IGCSE Biology

Diet, Exercise and Health

Indicates a Flash activity.

Indicates an accompanying worksheet.

Indicates that 'How Science Works' skills are covered.

Indicates a virtual experiment.

Indicates that there are teacher's notes.

For more detailed instructions, see the *Getting Started* presentation.

Diet, exercise and health

IGCSE Biology

- Vitamins and minerals
- Special diets
- Balancing energy needs
- Exercise and health
- Summary activities

Healthy diet

A healthy diet should have the right balance of different foods and give the right amount of energy.

As well as carbohydrates, fats and proteins, a balanced diet should include:

- **minerals** – elements that are needed by our bodies in small amounts
- **vitamins** – chemicals that help our bodies perform various processes
- **fibre** – indigestible parts of our food needed to make the gut work properly
- **water** – needed for cell chemistry.

Vitamins and minerals in the body

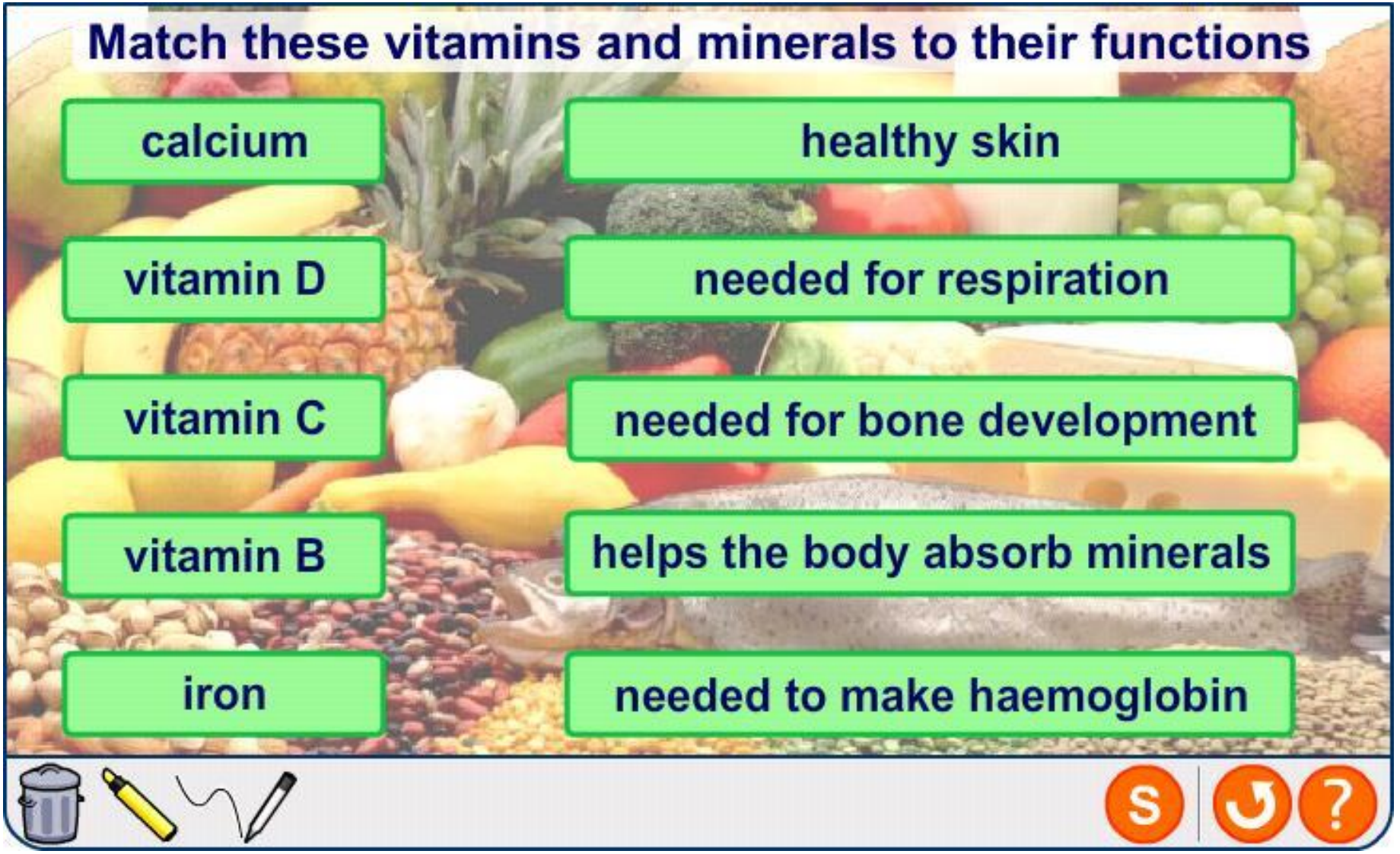
What do these vitamins and minerals do?

