

**2016 specification
first exams in 2018**

Macronutrients - Fats and Proteins

Chemical compounds found in food, and needed by the body in large amounts. Provide energy and building materials for the body's processes.

PROTEINS

large biomolecules built of amino acids bonded together in long chains

Proteins have many functions in our bodies:

- Build enzymes and hormones
- Build cell membranes
- Repair and maintain tissues
- Defend the body (antibodies)
- Secondary source of energy

There are approximately 20 amino acids in total and each one has a specific function in our body. While most can be made by our bodies, approximately nine cannot and have to be consumed by food.

- Essential amino acids - cannot be made by the body
- Non-essential amino acids - readily made by the body

Different foods contain different amounts of these essential amino acids. Foods that contain them all are called **high biological value** foods and a protein source that lacks one of these essential amino acids is called a **low biological value** protein.

Functional and Chemical Properties of Food 2

Fruits and Vegetables

Cooking and food preparation may have a large impact on nutritional value, appearance, flavour and smell of food products.

Foods such as bananas, apples and tomatoes need time to ripen. This ripening process is caused by enzymes.

Enzymatic Browning

Involves the discolouration of fruits and vegetables as a result of oxygen reacting with enzymes and plant cell substances.

Cooking, shredding, grating, slicing, peeling, etc.

Enzymes from the cytoplasm of cut plant cells react with substances from the air (oxygen) to cause browning.

Leads to change of cell composition (water and vacuoles) causing wilting and loss of turgor.

Why Particular Results May Not Always be Achieved

In cooking, everything depends - from the consistency and temperature of ingredients, to their amount, to the order they are used in, cooking time and temperature.

Cakes

the yeast was too much
the dough did not rise properly
the temperature was too high
the yeast was not activated properly
the yeast was not mixed properly
the yeast was not added in the right order
the yeast was not added in the right amount

Bread

the yeast was too much
the dough did not rise properly
the temperature was too high
the yeast was not activated properly
the yeast was not mixed properly
the yeast was not added in the right order
the yeast was not added in the right amount

Pastry

the fat was too much
the pastry was too sticky and difficult to handle
the pastry was too greasy and soft
the pastry was too dry and crumbly
the pastry was too hard and difficult to eat
the pastry was too bland and tasteless

Planning Balanced Diets for Individuals with Specific Lifestyle Needs

Planning Meals for Specific Dietary Needs

Some people cannot, or do not want to, eat certain products. It is important to take that into account when planning a meal or diet for them.

Vegetarians

People who do not eat any foods of animal origin.

- Lacto-vegetarians - eat dairy and eggs
- Ovo-vegetarians - eat dairy
- Piscitarians - eat fish

Vegetarians often choose foods which were produced with respect to animal welfare, such as free-range eggs or organic milk.

Vegetarian diet is suitable for all people, including pregnant women and children.

Vegetarian diet may be low in B12 protein, so people must remember about protein supplementation when planning their meals.

Vegans

People who do not eat any foods of animal origin, such as meat, fish, milk and dairy, eggs, honey and butter.

Often avoid using other products of animal origin, such as leather clothing, fur, feathers, etc.

All foods are plant-based.

- Rich in dietary fibre and most vitamins.
- May be low in protein.
- May lead to deficiency of vitamins B12, iron, and subsequent anaemia.
- May be very monotonous as the choice of products is smaller.

Physical Activity

People who are very active have higher energy needs and often need to consume additional macronutrients in order to remain healthy and support their stamina.

Carbohydrates

Needed as an easily accessible source of energy.

For whom? Athletes and marathon runners.

Electrolytes

Needed to maintain water balance in the body and prevent painful cramps.

For whom? All sportspeople.

Proteins

Needed to build and repair muscles.

For whom? Weightlifters and swimmers.

Fats

Needed to insulate the body and provide extra energy to maintain body temperature.

For whom? Those who train in the cold (e.g. winter sports, swimming).

Religion

Religion often dictates nutritional regimes, and indicates what foods can be eaten and when, and what foods should be avoided.

Fasting means that a person cannot eat any foods for a given period of time. Sometimes water and other beverages are permitted.

Alcohol consumption is forbidden by most religions.

	Islam (Muslims)	Judaism (Jews)	Hinduism (Hindus)
Eat	Halal food only	kosher food only Only fish which have both fins and scales can be eaten	Milk Mainly vegetarian
Don't eat (or drink)	Pork Alcohol Pork and shellfish without scales	Shellfish Pork Meat with dairy	Beef Alcohol
Holidays or fasting periods	Ramadan - month-long fasting period during which Muslims can eat only at night	Passover celebrates liberation of Jews from slavery in ancient Egypt Rosh Hashanah Yom Kippur Hanukkah	Diwali - Festival of lights
Other info	Halal means permitted, allowed To be halal, meat has to be produced in a special way, e.g. animals must be slaughtered in a continuous way where all blood is drained from them.	Kosher means clean. Kosher is a special religious-based diet during Passover. The dietary laws of Judaism are known as Kashrut.	Cows are sacred animals and, therefore, their meat cannot be eaten. During Diwali, sweets are given as gifts.

Topic on a Page

for GCSE Eduqas Food Preparation and Nutrition

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Completed Mind Maps

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All Mind Maps are provided in A3 and A4

Teacher's Introduction

This resource is primarily intended to be used during revision by students studying GCSE Eduqas Food Preparation and Nutrition.

As a revision tool, this resource does not aim to cover the material in depth, but rather provide visual 'mind maps' of the entire GCSE Eduqas Food Preparation and Nutrition theory specification, which students can use as the basis of their revision, covering all the key vocabulary and knowledge that students need for their exam. The resource is especially suited to visual learners, and those learners who find it hard to revise from written notes.

The resource consists of:

- 25 activity mind maps (partially complete) for students to complete, labelled
- 25 completed mind maps, which provide solutions to the activity mind maps,

All mind maps are provided in A3 and A4 formats.

How to use the resource:

- The sheets can be handed out at the end of the course, or at the end of each
- The mind maps can be printed out poster size and displayed on the classroom wall, so that students have a visual reminder of what they have been covered
- The resource also includes partially completed mind maps. Students could be given these as exercises as a way to recap on knowledge from the topic at the end of teaching a topic. Additionally, be asked to think of further examples to illustrate the points, which could provide more illustrations, or colour-code the mind maps, to aid memory.

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Macronutrients – Fats and

Chemical compounds found in food, and needed by the body to provide energy and building materials for the body.

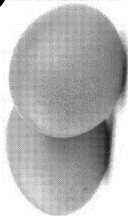
PROTEINS

large biomolecules built of amino acids bound together into long chains

15% of daily energy intake

A Identify the functions of proteins.

Functions

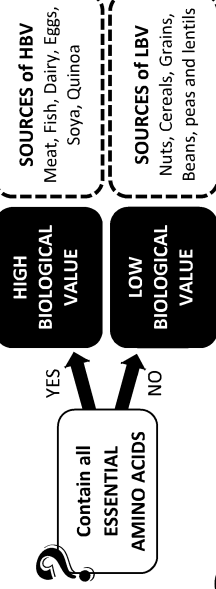


B Explain the difference between essential and non-essential amino acids.

There are approximately 20 amino acids. Some have a specific function in our body.

Essential amino acids and non-essential amino acids.

Different foods contain different amounts of these essential amino acids. Foods that contain them all are called **high biological value** foods and a protein source that lacks one of these essential amino acids is called a **low biological value** protein.



C Using examples, explain what is meant by protein complementation.

D List at least three essential amino acids and three non-essential amino acids.

What about vegetarian alternatives?

Vegetarians don't consume meat so instead they use protein alternative products, which are manufactured in order to provide protein in a diet, and protein-rich plant foods.

- Examples include:
- Mycoprotein (Quorn®)
 - Tofu
 - Tempeh
 - Soy chunks
 - Textured vegetable proteins (TVP)
 - Beans, lentils, chickpeas

Excess

Deficiency

E Identify what happens when we consume too little or too much protein.

FATS

The functions of fats

Functions

F Outline each of the functions of fats

Saturated

G Describe the structure of saturated and unsaturated fats



H Identify the health effects of excess fat

Excess

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Macronutrients – Carbohydrates

CARBOHYDRATES

large biomolecules built of carbon, oxygen and hydrogen, in form of simple, double or complex molecules consisting of hundreds of molecules of sugar bonded together

Identify how much of daily energy intake should be provided with carbohydrates.

There are two types of carbohydrate: sugars and polysaccharides. Sugars are further broken down into monosaccharides and disaccharides.

SUGARS

Sweet-tasting carbohydrates made up of simple or double chains of carbohydrates

Monosaccharid
One sugar molecule

Identify three monosaccharides and provide a source of each.

- 1.
- 2.
- 3.

Disaccharides
Two sugar molecules

Identify three disaccharides and provide a source of each.

- 1.
- 2.
- 3.

Digestible
Are absorbed and provide source of energy

Identify two types of digestible polysaccharides and two types of non-digestible polysaccharides.

- 1.
- 2.

Are not absorbed and do not provide health. Also known as fibre.

POLYSACCHARIDES
Long chains of sugar bound together. Also known as complex carbohydrates. Polysaccharides are either digestible or non-digestible.

Free sugar

Sugar that is added to food, or naturally present in food, and is not bound to fibre.

These should make up no more than 5% of your daily energy intake.

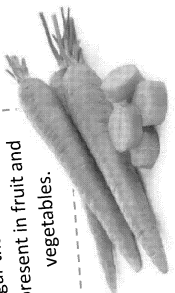
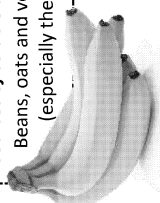
Intrinsic sugar

Sugar that is naturally present in fruit and vegetables.

SOLUBLE

- 1.
- 2.

Sources of soluble dietary fibre
Beans, oats and vegetables (especially the skins)



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Micronutrients – Minerals and Trace

Micronutrients are needed by the body in small amounts to facilitate a range of physiological functions

Identify the functions, and effects of deficiency or excess, of each of the minerals.

Calcium (Ca)

Functions:

Excess

Deficiency

DRV: 700 mg daily

Commonly found in milk and dairy products

Also present in nuts, bread and cereals, oily fish and green vegetables

Magnesium (Mg)

Functions:

Excess

Deficiency

DRV: 300 mg daily

- Leafy green vegetables e.g. spinach
- Nuts and whole grains
- Mineral water

Iron (Fe)

Functions:

HAEMOGLOBIN (protein in the blood cells, which bind oxygen and carry it around the body)

Non-haem iron (Easily absorbed by the body)

Red meat, offal, egg yolk

Non-haem iron (Difficult to absorb)

Green leafy vegetables, dried fruit, chocolate, lentils

MENSTRUATION: Part of the female monthly cycle when bleeding occurs, that increases the risk of developing iron-deficiency anaemia in girls and women

Excess

Potassium (K)

Functions:



Both deficiency and excess usually cannot occur in diet, but if they happen

Sources:

- Potatoes and yams
- Milk, chocolate, cocoa beans
- Bananas, avocados
- Nuts and dried fruits
- Vegetables and fruits
- Red meats

Excess

Functions:

Trace

Micronutrient in very small amounts

Iodine (I)

Excess

Deficiency

DRV: 140 mcg daily

- Red meat, sea fish, shellfish, cereals, grains, nuts and meat
- May be inhaled at the seaside and in salt caves

THYROID: small gland found at the front of the neck

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Micronutrients – Vitamins

Micronutrients are needed by the body in small amounts.

Fat-soluble Vitamins

Vitamins A, D, E and K, present mainly in fatty foods, which can be stored in the body for long periods of time – excess may be harmful

Vit. A

Retinol

active form of vitamin A. Found in animal-origin foods

Beta carotene

inactive form of vitamin A. Found in plant foods

Functions:

Sources:

Deficiency: blindness, flaky and dry skin
Excess: harmful for unborn babies

DRV 600 mcg daily

Vit. D

Cholecalciferol

Vitamin D

deficiency is very common in the UK. For that reason, a doctor can prescribe you a vitamin supplement.

Functions:

Sources:

Deficiency: rickets, osteoporosis, depression, increased risk of cancer
Excess: damage to the kidneys and other organs, weakened bones

DRV 10 mg daily

B Define what is meant by antioxidants. Name three vitamins that are antioxidants.

Antioxidants

Free Radicals

Particles of oxygen which have too few electrons and steal electrons from other particles in the body, causing damage and oxygen stress.

Vit. E

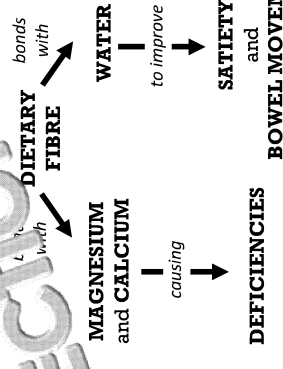
Fat-soluble vitamin present in vegetable oils, nuts and seeds. Needed to maintain healthy skin. Antioxidant.

Vit. K

Fat-soluble vitamin present in leafy green vegetables, dairy and egg yolks. Also produced by bacteria in the gut. Necessary for proper blood clotting.

Complementary Actions of Nutrients

Various nutrients work together in the body to carry out chemical processes and enhance health.



Dietary fibre absorbs water to enhance digestion. Excess fibre can affect absorption of minerals from food, leading to deficiency of them.

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Planning Balanced Diets

Current Guidelines

Nutritional needs of people differ depending on:

age, weight, height	sex/gender
physical activity levels	state of health

A Draw a simple diagram to show nutritional guidelines presented in the table.

B List four out of the eight tips for healthy eating.

G

How Nutritional Needs Vary Depending on Age

As we age, nutritional needs change for a number of reasons. It is important to adjust the diet to the individual requirements of a person.

Toddler (1-3)

C Explain what is meant by the 32 rule when planning diets for toddlers.

Young children (4-10)

D Give two reasons why young children should limit consumption of sugary beverages and sweets.

Teenagers

E Explain why teenage girls eat more than teenage boys.



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Planning Balanced Diets for Individuals

Planning Meals for Specific Dietary Needs

Some people cannot, or do not want to, eat certain products. It is important to take that into account when planning a meal or diet for them.

Vegetarians

People who do not eat meat and sometimes other foods of animal origin.

A Name three different groups of vegetarians and state what foods of animal origin they can/cannot eat.

-
-
-

Vegetarians often choose foods which were produced with respect to **animal welfare**, such as free range eggs or organic milk.

- + Vegetarian diet is suitable for all people, including pregnant women and toddlers.
- Vegetarian diet may be low in HBV protein, so people must remember about **protein complementation** when planning their meals.

Vegans

People who do not eat any foods of animal origin, such as meat, milk, dairy, eggs, honey or leather.

Often avoid using other products of animal origin, such as leather clothing, fur, feathers, etc.

All foods are plant-based.

B Name one nutrient provided in abundance in a vegan diet, and one nutrient which might be deficient.

Religion

Religion often dictates nutritional regime, and indicates what foods can be eaten and when, and what foods should be avoided.

Fasting means that a person cannot eat any foods for a given period of time. Sometimes water and other beverages are permitted.

D Name two foods which can be eaten by the followers of these religions.

