Integrated Science
Curriculum Units

Core Curriculum Programme
with examples of teaching activities
2014

Form 1
Integrated Science Curriculum
Core Curriculum Programme
INTEGRATED SCIENCE CURRICULUM UNITS – FORM 1

SCI 7.1  YOUNG SCIENTIST AT WORK

SCI 7.2  LIVING THINGS AND THE ENVIRONMENT

SCI 7.3  CHEMICAL PROPERTIES

SCI 7.4  ENERGY AROUND US

SCI 7.5  CELLS AND REPRODUCTION
**Subject:** CCP Integrated Science  
**Unit code and title:** SCI 7.1 **YOUNG SCIENTIST AT WORK**  
**Strand:** Physical Properties / Materials and their properties  
**Unit duration:** Approx. 20 sessions of 40 minutes (Total 13 hours)

**OBJECTIVES**  
Teacher will:
1. introduce the relevance of science in everyday life.  
2. introduce the students to simple apparatus (glassware) and thus be able to use this apparatus in simple experiments.  
3. introduce the students to measuring instruments and thus be able to use them correctly.  
4. guide students to perform simple experimental tasks.  
5. guide the students to identify safety issues in the laboratory  
6. teach students to light and use a Bunsen burner safely.  
7. engage students to explore burning and use the fire triangle to describe fire.

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<tr>
<th>Key words</th>
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<tr>
<td>scientist, glassware, measurement, instruments, apparatus, test tube, test tube rack, beaker, flask, funnel, measuring cylinder, Bunsen burner, thermometer, stand, spatula, balance and stopwatch, safety rules, Bunsen burner, yellow &amp; blue flame, poisonous, flammable, corrosive, fire triangle.</td>
<td>This curriculum promotes an inquiry based and student centred methodology, based on the 5E model in which students engage, explore, explain, elaborate and evaluate. Theory and practice should be part and parcel of the scientific process. <strong>ENGAGE</strong> students’ interest and curiosity. Students observe, <strong>EXPLORE</strong>, predict, plan and conduct investigations, collect and interpret data and give <strong>EXPLANATIONS</strong>. Students are then challenged to <strong>ELABORATE</strong> on their understanding by linking known with new and by applying concepts and skills in new contexts. Students are encouraged to <strong>EVALUATE</strong> their understandings and competences. Assess the areas of strengths/weaknesses exposed by the student performance in the activity. Be aware of health and safety issues when carrying out experiments.</td>
<td>test-tubes, test-tube rack, holder, beakers, flask, pipette, chemical bottle, spatula, stirrer, evaporating dish, funnel, metre ruler, stopwatch, measuring cylinder, digital balance, thermometer, Bunsen burner, tripod, wire gauze, hazard labels.</td>
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**5E model Science lesson**  
http://cte.jhu.edu/techacademy/fellows/ullrich/webquest/ScienceLesson.htm  
**Science is fun**  
**Scientists and latest inventions**  
**Lighting the Bunsen burner**  
**Interactive Fire Triangle:**  
http://www.absorblearning.com/media/item.action?quick=vb  
**Fire safety**  
http://www.firefacts.org/
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<tr>
<td><strong>THE TEACHER WILL:</strong></td>
<td><strong>Starter suggestion:</strong> Ask students to give examples of science in everyday life and things which have to do with science.</td>
<td><strong>STUDENTS CAN:</strong> link scientists to inventions and technology. (Level 6)</td>
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<tr>
<td>1. introduce the relevance of science to everyday life.</td>
<td><strong>Main activity:</strong> Guide students to think about developments in areas such as communication, transport, buildings, health care, etc. and explain how the area developed over the time. Encourage students to predict the futuristic development in that area.</td>
<td>recall that science and technology has implications on everyday activities. (Level 5)</td>
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<td><strong>Other activities:</strong></td>
<td>be aware that things such as technology and medicine change over time. (Level 4)</td>
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<td></td>
<td>- Use the IWB to display images of a scientist or two. Think about past/present, foreign/local, male/ female scientists. Ask students to explore how the work of these scientists has changed our lives.</td>
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<td>- Refer to the everyday use of science in the work of engineers, environmentalists, medical specialists, meteorologists and so on.</td>
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<td>(Class can be divided into groups and each group may be named after a scientist. Students will be part of this group when doing experiments).</td>
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<td></td>
<td><strong>Other notes:</strong></td>
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Directorate for Quality and Standards in Education – Department of Curriculum Management – Integrated Science – 2014
2. introduce the students to simple apparatus (glassware) and thus be able to use this apparatus in simple experiments.

**Starter suggestion:** Present a tray with different glassware and simple apparatus such as test-tubes, test-tube rack, holder, beakers, flask, pipette, chemical bottle, spatula, stirrer, funnel, etc. Ask students to identify some known items.

**Main activity:** Write the name of some of this apparatus on the IWB. Ask students to suggest what the apparatus is used for. Give examples of their use. Use an interactive presentation and guide students to link the name with the apparatus.

**Other activities:**
- on the IWB, students match names with apparatus.
- Go through some of the following hands-on activities.
  - dissolving crystals of salt or sugar
  - pouring water into a flask
  - putting 5 drops of water in an evaporating dish
  - pouring water from a beaker into a test tube.

**Other notes:**
- state the use of some common science apparatus and handle this apparatus safely. (Level 6)
- identify simple glassware and other commonly used apparatus. (Level 5)
- know that apparatus is used in science experiments. (Level 4)
3. Introduce the students to measuring instruments and thus be able to use them correctly.

**Starter suggestion:** Ask a student from each group to measure the length of the main bench with his hand span. Compare results and ask students possible reasons why they are not the same.

**Main activity:** Guide the students to understand the need and importance of measurements in everyday life. Introduce the ruler, measuring cylinder, digital balance as examples of measuring instruments. Demonstrate the correct use of these instruments (for example, the correct reading of the scale, correct eye position when using the measuring cylinder).

These measuring skills need to be improved in future activities. Some eLearning resources may help students to practice scale reading. Ask students to identify and match the measurement with the measuring instrument and appropriate measuring unit. Use the IWB to explain clearly how a measuring scale is used.

Engage students in simple measuring tasks. Students may use a fill-in work sheet to note their findings. Remind students of possible safety measures.

**Other possible activities:**
- Some students may explore other measuring instruments.

**Other notes:**

| Use a measuring cylinder and digital balance correctly. (Level 6) |
| Identify the names of some common measuring instruments. (Level 5) |
| Use a ruler correctly. (Level 4) |

**Starter suggestion:** Revise the names of some of the apparatus introduced earlier.

**Main activity:** Guide students to go through a number of simple tasks. Some students may be able to choose some of the apparatus themselves. Tasks can include:
- measuring the mass of their pocket
- measuring the length of their chair, stool
- measuring the volume of water in a beaker

Identify the correct units when measuring is taking place. Some students may be able to link the unit with the correct measurement.