The body needs vitamins and minerals to stay healthy. These substances have lots of different functions in the human body.

Press on the buttons for more information about the uses of vitamins and minerals.

B vitamins | vitamin C | vitamin D | iron | calcium

What are vitamins and minerals for?



What is a deficiency disease?

A person who does not eat a balanced diet, or does not eat enough food, is said to be **malnourished**.

Vitamins and minerals cannot be made by the body. So, when they are absent from a diet, a person may suffer from a **deficiency disease**.

Each deficiency disease has characteristic symptoms. Nutritionists, dieticians and doctors need to be able to recognize these symptoms in order to diagnose the disease and cure the patient.

Deficiency diseases can be cured by eating the right food.

Diagnosing deficiencies

What disease does this patient have?

Symptoms

feels faint

looks very pale

feels tired all of the time

constipation

scurvy

anaemia

brittle bones

back next

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Personal choice

Some people restrict their diets by choice. This may be for ethical or religious reasons, or perhaps just because they don't like something.

- **Vegetarian diets** do not contain meat. People often become vegetarian if they believe it is wrong to kill animals for food.
- **Vegan diets** do not have any animal products in them. This includes eggs and dairy products as well as meat.

By limiting your diet, you can become malnourished. People on special diets must balance what they eat to make sure they are not deficient in any vital nutrients.

Diet and religion

Some people limit their diet because of their religious beliefs.

Here are some examples:

- **Muslims** only eat ‘halal’ meat which has been killed in a special way.
- **Jewish** people follow a kosher diet, where certain foods, like pork, are forbidden. Some foods cannot be eaten together, for example, meat and cheese.
- **Buddhists** believe in non-violence, so they follow a vegetarian diet that does not involve killing animals.

Food allergies and food intolerances

Food allergies are caused by the body's immune system confusing safe food for something dangerous.

Common foods that cause allergies include eggs and nuts.

Most food allergies are mild and may only cause a slight rash. Occasionally they can be life threatening. In severe attacks a person may go into **anaphylactic shock**. This can be treated with an adrenaline injection.

Food intolerances do not involve the immune system. The symptoms of a food intolerance could include a stomach ache, wind or a change in toilet habits.

Allergies, intolerances and diet

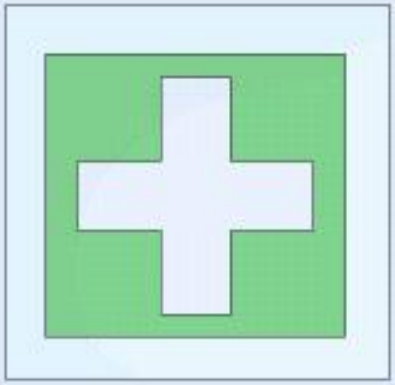
People with food allergies and intolerances have to look closely at the packaging of the food they buy.

Common allergens are often identified on food packaging.

People with food intolerances and allergies have to restrict their diet. For example, being **lactose intolerance** means that one cannot consume cows' milk. This can lead to calcium deficiency and health problems.