E Explain the following, assign them to the correct religion:

- halal
- kosher



Alcohol consumption is forbidden by most religions

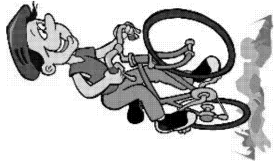
Eat	Islam (Muslims)	Judaism
Halal food (or not)	- Kosher food only - Only fish which can be eaten	
Holidays or fasting periods	Ramadan – month-long fasting period during which Muslims do not eat or drink between dawn and sunset.	- Passover celebration from slavery in a - Rosh Hashanah - Yom Kippur - Hanukkah
Other info		

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1 Diet and Good Health



A Explain how the following factors affect energy needs.

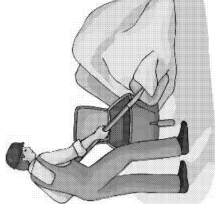
Lifestyle

Genetics

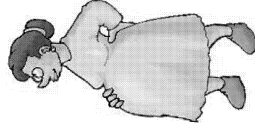
Genes control our body composition (how much muscle and fat tissue we have), the ratio of metabolism, etc.

Sex

Occupation
People who are physically active at work will need more energy than those who are not active.



Height and Weight



Pregnancy

Factors Affecting Energy Needs

Daily Energy Intake

To remain healthy, we need to ensure that the energy in our diet comes from various sources.

B State how much energy should be provided with the following macronutrients in a balanced diet: **starches, sugars, proteins and fats.**

Energy is measured in kilocalories [kcal] or kilojoules [kJ].

$$1 \text{ kcal} = 4.184 \text{ kJ}$$

Sources of energy include:

Protein	4 kcal / 1 g
Carbohydrate	4 kcal / 1 g
Alcohol	7 kcal / 1 g
Fat	9 kcal / 1 g

Who needs more energy?

1. Professional sportspeople and people with very active lifestyles.
2. Women at the end of pregnancy and when breastfeeding.
3. People suffering from certain diseases such as cystic fibrosis, and certain forms of cancer, or extensive burns.

What Happens if Someone Eats Little Energy?

Energy balance means that a person provides with food the energy needed to carry out all daily tasks and perform all bodily functions.

If there is too little or too much, the body begins to malfunction and disease occurs.

Energy Deficiency

This occurs when more energy is provided with the diet than is used.

- This can lead to:
- weight gain
 - overweight and obesity
 - joint pains
 - type 2 diabetes
 - coronary heart disease
 - hypertension
 - bowel and breast cancer

Energy Excess

This occurs when less energy is provided with the diet than is used.

- This can lead to:
- weight loss
 - malnutrition
 - osteoporosis
 - anemia
 - heart disease
 - diabetes
 - cancer

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Planning Balanced Diets

Dietary Needs and Nutritional Deficiencies

A Complete the empty fields to provide:

- two reasons or risk factors for the disease
- two health effects or symptoms
- an explanation of how to adjust the diet to meet the needs of people suffering from a given condition

Diet: all food and eating habits of a person



Nutrition: macro- and micro-nutrients provided with diet

Obesity

Description:

- Condition in which fat is stored by the body in large amounts
- 25% of adults and 16% of children in the UK are obese.

Reasons why...

Results in...



How diet should be changed to meet the need

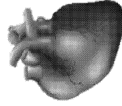
Coronary Heart Disease

Description:

- Chronic condition in which blood vessels in the heart are narrowed
- Cholesterol plaque build-up
- CHD is the main cause of deaths in the UK

Reasons why...

Results in...



How diet should be changed to meet the needs...

Iron-deficiency Anaemia

Description:

- Condition caused by lack of iron in the diet or by impaired absorption in the gut
- Girls and women are at greater risk of developing iron-deficiency anaemia due to menstruation (monthly bleeding)

Reasons why...

Results in...



How diet should be changed to meet the needs:

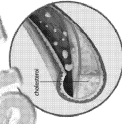
Hypercholesterolemia

Description:

- Condition in which blood cholesterol levels (total cholesterol and LDL cholesterol) are abnormally high

Reasons why...

Results in...



How diet should be changed to meet the needs:

Liver Disease

Description:

- Chronic or acute inflammation of the liver

Reasons why...

Results in...



How diet should be changed to meet the needs:

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Planning Balanced Diet

Dietary Needs and Nutritional Deficiencies

Coeliac Disease

Reasons for the condition:

- occurs in people with genetic predisposition
- cannot be cured, but can be treated – coeliac disease diet
- follow a gluten-free diet from birth to the end of their lives

C Name three cereals which cannot be consumed by coeliacs.

Reasons for the condition:

- lack of lactase enzyme in the small intestine
- risk of developing lactose intolerance increases with age

Results in:

Explain why lactose intolerant people can consume fermented dairy products.

A Define the following terms:

- coeliac disease
- lactose intolerance
- food intolerance

B

Identify two symptoms of each of the conditions.

Lactose Intolerance

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The Effect of Cooking on

Why food is cooked

Applying heat to food is advantageous for a number of reasons. It not only makes the food safe to eat, but also gives it the desired palatability and organoleptic qualities.

A Describe how cooking of food helps to obtain the following advantages, and provide an example of each.	
Explanation	Example
To Improve Digestion	
To Improve Taste	
To Improve Texture	
To Improve Appearance	
To Avoid Contamination	

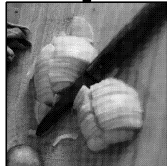
There are three methods of cooking:

B Describe how the method works	
How Does It Work?	
Pattern	
Example	

C Describe one of the methods	

Water-based Cooking Methods

Steaming	
Boiling	
Simmering	Long time required causes vitamin loss, helps to obtain tender meats and aromatic sauces.
Blanching	
Poaching	
Braising	

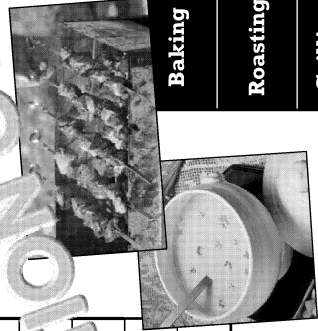


During cooking, onion becomes brown, soft and sweet.

Various cooking methods help preserve or modify the nutritional value of food. Cooked foods can also be safely stored for a long time.

D Explain how the following cooking methods affect the nutritional and sensory qualities of food.

Dry Methods	
Baking	
Roasting	
Grilling	May create harmful substances. Usually creates appealing brown-black finish.
Dry frying	



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The Positive Use of Micro

Various microorganisms and enzymes are commonly used in the production of food to improve the texture and flavour of food, often improving its digestibility and providing health benefits.

Enzymes

Enzymes such as **rennet** break down chemical bonds between amino acids in proteins, changing the texture of food. They also affect the aroma and taste.

Bacteria

Probiotic bacteria ferment lactose in milk and turn it into lactic acid. This acid turns the milk sour and coagulates the proteins in it, which gives it a thick, creamy texture.

Moulds

Mould breaks down long chains of amino acids, which change the flavour of food.

A Name one product which is produced with the use of both enzymes and bacteria.

Blue Cheese and Camembert

Moulds create the white coat on the outside and the blue/green veins on the inside of various cheeses, such as Devon blue, Roquefort and Brie.



Sauerkraut and Pickled Vegetables

Probiotic bacteria produce acid, which makes the vegetables sour and keeps them crispy. Acid also prevents growth of pathogenic microorganisms.

Cooked soy beans and vegetables in a mixture has fermented.

E Explain how bread is made.

How it is Made:

B Name one dairy product which is produced with the use of bacteria, and explain how it is made.

How

Pickled Fish

One of the most popular pickled fish is herring. An example is Swedish surströmming.

Sausages

- bacteria transform nitrates to nitrites, which means the meat remains bright red
- bacteria produce acid, which denatures protein and improves the texture
- mould creates a white coat, which shields the sausage from other microorganisms

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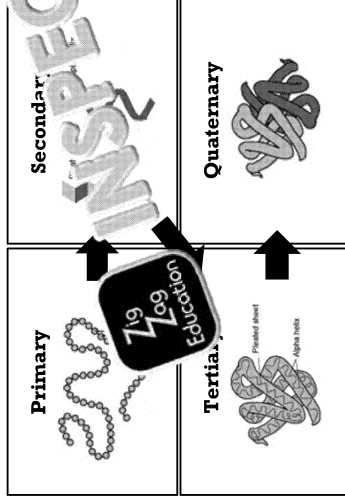
Functional and Chemical Properties

The chemical structure of food ingredients plays a vital role in how they can be used in food. The structure of proteins, carbohydrates and fats usually damages their structure, which he

Proteins

Macromolecules built of thousands of amino acids bonded together into long chains
Amino acids → peptides → polypeptides (proteins)

The structure of proteins:



A Identify three factors which cause protein denaturation.

Functional and chemical properties:

1. Denaturation – damage to the protein's structure caused by:

- 1.
- 2.
- 3.

2. Coagulation

3. Syneresis

4. Gluten formation

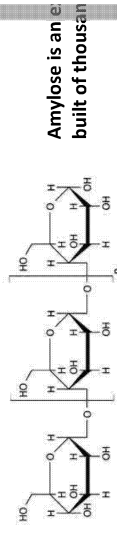
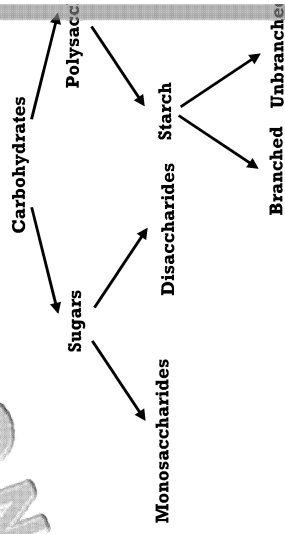
5. Foam formation – air bubbles trapped in a liquid (e.g. egg white).
Whisking makes proteins unravel and denature.

B Define coagulation and syneresis.

C Outline how gluten is formed.

Carbohydrates

Macromolecules built of thousands of amino acids bonded together into long chains
Amino acids → peptides → polypeptides (proteins)



D Explain how the following processes happen.

Functional and chemical properties:

1. Gelatinisation

3. Caramelisation*

*Caramelisation is not required by the specification; however, it is a process that occurs in food during cooking, causing changes in appearance and flavour.

Fruits and Vegetables

Cooking and food preparation may have a large impact on nutritional value, appearance, flavour and smell of food products.

Foods such as bananas, apples and tomatoes need time to ripen. This ripening process is caused by enzymes.

Enzymatic Browning

Involves the discolouration of fruits and vegetables as a result of the reaction between phenolic substances and plant cell substances.

Cutting, shredding, grating, biting, peeling, etc.

Leads to damage or cell vacuoles (spaces) and cytoplasm (outside of vacuole)

Leads to damage or cell vacuoles (spaces) and cytoplasm (outside of vacuole)

Leads to corrosive effect (brown colour and vitamin loss)



This process can be slowed down or accelerated...

A Identify two ways in which enzymatic browning can be slowed down or accelerated.

Slowed down by

- 1.
- 2.

Accelerated by

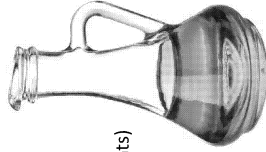
- 1.
- 2.

B Provide two examples of fruit and vegetables which are prone to enzymatic browning.

- 1.
- 2.

Oxidation

- The process when substances combine with oxygen, leading to the destruction of chemical structure and nutritional value of food (e.g. rancidity in fats)
- Causes changes in taste, smell and nutritional value of food (e.g. rancidity in fats)



Leaving oil without a cover will cause it to become rancid.

C Identify two ways in which oxidation can be slowed down or accelerated.

Slowed down by:

- 1.
- 2.

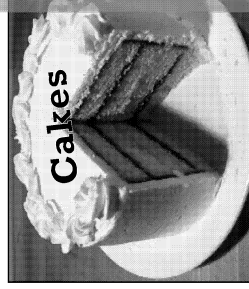
Accelerated by:

- 1.
- 2.

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Why Par

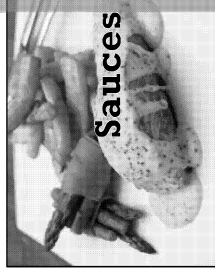
In cooking, everything matters – if you get the timing and temperature.



Cakes

Why did my cake not turn out this good?'

- ★ too much sugar was added
- ★ the cake was too high up in the oven
- ★ too much flour was added
 - the cake is tough and dry
- ★ not enough rising agent was added
 - the cake/dough did not rise
- ★ wrong raising method was used
 - the cake did not rise
 - the cake is tough and has a closed texture
- ★ the tin was overfilled
 - the cake burnt on top
 - the top has cracked
 - the cake has overboiled
- ★ the batter was too wet
 - the fruit sank



Sauces

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Food Spoilage

Food spoilage may be caused by many various microorganisms: by bacteria, yeast and mould. It is important to correctly store food and apply food safety principles to avoid food products.

Microorganisms

Tiny organisms visible only under a microscope
Bacteria, yeast and mould

Identify and describe the ideal conditions for microorganisms' growth.

Growth conditions

Most microorganisms will grow optimally in danger zone temperature (5-63 °C) but will not grow below or above that limit. This is because enzymes necessary to replicate the cell become inactive at temperatures below 5 °C and over 63 °C.



Define and give two examples of high-risk foods.

Microorganisms' growth can be controlled by:

- ✓ storing food in proper conditions
- ✓ freezing or refrigerating fresh food
- ✓ cooking thoroughly before eating
- ✓ not refreezing cooked food



Signs of Food Spoilage

Many species of microorganism and some enzymes can cause food spoilage or diseases.

Identify one sign of food spoilage caused by the following factors.

	Bacteria	Yeast	Mould	Enzymes
Food Spoilage				

Preservation Methods

Growth of microorganisms can be prevented by preservation methods.

Explain how the following preservation methods work.

Method	How it works?
Jam making	
Pickling	Microorganisms live in acidic conditions. That's because low pH and high concentration of salt causes water to be drawn from their cells.
Freezing	
Bottling	
Vacuum packing	High temperatures kill microorganisms and inactivate enzymes.

Enzymes

- Biologically active proteins
- They are catalysts, which speed up the tempo of chemical reactions
- Enzymes are necessary for the life of food.

Darkening of fruit and vegetables is called enzymatic browning. It should be avoided to prevent food from becoming unattractive.

Cross-contamination

Define cross-contamination.

Food can become contaminated by:

- × waste food and food scraps
- × pests and rodents
- × the cook's hands
- × work surfaces and equipment
- × other contaminated food

Food Poisoning

- Food poisoning is a disease caused by eating food that contains certain microorganisms.
- Microorganisms which cause food poisoning are called pathogens.
- A person who carries a pathogen is called a carrier.

Food poisoning bacteria

- × *Campylobacter* → undercooked poultry, milk
- × *E. coli* → undercooked meat, dirty hands
- × *Salmonella* → raw unpasteurised milk, poultry, cream, hair
- × *Staphylococcus aureus* → food handled by infected person

Symptoms of food poisoning

- ⊗ Stomach pains and cramps
- ⊗ Nausea and vomiting
- ⊗ Diarrhoea

Faecal contamination
with *E. coli* may occur when people don't wash their hands after using the toilet or when human and animal body waste is used to fertilise crops.

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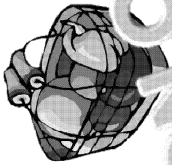
Buying, Storing, Preparing and Consuming Food

Applying certain rules when buying, preparing and cooking foods, and proper storage, can help to avoid food spoilage and contamination, and lowers the risk of food poisoning.

