

UNIDAD DIDÁCTICA
THE DIGESTIVE APPARATUS. FOOD
AND NUTRIENTS

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1. INTRODUCCIÓN

Esta unidad didáctica está dirigida al 3º curso de ESO. Aunque en el I.E.S. Sánchez Lastra este es el primer nivel académico en el que se imparte una asignatura del área de Ciencias Naturales dentro del programa Bilingüe, los alumnos ya han cursado el Primer Ciclo de ESO dentro de dicho programa, y son perfectamente capaces de expresarse en este idioma, así como de comprender textos relativamente sencillos.

De acuerdo con el Decreto 74/2007 del 14 de junio (por el que se establece el currículo de la Educación Secundaria Obligatoria en el Principado de Asturias), la presente unidad didáctica se incluye dentro del bloque 2 de contenidos para el 3º curso de ESO titulado “Las personas y la salud. Alimentación y nutrición humanas”. Se asume que en los cursos previos los alumnos han estudiado las funciones que caracterizan a los seres vivos (nutrición, relación y reproducción), y que conocen someramente la anatomía de los distintos aparatos que participan en la nutrición del hombre y de otros vertebrados superiores.

En 3º curso de ESO la asignatura de Biología y Geología cuenta tan solo con una carga lectiva de dos horas semanales. Por este motivo en el programa Bilingüe se ha optado por impartir además un taller semanal de una hora denominado “Educación para la Salud” en el que, a lo largo del primer trimestre, se trabajan contenidos relacionados con la alimentación y nutrición humanas. La unidad didáctica que aquí se presenta, que consta de diez sesiones lectivas, se ha diseñado con este fin. No obstante, cualquiera de las actividades propuestas podrían incluirse en un periodo lectivo normal, y muchas de ellas pueden emplearse como material de refuerzo.

Al finalizar esta unidad los alumnos deberían ser capaces de explicar los procesos fundamentales que sufre un alimento a lo largo del proceso de la digestión, así como las funciones de cada uno de los órganos que componen el aparato digestivo. Asimismo deberían ser capaces de clasificar distintos tipos de alimentos como energéticos, plásticos y reguladores, y de diferenciar los hábitos alimentarios saludables de aquellos insanos y que pueden conducirnos a la adquisición de una serie de enfermedades.

2. CONTENIDOS

Los contenidos a desarrollar son los siguientes:

- Los alimentos y los nutrientes. Nutrientes inorgánicos (agua y sales minerales) y orgánicos (glúcidos, lípidos, proteínas y vitaminas).
- Los diferentes tipos de alimentos: energéticos, plásticos y reguladores.
- El valor energético de los alimentos. Dietas y hábitos alimenticios saludables. Diferencias entre alimentación y nutrición.
- Algunos trastornos relacionados con la alimentación (enfermedades carenciales, anorexia, obesidad, ...)
- La conservación de los alimentos.
- Anatomía del aparato digestivo.
- Digestión mecánica y química. Absorción y egestión.
- Principales enfermedades relacionadas con el aparato digestivo.

Contenidos específicos relacionados con el idioma inglés:

Los alumnos deberán de familiarizarse con el vocabulario en inglés propio del tema. En concreto las palabras más frecuentes que deberán conocer son: mouth, tongue, teeth, salivary glands, throat (= pharynx), gullet (=oesophagus), stomach, liver, gall bladder, pancreas, guts, small and large intestine, bowel, nutrients, carbohydrates (= glucids), lipids, proteins, vitamins.

Asimismo, en algunas de las actividades que se proponen al comienzo de la unidad deberán manejar un vocabulario bastante amplio sobre tipos de alimentos (nombres de distintas frutas, cereales, verduras y hortalizas, pescados, etc.).

La comprensión lectora y la expresión oral y escrita en inglés se trabajan en todas las actividades de la unidad didáctica. No obstante, se propone además una actividad concreta de reading (sesión 4) así como también una actividad de listening (sesión 10).

3. OBJETIVOS

Objetivos específicos de Biología:

- Conocer la diferencia entre los conceptos de alimentación y nutrición, así como la finalidad del proceso digestivo.
- Conocer los diferentes tipos de nutrientes que están presentes en los alimentos.
- Realizar cálculos sencillos sobre calorías ingeridas en una comida.
- Utilizar métodos de análisis sencillos para identificar algunos de los principales nutrientes.
- Conocer la anatomía básica del aparato digestivo y la función que cada parte del mismo realiza en el proceso de la digestión.
- Conocer el papel de los enzimas digestivos en la transformación de moléculas complejas en otras más sencillas.

Objetivos lingüísticos y comunicativos:

- Ser capaces de entender instrucciones sencillas en inglés para la realización de las actividades propuestas (uso del imperativo).
- Ser capaces de formular preguntas para obtener información (-wh questions).
- Expresar relaciones causa/efecto utilizando un vocabulario adecuado (because, results from, comes from, is caused by, can lead to, results in, ...).
- Ser capaces de describir procesos, secuenciándolos (firstly, then, next, finally, ...).
- Expresar información en porcentajes, así como expresar el resultado de cálculos matemáticos sencillos.
- Ser capaces de usar oraciones de relativo para añadir información adicional.
- Ser capaces de usar oraciones condicionales.

4. METODOLOGÍA

De acuerdo con los principios pedagógicos que establece el Decreto de currículo en su artículo 11, la metodología en la etapa de educación secundaria obligatoria será fundamentalmente activa y participativa, favoreciendo el trabajo individual y cooperativo del alumnado en el aula. Se facilitará la construcción de aprendizajes significativos estableciendo relaciones entre los nuevos contenidos y las experiencias y conocimientos previos. Se fomentarán clases activas, creando las condiciones para que el alumnado sea progresivamente más autónomo.

Con el fin de atender la diversidad de intereses, capacidades y necesidades de los alumnos y alumnas se seleccionarán actividades variadas, se promoverán agrupaciones diversas y se utilizarán distintos recursos (bibliográficos, audiovisuales, laboratorio, incluyendo las tecnologías de la información y la comunicación).

Con el fin de desarrollar la comprensión oral y escrita se fomentarán los hábitos de lectura y escritura, realizando actividades relacionadas con la lectura y comprensión de textos, la distinción de ideas principales y secundarias, la elaboración de síntesis, y la interpretación de gráficos, imágenes o tablas de datos.

El alumnado debe iniciarse en la utilización de bibliografía variada (manuales, guías u otros) y en el empleo de los recursos proporcionados por las tecnologías de la información y la comunicación.

También se fomentará la realización de alguna actividad de carácter práctico, con el que alumnos y alumnas puedan entrar en contacto de forma elemental con el método científico (observación de fenómenos, toma de datos, elaboración de hipótesis sencillas, verificación de las mismas).

