the fish, in the opposite direction to the scales.

Gutting removes the entrails of the fish. **Filleting** results in portions of fish that are separated from the head, tail and major bones.

Pin boning removes the remaining small bones.

Marine Stewardship Council

The MSC logo means that this fish has been caught in a way that is more sustainable.



Logo © Marine Stewardship Council

Cooking with fish

Fish can be cooked in a variety of ways, such as being grilled, baked, sautéed, fried or barbecued.

Grilling and baking are usually healthier cooking methods and they can also help to bring out the flavour of many fish. Some fish can be eaten raw (e.g. sushi).

Growing mussels

Mussels can be grown on ropes, so they can be easily collected in large numbers. 'Seed' mussels stick to the rope and grow in place before harvesting.

Wild fishing

Advantages

- Wild fish have a more varied diet than farmed fish and therefore may taste different.

Disadvantages

- Can be less sustainable due to overfishing and may become more expensive.
- Nets can damage the seabed.

Farming fish

Advantages

- Prevents wild fish from being overfished.
- Can provide fish to communities where wild fish is scarce.
- Can allow for fish farmed that are hard to catch.

Disadvantages

- Disease can be more common if many fish are kept close together.
- Farmed fish may harm wild fish if they escape.
- If waste from the fish farm is not disposed of correctly it can cause pollution.

Preparing shellfish safely

Many shellfish are filter feeders. This means that they can gather up bacteria and viruses from their environment. The best way to avoid illness is to make sure that shellfish are properly cooked. When cooked in the shell, mussels, clams and oysters will open. Raw shrimp and prawns will turn pink and firm up when properly cooked.

Task

Create an infographic that highlights all the reasons we should eat fish. Include the recommendations, the nutrients in fish and how we can cook them in healthier ways.

Food choice

Food choice

Food choices for a balanced diet depend on many factors, such as:

- advertising and other point of sale information;
- cost and economic considerations;
- cultural or religious practices;
- environmental and ethical considerations;
- food availability;
- food preferences;
- food provenance;
- health concerns;
- individual energy and nutrient needs;
- portion size;
- social considerations.

Consumer information

Information can help consumers make informed choices, including:

- advertising and marketing;
- media, online blogs/forums;
- packaging, nutrition and health claims;
- point of purchase information and product placement;
- recipe ideas.

Cost and economic considerations

The cost of food and money available will influence people's food choices. If money is limited, people may choose to buy more basic items. Luxury items might then be selected for special occasions.

Food prices

Food prices can and do change throughout the year and over time. This may be due to a variety of reasons, including:

- climate and weather patterns;
- crop failure;
- crop disease;
- seasonality;
- consumer demand;
- agricultural costs increase;
- fuel prices go up;
- increased use of bio fuels.

Budgeting

There are many things that we can do to spend money wisely on food. Examples can include:

- eating the seasons;
- stocking up on food with a long shelf-life;
- taking time to plan meals and write a shopping list;
- cooking using one pot;
- making fake-aways rather than buying takeaways;
- using leftovers;
- replacing branded items with cheaper items;
- comparing prices and shop around to find the cheapest items;
- growing your own food.

Cultural or religious practices

People around the world choose to eat or avoid certain food due to their cultural or religious practices.

Religion	Pork	Beef	Lamb	Chicken	Fish
Islam	x	Halal only	Halal only	Halal only	✓
Hinduism	x	x	✓	✓	✓
Judaism	x	Kosher only	Kosher only	Kosher only	✓
Sikhism	x	x	✓	✓	✓
Buddism (strict)	x	x	x	x	x
Seventh-day Adventist Church	x	x	x	✓	✓
Rastafari movement	x	x	x	x	x

Environmental and ethical considerations

Some considerations when buying food might be:

- fair trade;
- local food;
- genetically modified (GM) food;
- organic food;
- free range.

Food availability

Buying food when it is in season will often mean that the price is lower. Technology and the importation of food has allowed food to be available all year round.

To find out more, go to: <https://bit.ly/3dpC9Fi>

Personal preferences

A number of factors can influence personal preferences, including:

- colour, size and shape of crockery and cutlery used;
- portion size;
- serving style;
- taste, aroma, texture, appearance, shape and colour of food.

Food provenance

Food provenance is about where food is grown, caught or reared, and how it was produced. Food certification and assurance schemes guarantee defined standards of food safety or animal welfare. There are many in the UK, including:

Red Tractor



The British Lion mark



Marine Stewardship Council



Health concerns

People may choose their food based on their own or their family's health and wellbeing:

- allergy and intolerance, e.g. lactose intolerance, coeliac disease, wheat allergy, dairy allergy;
- body image;
- health issues, e.g. coronary heart disease, type 2 diabetes, inflammatory bowel disease, over or under malnutrition;
- mental health.

Individual energy and nutrient needs

The amount of energy and nutrients needed differs between different age groups and between males and females.

Energy needs also depend on activity levels. For example, athletes will have much higher energy requirements due to their high level of physical activity.

Tasks

1. Consider your own household and create a mind map of the social and economic considerations that affect your food choice. Explain how different this might be to your grandparents at your age.
2. Explain why food provenance is important to some consumers. Include examples of UK food certification and assurance schemes.

Key terms

Advertising: Advertising is a form of communication for marketing and used to encourage, persuade, or manipulate an audience to continue or take some new action.

Ethical: Relating to personal beliefs about what is morally right and wrong.

Food certification and assurance schemes: Defined standards of food safety, quality or animal welfare.

Food provenance: Knowing where food was grown, caught or reared and how it was produced.

Marketing: Promoting and selling products or services, including market research and advertising.

Religion: A particular system of faith and worship.

Seasonal food: Food grown at a particular time of year.

Portion size

Having a healthy, balanced diet is about getting the right types of foods and drinks in the right amounts.



Social considerations

- Body image and peer pressure.
- Development of ready meals and a wider range of convenience foods.
- Development of labour saving devices.
- Lack of competence and confidence in the kitchen.
- Lack of time.
- Living arrangement (e.g. living alone).

Food hygiene

- Good food safety and hygiene practices are essential to reduce the risk of food poisoning.

Food poisoning
 Food poisoning can be caused by:

- bacteria, e.g. through cross-contamination from pests, unclean hands and dirty equipment, or bacteria already present in the food, such as salmonella;
- physical contaminants, e.g. hair, plasters, egg shells, packaging;
- chemicals, e.g. cleaning chemicals.

Bacterial contamination is the most common cause. Microorganisms occur naturally in the environment, on cereals, vegetables, fruit, animals, people, water, soil and in the air. Most bacteria are harmless but a small number can cause illness. Harmful bacteria are called pathogenic bacteria. The process of food becoming unfit to eat through oxidation, contamination or growth of micro-organisms is known as food spoilage.

Bacterial growth and multiplication
 All bacteria, including those that are harmful, have four requirements to survive and grow:

- food;
- moisture;
- warmth;
- time.



High risk food
 Bacteria easily multiply on foods known as 'high-risk food'. These are often high in protein or fat, such as cooked meat and fish, dairy foods and eggs. Cooked pasta and rice are also regarded as high risk foods if they are not cooled quickly after cooking and stored below 5°C.

Moisture
 Bacteria need moisture to survive. Dried foods, such as powdered milk, cereals or dried egg do not support bacterial growth, if properly stored. However, if moisture is added, any bacteria still alive can quickly begin to multiply.

Symptoms of food poisoning
 The symptoms of food poisoning include:

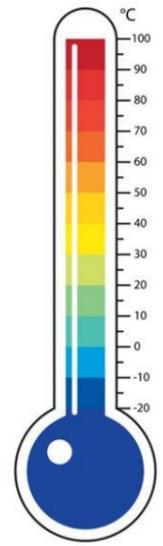
- nausea;
- vomiting;
- stomach pains;
- diarrhoea.

People at risk
 Elderly people, babies and anyone who is ill or pregnant needs to be extra careful about the food they eat.

Why clean?
 To remove grease, dirt and grime, and prevent food poisoning and pests.

Temperatures to remember
 To reduce the risk of food poisoning, good temperature control is vital:

- 5-63°C – the danger zone where bacteria grow most readily.
- 37°C – body temperature, optimum temperature for bacterial growth.
- 8°C – maximum legal temperature for cold food, i.e. your fridge.
- 5°C (or below) – the ideal temperature your fridge should be.
- 75°C – if cooking food, the core temperature, middle or thickest part should reach at least this temperature.
- 75°C – if reheating food, it should reach at least this temperature. In Scotland food should reach at least 82°C.



Allergen and food intolerance awareness
 There are 14 ingredients (allergens) that are the main reason for adverse reactions to food. Cross-contamination of food containing these allergens must be prevented to reduce the risk of harm. They must also be labelled on pre-packaged food and menus so that consumers can make safe choices. The 14 allergens are:

Celery (and celeriac)	Milk
Cereals containing gluten	Molluscs
Crustaceans	Mustard
Eggs	Nuts
Fish	Peanuts
Lupin	Sesame
	Soybeans
	Sulphur dioxide

Where should food be stored in the fridge?

Cheese, dairy and egg-based products
 The temperature is usually coolest and most constant at the top of the fridge, allowing these foods to keep best here.

Cooked meats
 Cooked meats should always be stored above raw meats to prevent contamination from raw meat.

Raw meats and fish
 Raw meats and fish should be below cooked meats and sealed in containers to prevent contamination of salad and vegetables.

Salad and vegetables
 These should be stored in the drawer(s) at the bottom of the fridge. The lidded drawers hold more moisture, preventing the leaves from drying out.

Time
 When bacteria spend enough time on the right types of food, at warm temperatures, they can multiply to levels that cause illness.
 Reheat food only once and eat leftovers within 48 hours.