**Other possible activities:**
- students may explore other tasks
- some students may identify safety issues in some tasks

**Other notes:**
- identify the correct apparatus for an experiment made up of a single task and use the appropriate measuring units. (Level 6)
- use basic apparatus for simple tasks under supervision. (Level 5)
- actively participate in simple experimental tasks and activities. (Level 4)
| **5. guide students to identify safety issues in the laboratory.** | **Starter suggestion:** Show a picture of students working in a science laboratory. Discuss the issue of health & safety and ask for possible dangers which may be present.

**Main activity:** Ask students to identify number of dangerous / inappropriate situations shown on the picture. Elaborate on these situations by writing a set of safety rules and give explanations.

**Other activities:**
- Identify common hazard labels such as poisonous, flammable and corrosive.
- Produce a chart which shows the basic safety rules. Put on the notice board.

**Other possible activities:**
- Students design signs to promote safety.

**Other notes:**
- Identify common hazard labels. (Level 6)
- Follow verbal instructions to use the laboratory safely. (Level 5)
- Identify dangerous situations in a lab. (Level 4) |
| **6. teach students to light and use a Bunsen burner safely.** | **Starter Suggestion:** Use a beaker, tripod, wire gauze, water and a Bunsen burner. Introduce the Bunsen burner as a safe way of using heat.  
**Main activity:** Project a large image of a Bunsen burner. Give the name and show the function of the main parts of the burner. Use an interactive simulation to label the Bunsen burner. Show the correct way of lighting a Bunsen burner. Ask the students to suggest safety issues when using the Bunsen burner. Include the use of a heat-proof mat. Demonstrate the blue and yellow flames and identify their use.  
Students use a prepared work sheet which includes a diagram of the Bunsen burner. Students label the diagram and take note of the five steps which must be followed to light the Bunsen burner safely.  
**Other activities:**  
- if possible, guide the students to light the Bunsen burner one by one.  
- ask the students to note differences between both types of Bunsen flames.  
**Other possible activities**  
- ask of students to set up the apparatus to heat 50cm$^3$ of water. Some students may be able to choose the appropriate apparatus. Before lighting on the Bunsen burner, ask them to explain their method and evaluate their set-up. Ask for safety measures to be adopted.  
**Other notes:** |
| |
| identify and label the main parts of the Bunsen burner. (Level 6)  
be aware that there are safety issues when using the Bunsen burner. (Level 5)  
recall that the Bunsen burner can be used for heating purposes. (Level 4) |
7. **Engage students to explore burning and use the fire triangle to describe fire.**

**Starter suggestion:** Do the burning candle experiment. Light a candle and cover it with a large beaker or jar. Ask students to describe their observations and give reasons.

**Main activity:** Some students may be able to recall that air (oxygen) is needed to produce a fire. Show a clip of a fire. Ask students to identify the conditions which lead to a fire. Identify the three things (fuel, oxygen and heat) that need to be present for a fire to keep burning. Draw the fire triangle.

**Other activities:**
- Present a number of burning situations. Some students may be able to identify the source of heat, oxygen and fuel. Can include examples such as fire coming from a cigarette lighter, matches, gas burner, magnifying glass, etc.
- Make students aware of basic safety precautions and refer to the responsible use of the emergency call (112)
- Make students aware of the fire extinguisher and the fire blanket which are found in the lab as ways of putting out a small fire. May involve the school health & safety teachers in this activity.
- Identify the flammable hazard label on certain products.

**Other notes:**
- Identify heat, oxygen and fuel as the three things needed to produce a fire.
  (Level 6)
- Identify basic safety precautions and identify 112 as the emergency number.
  (Level 5)
- Recognize that fire may be dangerous.
  (Level 4)
Subject: Integrated Science  
Unit code and title: **SCI 7.2 LIVING THINGS AND THE ENVIRONMENT**  
Strand: Life Processes and Living Things  
Unit duration: Approx. 20 sessions of 40 minutes (Total 13 hours)

### OBJECTIVES
Teacher will:
1. guide students to understand the significance of fossils.
2. explain that the seven vital functions distinguish living and non-living things.
3. show that living things are grouped into plants, animals and small microbes.
4. teach students to sort animals into vertebrates and invertebrates.
5. teach students to sort vertebrates into fish, amphibians, reptiles, birds and mammals.
6. guide students to identify types of feeding relationships.
7. engage students to explore simple plant and animal adaptations.
8. guide students to explore different types of habitats and living organisms through a fieldwork activity.

### Key words
- plants, animals, microbes, microorganisms, fossils, vertebrate, invertebrate, breathe, extinct, excrete, reproduce, sense, grow, characteristics, skeleton, fish, reptiles, birds, amphibians, mammals, mountain, forest, rainforest, cliffs, valleys, endemic, endangered, hibernation, producer, consumer, food chain, herbivore, carnivore, omnivore

### Points to note
- Refer to 5E approach to teaching and learning of science. Be aware of health and safety issues if students are to handle some animals or plants.
- Link this unit about living things with the unit about ecology through a fieldwork activity, a visit to a nature reserve or to the Natural History Museum.
- Note that some students may find it difficult to:
  - recognise the presence of a skeleton in some animals such as snakes and mice.
  - identify invertebrates, birds, fish, amphibians and reptiles as animals. For some, ‘animals’ is another word for ‘mammals’!
- Note that the terms (cold and warm blooded) may be misleading for some.

### Resources
- fossils; pictures showing Ghar Dalam, animals from Galapagos Islands, variety of animals, plants and other organisms; model (or chart) of the human skeleton
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<td><strong>THE TEACHER WILL:</strong></td>
<td><strong>Starter suggestion:</strong> Show some fossils. Give a fossil or two to each group of students. Give time for students to observe the fossils. Ask students to describe what fossils are.</td>
<td><strong>STUDENTS CAN:</strong> recall that fossils show evidence of organisms that lived thousands/ millions of years ago. (Level 6)</td>
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<tr>
<td>1. guide students to understand the significance of fossils.</td>
<td><strong>Main activity:</strong> Describe that the Earth is about 4.6 billion years old and that fossils give an indication of our past history. Refer to Ghar Dalam and ask if any of the students have visited this place. Make the students aware that the extensive discovery of fossils at Ghar Dalam gives an indication of our past history. Refer to some animals which are now extinct.</td>
<td>recall that some organisms shown in fossils may now no longer exist. (Level 5)</td>
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<td><strong>Other activities:</strong> some students may refer to some extinct species such as dinosaurs.</td>
<td>be aware that the Earth is billions of years old. (Level 4)</td>
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<td><strong>Other notes:</strong></td>
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</table>
2. explain that the seven vital functions distinguish living and non-living things

**Starter suggestion:** Ask students to discuss whether the sun and soil are living things.

**Main activity:** Give time for students to share their answers. Ask questions to clarify their responses.

Use a clip which shows a number of living things and guide students to work in groups to identify features which shows that the organism is a living thing. Give time to students to share their results. Guide students to identify the things that living things have in common. Identify movement, growth, sensation, respiration, excretion, feeding and reproduction. Use an interactive simulation to give examples of how these vital functions are illustrated in different living things.

