

Checkpoint Science Scheme of Work

Biology – Year 2

Topic: Food

Aims

That pupils should be able to:

- appreciate nutritional requirements and a healthy diet
- understand the relationship between diet and fitness
- know about the effects of deficiencies

Links

Checkpoint curriculum – Bh2, Bh 5

IGCSE Biology Section II 6.3.1, IGCSE Co-ordinated Sciences B 8 , IGCSE Combined Sciences Biology Topic Two

Words

nutrition, diet, deficiency

Activities

Objectives Students should be able to:	Possible Activities	Health and safety/notes
appreciate that food contains different kinds of nutrients.	Students can collect and study food labels from cans etc to discover how foodstuffs are divided into carbohydrates, proteins etc. They identify the foods with the highest energy content (for growth, movement and keeping warm) and discuss whether they think these are the most 'healthy' foods.	Note the units for energy, joules or kJ. Compare with fuels as substances which react with oxygen to release energy.
identify carbohydrates as energy sources	The energy content of foods can be compared by burning known masses to heat equal volumes of water. The temperature rises can be compared. Obesity as a result of overeating of energy foods should be included.	Safety goggles must be worn, and other procedures for heating followed. Examples; dry bread, dry banana. Handle sensitively.
know that protein is used for growth and repair.	Students can investigate which foods contain protein using the Biuret test on a few samples. They should know non-animal sources of protein	Warnings; avoid potassium hydroxide solution on the skin, copper sulphate is poisonous. Safety goggles should be worn.

	and be able to suggest a group of people who need a lot of protein.	
specify further major essentials in the diet	Fat in foodstuffs can be seen using the paper test – rubbing to reveal a translucent patch. Fibre and water – see web sites for balanced diet.	
specify minor essentials in the diet	Names of vitamins and minerals are usually displayed on food labels. As a memory-aiding display draw giant loaves, milk bottles, eggs etc and write in vitamins and minerals with quantities.	
describe a balanced diet	Students should tabulate some of the contents of the diet with effects of too much or too little. Add a column for which foods would ensure a suitable quantity in a day. Vitamin supplements can exceed the RDA and cause problems. Students can keep a food log for a day and analyse what they have eaten.	Suitable examples; too much fat – obesity and heart disease, too little fibre –problems of the bowel, constipation too little vitamin C – scurvy, too little vitamin D - rickets too little iron – low red blood cells, anaemia too little calcium- weak bones and teeth
Appreciate what is meant by Recommended Daily Allowance.	Students can prepare menus for specified people, elderly, teenage, pregnant women. Include variety and palatability as criteria for good examples.	

Resources

<http://www.ausd.k12.ca.us/shape/lessons/nutrition/>

<http://www.teachnet.com/lesson/science/biology/foodchain111300.html>

Topic: Digestion

Aims

That pupils should be able to:

- know the organs and basic functions of the alimentary canal
- know that enzymes are biological catalysts

Links

Checkpoint curriculum – Bh 3

IGCSE Biology Section II 6.3, IGCSE Co-ordinated Sciences B 9, IGCSE Combined Sciences Biology Topic Two

Words

Alimentary canal, digestion, enzyme

Activities

Objectives Students should be able to:	Possible Activities	Health and safety/notes
identify and place the organs of the digestive system -.mouth, oesophagus/gullet, stomach, small intestine, large intestine	A model body is helpful for a three dimensional understanding of the digestive system. Students can complete and label a diagram of the organs. Include the liver and pancreas.	A crude model can be made from a soft bag and about 6 m of flexible tubing. Alimentary canal should be seen as one tube of differing widths containing undigested food.
understand where and how digestion begins.	Students can use a small reflecting surface on a lollystick to examine their teeth. Chewing a piece of hard fruit or vegetable shows which teeth perform which function. It also shows the production of saliva. Design a poster about an aspect of tooth care.	Normal rules of hygiene must be applied.
describe the tests for starch and reducing sugar.	Tests for starch and reducing sugar should be investigated with e.g. potato and a sweet drink or fruit (check the ingredients). Starch solution can be mixed with amylase and tested at intervals to show that the starch 'disappears'.	Safety goggles must be worn.
Know a test for fats.	Use the emulsion test with ethanol for detection of fats.	Safety goggles, no naked flames with ethanol.

MOVE ?TO PREVIOUS UNIT NEEDS TO BE CHECKED WITH TEXTBOOK	Students should know that fats also provide energy, particularly for keeping warm and which foods contain large amounts of fat.	
Understand a simple version of the process within the complete alimentary canal.	A flow chart or a game is a useful way to summarise the working of the alimentary canal. Mechanical and chemical breakdown of food should be discussed.	A flow chart can be displayed on large outlines of the involved organs linked by tubes. For the game a large drawing of the canal is needed, pieces of food can be counters and dice-throws propel them on a hazardous journey from mouth to anus.
Appreciate that enzymes exist and help in the breakdown of specific foods.	The action of liver on hydrogen peroxide demonstrates the function of an enzyme. An investigation into biological washing powders shows the effect of temperature/pH on enzymes.	Names of different enzymes need not be learnt.