Buying Food

When buying food it is important to ensure food's quality by:

- ✓ checking the date marks
- ✓ carrying out visual checks



A Explain the difference between the best before and use by date marks. Identify one food for which each of them would be relevant.

Date Marks

Best before :

Use by :

Labelling

Foods are often labelled specifically to identify storage conditions and instructions for preparation. This helps to:

- enhance the shelf life of food
- ensure it's nutritious and safe to eat
- ensure it's prepared in a correct way to offer all nutritional and sensory values

Preparing Food



Applying these rules will help to prevent cross-contamination and food poisoning!

B Identify two practices associated with the following food safety principles.

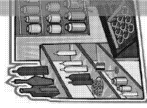
Personal Hygiene	Work Surfaces
Separation of foods	Temperature Control

Storing food in correct conditions helps to maintain its quality, safety and freshness.

Chilling and Freezing
Correct use of a fridge-freezer ensures freshness and safety.

Ambient Storage

Storing food at room temperature (usually around 20 °C)



Food Covering and Packaging

1. Protects from light
2. Protects from air, oxygen and dust
3. Protects from pests and rodents
4. Prevents tainting

To prevent food poisoning, one must:

E Identify the correct temperatures for the following processes.

F Explain what is meant by the range of temperatures for the following processes.

Temperature

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Food Provenance

Where and how food is made depends on many factors, such as:

- climate
- soil quality
- availability of water and other resources
- availability of land suitable for growing plants and pastures
- the size of a population and how much food needs to be produced

Other factors, such as religion and ethical beliefs of local communities, also play an important role in deciding where food will be made in the nearest area.

For example, more and more people are becoming interested in the UK nowadays due to the fact that free-range hens are happier and produce better quality eggs, but also to ensure animal welfare standards are met.

Sustainable Fishing

Rearing fish and seafood in fish farms for meat, caviar, pearls, animal feed or other reasons. Sustainable fishing means that fishing in natural fisheries is allowed only for certain period of time so that the shoal of fish has the chance to reproduce and restore itself.

C Identify two advantages and two disadvantages of fish farms.

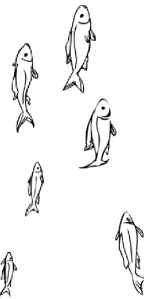
Advantages of Fish Farms:

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

Disadvantages of Fish Farms:

- 1.
- 2.

- **Purse seining:** fishing where large numbers of fish are trapped in a large net in which fish and other sea organisms are trapped.
- **Longlining:** fishing with the use of a long line to which other lines are attached, each of which ends with a hook.
- **Bottom trawling:** pulling a large net along the sea bottom, used to catch shrimp and bottom-dwelling fish.



Where and How Food is Produced

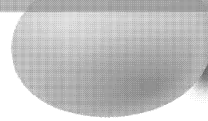
The way food is grown, reared and caught affects its safety and amount. Modern technologies help produce a large amount of food while ensuring it's safe to eat.

Egg Production

D Name and describe egg production methods which use the following symbols.

Symbol	Method	Conditions
1		
2		
3		

Red Lion Scheme is a quality mark which ensures that all hens were vaccinated against salmonella so the eggs are safe to eat.

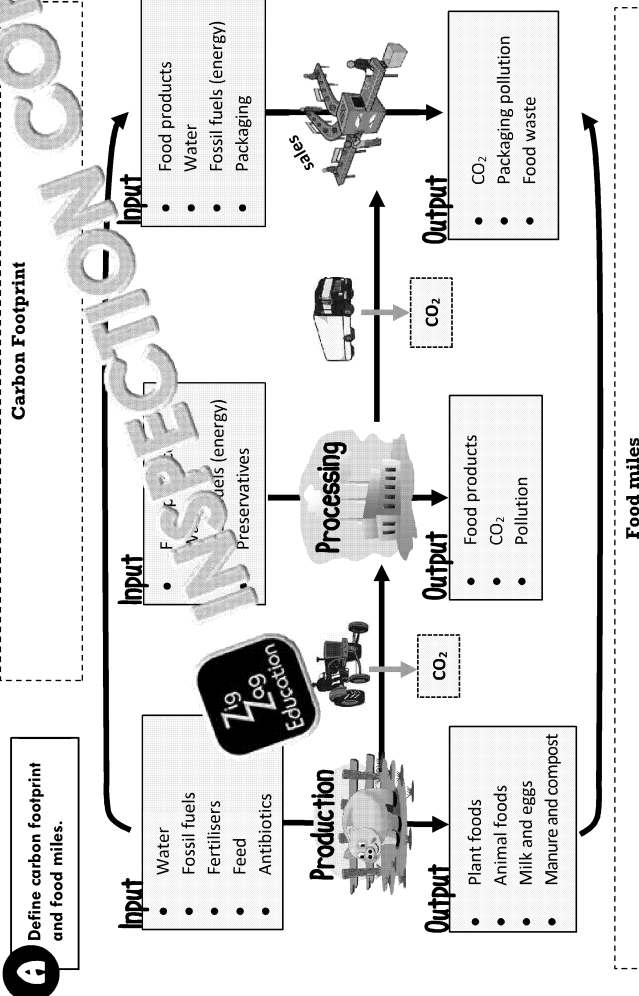


Food and the Environment

Each step of food production has a huge impact on the environment. Overexploitation of soil and fossil fuels, together with transportation and packaging of the food, largely contribute to the effect of that process is known as the carbon footprint. Climate change is becoming more and more severe because they are caused by greenhouse gases. Severe hurricanes and massive crop failure due to climate change are causing food availability issues around the world.

Why Carbon Dioxide is So Dangerous

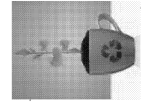
Food production, at each of its stages, emits large amounts of carbon dioxide. Carbon dioxide creates an impermeable coat around the earth. When warmth is reflected from the surface of the earth, it is caught by that coat and bounced back. As an effect, the average temperature on Earth rises, and that affects plant and animal species...



How Food Production Affects the Environment and Communities

Food production has direct and indirect effects on the environment by creating levels of pollution or deforestation. The way we produce and transport food is also meaningful to those who produce it: farmers, farmworkers, and even people working in your local community.

D Indicate two advantages and two disadvantages of local food production.



Advantages of Fairtrade:

- Ensures fair wages and prices
- Improves working conditions
- Empowers local communities, farmers and workers
- Supports education and growth in poor countries
- Helps to protect the environment

... the effect of that process is known as the carbon footprint. Climate change is becoming more and more severe because they are caused by greenhouse gases. Severe hurricanes and massive crop failure due to climate change are causing food availability issues around the world.

Carbon dioxide and other greenhouse gases form a coat around the earth. The heat cannot escape from the atmosphere temperature. Glaciers melt and the sea level rises faster due to evaporation. Fierce hurricanes, rain, and droughts devastate the land. Crop failure due to climate change is causing food availability issues around the world.

Climate change affects food availability around the world. Causes of crop failure around the world include:

C Identify two factors which affect food security.

Food availability may be affected by:

- 1.
- 2.

E List three causes and three effects of food poverty.

Food poverty

Situation when a person or a community does not have access to buy sufficient amounts of food.

Causes of food poverty:

- 1.
- 2.
- 3.

Effects of food poverty:

- 1.
- 2.
- 3.

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British Cuisine

Cuisine is a style of cooking characteristic for a given region or country, which uses specific ingredients, dishes, preparation and cooking methods.

Cuisine may be affected by many different factors, such as climate, type of soil available for growing plants, or the availability of local ingredients.

Distinctive features and characteristics of cooking

Main ingredients used, traditional dishes and other factors which distinguish the cuisine from others.

A Identify five ingredients characteristic of British cuisine.

Traditional ingredients:

- 1.
- 2.
- 3.
- 4.
- 5.



Traditional meals and dishes differ depending on the region (see below).



Equipment and cooking methods

Kitchen utensils, dishes and cooking methods specific to a given cuisine.

Equipment used in cooking, now replaced by modern ovens.

- Black ceramic dishes used for stews, soups and sauces
- Tins and moulds for making puddings, pies and tarts

Cooking methods:

- Stewing, simmering and braising
- Roasting and baking
- Grilling and barbecuing
- Poaching
- Frying



Eating patterns

The meal is divided into three parts: breakfast, lunch and dinner. The meals are eaten at different times of the day. This is changing dynamically due to busy lifestyles.

B Give examples of three eating patterns characteristic of British cuisine.

- 1.
- 2.
- 3.

Traditional Food of Great Britain

C List three foods associated with each of the countries of Great Britain.



England



- 1.
- 2.
- 3.



Wales

- 1.
- 2.
- 3.



Northern Ireland

- 1.
- 2.
- 3.

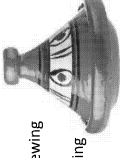
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International Cuisines

The cuisine depends on a region: its culture, religion, climate and weather conditions, and for centuries, countries and regions have created a variety of meals, cooking dishes and methods, and even s

Distinctive features and characteristics of cooking		Equipment and cooking methods	Eating patterns
A Name three countries which lay in the Mediterranean region. For each of them identify three ingredients or dishes	1. 	Equipment: - Clay cooking pots - Electric ovens - Thick ceramic dishes for stews - Skillet – shallow frying pan used to make paella - Tagine – a dome-shaped clay dish used to prepare tagines in Arabic countries Cooking methods: - Baking - Frying - Simmering and stewing - Grilling - Steaming and boiling 	C Describe the eating patterns characteristic of Mediterranean countries.
	Each canton in China has its own, regional cuisine and uses different ingredients and spices (e.g. Szechuan and Cantonese) Ingredients: noodles and rice, pork, duck, chicken, Chinese cabbage, water chestnuts, bamboo shoots, mushrooms, bean sprouts, soy, soy sauce, lychee fruit, fish and seafood, eggs, ginger, garlic, sesame and peanut oil Traditional meals: steamed or fried rice, chicken soup with noodles, tofu and stinky tofu, moon cake, spring rolls, wontons, dumplings, chow mein, sweet and sour pork	Equipment: - Wok – deep, rounded pan - Chopsticks – used instead of cutlery - Bamboo strainers – used to drain wontons and dumplings - Cleaver – large, heavy-duty knife used by chefs - Brightly coloured lacquerware and porcelain dishes used to serve foods Cooking methods: - Stir-frying and deep-frying - Steaming and boiling - Red stewing 	- Breakfast is rather light, may consist of soy milk, noodles or soup - Lunch is usually eaten in a nearby canteen or ordered in, rather light, consists of rice or noodles with meat and vegetables - Dinner is large and often eaten in a restaurant, with a broad selection of meats and vegetables - Soup is eaten throughout a meal, not only at the beginning
B Identify the staple food and the main cooking method in each cuisine	Ingredients: rice, soya, fish and seafood, noodles, seaweed, eggs, seasonal foods, green tea, wasabi Traditional meals: sushi, tempura, donburi, udon noodles, miso soup, sashimi	Equipment: - Wok – deep, rounded pan - Chopsticks – used instead of cutlery - Bamboo strainers – used to drain wontons and dumplings - Cleaver – large, heavy-duty knife used by chefs - Brightly coloured lacquerware and porcelain dishes used to serve foods Cooking methods: - Stir-frying and deep-frying - Steaming and boiling - Red stewing 	- Typically three meals during the day - Early breakfast, might contain boiled white rice with various sides - Lunch may be substituted with light snacks - Dinner, usually shared with family or friends
	Also differs from other cuisines Shaped by colonialism Ingredients: pearl millet, rice, lentils, chickpeas, beans, peanut oil, coconut milk, ghee butter, paneer cheese, many rich spices Traditional meals: fired paneer, vindaloo curry, rogan josh, korma, bhajji, tandoori chicken	Equipment: - Wok – deep, rounded pan - Chopsticks – used instead of cutlery - Bamboo strainers – used to drain wontons and dumplings - Cleaver – large, heavy-duty knife used by chefs - Brightly coloured lacquerware and porcelain dishes used to serve foods Cooking methods: - Stir-frying and deep-frying - Steaming and boiling - Red stewing 	- Rich, filling breakfast is important to provide energy for the whole day - Betel leaves may be eaten after the meal to support digestion - Evening meal is usually eaten with the whole family, it is the most important meal of the day

*This provides two cuisines, however schools or colleges/students can select any two different cuisines

Food Production and Processing

Various methods of food production and processing help to produce a variety of food products, but can also affect the nutritional value of the food.

Primary Sources of Food

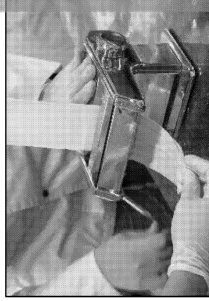
Foods in their natural, raw state, e.g. milk, wheat grains, apples



Primary processing of food

Does not significantly affect natural values of food products

Complete the diagrams to indicate five primary and five secondary processes applied to foods.

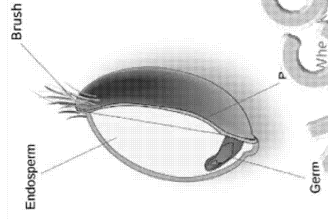


The Making of Flour

1. Harvesting and transporting to the factory/mill
2. Separating from dirt, stones, pieces of metal and other pollution
3. Washing and drying to easily separate the bran
4. Milling
5. Sieving to separate the bran

Bran: the outer layer of a grain

Milling: the process of grinding and purifying grains to obtain flour



B Describe the following processes applied to milk and explain how they change the characteristics of milk.

Heat Treatment

Pasteurisation:

Ultra heat treatment:

Micro filtration:

Homogenisation:

Sterilisation:

Drying:



The making of pasta

1. Harvesting the cereals and transporting to the factory
2. Milling and transportation to the factory
3. Mixing flour with warm water
4. Kneading and gluten formation
5. Adding flavourings and colour
6. Rolling and pressing
7. Pasteurisation with steam
8. Cutting the pasta into chosen shapes
9. Drying
10. Packaging

The Making of Cheese

1. Milking cows and transporting to the factory
2. Pasteurisation and homogenisation
3. Warming up to 42 °C
4. Adding starter culture
5. Fermentation (ripening)
6. Cooling
7. Adding flavourings
8. Packaging

Starter cultures:

Fermentation:

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Modern technologies not only help to obtain high-yield crops, but also help to better preserve and improve the quality of food products.

Supporting Health



What we eat has a huge impact on health. Eating too little may lead to deficiency of a given nutrient. This is important since processing of food often leads to decrease of its nutritional value – higher calorie content, but lower vitamin and mineral amount, etc.

Governments and producers strive to make food safe and healthy for the consumers by adding substances which are beneficial for health.



Cholesterol and Fat Spreads

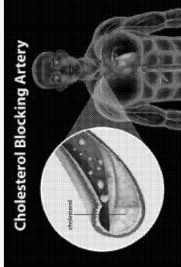
Cholesterol: fatty substance that is used to transport fats around the body. It is found in many animal-derived products, such as meat, cheese and eggs. Cholesterol does not occur in plant-derived products.

- LDL is 'bad' cholesterol because it increases its amount in blood
- HDL is 'good' cholesterol because it transports it to the liver and lowers its amount in the blood

Identify two health outcomes of high blood cholesterol level.

Health outcomes of increased cholesterol levels and excessive fat consumption:

- 1.
- 2.



Some fat spreads are enriched in **plant sterols** and **plant stanols**. These substances have proved to be effective in lowering blood cholesterol level and preventing atherosclerosis.