Getting ready to cook

- Remove blazers/jumpers and roll up long sleeves.
- Tie up long hair and tuck in ties or head coverings.
- Thoroughly wash and dry hands.
- Put on a clean apron.

Use-by-date
 You've got until the end of this date to use or freeze the food before it becomes too risky to eat.

USE BY:
25/08/20
KEEP REFRIGERATED

Best-before-date
 You can eat food past this date but it might not be at its best quality.

BEST BEFORE:
25/08/21
STORE IN A COOL DRY PLACE

Key terms
Allergens: Substances that can cause an adverse reaction to food. Cross-contamination must be prevented to reduce the risk of harm.

Bacteria: Small living organisms that can reproduce to form colonies. Some bacteria can be harmful (pathogenic) and others are necessary for food production, e.g. to make cheese and yogurt.

Cross-contamination: The transfer of bacteria from one source to another. Usually raw food to ready-to-eat food but can also be the transfer of bacteria from unclean hands, equipment, cloths or pests. Can also relate to allergens.

Food poisoning: Illness resulting from eating food which contains food poisoning micro-organisms or toxins produced by micro-organisms.

High risk ingredients: Food which is ready to eat, e.g. cooked meat and fish, cooked eggs, dairy products, sandwiches and ready meals.

Task
 Create a poster highlighting the top tips for ensuring food is safe to eat. Include personal hygiene, safe storage, preparation and cooking of food.

To find out more, go to:
<https://bit.ly/2Z97B5f>

Food hygiene, safety and cooking



- Buying, storing, preparing and cooking food safely and hygienically are vital for health.
- There is a range of additional food skills and cooking techniques, which enable a wide range of dishes to be made.

Food can spoil and decay due to the action of microbes, insects and other pests/pets.



Food spoilage

When food spoils, the following may change:

- appearance;
- taste;
- texture;
- smell.



Food needs to be stored properly and within its date mark.

USE BY:

25/08/20

KEEP REFRIGERATED

BEST BEFORE:

25/08/21

STORE IN A COOL DRY PLACE

Good personal hygiene is vital when cooking to avoid the risk of food poisoning.

Food can be purchased from a variety of sources.



There are a number of basic food skills which enable you to prepare a variety of simple dishes.

These can include:

- cutting (with a knife);
- grating.
- juicing;
- kneading;
- measuring;
- peeling;
- rolling-out;
- rubbing-in;
- stirring;
- washing;
- weighing.

The bridge hold and claw grip should be used when cutting food to avoid harm.

Bridge hold



Claw grip



Basic cooking skills are required to make a dish.

Grate



Knead



Measure/weigh



Peel



Roll-out



Rub-in



Microorganisms

Microorganisms are everywhere. They can be carried by food, people, dirty equipment, animals and pests. Most are harmless.

Microorganisms

Very small

Living things

Food labels provide useful information to the consumer.

Baby leaf salad

Keep refrigerated. Once opened consume within 24 hours and by the 'use-by' date shown.

There are lots of food skills which enable you to extend the range of dishes you can already cook.

It is important to take care when using sharp and/or hot equipment so that you don't hurt yourself or someone else.

Task: Make a list of the steps you would take before, during and after cooking to make sure you follow good food hygiene and safety practices.

Food labelling and health claims

Food labelling

Manufacturers include a range of information on food labels. Some of which is legally required and some of which is useful to the consumer or supermarket.

Nutrition information helps consumers make healthier choices. Back-of-pack nutrition information is legally required on food packaging.

NUTRITION

When heated according to instructions

Typical values	Per 100g	Each pack (390g**)
Energy	457kJ 109kcal	1781kJ 424kcal
Fat	3.9g	15.2g
of which saturates	1.9g	7.5g
Carbohydrate	12.1g	47.1g
of which sugars	1.6g	6.2g
Fibre	1.1g	4.2g
Protein	5.8g	22.6g
Salt	0.6g	2.2g

Legally required information

- Name of food or drink.
- List of ingredients (including water and food additives), in descending order of weight.
- Weight or volume.
- Date mark (Best-before and use-by).
- Storage and preparation conditions.
- Name and address of the manufacturer, packer or seller.
- Country of origin and place of provenance.
- Nutrition information.

Additional information may also be provided, such as cooking instructions, serving suggestions or price.

Date marks

Best-before-date: The date after which foods may not be at their best, although probably safe to eat if stored according to instructions.

Use-by-date: The date given to foods that spoil quickly, such as cooked meats. It is unsafe to eat foods beyond their use-by-date.



Beetroot salad

Keep refrigerated. Once opened consume within 24 hours and by the 'use-by' date shown.

Additives

Food additives must be shown clearly in the list of ingredients on food labels, either by the additive's name or E number.

Additives are added to ensure safety, increase shelf life or improve the taste, texture or appearance of food. Additives need to be approved before they can be used. Additives are given an 'E number' to show that they have been rigorously tested for safety and have been approved for use in food by the European Commission.

An example is E100 or curcumin, made from turmeric.

Another example is caramel (E150), a synthetic colouring commonly used to colour colas.



Key terms

Additives: Are added to ensure safety, increase shelf life or improve the taste, texture or appearance of food. They must be shown clearly on food labels.

Allergen labelling: Allergens must be clearly shown in **bold**, **highlighted**, **underlined** or in *italics*.

Back-of-pack labelling: Is legally required and can help consumers make healthier choices.

Claim: Any statement about the nutrient content or health benefit of a food product.

Front-of-pack labelling: Is voluntary but must provide certain information and can use red, amber and green colour coding.

Labelling: The term given to the information about the product which is displayed on the packaging.

Nutrition information: Helps consumers make healthier choices.

Front-of-pack labelling

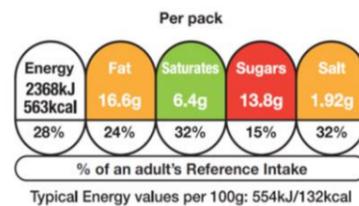
Front-of pack-nutrition information is voluntary but if a food business chooses to provide this, only the following information may be provided:

- energy only;
- energy along with fat, saturates, sugar and salt.

Red, amber and green colours, if used, show at a glance whether a food is high, medium or low for fat, saturates, sugars or salt. The colour coding can be used to compare two products.

Nutrient	Low	Medium	High
Fat	≤3.0g/100g	>3.0g to ≤17.5g/100g	>17.5g/100g
Saturates	≤1.5g/100g	>1.5g to ≤5.0g/100g	>5.0g/100g
(Total sugars)	≤5.0g/100g	>5.0g and ≤22.5g/100g	>22.5g/100g
Salt	≤0.3g/100g	>0.3g to ≤1.5g/100g	>1.5g/100g

Note: Portion size criteria apply to portion sizes/servings greater than 100g.



To find out more, go to: <https://bit.ly/2SPnj1g>

Allergen labelling

An allergic reaction to a food can be described as an inappropriate reaction by the body's immune system to the ingestion of a food.

By law, food, drink and ingredients that are known to contain allergens are required to be in **bold**, **highlighted**, **underlined** or in *italics*.

The most common allergens are present in:

- | | |
|---------------------------|-----------------|
| Celery (and celeriac) | Milk |
| Cereals containing gluten | Molluscs |
| Crustaceans | Mustard |
| Eggs | Nuts |
| Fish | Peanuts |
| Lupin | Sesame |
| | Soybeans |
| | Sulphur dioxide |

INGREDIENTS

Water, Carrots, Onions, Red Lentils (4.5%), Potatoes, Cauliflower, Leeks, Peas, Cornflour, **Wheat** flour, Cream (**milk**), Yeast Extract, Concentrated Tomato Paste, Garlic, Sugar, **Celery** Seed, Sunflower Oil, Herb and Spice, White Pepper, Parsley

ALLERGY ADVICE

For allergens, see ingredients in **bold**

Nutrition and health claims

Nutrition and health claims are controlled by European regulations. Claims on a food or drink should have been authorised and listed on the European register of claims and have met certain conditions.

Nutrition claims

A nutrition claim describes what a food contains (or does not contain) or contains in reduced or increased amounts. Examples include:

- Low fat (less than 3g of fat per 100g of food);
- High fibre (at least 6g of fibre per 100g of food);
- Source of vitamin C (at least 15% of the nutrient reference value for vitamin C per 100g of food).

Health claims

A health claim states or suggests there is a relationship between a product and health. In order to make a claim, the amount present of the nutrient, substance or food must fulfil the specific conditions of use of the claim. The types of health claims are:

- 'Function Health Claims';
- 'Risk Reduction Claims';
- Health 'Claims referring to children's development'.

Tasks

1. Find four different packaged food items in your household or online and list the information provided on the packaging. Explain the purpose of each piece of information and identify if it is legally required or consumer information.
2. Explain the importance of date marks and storage instructions, including the consequences of not following them.

Name:

Date:

Food labelling

- Food labels provide information, which helps people to know when to eat food, and how to store it safely.
- Nutrition and allergy information on food labels help to make informed food and drink choices.



Food labelling

Information on the labels of pre-packed food and drink products can be legally required or just for consumer information.

Legally required information:

- country of origin and place of provenance;
- date mark;
- list of ingredients (including additives and allergens);
- name and address of the manufacturer, packer or seller;
- name of food or drink;
- nutrition information;
- storage and preparation instructions;
- weight or volume.

Consumer information:

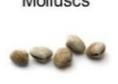
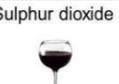
- front-of-pack nutrition label;
- price;
- serving suggestions/image.

Allergen labelling

There are 14 ingredients (allergens) that are the main reason for adverse reactions to food. They must be labelled on pre-packaged food and menus so that consumers can make safe choices.

From summer 2021 new legislation will tighten the rules requiring food that is prepared for direct sale, e.g. in a coffee shop, to carry a full list of ingredients.