5. SECUENCIACIÓN DE LAS SESIONES. MATERIALES CURRICULARES DE CADA SESIÓN

Como ya se ha indicado, la unidad didáctica se compone de un total de diez sesiones lectivas. La primera sesión tiene como objetivos el diferenciar entre alimento y nutriente, así como introducir el concepto de dieta saludable.

En la segunda sesión se abordan los seis grupos básicos de alimentos y se analizan los nutrientes más abundantes en cada grupo.

En la tercera sesión se propone el análisis detallado de las etiquetas de algunos alimentos, obteniendo información de las mismas.

La cuarta sesión es una actividad de lectura comprensiva de un texto, sobre el que los alumnos deben responder una serie de cuestiones. De acuerdo con los principios metodológicos que establece el decreto de currículo, “la lectura constituye un factor fundamental para el desarrollo de las competencias básicas”.

En la quinta sesión los alumnos deben manejar una tabla sencilla de calorías y realizar cálculos sobre ella. Asimismo se plantea una breve lectura sobre dos enfermedades carenciales, de la que deben extraer la información básica sobre las mismas.

La sexta sesión es una actividad de laboratorio en la que los alumnos deben realizar una prueba sencilla que sirve para detectar la presencia de almidón y de proteínas en diferentes alimentos.

Las sesiones séptima y octava están dedicadas al estudio del aparato digestivo, su anatomía y su funcionamiento básico, a través de la interpretación de dibujos, esquemas, etc.

La novena sesión está dedicada a las técnicas de conservación de los alimentos, y en ella se proponen también actividades de repaso sobre lo aprendido hasta el momento.

Por último, en la décima sesión se propone el visionado de un video corto y sencillo con dos experiencias relacionadas con la digestión.

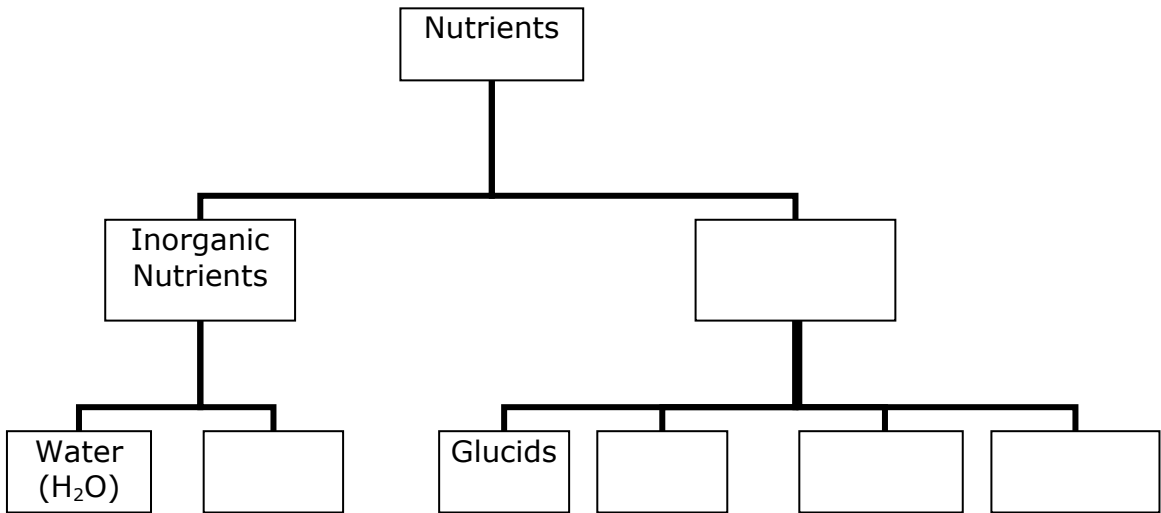
| Session number | Session title | Activities |
|-----------------------|---|----------------------|
| Session 1 | Nutrients and food. Types of nutrients | Activities 1 to 9 |
| Session 2 | A healthy diet. The food wheel | Activities 10 to 13 |
| Session 3 | Food labels | Activity 14 |
| Session 4 | Learning about fats (reading) | Activity 15 |
| Session 5 | Calculating calories / Effects of a poor diet | Activities 16 and 17 |

| | | |
|------------|---|---------------------|
| Session 6 | Laboratory activity | Activity 18 |
| Session 7 | Anatomy of the digestive apparatus | Activities 19 to 21 |
| Session 8 | Mechanical and chemical digestion. | Activities 22 to 27 |
| Session 9 | How to preserve food. Review activities | Activities 28 to 31 |
| Session 10 | Watching a video about digestion | Activity 32 |

SESSION 1: NUTRIENTS AND FOOD. TYPES OF NUTRIENTS

► **Activity 1:** Using the information available in your textbook, answer the following questions:

- a) Complete: **Nutrients** are substances we need for obtaining and for making our own living matter.
- b) Could you say what **food** is?
- c) Complete the scheme about the different types of nutrients:



► **Activity 2:** Classify the following words into glucids, lipids, proteins, vitamins or mineral salts:

Starch / triglyceride / glucose / A / fructose / fatty acids / casein / E / cellulose / haemoglobin / sodium chloride / cholesterol / albumin / C / amino acids / fibre /

| Glucids | Lipids | Proteins | Vitamins | Mineral salts |
|---------|--------|----------|----------|---------------|
| | | | | |
| | | | | |
| | | | | |

► **Activity 3:** Vegetables are sources of vitamins and fibre. Could you give some examples of vegetables?

► **Activity 4:** Fruits are sources of glucids, vitamins and fibre. Could you give some examples of fruits?

▶ **Activity 5**: The source of lipids are vegetable oils and animal fats. Can you give some examples of foods containing them?

▶ **Activity 6**: Starch is one type of glucid. Can you find some examples of foods that provide starch to us?

▶ **Activity 7**: Could you give some examples of foods that are rich in proteins?

▶ **Activity 8**: Do you think proteins are only present in foods which have an animal origin? (Think about vegetarian and vegan people before answering)

▶ **Activity 9**: What is a diet? Use a dictionary to find an accurate definition of this word.

SESSION 2: A HEALTHY DIET. THE FOOD WHEEL

► **Activity 10:** What do you think a healthy diet is?

► **Activity 11:** There are six main **groups of foods** included in the “food wheel”:

- group 1 – Milk and dairy products
- group 2 - Meat, fish and eggs
- group 3 – Fats and oils
- group 4 – Cereals, pulses, potatoes and sugar
- group 5 – Fruits
- group 6 – Vegetables

- a) Can you give some examples of dairy products?

- b) Do you know what type of nutrients are found in milk?

- c) And what type of nutrients are found in foods belonging to group 2?

- d) Can you give two examples of fats and two examples of oils?

