

Dazzling Digestion Unit Overview

Age 10-11

Objectives

- To analyse a group's diet
- To describe how vitamins and minerals, contained in food, help our bodies to function
- To think why different people in the world, now or in the past, have different diets.

The Big Questions

- Why does the food we eat affect our health?
- How can the food we eat help us to do our best?



Dairy products - Fotolia.com / matka_Wariatka

Unit Summary

Learners will examine their own diets in terms of the amount of different nutrients they consume and what effects these have on our bodies. They will explore how the body digests these nutrients, and carry out a comparative test to investigate why calcium is important for our bones. They will also develop an understanding of how scientists use models in their experiments to better understand the world around us. They will then explore why different people need certain diets to perform well.

Background Information

Pupils may build on prior learning about the main body parts and internal organs (skeletal, muscular and digestive system) in this unit. They will be offered opportunities to explore and answer questions that help them to understand how the digestive system enables the body to function.

The aim of this unit is to help children to develop an awareness of the vitamins and minerals contained in food, in order to better understand the effect their choice of food has on their bodies, and their overall well-being.

Curriculum Links

National Curriculum - England

- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans.

Working scientifically Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

Using test results to make predictions to set up further comparative and fair tests

Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

Identifying scientific evidence that has been used to support or refute ideas or arguments

Wales KS2 Interdependence of organisms

- Pupils should use and develop their skills, knowledge and understanding by investigating how animals and plants are independent yet rely on each other for survival.
- They should be given opportunities to study the names, positions, functions and relative sizes of a human's main organs; the effect on the human body of some drugs, e.g. alcohol, solvents, tobacco.

Northern Ireland KS2 WAU:

Strand 1: Interdependence

- How they and others interact in the world;
- Interdependence of people and the environment and how this has accelerated over time by advances in transport and communications;

Strand 4: Change over time

- How change is a feature of the human and natural world and may have consequences for our lives and the world around us;
- Ways in which change occurs over both short and long periods of time in the physical and natural world

Scotland: Curriculum for Excellence

First: Body systems and cells: By researching, I can describe the position and function of the skeleton and major organs of the human body and discuss what I need to do to keep them healthy.

Second: Body systems and cells: By investigating some body systems and potential problems which they may develop, I can make informed decisions to help me to maintain my health and wellbeing.

Cross-curricular opportunities

Literacy: Writing; Enjoyment and choice – within a motivating and challenging environment, developing an awareness of the relevance of texts in my life

Art: Learners could design their own menu formats, taking into account the environment it will be used in



For extra drama opportunities, consider preparing and performing the Theatre of Debate Play-in-a-Day, The Lament of the Green Bean, For Richer, For Poorer and The Day of Temptations.



Food, Fabulous Food

Lesson Notes 1

What's It All About

Children will learn about the nutrients in their favourite meals, in particular vitamins and minerals. They will identify what each nutrient helps their bodies to do, and what their bodies are good at doing because of the food they eat.

Learning Outcomes

- I know that our bodies need food to stay healthy
- I can describe some of the things that food provides for our bodies
- I know why some foods are more healthy for us than others

Working Scientifically

- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments

Big Question

- How does the food we eat affect our health?

Key Words:

nutrition, protein, carbohydrates, fats, vitamins, minerals



Equipment



From The Crunch Kit:

Resource Sheets 1a and 1b: Vitamins and Minerals (Teaching Notes, p101-102)
Resource Sheet 2: Tally Sheet (Teaching Notes, p103)



From The Crunch Website:

Dazzling Digestion PowerPoint (Lesson 1)

Other Things You Will Need:

Sticky notes or index cards



Preparation

Ask children to think about what their favourite meal is, before the lesson.

The children should have an understanding of what makes up a balanced diet before they start this unit.

Appetiser

Ask the children to think of their favourite meal, and to write it down on an index card or sticky note. Once they have done this tell them they can't change it! Include some suggestions of your own, introducing more unusual foods that children may not have tried themselves.

