

## 1.0 Learning Intentions

**At the end of the lesson, tick of each of the learning intentions below that you have achieved, if you cannot tick it off, revise over the section again. These are taken from the Science Syllabus.**

### 1.1: Living Things

- Identify characteristics of life
- Use a simple key to identify plants and animals, including vertebrates and invertebrates
- Explain and investigation into the variety of living things by direct observation of animals and plants in their environment; classify living organisms as plants or animals, and animals as vertebrates or invertebrates
- Discuss biological organisation (cells, tissues, organs)

### 1.2 : Cell and Microscope

- Describe the functions of the main parts of a light microscope
- Draw one example each of an animal cell and a plant cell, identifying the nucleus, cytoplasm and cell wall (plant cell), and indicating the position of the cell membrane
- Explain how to prepare a slide from plant tissue and sketch the cells under magnification

### 1.3. : Food

- Recall that a balanced diet has six constituents: carbohydrates (including fibre), fats, proteins, vitamins, minerals and water, each with different functions
- Describe a food pyramid and give examples of types of food recommended in a balanced diet
- Explain how to carry out qualitative food tests for starch, reducing sugar, protein and fat
- Read and interpret the energy values indicated on food product labels
- Investigate the conversion of chemical energy in food to heat energy

## 2.0 Chief Examiners Comments

2010 Report – Please use the below comments when looking at the relevant exam questions and see where some common mistake were made.

Question	Comment
Q1. D) (Cell)	This part was reasonably well-answered. Some gave 'membrane' for cell wall; 'chloroplast', 'DNA', & 'vacuole' were given by some candidates for nucleus
Q2. B) (Food)	(i) Some line graphs appeared. (ii) Some candidates appeared not to understand the word 'constituent'. (iii) 'Transparent' and 'see through' appeared on some scripts.
Q1. A) (Cell) <b>Ordinary Level</b>	The first part of this question was well-answered; 'membrane' sometimes offered. The second part was also was well-answered. 'Vacuole/cytoplasm' were the most common incorrect answers.
Q1. D) (Food) <b>Ordinary Level</b>	This was generally poorly answered; many candidates gave the result of a positive test (which was given in the question). The second part of this question was also poorly answered; many of those who received marks answered 'energy' even though they received no marks for the first element.

3.0 Revision Notes

### 3.1 Living Things

To be alive and organism has to be able to carry out the 7 characteristics of life

1. Movement – moving from one place to another
2. Respiration- releasing energy from food
3. Response – reacting to changes in surrounding
4. Feeding – getting food
5. Excretion – removing waste matter from the body
6. Reproduction – forming new organisms
7. Growth – getting bigger



Living things are classified as animals or plants, the main difference between these are movement, food and cell walls. Animals can be classified as invertebrates (no backbone) or vertebrates (have backbone).

To assist with classification we can use a key – this includes a series of questions that can be used to identify plants and animals

#### 3.1.2 Mandatory Experiment: Investigate the variety of living things by direct observation of animals and plants in their environment; classify living organisms as plants or animals, and animals as vertebrates or invertebrates

Procedure

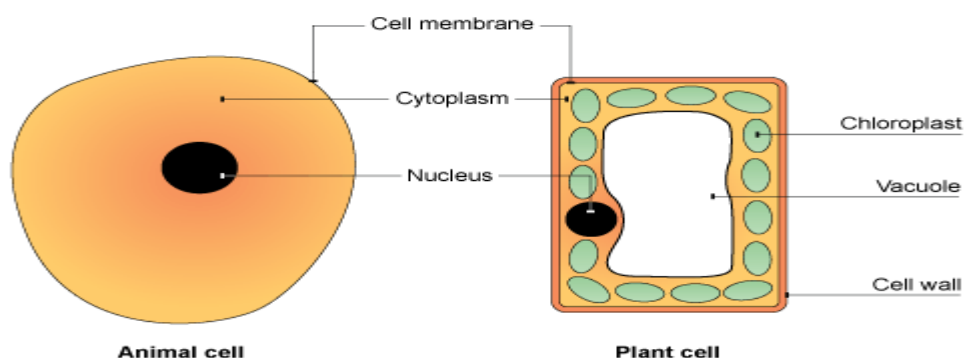
1. Pick a habitat (e.g. a hedge) and identify as many plants and animals as you can.
2. Use keys to identify all of the plants and animals that you have found
3. Record your results in a table – have separate columns for *plants*, *vertebrate animals* and *invertebrate animals*