- e) Can you say the main nutrients included in foods belonging to group 4?

- f) Fibre does not belong to any food group. Do you remember why is so important to include it in our diet?

▪ g) Match the following terms:

Fuel foods
Protective foods
Growth foods
Fibre

to avoid constipation
to provide energy
we need them in small quantities
to build cells

- e) Complete the table about the groups included in the food wheel:

| Group | Main nutrients | Function |
|-------------|-----------------------------------|---------------------------------|
| 1: | Proteins, vitamins and calcium | Growth foods / Protective foods |
| 2: |, and also vitamins and iron | / Protective foods |
| 3: | Lipids | |
| 4: | Glucids, and also | Fuel foods / Growth foods |
| 5: | Vitamins, fibre and | Protective foods / Fuel foods |
| 6: | Vitamins, fibre and minerals | Protective foods / Avoid |

► **Activity 12:** Do you know why is so important for us to include a source of vitamins in our diet?

► **Activity 13:** Major nutrients provide energy to the body. This energy keeps your heart beating, your brain active, and your muscles working. Energy is measured in kilocalories.

- Proteins have 4 kilocalories/gram (a gram is a measure of weight)
- Glucids have 4 kilocalories/gram
- Lipids have 9 kilocalories/gram

- Why do you think animals use lipids (= fats) to store energy? (Include these groups of words in your answer: to move, low body weight, twice the amount of energy)

- And why do you think plants use glucids to store energy?

SESSION 3: FOOD LABELS

► Activity 14: Scavenger hunt about food labels

Food is an energy resource and there are some foods that have more energy in them than others. Read the food labels you have been given and see if you can find the answers to these questions:

- a) How much protein is in one serving of beef burger?
- b) How much protein is in 100 g of beef burger?
- c) How many grams of sugar are in one serving of burger?
- d) What percent of the daily value of salt (sodium) is in one serving of Mini chicken breast fillets?
- e) How much fat is in 100 g of burger?
- f) And how much fat is in 100 g of chicken breast?
- g) If you are trying to lose weight, which kind of meat should you eat, and why?
- h) How many carbohydrates are in one serving of mushy peas?
.....
- i) How much energy is in one serving of mushy peas?
- j) What is the main ingredient in Fingers?
- k) Using the back of the paper, draw a bar chart comparing how many lipids there are in 100 g of burgers, chicken breasts, Fingers and mushy peas.
- l) Draw another bar chart showing how many proteins there are in 100 g of each food.
- m) Compare the bar charts you have drawn. Do they have the same shape or a similar shape?.

100 % beef burgers

| Nutrition | | | Ingredients |
|---------------------------|--------------------|---------------------|---|
| Typical values | Per burger | Per 100 g | |
| Energy | 551 kJ 133 kcal | 1279 kJ 308 kcal | Beef (98%), Flavourings, SALT, dextrose, yeast extract, onion powder, black pepper, black pepper extract Gluten free Healthy hints: Reducing the total fat in your diet, particularly saturated fat, may help to maintain a healthy heart |
| Protein | 9.4 g | 21.9 g | |
| Carbohydrate | 0.4 g | 0.8 g | |
| Of which sugars | 0.2 g | 0.3 g | |
| Of which starch | 0.2 g | 0.5 g | |
| Fat | 10.4 g | 24.1 g | |
| Of which saturates | 4.4 g | 10.1 g | |
| Of which mono-unsaturates | 4.7 g | 11.0 g | |
| Of which polyunsaturates | 0.2 g | 0.6 g | |
| Fibre | 0.4 g | 0.8 g | |
| SALT | 0.4 g | 1.0 g | |

| TESCO <i>Every little helps</i> | | NUTRITION INFORMATION | | |
|------------------------------------|---------------------|-----------------------|------------------|-----------|
| Mushy peas | TYPICAL COMPOSITION | 150 g (5 ¼ oz) | 100 g (3 ½ oz) | |
| | | | provides: | provides: |
| | Energy | 549 kJ / 129 kcal | 366 kJ / 86 kcal | |
| | Protein | 6.6 g | 4.4 g | |
| | Carbohydrate | 18.2 g | 12.1 g | |
| | of which sugars | 2.9 g | 1.9 g | |
| | Fat | 0.3 g | 0.2 g | |
| | of which saturates | 0 g | 0 g | |
| | Fibre | 4.1 g | 2.7 g | |
| | Sodium | 0.5 g | 0.3 g | |

This can contains two servings

A serving (150 g) contains the equivalent of approx. 1.2 g of salt

Remember: there are 28 grams (g) in 1 ounce (oz)

extra crunchy Fingers

| NUTRITION INFORMATION | | Per 100 g | Per biscuit |
|-----------------------|------|-----------|-------------|
| Energy | kJ | 2110 | 115 |
| | kcal | 505 | 25 |
| Proteins | g | 6.6 | 0.4 |
| Carbohydrates | g | 66.2 | 3.5 |
| Fats | g | 23.6 | 1.3 |

FRESH SKINLESS MINI CHICKEN BREAST FILLETS



GUIDELINE DAILY AMOUNTS

| EACH DAY | MEN | WOMEN |
|----------|------|-------|
| CALORIES | 2500 | 2000 |
| FAT | 95 g | 70 g |
| SALT | 7 g | 5 g |

These figures are for average adults of normal weight. Your own requirements will vary with age, size and activity level.

NUTRITION INFORMATION

TYPICAL COMPOSITION 100 g (3 ½ oz) provide

| | |
|--------------------|------------------|
| Energy | 421 kJ / 99 kcal |
| Protein | 23.9 g |
| Carbohydrate | 0 g |
| Of which sugars | 0 g |
| Fat | 0.4 g |
| Of which saturates | 0.1 g |
| Fibre | 0.3 g |
| Sodium | 0.3 g |

SESSION 4: LEARNING ABOUT FATS

► **Activity 15:** Read the text and answer the questions:

Fat is a component in food. Some foods, including most fruits and vegetables, have almost no fat. Other foods have plenty of fat. They include nuts, oils, butter, and meats like beef.

The name - fat - may make it sound like something you shouldn't eat. But fat is an important part of a healthy diet. And little kids, especially, need a certain amount of fat in their diets so the brain and nervous system develops correctly. That's why toddlers need to drink whole milk, which has more fat, and older kids can drink low-fat or skim milk.

How much fat should you eat? Experts suggest kids who are 6 to 8 eat 48 to 60 grams per day. Older kids, between 9 and 12, should eat about 60 to 75 grams. That's about 27% of a kid's daily calories. Babies need more, but kids older than 2 and adults should get less than 30% of their daily calories from fat, nutrition experts say. You can figure out how many grams of fat are in a food by looking at the food label.