Remind the children what the eat well guide recommends (fruit and vegetables, potatoes, bread, rice and pasta, some dairy, beans, pulses, fish, eggs and meat). Tell the children that they are going to investigate the science behind the guide and relate it to their own favourite meals.

Main Course

Talk about why we need food. Establish that all foods provide nutrients. There are 6 'classes' of nutrients: water, proteins, carbohydrate, fats, minerals and vitamins. Tell them that most, but not all, of the food we eat contains vitamins and minerals. These are chemicals that help our bodies to work really well. There are lots of different types, and each one helps us in different ways. Look at some of the examples on the Dazzling Digestion PowerPoint.



Divide the class into groups and give them Resource Sheet 1 and Resource Sheet 2. Ask them to read about the vitamins and minerals on Sheet 1 and to talk about what vitamins and minerals they think are contained in their favourite meals. Which ones have the most vitamins and minerals, which ones have the least?

Ask each group to go through each of their favourite meals and keep a tally chart of how many foods, in their favourite meals, contain each of the vitamins and minerals. They can record their tally on Sheet 2. Alternatively, they could record their favourite meals on the British Nutrition Foundation's Explore Food website. The Diet or Recipe Calculator will automatically calculate the vitamins and minerals in most foods.

Once the groups have completed their recording, ask them to look at which vitamins and minerals they have a lot of, and which they don't. Were there any meals that were particularly high or low in vitamins or minerals? Do they think that there are any that are particularly hard to find, what foods would they have to eat more of to get that nutrient?

Dessert

In their groups, ask the children to look at the list of nutrients on Sheet 1 and what each one helps their bodies to do. Ask them to use their tallies to identify what their bodies are really good at doing, because of the food they eat. Finally, ask the children to complete the sentence: 'If there was one food that we should eat more of, it would be... because ...'

An Extra Helping

Consider preparing and performing the Theatre of Debate Play-in-a-Day, The Lament of the Green Bean. Explore the effects of food consumption. Where does our food come from, why should we be careful not to waste it, and how can we make sensible and healthy choices?





An Eggs-cellent Eggs-periment!

Lesson Notes 2

What's It All About

Children will learn about what happens if we are missing an important mineral from our diet. They will carry out an experiment soaking eggs in vinegar to find out what happens to bones when there is not enough calcium.

Learning Outcomes

- I can describe the process of digestion
- I understand the importance of calcium in our diets to strengthen bones

Working Scientifically

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Using test results to make predictions to set up further comparative and fair tests
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

Big Question

- What happens if an important nutrient is missing from our diet?

Key Words:

digestion, prediction, comparative



Equipment



From The Crunch Kit:

Vinegar
Beakers
Measuring cylinders
Resource Sheet 3: Eggs-cellent Models (Teaching Notes, p104)



From The Crunch Website:

Video: Dazzling Digestion

Other Things You Will Need:

Sticky notes
12 eggs, hard-boiled
Water
Measuring scales
Spoons

Preparation

This activity takes place over the course of 24 hours (you could carry out the experiment over the weekend), and you will need to make sure that you have enough hard-boiled eggs for two per group.

The experiment in this lesson uses eggs to find out what happens if we remove calcium from our bones.