The 14 allergens are:

Foods containing gluten, present in wheat, barley and rye 	Crustaceans 	Eggs 	Fish 	Lupin 
Peanuts 	Soybeans 	Milk 	Nuts 	Molluscs 
Celery 	Mustard 	Sesame seeds 	Sulphur dioxide 	

Nutrition information

Nutrition information can help consumers make healthier choices.

Back-of-pack nutrition information is legally required.

NUTRITION

When heated according to instructions

Typical values	Per 100g	Each pack (390g**)
Energy	457kJ 109kcal	1781kJ 424kcal
Fat	3.9g	15.2g
of which saturates	1.9g	7.5g
Carbohydrate	12.1g	47.1g
of which sugars	1.6g	6.2g
Fibre	1.1g	4.2g
Protein	5.8g	22.6g
Salt	0.6g	2.2g

Key terms

Allergen: An ingredient that may cause an adverse reaction to food.

Back-of-pack labelling: Is legally required and can help consumers make healthier choices.

Front-of-pack labelling: Is voluntary but must provide certain information and can use red, amber and green colour coding.

Use-by-date: Relates to the safety of the food. Food must be eaten by this date.

Best-before-date: Relates to the quality of the food. Food may still be eaten beyond this date.

Date marks/shelf life

'Use by' dates relate to the safety of the food and 'best before' dates relate to quality. Eating foods after their 'use by' date could lead to food poisoning.

USE BY:

25/08/20

KEEP REFRIGERATED

BEST BEFORE:

25/08/21

STORE IN A COOL DRY PLACE

Baby leaf salad

Keep refrigerated. Once opened consume within 24 hours and by the 'use by' date shown.

Ingredients

It is a legal requirement to include an ingredients list on packaged or pre-prepared foods. The ingredients must appear in descending order and with the allergens identified in **bold**, **highlighted**, underlined or in *italics*.

INGREDIENTS

Water, Carrots, Onions, Red Lentils (4.5%), Potatoes, Cauliflower, Leeks, Peas, Cornflour, **Wheat** flour, Cream (**milk**), Yeast Extract, Concentrated Tomato Paste, Garlic, Sugar, **Celery** Seed, Sunflower Oil, Herb and Spice, White Pepper, Parsley

ALLERGY ADVICE

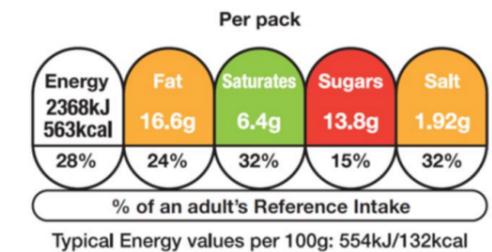
For allergens, see ingredients in **bold**

Front-of-pack labelling

Front-of-pack nutrition information is voluntary. If a food business chooses to provide this, only the following information may be provided:

- energy only;
- energy along with fat, saturates, sugars and salt.

Red, amber and green colours, if used, show at a glance whether a food is high, medium or low for fat, saturates, sugars or salt. The colour coding can be used to compare two products.



Task

Produce a food label for a dish you have made. Ensure that the label includes the information required by law that relates to food hygiene and safety, i.e. a date mark, ingredient list (with allergens identified) and storage instructions.

Food science



Functions of ingredients

Ingredients provide a variety of functions in recipes.

Carbohydrate, protein and fat

Carbohydrate, protein and fat all have a range of properties that make them useful in a variety of food products.

Carbohydrates perform different functions in food.

They can:

- help to cause the colour change of bread, toast and bakery products (dextrinisation);
- contribute to the chewiness, colour and sweet flavour of caramel;
- thicken products such as sauces and custards (gelatinisation).

Maillard reaction

Foods which are baked, grilled or roasted undergo colour, odour and flavour changes. This is primarily due to a group of reactions involving amino acids (from protein) and reducing sugars.

Dextrinisation

When foods containing starch are heated they can also produce brown compounds due to dextrinisation. Dextrinisation occurs when the heat breaks the large starch polysaccharides into smaller molecules known as dextrans which produce a brown colour.

Caramelisation

When sucrose (table sugar) is heated above its melting point it undergoes physical and chemical changes to produce caramel.

Gelatinisation

When starch is mixed with water and heated, the starch granules swell and eventually rupture, absorbing liquid, which thickens the mixture. On cooling, if enough starch is used, a gel forms.

Proteins perform different functions in food products.

They:

- aerate foods, e.g. whisking egg whites;
- thicken sauces, e.g. egg custard;
- bind ingredients together, e.g. fishcakes;
- form structures, e.g. gluten formation in bread;
- gel, e.g. lime jelly.

Gluten formation

Two proteins, gliadin and glutenin, found in wheat flour, form gluten when mixed with water. Gluten is strong, elastic and forms a 3D network in dough. In the production of bread, kneading helps untangle the gluten strands and align them. Gluten helps give structure to the bread and keeps in the gases that expand during cooking.

Gelation

Gelatine is a protein which is extracted from collagen, present in animal connective tissue. When it is mixed with warm water, the gelatine protein molecules start to unwind. On cooling, a stable, solid network is formed, trapping the liquid.

Denaturation

Denaturation is the change in structure of protein molecules. The process results in the unfolding of the protein's structure. Factors which contribute to denaturation are heat, salts, pH and mechanical action.

Coagulation

Coagulation follows denaturation. For example, when egg white is cooked it changes colour and becomes firmer (sets). The heat causes egg proteins to unfold from their coiled state and form a solid, stable network.

Aeration

Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar. Small bubbles of air are incorporated and form a stable foam.

Fats performs different functions in food.

They help to:

- add 'shortness' or 'flakiness' to foods, e.g. shortbread, pastry;
- provide a range of textures and cooking mediums;
- glaze foods, e.g. butter on carrots;
- aerate mixtures, e.g. a creamed cake mix;
- add a range of flavours.

Plasticity

Fats do not melt at fixed temperatures, but over a range. This property is called plasticity.

Colloidal systems

Colloidal systems give structure, texture and mouthfeel to many different products.

System	Disperse phase	Continuous phase	Food
Sol	Solid	Liquid	Unset jelly
Gel	Liquid	Solid	Jelly
Emulsion	Liquid	Liquid	Mayonnaise
Solid emulsion	Liquid	Solid	Butter
Foam	Gas	Liquid	Whipped cream
Solid foam	Gas	Solid	Meringue

Raising agents

Raising agents include anything that causes rising within foods, and are usually used in baked goods. Raising agents can be:

- biological, e.g. yeast;
- chemical, e.g. baking powder;
- mechanical, e.g. adding air through beating or folding.

Functional ingredients

These are ingredients that are specifically included in food for additional health benefits. They include:

- probiotics – 'good' bacteria that may have a positive impact on human health;
- prebiotics – food ingredients that promote the growth of beneficial microorganisms in the gut;
- sterols/stanols – compounds that can lower cholesterol;
- healthy fats (e.g. omega-3);
- added vitamins and minerals (more than in the original food).

Why is food prepared and cooked?

Food is prepared and cooked to:

- make the food more palatable – improves flavour, texture and appearance;
- reduce the bulk of the food;
- provide variety and interest to meals.

Methods of cooking food

The methods of cooking are divided up into groups. These are based on the cooking medium used.

They are:

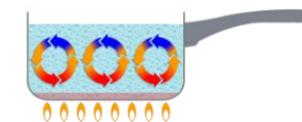
- moist/liquid methods, e.g. boiling;
- dry methods, e.g. grilling;
- fat-based, e.g. frying.

Selecting the most appropriate way of preparing and cooking certain foods is important to maintain or enhance their nutritional value.

- Vitamins can be lost due to oxidation during preparation or leaching into the cooking liquid.
- Fat-based methods of cooking increase the energy (calories) of the food.
- The use of different cooking methods affects the sensory qualities of the food.

There are three ways that heat is transferred to food.

- Conduction – the exchange of heat by direct contact with foods on a surface.
- Radiation – energy in the form of rays.
- Convection – currents of hot air or hot liquid transfer the heat energy to the food.



Tasks

1. Choose a recipe that you enjoy or have made recently and explain in detail the functions of the ingredients.
2. Explain the function of raising agents, giving examples of recipes.

To find out more go to: <https://bit.ly/2SPqWEG>

Food spoilage, contamination and food poisoning



Food spoilage

As soon as food is harvested, slaughtered or processed it starts to change. This happens for two main reasons:

- autolysis – self destruction, caused by enzymes present in the food;
- microbial spoilage – caused by the growth of micro-organisms, i.e. bacteria, yeasts and moulds.

Food spoilage: Autolysis – enzymes

Enzymes are chemicals which can cause food to deteriorate in three main ways:

- ripening – this will continue until the food becomes inedible, e.g. banana ripening;
- browning – enzymes can react with air causing certain foods to discolour, e.g. apples;
- oxidation – loss of nutrients, such as vitamin C from food, e.g. over boiling of green vegetables.

Food spoilage: Microbial spoilage

Spoilage can be caused by the growth of:

- bacteria – single celled micro-organisms which are present naturally in the environment;
- yeasts – single celled fungi;
- moulds – fungi which grow as filaments in food.

Food contamination

Food contamination can lead to food poisoning. There are three ways which food can be contaminated: **bacterial**, **chemical** and **physical**.

Chemical contamination

Chemical contamination can occur in a variety of ways at different stages of food processing and production. For example, chemicals from the farm; cleaning products used in the processing plant and fly spray used in the kitchen.

Physical contamination

This can occur in a variety of ways at different stages of food processing and production. Some examples are:

- soil from the ground when harvesting;
- a loose bolt from a processing plant when packaging;
- a hair from a chef in the kitchen.

Bacterial contamination

Most bacteria are harmless but a small number can cause illness. These are known as pathogenic bacteria. Food which is contaminated with pathogenic bacteria can look, taste and smell normal.