Types of Fat

You might see ads for foods that say they're "low-fat" or "fat-free". Lower-fat diets have been recommended for health and to help people lose weight. But nutrition experts are finding that fats are more complicated and that some kinds of fat are actually good for your health. As a bonus, fat in food helps people feel full, so they don't eat as much.

But that doesn't mean a high-fat diet will be good for you. And some fats are better than others. Here are the three major types:

Unsaturated fats: These are found in plant foods and fish. These may be good for heart health. The best of the unsaturated fats are found in olive oil, peanut oil, canola oil, albacore tuna, and salmon.

Saturated fats: These fats are found in meat and other animal products, such as butter, cheese, and all milk except skim. Saturated fats are also in palm and coconut oils, which are often used in commercial baked goods (the kind you buy at the store). Eating too much saturated fat can raise blood cholesterol levels and increase the risk of heart disease.

Trans fats: These fats are found in margarine, especially the sticks. Trans fats are also found in certain foods that you buy at the store or in a restaurant, such as snack foods, baked goods, and fried foods. When you see "hydrogenated" or "partially hydrogenated" oils on an ingredient list, the food contains trans fats.

Like saturated fats, eating too much can raise cholesterol and increase the risk of heart disease.

Why Do We Need Fat?

Fats fuel the body and help absorbing some vitamins. They also are the building blocks of several hormones and of cell membranes, and they insulate nervous system tissue in the body.

So fat is not the enemy, but you'll want to choose the right amount - and the right kind - of fat. If you're getting most of your fat from protein-rich meats, nuts, and heart-healthy oils, you've already made fat your friend!

Modified from: Mary L. Gavin, MD - 2008 (www.kidshealth.org)

Questions:

- a) What is the meaning of “ads” in the fourth paragraph?
- b) Do you remember what fats are used for?
- c) Write ten examples of foods that are low in fats.
- d) Write ten examples of foods that are rich in fats.
- e) How many types of fat are there?
- f) How much fat should you eat every day?
- g) Which type of fat do you think is the best and why?
- h) Which type of fat do you think is the worst and why?
- i) Do you think beef burgers are fatty or lean food? And what about chicken breasts?

SESSION 5: CALCULATING CALORIES

► Activity 16: Calculating the calories you eat

Calculate how many calories you can obtain from the following meal:

Lunch:

- one serving of spaghetti (80 g) with cheese (50 g) and tomato sauce (100 g of tomato and 20 g of olive oil)
- a pork chop (125 g) with chips (100 g) and lettuce (75 g)
- an apple (150 g)
- 50 g of bread

| Food | Energy (kcal per 100 g of food) |
|-----------|---------------------------------|
| apple | 47.1 |
| chips | 245.6 |
| Pork | 252.7 |
| bread | 258.7 |
| tomato | 17.9 |
| cheese | 377.2 |
| spaghetti | 374.1 |
| lettuce | 13.9 |
| Olive oil | 852.8 |

| Energy needs (Kcal/day) | | |
|-------------------------|-------|-------|
| | Men | Women |
| Young | 3,000 | 2,400 |
| adult | 2,600 | 2,000 |
| old person | 1,900 | 1,400 |

Total amount of kcal from this meal:

Remember: Every day about 55 % of energy you obtain from food should come from glucids; about ---- % from lipids and about ---- % from proteins.

- Usually about the 20 % the energy should come from breakfast, about 40 % from lunch and about 20 % from dinner. According to this, do you think the lunch above is a balanced one or not?
- Where do you think the remaining 20 % of energy comes from?
- If we get too much energy from our diet we -----
- If we get too little energy from our diet we -----

SESSION 5: EFFECTS OF A POOR DIET

► Activity 17: Some effects of a poor diet (Student A)

Work in pairs: each student has to read the information about two diseases related to a poor diet and complete two rows in the table. After this, share the information with your mate and complete the remaining rows. Use the following expressions to tell your mate the information: results from, comes from, is caused by, can lead to, results in, could be avoided by, ...).

| Disease | Causes | Effects | Solutions |
|---------|--------|---------|-----------|
| | | | |
| | | | |
| | | | |
| | | | |

Constipation

Constipation is defined as having a bowel movement fewer than three times per week. With constipation stools are usually hard, dry, small in size, and difficult to eliminate. Some people who are constipated find it painful to have a bowel movement and often experience straining, and the sensation of a full bowel.

Almost everyone experiences constipation at some point in their life, and a poor diet typically is the cause. Most constipation is temporary and not serious. Understanding its causes, prevention, and treatment will help most people find relief.

Goitre

A goitre (pronounced "goy-ter") is an enlargement of the thyroid gland. This gland is situated at the front of the throat, below the Adam's apple (larynx). The thyroid gland secretes hormones to regulate many metabolic processes, including growth and energy expenditure.

The thyroid gland is controlled by the pituitary gland, which is located in the brain. The pituitary prompts the thyroid to make its hormones by releasing thyroid-stimulating hormone (TSH). However, the thyroid can't manufacture its hormones without sufficient dietary iodine. If a person's diet is low in iodine, the pituitary keeps sending chemical messages to the thyroid, but in vain. The thyroid gland enlarges as it attempts to comply with the pituitary's demands.

SESSION 5: EFFECTS OF A POOR DIET

► Activity 17: Some effects of a poor diet (Student B)

Work in pairs: each student has to read the information about two diseases related to a poor diet and complete two rows in the table. After this, share the information with your mate and complete the remaining rows. Use the following expressions to tell your mate the information: results from, comes from, is caused by, can lead to, results in, could be avoided by, ...).

| Disease | Causes | Effects | Solutions |
|---------|--------|---------|-----------|
| | | | |
| | | | |
| | | | |
| | | | |

Rickets

Rickets is a disorder due to lack of vitamin D which leads to softening and weakening of the bones. Vitamin D helps to control calcium and phosphate levels in the body. When the body is deficient in vitamin D, it is unable to properly control those levels. If the blood levels of these minerals become too low, the body may produce some hormones to release them from the bones. This leads to weak bones.

Vitamin D may be absorbed from food or may be produced by the skin when it is exposed to sunlight. Lack of vitamin D production by the skin may occur in people who must stay indoors, work indoors or live in climates with little exposure to sunlight. You may not get enough Vitamin D from your diet if you follow a vegetarian diet or do not drink milk products.

Anaemia

Anaemia is a condition in which the blood fails to supply the body's tissues with sufficient amounts of oxygen. This is due either to a lack of red blood cells, or to each cell containing too little of the oxygen-carrying protein haemoglobin.

There are several causes of anaemia but, by far the most common form of the condition is caused by iron deficiency. Lack of iron prevents the bone marrow from making enough haemoglobin for the red cells. The problem can be due to a lack of iron in the diet. Good sources of iron include fruit, wholemeal bread, beans, and lean meat. The first symptoms of anaemia are tiredness and palpitations.