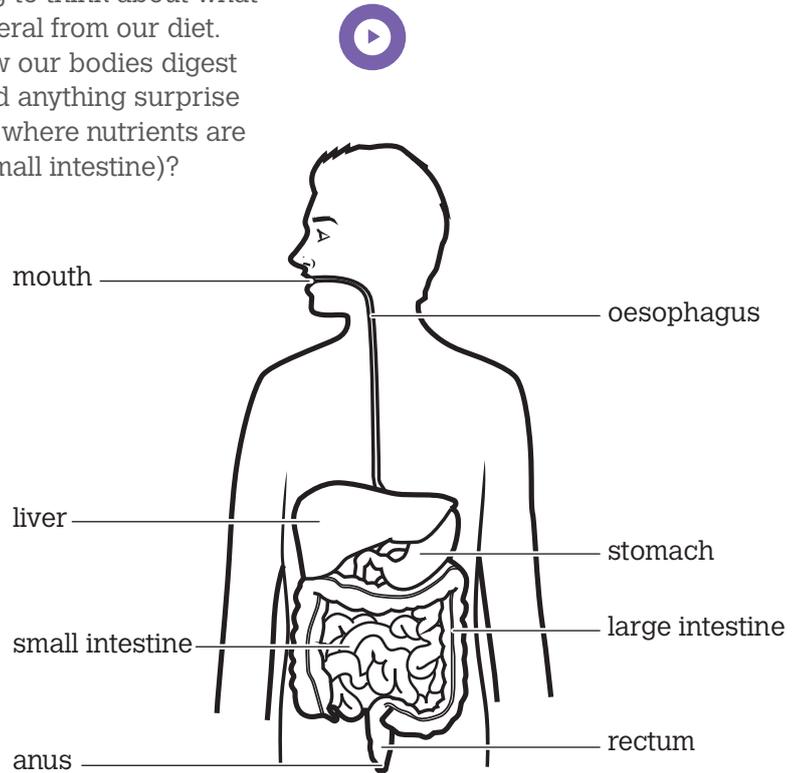
Safety

Always wash your hands after handling eggs.

Appetiser

Tell the children that, in this lesson, they are going to think about what happens to us if we are missing an important mineral from our diet. First show the Dazzling Digestion video about how our bodies digest food. Ask the children what they already knew, did anything surprise them? In the digestive system, do they remember where nutrients are absorbed into the rest of our bodies (the upper small intestine)?

Remind children that different foods provide us with the nutrients we need to keep our bodies healthy. Which nutrients do they remember? What do they do? Can they name a food and the nutrients it might contain? Do they remember a mineral called 'calcium' and do they know which foods are good sources of calcium (cheese, milk, yogurt, dark green leafy vegetables, tinned sardine or salmon fish bones etc)? What parts of our bodies need calcium (our bones and teeth need calcium to keep them strong and help them to grow; our nerves and muscles use calcium to help us move)? Explain to the children that they will be carrying out an experiment which will take 24 hours to find out about calcium in our bones.



The Digestive System

Ask the children to make predictions about what they think our bones would be like if we didn't have enough calcium in our diet. Ask the children to make their predictions on sticky notes and stick them to a display board, or to a wall or window. They may want to write their answers down, or draw pictures.

Look at the predictions as a class; ask for a few volunteers to explain their theories. Tell the children that it would be very hard for us to remove the calcium from a person to find out if their predictions are right. The person probably wouldn't appreciate it either! Tell the children that often scientists use models to conduct experiments, rather than trying things out in the real world where people or the environment could be damaged.

Put the children into groups. You may want to ask each group to suggest a way of finding out what happens to bone if there is not enough calcium. Alternatively, tell the class that they are going to use hard-boiled eggs to create a model to find out what happens to bones when there is not enough calcium.

Main Course

Give each group two hard-boiled eggs, two beakers, a measuring cylinder, some vinegar, some water, a set of measuring scales, and a washing up bowl. Tell the children that the egg shell contains lots of calcium, just like bones. It is made from calcium carbonate and it is very strong. Explain that they are going to remove the calcium by using vinegar, a weak acid. They will put one egg in water and the other in vinegar for at least 24 hours. Ask them to predict what will happen to the shell of the egg put in water and the egg put in vinegar, an acid. (The calcium carbonate will react with the vinegar to make a new substance, leaving the egg without a shell, if it is left long enough.)



Give each group a copy of Resource Sheet 3 and ask them to choose a name for each of their eggs, and measure and record the mass using the measuring scales. This is a comparative test and the variable being changed is the liquid (vinegar or water). Measure at least 120 mL of vinegar into a beaker and then measure the same amount of water into another beaker. Ask the children to write down the volume of liquid you have used for each beaker. Label each beaker so you know which is which.

Each group should place one egg into a beaker of vinegar, and another egg into a beaker of water, as a control. Make sure that they record the time and date. Ask the children to watch what happens to each egg and to write down any changes that they see happening on Resource Sheet 3. (The egg that has been placed in vinegar will be covered in bubbles. This is because carbon dioxide is being released as the calcium carbonate in the egg shell reacts with the vinegar.)