Food Fortification

During processing, many food products lose their nutritional value.

The purpose of food fortification is to:

- restore nutritional value of foods
- improve nutritional value of foods
- make food more suitable for certain groups of consumers
- prevent diseases caused by malnutrition



Some foods are fortified by law:

Wheat flour and bread	
Vegetable fat spreads	
Semi-skimmed and skimmed milk	

Other foods, such as cereals or fruit juices, are fortified voluntarily.

60% Whole wheat flour
38% Whole wheat flour
Niacin, iron
Thiamin B1
Vitamin B6



Indicate one advantage and one disadvantage of food fortification.

Disadvantages

Advantages	Disadvantages
Colourings	
Emulsifiers and stabilisers	
Flavourings	
Preservatives	

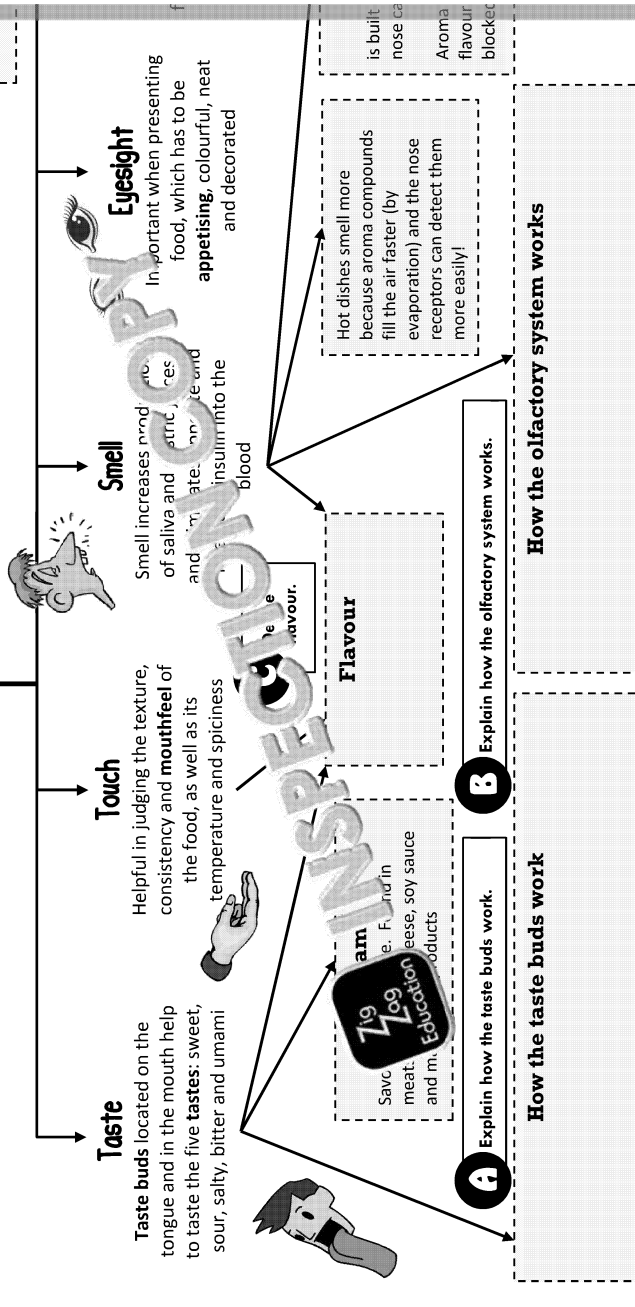
Food additives may be both natural (e.g. beetroot extract) and synthetic (e.g. citric acid).

All food additives are carefully tested before they may be used in food products. They are listed on the food label along with their E number.



Sensory Perception

Helps to ensure the quality, consistency in time and acceptability of food by consumers by the use of the five senses:



Sensory Analysis Tests

D Explain how the following sensory analysis tests are used.

Preference tests

are used to discover if a food is acceptable for the consumers

Paired preference test

Hedonic test – to identify preferred sample out of a few

Which one do you like most?

☐ Sample 587 ☐ Sample 895 ☐ Sample 758 ☐ Sample 958

Grading

are used to rank samples, which are ordered of preference given factor

Rating test – measures the acceptability of a given feature in a number of samples OR a number of features in one food product; foods are rated on a scale from 1 to 5 or 1 to 9

Which sample is the crispiest?

☐ ☐ ☐ ☐ ☐ OR ☐ ☐ ☐ ☐ ☐

saltness
sweetness
spiciness
creaminess
fruitiness

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Physical Activity Level

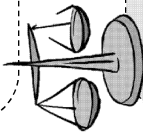
Amount of energy needed to perform all daily tasks, i.e. waking up, showering, jogging, working, shopping, etc.

The more active the person, the more energy needed.

If you eat more than you need (your PAL is low), you are likely to gain weight.

If you do not eat enough or you are very active (your PAL is high) then you are likely to lose weight.

Keep your diet balance



Healthy Eating

Factors Influencing Food Choice

Food choices are driven by many various factors, which are very important when planning diets, meals and menus.

Time Available to Prepare Food

→ Rules and lack of time
→ People choose ready-to-eat foods, order in or eat outside more often
→ People choose simple recipes which don't take too long to cook

Time of Day (in the UK)

Lifestyle



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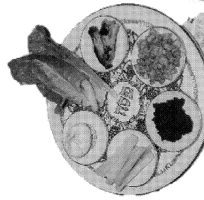
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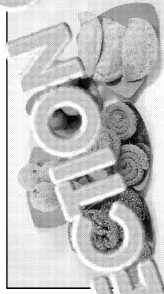
Religion

A Identify three ways in which religion may affect someone's food choices. Give examples.

- 1.
- 2.
- 3.



Jews prepare a Seder plate for the night of Passover. Each food on the plate has its own symbolic meaning.



Various sweets and confectionery are an important part of Diwali in Hindu tradition.



During Ramadan, food can be eaten only at night-time (from dusk to dawn). It is, however, rich and filling.

Ethical Beliefs

B Explain how the following ethical beliefs affect peoples' food choices.

1. Whether animals or people suffer during production.
2. How food is made.
3. How food production affects the environment.

1
Fairtrade

2
Organic foods

2
GM foods

1
Animal welfare

Local products

Food miles

Carbon footprint

Greenhouse gases

Food Labelling

Proper labelling of food products is important to ensure food safety (e.g. for allergic people) and nutritional education (e.g. for those who wish to lead a healthy lifestyle).

1 Explain why the following pieces of information (labelled 1–10) are included on a food label.

Name of the food

Use by

Best before

Quantity

Warnings

List of ingredients

Name of the company

The lot number

Storage conditions

Instruction for preparation

Country of origin

Food Legislation Authorities



European Parliament and the Council



Food Standards Agency

Food Labelling

Name of the food

Date marks

Quantity, e.g. in litres, grams or pieces

Warnings

List of ingredients

Name and address of the producing, packing or selling company

The lot number

Special storage conditions

Necessary instructions for use or preparation

Country of origin

Allergens

Nutrition declaration

11

Allergens – ingredients which may cause allergic reaction (are shown in **bold**)

List of allergens which **HAVE** to be indicated on the label

Identify the 14 food allergens indicated on the food label by law.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
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12

Nutrition declaration informs consumers of the amount of certain nutrients per 100 g or portion of product and % of GDA it provides.

Traffic light label may be used to indicate low (green), medium (amber) or high (red) amounts of sugar, fats, saturated fats, and salt in a portion of a food product.

Protein	8.8g	15.5%	10g
Salt	1.8g	3.6%	5g

Energy	2%
Fat	3%
Saturated	4%
Sugars	2%
Salt	2%

Explain the difference between nutritional claims and health claims.

Nutritional claim

Health claim

Nutrients have to be listed in a specific order...

1. Energy
2. Fat, inc. saturates
3. Carbohydrates, inc. sugars
4. Fibre, if any
5. Proteins
6. Salt or sodium
7. Vitamins and minerals

Non-mandatory information

Some food labels may include non-mandatory information, such as a picture of the food, health and nutritional claims or serving suggestions.

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Macronutrients – Fats and

Chemical compounds found in food, and needed by the body to provide energy and building materials for the body

PROTEINS

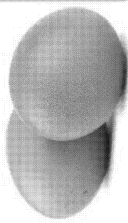
large biomolecules built of amino acids bound together into long chains

15% of daily energy intake

Proteins have many functions in our bodies:

- Build enzymes and hormones
- Build cell membranes
- Repair and maintain tissues
- Defend the body from infections
- Second messengers

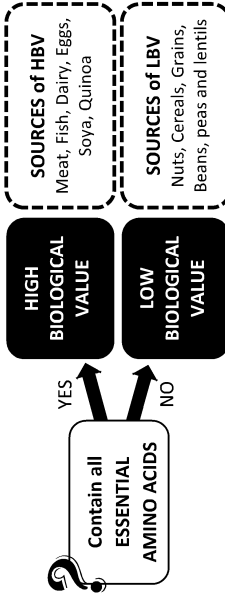
Functions



There are approximately 20 amino acids that can be made by our bodies. They have a specific function in our body. While most amino acids are not essential, they must be consumed by food.

- **Essential amino acids** – must be made by our bodies and need to come from food
- **Non-essential amino acids** – readily made by the body

Different foods contain different amounts of these essential amino acids. Foods that contain them all are called **high biological value** foods and a protein source that lacks one of these essential amino acids is called a **low biological value** protein.



Protein Complementation

A process of combining two or more LBV protein sources to obtain an HBV protein

Examples of protein complementation:

- Baked beans + Bread
- Rice + Peas
- Peanut butter + Porridge oats

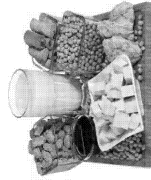
You can obtain HBV proteins by combining two LBV proteins. This is called:

What about vegetarian diets?

Vegetarians don't consume meat so instead they use plant-based alternative products, which are often fortified with protein. To provide protein in a diet, and protein-rich plant foods.

Examples include:

- Mycoprotein (Quorn®)
- Tofu
- Tempeh
- Soy chunks
- Textured vegetable proteins (TVP)
- Beans, lentils, chickpeas



Essential amino acids: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine

Non-essential amino acids: alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, tyrosine

Too much or too little protein can happen:

Excess • Kidney diseases • Weight gain	Deficiency • Kwashiorkor • Slowing growth rate • Swelling
--	--

FATS

The function

Function

There are two

Saturated fats
Contain one double bond
Solid at room temperature

Unsaturated fats
Contain two or more double bonds
Meat, cheese, whole milk

Visible

Involved

Excess

- Obesity
- High cholesterol
- Coronary heart disease
- Fat liver
- Type 2 diabetes

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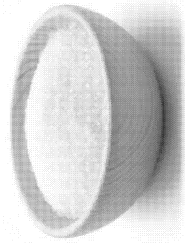
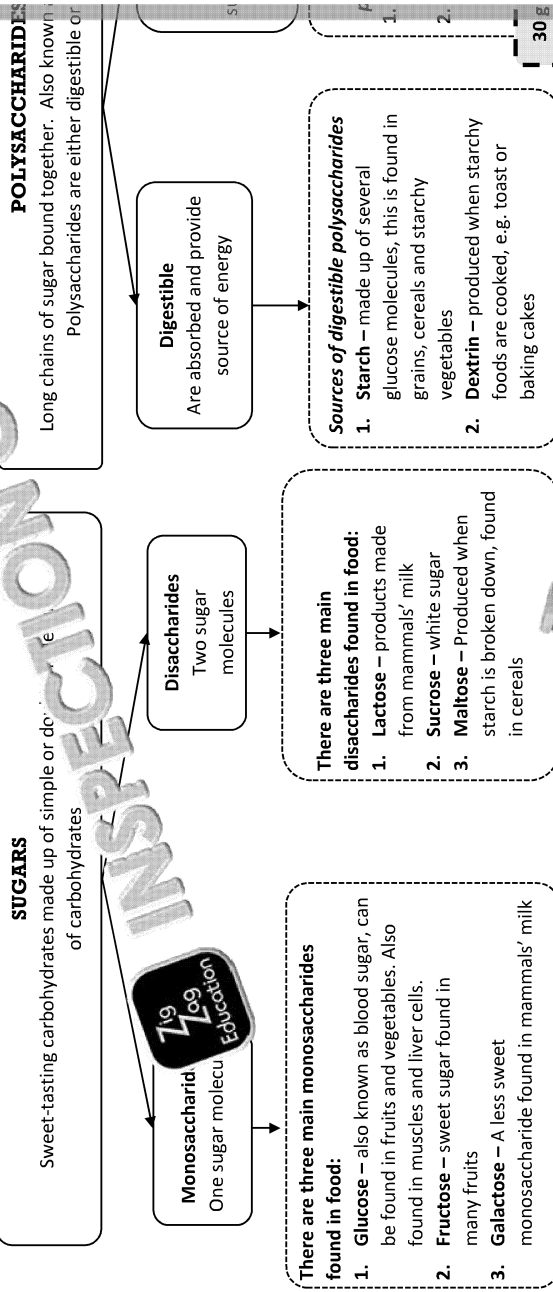
Macronutrients – Carbohydrates

CARBOHYDRATES

50% of daily energy intake

large biomolecules built of carbon, oxygen and hydrogen, in form of simple, double or complex molecules consisting of hundreds of molecules of sugar bonded together

There are two types of carbohydrate: sugars and complex carbohydrates known as polysaccharides, which are further divided into starches and fibre.



Sources of sugars

- Fruit and vegetables
- Milk and dairy products
- Sweets and condiments
- Juices and beverages
- Sugar, honey and syrups

Free

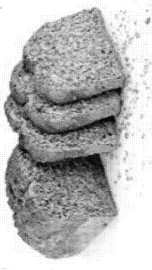
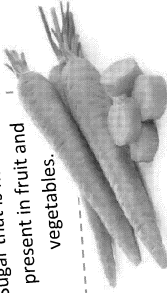
Sugar that is naturally present in the sugar foods, and in honey

VS

Intrinsic sugar

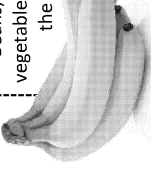
Sugar that is naturally present in fruit and vegetables.

These should make up no more than 5% of your daily energy intake.



Sources of starches

- Starchy foods, e.g. potatoes, pasta, grains
- Grains, e.g. wheat, rice, barley, maize, quinoa, bread and pasta, porridge, couscous



Sources of dietary fibre

- Beans, lentils, pulses
- Vegetables (the skin)

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Micronutrients – Minerals and Trace

Micronutrients are needed by the body in small amounts to facilitate a range of physiological functions

Calcium (Ca)

- Works together with phosphorus and vitamin D to ensure proper bone and tooth health
- Works with vitamin K to ensure proper clotting of blood
- Supports muscle contractions
- Takes part in transmitting nerve impulses

Excess

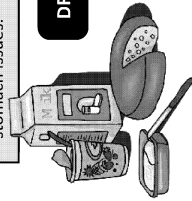
Excess is rare but too much may lead to it being stored in the kidneys, stopping them from working.

May also cause constipation and stomach issues.