Why do people alter their diets?

Why do people follow special diets?

health	religion	personal choice
		

vegan

Quantitative or qualitative?

There are many reasons why people's dietary needs change.

Read each reason carefully and decide whether you think it would change a person's diet **quantitatively** or **qualitatively**.

Press **"start"** to begin.

start

quantitative | qualitative

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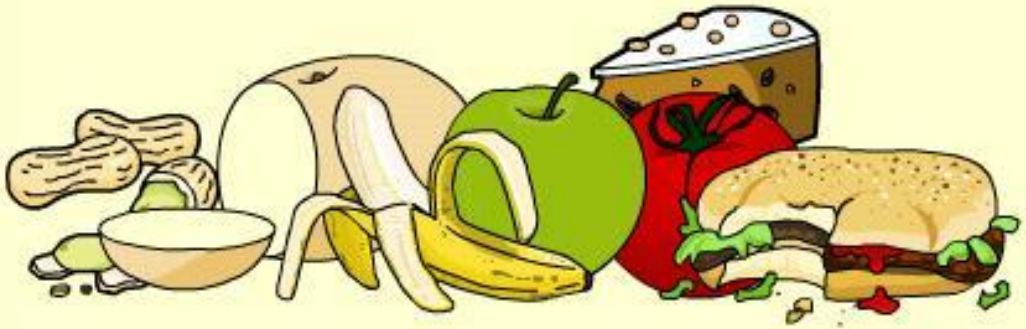
Energy requirements

How do energy requirements differ among individuals?

- sex
- age
- health
- mass
- activity level

Energy requirements are different for different people. The amount of energy that is needed will depend on a number of different factors.



Press the buttons to find out about some of the differences.

Body mass

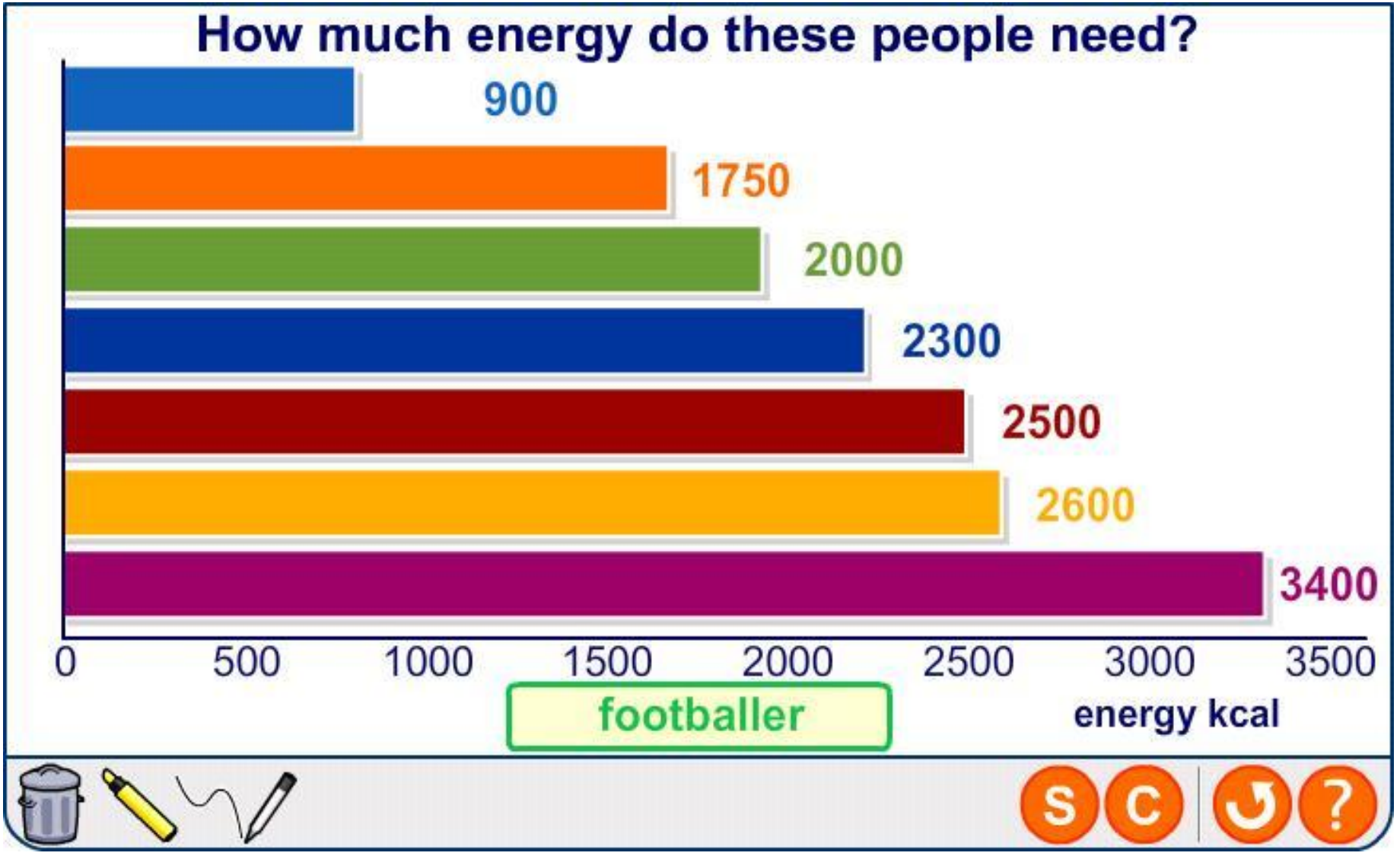
Body mass is the mass of a person measured in kilograms.
As you grow, your body mass increases.
Women tend to have a lower body mass than men.