Bacteria can be transferred onto food through cross-contamination, via equipment, people or pests, or can be naturally present in the food. Some bacteria can produce toxins which can cause food poisoning.

Micro-organisms

Micro-organisms need conditions to survive and reproduce these can include:

- temperature;
- moisture;
- food;
- time;
- oxygen and pH level.

Temperature

Bacteria need warm conditions to grow and multiply.

- The ideal temperature for bacterial growth is 30°C – 37°C.
- Some bacteria can still grow at 10°C and 60°C.
- Most bacteria are destroyed at temperatures above 63 °C.
- Bacterial growth danger zone is 5°C - 63°C.

At very cold temperatures, bacteria become dormant – they do not die, but they cannot grow or multiply.

Moisture

Where there is no moisture bacteria cannot grow. However, bacteria and moulds can both produce spores which can survive until water is added to the food.

To find out more, go to: <https://bit.ly/3nE9fpE>

Food

Bacteria need a source of food to grow and multiply, these food are usually high in moisture, fat and protein, and may be ready to eat. Food where bacteria rapidly multiply in is called a **high risk food**. For example:

- meat, meat products and poultry;
- milk and dairy products;
- eggs – uncooked and lightly cooked;
- shellfish and seafood;
- prepared salads and vegetables;
- cooked rice and pasta.

Time

Given the right conditions, one bacterium can divide into two every 10-20 minutes through a process called binary fission.



People at high risk of food poisoning

Elderly people, babies and anyone who is ill or pregnant needs to be extra careful about the food they eat.

Symptoms of food poisoning

Food poisoning can be mild or severe. The most common symptoms are:

- feeling sick;
- being sick;
- diarrhoea;
- abdominal pain.

Campylobacter

Sources
Raw and undercooked poultry, unpasteurized milk, contaminated water.

Signs and symptoms

Onset 2 – 5 days (can be longer). Fever, headache and dizziness for a few hours, followed by abdominal pain.

E Coli 0157

Sources

Raw and undercooked meat and poultry. Unwashed vegetables. Contaminated water.

Signs and symptoms

Onset usually 3-4 days. Diarrhoea, which may contain blood, can lead to kidney failure or death.

Listeria

Sources

Unpasteurised milk and dairy products, cook-chill foods, pâté, meat, poultry and salad vegetables.

Signs and symptoms

Onset 1-70 days. Ranges from mild, flu-like illness to meningitis, septicaemia, pneumonia. During pregnancy may lead to miscarriage or birth of an infected baby.

Salmonella

Sources

Raw meat, poultry and eggs. Flies, people, sewage and contaminated water.

Signs and symptoms

Onset 6-48 hours. Headache, general aching of limbs, abdominal pain and diarrhoea, vomiting and fever. This usually lasts 1 – 7 days, and rarely is fatal.

Staphylococcus aureus

Sources

Humans: nose, mouth and skin. Untreated milk.

Signs and symptoms

Onset 1 – 6 hours. Severe vomiting, abdominal pain, weakness and lower than normal temperature. This usually lasts 6 – 24 hours.

Task

Explain in detail the conditions bacteria need to survive and reproduce. Give examples of controls to reduce the likelihood of bacterial multiplication and risk of food poisoning.

Key terms

Bacteria: Small living organisms that can reproduce to form colonies. Some bacteria can be harmful (pathogenic) and others are necessary for food production, e.g. to make cheese and yogurt.

Binary fission: The process that bacteria uses to divide and multiply.

Cross-contamination: The transfer of bacteria from one source to another. Usually raw food to ready-to-eat food but can also be the transfer of bacteria from unclean hands, equipment, cloths or pests. Can also relate to allergens.

Food spoilage: The action of enzymes or microorganisms which make the food unacceptable to consume.

Food poisoning: Illness resulting from eating food which contains food poisoning micro-organisms or toxins produced by micro-organisms.

Toxin: A poison produced by some bacteria which can cause food poisoning.

Allergens

Allergenic ingredients can cause adverse reactions in some people. Care must be taken at each stage of food processing to prevent contamination.

Desirable food changes

Desirable changes that can be caused by micro-organisms include:

- bacteria in yogurt and cheese production;
- mould in some cheeses, e.g. Stilton;
- yeast in bread production.

Name:

Date:

Food commodities: Fruit and vegetables



Fruit

One of the main purposes of fruit is to spread the seeds of the plant.

Fruit can be classified as:

- berries;
- citrus fruit;
- fleshy fruit;
- pomes;
- stone fruit.



Berries



Citrus fruit



Pomes



Stone fruit



Fleshy fruit

Berries – e.g. grapes, strawberries

A berry is a small, sweet fruit. They are often coloured red, blue or black.

Berries contain small seeds, which are usually edible and do not have a large stone.

Raspberries

Botanically, raspberries are not a true berry (a fruit with many seeds scattered throughout the pulp) but an etaerio (or aggregate fruit) made up of drupelets (individual sections of fruit each with its own seed).

For more information, go to:

<https://bit.ly/3fGKqT0>

Citrus fruits – e.g. lemon, orange

Citrus fruits are usually quite large and round. They have a waxy outer layer that needs to be peeled off before they can be eaten.

Pomes – e.g. apples, pears

Apples and pears are a special type of fruit called a 'pome'. These fruits have a core which is usually not eaten and contain several 'pips'.



Fleshy fruits – e.g. banana, melon

These fruits are usually fairly large and do not have a central stone. Often, the seeds in the fruit are eaten along with the flesh as they are small and soft, but this is not true with melons.

Stone fruit – e.g. cherries, peaches

Stone fruits are those that have a large, hard 'stone' in the middle of them that is not eaten.



Tasks

1. Keep a diary of the different fruit and vegetables you eat – can you get 10 different types in one week?
2. Create a poster on the different types of fruit and vegetables. Include an example of each type and explain how they can be used in dishes.

Vegetables are the edible part of a plant. They are often grouped according to the part of the plant that is eaten:

- bulbs;
- flowers;
- fruit;
- leaves;
- roots;
- seeds;
- stem (stalk).



Garlic is a bulb

Bulbs – e.g. garlic, fennel, onions, shallots

Some plants have bulbs which stay underground to store food for the plant when it is not growing. When the time is right, the bulb produces shoots which grow up through the soil.

Flowers – e.g. broccoli, cauliflower, capers

Flowers are part of the plant that allow it to reproduce. Some flowers are edible, but many others are not.



Fruit – e.g. cucumber, pepper, tomatoes

The fruit of a plant is created after its flowers have been pollinated. Many fruits are sweet, but some fruits are not and are usually used like a vegetable in food.

Roots – e.g. beetroot, carrot, parsnip

The roots of the plant take up water and nutrients from the soil for growth. They also anchor the plant to the ground.

Tubers – e.g. casava, potatoes, yams

Tubers store nutrients for the plant and also propagate new plants by forming stems and leaves. Tubers are often high in carbohydrates.

Leaves – e.g. cabbage, kale, spinach

Plant leaves capture sunlight and use the energy from it to make food. This process is known as photosynthesis.



Legumes – e.g. garden peas, kidney beans

Legumes are grown for their edible seeds, known as beans and peas. They are the fruit (seed) of a plant. Legume seeds that are dried and used as food are called pulses (e.g. lentils).

Stem (stalk) – e.g. asparagus, celery

The stalk of the plant helps to keep it standing up, provide support and carry water and nutrients to different parts of the plant.



Mushrooms – e.g. button, chestnut

Mushrooms are different kinds of fungi, rather than plants. Many types of mushrooms are dangerous to eat.

Mushrooms available for consumers to buy are carefully selected to be safe.



Key terms

Fruit: The mature ripened ovaries of flowers.

Vegetables: The edible part of a plant.

Flowers: The part of the plant that allow it to reproduce.

Eat 5 A DAY!

Fruit and vegetables are an important part of a **healthy, balanced diet**.



Some types are good sources of **fibre**, as well as providing lots of essential **vitamins and minerals**.

Eating lots of fruit and vegetables can help you **maintain a healthy weight** (as they are naturally low in calories) and having your 5 A DAY could reduce your risk of some diseases.

What counts?

All fruit and vegetables count, including fresh, frozen, canned, dried and juiced varieties.



150ml



80g



30g

Name:

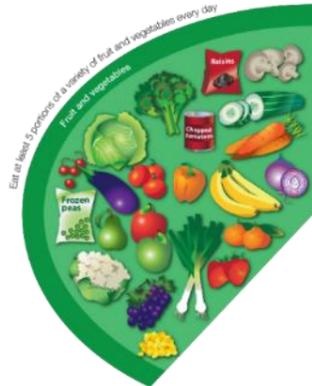
Date:

Food commodities: Fruit and vegetables



Eat 5 A DAY!

Fruit and vegetables are an important part of a **healthy, balanced diet**.



Some types are good sources of **fibre**, as well as providing lots of essential **vitamins and minerals**, such as:

- vitamin a;
- vitamin c;
- folate;
- potassium.

Eating lots of fruit and vegetables can help you **maintain a healthy weight** (as they are naturally low in calories) and having your 5 A DAY could reduce your risk of some diseases.



What counts?

All fruit and vegetables count, including fresh, frozen, canned, dried and juiced varieties.



150ml

80g

30g

Fruit

One of the main purposes of fruit is to spread the seeds of the plant.

Fruit can be classified as:

- berries;
- citrus fruit;
- fleshy fruit;
- pomes;
- stone fruit.



Berries

Citrus fruit



Pomes

Stone fruit



Fleshy fruit

Berries – e.g. blackberries, blueberries

A berry is a small, sweet fruit. They are often coloured red, blue or black. True berries are defined as a fleshy fruit where the entire ovary wall (in a single flower) ripens into a fruit.

Citrus fruits – e.g. kumquat, lime

Citrus fruits are also berries and are a type of berry known as hesperidium (a berry with sections of pulp inside a peelable rind).