SESSION 6: LABORATORY ACTIVITY

► Activity 18: Testing for starch and proteins

In this activity, you are going to work in groups of four students. First at all, review if all the material you need is on the lab desk.

Needed material:

- Food samples: rice, bread, flour, sugar, potato, sausage, some cold cut (ex. ham)
- 12 Test tubes
- A marker
- 1 Petri dish
- Iodine solution
- Pestle and mortar
- Sodium hydroxide solution and a pipette
- Copper sulphate solution and a pipette
- A beaker with water

Read carefully the steps you have to do to test for starch and proteins.

Test for Starch

a) Take a small sample of each food and put it in the Petri dish. If the food is powder, put a small amount of it in a test tube, add an equal volume of water and shake it. Using the pestle and the mortar, crush some grains of rice and use this powder to test on it. With the marker, write on each test tube the name of the food.

b) Add some drops of iodine solution. If a blue–black colour appears, starch is present.

Test for protein

a) Using a pestle and a mortar, crush a small amount of each food and mix it with water in a test tube. With the marker, write on each test tube the name of the food.

b) Add 5 -6 drops of dilute sodium hydroxide solution.

c) Now add 5 - 6 drops of copper sulphate solution and wait for few minutes. If there is protein in the food that you are testing, it will turn into a violet colour.

Do the previous tests on different foods. Enter your results in the table below and answer the questions.

| Name of food | Does it contain starch? | Does it contain protein? |
|---------------------|--------------------------------|---------------------------------|
| Rice | | |
| Bread | | |
| Flour | | |
| Sugar | | |
| Potato | | |
| sausage | | |
| cold cut (like ham) | | |

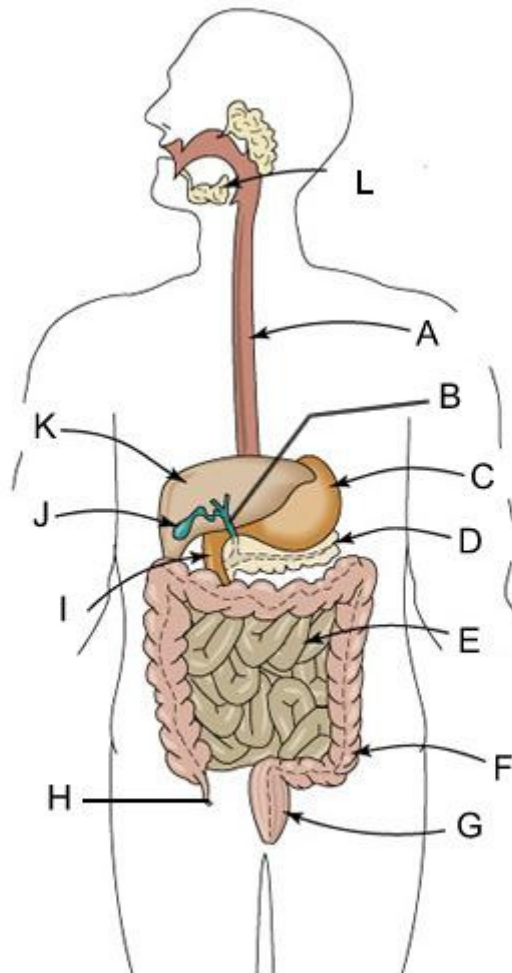
Questions:

- a) Which foods contain starch? What do all these foods have in common?
- b) How can you know if a food contains starch?
- c) Which foods contain proteins? What do they have in common?
- d) Can you explain why sugar does not contain starch, if it is a glucid?
- e) Write a brief report explaining the results of this activity:

(Modified from: “*Exploring Science for QCA*” Copymaster File 8. Pearson Education Limited, 2002)

SESSION 7: ANATOMY OF THE DIGESTIVE APPARATUS

► **Activity 19:** The diagrams below show the anatomy of the digestive apparatus and some details of it. Write the names for each part using all the words in the box (add as many arrows as you need):



| | | |
|--------------------|------------------|------------|
| gall bladder | small intestine | oesophagus |
| duodenum | bile duct | rectum |
| vermiform appendix | descending colon | pancreas |
| stomach | salivary glands | liver |
| anus | ascending colon | mouth |

► **Activity 20:** Here you can find some terms related to the digestive process. Match each event with one or more of the following terms: **large intestine, small intestine, mouth, stomach, oesophagus** and **food (chips)** (Example: incisor is related with mouth)

| | |
|---------------------------|----------------------|
| Incisor: mouth | Fats: |
| Chewing: | Molar and pre-molar: |
| Peristalsis: | Water removed: |
| Saliva: | Swallow: |
| Pancreatic juices: | Carbohydrate: |
| Transfer to blood stream: | Fibre remains: |
| Mixing and churning: | Absorption: |

► **Activity 21:** Complete the following paragraphs related to digestion, and say in which organ the process described takes place:

- a) Food is mashed up by means of the At the same time, chemical digestion begins with the mixture of the from the glands.

The organ is:

- b) After swallowing, food reaches the Food moves and is softened thanks to the movement of the walls of this organ, and it is mixed with These contain various substances like, which act chemically on food. Finally, a pulp known as is produced and it leaves this organ via the pylorus.

The organ is:

- c) In the first part of this organ, the ascending colon begins to recover and some salts. The final tract is the, where faeces are stored until they are expelled through the

The organ is:

(Text modified from: “*Science 3. Biology and Geology*”. Richmond Publishing – Santillana, 2003)

SESSION 8: PROCESSING FOOD: MECHANICAL AND CHEMICAL DIGESTION

► **Activity 22:** Name the part of the digestive apparatus where:

- bile is produced:
- the conditions are acidic:
- bile is stored:
- excess water and salts are removed:
- only protease enzymes are produced:
- protease, lipase and carbohydrase enzymes are produced:
.....
- digestion is completed here:
- the carbohydrate starch is broken down by the amylase:
.....
- incisors, molars and canines are found:
- food and drink go from the mouth down to the stomach:
.....
- absorption of nutrients takes place:

► **Activity 23:** In the table below decide if the information for each box is true (T) or false (F).

| Feature | Pancreatic juices | Saliva | Gastric juices | Intestinal juices | Bile |
|-------------------------------|-------------------|--------|----------------|-------------------|------|
| Produced by stomach | | | | | |
| Contains a lipase | | | | | |
| Produced by the liver | | | | | |
| Contains a protease | | | | | |
| Produced by the duodenum wall | | | | | |
| Contains a carbohydrase | | | | | |

► **Activity 24:** Describe the role of bile in the digestion of fats (some “clues” you can include in your answer: emulsifier, to emulsify, to break down).

