

## **Biology Knowledge Organiser**

### **Nutrition**

**KPI 5.1:** Describe and explain the components that make up a balanced diet, describing the consequences of an imbalanced diet

#### **Balanced diet**

There are 7 major food groups, a balanced diet will contain the correct amounts of all of these for the person's needs, e.g. someone who does a lot of exercise will need a lot more carbohydrate than someone who does not. The seven food groups are summarised below:

Food Group	Example	Function
Protein	Fish, meat, dairy	For growth and repair.
Fat	Butter, oils, nuts	To provide energy. Fat provides a long term store of energy. It also provides insulation for the body.
Carbohydrate	Bread, pasta, sugar	To provide energy.
Fibre	Vegetables, Bran	To help food move through the gut.
Minerals	Dairy (calcium)	Required in small amounts to remain healthy, for example calcium is crucial for healthy teeth and bones.
Vitamins	Oranges (vitamin C), Carrots (vitamin A)	Required in small amounts to remain healthy, for example vitamin D is needed to keep teeth and bones healthy.
Water	Water, fruit juice, milk	Needed to form the cytoplasm of the cells and other fluids.

#### **Key Terms**

#### **Definitions**

Kilojoules (kJ)

A unit used to measure energy in foods

Deficiency Disease

A disease caused by the lack of a specific nutrient

#### **Malnutrition**

If a person has an unbalanced diet they are said to be malnourished. This can lead to people becoming overweight or underweight or having deficiency diseases.

#### **Obesity**

If a person eats too much food and does not do enough exercise they will gain weight. If someone becomes very overweight they are said to be obese. Obese people have a higher risk of certain conditions such as:

- Diabetes
- Heart disease
- Arthritis

#### **Starvation**

If a person does not eat enough food they will they will lose weight. In the extreme this can lead to starvation. Very underweight people are more at risk of having:

- A weakened immune system
- Fragile bones
- Fertility problems

#### **Deficiency Diseases**

Deficiency diseases are when the body does not get enough of a certain nutrient.

- A lack of vitamin C can lead to scurvy which affects the gums.
- A lack of vitamin D can lead to rickets which affects the bones.

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### **Nutrition**

**KPI 5.2:** Evaluate how different lifestyles have different energy needs

#### **Energy in Food**

The energy in food is often measured in kJ, the amount of energy you need depends on different factors including:

1. Your age
2. Your gender
3. Your metabolic rate (rate of reactions within your cells)
4. Your lifestyle

Someone with a more active job, such as a builder, would most likely need more energy from their diet than someone with a less active job such as working in an office.

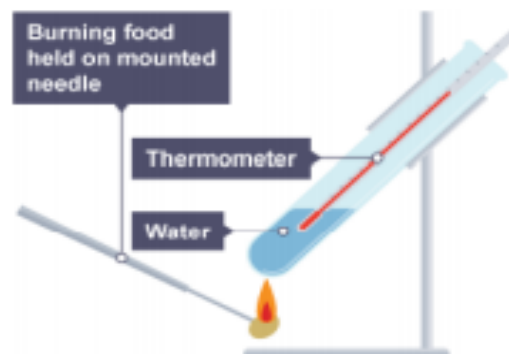
Labels on food packaging inform us about the energy and nutrients they contain and allow us to make informed choices about what we are eating.

<b>Nutrition</b>				
Typical values	100g contains	Each slice (typically 44g) contains	% RI*	RI* for an average adult
Energy	985kJ 235kcal	435kJ 105kcal	5%	8400kJ 2000kcal
Fat	1.5g	0.7g	1%	70g
of which saturates	0.3g	0.1g	1%	20g
Carbohydrate	45.5g	20.0g		
of which sugars	3.8g	1.7g	2%	90g
Fibre	2.8g	1.2g		
Protein	7.7g	3.4g		
Salt	1.0g	0.4g	7%	6g

This pack contains 16 servings  
\*Reference intake of an average adult (8400kJ / 2000kcal)

#### **Measuring Energy in Food**

The energy in different foods can be measured using a simple experiment. If the food is set on fire, it can be used to heat up water and by measuring the temperature change, you should be able to see which foods cause the greatest rise in temperature and have therefore given out the most energy.



#### **Food Tests**

There are some simple chemical tests that can be carried out, to see what food groups are present.

##### **Iodine**

If iodine is added to starch it will turn blue/black.

##### **Sugar**

If Benedict's solution is added to a sugar and heated it will form an orange precipitate.

##### **Fat**

To test for fat, mix the substance with a small amount of ethanol and distilled water, if a milky white emulsion appears, then fat is present.

##### **Protein**

If Biuret solution is added to protein it will turn purple.