If people eat too much energy, body mass increases and they become **overweight**.

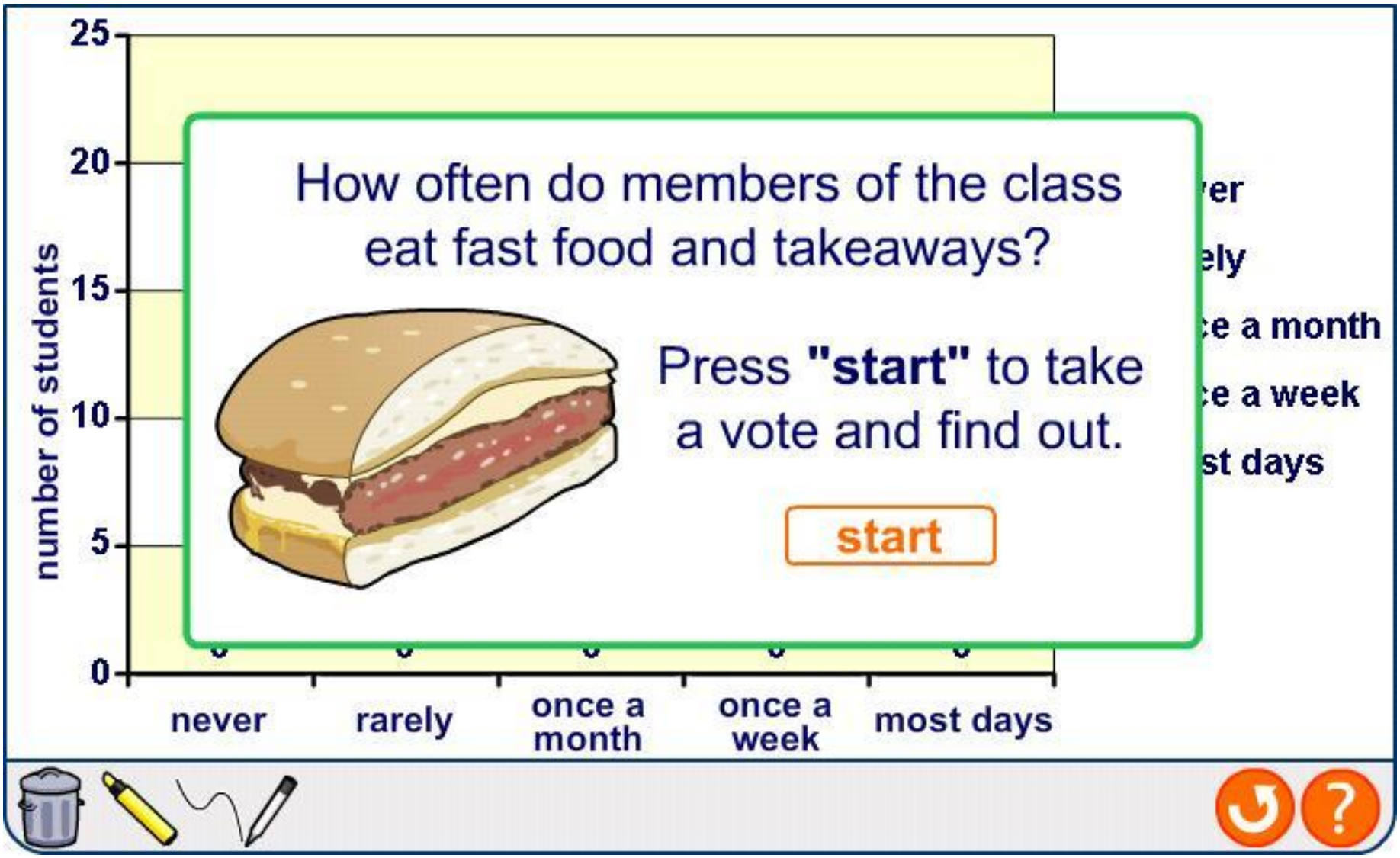
If people eat too little energy their body mass may decrease and they can become **underweight**.

To maintain your body mass, you need to balance the energy you eat against the energy you use. The energy your body needs changes depending on physical activity.

How much energy do you need?



Unhealthy diets?



The problem with fast food

This table shows typical calorie contents for some types of takeaway fast food.

food	typical calories
burger	500–650
¼ pizza	400–700
kebab	900–1000
curry	800–1000

Why might eating fast food make maintaining your body mass difficult?

As well as a lot of calories, fast food often also contains high levels of salt and saturated fats.

What is BMI?

Body Mass Index (BMI) measures the relative amounts of fat and muscle in the body.

$$\text{BMI} = \frac{\text{body mass (kg)}}{(\text{height})^2 \text{ (m)}}$$

Gloria: 1.45 m and 66 kg

BMI = **31**

Zak: 1.85 m and 66 kg

BMI = **19**

What are their health risks?

BMI	Conclusion
<20	underweight
20-25	normal
25-30	overweight
>30	obese

Obese people have an increased risk of arthritis, diabetes and heart disease. People who are underweight tend to have poor immune systems and often get ill.

BMI calculations

Can you work out the BMI (to one decimal point)?

Matthew weighs 59 kg and is 156 cm tall.
Can you calculate his BMI?

.....

check next

Body Mass Index (BMI) = Mass (kg) / Height^2 (m)

Are you right for your height?

In 2008, 21% of boys and 18% of girls aged 11–15 in the UK were obese. Statistics show that obesity levels, among both young people and adults, have risen over the last ten years.

Calculating a person's BMI can be useful, but the formula can overestimate the proportion of body fat in people who are muscular.

This is because muscle is more dense than fat.

This means it is helpful to use extra measures to help judge how healthy a person is, such as waist circumference.

What is diabetes?