**Other activities:**
- ask students to sort a list of things into living or non-living. Some students may write the names of the things but others may use pictures.

**Other notes:**

identify living and non-living things by referring to some of the vital functions.

(Level 6)

identify living and non-living things.

(Level 5)

recognise differences / characteristics between living organisms.

(Level 4)
3. show that living things are grouped into plants, animals and small microbes.

**Starter suggestion:** Show images of some living things such as a large tree, bacteria, a frog, a bird, a human being, a fish, a cow, grass, a snail, a jelly fish, any flowering plant and a mushroom. Ask students to sort into groups.

**Main activity:** Guide students to appreciate that grouping things makes life easier. Show that, similarly, grouping living things makes it easier to study them. Ask students to identify the best grouping results of the above exercise.

Show that living things are divided into a number of groups. At this level divide living things as
- animals
- plants
- other small living things.

Explore other examples of living organisms and sort into groups.

**Other notes:**

- recall that living things are sorted into groups according to similar characteristics and be able to sort some. (Level 6)
- identify a variety of living things (Level 5)
- identify different features in living things. (Level 4)
### 4. Teach students to sort animals into vertebrates and invertebrates

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<th><strong>Starter suggestion</strong></th>
<th>Show images of a number of animals and ask students to group these animals into groups.</th>
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<tr>
<td><strong>Main activity</strong></td>
<td>Some students may sort animals as domestic, wild, farm, etc. Present pictures of animal X-rays and make students aware that science uses a system based upon the presence or absence of backbone/skeleton. Draw attention to the fact that the skeleton is not always evident and some students may find it difficult to recognise the presence of a skeleton in some animals such as snakes and mice. Use a large diagram / model of a human skeleton / backbone and ask students to describe the importance of skeleton.</td>
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</table>
| **Other activities**    | - show further images of a number of animals and ask students to sort the animals into vertebrates or invertebrates. Guide students to explore the variation in size, colour, body features and so on.  
|                        | - students identify living things during a fieldwork activity. Point out any endemic or endangered species that students come across. |
| **Other possible activities** | - ask students to use the internet, interactive simulations and other resources to explore other types of animals and sort them into groups. |
| **Other notes**         | Identify vertebrates as animals with bones and invertebrates as animals without bones. (Level 6)  
|                        | Recall characteristics in different animals. (Level 5)  
|                        | Identify different features in animals. (Level 4) |
5. Teach students to sort vertebrates into fish, amphibians, reptiles, birds and mammals.

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<th>Starter suggestion:</th>
<th>Show images of vertebrates and ask students to give the names of these animals. Guide students to identify common things.</th>
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<tbody>
<tr>
<td><strong>Main activity:</strong></td>
<td>Students may be able to identify characteristics such as presence of fur, legs, wings, fins, feathers, etc.</td>
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<td>Use an example from each group of vertebrates and identify characteristics which are common to that group. Engage students to explore common features and identify the function or advantages of some of these features. Sort vertebrates by using common features such as body covering, warm/cold blooded, type of birth, types of limbs, milk production and so on.</td>
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<td><strong>Other activities:</strong></td>
<td>- use a prepared handout to fill in examples of vertebrates and characteristics of each group.</td>
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<td>- use an interactive presentation to sort vertebrates into their correct group.</td>
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<td><strong>Other notes:</strong></td>
<td>Identify some vertebrate groups and identify some examples of each.</td>
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<td></td>
<td>(Level 6) recognise that vertebrates are animals with a backbone.</td>
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<td></td>
<td>(Level 5) recall that some animals have a backbone and other bones.</td>
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<td>(Level 4)</td>
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</table>
| 6. guide students to identify types of feeding relationships. | **Starter suggestion:** Show a clip of animals feeding on their prey.  
**Main activity:** Show pictures of different animals and ask students to identify some of the animals. Then guide students to sort them in groups according to the type of food they eat (herbivores, carnivores and omnivores). Show that plants get their energy from the Sun. Link the plants and animals in a food chain.  
Guide students to go through and interpret other food chains found in different habitats.  
**Other activities:**  
- use interactive simulations and guide students to link other examples in a food chain.  
- students may demonstrate a food chain pictorially. Other students use pictures and labels provided to build up their food chain.  
**Other notes:** | interpret simple food chains.  
(Level 6)  
identify animals as carnivores, herbivores and omnivores.  
(Level 5)  
recognise that animals eat different things.  
(Level 4) |
7. **engage students to explore simple plant and animal adaptations.**

| **Starter suggestion**: Show images of plant and animals and ask students to match them to their habitats. |
| **Main activity**: Guide students to explore and identify the main parts of a plant. Students use an interactive presentation to label the roots, the stem, the leaves and the flower and explore their function. Identify some adaptations (e.g. leaf size) which allow plants to live in certain conditions. Similarly students use an interactive presentation to identify special characteristics of animals which allow them to survive in their natural habitats. Ask students to show the various adaptations such as camouflage, fur, feathers, claws, behaviour, etc. Some students may describe these characteristics. |
| **Other activities**:
  - link some plants and animals with their habitats. |
| **Other notes**:
  - link some plants and animals with their habitats. (Level 6)
  - identify the leaves, stem, flowers and roots as the main parts making up a plant. (Level 5)
  - Identify differences (such as size, colour and shape) between different plants or animals. (Level 4) |
| 8. guide students to explore different types of habitats and living organisms through a fieldwork activity. | Give background information about the place in which this activity is to take place. Students use prepared worksheets to guide them through this activity. Activities may include:  
- observations of the different kinds of habitats  
- measurement of some environmental conditions such as the temperature, humidity, pH, wind speed, etc  
- animal and plant identification  
- observing leaf patterns and seeds  
- silent exercise  
- studying an area by using a quadrat  
- observing man-made or natural features in the environment  
- identifying examples of pollution and conservation  
Link this activity with the lessons about grouping living things. Places in which some of above activities may be carried out include a nature reserve (e.g. Simar, Ghadira, Majjistral, etc), Buskett, garigue, Xrobb l-Ghagin, a valley, rocky or a sandy sea shore, or school grounds. **Note also:**  
- safety considerations (risk assessment of the place to be visited, students with particular health issues)  
- consent forms including parents/guardian contact number | link some characteristics of animals/plants to their habitat. (Level 6) 
recognise different habitats in a given area. (Level 5) 
Identify differences found in different areas. (Level 4) |
Subject: Integrated Science
Unit code and title: SCI 7.3 CHEMICAL PROPERTIES
Strand: Materials and their Properties