DRV: 700 mg daily

Commonly found in milk and dairy products

Also present in nuts, bread and cereals, oily fish and green vegetables



Iron (Fe)

- Necessary to build haemoglobin

HAEMOGLOBIN

which binds oxygen and carries it around the body

Non-haem iron

(Easily absorbed by the body)

Red meat, offal, egg yolk

Non-haem iron

(Difficult to absorb)

Green leafy vegetables, dried fruit, chocolate, lentils

Excess

- Stomach ache
- Nausea
- Vomiting
- Constipation

MENSTRUATION: Part of the female monthly cycle when bleeding occurs, that increases the risk of developing iron-deficiency anaemia in girls and women

DRV: 14.7 mg daily

Potassium (K)

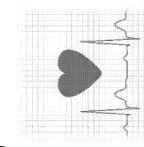
- Maintains body water balance
- Necessary for muscle contractions
- Important electrolyte
- Controls the heart's electrical activity

Sources:

- Potatoes and yams
- Milk, chocolate, cocoa beans
- Bananas, avocados
- Nuts and dried fruits
- Vegetables and fruits
- Red meats

Excess

- Bradycardia (slow heart rate)
- Heart palpitations (arrhythmia)
- Heart failure
- Nausea and vomiting
- Difficulty breathing
- Chest pain



Both deficiency and excess usually cannot occur on a healthy diet, but if they happen

DRV: 3500 mg daily

Magnesium (Mg)

- Essential for energy synthesis
- Necessary to build DNA
- Together with calcium, controls muscle contractions
- Increases bowel movements

Excess

- Nausea and vomiting
- Diarrhoea
- Very low blood pressure
- Slow heartbeat

Deficiency

- Painful muscle cramps
- Abnormal heartbeat
- High blood pressure
- Leafy green vegetables, e.g. spinach
- Nuts and whole grains
- Mineral water

DRV: 300 mg daily

- Builds hormones in the thyroid gland
- Controls the ratio of metabolism

Iodine (I)

Excess

- Weight gain
- Change in metabolism

Deficiency

- Swelling of the thyroid (GOITRE)

- Red meat, sea fish, shellfish, cereals, grains, nuts and meat
- May be inhaled at the seaside and in salt caves

THYROID: small gland found at the front of the neck

DRV: 140 mcg daily

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ZigZag
Education

Fat-soluble Vitamins

Vitamins A, D, E and K, present mainly in fatty foods, which can be stored in the body for long periods of time – excess may be harmful

Vit. A

Retinol
active form of
vitamin A, found in
animal-origin foods

- Growth and development of the body
- Helps support vision at night
- Keeps the skin and cell membranes healthy

Sources:

- Retinol: liver, milk and egg yolk, fish
- Vitamin C: citrus fruits, green vegetables and fruit

Beta carotene
inactive form of
vitamin A, found in
plant foods

- Deficiency:** Irritability, fussiness, dry skin
- Excess:** Irritability, fussiness, dry skin

100 mcg daily

Vit. D

Cholecalciferol
Vitamin D
deficiency is very
common in the UK.
For that reason, a
doctor can
prescribe you a
vitamin
supplement.

- Functions:**
- Healthy bones and teeth
 - Helps absorb calcium

DRV
mg daily

- Sources:**
- Produced in the skin in response to sunshine exposure
 - Liver, milk and dairy, egg yolk, oily fish

Deficiency: rickets, osteoporosis, depression, increased risk of cancer
Excess: damage to the kidneys and other organs, weakened bones

Vit. E

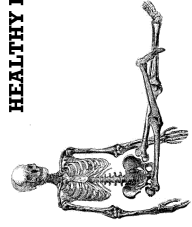
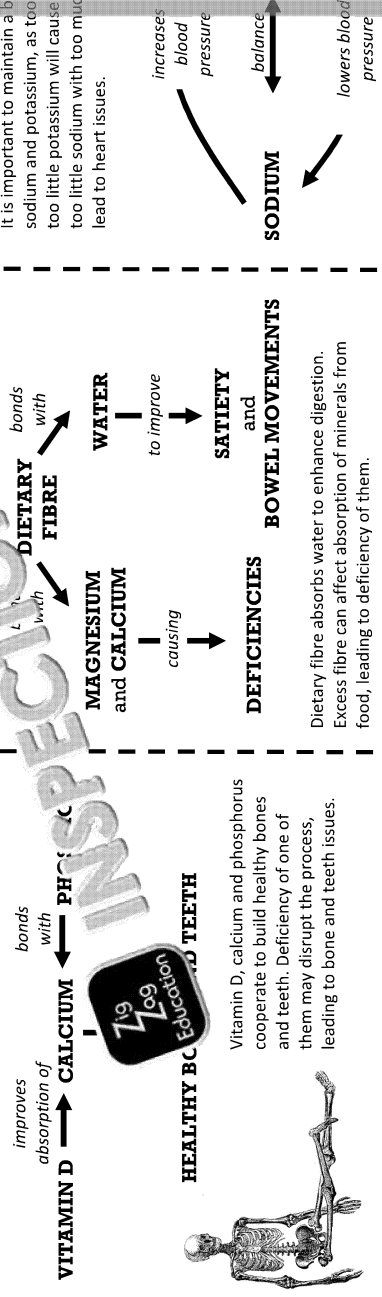
Fat-soluble vitamin present in vegetable oils, nuts and seeds. Needed to maintain healthy skin. Antioxidant

Vit. K

Fat-soluble vitamin present in leafy green vegetables, dairy and egg yolks. Also produced by bacteria in the gut. Necessary for proper blood clotting.

Complementary Actions of Nutrients

Various nutrients work together in the body to carry out chemical processes and energy



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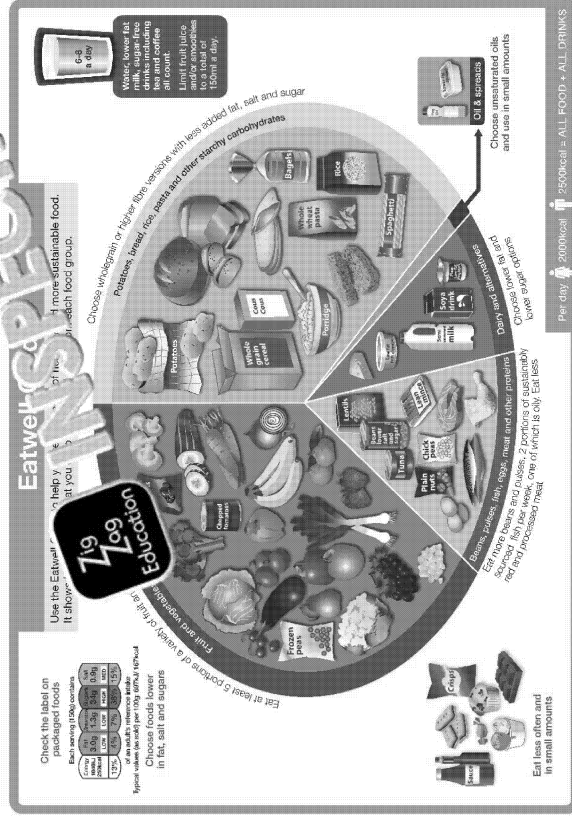
Planning Balanced Diets

Current Guidelines

Nutritional needs of people differ depending on:

age, weight, height	sex/gender
physical activity levels	state of health

However, general guidance can be taken from the **Eatwell Guide**



Follow the **eight tips for healthy eating** (below) to ensure your diet is balanced!

- 1. **Use the Eatwell Guide to plan your meals on starchies, proteins, fats and sugars.**
- 2. **Eat a lot of fruits and vegetables.**
- 3. **Eat more fish – and at least one portion of oily fish a week.**
- 4. **Limit the amount of saturated fats and sugars you eat.**
- 5. **Eat less salt – no more than 6 g a day.**
- 6. **Be active and try to maintain a healthy body weight.**
- 7. **Drink plenty of water.**
- 8. **Do not skip breakfast.**

How Nutritional Needs Vary Depending on Age

As we age, nutritional needs change for a number of reasons. It is important to adjust the diet to the individual requirements of a person.

Toddler (2-3 years)

- A diet for toddlers should follow the 32 rule:
 - 5 portions of starchies
 - 5 portions of vegetables and fruit
 - 3 portions of milk and dairy
 - 2 portions of protein-rich foods
 - Vegetarian children should eat 3 portions of protein-rich foods.

Young children (4-10)

- **Growth spurt** means young children require more protein, calcium and vitamin D.
- **Teething** means they require more calcium, fluoride and vitamin D to build healthy new teeth.
- More vitamins and minerals are needed to support **forming of the immune system**.
- Sugary sweets and drinks should be avoided to prevent weight gain and tooth decay.

Teenagers

- Again, calcium and vitamin D are important for growth spurts and help reach peak bone mass from menstruation
- **Teenage girls need more iron** from menstruation
- **Eat regularly** to provide more energy for physical and intellectual activities
- **Limit consumption of sweets** to avoid more physical activity and drinking water to prevent obesity and other health issues

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Planning Balanced Diets for Individuals

Planning Meals for Specific Dietary Needs

Some people cannot, or do not want to, eat certain products. It is important to take that into account when planning a meal or diet for them.

Vegetarians

People who do not eat meat and sometimes other foods of animal origin.

- Lacto-ovo-vegetarians – eat dairy and eggs
- Lacto-vegetarians – eat dairy
- Ovo-vegetarians – eat eggs
- Pescatarians – eat fish

Vegetarians often choose products which were produced with respect to animal welfare, such as free range eggs or organic milk.

- + Vegetarian diet is suitable for all people, including pregnant women and toddlers.
- Vegetarian diet may be low in HBV protein, so people must remember about **protein complementation** when planning their meals.

Do not eat any foods of animal origin, such as meat, fish, milk and dairy, eggs, honey and butter.

Often avoid using other products of animal origin, such as leather clothing, fur, feathers, etc.

All foods are plant-based.

- + Rich in dietary fibre and most vitamins.
- May be low in protein.
- May lead to deficiency of vitamin B12.
- May lead to deficiency of iron, and subsequent anaemia.
- May be very monotonous as the choice of products is smaller.

Religion

Religion often dictates nutritional regime, and indicates what foods can be eaten and when, and what foods should be avoided.

Fasting means that a person cannot eat any foods for a given period of time. Sometimes water and other beverages are permitted.

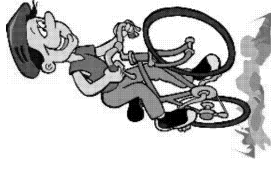
Alcohol consumption is forbidden by most religions

Eat	Islam (Muslims)	Judaism
Do not eat	• Alcohol • Fish and shellfish without scales	• <i>Kosher</i> food only • Only fish which can be eaten
Holidays or fasting periods	Ramadan – month-long fasting period during which Muslims can eat only at night	• Shellfish • Pork • Meat with dairy • Passover celebration from slavery in a special way • Rosh Hashanah – New Year • Yom Kippur – Day of Atonement • Hanukkah – Festival of Lights
Other info	• <i>Halal</i> means permitted, allowed. • To be <i>halal</i>, meat has to be produced in a special way, e.g. animals must be slaughtered in a ceremonious way where all blood is drained from them.	• <i>Kosher</i> means clean • <i>Matza</i> is a special unleavened bread eaten during Passover • The dietary laws are called <i>kashrut</i>.

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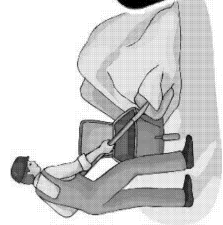
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Lifestyle

People who have an active lifestyle will need more energy than those who lead a sedentary lifestyle



Occupation

People who are physically active at work will need more energy than those who are not active

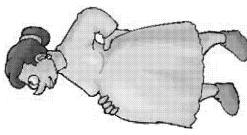
Genetics

Genes control our body composition (how much muscle and fat tissue we have), the ratio of metabolism, etc.

Sex

Males usually need more energy because they have more muscle mass, which requires more energy to work

Factors Affecting Energy Needs



Pregnancy

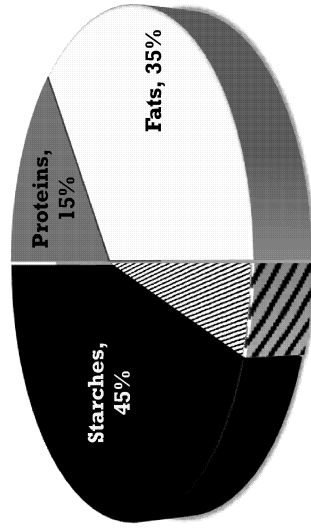
Pregnant women need extra energy to support the growth of the fetus and then extra energy to produce milk

Height and Weight

Taller and heavier people will need more energy than those who are short and thin, because there are less tissues to nourish

Daily Energy Intake

To remain healthy, we need to ensure that the energy in our diet comes from various sources.



Sources of Energy

Energy is measured in kilocalories [kcal] or kilojoules [kJ]

1 kcal = 4.184 kJ

Sources of Energy

Food Source	Energy (kcal / 1 g)
Proteins	4
Carbohydrates	4
Fats	9
Alcohol	7

Who needs more energy?

- Professional sportspeople and people with very active lifestyles.
- Women at the end of pregnancy and when breastfeeding.
- People suffering from certain diseases such as cystic fibrosis, and certain forms of cancer, or extensive burns.

What Happens if Someone Eats Little Energy?

Energy balance means that a person provides with food the energy needed to carry out all daily tasks and perform all bodily functions

If there is too little or too much, the body begins to malfunction and disease occurs

Energy Deficit

Occurs when more energy is provided with the diet than is used.

- weight gain
- overweight and obesity
- joint pains
- type 2 diabetes
- coronary heart disease
- hypertension
- bowel and breast cancer

Energy Excess

Occurs when the body uses more energy than is provided with the diet

This can lead to:

- weight loss
- malnutrition
- osteoporosis
- anemia
- hypertension
- heart disease
- diabetes
- bowel and breast cancer

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Nutrition: macro- and micronutrients provided with diet

Coronary Care. Di-

Description:

- Description:**
- Congestive heart failure (CHF) is a condition in which the heart is unable to pump enough blood to meet the body's needs. This can lead to fluid buildup in the lungs and other parts of the body, causing symptoms such as shortness of breath, swelling, and fatigue.

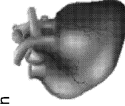
Reasons why...

- Reasons why...**

 - imbalanced diet
 - too much cholesterol
 - obesity
 - hypertension
 - smoking

Results in...

 - × cholesterol plaque buildup in the heart blood vessels
 - × increased risk of heart attack
 - × chest pains (angina)



How diet should be changed to meet the needs...

How diet should be changed to meet the needs...
Diet should be balanced, varied, low-fat to reduce weight, low-cholesterol.

Hypercholesterolemia

Description:

- Condition in which blood cholesterol levels (total cholesterol and LDL cholesterol) are abnormally high

Results in...

- Results in...

- × pale skin
 - × tiredness
 - × short breath
 - × heart
 - × palpitations
 - × dizziness
 - × fainting

Reasons why...

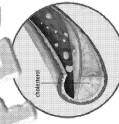
- imbalanced diet
 - high in saturated fats
 - obesity
 - poor diet
 - stress

Results in...

- × cholesterol
 - × blood pressure
 - × stroke
 - × heart disease
 - × diabetes
 - × liver disease
 - × kidney disease
 - × high cholesterol

Reasons why...

- imbalanced diet
 - high in saturated fats
 - obesity
 - poor diet
 - stress



How diet should be changed to meet the needs:

How diet should be changed to meet the needs:
Diet should be based on starchy

How diet should be changed
Diet should be based on simple carbohydrates, very low in protein, consumption of proteins, limited salt consumption.