For more information, go to:

<https://bit.ly/3ErAcYD>

Fleshy fruits – e.g. guava, melon

These fruits are usually fairly large and do not have a central stone.

Often, the seeds in the fruit are eaten along with the flesh as they are small and soft, but this is not the case with melons. Melons are, botanically speaking, berries and are a particular group of berries known as pepoes.



Pomes – e.g. apples, pears, quince

Pomes are berry-like fruits, with a large portion of outer flesh and a tough 'core' which contains the seeds (usually five.)

Stone fruit (drupes) – e.g. nectarine

A drupe is defined as a fleshy fruit containing a single seed (also known as a pit or stone), which is not eaten.



Multiple fruits – e.g. pineapple

Multiple fruits are fruits that are formed from separate flowers, but that fuse together into a single mass.

Increasing the vegetable content in dishes:

- ✓ Add vegetables into rice, pasta or couscous.
- ✓ Experiment with colourful and interesting salads, salsas, vegetable-based dips.
- ✓ Vegetables like carrot, parsnip and beetroot can also be added to sweet foods, such as cakes.
- ✓ Incorporate vegetables into sauces or with other foods.

Vegetables are the edible part of a plant.

They are often grouped according to the part of the plant that is eaten:

- bulbs;
- flowers;
- fruit;
- leaves;
- roots;
- seeds;
- stem (stalk).



Celeriac is a stem

Bulbs – e.g. garlic, fennel, onions, shallots

Some plants have bulbs which stay underground to store food for the plant when it is not growing. When the time is right, the bulb produces shoots which grow up through the soil.

Flowers – e.g. broccoli, cauliflower, capers

Flowers are part of the plant that allow it to reproduce. Some flowers are edible, but many others are not.



Fruit – e.g. cucumber, pepper, tomatoes

The fruit of a plant is created after its flowers have been pollinated. Many fruits are sweet, but some fruits are not and are usually used like a vegetable in food.

Legumes – e.g. sugar snap peas, black beans

Legumes are grown for their edible seeds, known as beans and peas. They are the fruit (seed) of a plant. Legume seeds that are dried and used as food are called pulses (e.g. lentils).

Roots – e.g. turnips, yams, potatoes

The roots of the plant suck up water and useful nutrients from the soil to help the plant stay healthy. Tubers (e.g. potatoes) store nutrients for the plant and also propagate new plants by forming new stems and leaves.

Key terms

Fruit: The mature ripened ovaries of flowers.
Vegetables - the edible part of a plant.
Flowers: The part of the plant that allow it to reproduce.

Leaves – e.g. cabbage, cavolo nero, lettuce

Plant leaves capture sunlight and use the energy from it to make food. This process is known as photosynthesis.



*Some plants are grown hydroponically. This means that they get their water from a nutrient solution, rather than the soil.

Stem (stalk) – e.g. celeriac, kohlrabi

The stalk of the plant helps to keep it standing up and also helps to move water and nutrients to other parts of the plant.

Mushrooms – e.g. shiitake, oyster

Mushrooms are different kinds of fungi, rather than plants.

Many types of mushrooms are dangerous to eat. Mushrooms available for consumers to buy are carefully selected to be safe.

Tasks

1. Create an infographic on fruit and vegetables. Include: why they are important, what they are and ways to include them in a healthy, varied and balanced diet.
2. Keep a fruit and vegetables diary for one week. See if you can achieve 5 A DAY and choose a variety.

Name:

Date:

Good food hygiene and safety practices



Good food hygiene practices are necessary in order to produce, make and supply food that is safe to eat. This involves more than just being clean. A simple way to remember is the **4Cs**:

- cleaning;
- cooking;
- chilling;
- cross-contamination.

FOOD SAFETY

COOK cook to proper temperatures	SEPARATE do not cross-contaminate
CLEAN wash hands and surfaces often	CHILL refrigerate promptly

give bacteria no chance

Cleaning
Cleaning the kitchen is important to keep food safe and prevent bacteria from spreading. 'Clean as you go' means people make sure that they clean the area and utensils they have been working in or with, as they prepare food. This avoids build-up of mess and leads to better hygienic conditions. Areas which need particular attention are:

- surfaces that come into contact with food, e.g. chopping boards, utensils;
- surfaces that come into contact with hands, e.g. cupboard and fridge doors.

Cleaning – personal hygiene and getting ready to cook
Good personal hygiene is essential to reduce the risk of food poisoning.

- **Hands:** Thoroughly wash and dry hands before and after touching food and regularly throughout cooking.
- **Clothing:** Clean clothing should be worn. Long sleeves should be rolled up and a clean apron or chef's jacket worn over outside clothes. Enclosed, non-slip, shoes should be worn in the kitchen.
- **Jewellery:** All jewellery, including a watch, should be removed (piercings should be covered if they cannot be removed).
- **Skin:** Cuts and wounds should be covered with a coloured, waterproof dressing. The plasters are often blue in colour so they can be easily identified if they fall into food.
- **Face:** Do not cough or spit near or over food, taste food with fingers, bite nails, eat, chew or smoke, touch nose, or remove earrings.

For more information, go to: <https://bit.ly/3nE9fpE>

Cooking
To reduce the risk of food poisoning, hot food must be served steaming hot, that is above **63°C**.

- Bacteria will begin to die when the temperature rises above **60°C**.
- Some foods change colour when they are cooked.
- Cooking food thoroughly to a minimum core temperature of **75°C** will ensure most bacteria is destroyed.
- When cooking burgers, sausages, portions of pork and chicken, there should be no pink meat. They should also be steaming hot inside and the juices should run clear when cooked.
- Steak or other cuts of beef or lamb can be eaten less well done as long as they have been properly sealed. Sealing the meat will kill any bacteria on the outside.
- Leftovers should be cooled as quickly as possible within two hours and then stored in the fridge below **5°C**. When leftovers are re-heated, they need to be steaming hot. Leftovers should not be re-heated more than once and should be used within 48 hours from when it was made (24 hours for rice dishes).

Chilling
The temperature between **5°C– 63°C** is known as the 'danger-zone'. Bacteria will multiply most rapidly within this temperature range. Reducing the temperature below **5°C** slows the reproduction of microorganisms. Cold temperatures do not kill bacteria.
High-risk food, such as such as meat, fish and dairy products plus opened bottles, jars or tubes, should be stored below 5°C. Eggs should be stored in a cool, dry place. Ideally, eggs should be stored in the fridge.

Cross-contamination
The process by which bacteria are transferred from one area to another is known as **cross-contamination**. The main carriers of bacteria and causes of cross contamination are:

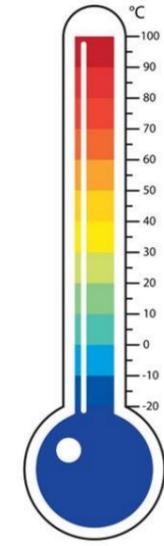
- humans;
- rubbish;
- pests and other animals;
- food, e.g. raw meat or poultry.

Cross contamination – raw meat

- Keep raw meat separate from ready-to-eat food.
- Do not let raw meat drip onto other food.
- Never use the same chopping board for raw meat and ready-to-eat food without washing the board (and knife) thoroughly in between. Ideally use a red board.
- Do not wash meat before cooking it.

Temperatures to remember
To reduce the risk of food poisoning, good temperature control is vital:

- 5-63°C – the danger zone where bacteria grow most readily.
- 37°C – body temperature, optimum temperature for bacterial growth.
- 8°C – maximum legal temperature for cold food, i.e. your fridge.
- 5°C (or below) – the ideal temperature your fridge should be.
- 75°C – if cooking food, the core temperature, middle or thickest part should reach at least this temperature.
- 75°C – if reheating food, it should reach at least this temperature. In Scotland food should reach at least 82°C.



Safe use of a food probe
Digital probes can be used to check the temperature of food. To use a food probe:

- clean with a disinfectant wipe before and after use;
- insert the probe into the core (centre) or the thickest part of the food;
- do not touch the bottom of the pan or cooking dish.

Food labelling
Food labels help consumers make healthier choices. Some information also helps to reduce the risk of food poisoning or other adverse reactions to food:

- date marks;
- list of ingredients with allergens in **bold**, **highlighted**, underlined or in *italics*;
- storage and preparation conditions.

Tasks

1. Write a detailed explanation of the 4Cs, demonstrating how they can help to reduce the risk of food poisoning.
2. Explain, giving detailed reasons, the food hygiene controls when buying, preparing, cooking and serving fresh poultry.

Key terms
Best-before-date: Relates to the quality of the food. Food may still be eaten beyond this date.
Cross-contamination: The transfer of bacteria from one source to another. Usually raw food to ready-to-eat food but can also be the transfer of bacteria from unclean hands, equipment, cloths or pests. Can also relate to allergens.
Danger zone: Bacteria will multiply most rapidly between 5-63°C.
Optimum temperature: Bacteria that cause food poisoning reproduce around body temperature (37°C).
The 4Cs: Cleaning, cooking, chilling and cross-contamination.
Use-by-date: Relates to the safety of the food. Food must be eaten by this date.

Use-by-date
You have until the end of this date to use or freeze the food before it comes too risky to eat.

USE BY:
25/08/20

KEEP REFRIGERATED

Best-before-date
You can eat food past this date but it might not be at its best quality.

BEST BEFORE:
25/08/21

STORE IN A COOL DRY PLACE

Ingredients – functional characteristics

- Ingredients are selected for their nutritional, functional and sensory characteristics, as well as provenance and seasonality.

Selecting ingredients

Ingredients are chosen for a number of reasons, such as:

- to add flavour, colour or texture;
- to provide a particular function, e.g. to thicken;
- to provide nutrients or change the nutritional profile of a dish, e.g. to increase fibre;
- to extend the shelf life, e.g. vinegar for pickling or chemical preservatives;
- cost and availability, e.g. fruit in season;
- to satisfy a need to buy food with a certain provenance, e.g. Red Tractor.