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<td>1.</td>
<td>guide students to identify three states of matter.</td>
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<td>2.</td>
<td>guide students to explore the change of state of matter</td>
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<td>3.</td>
<td>make students familiar with common acids and alkalis.</td>
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<td>4.</td>
<td>engage students to investigate the strength of acids and alkalis using indicators coupled with the pH scale.</td>
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<td>5.</td>
<td>engage students to investigate the neutralisation of an acid with an alkali.</td>
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<td>6.</td>
<td>engage students to explore production, use and test for hydrogen.</td>
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<td>7.</td>
<td>engage students to explore production, use and test for oxygen.</td>
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<td>solid, liquid, gas, reversible change, three states of matter, melting, evaporation, condensation, freezing, acid, alkali, metal, chemical reaction, corrosive, carbon dioxide, hydrogen, oxygen, neutralisation, indicator, litmus, universal indicator, oxygen, flammable, effervescence</td>
<td>Refer to notes re 5E approach to science teaching and learning. Ensure the necessary safety precautions are used when handling acid and alkali solutions. Use small amounts and wear protective equipment (lab coats and safety specs). In addition, apply standard laboratory safety rules. Inspect laboratory first aid and eye wash kits before the start of the unit. Concentrated acid should only be handled by the teacher and used in a fume cupboard. Lab technicians must provide Material Safety Data Sheets (MSDS) for each commercial chemical and make them readily available in case of emergency. Laboratory technicians must be aware of an emergency procedure in case of acid or alkali spillage.</td>
<td>Common laboratory glassware, labcoats and safety goggles. magnesium, zinc granules, marble chips, dilute hydrochloric, sodium hydroxide solution, distilled water, wooden splints, limewater, litmus paper, universal indicator, beetroot or red cabbage, common household acids and alkalis, antacid e.g. milk of magnesia, liquid soad, zinc granules, concentrated and dilute H₂O₂, manganese (IV) oxide. Acids, alkalis and the pH scale <a href="http://www.bbc.co.uk/schools/ks3bitesize/science/chemical_material_behaviour/acids_bases_metals/revise1.shtml">http://www.bbc.co.uk/schools/ks3bitesize/science/chemical_material_behaviour/acids_bases_metals/revise1.shtml</a> Properties of gases <a href="http://phet.colorado.edu/en/simulation/gas-properties">http://phet.colorado.edu/en/simulation/gas-properties</a> Interactive simulations – properties of materials <a href="http://www.bbc.co.uk/schools/ks2bitesize/science/materials/">http://www.bbc.co.uk/schools/ks2bitesize/science/materials/</a> Carbon dioxide: <a href="http://www.youtube.com/watch?v=j5vF4_ggLv8&amp;feature=player_embedded">http://www.youtube.com/watch?v=j5vF4_ggLv8&amp;feature=player_embedded</a> Hydrogen: <a href="http://www.youtube.com/watch?v=adBz9clkJTg&amp;feature=player_embedded">http://www.youtube.com/watch?v=adBz9clkJTg&amp;feature=player_embedded</a> Oxygen: <a href="http://www.youtube.com/watch?v=Jxp_wpDufdg&amp;feature=related">http://www.youtube.com/watch?v=Jxp_wpDufdg&amp;feature=related</a> <a href="http://www.sciencekids.co.nz/sciencefacts/chemistry/oxygen.html">http://www.sciencekids.co.nz/sciencefacts/chemistry/oxygen.html</a></td>
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<tr>
<td><strong>THE TEACHER WILL:</strong></td>
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| 1. guide students to identify three states of matter | **Starter suggestion:** Show examples of different things and ask students to identify differences /similarities.  
**Main activity:** Students may refer to colour, shape, material, texture, etc. Ask students to sort these things in groups. There is usually more than one possible answer but the important outcome is the students' justification of their decisions.  
Ask students to sort the things in a different way. Students may come out with different types of groups but finally guide students to understand that things can be sorted out into solids, liquids and gases. These are called the States of Matter.  
Use an interactive presentation and ask students sort other things into solids, liquids and gases. Guide students to identify some properties of solids, liquids and gases. May refer to properties like fixed shape, spreading out or flowing easily, compressibility and expansion. Some of the following experiments may be used:  
- pushing the plunger of a sealed syringe to investigate compressibility  
- observing the column of water in a capillary tube connected to a conical flask full of water put in a hot water bath.  
- smelling perfume across the room  
- putting a hot empty drink can into a trough with cold water (note safety measures) | **STUDENTS CAN:**  
Identify one property of a solid, liquid and a gas.  
(Level 6)  
sort objects in solids, liquids and gases.  
(Level 5)  
Identify similarities and differences between different objects.  
(Level 4) |

**Other notes:**
2. Guide students to explore the changes of states of matter

**Starter suggestion:** Give students a list of substances and ask them how many different ones there are. For example, they may include: ice, water, steam (all water).

**Main activity:** Show students some ice cubes. Ask students what will happen to ice if they were left on the side or heated. Heat the ice in a beaker until it melts. Ask students what will happen if you continue to heat it. Heat the water until it boils. Watch the water boil and show that it can be condensed by holding a piece of cold glass over the steam.

**Other activities:**
- Guide students to experience changes such as ice melting in their hand, butter melting, etc.
- Use a flow chart, linking the words, solid, liquid and gas. Add the words melting, freezing, boiling and condensing.
- Use interactive simulations to show change of state.

**Other possible activities:**
- Use the terms melting and freezing correctly. (Level 6)
- Recognise that water can be found in different forms. (Level 5)
- Recall that ice melts to water when heated. (Level 4)
3. make students familiar with common acids and alkalis.

**Starter suggestion:** Drop a piece of magnesium or zinc in a beaker/test tube half full of dilute hydrochloric acid. Ask students to observe what happens and give possible reasons for these observations. Note any misconceptions which might be addressed at a later stage. Make the students aware that the effervescence they observe in this experiment is due to the production of a colourless gas.

**Main activity:** Ask students what they know about acids and present their ideas in few sentences or as diagrams. Encourage students to give the name of common acids they know.

Guide students through an experiment in which they test the strength of two acids (such as hydrochloric and ethanoic acids). Label acids with the *corrosive* symbol and explain this label to students. Ask students to investigate the reaction between zinc and these acids. Guide students to record their results and share their observations. Relate effervescence with acid strength.

Similarly present examples of commonly used alkalis such as liquid soap, detergents, and bleach. Students explore the soapy texture of some alkalis such as liquid soap. Students find the properties of these chemicals and work in groups to present their ideas verbally, written or as a drawing. Illustrate that strong alkalis are corrosive, sometimes dangerous but useful. Remind students that the corrosive label is also used with alkalis.

**Other activities:**
- students list the names of common acids and alkalis used in the laboratory, in the home and in everyday life
- identify some common properties.
- students relate acid corrosiveness with its hazards.

**Other notes:**

- name one common acid and alkali (Level 6)
- recognise the corrosive hazard symbol and know basic safety procedures when handling chemicals. (Level 5)
- recognise that some chemicals may be dangerous. (Level 4)
4. **Starter suggestion:** Present two test tubes (hydrochloric acid and sodium hydroxide). Ask students to distinguish between the two.