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How

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Planning Balanced Diet

Dietary Needs and Nutritional Deficiencies

Coeliac Disease

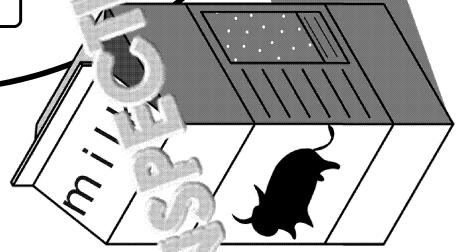
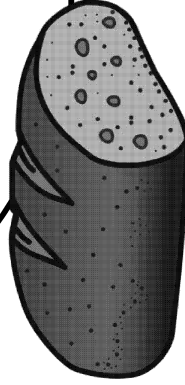
Condition in which gluten cannot be broken down in the small intestine, causing inflammation and damage to the villi.

Reasons for the condition:

- occurs in people with genetic predisposition
- cannot be acquired
- treated – coeliac diet
- follow a gluten-free diet from birth to the end of their lives

How diet should be changed to meet needs:

Diet should be entirely gluten-free, i.e. foods containing wheat, barley or rye in any form must not be eaten.



Lactose Intolerance

Condition in which lactose (milk sugar) cannot be broken down in the body. May be acquired (most often) and inborn (rarely).

Reasons for the condition:

- lack of lactase enzyme in the small intestine
- risk of developing lactose intolerance increases with age

Results in:

- × painful bloating
- × gases
- × diarrhoea after eating food containing lactose

How diet should be changed to meet needs:

Diet should be free from lactose, i.e. must not contain milk or unfermented dairy products. In most cases it is OK to eat fermented dairy products such as cheese and yoghurt.

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The Effect of Cooking on

Why food is cooked

Applying heat to food is advantageous for a number of reasons. It not only makes the food safe to eat, but also gives it the desired palatability and organoleptic qualities.

	Explanation	Example
To Improve Digestion	During cooking, proteins and carbohydrates, including fibre, undergo chemical processes which make them easier to break down in the human digestive tract.	Cooked meat is easier to digest as the chemical bonds in the muscle are already partially broken down. Less work is needed from the gut to break it down entirely.
To Improve Taste	During cooking, chemical reactions take place which help to obtain a more appealing flavour.	Caramel has a different taste to sugar due to caramelisation. Marinades help to alter the flavour of meats and fish, making them more appealing.
To Improve Texture	Cooking involves processes such as caramelisation, dextrinisation and denaturation. These help to obtain the required texture of food.	Cakes rise, rice softens and increases in volume, bread has crispy skin and soft interior, meats become tender and easy to chew, sugar melts into caramel...
To Improve Appearance	During cooking, chemicals in food undergo a number of changes which change the appearance of food.	Bread becomes golden, caramel changes from yellow to brown to black, roast potatoes brown, green peas change from bright green to dull, greyish colour...
To Avoid Contamination	High temperature helps to kill most of the pathogenic bacteria which usually occur on various foods, making them safe to eat.	Salmonella in eggs and poultry, <i>Campylobacter</i> in meat, <i>Listeria</i> in milk.

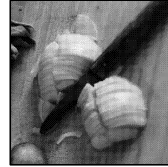
There are three methods of cooking:

How Does It Work?	Direct heat → Frying → Boiling → Steaming
Pattern	• Direct • Indirect • Both
Example	• Baking • Braising • Steaming

Most dishes require a combination of the following methods:
For example:
baking
braising
steaming

Water-based Cooking Methods

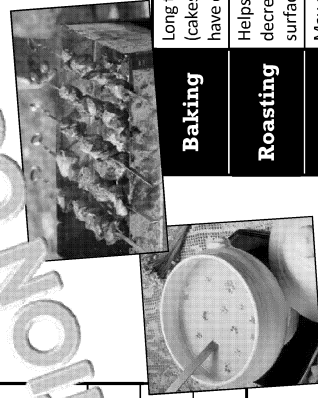
Steaming	Helps preserve nutritional value of food, low-fat, softens vegetables.
Boiling	May cause vitamin loss, low-fat, softens vegetables, may cause meats to shrink and become tough.
Simmering	Long time required causes vitamin loss, helps to obtain tender meats and aromatic sauces.
Blanching	Prevents enzymatic browning and oxidation, maintains crisp texture of vegetables.
Poaching	Ideal for preparing delicate foods, helps to maintain their tender texture, low-fat, helps to prevent vitamin loss.
Braising	Long time required causes vitamin loss. Helps to obtain tender meats and a rich, aromatic sauce. Creates an appealing brown finish.



During cooking, onion becomes brown, soft and sweet.

Dry Methods

Various cooking methods help preserve or modify the nutritional value of food. Cooked foods can also be safely stored for a long time.



Baking	Long time required causes vitamin loss (cakes and other baked goods become dry). Causes cakes and breads to have a crispy top.
Roasting	Helps to reduce amount of fat in food, decreases vitamin content. Helps to create a brown finish.
Grilling	May create harmful substances. Usually creates a brown-black finish.
Dry frying	Reduces amount of fat in food. Helps to create a brown finish. Quick and fast. Very hot oil may cause food to burn easily.

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The Positive Use of Micro

Various microorganisms and enzymes are commonly used in the production of food, often improving its digestibility and preserving the texture and flavour of food.

Enzymes

Enzymes such as **rennet** break down chemical bonds between amino acids in proteins, changing the texture of food. They also affect the aroma and taste.

Different types of bacteria are used to produce soft cheese, e.g. produce soft cheese.

Bacteria

Probiotic bacteria ferment lactose in milk and turn it into lactic acid. This acid turns the milk sour and coagulates the proteins in it, because of which it becomes solid (cheese).



Blue Cheese and Camembert

Moulds create the white coat on the outside and the blue/green veins on the inside of various cheeses, such as Devon blue, Roquefort and Brie.



Sauerkraut and Pickled Vegetables

Probiotic bacteria produce acid, which makes the vegetables sour and keeps them crispy. Acid also prevents growth of pathogenic microorganisms.

Cooked soy beans and mixture has fermented.

How

1. Flour, water, salt
2. The mixture is kneaded
3. The mixture is left to **prove** (proving).
4. The mixture is kneaded again
5. The portions are placed in a warm place (second proving)
6. The bread is baked
7. The bread is cooled
8. The bread is sliced
9. The bread is served

How Yoghurt is Made

1. Milk is collected from farms and transported to factories.
2. Milk is **pasteurised** to remove harmful bacteria.
3. Milk is **homogenised** to ensure it doesn't split.
4. Milk is warmed up to 42 °C.
5. **Starter cultures** containing live **probiotic** bacteria are stirred into the milk.
6. Bacteria **ferment lactose** from milk and produce lactic acid.
7. Yoghurt becomes solid.
8. The protein in milk increases to a high acid concentration.
9. Yoghurt becomes thick.
10. Yoghurt is cooled down.
11. Flavours (e.g. fruit) are added.
12. Yoghurt is packaged and refrigerated.
13. Yoghurt is sent off to retailers.

Yoghurt

Different types of bacteria are used to change the texture and flavour of the yoghurt.

Pickled Fish

One of the most popular pickled fish is herring. An example is Swedish surströmming.

Sausages

- bacteria transform nitrates to nitrites, which means the meat remains bright
- bacteria produce acid, which denatures protein and improves the texture
- mould creates a white coat, which shields the sausage from other microorganisms

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ZigZag
Education

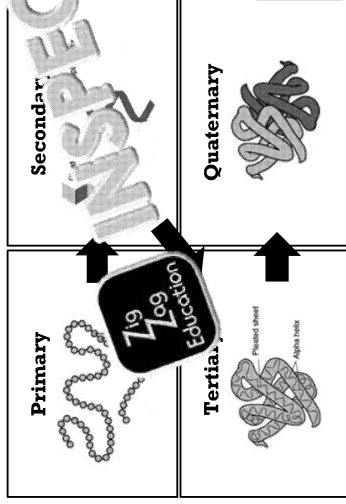
Functional and Chemical Properties

The chemical structure of food ingredients plays a vital role in how they can be used in food. For example, proteins, carbohydrates and fats usually damages their structure, which he

Proteins

Macromolecules built of thousands of amino acids bonded together into long chains
Amino acids → peptides → polypeptides (proteins)

The structure of proteins:



Functional and chemical properties:

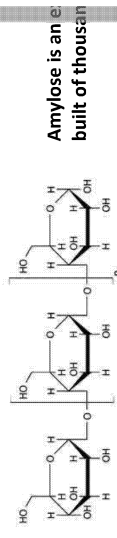
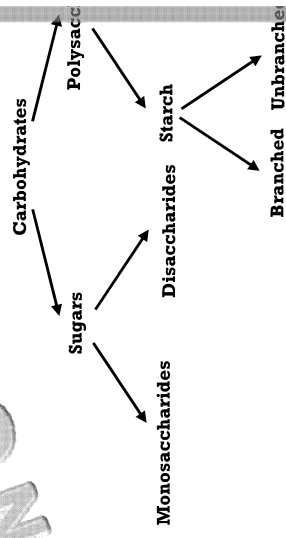
- Denaturation** – damage to the protein's structure caused by:
 - Heat** – during cooking, proteins vibrate quickly and as a result hydrogen bonds in them rupture
 - Acid** – because hydrogen atoms from the acid bind with nitrogen from the protein, preventing it from forming hydrogen bonds within protein molecule and so it cannot form a 3D structure
 - mechanical action (physical)** – during whisking, protein uncoils and exposes hydrophobic areas, which stick together and form a foam
- Coagulation** – aggregation of protein particles into larger lumps, causing it to set. Examples of protein coagulation include cheese becoming rubbery when overheated and egg whites becoming solid when cooked.
 

During cooking, the protein in eggs coagulates and denatures.
- Syneresis** – leakage of water from overcooked eggs. (e.g. curd-coagulated) proteins. Usually associated with curdling.
- Gluten formation** – occurs when protein built of glutenin and gliadin, simple proteins (wheat, rye, barley and oats; the two proteins cross-link with each other, creating a net (as in a sweater) which can hold air bubbles during proving and baking of bread and bakery products
- glutenin + gliadin + water → gluten net → soft, springy texture**
- Foam formation** – air bubbles trapped in a liquid (e.g. egg white). Whisking makes proteins unravel and denature.

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Carbohydrates

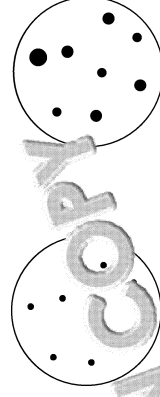
Macromolecules built of thousands of amino acids bonded together into long chains
Amino acids → peptides → polypeptides (proteins)



Functional and chemical properties:

- Gelatinisation** – happens when starch granules absorb water and swell and break during heating, so that mixtures thick when cooled; used to prepare sauces and puddings

starch + water + heat → gelatinisation



Starch granules in cold water. **Starch granules absorb water when heated.**

- Dextrinisation** – happens when starch chains break down into dextrins; during the process molecules of water evaporate, leaving a brown color; occurs during baking and toasting of baked goods

starch + heat → dextrinisation

- Caramelisation*** – happens when sugar is heated in very high temperatures, causing it to liquefy and form a thick, brown liquid. The process involves water evaporation and carbon is left to create a brown color. It occurs during roasting of vegetables, making caramel and other products.

sugar + heat → caramelisation

*Caramelisation is not required by the specification; however, it is a process that occurs in food during cooking, causing changes in appearance and texture.

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Fruits and Vegetables

Cooking and food preparation may have a large impact on nutritional value, appearance, flavour and smell of food products.

Foods such as bananas, apples and tomatoes need time to ripen. This ripening process is caused by enzymes.

Enzymatic Browning

Involves the discolouration of fruits and vegetables as a result of the reaction between enzymes and plant cell substances.

Cutting, shredding, grating, biting, peeling, etc.

Enzymes and cytoplasm are activated when exposed to air and mix with the substances from the vacuole.

Leads to damage or cell vacuoles (spaces) and cytoplasm (outside of vacuole)

Leading to corrosive effect (brown colour and vitamin loss)

This process can be slowed down or accelerated...

Slowed down by

- ↓ lowering temperature
- ↓ inactivating enzymes with the use of heat (blanching) or acid (vinegar / lemon juice)
- ↓ removing oxygen / protecting from air

Accelerated by

- ↑ iron and copper
- ↑ diminution
- ↑ oxygen exposure

Foods most prone to enzymatic browning:

- ▷ **Fruit:** avocados, bananas, peaches, pears, apples, mangos, apricots, plums, grapes
- ▷ **Vegetables:** aubergines, mushrooms, potatoes, lettuce

Oxidation

- The process when substances combine with oxygen
- Destruction of chemical structure due to oxygen exposure
- Causes changes in taste, smell and nutritional value of food (e.g. rancidity in fats)

Slowed down by:

- ↓ covering food
- ↓ packing food in oxygen – free conditions
- ↓ covering food with sauces and dressings

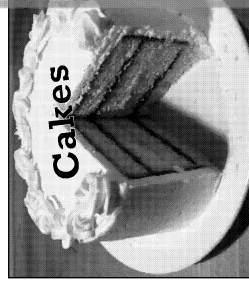
Accelerated by:

- ↑ diminution
- ↑ oxygen exposure

Leaving oil without a cover will cause it to become rancid.

Why Par

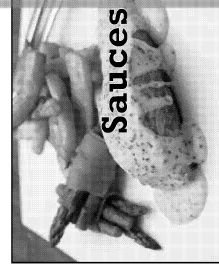
In cooking, everything matters – from the ingredients to the cooking time and temperature.



Cakes

'Why did my cake not turn out this good?'

- ★ **too much sugar was added**
 - the cake has a hard crust
 - the cake sunk in the middle
- ★ **the cake was too high up in the tin**
 - the cake cracked on top
 - the top is burnt
 - the cake is underbaked
- ★ **too much flour was added**
 - the cake is tough and dry
- ★ **not enough rising agent was used**
 - the cake/dough did not rise
- ★ **wrong raising method was used**
 - the cake did not rise
 - the cake is tough and hard
- ★ **the tin was overfilled**
 - the cake burnt on top
 - the top has cracked
 - the cake has overboiled
- ★ **the batter was too wet**
 - the fruit sank



Sauces

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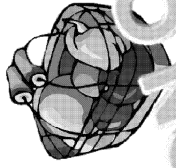
Buying, Storing, Preparing and Cooking

Applying certain rules when buying, preparing and cooking foods, and properly storing them, can help to avoid food spoilage and contamination, and lowers the risk of food poisoning.

Buying Food

When buying food it is important to ensure food's quality by:

- ✓ checking the date marks
- ✓ carrying out visual checks



Date Marks

Best before – applies to food quality (look, flavour or colour) and it's not a safety issue. It means the food is still safe to eat after that date; it is used on dry, frozen or tinned foods and eggs.

Use by – applies to food safety so it might be harmful to eat after that date; used on fresh foods such as milk and dairy.

Labelling

Foods are often labelled specially to identify storage conditions and instructions for preparation. This helps to:

- enhance the shelf life of food
- ensure it's nutritious and safe to eat
- ensure it's prepared in a correct way to offer all nutritional and sensory values

More about labelling on p. 29



Preparing Food



Applying these rules will help to prevent cross-contamination and food poisoning!