Adding flavour, colour or texture

- Fresh and dried herbs and spices can be added to dishes to provide flavour and replace the salt in some dishes, e.g. garlic and ginger.
- Fruit, vegetables, herbs and spices can all be used in recipes to add colour.
- Nuts, seeds, grains, fruit and vegetables can be added to recipes to provide texture.
- The cooking method and cooking time can impact the texture, e.g. steaming or microwaving vegetables quickly can retain their colour, flavour and firm texture.
- Equipment used to process food can impact the texture, e.g. using a food processor to blend soup for a smoother texture.
- Natural, nature identical or artificial additives may be added to foods to perform specific functions.
- The main food additives are antioxidants, colours, flavour enhancers, sweeteners, emulsifiers and stabilizers, and preservatives.

Functional characteristics of ingredients

Ingredients provide a variety of functions in recipes, such as:

- browning, e.g. flour in a bread roll (dextrinisation);
- raising, e.g. yeast in bread (aeration);
- setting, e.g. scrambled eggs (coagulation);
- thickening, e.g. flour in a roux sauce (gelatinisation).

Food functions

	Example	What happens?
Aerate	Cake	Baking powder makes the cake light
	Meringue	Egg white is whisked to form a foam
	Scone	Self-raising flour helps the dough rise
	Bread	Yeast makes the dough rise
Bind	Fish cake	Egg holds other ingredients together
	Naan bread	Yogurt binds dry ingredients into a smooth dough
	Pancake	Milk and egg combine flour into batter
	Pastry	Water combines flour and fat into a dough
Bulk	Cottage pie	Textured vegetable protein may be mixed with minced meat and vegetables
	Fruit pie filling	Sugar is boiled with fruit to form a thick puree
	Nut roast	Breadcrumbs absorb liquid and increase in size
Glaze	Vegetable samosa	Potato is the main filling
	Hot cross bun	Sugar solution is brushed over bun after baking
	Gammon	Honey is poured over to glaze
	Pie	Milk is brushed over before baking
Set	Sausage roll	Egg is brushed over to give a shiny golden colour
	Blancmange	Cornflour is boiled with milk and flavourings and then cooked
	Cold souffle	Gelatine forms a gel
	Jam	Pectin mixed with sugar and acid forms a gel
Thicken	Quiche	Egg is mixed with other ingredients and then baked
	Egg custard	Egg thickens when gently heated
	Sauce flour	Flour thickens a liquid when boiled
	Soup	Potato thickens soups
	Syrup	Sugar is boiled with water or fruit juice

Raising agents

These can be:

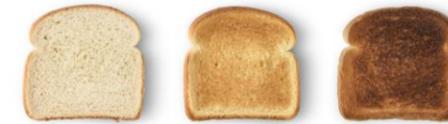
- mechanical, e.g. beating, creaming, rolling and folding, sieving, whisking;
- chemical, e.g. baking powder, bicarbonate of soda, self-raising flour;
- biological, e.g. yeast.

Different foods may use one or more of these to achieve a desirable end result.

To find out more, go to: <https://bit.ly/38pu3dt>

Dextrinisation

When food containing starch is heated (without the presence of water) it can produce brown compounds due to dextrinisation. Dextrinisation occurs when the heat breaks the large starch polysaccharides into smaller molecules known as dextrins. Many of these dextrins can also produce a brown colour.



Maillard reaction

Foods which are baked, grilled or roasted undergo colour, odour and flavour changes.

This is primarily due to a group of reactions involving amino acids (from protein) and reducing sugars. This reaction is known as the Maillard reaction. This reaction can also take place in foods with high protein content, such as meat.

Tenderisation

Mechanical tenderisation – a meat cleaver or meat hammer may be used to beat the meat. Cutting into small cubes or mincing can also help.

Chemical tenderisation (marinating) – the addition of any liquid to flavour or soften meat before cooking.



Key terms

Aeration: Incorporating air into a mixture.

Caramelisation: The chemical change of heated sucrose (sugar) to caramel, which produces flavour and browning.

Coagulation: The irreversible denaturation of protein molecules to thicken and set.

Denaturation: A change in the structure of protein molecules, resulting in their unfolding.

Dextrinisation: The reaction of dry heat on the surface of food which changes starch to dextrin, e.g. toast.

Gelatinisation: The process of thickening which takes place when a mixture of starch and liquid is heated.

Shortening: The effect caused when fat is rubbed into flour. The fat coats the flour particles, waterproofing them to prevent gluten formation.

Task

Explain the function of each of the ingredients in bread, white sauce and Victoria sponge.

Macronutrients, fibre and water



Macronutrients

Macronutrients provide energy. The macronutrients are:

- carbohydrate;
- protein;
- fat.

Macronutrients are measured in grams (g).

Alcohol

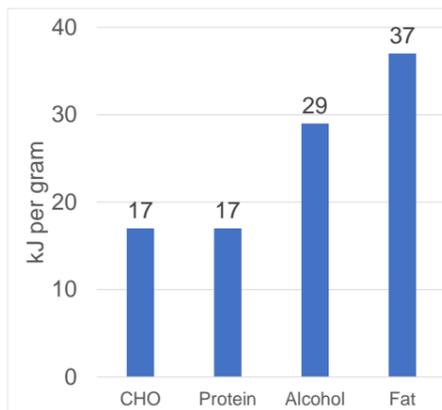
Alcohol is not considered a nutrient, but is a source of energy in the diet.

The government recommends no more than 14 units of alcohol per week for both men and women.

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).
- Different macronutrients, and alcohol, provide different amounts of energy.

	Energy per gram
Carbohydrate	16kJ (3.75 kcals)
Protein	17kJ (4 kcals)
Alcohol	29kJ (7kcals)
Fat	37kJ (9 kcals)



Protein

- Made up of building blocks called amino acids.
- There are 20 amino acids found in protein.
- Eight amino acids have to be provided by the diet (called essential amino acids).

The essential amino acids (EAAs) are isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

In young children, additional amino acids, e.g. histidine and tyrosine, are sometimes considered to be essential (or 'conditionally essential') because they may be unable to make enough to meet their needs.

Recommendations

- 0.75g/kg bodyweight/day in adults.

Sources:

Animal sources: meat; poultry; fish; eggs; milk; dairy food.

Plant sources: soya; nuts; seeds; pulses, e.g. beans, lentils; mycoprotein.

Protein complementation

Different food contains different amounts and combinations of amino acids.

Vegans and vegetarians can get all the amino acids they need by combining different protein types at the same meal. This is known as protein complementation.

Examples are:

- rice and peas;
- beans on toast;
- hummus and pitta bread;
- bean chilli served with rice.

Carbohydrate

All types of carbohydrate are compounds of carbon, hydrogen and oxygen. They can be divided into three main groups according to the size of the molecule.

These three types are:

- monosaccharides (e.g. glucose);
- disaccharides (e.g. lactose);
- polysaccharide (e.g. sucrose).

The two types main of carbohydrate that provide dietary energy are starch and sugars. Dietary fibre is also a type of carbohydrate.

Starchy carbohydrate is an important source of energy.

Starchy foods - we should be choosing wholegrain versions of starchy foods where possible.

Recommendations

- Total carbohydrate - around 50% of daily food energy.
- Free sugars include all sugars added to foods plus sugars naturally present in honey, syrups and unsweetened fruit juice (<5% daily food energy).
- Fibre is a term used for plant-based carbohydrates that are not digested in the small intestine (30g/day for adults).

Fibre

- Dietary fibre is a type of carbohydrate found in plant foods.
- Food examples include wholegrain cereals and cereal products; oats; beans; lentils; fruit; vegetables; nuts; and, seeds.

Dietary fibre helps to:

- reduce the risk of heart disease, diabetes and some cancers;
- help weight control;
- bulk up stools;
- prevent constipation;
- improve gut health.

Fat

Sources of fat include:

- saturated fat;
- monounsaturated fat;
- polyunsaturated fat.

Fats can be saturated, when they have no double bonds, monounsaturated, when they have one double bond, or polyunsaturated, when they have more than one double bond.

Recommendations

- <35% energy, Saturated fat <11% energy.

A high saturated fat intake is linked with high blood cholesterol levels.

Sources:

Saturated fat: fatty cuts of meat; skin of poultry; butter; hard cheese; biscuits, cakes and pastries; chocolate.

Monounsaturated fat: edible oils especially olive oil; avocados; nuts.

Polyunsaturated fatty acids: edible oils especially sunflower oil; seeds; margarine; spreadable fats made from vegetable oils and oily fish.

Dietary reference values (DRVs) are a series of estimates of the energy and nutritional requirements of different groups of healthy people in the UK population. They are not recommendations or goals for individuals.

Reference Intakes are guidelines for the maximum amount of energy (calories), fat, saturated fat, sugars and salt consumed in a day (based on a healthy adult female).

Tasks

1. Create an infographic on macronutrients. Focus on the definition of each nutrient, daily recommendations and source.
2. Keep a food diary for four days and calculate the macronutrients provided per day. <http://explorefood.foodafactoflife.org.uk>

Key terms

Dietary reference values: Estimated dietary requirements for particular groups of the population.

Essential amino acids: 8 of the different amino acids found in proteins from plants and animals that have to be provided by the diet.

Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.

Protein complementation: Combining different protein types at the same meal to ensure all EAAs are ingested.

Reference Intakes: Guidelines for the maximum amount of nutrients consumed.

Hydration

- Aim to drink 6-8 glasses of fluid every day.
- Water, lower fat milk and sugar-free drinks including tea and coffee all count.
- Fruit juice and smoothies also count but should be limited to no more than a combined total of 150ml per day.