► **Activity 25:** With your mate, discuss and answer the following questions:

- a) Why does digestion need to take place?
- b) Where does the process of digestion begin?
- c) Where does this process finish?
- d) Why don't simple sugars, vitamins and minerals need to be broken down?
- e) What are the products of digestion used for?

► **Activity 26:** Match the following words to their definitions:

| Word | Definition |
|-----------------|--|
| Stomach | Six metres long, digests food and pushes the food to the large intestine |
| Glucose | Helps us taste bitter/salty/sweet/sour |
| Small intestine | Shaped like a pear, it stores a greenish yellow liquid |
| Pancreas | The first step of food breakdown happens here |
| Liver | Digests or breaks down food into smaller pieces and holds food for about two hours |
| Gall bladder | Makes pancreatic juice and insulin to regulate blood sugar |
| Bowel | It cleans blood and sends liquid waste to the gall bladder |
| Tongue | Water is absorbed here |
| Mouth | The energy-rich molecule used in cell respiration |

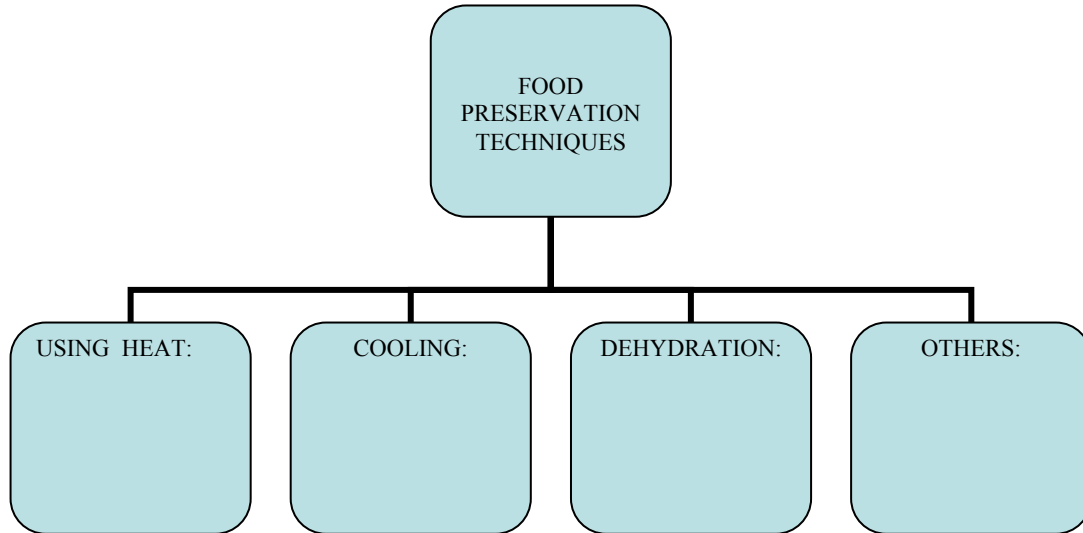
► **Activity 27:** Search the Internet and complete the table about the biological role of some nutrients and the effects of their lack on the body, using the words below:

| Nutrient | Essential for | Deficiency |
|-----------|---|-----------------|
| Iron | carrying oxygen in the red blood cells | |
| | making a hormone that regulates growth | Goitre |
| | having strong bones by controlling calcium and phosphate levels | Rickets |
| Vitamin C | having a healthy skin and gums | |
| | good night vision | Night blindness |

Words: iodine / anaemia / vitamin A / scurvy / vitamin D

SESSION 9: HOW TO PRESERVE FOOD

► **Activity 28:** Complete the following scheme about how to preserve food. Classify the following preservation techniques in the corresponding box: smoking, freezing, canning, pasteurization, sun drying, salting, using chemical preservatives, refrigeration, pickling, using a dehydrator, UHT (ultra-high temperature).



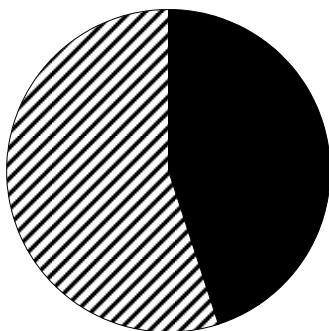
► **Activity 29:** You have the definitions of some food conservation techniques below. Using the information on your text book, try to guess the name of each process:

- This technique first destroys bacteria through heating and then the food is placed in a sterilized container and sealed: -----
- This technique removes water which is required by bacteria to grow and reproduce from the food: -----
- This technique slows down the spoilage process by changing some essential water into ice, a form that the bacteria cannot use: -----
- This technique destroys most of the existing microorganisms by heating the food to a high temperature for a short duration: -----
- This technique keeps the food with a high level of acid, making it an inhospitable environment for bacteria: -----
- This technique uses a vacuum sealed, impermeable film that inhibits yeasts and bacterial growth on the foods' surface: -----
- This technique adds smoke-born chemicals which help destroy potential spoilage organisms from food : -----

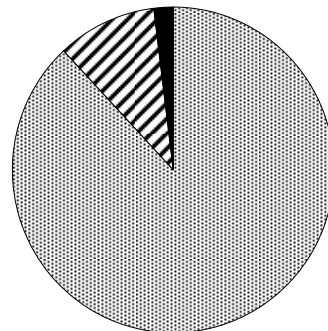
► **Activity 30:** Decide if the following statements are true (T) or false (F):

- Iodine solution can be used to test proteins:
- Milk is a nutrient:
- Vitamins can be used to obtain energy:
- Glucids are found in foods like olive oil and lard:
- Water is the main component in living beings:
- Glucose is a complex glucid:
- Starch is made of glucose molecules and it tastes sweet:
- Meat does not contain proteins:
- Cholesterol is a type of protein:
- You should give vitamins to a plant:
- Starch is a big molecule and it is used to store glucose in animals:
- Meat and fish are the main sources of vitamins:
- In a balanced diet, you don' t need to include fruits:

► **Activity 31:** The pie charts show the percentage of different nutrients in rice and eggs. From the information in the pie charts identify each food (striped pattern are proteins; black pattern are fats and grey pattern are glucids):



Food A is -----



Food B is -----

SESSION 10: WATCHING A VIDEO ABOUT DIGESTION

► **Activity 32:** You are going to watch the video “KS3/ KS4: Demonstrating Biology. 8 demonstrations” (from www.teachers.tv). The first two demonstrations (about 7 minutes long) are related to the digestive apparatus. Watch the video and try to answer the following questions:

First demonstration: “Icing sugar”

- What is the aim of this experiment?
- What is icing sugar?
- What are the three candles used for in this experiment?
- What is used to put sugar inside the paint pot?