## **Biology Knowledge Organiser**

### **Digestion**

**KPI 3.1:** Describe the symbiotic relationship between bacteria and the human digestive system.

Key Terms	Definitions
Symbiotic	Where both organisms benefit from each other
Digestive System	The organ system that breaks down food into small molecules
Mechanical Digestion	When large pieces of food are broken down into smaller ones (e.g. by chewing)
Chemical Digestion	When food is broken down into small soluble chemicals, enzymes help with this
Enzymes	Protein molecules that speed up chemical reactions

### **Bacteria**

The human digestive system contains many symbiotic bacteria that play important roles for example:

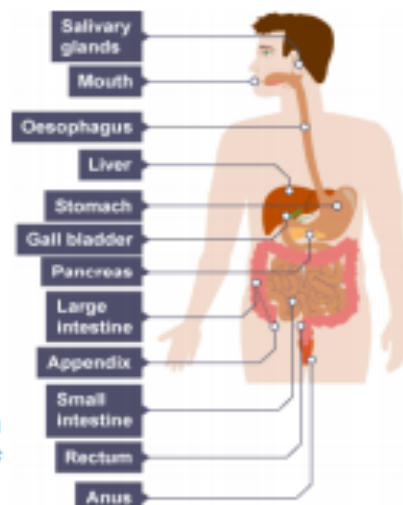
1. They can digest certain carbohydrates that our own enzymes cannot digest
2. They can reduce the chances of harmful bacteria multiplying and making us ill
3. They can produce some vitamins that we need that we are unable to produce ourselves such as vitamins K and B

**KPI 3.2:** Describe how and explain why foods are broken down in the digestive system, in terms of enzymes

### **The digestive system**

Food is digested in the digestive system, this is an organ system. You should be able to name all parts of the diagram below:

- The mouth has teeth that mechanically digest the food, it also has a salivary gland that releases enzymes to break the food down.
- The oesophagus is a muscular tube that pushes the food into the stomach
- The stomach churns the food up, while also adding acid and enzymes to break the food down.
- In the small intestine, food is broken down further and is absorbed through the walls of the intestine into the blood stream.
- The large intestine absorbs any remaining water
- Finally the food passes through the anus as faeces



### **The liver**

The liver produces bile which is then stored in the gall bladder. It is added to the food after it leaves the stomach to neutralise the stomach acid. It is important to neutralise the acid so that amylase and lipase can break down food in the small intestine.

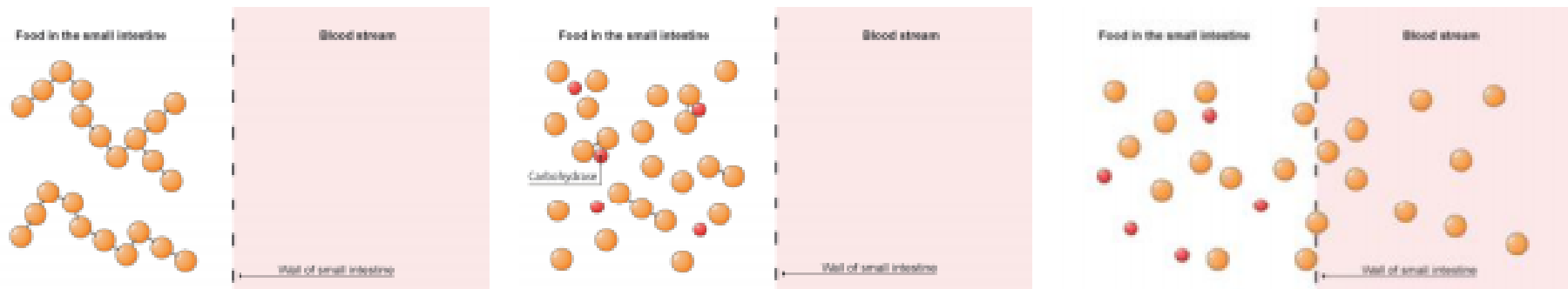
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## **Digestion**

**KPI 3.2:** Describe how and explain why foods are broken down in the digestive system, in terms of enzymes

### **Enzymes**

Enzymes help to break down larger food molecules into smaller ones, so that they can be absorbed through the walls of our small intestines, into our blood stream.



Proteins, carbohydrates and fats each have their own enzyme that breaks them down.

<b>Enzyme</b>	<b>Enzyme made in.....</b>	<b>Where it breaks food down....</b>	<b>What it breaks down.....</b>
Amylase	Salivary glands, pancreas, small intestine	Mouth and small intestine	Starch into sugars
Protease	Stomach, pancreas, small intestine	Stomach and small intestine	Protein into amino acids
Lipase	Pancreas and small intestine	Small intestine	Lipids into fatty acids and glycerol