20% of water is provided by food such as soups, yogurts, fruit and vegetables.

The other 80% is provided by drinks such as water, milk and juice.

Drinking too much water can lead to 'water intoxication' with potentially life threatening hyponatraemia.

This is caused when the concentration of sodium in the blood gets too low.

For more information, go to: <https://bit.ly/36KUnji>

Name:

Date:

Micronutrients



Micronutrients are needed in the body in tiny amounts. They do not provide energy, but are required for a number of important processes in the body.

There are two main groups of micronutrients:

- vitamins;
- minerals and trace elements.

Micronutrients are measured in milligrams (mg) and micrograms (μg) with $1\text{mg} = 0.001\text{g}$ and $1\mu\text{g} = 0.001\text{mg}$.

Micronutrient recommendations
People have different requirements for each micronutrient, according to their:

- age;
- gender;
- physiological state (e.g. pregnancy).



Vitamins

Nutrient	Function	Sources
Vitamin A	Helps the immune system to work as it should and with vision.	Liver, cheese, eggs, dark green leafy vegetables and orange-coloured fruits and vegetables.
B vitamins	Thiamin, riboflavin, niacin, folate, and vitamin B12 have a range of functions within the body.	Different for each B Vitamin.
Vitamin C	Helps to protect cells from damage and with the formation of collagen.	Fruit (especially citrus fruits), green vegetables, peppers and tomatoes.
Vitamin D	Helps the body to absorb calcium & helps to keep bones strong.	Oily fish, eggs, fortified breakfast cereals and fat spreads.
Vitamin E	Helps to protect the cells in our bodies against damage.	Vegetable and seed oils, nuts and seeds, avocados and olives.
Vitamin K	Needed for the normal clotting of blood and is required for normal bone structure.	Green vegetables and some oils (rapeseed, olive and soya oil).

Key terms

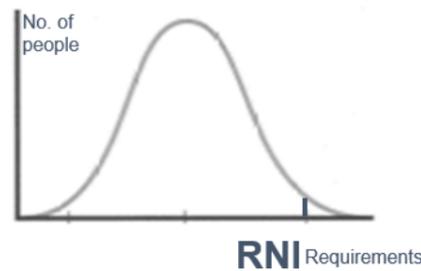
Micronutrients: Nutrients needed in the diet in very small amounts.

Lower Reference Nutrient Intake (LRNI): Is the amount of a nutrient that is enough for only the small number of people who have low requirements (2.5%). The majority of people need more.

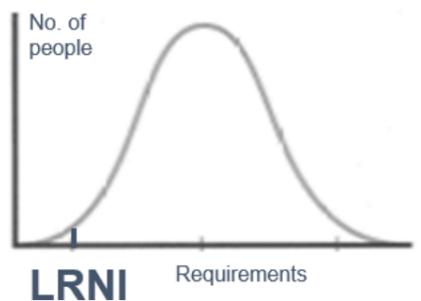
Reference Nutrient Intake (RNI): The amount of a nutrient that is enough to ensure that the needs of nearly all the group (97.5%) are being met. The RNI is used for recommendations on protein, vitamins and minerals.

Micronutrient recommendations

The recommendations for vitamins and minerals are based on the **Reference Nutrient Intake (RNI)**.



When looking at low intakes of micronutrients, the Lower Reference Nutrient Intake (LRNI) is used.



For more information, go to: <https://bit.ly/36KUnji>

Vitamins

Vitamins are nutrients required by the body in small amounts, for a variety of essential processes.

Most vitamins cannot be made by the body, so need to be provided in the diet.

Vitamins are grouped into:

- fat-soluble vitamins (vitamins A, D, E and K);
- water-soluble vitamins (B vitamins and vitamin C).

Minerals

Minerals are inorganic substances required by the body in small amounts for a variety of different functions.

The body requires different amounts for each mineral.

Some minerals are required in larger amounts, while others are needed in very small amounts and are called 'trace elements'.

Minerals

Nutrient	Function	Sources
Calcium	Helps to build and maintain strong bones and teeth.	Dairy, calcium-fortified dairy-alternatives, canned fish (where soft bones are eaten) and bread.
Iron	Helps to make red blood cells, which carry oxygen around the body.	Offal, red meat, beans, pulses, nuts and seeds, fish, quinoa, wholemeal bread and dried fruit.
Phosphorus	Helps to build strong bones and teeth and helps to release energy from food.	Red meat, poultry, fish, milk, cheese, yogurt, eggs, bread and wholegrains.
Sodium	Helps regulate the water content in the body.	Very small amounts found in foods. Often added as salt.
Fluoride	Helps with the formation of strong teeth and reduce the risk of tooth decay.	Tap water, tea (and toothpaste).
Potassium	Helps regulate the water content in the body and maintain a normal blood pressure.	Some fruit and vegetables, dried fruit, poultry, red meat, fish, milk and wholegrain breakfast cereals.
Iodine	Helps to make thyroid hormones. It also helps the brain to function normally.	Milk, yogurt, cheese, fish, shellfish and eggs.

Vitamin D

Vitamin D is a pro-hormone in the body. It can be obtained in two forms:

- ergocalciferol (vitamin D₂);
- cholecalciferol (vitamin D₃).

Vitamin D₃ is also formed by the action of sunlight. Different to most vitamins, the main source of vitamin D is synthesis in the skin following exposure to sunlight. The wavelength of UVB during the winter months in the UK does not support vitamin D synthesis.



Tasks

1. Create an infographic on micronutrients. Focus on the definition of each micronutrient, daily recommendations and source.
2. Keep a food diary for four days and calculate the micronutrients provided per day. <http://explorefood.foodafactoflife.org.uk>

Name:

Date:

Planning what to cook

- Current healthy eating advice, dietary needs, socio-economic factors, preferences, occasion and cost need to be considered when planning to cook.



Planning what to cook

Deciding on what to cook or eat, whether for yourself or someone else, requires making a number of decisions:

- beliefs and values;
- consumer information;
- food preferences;
- food provenance;
- health and wellbeing;
- social and economic considerations;
- who, what, when and where.



Consumer information

Information can help consumers make informed choices, including

- advertising and marketing;
- media;
- online blogs/forums;
- packaging, nutrition and health claims;
- point of purchase information;
- product placement;
- recipe ideas.

Who, what, when and where

The time of day, location and who is eating can impact food choice:

- eating alone, with family or friends;
- celebration;
- day of the week,
- location, e.g. at home, school or work, at a restaurant, on the go;
- meal or snack;
- occasion and time of day.

Personal preferences

A number of factors can influence personal preferences, including:

- colour, size and shape of crockery and cutlery used;
- portion size;
- serving style;
- taste, aroma, texture, appearance, shape and colour of food.

Social and economic considerations

The cost of food, money available and social aspects will influence people's food choices:

- cost of food;
- greater food availability;
- income;
- labour saving equipment;
- lack of cooking skills;
- long hours at work;
- wider range of convenience foods.

Allergy and intolerance

There are 14 ingredients (allergens) that are the main reasons for adverse reactions to food. People who are allergic, or intolerant, to these ingredients should take care to avoid eating them. The 14 allergens are:

- | | |
|---------------------------|-----------------|
| Celery (and celeriac) | Milk |
| Cereals containing gluten | Molluscs |
| Crustaceans | Mustard |
| Eggs | Nuts |
| Fish | Peanuts |
| Lupin | Sesame |
| | Soybeans |
| | Sulphur dioxide |

Beliefs and values

Personal beliefs and values include:

- culture, tradition and heritage;
- food ethics, e.g. environment, fair trading, organic, free-range, local and seasonal food;
- lifestyle choices, e.g. vegetarian, vegan;
- religion.

Religion	Pork	Beef	Lamb	Chicken	Fish
Islam	x	Halal only	Halal only	Halal only	✓
Hinduism	x	x	✓	✓	✓
Judaism	x	Kosher only	Kosher only	Kosher only	✓
Sikhism	x	x	✓	✓	✓
Buddhism (strict)	x	x	x	x	x
Seventh-day Adventist Church	x	x	x	✓	✓
Rastafari movement	x	x	x	x	x

Food provenance

Food provenance is about where food is grown, caught or reared, and how it was produced. Food certification and assurance schemes guarantee defined standards of food safety or animal welfare. There are many in the UK, including:



Red Tractor



British Lion



RSPCA Assured



Marine Stewardship Council

Health and wellbeing

People may choose their food based on their own or their family's health and wellbeing:

- age and gender;
- allergy and intolerance;
- body image;
- health status;
- mental health;
- physical activity.

Eating the seasons

Most foods are grown in a particular season of the year, e.g. strawberries are harvested in summer in the UK. These are called 'seasonal foods'. Buying foods when they are in season will often mean that the price is lower. Technology and the importation of food has allowed food to be available all year round. Frozen foods, such as vegetables, are a great alternative to fresh, if they are unavailable.

Key words

Advertising: Advertising is a form of communication for marketing and used to encourage, persuade, or manipulate an audience to continue or take some new action.

Allergens: Substances that can cause an adverse reaction to food.

Ethical: Relating to personal beliefs about what is morally right and wrong.

Food certification and assurance schemes: Defined standards of food safety, quality or animal welfare.

Food provenance: Where food is grown, caught or reared, and how it was produced.

Marketing: Promoting and selling products or services, including market research and advertising.

Religion: A particular system of faith and worship.

Seasonal food: Food grown at a particular time of year.

Seasonality: The times of year when a given type of food is at its peak, either in terms of harvest or its flavour.

Task

Research one consideration when planning what to cook. Prepare a PPT presentation to share with the class next lesson.

To find out more, go to:
<https://bit.ly/3dNUMBf>

Sensory characteristics

- Ingredients are selected for their nutrition, functional and sensory characteristics, as well as provenance and seasonality.