Second demonstration: “Gums to bums”

- What is the aim of this experiment?
 - What is the man using in the experiment as saliva?
 - What is he using as stomach acid?
 - What is he using as enzymes?
 - And what is he using as bile salts?
 - Why is he adding sodium bicarbonate in the small intestine?
 - How is he trying to reproduce the absorption process?
- If we have some extra time, we can play the “Amazing food detective” (<http://members.kaiserpermanente.org/redirects/landingpages/afd>) or visit the BBC page (<http://www.bbc.co.uk/schools/GCSEbitesize>)

| GLOSSARY ABOUT NUTRIENTS AND DIGESTIVE APPARATUS | | | |
|---|--------------------|---------|---------------------|
| ENGLISH | SPANISH | ENGLISH | SPANISH |
| | nutriente | | morder |
| | glúcido | | masticar |
| | almidón | | cortar |
| | glucosa | | triturar |
| | fibra (= celulosa) | | tragar |
| | lípidos | | mezclar |
| | colesterol | | segregar |
| | proteína | | glándulas salivares |
| | vitamina | | saliva |
| | boca | | jugos gástricos |
| | faringe | | ácido clorhídrico |
| | esófago | | bilis |
| | estómago | | emulsionar |
| | hígado | | vesícula biliar |
| | pancreas | | enzimas digestivos |
| | intestino delgado | | digestión mecánica |
| | duodeno | | digestion química |
| | intestino grueso | | jugos pancreáticos |
| | colon | | absorción |
| | recto | | difusión |
| | ano | | |
| | heces | | |

6. COMPETENCIAS BÁSICAS QUE SE TRABAJAN EN LA UNIDAD DIDÁCTICA

El Real Decreto 1631/2006 de 29 de diciembre establece ocho competencias básicas a cuyo logro deberá contribuir la educación secundaria obligatoria. De ellas, en esta unidad didáctica se trabajan las siguientes:

Competencia en comunicación lingüística

Se trabaja la competencia en comunicación lingüística en lengua inglesa a través de diversas actividades, como por ejemplo la lectura e interpretación de la información contenida en las etiquetas de varios alimentos. También a través de la lectura comprensiva de un texto, del que los alumnos deben extraer información.

La comunicación escrita de los resultados obtenidos en una actividad de laboratorio es otra actividad que fomenta el desarrollo de esta competencia. Y la actividad propuesta en la última sesión (ver un vídeo y contestar a una serie de preguntas sobre el mismo) permite trabajar la capacidad de comprensión oral de los alumnos.

En la clase de Inglés esta competencia se desarrolla por medio de:

- El correcto uso de expresiones de tiempo (once, two times, often, never, usually...) para describir hábitos saludables.
- Producción escrita de menús para diferente tipo de gente, teniendo en cuenta las calorías asociadas a cada tipo de comida y las calorías máximas de ingesta según persona.
- Producción oral de una presentación utilizando un slogan para anunciar un producto que nos ayude a mantenernos en forma para cuidar nuestra salud.
- Ser capaces de entender un texto escrito e identificar frases falsas basadas en el texto.

Competencia matemática

Se requiere el uso de las matemáticas en la representación gráfica de datos (representación del porcentaje de distintos nutrientes presentes en varios alimentos) y la comparación e interpretación de los mismos.

También se utilizan destrezas matemáticas para la interpretación de gráficas de sectores que muestran los % de nutrientes en dos alimentos distintos; y para la realización de cálculos sencillos para conocer la cantidad de calorías ingerida en una comida.

Competencia en el conocimiento y la interacción con el mundo físico

Las ciencias de la naturaleza buscan el desarrollo del conocimiento del propio cuerpo y las relaciones entre los hábitos y las formas de vida y sus repercusiones en la salud. En esta unidad se utilizan dibujos sencillos (así como modelos anatómicos tridimensionales disponibles en el laboratorio) para el estudio de la anatomía del aparato digestivo humano. Se analiza el proceso de la digestión, así como los hábitos alimenticios saludables para nuestro organismo.

Tratamiento de la información y competencia digital

Las tecnologías de la información y la comunicación también se emplean en esta unidad. En concreto se propone el visionado de un video sobre la digestión, así como la conexión a algunas páginas web que ofrecen resúmenes muy buenos en inglés como la de la BBC (bbc.co.uk/schools/GCSEbitesize).

Competencia social y ciudadana

La competencia social se potencia a través de actividades en grupos pequeños y a través del trabajo de laboratorio. También a través del estudio de algunas enfermedades relacionadas con el aparato digestivo que llevan a una reflexión sobre la conveniencia de que nuestra alimentación sea correcta, equilibrada y suficiente.

Competencia para aprender a aprender

Esta competencia se trabaja a través de la realización de una experiencia en el laboratorio, ya que este tipo de actividades motivan la curiosidad de los alumnos y sirven para desarrollar sus habilidades experimentales y de observación.

En general las actividades planteadas en esta unidad pretenden seguir una metodología activa y participativa, con el fin de conseguir un aprendizaje significativo por parte de los alumnos.

7. MATERIALES Y ESPACIOS NECESARIOS

- Laboratorio y material de laboratorio (placas de petri, tubos de ensayo, gradillas, etc).
- Reactivos: lugol, solución de hidróxido sódico y solución de sulfato de cobre.
- Modelos anatómicos y láminas sobre el cuerpo humano.
- Ordenador y cañón de proyección para visionar un video.
- Conexión a Internet para visitar algunas páginas en inglés, como la sección de educación de la BBC.

8. EVALUACIÓN. CRITERIOS DE EVALUACIÓN Y DE CALIFICACIÓN

Criterios de evaluación

▪ Explicar los procesos fundamentales que sufre un alimento a lo largo de todo el transcurso de la nutrición, utilizando esquemas y representaciones gráficas para ilustrar cada etapa, y justificar la necesidad de adquirir hábitos alimentarios saludables y evitar las conductas alimentarias insanas.

Con este criterio se pretende evaluar que el alumno o la alumna es capaz de:

- describir las funciones de cada uno de los órganos del aparato digestivo, así como la función del aparato digestivo en el conjunto de la nutrición.

- conocer las principales alteraciones del aparato digestivo y la importancia de los hábitos de higiene en la prevención de algunas de estas enfermedades (por ejemplo, las caries).

- reconocer los hábitos alimentarios saludables, como medio para prevenir enfermedades como la obesidad, la diabetes o las enfermedades cardiovasculares, desarrollando una actitud crítica ante ciertos hábitos consumistas poco saludables.