Personal Hygiene	Work Surfaces
✓ Always wash hands before and after cooking and dry with disposable paper towels ✓ Avoid touching your face or hair ✓ Tie your hair back and cover with a hairnet ✓ Avoid cooking when you're ill ✓ Change clothes and use an apron ✓ Cover any wounds with a waterproof plaster ✓ Do not wear rings or other jewellery when cooking	✓ Clean thoroughly after dealing with high-risk foods ✓ Use soapy hot water or antibacterial spray to clean any spills ✓ Use a clean kitchen towel or disposable towels
Separate Foods	Temperature Control
✓ Separate raw and cooked foods, both when preparing and storing ✓ Cover prepared food in airtight containers ✓ Use dedicated, colour-coded utensils ✓ Wash dishes straightaway in hot water to avoid pests and cross-contamination	✓ Make sure the temperature inside food reaches 75 °C both when cooking and reheating ✓ Make sure the temperature of served food is above 63 °C ✓ Do not put hot food straight into the fridge, let it cool for 90 minutes ✓ Ensure correct cooking time to avoid cold spots ✓ Defrost thoroughly to avoid cold spots



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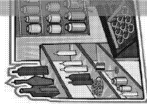
Storing food in correct conditions

Chilling and Freezing

Correct use of a fridge-freezer can help to ensure freshness and safety.

Ambient Storage

Storing food at room temperature (usually around 20 °C)



Food Covering and Packaging

1. Protects from light
2. Protects from air, oxygen and dust
3. Protects from pests and rodents
4. Prevents tainting

To prevent food poisoning, one

Freezing	-18 °C
Chilling	0 to 5 °C
Cooking	75 °C
Reheating	75 °C

Temperature Danger Zone

Range of temperatures in which microorganisms grow the fastest, leading to food spoilage and food poisoning.

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Food Provenance

Where and how food is made depends on many factors, such as:

- climate
- soil quality
- availability of water and other resources
- availability of land suitable for growing plants and pastures
- the size of a population and how much food needs to be produced

Other factors, such as religion and ethical beliefs of local communities, also play an important role in deciding what will be made in the nearest area.

For example, more and more eggs are produced in the UK nowadays due to the fact that free-range hens are happier and produce better eggs, but also to ensure animal welfare standards are met.



Sustainable Fishing

Rearing fish and seafood in fish farms for meat, caviar, pearls, animal feed or other reasons. Sustainable fishing means that fishing in natural fisheries is allowed only for certain period of time so that the shoal of fish has the chance to reproduce and restore itself.

Advantages of Fish Farms:

- ✓ Protecting natural ecosystems
- ✓ Preventing overexploitation of fisheries
- ✓ Keeping animal welfare standards
- ✓ Protecting wild species diversity
- ✓ Preventing by-catch



By-catch: accidental catch of a sea organism which wasn't the primary goal of the fishing.

Disadvantages of Fish Farms:

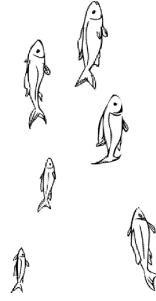
- ✗ The fish tanks are often overcrowded
- ✗ Fish might be fed low-quality feed which affects their flavour
- ✗ Fish might be fed antibiotics, increasing the risk of antibiotic resistance

Sustainable fishing policy is set by the Marine Stewardship Council.



Methods of Fishing:

- **Purse seining:** fishing for fish and other sea organisms are trapped in a large net in which fish and other sea organisms are trapped
- **Longlining:** fishing with the use of a long line to which other lines are attached, each of which ends with a hook
- **Bottom trawling:** pulling a large net along the sea bottom, used to catch shrimp and bottom-dwelling fish



Food Source Type	Where	Example	What is produced?
Grown 	Orchards	Apples, plums, avocados, cherries, nuts	Fruit, nut feed
	Fields	Root vegetables, grains, seeds, legumes	Food, animal feed, fertiliser
	Polytunnels	Let us see, radish, strawberries	To ensure all year round production
Reared 	Shed	Cattle, pigs, horses, poultry	Meat, milk, feathers, bioenergy
	Fish farms	Fish, seafood	Food, animal feed
Caught 	Open spaces and forests	Wild animals, game and venison	Food, animal feed
	Oceans and seas	Wild fish, seafood	Food

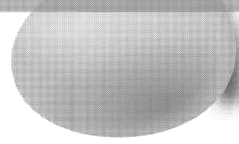
Where and How Food is Produced

The way food is grown, reared and caught affects its safety and amount. Modern technologies help produce a large amount of food while ensuring it's safe to eat.

Egg Production

Symbol	Name	Conditions
0	Organic free range	Birds are fed only organic feed and animal welfare standards are applied
1	Free range	Hens are let outside the barn during the day to enjoy most natural conditions possible
2	Barn	Birds can move freely around the barn, but may have trimmed beaks to prevent them fighting between themselves
3	Cage	Hens are kept in tight cages, without possibility of moving

Red Lion Scheme is a quality mark which ensures that all hens were vaccinated against salmonella so the eggs are safe to eat.



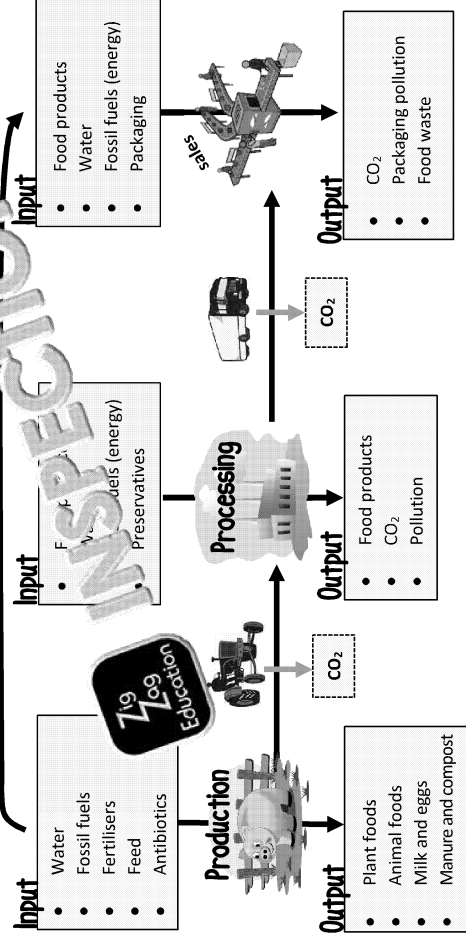
Each step of food production has a huge impact on the environment. Overexploitation of soil and fossil fuels, together with transportation and packaging of the food, large

Why Carbon Dioxide is So Dangerous

Food production, at each of its stages, emits large amounts of carbon dioxide. Carbon dioxide creates an impermeable coat around the earth. When warmth is reflected from the surface of the earth, it is caught by that coat and bounced back. As an effect, the average temperature on Earth rises, and that affects plant and animal species...

Carbon Footprint

The amount of carbon dioxide and other greenhouse gases emitted into the environment during production and transportation of a product



Food miles

The distance from the field to the plate of the consumer – importing food products from distant countries increases the food miles

How Food Production Affects the Environment and Communities

Food production has direct and indirect effects on the environment by creating levels of pollution or deforestation. The way we produce and transport food is also meaningful to those who produce it: farmers, farmworkers, and even people working in your local community.

- Fossil fuels used to produce food
- Tonnes of used packaging in every day.
- Non-recyclable packaging creates pollution.
- Animals, birds and fish swallow the debris and die.
- Some materials used for packaging NEVER decompose!
- + Protects the food from damage.
- + Protects the food from sunlight, oxygen, bacteria and dirt.
- + Provides information about the food inside.

Advantages of Fairtrade:

- ✓ Ensures fair wages and prices
- ✓ Improves working conditions
- ✓ Empowers local communities, farmers and workers
- ✓ Supports education and growth in poor countries
- ✓ Helps to protect the environment

Foundation and ethical movement focused on supporting farmers and sustainability of food.



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British Cuisine

Cuisine may be affected by many different factors, such as climate, type of soil available for growing plants, or

Cuisine is a style of cooking characteristic for a given region or country, which uses specific ingredients, dishes, preparation and cooking methods.

Distinctive features and characteristics of cooking

Main ingredients used, traditional dishes and other factors which distinguish the cuisine from others.

Traditional ingredients:

- Beef, lamb, pork, poultry, bacon and ham
- Potatoes, onions, leeks, mushrooms
- Milk and cheese (e.g. Cheddar, Brie)
- Herbs, such as mint

Traditional meals and dishes (depending on the region (see below)).



Equipment and cooking methods

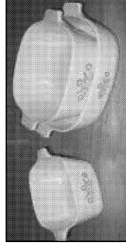
Kitchen utensils, dishes and cooking methods specific to a given cuisine.

Equipment:

- Stoves, ovens, and microwaves
- Cast iron pans, now replaced by stainless steel
- Black ceramic dishes used for stews, soups and sauces
- Tins and moulds for making puddings, pies and tarts

Cooking methods:

- Stewing, simmering and braising
- Roasting and baking
- Grilling and barbecuing
- Poaching
- Frying



Eating patterns

The meal is divided into three parts: breakfast, lunch, and dinner. The meals are eaten at different times of the day and the meals are served. This is changing dynamically due to busy lifestyles.

- **Breakfast** – eaten in the early morning, traditionally very filling, nowadays more healthy, may consist of toast with coffee or a bowl of cereal
- **Evenings** – small, usually sweet snacks eaten around 11am with a cup of tea or coffee
- **Brunch** – eaten before noon instead of breakfast and lunch, usually at weekends or during business meetings
- **Lunch** – midday meal consisting of a sandwich, salad or soup; traditionally, a Sunday lunch is more filling and consists of roasted meat, vegetables, Yorkshire pudding and gravy
- **Afternoon tea** – eaten in the afternoon, consists of a pot of tea or coffee with a range of small snacks, sandwiches, biscuits and cakes
- **Dinner** – hot meal eaten in the early evening, the main meal of the day
- **Supper** – consumed a bit later than dinner, usually replaces it

Traditional Food of Great Britain



England

- Cornish pasty
- Yorkshire pudding
- Lancashire hotpot – lamb and vegetable stew topped with mashed potatoes
- Clotted cream, cream
- Fish and chips
- English breakfast – rich in calories; contains bacon, sausages, baked beans, buttered toast, hash browns, fried mushrooms and tomatoes
- Sandwiches
- Sunday roast
- Beer and cider
- Welsh rarebit – spiced melted cheese served in toast
- Glamorgan sausage
- Welsh cakes
- Bara brith – rich yeast bread with dried fruit
- Laver bread – stewed laver weed
- Tattws popty – potatoes baked with onion under a thick layer of cheese



Northern Ireland

- Colcannon – mashed potatoes with kale and cabbage
- Soda bread
- Black pudding – sausage made of pork fat, blood and oatmeal
- Shepherd's pie
- Irish stew
- Oatmeal
- Irish cream
- Whiskey and beer

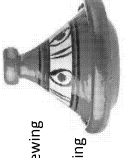
- Porridge
- Scotch Whisky
- Dunlop
- Kipper
- Tattie
- Haggis
- and b
- Scotch filling
- Oatmeal
- Shortbread
- Neeps
- Suet
- Whiskey

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International Cuisines

The cuisine depends on a region: its culture, religion, climate and weather conditions, and for centuries, countries and regions have created a variety of meals, cooking dishes and methods, and even s

Distinctive features and characteristics of cooking		Equipment and cooking methods	Eating patterns
Mediterranean cuisine	Includes: Italy, France, Spain, Greece, Northern Africa, Turkey	Equipment: - Clay or ceramic cooking pots - Shallow frying pan used to make paella - Tagine – a dome-shaped clay dish used to prepare tagines in Arabic countries Cooking methods: - Baking - Frying - Simmering and stewing - Grilling - Steaming and boiling 	The meals vary during the day vary between breakfast, lunch and dinner. Meals are eaten at different times of the day. This is changing dynamically due to busy lifestyles. - In Italy and France, especially on large occasions, meals can have many courses (usually a starter, soup, main dish, salad, cheese and dessert), usually accompanied by wine - Breakfast might be rather small and sweet, e.g. croissants with jam and coffee - In Spain, a siesta (short nap) is taken after the midday meal - In Spain and Greece, dinner (vradino) is eaten quite late – after 9pm. - In Morocco and other Arabic countries, meals are celebrated and a long time is spent eating - In Turkey, hands and mouth are washed before and after eating; traditionally it was acceptable to belch and lick fingers during eating, nowadays it may be considered rude
	Each canton in China has its own, regional cuisine and uses different ingredients and spices (e.g. Szechuan and Cantonese)	Equipment: - Wok – deep, rounded pan - Chopsticks – used instead of cutlery - Bamboo strainers – used to drain wontons and dumplings - Cleaver – large, heavy-duty knife used by chefs - Brightly coloured lacquerware and porcelain dishes used to serve foods  Cooking methods: - Stir-frying and deep-frying - Steaming and boiling - Red stewing	- Breakfast is rather light, may consist of soy milk, noodles or soup - Lunch is usually eaten in a nearby canteen or ordered in, rather light, consists of rice or noodles with meat and vegetables - Dinner is large and often eaten in a restaurant, with a broad selection of meats and vegetables - Soup is eaten throughout a meal, not only at the beginning
Asian cuisine	Ingredients: rice, soy, fish and seafood, noodles, seaweed, eggs, seasonal foods, green tea, wasabi	Equipment: - Chopsticks - Kris – traditional Indonesian dagger - Joking r. h. s. (Joking r. h. s. is a traditional Indonesian dagger used for joking) - Deep-frying, grilling and steaming - Eating raw fish, vinegared dishes	Typically three meals during the day - Early breakfast, might contain boiled white rice with various sides - Lunch may be substituted with light snacks - Dinner, usually shared with family or friends
	Also differs from other cuisines. Shaped by colonialism and development of trade	Equipment: - Tandoor oven – cylindrical clay oven used to roast and bake, typical for India and Central Asia - Handi – deep, wide metal cooking dish  Cooking methods: - Deep-frying, frying, roasting - Stewing, steaming	- Rich, filling breakfast is important to provide energy for the whole day - Betel leaves may be eaten after the meal to support digestion - Evening meal is usually eaten with the whole family, it is the most important meal of the day

*This provides two cuisines, however schools or colleges/students can select any two different cuisines

Food Production and Processing

Various methods of food production and processing help to produce a variety of food products, but can also affect the nutritional value of the food.