### 3.2. Cells and the Microscope

Organisms are extremely organised:

Cells → Tissue → Organs → Organ Systems → Organisms

#### Animal and Plant Cells



- **Cell membrane:** thin layer surrounding the cell
- **Nucleus:** Control centre of the cell –DNA (genes) is stored here
- **Cytoplasm:** watery fluid between the nucleus and cell membrane
- **Cell wall:** outside **plant cells** only, protects cells and gives them their shape
- **Vacuole:** Empty storage space in **plant cells** only

Cells produce new cells through cell division – if your muscles need to grow muscle cells divide to produce new muscle cells, if you cut your skin, skin cells divide to produce new skin cells to repair the damage. Your cells are constantly dividing and producing new cells, every second of the day!!

## The Microscope

This is used to magnify samples so you can view cells (structure in detail in experiment below)

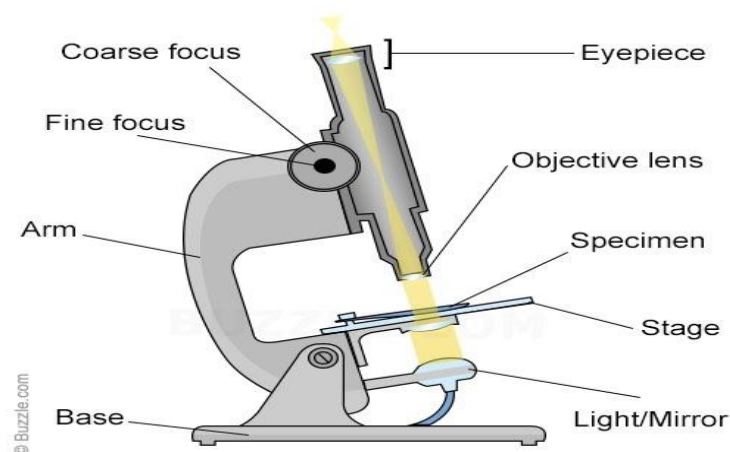
You can view both animal and plant cells under a microscope and identify the nucleus, the cytoplasm and cell wall

**Animal Cells:** Swab inside your cheek with a cotton swap, the cells removed are placed on a glass slide and stained using **methylene blue**. A glass cover slip is placed over the cells protecting them; they are placed on the stage of the microscope and can now be viewed. The cell membrane, nucleus and cytoplasm should be visible. Draw a diagram of the animal cell

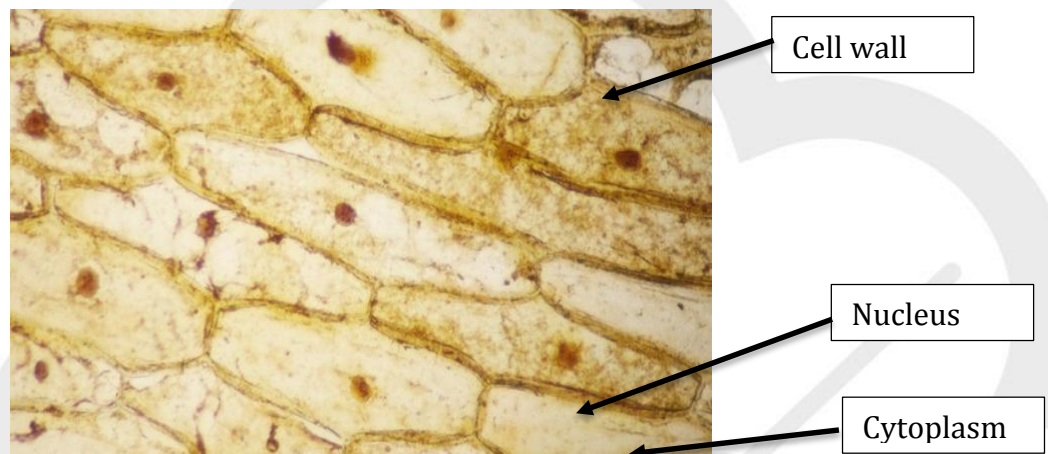
### 3.2.1. Mandatory Experiment: Prepare a slide from plant tissue and sketch the cells under magnification.