Criterios de calificación

Al finalizar la unidad se realizará una prueba escrita, que supondrá el 80% de la calificación. El 10% de la calificación se obtendrá a través de la valoración de las tareas propuestas (trabajo en clase y en casa) y 10% restante se obtendrá de valorar la actitud (asistencia, puntualidad, comportamiento respetuoso hacia el profesor y hacia los compañeros).

Cada prueba escrita constará de 9 preguntas en castellano y una en inglés, que se valorará como un 10% de la nota obtenida.

EN LA CLASE DE INGLÉS

ACTIVITY 1

Read the following questionnaire and choose the best answer according to your habits. Then count the points assigned to each question and read your score. Do you agree with it?

ARE YOU A HEALTHY PERSON?



1. How often do you eat chocolate?

- A. Once a week B. Everyday C. Two bars a day D. Three times a week

2. How much water do you drink a day?

- A. 1 litre B. Two glasses of water C. 2 litres D. I don't drink any water

3. How often do you play sports with your friends?

- A. Sometimes B. Never C. Always D. Often

4. Do you always clean your teeth after eating? (Even if you've only eaten chewing-gum)

- A. Always B. Sometimes C. Never D. Usually

5. How often do you walk home?

- a. Everyday B. Never C. At the weekend D. Five days a week

6. How often do you go swimming?

- A. Everyday B. I never swim. I only play in the water C. At the weekend D. Three or four days a week

7. How often do you eat vegetables?

- A. Twice a week B. Everyday C. Never D. Once a week

8. How many cokes do you drink a day?

- A. I only Drink water B. A glass C. 1 litre approximately D. Two cans

9. How much salt do you normally put ion your food?

- A. None B. Not much C. A lot D. Some

10. How much sugar do you put in a yogurt?

- A. One spoonful B. Two spoonfuls C. None D. Three spoonfuls

POINTS

| | A | B | C | D |
|-----|---|---|---|---|
| 1. | 4 | 2 | 1 | 3 |
| 2. | 3 | 2 | 4 | 1 |
| 3. | 2 | 1 | 4 | 3 |
| 4. | 4 | 2 | 1 | 3 |
| 5. | 4 | 1 | 2 | 3 |
| 6. | 4 | 1 | 2 | 3 |
| 7. | 3 | 4 | 1 | 2 |
| 8. | 4 | 3 | 1 | 2 |
| 9. | 4 | 3 | 1 | 2 |
| 10. | 3 | 2 | 4 | 1 |

SCORES



10-19 Mmm! You are not a healthy person at all. You should change your habits or you may have serious problems. I suggest you start by drinking one and a half litres of water a day and by walking home.



20-29 Oh dear! Not a very good score! You should be careful with your diet. And remember that exercise is good for your health, so make sure you do half an hour three times a week.



30-40 Congratulations! You have a healthy life-style. You know how important being fit is for you. Arnold Schwarzenegger would be very proud of you!

ACTIVITY 2

TYPE OF FOOD (calories per 100 gr.)

CEREALS

Bread (4 slices) 343
Rice 122
Cornflakes 367
Macaroni 114
Flour 35

MILK PRODUCTS AND EGGS

Butter 770
Cheese 400
Cream 300
Eggs 160
Milk (skimmed) 35
Milk (whole) 66
Yoghurt (low fat) 54

FATS AND OILS

Lard 920
Margarine 795
Olive oil 930

FISH

Cod 100
Crab 127
Haddock 100
Halibut 150
Lobster 80
Mussels 87
Plaice 100
Prawns 104
Salmon 200
Sardines (tinned) 294
Sardines (fresh) 180

BEVERAGES

Beer 30
Champagne 74
Cider 37
Spirits 222
Wine (dry white) 75
Wine (sweet white) 93
Wine (red) 68
Wine (Martini, Port) 156

MEAT

Bacon 405
Beef 165
Chicken (without skin) 100-150
Chicken (with skin) 300
Duck (without skin) 160
Duck (with skin) 330
Ham 260
Kidney 100
Lamb 260
Pork 260
Rabbit 150
Sausages 350
Turkey 130

VEGETABLES

Asparagus 18
Beans (green) 7
Beetroot 44
Cabbage 20
Carrots 22
Cauliflower 11
Celery 9
Leeks 25
Lentils 95
Lettuce 11
Mushrooms 10
Peas 50
Potatoes chips 239
Potatoes crisps 530
Spinach 26
Tomatoes 14

PUDDINGS, CAKES, SWEETS ...

Apple pie 190
Biscuit 435
Cake 378
Chocolate 550
Ice-cream 196
Jam 260
Jelly 82
Sugar 395

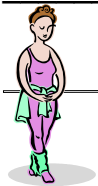
NEEDED CALORIES

| AGE | WOMEN | MEN |
|------------|---------------|-------------|
| 16 | 2,300 | 2,900 |
| 25 | 2,200-2,700 | 2,700-3,600 |
| 45 | 2,200-2,500 | 2,600-2,900 |
| 65 | 2,500 or less | About 2,500 |

Using this calorie table, design two sets of menus for a day or two, one of them for a woman who is trying to lose weight and one for a man who wants to put on weight. The woman is 31 and the man 50.



MAN'S MENU



WOMAN'S MENU

ACTIVITY 3



Divided in groups of four, you have to invent a product used to keep oneself fit. The product guarantees success. You have to elaborate the advert and a catchy slogan.

Once you finish, show and explain the advert to the rest of the class.

ACTIVITY 4

Read the following story and decide if the statements below are True or False. If the sentence is false, provide the correct one using your own words.

HEALTHY FOOD

An 85-year-old couple, having been married for almost 60 years, die in a car crash. They had been in good health the last ten years, mainly due to the wife's neurotic interest in health food.

When they reached the heaven, St. Peter took them to their mansion, with a beautiful kitchen and a bath suite and Jacuzzi. As they oohed and aahed, the old man asked Peter how much this was going to cost.



"It's free," Peter replied, "Remember, this is Heaven." Next they went out back to see the championship golf course. They had golfing privileges every day, and each week the course changed to a new one representing the great golf courses on Earth.

The old man asked, "What are the green fees?"

"This is heaven," St. Peter replied. "You play for free."

Next they went to the clubhouse and saw the excellent buffet lunch. "How much can we eat?" asked the old man.

"Don't you understand yet?" St. Peter asked. "This is heaven. It's free!"

"Well, where are the low fat and low cholesterol foods?" the old man asked timidly.

"That's the best part...you can eat as much as you like of whatever you like and you never get fat and you never get sick. This is Heaven."

The old man looked at his wife and said, "You and your disgusting low fat muffins. I could have been here ten years ago!"

TRUE OR FALSE

1. The husband had been really worried about healthy food all his life.
2. The mansion cost a lot of money.
3. People in heaven never put on weight or get ill.
4. The husband was really happy with his wife at the end of the story.
5. They could only practice sport twice a week.