Now, ask the children to leave their eggs somewhere safe, where they won't get knocked, for 24 to 48 hours.

When the children come back to their eggs, ask them to look carefully at both beakers and to think about the best way to record any changes they can see to the liquid and to the eggs. (They could write down, draw or photograph anything they notice.) Ask what they think has happened and why. Put both beakers into the washing up bowl and remove the egg carefully from the water. This egg will look the same as it did before. Check the mass of the egg. Has it changed? Use the measuring cylinder to find out how much water is left in the beaker. Is it the same? There may be less water if some has evaporated.

Now remove the egg from the vinegar. This egg will still look like an egg, but it will no longer have a shell, only the membrane that surrounds the hard-boiled egg will be left. Use the measuring cylinder to find out how much vinegar is left. Is there less or still the same amount? Explain that the liquid still smells vinegary but it's not vinegar anymore because the calcium carbonate in the egg shell has reacted with the vinegar to make a new substance. Is this a reversible reaction? Why do you think that?

Finally, ask the children to measure the mass of the eggs, is it the same as at the beginning of the experiment? Can they offer reasons why? What do they think the inside of the egg will be like? Ask them to try and break the membrane of the egg. The egg white and yolk will look the same as any other hard-boiled egg.

Dessert

In their groups, ask the children to look at their predictions about what they thought would happen to the egg. How accurate were their predictions? What have they learned as a result of the experiment? What does this show you about why you need calcium in your bones? They should use all their observations and measurements to help explain their ideas.

An Extra Helping

Consider preparing and performing the Theatre of Debate Play-in-a-Day, For Richer, For Poorer. Explore the causes and effects of malnutrition. What happens to our bodies if we don't have a balanced diet?





The Perfect Menu

Lesson Notes 3

What's It All About

Children will research the dietary needs of a particular person and use what they have learned to design a meal that will give that person the best diet, with all the nutrients they will need to survive and thrive.

Learning Outcomes

- I can create a menu of food that will give someone 'superpowers'
- I know that the type of food I eat can have an impact on my performance

Working Scientifically

- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments

Big Question

- How can food help someone be amazing?

Key Words:

menu, thrive, fresh, diabetes

Preparation

This activity is a mini project that could be used as a homework activity, or as part of topic work in class. Children will need to choose an occupation or person (e.g. an astronaut, a gladiator, Scott of the Antarctic, someone with a particular medical condition, etc.) to design a menu for.

Appetiser

Tell the children that they are going to use what they have learned in the last two lessons to design a menu for a person. Remind children that we all need vitamins and minerals in our diets. They will need to think about the best diet that this person will need to survive and thrive, and they will also need to think about whether the food that contains these nutrients will stay fresh in the conditions that the person has to eat them.

Main Course

Ask children to select a type of person from a topic they are studying (e.g. a gladiator, astronaut, explorer, etc). Explain to children that gladiators actually had a very healthy diet. They were slaves who were often treated as the lowest of the low, and so their diet included a lot of vegetables and barley. Occasionally they could eat the meat from the animals they slaughtered but it was tough and not very nice! Alternatively ask children to think of someone with a particular medical condition which is affected by diet, for example diabetes. Ask them to research the dietary needs that this person may have, and use what they have learned to design a meal for them, that will give them all the nutrients they will need.

If children need some inspiration, have a look on stem.org.uk at the project that has been done about designing a meal for British astronaut Tim Peake's journey into space in December 2015.

After the children have done the research, tell the children that they should present their menu and write a short paragraph explaining why their menu is perfect for their chosen person. Display these on a board, and ask the children to read other people's menus, and award a star to the menu they would like the most.

Dessert

Once all the stars have been awarded, ask the class to choose three to present in a school assembly. Remind them that menus with no stars may be as good to present, as one with lots of stars. Some menus may be really good for our health, or for the conditions we find ourselves in, even if they don't sound very nice.