#### Procedure

1. Place a drop of iodine onto a clean glass slide (iodine is used to 'stain' a cell and make it easier to see).
2. Cut an onion and remove a thin layer of inner cells (called the 'tissue').
3. Place it on the slide, add drop of water and place a cover slip on top.
4. Stain using a drop of iodine, place this on one side of the coverslip, place tissue paper on the other side of cover slip and observe as iodine moves into the cells giving yellow colour.
5. Place the glass slide on the stage and secure with clips.
6. Watch from the side and turn the coarse focus wheel so that the objective lens is as close to the stage as possible.
7. Put your eye to the eyepiece and gently turn the fine focus wheel the opposite way to sharpen the image. You should now be able to see the cells in focus and identify the structures.



The main part of the microscope.



### 3.3 Food

#### 3.3.1 Balanced Diet

To have a balanced diet you require the below 6 components of food in the correct amount every day.

Component	Functions	Sources
<b>Carbohydrates</b> -Sugars -Starch -Fibre	-Gives quick burst of energy -Gives slow release of energy -Helps to move food through digestive system – prevents constipation	-Fruit, sweets, soft drinks -Breads, rice, potatoes -Brown bread, cereals, vegetables
<b>Fats</b>	Supplies energy Stores energy in the form of fat tissue Insulates the body and the organs Too much fat in diet means more fat storage = weight gain	Butter, cream, oils, red meat
<b>Protein</b>	Makes muscle, hormones, hair, nails and enzymes Very important for growth and repair	Meat, eggs, fish, dairy, cheese, nuts
<b>Minerals</b>	Needed by body to survive and carry out daily <b>functions</b> and processes	
<b>Iron</b>	Healthy red blood cells	Red meat, green vegetables
<b>Calcium</b>	Strong healthy bones	Milk, cheese yogurt
<b>Vitamins</b>	Essential for normal cell <b>function</b> , growth, and development.	
<b>Vitamin C</b>	Essential for healthy gums and skin	Fruit, green vegetables
<b>Vitamin D</b>	Essential for healthy bones	The sun, fish, eggs
<b>Water</b>	Cells need this to function correctly Your body is 60-70% water	Drinks and vegetables

Your requirements depend on

- Age: Young people need more food than older people as their bodies are growing and changing
- Gender: Males need more food than females
- Activity levels: The more active you are the more food your body needs to fuel the activity
- Health: Illness can affect the amount of food you can eat

### 3.3.2. Food Pyramid

The food pyramid gives us guidelines on the amount of foods we should eat, foods at the top we eat less of and foods at the bottom we eat more of:

- Plenty of bread, rice, potatoes, pasta and cereals – going for the wholegrain varieties whenever you can
- Plenty of fruit and vegetables
- Some milk, cheese and yoghurt
- Some meat, poultry, eggs, beans and nuts
- A very small amount of fats and oils
- And a very small amount or no food and drinks high in fat, sugar and salt

*Understanding the Food Pyramid*



### Energy Values

Different food have different amounts of energy – this know as energy value  
 Energy is measured in joules (J) and energy value of foods is kilojoules per gram (kJ/g)  
 Protein and carbohydrates have same energy values and fats have nearly twice as much

### Nutritional Labels

Nutrition			
	Typical Composition	A 50g (1 <sup>3</sup> / <sub>4</sub> oz) serving provides	100g (3 <sup>1</sup> / <sub>2</sub> oz) provide
1	<b>Energy</b>	<b>757kJ</b>	<b>1514kJ</b>
		<b>179kcal</b>	<b>358kcal</b>
3	<b>Protein</b>	<b>5.5g</b>	<b>11.0g</b>
4	<b>Carbohydrate</b>	<b>30.2g</b>	<b>60.4g</b>
	of which sugars	0.8g	1.5g
5	<b>Fat</b>	<b>4.1g</b>	<b>8.1g</b>
	of which saturates	0.8g	1.6g
	mono-unsaturates	1.9g	3.8g
	polyunsaturates	1.4g	2.7g
6	<b>Fibre</b>	<b>4.3g</b>	<b>8.5g</b>
7	<b>Sodium</b>	<b>trace</b>	<b>trace</b>

The nutritional information of a food product should be contained on the label.