Using our senses
A range of senses are used when eating food:

- sight;
- smell;
- hearing;
- taste;
- touch.

A combination of these senses helps to evaluate a food.

Other factors
Other factors also experience the way we feel about food. These include:

- food previously eaten;
- hunger and satiety;
- mood;
- where you eat, e.g. home, canteen, picnic;
- beliefs and values, e.g. religion, culture and tradition;
- social aspects, e.g. special occasions, events.

Sensory evaluation and tests
Sensory evaluation analyses and measures human responses to food and drink, e.g. appearance, touch, odour, texture, temperature and taste. In order to obtain reliable results, sensory evaluation tests should be set up in a controlled way to ensure fair testing, e.g. no distracting colours, noise or smells; same size portions; coded samples, and water to drink.

Preference tests - these types of tests supply information about people's likes and dislikes of a food. They include hedonic, paired comparison and scoring tests.

Discrimination tests - these types of tests aim to evaluate specific attributes, i.e. characteristics of a food (such as crunchiness). They include triangle, duo trio, ranking and paired comparison tests.

Key terms
Discrimination tests: Aim to evaluate specific attributes, such as crunchiness.
Preference tests: Supply information about people's likes and dislikes of food.
Sensory attributes: Words used to describe the appearance, odour, taste and texture of a food product
Sensory evaluation: A scientific discipline that analyses and measures human responses to the composition of food and drink.
The olfactory system: The sensory system used for olfaction, or the sense of smell.
Umami: Savoury taste, often known as the fifth taste.

Sight
The size, shape, colour, temperature and surface texture all play an important part in helping to determine your first reaction to a food. Often if a food does not look appetising, then you will not eat it.

Taste
The tongue can detect five basic tastes:

- bitter;
- salt;
- sour;
- sweet;
- umami.

Taste receptors
Our tongues are covered with taste buds, which are designed to sense chemicals in the mouth.

Smell (odour)
The nose detects volatile aromas released from food. An odour may be described by association with a particular food, e.g. herby, cheesy, fishy. The intensity can also be recorded.

Touch
Texture can be assessed through touch. When food is placed in the mouth, the surface of the tongue and other sensitive skin reacts to the feel of the surface of the food. The sensation is also known as mouth-feel.

Taste receptors
Sensitivity to all tastes is distributed across the whole tongue (and indeed other regions of the mouth where there are taste buds), but some areas are more responsive to certain tastes than others.

Smell and taste
Smell (odour) and taste work together to produce flavour. This is the reason why people with a blocked nose find it difficult to determine the flavours of foods.

Hearing/sound
The sounds of food being prepared, cooked, served and eaten all help to influence our preferences. The sound of eating food can alter our perception of how fresh a food is (e.g. crunchy carrots).

Umami
Umami is a savoury taste, often known as the fifth taste. It is a subtle taste and blends well with other tastes. Umami has its own distinct savoury taste, often associated with ripe tomatoes and cheese.

The olfactory system
The olfactory system is the sensory system used for olfaction, or the sense of smell.



	Tasting vocabulary (sensory attributes)		
Sight	Bubbling	Flaky	Opaque
	Caramelised	Firm	Smooth
	Clear	Heavy	Solid
	Coarse	Icy	Steaming
Smell	Crumbly	Juicy	Sticky
	Dry	Moist	Thick
	Acidic	Fresh	Spicy
	Aromatic	Meaty	Strong
Sound	Bland	Mild	Sweet
	Citrus	Pungent	Tart
	Earthy	Savoury	Weak
	Fragrant	Smoky	Zesty
Taste	Brittle	Crisp	Pop
	Crackle	Crunch	Sizzle
	Bitter	Rich	Strong
	Bland	Salty	Sweet
Touch	Floury	Savoury	Tangy
	Hot	Smoky	Tart
	Mild	Sour	Umami
	Piquant	Spicy	Zesty
	Brittle	Dry	Short
	Bubbly	Goey	Soft
	Chewy	Granular	Solid
	Close	Greasy	Tacky
	Cloying	Moist	Tender
	Coarse	Open	Waxy

Tasks

- Work through the sensory evaluation worksheets on *Food – a fact of life* <https://bit.ly/2WpSTov>
- Make a list of the sight, smell, taste, touch and sound of the different food had for lunch yesterday. Describe how these different attributes influenced your like/dislike of the different food.

Name:

Date:

Sensory science



Using our senses
A range of senses are used when eating food:

- sight;
- smell;
- hearing;
- taste;
- touch.



A combination of these senses helps to evaluate a food.

Appearance
The size, shape, colour, temperature and surface texture all play an important part in helping to determine first reactions to a food.

Taste
There are five basic tastes:

- bitter;
- salt;
- sour;
- sweet;
- umami.

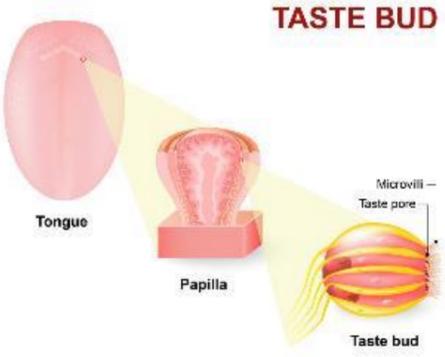
Smell (odour or aroma)
The nose detects volatile aromas released from food. An odour may be described by association with a particular food, e.g. herby, cheesy, fishy.

The intensity can also be recorded. Odour and taste work together to produce flavour.

Touch
Food texture is the way food is felt by the fingertips, tongue, teeth and palate. When food is placed in the mouth, the surface of the tongue and other sensitive skin reacts to its surface texture. This sensation is known as mouthfeel.

Hearing (sound)
The sounds of food being prepared, cooked, served and eaten all help to influence our preferences. The sound of eating food can alter our perception of how fresh a food is, e.g. crunchy carrots.

Taste receptors
Our tongues are covered with taste buds, which are designed to sense chemicals in the mouth. Most taste buds are located in the top outer edges of the tongue, but there are also receptors at the back of the tongue as well as on the walls of the mouth and at the back of the throat. As we chew food, molecules mix with saliva, enter taste pores and interact with gustatory hairs, also known as taste receptors. This triggers nerve impulses that are transmitted to the brain.



	Tasting vocabulary (sensory attributes)		
Sight	Bubbling	Flaky	Opaque
	Caramelised	Firm	Smooth
	Clear	Heavy	Solid
	Coarse	Icy	Steaming
	Crumbly	Juicy	Sticky
Smell	Acidic	Fresh	Spicy
	Aromatic	Meaty	Strong
	Bland	Mild	Sweet
	Citrus	Pungent	Tart
	Earthy	Savoury	Weak
Sound	Brittle	Crisp	Pop
	Crackle	Crunch	Sizzle
Taste	Bitter	Rich	Strong
	Bland	Salty	Sweet
	Floury	Savoury	Tangy
	Hot	Smoky	Tart
	Mild	Sour	Umami
Touch	Piquant	Spicy	Zesty
	Brittle	Dry	Short
	Bubbly	Goopy	Soft
	Chewy	Granular	Solid
	Close	Greasy	Tacky
	Cloying	Moist	Tender
	Coarse	Open	Waxy

Sensory evaluation and tests
Sensory evaluation analyses and measures human responses to food and drink, e.g. appearance, touch, odour, texture, temperature and taste. In order to obtain reliable results, sensory evaluation tests should be set up in a controlled way to ensure fair testing, e.g. no distracting colours, noise or smells; same size portions; coded samples, and water to drink.

Preference tests - these types of tests supply information about people's likes and dislikes of a product. They are not intended to evaluate specific characteristics, such as crunchiness or smoothness. They are subjective tests and include hedonic, paired comparison and scoring.

Discrimination tests - these types of tests aim to evaluate specific attributes, i.e. characteristics of products (crunchiness). They are objective tests and include triangle, duo trio, ranking and paired comparison.

Name: _____ Date: _____

Hedonic scale

Sample	1. Dislike very much	2. Dislike	3. Neither like or dislike	4. Like	5. Like very much	Comments

Overall conclusions: _____

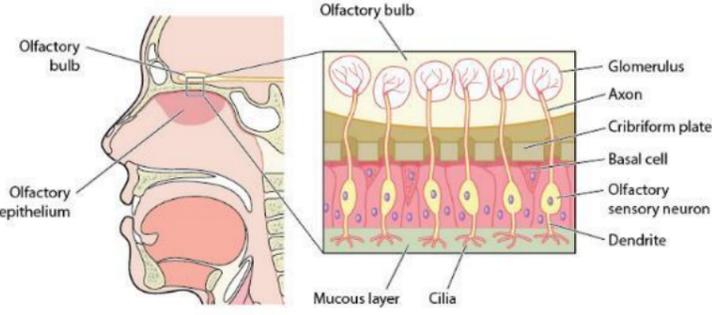
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Key terms
Fair testing: Ensuring that sensory tests obtain reliable results.
Food texture: The way food is felt by the fingertips, tongue, teeth and palate.
Olfactory system: The sensory system used for olfaction, or the sense of smell.
Senses: Sight, smell, hearing, taste and touch are all used when eating food and drink.
Sensory attributes: Words used to describe the appearance, odour, taste and texture of a food product
Sensory evaluation: Analyses and measures human responses to food and drink.

Intensity
Foods may be described by association, e.g. meaty, minty or fruity.

The intensity (low, medium or high) can also be recorded, e.g. garlicky or salty.

Olfactory system
This is the sensory system used for olfaction, or the sense of smell. As we breathe in, the olfactory receptor cells are stimulated by odours and the olfactory membrane sends neural messages up the olfactory nerve to the brain.



Tasks

1. Write a guide to conducting sensory evaluation tests that are fair and reliable.
2. Research umami and make a dish that is rich in the taste of umami.

To find out more, go to:
<https://bit.ly/2Bzsgq5>