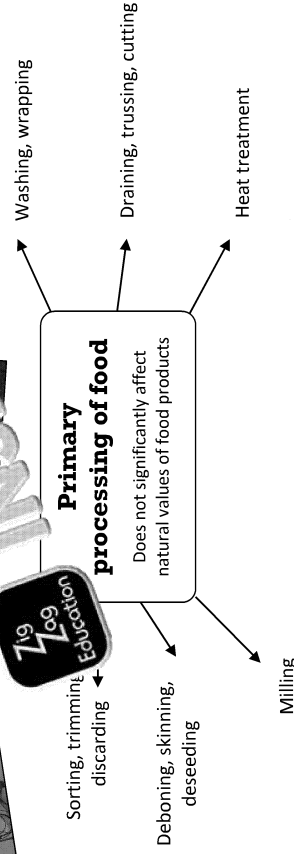
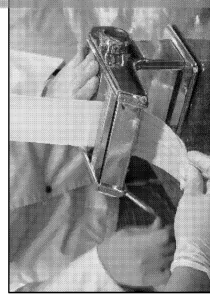
Primary Sources of Food

Foods in their natural, raw state, e.g. milk, wheat grains, apples



Issues related to transport of food are covered on p. 16

Where and how foods are grown, reared and caught (point of origin) on p. 16

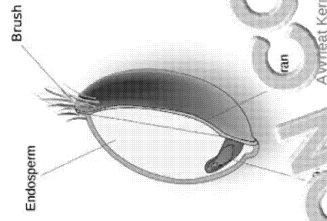


The Making of Flour

1. Harvesting and transporting to the factory/mill
2. Separating from dirt, stones, pieces of metal and other pollution
3. Washing and drying to easily separate the bran
4. Milling
5. Sieving to separate the bran

Bran: the outer layer of a grain

Milling: the process of grinding and purifying grains to obtain flour



Heat Treatment

Pasteurisation: warming the milk to 72 °C for 15 seconds to kill most of the pathogenic bacteria

Ultra heat treatment: heating the milk up to 135 °C for 1–2 seconds to kill all bacteria and spores

Micro filtration: pushing milk through very fine membranes to remove bacteria and other pollution

Homogenisation: pushing milk under pressure through very fine membranes to reduce the size of fat droplets and prevent formation of cream

Sterilisation: heating the milk up to over 110 °C for 30 minutes to kill bacteria and spores

Sterilisation of milk leads to change in colour, flavour and nutritional value of milk. During the process, milk proteins react with lactose, creating brown pigments which also affect the flavour of milk. High temperature decreases the amount of vitamins in the milk, especially B1 and B12.

Drying: process in which milk is first condensed, and then dried. The temperatures used during the process may lead to a fall in vitamin B1 and B12 amount in the powdered milk.

The making of pasta

1. Harvesting the cereals and transporting to the mill
2. Milling and transportation to the factory
3. Mixing flour with warm water
4. Kneading and gluten formation
5. Adding flavourings and colour
6. Rolling and pressing
7. Pasteurisation with steam
8. Cutting the pasta into chosen shapes
9. Drying
10. Packaging

The Making of Cheese

1. Milking cows and transporting the milk to the factory
2. Pasteurisation and homogenisation
3. Warming up to 42 °C
4. Adding starter cultures
5. Fermentation (ripening)
6. Cooling
7. Adding flavourings
8. Packaging

Starter cultures: probiotic bacteria

and cheese production to begin the process

Fermentation: changing lactose into lactic acid, which changes the pH of milk and leads to coagulation/denaturation and thickening

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Modern technologies not only help to obtain high-yield crops, but also help to better preserve and improve the quality of food products.

Supporting Health



What we eat has a huge impact on health. Eating too little may lead to deficiency of a given nutrient. This is important since processing of food often leads to decrease of its nutritional value – higher calorie content, but lower vitamin and mineral amount, etc.

Governments and producers strive to make food safe and healthy for the consumers by adding substances which are beneficial for health.

Cholesterol and Fat Spreads

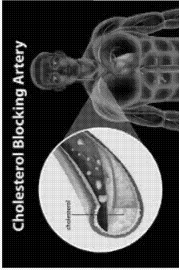
Cholesterol: fatty substance that is used to correctly transport fats around the body. It is found in many animal-derived products, such as meat, cheese and eggs. Cholesterol does not occur in plant-derived products.

- LDL is 'bad' cholesterol because it increases its amount in blood
- HDL is 'good' cholesterol because it transports it to the liver and lowers its amount in the blood

Health outcomes of increased cholesterol levels and excessive fat consumption:

- In excess, cholesterol may deposit in the blood vessels, creating atherosclerotic plaque
- This increases the risk of hypertension, CHD, heart failure and stroke

Some fat spreads are enriched in **plant sterols** and **plant stanols**. These substances have proved to be effective in lowering blood cholesterol level and preventing atherosclerosis.



Food Fortification

During processing, many food products lose their nutrients.

The function of food fortification is to:

- restore nutritional value of foods
- improve nutritional value of foods
- make food more suitable for certain groups of consumers
- prevent diseases caused by malnutrition

Some foods are fortified by law:

Thiamine

Niacin

Calcium

Iron

Vitamin A

Vitamin D

Vitamin A

Wheat flour and bread

Vegetable fat spreads

Semi-skimmed and skimmed milk

Other foods, such as cereals or fruit juices, are fortified voluntarily.

60% Wholegrain
38% Wholegrain
Niacin, Iron, Riboflavin
Thiamin B1, Folic acid
Vitamin B12

All food additives are carefully tested before they may be used in food products. They are listed on the food label along with their E number and their function.

	Advantages	Disadvantages
Colourings	• Improve the appearance of food • Make food more appetising	• May be used to hide poor quality of food • May cause hyperactivity in children
Emulsifiers and stabilisers	• Prevent ingredients from separating • Maintain the texture of food	• Flatulence and bloating • May be used to hide poor quality of ingredients used
Flavourings	• Improve the taste and smell of food • Make food more appetising	• May be used to hide poor quality of ingredients used • Increase appetite and make people eat more than they need
Preservatives	• Enhance shelf life of food • Prevent oxidation and spoilage	• May cause allergy response and anaphylactic shock • Nitrates may contribute to cancer development

Food additives may be both natural (e.g. beetroot extract) and synthetic (e.g. citric acid).

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Sensory Perception

Helps to ensure the quality, consistency in time and acceptability of food by consumers by the use of the five senses:

Taste

Taste buds located on the tongue and in the mouth help to taste the five **tastes**: sweet, sour, salty, bitter and umami

Touch

Helpful in judging the texture, consistency and **mouthfeel** of the food, as well as its temperature and spiciness

Smell

Smell increases production of saliva and stimulates and insinuates into the blood

Eyesight

Important when presenting food, which has to be **appetising**, colourful, neat and decorated

Flavour

is the combination of taste, aroma and mouthfeel of food.

How the taste buds work

- food dissolves in saliva and enters the taste buds
- taste receptors in taste buds depolarise and send electrical impulses to the brain
- the brain recognises the taste

How the olfactory system works

- the aroma compounds from food enter the nose cavity
- the olfactory receptors in the olfactory bulb send electrical impulses to the brain
- the brain recognises the aroma

Hot dishes smell more because aroma compounds fill the air faster (by evaporation) and the nose receptors can detect them more easily!

is built nose ca Aroma flavour blocked

Sensory Analysis Tests

Preference tests

are used to discover if a food is acceptable for the consumers

Paired preference test – to indicate a preferred sample out of two

Which one do you like more?

☐ ☐

Sample 587 Sample 895

Hedonic test – to indicate a preferred sample out of a few

Which one do you like most?

☐ ☐ ☐ ☐

Sample 587 Sample 895 Sample 758 Sample 958

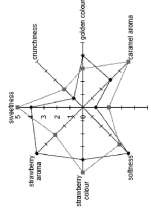
Grading

are used to rank food samples, ranked in order of strength of a given attribute (e.g. saltiness)

are often used in the industry, especially when new products are launched, to predict their popularity in the market.
One sample of food can be assessed with the intensity of various tests.

Profiling

choose the intensity of a food attribute (e.g. 1 to 10) and then the shape of a star to obtain the detailed information



Rating test – measures the acceptability of a given feature in a number of samples OR a number of features in one food product; foods are rated on a scale from 1 to 5 or 1 to 9

Which sample is the crispiest?

☐ ☐ ☐ ☐ ☐

OR

saltiness
sweetness
spiciness
creaminess
fruitiness

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Physical Activity Level

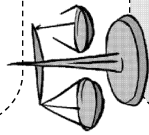
Amount of energy needed to perform all daily tasks, i.e. waking up, showering, jogging, working, shopping, etc.

The more active the person, the more energy needed.

If you eat more than you need (your PAL is low), you are likely to gain weight.

If you do not eat enough or you are very active (your PAL is high) then you are likely to lose weight.

Keep your diet balance

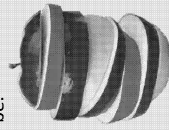


Healthy Eating

A balanced and varied diet is a key to a long life!

Healthy foods and snacks may be:

- Low – fat
 - Low – sugar
 - High – fibre
 - Low – calorie
 - Low – salt
- or a combination of these.



Reasons for choosing them usually include the need to lose weight or maintain health.

Lifestyle

The way in which people live

- busy schedules
- no time for shopping
- no time for eating

Healthy lifestyle should include cooked food and regular meals during the day. The variety of **healthy snacks** and foods which are ready to eat:

- Portioned fruit and vegetables
- Protein shakes and smoothies
- Sandwiches, salads and soups

Food Availability

The amount and variety of food depends on:

- food production possibilities
- food storage
- transportation and import from other countries

Seasonal foods might be cheaper in their harvesting season but still available all year round.



Seasonality

Some foods may be unavailable, or more expensive, beyond their harvesting season.

People may prefer seasonal foods for various reasons:

- Locally grown, cheaper, fresher, tastier
- Want to decrease the environmental impact – food miles and carbon footprint

Factors Influencing Food Choice

Food choices are driven by many various factors, which are very important when planning diets, meals and menus.

Time Available to Prepare Food

- Rules and lack of time
- People choose ready-to-eat foods, order in or eat outside more often
- People choose simple recipes which don't take too long to cook

Time of Day (in the UK)

- Breakfast: sandwiches, cereals, more filling meals are served on weekends or holidays
- Lunch: pasta, salads, sandwiches or eat out
- Dinner: more demanding foods, soups, stir-fry, curry, pie, order in or eat out

The price of food

- quality
- quantity in a
- brand
- place you're

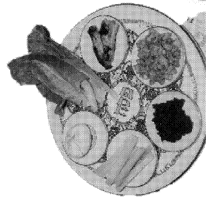
Supermarkets use products than co

Food may be chea

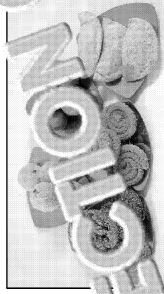


Religion

- Often dictates nutritional regime, indicates what foods can be eaten and when, and what foods should be avoided
- Each religion has a number of celebratory foods and eating habits
- Some religions require foods to be prepared in a specific way
- Religions can also decide when certain food can or cannot be eaten (fasting periods)



Jews prepare a Seder plate for the night of Passover. Each food on the plate has its own symbolic meaning.



Various sweets and confectionery are an important part of Diwali in Hindu tradition.



During Ramadan, food can be eaten only at night-time (from dusk to dawn). It is, however, rich and filling.

Ethical Beliefs

People may choose to eat, or avoid eating, certain products because of their ethical or moral beliefs.

These may be based on:

- whether animals or people suffer during food production
- how food is made
- how food production affects the environment

Fairtrade

Global movement focused on ensuring fair working conditions, prices and wages for farmers and workers in the developing countries.

- Improves working and living conditions
- Supports education and development
- Empowers farmers and their families



Animal welfare

Movement focused on ensuring humane conditions for animals.

- How animals are treated
- How they are nursed/diseases
- How they are slaughtered
- What their living conditions are



2

Organic foods

Plants and animals are grown and reared in the most natural way possible.

- No chemicals
- No pesticides, herbicides
- No antibiotics
- No GM feed or fertilisers



7

GM foods

Plants or animals whose DNA was altered.

Carrier of a gene that is a living organism, in a form that is tightly packed in a cell's nucleus

Gene

Part of a DNA strand, which carries specific information.

- Improved immunity, less need for pesticides
- Higher crops and smaller risk of food shortage
- More nutrients (e.g. golden rice)
- Unknown health effects
- Probably cause morbid obesity
- Potentially cause cancer



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Food Labelling

Proper labelling of food products is important to ensure food safety (e.g. for allergic people) and nutritional education (e.g. for those who wish to lead a healthy lifestyle).

1 **Name of the food** is important so that people know what is inside the package, e.g. butter or butter-like spread

2 **Use by** – applies to food safety; it may be harmful to eat food after that date; used on fresh, perishable foods such as milk, dairy or fresh meat

Best before – applies to food quality; it is usually safe to eat the food after that date, although its flavour, colour or look may be changed; used on dried, preserved or tinned foods such as jams, pasta

3 **Quantity** is given so that consumers can compare prices between products and so that the consumer knows how many portions of food his package contains

4 **Warnings** are given as necessary, e.g. may contain nuts, source of phenylalanine

5 **List of ingredients** is shown in descending order, from the one which is used in the largest amount to the one which is used only in a tiny amount

6 **Name of the company** is important to track where the food comes from in case of food spoilage, anaphylactic reactions, pieces of glass inside, etc.

7 **The lot number** is useful in case of a food spoilage or contamination, when it is easier to track the whole lot and remove it from the market

8 **Storage conditions** are given to ensure the food is stored, e.g. refrigerate after opening, keep for freezing

9 **Instruction for preparation** helps people to properly prepare and enjoy the food without poisoning themselves

10 **Country of origin** is important to track in case of food poisoning, but also for people who prefer to eat locally

Food Legislation Authorities



European Parliament and the Council
Food Standards Agency

Food Labelling in the UK

1. Name of the food
2. Date marks
3. Quantity, e.g. in litres, grams or pieces
4. Warnings
5. List of ingredients
6. Name and address of the producing, packing or selling company
7. The lot number
8. Special storage conditions
9. Necessary instructions for use or preparation
10. Country of origin
11. Allergens
12. Nutrition declaration

11

Allergens – ingredients which may cause allergic reaction (are shown in **bold**)

List of allergens which HAVE to be indicated on the label

1. Cereals containing gluten: wheat, rye, barley, oats
2. Peanuts
3. Nuts: almond, hazelnut, walnut, cashew, pecan, Brazil, pistachio, macadamia, Queensland nut, e.g. *flavourings (almond)*
4. Mustard
5. Sesame, e.g. *tahini (sesame)*
6. Soybeans, e.g. *tofu (soya)*
7. Fish, e.g. *cod (fish)*, *salmon (fish)*
8. Crustaceans: prawns, crayfish, lobster, shrimp
9. Molluscs: oyster, squid, cockles, mussels, winkles, scallops, snails, e.g. *oyster sauce (molluscs)*
10. Lupin
11. Eggs, e.g. *powdered yolk (eggs)*
12. Celery
13. Milk, e.g. *cheddar cheese (from milk)*
14. Sulphur dioxide or sulphites, e.g. *preservative (sulphur dioxide)*

12

Nutrition declaration informs consumers of the amount of certain nutrients per 100 g or portion of product and % of GDA it provides.

Traffic light label may be used to indicate low (green), medium (amber) or high (red) amounts of sugar, fats, saturated fats, and salt in a portion of a food product.

Protein	8.8g	15.5%	100g	6g
Salt	1.8g	3%	100g	2%

Nutritional claim
Statement regarding nutrient content, e.g. *low energy, low fat, sugar free, source of vitamin C*

Health claim
Statement suggesting potential health benefits of eating given product, e.g. *Calcium is needed for the maintenance of normal teeth and bones*

Nutrients have to be listed in a specific order...

1. Energy
2. Fat, inc. saturates
3. Carbohydrates, inc. sugars
4. Fibre, if any
5. Proteins
6. Salt or sodium
7. Vitamins and minerals

Non-mandatory information

Some food labels may include non-mandatory information, such as a picture of the food, health and nutritional claims or serving suggestions.

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