**Main activity:** Introduce Litmus paper as an indicator to distinguish between the two. Guide students in the use of this indicator to identify acids from alkalis.

Give students a number of unknown samples and guide students to use the litmus paper to sort as acids and alkalis.

**Other possible activities:**
- Some students may be able to distinguish between strong and weak acids / alkalis. Drop a piece of magnesium in two test tubes half full of dilute hydrochloric acid ethanoic acid respectively. Ask students to observe what happens and give possible reasons for these observations. Students may point out the difference in the rate of effervescence. Introduce the idea of acid strength.

- Introduce the pH scale as a measurement of the strength of acids and alkalis. Draw the pH scale and use the universal indicator to find the pH of some samples. May use dilute hydrochloric acid, vinegar, rain, dilute sodium hydroxide, dilute ammonia, baking soda, distilled water, tap water, orange juice, coke etc. Guide students to fill in a prepared work sheet to put down their results.

- Some students may use the IWB to match: pH value with names of chemicals; strong / weak with pH values; colours of universal indicator with the corresponding pH and so on.

- Some students may refer to their home experience of using indicators to measure pH of water in an aquarium.

**Other notes:**
- Recall one example of strong and weak acids and alkalis.
- Use litmus paper as a way of identifying acids and alkalis.
- Recall that some chemicals may be more dangerous than others.
5. engage students to investigate the neutralisation of an acid with an alkali

**Starter suggestion:** Show some images of a jelly fish bite/wasp/bee sting. Ask students to describe ways of treating these bites.

**Main activity:** Ask students to identify the best remedy. Help students to explain, elaborate and evaluate their responses. Ask students to link the above situation with acids and alkalis. Ask one student to draw the pH scale on the IWB. Repeat the above question and present the scenario of treating a bite. Ask students how they could make the bite less dangerous.

Present another scenario of a person suffering from acid stomach. Ask for possible remedies. After discussing some of the answers introduce some examples of antacids (e.g. Gaviscon, Milk of Magnesia). Ask students to predict and test its pH. Show that the above two scenarios involve the reaction between an acid and an alkali. Introduce the term ‘Neutralisation’ for reactions between acids and alkalis and ask for possible explanations how antacids reduce acid burns.

DO NOT go into the word equation of neutralisation reactions.

**Other activities:**
- give examples of neutralisation. Ask students to work in groups and explore the situation and present it to the whole class. These examples can include neutralisation of acid soil by lime, bee stings with weak alkali, acid produced by bacteria with toothpaste and lime scale removers.

**Other notes:**
- use an indicator to follow the reaction between and acid and alkali. (Level 6)
- recall everyday examples of neutralisation such as the use of antacids and toothpaste. (Level 5)
- recall one example of neutralisation such as the use of acids on jelly fish bites. (Level 4)
6. engage students to investigate the preparation, properties and uses of hydrogen.

**Starter suggestion:** Revisit SCI 7.3.3 and react a piece of magnesium and zinc in a test tube half full of dilute hydrochloric acid. Ask students to use previous knowledge and describe their observation.

**Main activity:** Students may be able to identify that the effervescence they observe in the experiment is due to the production of a colourless gas. Identify this gas as hydrogen. Guide students to show that the presence of this gas can be tested by using a lighted splint. Hydrogen burns with a pop. Helps students to repeat the experiment and the test. Note safety precautions.

Discuss appearance, properties and uses. These should include:

- **Appearance:** colourless, odourless
- **Properties:** flammable, lightest gas, found in many chemicals (such as water)
- **Uses:** fuel (in rockets and welding), making of margarine, fertilisers and disinfectants.

Use an interactive presentation to describe the above.

---

use the chemical test to identify hydrogen.
(Level 6)

identify hydrogen as a gas.
(Level 5)

link effervescence with the production of a gas.
(Level 4)
7. **engage students to investigate the preparation, properties and uses of oxygen.**

**Starter suggestion:** Show a clip illustrating the importance of oxygen. Can use a clip of a fire fighter, diver or a mountain climber with an oxygen mask. Ask students to describe the clip.

**Main activity:** Use the IWB to build a concept map about oxygen. Ask each student to add a one word idea to the concept map. Elaborate on their answers and highlight the importance of oxygen, identify plants as the natural source of oxygen, identify some physical properties such as appearance, ask students to predict the amount of oxygen present in air and so on.

**Other activities:**
- demonstrate the lab production of oxygen using hydrogen peroxide and manganese (IV) oxide powder. (Note: \( \text{H}_2\text{O}_2 \) is corrosive when concentrated). Explain that catalysts, such as manganese (IV) oxide powder, are used to break up \( \text{H}_2\text{O}_2 \). Ask students to use the concept map to predict a way of testing for the presence of oxygen. Give each group of students a conical flask containing \( \text{H}_2\text{O}_2 \). Add some manganese (IV) oxide. A strong effervescence (oxygen) and frothy fumes are produced. Use a lighted/glowing splint to test for oxygen. Ask the students to use the concept map to show the relation between oxygen and burning and rusting.

**Other notes:**
- use the chemical test to identify oxygen. (Level 6)
- recall the importance of oxygen for life. (Level 5)
- recall the importance of air for life. (Level 4)
**Subject:** Integrated Science  
**Unit code and title:** SCI 7.4 ENERGY AROUND US  
**Strand:** Physical Processes

<table>
<thead>
<tr>
<th><strong>Objectives:</strong> Teacher will:</th>
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<tbody>
<tr>
<td>1. guide the students to explore the main forms of energy</td>
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<tr>
<td>2. engage students to discover that energy can be changed from one form to another and that not all energy changes are useful</td>
<td></td>
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<tr>
<td>3. help students to recognize that food is a source of energy.</td>
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<tr>
<td>4. guide students to explore electricity as a form of energy and construct basic circuits.</td>
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<tr>
<td>5. teach students to use symbols to represent electrical circuits.</td>
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<tr>
<td>6. guide students to explore series and parallel circuits.</td>
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</tr>
<tr>
<td>7. engage students to identify conductors and insulators and relate them to issues of safety.</td>
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<table>
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<tr>
<th><strong>Key words</strong></th>
<th><strong>Points to Note</strong></th>
<th><strong>Resources</strong></th>
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</table>
| energy resources, stored energy, movement, heat, electrical energy, light, sound, joules, kilojoules, energy transfer, symbol, electric circuit, bulb, switch, battery, complete/incomplete circuit, series, parallel, current, voltage, component, conductor, insulator, resistance | Refer to the note re the 5E approach to teaching and learning of science.  
In this unit energy is treated as something that is found in various forms and is transferred to make things happen. Another important point is the fact that energy cannot be created nor destroyed. Do not distinguish between cells and battery. Refer only to batteries. Keep in mind that in Maltese most students use the term ‘dawl’ (light) instead of electricity. Some students mix the terms plug and socket.  
**Health & Safety:**  
Burning food experiment – make sure that no-one is allergic to any of the foods being burnt. For example, some students may be allergic to nuts. Remind students not to eat any of the foods. Be aware of health and safety issues when using electricity. | clockwork toy, bicycle dynamo, torch, photovoltaic cell, filament bulb, energy saving bulb, LED, thermometer, digital balance. circuit boards, batteries, bulbs, switches, wires, materials including copper, iron, aluminium, wood, plastic, paper, glass, data loggers, Christmas light set  
**Forms of energy:**  
http://www.misterteacher.com/whiteboard/energy.html#free  
http://www.energyquest.ca.gov/story/index.html  
**Energy transfer:**  
http://kmetemidni.mx.am/sfzps4.html  
**Energy in food:**  
http://www.practicalchemistry.org/experiments/energy-values-of-food_225.EX.html  
**Electrical circuits:**  
**Building circuits:**  
http://www.engineeringinteract.org/resources/siliconspies/flash/concepts/buildingcircuits.htm# |
### Teaching objective

**THE TEACHER WILL:**

1. guide the students to explore the main forms of energy.