People with **diabetes** are unable to regulate their blood glucose levels because their bodies don't produce enough of the hormone, insulin, or because their cells don't respond to it. **Type II diabetes** can be caused by obesity.

Blood glucose levels in diabetics can rise dangerously high after eating, which can cause cell damage.

Symptoms of diabetes can be severe. Initial symptoms include:

- increased thirst, hunger and production of urine
- weight loss, tiredness and nausea.

Obesity and diabetes

Trends in average body mass and diabetes in America

Press the buttons to compare trends in the average body mass and number of people with diabetes in America.

What trends can you see in the two graphs? How are they connected?

Press "**start**" to begin.

start

mean ma

diab

Diet, exercise and health

Metabolic rate

Chemical reactions happen in the cytoplasm of all living cells. The rate or speed of these chemical reactions is known as the **metabolic rate**.

Your metabolic rate depends partly on your genes, but it can also be affected by choices that you make.

Your metabolic rate will be higher if:

- you have a high muscle to fat ratio
- you do a lot of exercise.

Basal metabolic rate (BMR) is the rate that the body uses energy when it is at rest. Having a higher BMR means that you use up more calories even when you are not exercising.

Comparing metabolic rates

Who has the highest metabolic rate?

1  Zena

2

3

4

Body composition: 27% muscle, 26% fat.

Metabolic rate is affected by the amount of exercise a person does and their muscle to fat ratio. Put these people in order according to how high their metabolic rate is likely to be.

Press "**start**" to begin.

start

Health and fitness

Health and physical fitness are different.

- A **healthy** person is free from disease or abnormality.
- A **fit** person has good cardiorespiratory, aerobic and muscular endurance.

Physical fitness has many advantages. Exercise reduces your risk of heart disease and other illnesses, helps keep your body mass down and can even improve your mood and self-esteem.

How can fitness be measured?

How many methods can you think of?

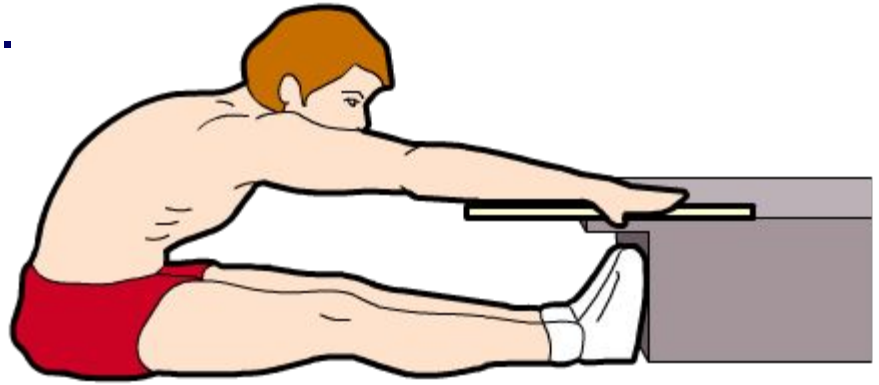
Measuring fitness

There are many different elements of fitness that you can measure yourself by taking tests and making measurements:

- strength
- stamina
- flexibility
- agility
- speed
- cardiovascular efficiency

One test of flexibility is whether a person can touch their toes with their legs straight.

Alternatively, a ruler and fixed box can be used to carry out a ‘touch test’.



Which test produces quantitative data?

Which test would you use to investigate flexibility?

Diet, exercise and health

Glossary of keywords: diet, exercise and health

allergy – A strong immune response to a particular food, which can cause inflammation, coma or even death.

body mass index – A measure of a person's weight in relation to their height.

Anagrams

Anagrams related to diet, exercise and health

How quickly can you unscramble words about

d i e t, e x e r c i s e

a n d h e a l t h ?

Press "**start**" to begin.

start

clue

30

Multiple-choice quiz

How healthy is your knowledge of diet, exercise and health?

Press **"start"** to begin.

start