From here you will be able to see the energy value (2) and the serving size (1).

All of food types should also be easily identified such as protein (3), carbohydrates (4) and fats (5) as well as anything else contained in the food such as fibre (6) and sodium (7).

### 3.3.3. Mandatory Experiments

#### A. Investigate the conversion of chemical energy in food to heat energy

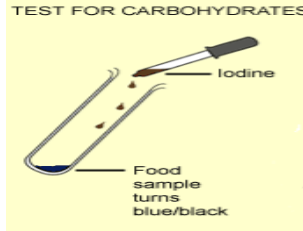
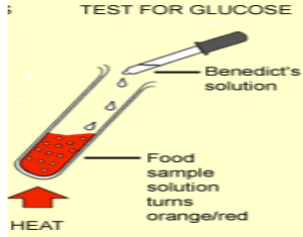
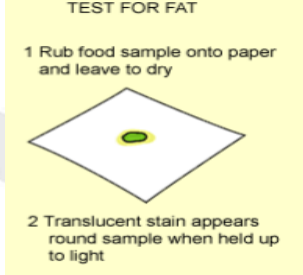
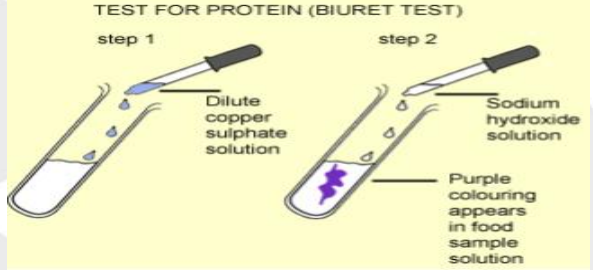
##### Procedure

1. Pour water into a test-tube and note the temperature.
2. Place a burning cream-cracker or peanut under the test-tube.
3. Leave for a minute.
4. Take the temperature of the water again.

##### Result

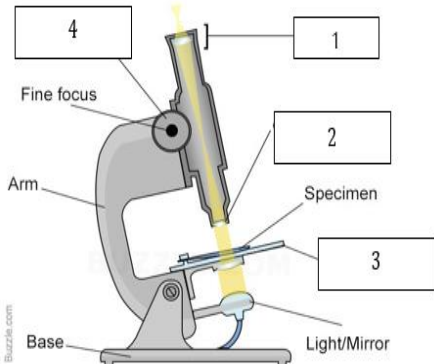
The temperature of the water rises because of gaining energy from the burning peanut.

#### B. Qualitative food tests for starch, reducing sugar, protein and fat

Food Tested	Procedure / Chemicals Used	Positive Result	
Starch (Potatoes)	Add iodine	Turns blue-black	 <p>TEST FOR CARBOHYDRATES</p> <p>Iodine</p> <p>Food sample turns blue/black</p>
Reducing sugar e.g. glucose	Add Benedict's solution and <b>heat</b> ( <b>THIS IS THE ONLY EXP INVOLVING HEAT</b> )	Turns brick-red	 <p>TEST FOR GLUCOSE</p> <p>Benedict's solution</p> <p>Food sample solution turns orange/red</p> <p>HEAT</p>
Fat (butter)	Rub food on brown paper	Translucent Stain	 <p>TEST FOR FAT</p> <p>1 Rub food sample onto paper and leave to dry</p> <p>2 Translucent stain appears round sample when held up to light</p>
Protein (milk)	Add sodium hydroxide and then copper sulfate	Turns purple	 <p>TEST FOR PROTEIN (BIURET TEST)</p> <p>step 1</p> <p>Dilute copper sulphate solution</p> <p>step 2</p> <p>Sodium hydroxide solution</p> <p>Purple colouring appears in food sample solution</p>



Q4. Explain the parts of the microscope labelled 1-4 below



- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

Q5. Explain what makes up a balanced diet?

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Q6. Explain with the aid of a diagram, how you would test for the presence of a reducing sugar in a food.

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