### Example of teaching activities / experiences

- **Starter suggestion:** Ask students to imagine a day without electrical energy at home or at school and list the effects this might have on their daily normal activities. Give time for students to share their responses. Guide students to understand that electricity is one form of energy.

- **Main activity:** Show a battery, a yo-yo and a food item and ask the students what do these things have in common. Some students may recognise different forms of energy. Set up a number of stations (e.g. batteries, yo-yo, radio, bulbs & LEDs, warm water, different food items, IWB showing short clips such as erupting volcanoes, bicycles on the move, aeroplanes taking off). Ask students to identify forms of energy present in each station. Guide students to draw a table with two columns; in the first column they write/draw the devices and in the second column they write its type of energy. Pool the results on the IWB. Guide the students to identify the main forms of energy and show that in all cases energy makes things happen.

- **Other possible activities:**
  - Some students may be able to understand that energy can be measured and recall that energy is measured in joules.
  - Some students may explore other examples and identify nuclear, potential and chemical energy as other forms of stored energy.

### Indicators of Learning outcomes

**STUDENTS CAN:**

- Identify different forms of energy such as stored, movement, heat, electrical, light and sound and realize that energy can be measured. (Level 6)

- Know that there are different forms of energy. (Level 5)

- Recall that energy can be found in different forms. (Level 4)
2. **engage students to discover that energy can be transferred from one form to another and that not all energy changes are useful.**

**Starter suggestion:** Present students with a filament bulb, an energy saving bulb and an LED. Ask students to identify any differences.

**Main activity:** Guide students to discuss the energy input and output present in each of the following: torch, clockwork toy, bicycle dynamo, photovoltaic cell, video clips demonstrating energy changers.

All students draw a diagram to show the energy changes taking place in the device they have at hand. Students state the energy changes that occur and whether they are useful changes or not.

**Other possible activities:**
- use an interactive animation in which students fill in the input and output energy/s in the space provided. Examples may include an athlete running; workers carrying heavy objects; a compressed spring; a device emitting a sound; an electrical device overheating, etc. Students identify the main form of energy and the non-useful part
- Some students discuss the intermediate energy changes that take place in the device such as the stored energy in a battery changes to electrical energy to light energy in the bulb.

**Other notes:**

identify some energy changes for a range of familiar devices. (Level 6)

Identify one energy change for a familiar device such as a bulb. (Level 5)

be aware that energy changes from one form to another. (Level 4)
3. help students to recognise that food is a source of energy

**Starter suggestion:** Show pictures of different types of foods and ask students to identify two food items with most energy content and two items with least energy content.

**Main activity:** Guide students to come up with a test to show that energy is present in a food sample. Students investigate energy from food by burning a food sample and heating water. Guide students to record the temperature rise of water in a boiling tube. Ask students to predict the amount of heat produced if a bigger sample of food is used thus linking the stored energy in the food with the amount of heat produced. At the end, the different groups present their results in the form of a table on the whiteboard.

**NOTE:** the aim of the above experiment is to recognise that food contains stored energy...and the heat produced (i.e. increase in temperature) is indicative of the amount of stored energy present in food. At this level it is NOT expected to calculate the amount of energy present in a food sample.

**Other notes:**

identify foods with the most/least energy content.  
(Level 6)

Recall that different foods contain different amounts of energy.  
(Level 5)

recognise the fact that food is a source of energy.  
(Level 4)
<p>| | | |</p>
<table>
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</table>
| 4. guide students to explore electricity as a form of energy and construct basic circuits. | **Starter suggestion:** Show a number of devices which use electricity as their starting form of energy. May show pictures of electric bulb, motor, driller, kettle, iron, etc. Ask students to state what do these things have in common. Guide students to identify electrical energy as their starting form of energy.  
Note: Briefly make the students aware of safety issues when using electricity. Identify batteries and sockets as two electrical sources and show that for safety reasons batteries are used in science experiments. | identify the function of basic electrical components and realise that a complete circuit is needed to light a bulb.  
(Level 6)  
name basic electrical components.  
(Level 5)  
name some basic electrical components.  
(Level 4) |
|   | **Main activity:** Ask students to pick items from the available electrical components. Students are to build a circuit and light a bulb in the shortest time possible. Guide students to construct a simple circuit using a battery, wires and a bulb. Show that a complete circuit is required to light a bulb. All students are to label the electrical components by using readily available labels provided by the teacher. |   |
| Other activities: |   |   |
| - ask students to identify the main electrical components and draw this circuit on a worksheet provided by the teacher. |   |   |
| Other notes: |   |   |
5. **teach students to use symbols to represent electrical circuits.**

<table>
<thead>
<tr>
<th>Starter suggestion: Ask students to set up a complete circuit. Some students may be able to choose any necessary components from the teacher’s bench. The task ends when the first student lights a bulb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main activity: Guide students to work in groups to draw a diagram which shows the complete circuit. Introduce the idea that at times it is much easier to use symbols. Give examples from everyday life (e.g. traffic signs). Introduce some electrical symbols and ask students to predict a match between the symbol and the electrical component. Guide students to use the symbols to draw a complete electrical circuit showing a battery, wires and a bulb. Give time to students to draw circuit diagrams on their workbook and then on the IWB. Some students may add more components to this circuit, such as other batteries, bulbs and a switch.</td>
</tr>
<tr>
<td>Other possible activities:</td>
</tr>
<tr>
<td>- individual students play an interactive quiz to select correct circuit diagrams.</td>
</tr>
<tr>
<td>- students make changes to circuits which were set up incorrectly.</td>
</tr>
<tr>
<td>Other notes:</td>
</tr>
<tr>
<td>- draw the circuit symbols for a battery, bulb, switch and wire. (Level 6)</td>
</tr>
<tr>
<td>- identify symbols for a battery, bulb, switch and wire. (Level 5)</td>
</tr>
<tr>
<td>- Identify symbols as symbols as symbols for electrical components. (Level 4)</td>
</tr>
</tbody>
</table>
6. guide students to explore series and parallel circuits.

**Starter suggestion:** Give students one battery, some wires and 2 or 3 bulbs. Ask students to connect all the components in one circuit.

**Main Activity:** Give time to students to make the bulbs light. Ask students to present their circuits. Different groups of students may have produced a different set up. Identify the two different ways of connecting circuits – series and parallel circuits. Investigate the properties of a series circuit. Show the effect of removing one bulb. Give time to students to check their predictions and answer a set of questions on a worksheet. Ask students to observe the brightness of the bulbs.

Investigate the properties of a parallel circuit. Ask students to set up a parallel circuit and predict the effect of removing one bulb. Give time to students to check their predictions and answer a set of questions on a worksheet. Ask students to observe the brightness of the bulbs. Assist students to draw correct circuit diagrams.

**Other possible activities:**
- Some students may be able to measure the current flowing through a circuit using a digital ammeter / data logger.
- Students use interactive games to explore the different properties of series and parallel circuits, including bulb brightness, current and the effect of removing or adding a bulb.

**Other notes:**

- Identify series and parallel circuits.
- Identify different ways of connecting bulbs in a circuit.
- Identify differences between different circuits.

*Level 6*

*Level 5*

*Level 4*
7. engage students to identify conductors and insulators and relate them to issues of safety.

<table>
<thead>
<tr>
<th>Starter suggestion:</th>
<th>Ask students to sort out and name familiar materials such as a spoon, a key, a plastic ruler and a rubber into two groups by predicting whether they conduct electricity or not.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main activity:</td>
<td>Most students will be aware that electricity will pass through some materials but not through others. Guide students to test their prediction. Give some time until each group of students tries the conductivity of a number of materials. Guide students to report back their results and take note of their findings in table form. Point out that in a circuit, electricity passes through a metal (conductor) all the way.</td>
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<tr>
<td></td>
<td>Guide the students to think about the issue of SAFETY. Ask students to think about safety features which are used when using electricity. Link to the lesson objective by referring to the proper use of insulators (plastic handles, rubber gloves, etc). Make students aware of basic safety precautions in case of electric shock and refer to the responsible use of the emergency call (112).</td>
</tr>
<tr>
<td>Other activities:</td>
<td>- students use interactive sources to classify materials as conductors or insulators.</td>
</tr>
<tr>
<td>Other notes:</td>
<td>use a simple circuit to classify materials as conductors and insulators. (Level 6)</td>
</tr>
<tr>
<td></td>
<td>recall some materials that conduct / do not conduct electricity. (Level 5)</td>
</tr>
<tr>
<td></td>
<td>Identify 112 as the emergency call. (Level 4)</td>
</tr>
</tbody>
</table>
Subject: Integrated Science  
Unit code and title: **SCI 7.5 CELLS AND REPRODUCTION**  
Strand: Life Processes and Living Things  

<table>
<thead>
<tr>
<th><strong>UNIT SPECIFIC OBJECTIVES:</strong></th>
<th>Teacher will:</th>
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<tbody>
<tr>
<td>1. teach students to use a light microscope effectively.</td>
<td></td>
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<tr>
<td>2. guide students to understand that cells are the basic unit of life and recognise plant and animal cells.</td>
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<tr>
<td>3. guide students to identify the main human organs.</td>
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<tr>
<td>4. guide students to identify the human reproductive cells and the human reproductive organs.</td>
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<tr>
<td>5. guide students to identify and understand the body changes during puberty and adolescence.</td>
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<tr>
<td>6. help students to understand that fertilisation is the fusion of the male and female reproductive cells.</td>
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<tr>
<td>7. engage students to understand what happens during pregnancy and birth.</td>
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</table>

<table>
<thead>
<tr>
<th>Key words</th>
<th>Points to note</th>
<th>Resources</th>
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</thead>
</table>
| cell, organ, microscope, nucleus, cell membrane, cytoplasm, cell wall, vacuole, chloroplast, eyepiece lens, objective lens, stage, sperm, egg, ova, sex cell, sexual intercourse, sex organs, testis, penis, tube, oviduct, ovary, uterus, cervix, vagina, fertilisation, conception, ejaculate, erection, semen, puberty, adolescence, menstruation, menstrual cycle, period, embryo, sexual reproduction | Refer to notes re 5E approach to science teaching and learning.  
Some students may find it difficult to understand the small size of cells. The exercise of viewing known objects (such as a plastic ruler) under the microscope might help.  
The second part of this unit is a good opportunity for students to ask questions that may be worrying them. Liaison with PSD department and be familiar with the school policies on sex education. Refer to the fact that values and respect are also part and parcel of human relationships in addition to the biological aspect of reproduction. | student light microscope, prepared slides, human torso, organ tunic  
**Biology:**  
[wwwbiology4kids.com](http://www.biology4kids.com)  
**Cells:**  
[http://www.udel.edu/biology/ketcham/microscope/scope.html](http://www.udel.edu/biology/ketcham/microscope/scope.html)  
**Under the microscope:**  
**Body organs:**  
[www.sciencenetlinks.com/interactives/systems.html](http://www.sciencenetlinks.com/interactives/systems.html)  
**Male & female reproductive systems:**  
[http://www.kscience.co.uk/revision/reproduction/reproduction_index.htm](http://www.kscience.co.uk/revision/reproduction/reproduction_index.htm)  
<table>
<thead>
<tr>
<th>Teaching objective</th>
<th>Example of teaching activities / experiences</th>
<th>Indicators of Learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THE TEACHER WILL:</strong></td>
<td></td>
<td><strong>STUDENTS CAN:</strong></td>
</tr>
<tr>
<td>1. teach students to use a light microscope effectively</td>
<td><strong>Starter suggestion:</strong> Ask students to use hand-lenses to observe details of small objects. Ask students to identify observed features. <strong>Main activity:</strong> Elaborate on the concept of being able to see more detail when we look closely enough. Introduce the light microscope to observe small detail. Through a hands-on activity, students explore through a hands-on activity how to use a microscope, first at low power and then at high power. Elaborate on the specific parts of the light microscope. Give out prepared slides of small things such as hair, cotton thread and parts of small animals and plants. Give time for each student to use the microscope effectively. <strong>Other activities:</strong> - use the IWB to show images of microscopic organisms. Do not show details of individual cells. <strong>Other notes:</strong></td>
<td>use the microscope to magnify small things/items invisible to the naked eye. (Level 6) use magnifying lenses to observe small things. (Level 5) Identify magnifying lenses as tools to observe small things. (Level 4)</td>
</tr>
</tbody>
</table>
2. guide students to understand that cells are the basic unit of life and help students recognise plant and animal cells.

<table>
<thead>
<tr>
<th><strong>Starter suggestion:</strong></th>
<th>Ask students to describe what do we use the microscope for.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Show a photo of a brick wall and ask students to identify what is in the picture. Engage students to use the brick wall analogy to describe how living things are made up of cells just like the wall is made of bricks. Elaborate and explain that cells cannot be seen by the naked eye since they are too small.</td>
</tr>
</tbody>
</table>

**Main activity:**

**Animal cells**

Use the digital microscope or IWB to show simple animal cells. Explain that animals are made up of a large number of cells. Explain the structure of a typical animal cell. Guide students to draw a labelled diagram of an animal cell. Give guidance re simple drawings.

**Plant cells:**

Repeat the above activity using images/slides of plant cells. Ask students to identify differences between animal and plant cells. Explain the function of the different parts (cell wall, vacuole and chloroplast). Ask the students to draw a labelled diagram of a plant cell.

**Other activities:**

- use an interactive presentation on the IWB; students match parts of cell to their function.
- use an interactive simulation to label plant and animal cells.

**Other notes:**

| identify a typical plant cell as seen under the light microscope. (Level 6) |
| identify a typical animal cell as seen under the light microscope. (Level 5) |
| know that plants and animals are made up of millions of cells. (Level 4) |
3. guide students to identify the main human organs

<table>
<thead>
<tr>
<th><strong>Starter suggestion:</strong></th>
<th>Ask students to name parts of the body.</th>
</tr>
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<tbody>
<tr>
<td><strong>Main activity:</strong></td>
<td>Describe that organs have a specialized function. Ask some students to give examples of human organs.</td>
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<tr>
<td></td>
<td>Show the position of organs on the organ tunic / human torso. Ask students in groups to list further body organs and possibly their function.</td>
</tr>
<tr>
<td><strong>Other activities:</strong></td>
<td>- use an interactive presentation to put human organs in their correct place. Match correct label with organ.</td>
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<tr>
<td></td>
<td>- Alternatively students may use a prepared work sheet to put human organs in their correct place.</td>
</tr>
</tbody>
</table>

**Other notes:**
- identify the correct position of the main organs on the human torso. (Level 6)
- name most important human organs. (Level 5)
- name two human organs. (Level 4)
| 4. guide students to identify the human reproductive cells and reproductive organs. | **Starter suggestion:** Show images of baby animals and ask students to link these images with those of adult animals.  

**Main activity:** Elaborate on the concept of living things being able to reproduce other ones like themselves and ask students to come up with reasons why this is important. Introduce the sperm and the ovum as specialised sex cells in animals.  

Explain that a baby is made when these two meet inside the woman’s body.  

Use the IWB to go through the structure of the male reproductive system. Elicit the importance and function of each part.  

Go through the same process with the female reproductive system. Use the IWB to describe and label the female reproductive system.  

**Other activities:**  
- use a drag and drop labelling exercise to reinforce the learning of the key words.  
- students use a prepared work sheet to fill in the labels of the male and female reproductive organs.  

**Other notes:** | Identify the male and female reproductive systems and able to label some parts.  
(Level 6)  

state that a new offspring is the result of a male and female coming together.  
(Level 5)  

link images of baby animals with those of adult animals.  
(Level 4) |
| 5. guide students to identify and understand the body changes during puberty and adolescence. | **Starter suggestion:** Use short advert clips, one about shaving foam and/or the other about sanitary towels. Ask the students to identify the target audience of these clips. Introduce the idea of body changes during teenage.

**Main activity:** Ask the students to identify and list changes that take place in boys and girls during adolescence. Refers to common changes in boys and girls such as growth in height, pubic hair; changes in boys such as change in voice, growth of facial hair, growth of reproductive organs, production of sperms; changes in girls such as development of breasts, menstrual periods, widening of hips.

Show the following pictures – one of a young child and one of adolescent – guide the students to point out key differences. Recap on the key differences between men and women during puberty changes and label on a diagram.

Elaborate on their results and add any changes that were not elicited. Present puberty as the process of reaching sexual maturity which involves the production of sperms and ova.

**Other activities:**
- use a simplified chart to explain the menstrual cycle and explain the terms ‘menstruation’, ‘ovulation’ and ‘periods’.

**Other possible activities:**
- use a blank chart to mark the period, fertile and ovulation days in a female. | identify common body changes taking place in boys and girls during puberty and adolescence. (Level 6)

identify puberty and adolescence as a period of rapid growth and other changes. (Level 5)

identify two body changes taking place in boys and girls during puberty and adolescence. (Level 4) |
6. help students to understand that fertilisation is the fusion of the male and female reproductive cells.

**Starter suggestion:** Present images of parents with their child. Ask students to identify any similarities between the parents and the child. Some students may refer to eye, hair and skin colour, their physical make up, health conditions, character and so on.

**Main activity:** Ask students to give reasons for these similarities. Some students may link this to the role of sex cells and others may refer to environmental (nurture) conditions. Show clips of how sperm meet and fertilise an egg and explain that at this point the nuclei of both cells join together – hence the resemblance of the offspring to the parents. Use a diagram of the female reproductive system and ask students to mark the passage of the sperm until it reaches the egg. Show the place where fertilisation occurs.

Students work in same ability groups to put in order the series of events leading to mating and fertilisation. Some students may use pictures and others statements. Use the IWB to show the correct order of events.

**Other activities:**
- use diagrams of the male and female reproductive systems, discuss where ova and sperm are formed, where fertilisation takes place.
- repeat the same activity using animals as examples. Show that sexual reproduction and fertilisation happens also in animals.

**Other notes:**

describe that fertilisation is the fusion of the male and female reproductive cells.
(Level 6)

identify the male and female sex cells.
(Level 5)

recall that an new offspring needs the presence of a male and a female.
(Level 4)
7. engage students to understand and describe what happens during pregnancy and birth.

<table>
<thead>
<tr>
<th>Starter suggestion: use a diagram of the female reproductive system. Ask students to identify where fertilisation occurs and ask them to describe what happens from then on.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main activity:</strong> Use a clip to show the development of the fertilised egg into an embryo and a foetus.</td>
</tr>
<tr>
<td>Use diagrams or models to show how the baby fits inside the uterus and how the uterus expands with the growth of the foetus. Refer to the function of the placenta as the link between foetus and the mother and the role of the amniotic fluid as protection to the foetus and its development.</td>
</tr>
<tr>
<td>Refer to a diagram showing the last stages of pregnancy and explain the process of birth.</td>
</tr>
<tr>
<td><strong>Other activities:</strong></td>
</tr>
<tr>
<td>- identify health hazards during pregnancy. Ask students divide a list of statements into do’s and don’ts for a pregnant woman. The list will include bad practices such as smoking, alcohol drinking and excessive medications and good practices, such as healthy eating, extra-care when going up stairs, moderate exercise.</td>
</tr>
<tr>
<td><strong>Other notes:</strong></td>
</tr>
</tbody>
</table>

recall in simple terms that the fertilised egg grows into a baby during nine months of pregnancy and at the end of which the baby is born. (Level 6)

Identify some examples of good and bad practices for a pregnant woman. (Level 5)

understand that a baby grows inside its mother. (Level 4)