Resources

<http://www.horizonshelpr.org:80/science/digestion/lesson2.html>

<http://www.brainpop.com/health/digestive/digestion/index.weml> X see note

Topic: Breathing and Circulation

Aims

That pupils should be able to:

- know the components and basic functions of the circulatory system
- describe disorders of the circulatory system
- know the structure and basic components of the respiratory system
- explain gas exchange
- describe the effects of smoking

Links

Checkpoint curriculum – Bh 4, Bh 5, Bh 6

IGCSE Biology Section II 8.3, IGCSE Co-ordinated Sciences B 5, IGCSE Combined Sciences Biology Topic Two

Words

breathing, circulation

Activities

Objectives Students should be able to:	Possible Activities	Health and safety/notes
Explain the working of the heart.	An appropriate video is a good introduction for studying the heart. Listen to a heart-beat through a stethoscope, a home-made one will work.	
Describe three types of blood vessel	Use a diagram to explain the double circulation system. Link with the reasons for the structures of artery, capillary and vein. Link artery and pulse. See veins in your wrist or crook of your elbow. Use the pulse to find recovery times and relate to fitness.	
Explain the functions of the blood.	Use diagrams to show that blood transports substances around the body.	Collect digested food from the small intestine. Collect oxygen from the lungs. Leave carbon dioxide at the lungs. Carries urea from liver to kidneys.
Recognise Red blood cells	Their structure related to their function through diagrams or photographs.	Commercially prepared slides may be used.

Know about disorders of circulatory system	Students can design advice posters on taking care of your heart by avoiding 'furring up' of arteries and heart attacks. Any locally available health education material should be used.	
Appreciate a simple model of the lungs	Use a lung model with two balloons in a bell jar and a rubber diaphragm. Compare it with the movement of ribs etc felt when breathing deeply.	Students need not learn the mechanism of breathing.
Know that gases are exchanged in the lungs.	Investigate the carbon dioxide in exhaled and inhaled air using lime water. Students can also breathe on to refrigerated mirrors and test the condensed vapour with cobalt chloride paper. Note higher temperature of exhaled air. Use simple diagrams to explain how gas exchange takes place in the alveoli.	
Understand the importance of keeping the airways clean.	Reasons why this is essential should be explained and a description of the way that cilia and mucus effectively clean the incoming air in nose and throat.	
Know some problems which result from smoking.	Use a 'smoking machine' which collects the products of a burning cigarette. They are drawn through cotton wool and Universal Indicator solution and their temperature is taken. Collect 'pros' and 'cons' of smoking and debate the topics, making use of any locally available health education material	Note : nicotine is an addictive drug, tar can cause cancer, the cilia become paralysed and the airways can not be cleaned effectively.

Resources

http://www.lifebytes.gov.uk/smoking/smo_why.html

Topic: Respiration

Aims

That pupils should be able to:

- Define and describe respiration including the use of a word equation

Links

Checkpoint curriculum – Bh 7

IGCSE Biology Section II 8.1, IGCSE Co-ordinated Sciences B 7, IGCSE Combined Sciences Biology Topic Two

Words

respiration

Activities

Objectives students should be able to:	Possible Activities	Health and safety/notes
write the basic equation for respiration	Essential reaction to supply the energy every cell needs to survive. Sugar + oxygen = carbon dioxide + water + energy Discuss how sugar and oxygen get to cells in the body and how the products leave.	
Recognise that both plants and animals respire	Students who have investigated release of carbon dioxide from their own lungs can design a similar investigation for another animal or a plant. (Plants need to be in the dark)	It is preferable to put the organism under a bell jar but changes in the lime-water will take some time. Draw air through this sequence of flasks; sodium hydroxide, lime water, organism, lime water.
compare respiration and burning	Both are exothermic reactions and require oxygen. Collect the products from burning e.g. a candle. Make a table of similarities and differences. Include the idea that as well as energy that is used, a lot is dispersed in the atmosphere.	Safety goggles.
recognise the role of the leaf in plant respiration	Students can view stoma by making nail varnish leaf peels.	

Resources

<http://www.cast.org/udl/Respiration901.cfm>

http://www.standards.dfee.gov.uk/schemes2/secondary_science/sci08b/?view=activities

Topic: Flowering Plants

Aims

That pupils should be able to:

- recognise the positions and functions of the major organs in flowering plants

Links

Checkpoint curriculum – Bp 1

IGCSE Biology Section III 1.2.1, IGCSE Co-ordinated Sciences B 12, IGCSE Combined Sciences Biology Topic Four

Words

transpiration

Activities

Objectives Students should be able to:	Possible Activities	Health and safety/notes
identify the positions of the major organs in a flowering plant	Grow a suitable plant which will show flower and fruit at the same time e.g. pea plant, pepper plant, tomato.	Labels include root, stem, leaf, bud, flower, petal, sepal, fruit.
describe roots and root hairs and their function.	Roots and root hairs of previously germinated seeds can be observed. Grow, for example, an onion suspended over water in a transparent jar to see the branching formation and then students can examine a piece with a hand lens.	Functions include the absorption of water from the soil by the root hairs.
describe plant stems and their function	Place a light coloured stem such as celery in a solution of dye. Cut slices to examine after a period of time.	Functions include support of the plant and the transporting of water up the stem in the xylem.
describe water loss from leaves	Condensed vapour shows water loss from leaves if a plant is placed in a bell-jar.	Functions include production of food in the form of sugars.
describe flower parts and their functions	Students should dissect a suitable flower and carefully separate all the parts. These can be displayed and identified. The function of each part can be included here.	Anther, filament, stigma, style, ovary, sepal, petals. Care must be taken with dissecting equipment.
describe fruits and their function.	Some fruits can be opened/cut to show the arrangement and number of seeds. Try to include some unusual ones and cut them to reveal the patterns of the seeds.	Care must be taken with dissecting equipment. The function is the protection of seeds.

Resources

<http://www.EnchantedLearning.com/subjects/plants/glossary/indexf.shtml>

<http://www.middleschoolscience.com/flower.pdf>