An Extra Helping

Consider preparing and performing the Theatre of Debate Play-in-a-Day, The Day of Temptations. We are surrounded by unhealthy food and not always encouraged to be very active. What choices can we make to try and be healthy all day?





Resource Sheet 1a

Name

Date

Dazzling Digestion – Lesson 1

Vitamins and Minerals

Vitamin or Mineral	What it does	Where you can find it
Vitamin A (Retinol)	Helps your immune system to fight against infections Helps you see in dim light Helps keep skin and linings of parts of our body, like the inside of your nose) healthy.	Cheese, eggs, oily fish, fortified low-fat spreads, milk and yogurt
Vitamin B1 (Thiamine)	Works with other B vitamins to help the body break down and release energy in food Keep your nervous system healthy	Vegetables, like peas; fresh fruit and dried fruit, eggs, whole grain bread, some fortified breakfast cereal, liver (you shouldn't eat more than one portion of liver a week)
Vitamin B2 (Riboflavin)	Keeps our skin, eyes and your nervous system healthy Helps your body release energy in food	Milk, eggs, fortified breakfast cereal, rice
Niacin	Helps keep our skin and nervous system healthy Helps to release energy in the foods we eat	Meat, fish, wheat four, eggs, milk
Vitamin B6	Helps our bodies to use and store energy Help form haemoglobin the substance in our blood that carries oxygen round the body	Pork, chicken or turkey, fish, bread, porridge, brown rice, eggs, vegetables, soya beans, peanuts, milk, potatoes and some fortified cereals
Vitamin B12	Keeps our nervous system healthy Releases food from the food we eat	Meat, salmon, cod, milk, cheese, eggs, some fortified cereals



Resource Sheet 1b

Name

Date

Dazzling Digestion – Lesson 1

Vitamins and Minerals

Vitamin or Mineral	What it does	Where you can find it
Vitamin C	Helps wound healing Helps protect against damage Helps maintain healthy skin, bones and blood vessels	Oranges and orange juice, red and green peppers, strawberries, blackcurrants, broccoli, Brussel sprouts, potatoes
Vitamin E	Helps maintain healthy skin, eyes and strengthens the immune system	Nuts and seeds, soya oil, corn oil, olive oil
Vitamin K	Helps wounds to heal properly Helps keep bones healthy	Green leafy vegetables, like broccoli and spinach, vegetable oils, cereal Small amounts can be found in meat and dairy foods too
Calcium	Builds strong bones Helps muscles to work (including keeping our heart beating!) Helps wounds to heal	Milk, cheese and other dairy foods, green leafy vegetables (not spinach), soya beans, tofu, fish bones and bread fortified with calcium
Iron	Helps your blood to carry oxygen round your body It is essential for our body to work properly	Meat, beans, nuts, dried fruit (like apricots), brown rice, fortified breakfast cereals, soybean flour, and most dark green leafy vegetables (such as water cress and curly kale)

These are some of the main vitamins and minerals you will find in food, there are more! Like anything, you should eat foods with lots of different vitamins and minerals in them, but be careful not to eat too much of each one.



Resource Sheet 2

Name

Date

Dazzling Digestion – Lesson 1

Tally Sheet

My favourite meal is:

It contains:

Vitamin or Mineral	Tick the box if your meal has this vitamin or mineral in it
Vitamin A	
Vitamin B1	
Vitamin B2	
Niacin	
Vitamin B6	
Vitamin B12	
Vitamin C	
Vitamin E	
Vitamin K	
Calcium	
Iron	



Resource Sheet 3

Name

Date

Dazzling Digestion – Lesson 2

Eggs-cellent Models

Name your two eggs and write down their mass:

Egg names	Mass of the eggs	We will put this egg in (Cross out one)
	g	water/vinegar
	g	water/vinegar

When we soak the eggs in vinegar and water, I predict that:

When soaked in water the egg will
When soaked in vinegar the egg will

When I first put the eggs in the solutions this is what happened:

In water
In vinegar

This is what happened to the eggs:

Egg names	Mass of the egg	What happened to the egg?
	g	The water made this egg
	g	The vinegar made this egg

My prediction was: