Integrated Science Curriculum Units

Core Curriculum Programme

with examples of teaching activities

2015

Form 2
Integrated Science Curriculum
Core Curriculum Programme
Form 2
INTEGRATED SCIENCE CURRICULUM UNITS – FORM 2

SCI-CCP 8.1  Healthy Living

SCI-CCP 8.2  The world of materials

SCI-CCP 8.3  Forensic Science

SCI-CCP 8.4  The Environment

SCI-CCP 8.5  Earth and Space
Subject: Integrated Science
Unit code and title: SCI CCP 8.1 HEALTHY LIVING
Strand 1: Life Processes and Living things

Unit Duration: Approx. 20 sessions of 40 minutes (13 hours)

**Objectives**
The teacher will:
1. guide students to identify the basic food substances, their use and the importance of a balanced diet.
2. guide students to identify the parts that make up the digestive system.
3. guide students to explore the lungs and the heart and the effect of smoking on them.
4. guide students to identify different microbes and explore ways in which they can be useful.
5. describe how harmful microbes cause diseases and how infections can be spread.
6. guide students to identify (natural) ways of preventing and fighting infections.
7. guide students to explore the use of medicines in preventing illnesses and fighting infections.

**Key Words**
Basic food substances, carbohydrates, proteins, fats, minerals, vitamins, fibre, water, balanced diet, digestive system, mouth, gullet, stomach, small intestine, large intestine, anus, digestion, breathing, lungs, heart, microbe, micro-organisms, diseases, bacteria, viruses, fungi, infection, vaccination, antibiotic,

**Points to Note**
This curriculum promotes an inquiry based and student centred methodology based on the 5E approach to teaching and learning of science in which students are encouraged to engage, explore, explain, elaborate and evaluate. Link this unit to SCI-CCP 7.2 re vital functions, SCI-CCP 7.5 re body systems.

Note the following misconceptions:
- The word ‘diet’ is often used in the context of ‘going on a diet’ to lose body mass rather than ‘what you eat’.
- Some students may think that all micro-organisms are harmful.

Be aware of the need for sensitivity to pupils and their families who may have or have had, a particular illness or condition.

**Resources**
Food labels, human torso or organ tunic, heart model,

**Resources to support inclusion:**
http://www.communication4all.co.uk/HomePage.htm

**Food substances/ Balanced diet:**
http://idahoptv.org/dialogue4kids/season11/nutrition/

**Breathing simulation:**
http://teachhealthk-12.uthscsa.edu/curriculum/pulmonary/pulmonary-breathsimulation.asp

**Finding microbes:**
http://www.sciencekids.co.nz/gamesactivities/microorganisms.html

**Vaccination**
http://www.youtube.com/watch?v=sGKrs1ED_rw
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<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning outcomes</th>
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<tr>
<td>THE TEACHER WILL: 1. guide students to identify the basic food substances and the importance of healthy eating.</td>
<td><strong>Starter suggestion:</strong> Show pictures of well-known athletes and obese people. Discuss what might lead to the situation in each case. Guide the students to the issue of food as one of the main factors. (Note that some students may be sensitive to their overweight situation.) <strong>Main activity:</strong> Give a list of food items and ask students to sort these items in groups – ask students to explain their sorting. Guide students to identify healthy and unhealthy food. Use the food packets / labels / IWB to identify some of the main food substances i.e. carbohydrates, proteins, fats, minerals, vitamins, fibre and water. Ask students to link some foods with the main type of food substance present in it (e.g. meat – proteins). <strong>Other activities:</strong> - Use a ‘drag and drop’ interactive exercise to link common foods to the most appropriate food type box. - May ask students to discuss any of the following: the benefits of a balanced diet and the dangers of following certain diets; the importance of having a breakfast; junk food; salts in our diet; misleading food labels; allergies to some foods such as nuts, milk and gluten. Link some foods to their function (e.g. meat / growth; sugars / energy) - Emphasise the importance of water.</td>
<td><strong>STUDENTS CAN:</strong> identify some food substances and their sources. (Level 6) link certain foods with healthy or unhealthy diets. (Level 5) sort foods using simple criteria. (Level 4)</td>
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2. **guide students to identify that parts that make up the digestive system.**

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<tr>
<th><strong>Starter suggestion:</strong></th>
<th>Ask students to give reasons why we need food. Students may refer to growth, repair and energy.</th>
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<tbody>
<tr>
<td><strong>Main activity:</strong></td>
<td>Give each student a biscuit and ask students to eat and observe what happens in the mouth. Ask students to describe what happens to the biscuit after swallowing.</td>
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<td>Link the above question to the digestive system. Ask students to describe what happens to food once it has been eaten. Use a video /RLO to show what happens to food as it passes through the digestive system.</td>
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<td>Identify the main parts of the digestive system. May use an interactive simulation and the human torso/organ tunic to describe the structure of the digestive system. Ask students to put the different organs in their place. Refer to the mouth, gullet, stomach, small intestine, large intestine and anus. May use a handout and students cut, stick and label the different organs in their correct place. (May use: <a href="http://www.kitses.com/animation/swfs/digestion.swf">www.kitses.com/animation/swfs/digestion.swf</a>)</td>
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<tr>
<td><strong>Other activities:</strong></td>
<td>- May refer to digested food being absorbed into the blood and carried round the body.</td>
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<tr>
<td><strong>Other notes:</strong></td>
<td>- Identify the structure of the digestive system. (Level 6)</td>
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<td></td>
<td>- Identify some parts of the digestive system (Level 5)</td>
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<td>- Link the digestive system to food. (Level 4)</td>
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3. guide students to explore the lungs and the heart and the effect of smoking on them.

**Starter suggestion:** Show a clip of an athlete breathing heavily or a diver. Ask students to suggest reasons why we breathe. Note any misconceptions which might be addressed later on.

**Main activity:** Use diagrams / simulations / human torso / models to show the position of the heart and the lungs. Ask students to feel the heart beat (pulse) in different places and measure the pulse rate and breathing rate. Repeat the measurement after students have done some exercise. Ask students to relate the movement of the lungs and pulse rate with exercise.

Briefly explain the effect of smoking on lungs, exercise and bad eating habits. Relate smoking to lung disease. Some students may ask about asthma and air pollution.

**Other activities:**
- May use IWB, chart or hand-out and ask students to put the heart, the lungs and other related organs in their correct place.
- May make a model of lungs using plastic bottle, straws and balloons.

**Other notes:**
- Identify bad eating habits, lack of exercise and smoking as unhealthy habits.
- State that the movement of the lungs and the heart increase during exercise and identify their position in the human body.
- Be aware of the movement of the lungs and the beatings of the heart continuously.
4. Guide students to identify different microbes and explore ways in which they can be useful.

**Starter suggestion:** Ask students to identify types of living things. Link with SCI 7.2.3 (CCP Curriculum) and recall that living things are grouped into animals, plants and small microbes.

**Main activity:** Use the following link and ask students to identify where in the diagram micro-organisms are found
http://www.sciencekids.co.nz/gamesactivities/microorganisms.html

Guide students to identify types of microbes such as bacteria, fungi (including yeast and mould) and viruses. Explain that these are very small organisms which can be observed under the microscope. Use images or simulations to describe the relative size of these microbes.

Ask students to use the above activity to identify where microbes are beneficial or harmful. Elaborate on useful/beneficial uses of microbes such as in the making of bread and wine, cheese and yoghurt, medicines such as penicillin.

**Other possible activities:**
- Students may explore the function of yeast. Use a plastic bottle, warm water, yeast and sugar. Place a balloon on the neck of the bottle.
- Students may grow some mould on a piece of damp bread. Place in a plastic bag and put in a warm place.

**Other notes:**
- identify three types of microbes (bacteria, fungi and viruses) and recognise that some may be useful. (Level 6)
- recognise that microbes exist everywhere. (Level 5)
- recall that microbes are living things. (Level 4)
5. describe how harmful microbes cause diseases and how infections can be spread

| Starter suggestion: Ask students to describe why sometimes we get sick. Note any use/misuse of words such as type of microbe (viruses/bacteria), linking some diseases with particular microbes, etc. At this point do not correct their responses but note any misconceptions which might be addressed at a later stage. |
| Main activity: Present the following scenario: three persons on a holiday trip are sick – one suffering from high fever, a second one from athlete’s foot and a third one suffering from diarrhoea. Ask students to identify the possible source of infection, mode of transmission, etc. Give time to students to share their responses and elicit further details. Prepare a list of diseases/illnesses that they know of. Pool results on the IWB and divide them in two groups: ask students to identify what is common in each group. Some students may note that the lists show infectious and non-infectious diseases. Elaborate on the infectious diseases list to include the type of microbe causing each disease and how it is spread. |
| Other activities: |
| Other notes: |

link some diseases with microbes and identify some ways how common diseases may spread. (Level 6)
identify some common diseases. (Level 5)
be aware that microbes can cause disease. (Level 4)
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<tr>
<th>6. <strong>guide students to identify (natural) ways of preventing and fighting infections</strong></th>
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<td><strong>Starter suggestion:</strong> Ask students whether they are concerned sitting near three different persons with flu, AIDS and cancer respectively.</td>
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<tr>
<td><strong>Main activity:</strong> Guide students to link the above question to the previous lesson and find out how these diseases spread. Explore the students’ ideas of why people are seldom ill despite surroundings rich in harmful microbes and ask students to think about ways how our bodies prevent the spread of infectious diseases and fight infections. Students may identify some natural barriers that prevent the entry of microbes such as the skin, hair in nostrils, tears, stomach acid, mucus, etc.</td>
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<td>Ask students to elaborate and explain how the body fights microbes which enter our bodies. Refer to the blood clotting and the formation of a scab as a way of stopping entry of microbes and preventing further loss of blood.</td>
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<td>Use a simulation / animation to show the action of white blood cells on microbes.</td>
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<td><strong>Other activities:</strong></td>
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<tr>
<td>- Illustrate methods of personal/home/everyday life hygiene which can reduce the risk of infection.</td>
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<td><strong>Other notes:</strong></td>
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<tr>
<td>identify natural barriers which act to prevent disease. (Level 6)</td>
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<tr>
<td>identify basic hygiene procedures as a way of preventing infections. (Level 5)</td>
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<td>understand that infections can be prevented. (Level 4)</td>
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<td>7. guide students to explore the use of medicines in preventing illnesses and fighting infections.</td>
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<tr>
<td><strong>Starter suggestion:</strong> Use the IWB and present a selection of antiseptics, disinfectants and antibiotics. Ask students to discuss the use of these three. Note any misconceptions which might be addressed later on.</td>
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<tr>
<td><strong>Main activity:</strong> Identify ways how infections are prevented or treated. Refer to the use of common antiseptics and disinfectants to prevent infections. Ask students about the role of antibiotics when fighting illnesses and infections.</td>
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<td>Students may identify some medicines they had to take to fight infections. Ask students to share their knowledge of vaccines. Some students may refer to vaccines which they might have come across (such as TB, tetanus, MMR, etc). Explain that a vaccine prepares the body with antibodies to fight microbes.</td>
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<td>Other activities:</td>
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<tr>
<td>- Ask students to predict what happens when someone re-encounters a microbe against which they have been immunised.</td>
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<td>- Explain that antibiotics are effective against bacteria but not viruses. The mis-use of antibiotics is harmful.</td>
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<td>- Some students may ask about allergy to penicillin.</td>
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<tr>
<td>- Ask students to group examples of antiseptics (wipes, mouthwash, <em>Dettol</em>) and disinfectants (such as bleach). Refer to pasteurization of milk</td>
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<tr>
<td>Other notes:</td>
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<tr>
<td>identify examples of antiseptics, disinfectants and antibiotics. (Level 6)</td>
</tr>
<tr>
<td>link the use of antiseptics, disinfectants and antibiotics as ways of fighting infections. (Level 5)</td>
</tr>
<tr>
<td>link the correct use of medicines to cure diseases. (Level 4)</td>
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Subject: Integrated Science  
Unit code and title: **SCI CCP 8.2 THE WORLD OF MATERIALS**  
Strand 1: Materials and their Properties  

**Unit Duration:** Approx. 20 sessions of 40 minutes (Total 13 hours)

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**Objectives**  
The teacher will:

1. guide students to explore objects and the materials they are made from.
2. guide students to explore the properties of materials (including liquids and gases)
3. guide students to identify metals and non-metals and their properties.
4. guide students to distinguish physical and chemical changes.
5. guide students to understand that chemical changes produce new materials which have different properties.
6. guide students to describe and investigate mixtures.

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<th>Key Words</th>
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<th>Resources</th>
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| element, compound, particle, atom, molecule, symbol, names of some elements, compounds and mixtures, periodic table, metals, non-metals, chemical and physical change | Refer to notes re 5E approach to teaching and learning of science. 
This unit links with SCI CCP 7.3 (*Chemical Properties*) 
Be aware that the ideas of the meaning of ‘pure’ when applied to a material may vary when used with reference to elements, compounds and mixtures. Some students may find it difficult to distinguish mixtures and compounds. 
Refer to notes re 5E approach to teaching and learning of science. | Molecular model kits, periodic table chart, samples of different elements, 
**Resources to support inclusion:**
http://www.communication4all.co.uk/ 
**Interactive elements game**
http://www.chemicalelements.com/ 
**Compounds and mixtures:**
http://www.bbc.co.uk/schools/ks3bitesize/science/chemical_material_behaviour/compounds_mixtures/activity.shtml 
**School.co.uk – a number of presentations: Chemistry content including uses of elements, metals and non-metals:**
http://lgfl.skool.co.uk/keystage3.aspx?id=64 
**Chemical reactions animations:**
http://bio-alive.com/animations/chemistry.htm |
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| The teacher will: 1. guide students to explore objects and the materials they are made from. | **Starter suggestion:** Ask students to look around them and identify objects made from certain material (e.g. wood or paper). May write the list of objects on the IWB.  
**Main activity:** Repeat the same activity for other materials and write a list of objects for each one (e.g. glass). Guide the students to understand that a material can be used for many objects and that objects are made of different materials.  
Ask students to name other materials and objects that are made out of it.  
**Other activities:**  
- Prepare a tray with different materials and students have to name each sample and describe its use.  
- Prepare an interactive activity which shows objects and materials which students have to link together.  
- May use materials that are liquids and gases.  
**Other notes:** | **STUDENTS CAN:**  
name the materials that make up some common objects. (Level 6)  
understand that objects are made up of different materials. (Level 5)  
sort objects according the simple criteria or materials. (Level 4) |
2. guide students to explore the properties of materials.

**Starter suggestion:** Give the students a piece of paper, some plasticine, a small stone and a piece of transparent hard plastic. Ask students to identify similarities and differences.

**Main activity:** Ask students to carry out some actions on all four materials. May try tearing in two pieces; roll out; hold in front of the window / light. Discuss the observations and guide the students to understand that materials have different properties. Guide students to fill in a prepared work-sheet.

May repeat the above exercise and ask students to identify properties of different materials. Students may observe properties such as hardness, transparency, mass, weight, texture, etc.

Discuss other materials that are liquids such as water, oil, paint and alcohol. May refer to gases such as air, oxygen and butane. Ask students to think about the properties of such materials and guide students to write their observations.

**Other activities:** Guide students to design and plan a model of any object using the appropriate materials. May co-ordinate this activity with D&T and guide students to identify materials with best properties for the particular object.

**Other notes:**

| identify one property of some common materials. (Level 6) | sort different materials according to given criteria. (Level 5) | understand that materials have different properties (Level 4) |
| 3. guide students to identify metals and non-metals and their properties. | **Starter suggestion:** Use the IWB and present pictures of objects made of metals and others of non-metals. Ask student so divide them into two groups. Ask for the common factor. There may be various common properties.

**Main activity:** Show the students that some objects are made of metals and others are not. Note that students may refer to any metal as iron (*hadia*). Present samples of different metals and give the name of each. May use/refer to iron, copper, aluminium, silver, gold, platinum, stainless steel, lead and mercury. Sample from the materials kit may be used in this activity.

Use an interactive activity to find the use of these metals and thus elicit some properties of these metals.

**Other activities:**
- Show videos re the use of gold in ancient Egypt, the gold rush, etc.
- May test the conductivity of different metals. Link to SCI 7.4.7 re conductors/insulators.
- Find the use of different metals / non-metals in the house and compile a table/chart with some examples.

**Other notes:** | identify one property and use some common metals.
(Level 6)

name some common metals
(Level 5)

sort objects into metals and non-metals.
(Level 4) |
4. guide students to distinguish physical and chemical changes.

**Starter suggestion:** Give some plasticine to the students and ask them to make it in the shape of a small hollow cylinder. In the mean-time the teacher melts some wax on a hotplate / Bunsen burner. Give some liquid wax to the student and them to fill their cylinder. After cooling ask students to remove the solid wax from the plasticine.

**Main activity:** Ask the students to name the materials and describe what they have done. Ask students to think about whether plasticine and wax were changed into a new material and whether they can be changed back.

Elaborate on their conclusions and explain that materials can be changed in shape, size, state of matter by giving other examples. May refer to water, chocolate and butter.

Do the ‘volcano experiment’ by burning a small sample of ammonium dichromate. Ask students to notice the changes and explain whether a new material was formed. Allow students to make their own experiment by using vinegar and sodium bicarbonate. Ask students whether the materials / chemicals used in these experiments can be changed back.

**Other activities:** use pictures / objects to show other changes. May refer to rusting, cooking and burning. Ask students whether these changes may be reversed or not. Note that a number of RLOs may be used here.

**Other notes:**

- know that a physical change is reversible while a chemical change is irreversible. (Level 6)
- understand that a material can change physically or chemically. (Level 5)
- understand that materials can change. (Level 4)
5. guide students to understand that chemical changes produce new materials which have different properties.

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<th><strong>Starter suggestion:</strong></th>
<th>Show the students sample of rock, granite, wood, polystyrene (jablo), glass, paper, cotton, plastic bag. Ask students where these materials came from.</th>
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<tr>
<td><strong>Main activity:</strong></td>
<td>Elaborate on their observations and guide students to explore that some materials come from Earth but others are formed from materials that have been changed. Show videos of production of (for example) plastic or paper. Discuss the properties of materials before and after the change.</td>
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<td>May burn a piece of magnesium ribbon. Ask students to make their observations. Show that burning makes materials change into others.</td>
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<td><strong>Other activities:</strong></td>
<td>- May ask students to compare a new iron nail and a rusty one. Ask students to identify the properties of both and say whether the material has changed or not. Students may use a handout or chart to mark the properties of both. Similarly students may use a wooden splint before/after burning and the properties in each case are noted.</td>
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<td><strong>Other notes:</strong></td>
<td>describe the products of burning and rusting. (Level 6) identify burning and rusting as chemical changes. (Level 5) know that materials can be natural or synthetic. (Level 4)</td>
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</tbody>
</table>
| 6. guide students to describe and investigate mixtures. | **Starter suggestion:** Present the students with different mixtures and ask them to identify any material present.

**Main activity:** Once again present some other mixtures. May use real mixtures of pictures on the IWB. May present examples such as a fruit salad or a fruit and nut chocolate bar. Guide students to understand that the materials seen keep their properties.

May try other examples such as mixing soil and water in a jar and let it settle down. Identify a mixture of grains, rocks and other organic matter.

**Other activities:**
- May discuss sea, air as examples of mixtures. Identify materials we can obtain from them.
- May produce a model of salt pens.

**Other notes:** | understand that the materials in mixtures retain their properties. (Level 6)
identify the components of some mixtures. (Level 5)
distinguish between a material and a mixture of materials. (Level 4) |
Subject: Integrated Science

Unit code and title: **SCI-CCP 8.3 FORENSIC SCIENCE**

Strands: Physical Properties, Life Processes and Living Things, Materials and Their Properties

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**Objectives**

The teacher will:

1. guide students to understand what forensic science is and the importance of observation skills.
2. guide students to identify, collect and process evidence from a crime scene.
3. guide students to identify, collect and process evidence from victims.
4. guide students to identify, collect and process evidence from suspects.
5. guide students to identify soluble and insoluble substances.
6. guide students to explore ways of separating mixtures.
7. guide students to separate a mixture of colours.

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**Key Words**

- evidence, contamination, DNA, fingerprints, chromatography, extraction, names of human teeth, flame tests

**Points to Note**

This unit is presented through a number of case studies using an inquiry approach. This is an excellent opportunity for learners to:

- Recognise the links between material, physical and life sciences
- Understand the applications and implications of science in everyday life
- Use investigative approaches
- Work critically with evidence
- Become motivated to learn about scientific ideas which they may not be too enthusiastic about.
- Work as a group

**Resources**

- Microscopes, magnifying lenses, model of the human teeth, hair samples, filter/chromatography paper, ink, ink pads, sheets of paper, bite marks images, fingerprint images
- Clips from popular drama should be used with care as they tend to give an impression of instant, easy crime solving.
  - http://www.youtube.com/watch?v=U-ZkMfrTxwQ
  - http://www.youtube.com/watch?v=qESpv6boBqU
  - http://www.youtube.com/watch?v=_58XsN6XJWQ&feature=related
- Interactive and stimulating activities, games and mysteries for students to solve www.forensicscience.org/resources/forensics-for-kids
- Website for teachers – ppt and worksheets: www.sciencespot.net/Pages/classforsci.html
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<td><strong>THE TEACHER WILL:</strong></td>
<td><strong>Starter suggestion:</strong> Show a short clip from a CSI, featuring police officers and forensic scientists. Ask the students why the latter are on the spot and give them time to describe their understanding of CSI.</td>
<td><strong>STUDENTS CAN:</strong> use observation skills to identify evidence. (Level 6) recognise that forensic science use scientific knowledge to solve problems. (Level 5) recognise that scientists help to solve problems. (Level 4)</td>
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<tr>
<td>1. guide students to understand what forensic science is and the importance of observation skills.</td>
<td><strong>Main activity:</strong> Explain that forensic science is the application of science to solve crimes. Display a number of pictures showing forensic scientists at work. Ask students to identify the forensic scientists and thus refer to the protective clothing used by forensic scientists. Refer to the importance of enclosing the area to preserve the evidence and the use of photography to record the scene. Using the pictures above ask students to observe any tools or apparatus being used on the spot and any observation or information that might help the investigation. Show that crimes are usually solved as a result of the investigations carried out by the forensic scientists. Discuss the type of crimes that can occur.</td>
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<td><strong>Other notes:</strong></td>
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2. **guide students to identify, collect and process evidence from a crime scene.**

| **Starter suggestion:** Present the following scenario and ask students to act as forensic scientists to solve the following crime.  

*Scenario: The police received a report of a robbery and a murder which took place in a shop, earlier in the day. (General clues may include open window, broken cash register, toppled furniture, blood stains, other marks and objects around).*  

**Main activity:** The students act the scene and then two/three students enter as the forensic scientists.  
Ask the students how they would start the investigation and what they would look for. Give them the following words to help them find what is relevant in this scenario.  
(date, time, weather, place, street, people involved, objects stolen, marks outside and inside, neighbours, animals, weapons used, CCTV, mobile phone)  
Make a list of clues. Let the students discuss the outcome of the clues and any conclusions that can be made.  
The students can draw a picture of the crime scene.  
Show a similar scene from an episode of CSI series.  
The students can act out a crime scene (prepared beforehand) and two or three students will be the forensic scientists. Some students will act as judges to see if the scientists were observing everything.  

**Other notes:**

| Collect and process some clues to give possible explanations. (Level 6)  
Identify a number of clues that can be useful in solving crimes. (Level 5)  
Name one piece of evidence or clue. (Level 4) |
3. guide students to identify, collect and process evidence from victims.

**Starter suggestion:** Present pictures of different crimes and ask the students to identify the victim/s in each case. Show that the victims in a crime are the people who suffer injury, death or damage to their property.

**Main activity:** Take each picture and ask the students to find all the clues they can from the victim. May refer to the previous lesson and recreate the scenario. The following clues may be pointed out in the end: The fingerprints, the hair, the teeth, the nails, the clothes, any scratches, blood stains, shoes, jewellery, mobile phone, wallet.

Elaborate on the hair colour and texture which can be used to identify a person. Students can use magnifying glass/microscope to observe (and possibly compare) hair samples.

Show that teeth can leave a mark on an object when they bite - compare bite marks – this can be done by asking students to bite gently on a polystyrene cup and then compare the bites. e.g. size of teeth, shape of bite (missing teeth, etc), depth of bite, overlap between upper and lower bites. Use a diagram/model to show the different types of human teeth.

**Other activities:**
- Show images of bite marks (or give samples of bite marks). Ask students to collect evidence from them.

**Other notes:**
- match pieces of evidence and identify some types of teeth. (Level 6)
- identify parts of the body that can produce evidence. (Level 5)
- Identify victims in a crime scene. (Level 4)
4. Guide students to identify, collect and process evidence from suspects.

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<tr>
<th>Starter suggestion: Refer to a CSI situation and ask students to say what the aim of an investigation is and why evidence is important.</th>
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<tbody>
<tr>
<td><strong>Scenario:</strong>  Present the following situation: A telephone call reported that thieves entered a house. When the police arrived on the scene, the house is in shambles. Clothes are scattered all around the room, lamps are overturned and there’s no sign of the thieves. The police asked the forensic scientists to help. One of the detectives picked up a glass. On its side was a smudged, thumbprint. He takes it down to the lab, where it’s analysed and matched to a recorded set of prints.</td>
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Ask students to identify the clues that might help the detectives. Explain how these clues may be used. Students may identify clues such as footprints, fingerprints, marks left by the thieves, etc.

- The above scenario indicates that fingerprints may be the best clue to identify the thief. Elaborate on fingerprints’ patterns as unique to each person. Show some examples. Ask students to print their own fingerprint by using an ink pad and a sheet of paper.
- Ask students to make two copies of each
  - Set A: print includes the name of the student.
  - Set B: print with no names.
- Randomly choose one print from set B. Ask students to study the patterns and match one print from set A with the one chosen from set B.

**Other activities:** May show examples of foot prints by scattering flour or talcum powder on a black paper and ask students step on it. Match the footprints to the soles on the shoes. Measure the length of the footprint and write the size of the shoe. Try to find a link.

**Other notes:**

- Group evidence from a crime scene and possibly link evidence to a suspect. (Level 6)
- Identify evidence from a crime scene. (Level 5)
- Identify suspects in a crime scene. (Level 4)
5. guide students to identify soluble and insoluble substances.

**Starter suggestion:** *Present this scenario: The police were searching the house of a man who was suspected to have stolen some jewellery. They found a box with marbles, salt and iron nails. They suspected that the jewellery might be hidden in that box.*

**Main activity:** Ask the students how they would go about it. Write their suggestions on the board. Students may suggest picking the marbles and the nails by hand. Others may mention the use of a magnet to pick the nails. Explain that the salt was making it difficult to check the contents of the box. Ask how water can be used. Students may remember that salt dissolves in water but marbles and nails will not. Give students a number of different solids to find out which of them are soluble and insoluble in water. May ask student to predict results. List things that are soluble in water and others that are insoluble.

**Other activities:**
- Students are given a mixture of solids to separate using different methods.

**Other notes:**
- identify soluble and insoluble substances. Identify soluble and insoluble substances. (Level 6)
- recognise water as a good solvent. (Level 5)
- separate a mixture of solids using hands, a magnet or tweezers. (Level 4)
6. guide students
to explore ways of separating mixtures

<table>
<thead>
<tr>
<th><strong>Starter suggestion:</strong> Once again present a new scenario...a case where someone mixed rice and sand together. Ask them how they would separate them.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main activity:</strong> Ask whether water would be useful in this case. Students may remember that both things are insoluble. A sieve may be useful. Now present a mixture of salt and sand. Ask if a sieve is useful in this case. Ask if water might be useful. Let the students try these methods.</td>
</tr>
<tr>
<td><strong>Other activities:</strong> The students are given a diagram of the filtering method and they label the funnel and the filter paper. Students are given daily examples where filtration is used such as using a teabag, coffee filter, wine filter.</td>
</tr>
<tr>
<td><strong>Other notes:</strong></td>
</tr>
</tbody>
</table>

Separate a mixture using a filter paper correctly.
(Level 6)

Understand that a filter paper is like a sieve with very small holes.
(Level 5)

Use a sieve to separate a mixture of solids.
(Level 4)
7. Guide students to separate a mixture of colours.

**Starter suggestion:** Use an interactive activity and ask students to mix some colours together. Ask students to observe any colour change.

**Main Activity:** Ask students to experiment with their own colours to produce new colours. They can write the result of their own work such as:

\[
\text{Blue} + \text{yellow} = \text{green}
\]

Explain that a mixed colour can be separated into different colours again by dissolving it in water (or another solvent).

Show how chromatography is carried out using filter paper and the students observe the way the colours separate. Present a case where forensic scientists need to examine some type of ink or paint. Guide the students to understand how chromatography can help to find evidence. Create a scenario where you need to find the marker used to write a message. May use two different black markers. (Check beforehand whether during chromatography they give different colours)

**Other activities:** Allow the students to experiment with different colours and find what makes up a colour. Allow the filter paper to dry so that it may be stuck in the student’s project book.

**Other notes:**

- separate a mixture of colours using chromatography. (Level 6)
- understand that paint/inks can dissolve in water or another solvent. (Level 5)
- recognise that some colours are a mixture of other colours. (Level 4)
Subject: Integrated Science
Unit code and title: SCI CCP 8.4 THE ENVIRONMENT
Unit Duration: Approx. 20 sessions of 40 minutes (13 hours)
Strands: Physical Properties, Life Processes and Living Things, Materials and Their Properties

Objectives
The teacher will:
1. guide students to understand the importance of electricity and its production.
2. engage students to investigate the products of burning fuels.
3. help students to understand what fossil fuels are.
4. guide students to identify examples of renewable and non-renewable sources of energy.
5. guide students to explore sources of air pollution.
6. guide students to understand what climate change is and its effects on the environment.
7. guide students to explore how waste can be managed for a better environment.
8. guide students to investigate a habitat. (Fieldwork)

Key Words
- fuel, crude oil, climate change, greenhouse effect, global warming, renewable, non-renewable, sustainable living, solar panel, wind turbine, pollution, conservation, carbon dioxide, water vapour, energy

Points to Note
Refer to notes re 5E approach to teaching and learning of science. Link this unit with SCI-CCP 7.4 Energy around us. It would be useful to look for cross-curricular links (for example with geography), news websites, websites of fuel companies and local NGOs such as:
- [http://www.naturetrustmalta.org/](http://www.naturetrustmalta.org/)
- [http://www.birdlifemalta.org/](http://www.birdlifemalta.org/)
- [http://www.bicref.org/](http://www.bicref.org/)
- [http://www.ramblersassociation.blogspot.com/](http://www.ramblersassociation.blogspot.com/)
- [http://www.foemalta.org/home/](http://www.foemalta.org/home/)
Note that greenhouse effect is one of the causes of global warming. Note that most students usually mix both terms. Be aware of health and safety issues if students are to handle some animals or plants.

Resources
Bunsen burner or spirit burner, solid or liquid fuel, lime water, wind turbine and solar panels models, pictures showing non-sustainable living episodes, local water & electricity bills, video clips

Climate change:
- [http://www.epa.gov/climatechange/kids/](http://www.epa.gov/climatechange/kids/)

Science behind climate change:
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will:</td>
<td></td>
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</tr>
<tr>
<td>1. guide students to understand the importance of electricity and its production.</td>
<td><strong>Starter suggestion:</strong> Ask students to mention any object in the room that uses electricity to work. Ask which objects are needed in our life and which are not so important. <strong>Main activity:</strong> Write a list of electrical devices that many people normally use every day. Separate those that use batteries from those that use mains electricity. Using circuit components ask the students to build a circuit and make a bulb shine. Ask them to replace the bulb with a buzzer and/or a motor. Explain the path electricity takes to make the object work. Compare this to what happens when objects work with mains electricity and elicit the source of electricity as the power station. Give some important facts about the local power station. Discuss how electricity can also be produced from a generator. <strong>Other activities:</strong> - may use a model wind turbine and PV cell show how these also produce electricity. Do not give any details, just refer to these as alternate sources of electricity. <strong>Other notes:</strong></td>
<td><strong>STUDENTS CAN:</strong> recognise different ways of producing electricity. (Level 6) identify the power station as the main source of electricity. (Level 5) understand that electricity is a very useful form of energy. (Level 4)</td>
</tr>
</tbody>
</table>
2. engage students to investigate the products of burning fuels.

**Starter suggestion:** Use video clips showing forest fires, oil wells burning, factories burning and other big fires. Ask the students what helped those fires to start. Revise the fire triangle.

**Main activity:** Prepare some different fuels – such as alcohol, wax, paper and kerosene. Gas can also be used through the Bunsen burner. Under supervision the students can light each of these fuels and they are asked to notice what is produced while burning takes place. Note safety precautions and always use small amount of fuel. Ask students to fill in a prepared worksheet with their observations – namely smell, sooth, gas, ashes, heat and light.

Go back to the starter activity and ask the students to identify any of the observations done on the fuels burned.

Elaborate more on the gases produced. Mention the fact that a smell comes from a gas and that most fuels produce carbon dioxide while they burn. This is the same gas produced when we breathe out.

**Other activities:** Testing for carbon dioxide can be tried – ask some students to blow into prepared test tubes containing lime water. Transparent lime water goes milky.

**Other notes:**

| identify some products of combustion of a fuel. (Level 6) |
| recall that heat energy is given out when fuels burn. (Level 5) |
| recall the meaning of the fire triangle. (Level 4) |
3. help students to understand what fossil fuels are.

**Starter suggestion:** Show some pictures of fossils (or samples if available) and remind the students that they were formed on the bottom of the sea under very high pressure.

**Main activity:** Discuss the difference between an animal in a shell and one without a shell and the effect of pressure on each. The shell resists pressure for a long time but the flesh of an animal is easily squashed. Use pictures to describe how oil (found underground) was formed from large quantities of small animals when they were placed under high pressure as sand/silt deposited on them. Explain that it took millions of years for this to happen. Natural gas is produced by the oil as it evaporates and remains above the oil. Similarly describe how coal was formed from dead plants that fell into water and under pressure from soil etc., they changed into a black rock-like substance. This also took millions of years. Show some samples of coal. (may use BBQ charcoal)

Explain that oil, gas and coal can burn – so they are called fuels but since they formed in the same way as fossils, we call them fossil fuels. Students can be shown samples/pictures of these fossil fuels. May use RLO to explain further.

Identify the common fuels that are produced from oil and coal – such as petrol, diesel, kerosene, lubricating oil, wax, charcoal.

Students may discuss the amount of fuel used in Malta and worldwide for various activities. This will give an idea how fossil fuels are depleting fast. Explain that they are not there for ever so we should use them responsibly.

**Other notes:**

- recognise that there is a finite amount of fossil fuels and thus they should be used responsibly. (Level 6)
- Identify coal, oil and natural gas as fossil fuels. (Level 5)
- recall what fossils are and how they are formed. (Level 4)
<table>
<thead>
<tr>
<th>4. <strong>guide students to identify examples of renewable and non-renewable sources of energy.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starter suggestion:</strong> Ask students how they can use a piece of paper to make cool or warm air. They may suggest using the paper as a fan (cooling action) and burning the paper to warm the air.</td>
</tr>
<tr>
<td><strong>Main activity:</strong> Demonstrate these two actions and ask the students to observe the results. Students can recall the forms of energy used and produced. Remind students the meaning of source of energy. Ask whether it is possible for the same actions to be repeated using the same materials – hence explain the meaning of non/renewable sources of energy. Use a list of forms of energy and ask students to give sources for each form. Discuss whether each source is non/renewable.</td>
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<tr>
<td>Use models of solar and wind driven devices available in the school lab to produce electricity. Compare these sources with a fuel power station and discuss the issue of pollution.</td>
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<tr>
<td><strong>Other activities:</strong></td>
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<tr>
<td>- Discuss the advantages and disadvantages of each source of energy.</td>
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<tr>
<td>- Students can produce posters encouraging the use of renewable sources of energy.</td>
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<tr>
<td>- A model of a wind mill can be made /pictures can be drawn showing its use.</td>
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<tr>
<td><strong>Other notes:</strong></td>
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<table>
<thead>
<tr>
<th>Class:</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td><strong>Level 6</strong></td>
<td>Identify the reduction in pollution as an important advantage of renewable sources of energy.</td>
</tr>
<tr>
<td><strong>Level 5</strong></td>
<td>Classify energy sources as renewable or non-renewable.</td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
<td>Recall the six forms of energy and some of their sources.</td>
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<tr>
<td>5. guide students to explore sources of air pollution</td>
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<td>-----------------------------------------------------</td>
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<tr>
<td><strong>Starter suggestion:</strong> Use a clip to show air pollution in an industrialised city. Clip may show car exhaust, smoke coming out of chimneys, people moving around with masks on their faces, smog over large cities, etc.</td>
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<tr>
<td><strong>Main activity:</strong> Ask students to give their comments and reactions about living in such an environment. Draw a concept map with their responses using air as the main word. Note any misconceptions which might be addressed at a later stage.</td>
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<tr>
<td>Guide students to identify:</td>
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<tr>
<td>- the composition of air</td>
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<tr>
<td>- sources of pollution (e.g. car exhaust, smoke from chimneys, dust, deforestation)</td>
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<tr>
<td>- possible effects (e.g. breathing problems, damage to buildings, cancer)</td>
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<tr>
<td>- ways of reducing the source of pollution. (e.g. efficient cars, use of cleaner fuels, reducing fuel consumption, planting more trees)</td>
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<tr>
<td><strong>Other activities:</strong> Use an interactive activity where students are presented with pictures showing a traffic jam, people cycling, cars emitting exhaust, electric cars, burning wood, burning gas, etc. Students are asked to join the pictures which show how pollution can be decreased.</td>
<td></td>
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<tr>
<td><strong>Other notes:</strong></td>
<td></td>
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<tr>
<td>identify some sources of air pollution.</td>
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<tr>
<td>(Level 6)</td>
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<tr>
<td>link clean air with healthy living</td>
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<tr>
<td>(Level 5)</td>
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<tr>
<td>understand that air is a mixture of gases and other things.</td>
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<tr>
<td>(Level 4)</td>
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</tbody>
</table>
6. **guide students to understand what climate change is and its effects on the environment.**

**Starter Suggestion:** Discuss the day’s weather and ask the students whether it is typical for Malta.

**Main Activity:** On a worksheet the students write the characteristics of the Summer and Winter weather including the effect on living things.

- Explain that we have that kind of climate and we know what to expect.
- Using video clips/pictures discuss other climates in Polar, desert and tropical regions and explain what might happen if the climate changes.
- Show videos of hurricanes, floods, drought, etc., mention also the increase in temperature, melting ice, oceans and seas warming up and their effects on living things and habitats in general.

- Use a presentation or an RLO to explain global warming. May use a model using an inflated plastic bag with a small ball hanging in the middle (representing Earth) and a thermometer partly inserted. Read the temperature and then light a lamp close to it. Watch the temperature rising while explaining that the air around the ball is warming up but the heat cannot go out because the plastic prevents it. Compare this to what is happening on Earth.

- Link global warming with pollution which is on the increase. Students suggest what can be done to avoid pollution.

**Other activities:**
- May discuss whether they are affected by climate change on a sample of animals/plants.
- Discuss the effect of climate change on people.

**Other notes:**
- Link climate change to air pollution and the use of fossil fuels. (Level 6)
- Understand the changes that can occur in the climate and the subsequent effects (Level 5)
- Describe characteristics of different climates. (Level 4)
7. guide students to explore how waste can be managed for a better environment.

**Starter Suggestion:** Present pictures of garbage bags/skips/bring-in sites and ask students to say what type of waste would be found in these things. Ask them to put their answers into groups.

**Main activity:** Describe this exercise as separating waste. Ask students how they would deal with each group. Some materials can be recycled but the rest is placed in a landfill. Using pictures, explain what a landfill is and that it can hold a finite amount of waste. Discuss how we can reduce the amount of waste thrown away. Describe the 3 R’s and give examples of how waste can be Reduced, Re-used and Recycled. Discuss the benefits of implementing this system and the harmful effect on the environment, of not doing so. Show that the type of waste or mismanagement of waste may result in land/sea pollution. Show that the success of waste management depends on legislations and initiatives taken on a national level and on the co-operation of each citizen.

**Other activities:**
- Students can draw posters re waste management.
- They can check how waste is managed in school.
- Students may be encouraged to use waste material to make a new object. This can be linked with art lessons as part of an art-science activity.
- A clean-up is organised in the school yards.

**Other notes:**
- describe the effects of land and sea pollution on the environment. (Level 6)
- identify ways of managing waste for a healthy environment. (Level 5)
- describe the different types of waste produced. (Level 4)
| 8. Guide students to investigate a habitat | Ask students about any previous fieldwork experiences. Decide on the type of habitats under investigation and ask students to give some information on these habitats.

Activities depend on the type of habitat and the duration of this activity. Students use prepared worksheets to guide them through this activity. Ask students to observe the environmental conditions of the habitat and the organisms found there.

Activities may include:
- observations of the different kinds of habitats
- measurement of some environmental conditions such as the temperature, pH, wind speed, etc.
- animal and plant identification
- identification of some endemic or indigenous species
- observing leaf patterns and seeds
- silent exercise
- characteristics of a microhabitat
- studying an area by using a quadrat.
- observing man-made or natural features in the environment
- identifying examples of pollution and conservation

Re Marine fieldwork activities may include
- water visibility, pH, temperature
- observing living things | identify links between environmental conditions and living things in a habitat.
(Level 6)

make simple observations in a given habitat.
(Level 5)

recall some habitats and the living things in them.
(Level 4) |
<table>
<thead>
<tr>
<th>Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>- school ground</td>
</tr>
<tr>
<td>- nearby valley or area</td>
</tr>
<tr>
<td>- areas such as Buskett, Mizieb, Majjistral Park, Xrobb l-Ghagin, Dwejra (Gozo) Ramla l-Hamra / Ghajn Tuffieha sand dunes, rocky sea shore.</td>
</tr>
</tbody>
</table>

May also consider a visit to Simar or Ghadira Nature Reserve.

**Duration of activity**

- double lesson
- half day/ whole day which may be carried out in co-operation with geography and/or history.
Subject: Integrated Science
Unit code and title: SCI CCP 8.5 EARTH AND SPACE
Strand 1: Physical Properties

Unit Duration: Approx. 20 sessions of 40 minutes (13 hours)

Objectives
The teacher will:
1. guide students to understand that the Earth orbits the Sun while it is spinning on its axis continuously.
2. help students understand that seasons occur as the Earth moves in its orbit round the Sun.
3. guide students to understand what the Moon is and its movement round the Earth.
4. guide students to identify the main features of the Solar system.
5. describe the Sun and stars.
6. explore the use of artificial satellites.
7. illustrate the history of space exploration.

Key Words
Earth, tilt of Earth, axis, orbit, year, spinning, leap year, direct sunlight, full Moon, new Moon, phases of the Moon, natural satellite, solar eclipse, lunar eclipse, planet, dwarf planet, telescope,

Points to Note
Note that:
- Pluto is no longer classified as a planet (due to its small size) but some resources will refer to Pluto as a planet.
- the terms weight, mass and gravity may cause problems. Some sources may even confuse mass and weight. Be aware that primary school maths textbooks refer to weight in terms of kg (e.g. what is the weight of this block? 10kg).

Resources
Rotating model of the Sun, Earth and moon system. Source of light, 2 balls of different sizes, polystyrene ball and a stick, darkened room. Focus Educational Software (KS3 Physics) or other simulations available. Use photographs and clips showing the phases of the Moon, Earth from the Moon, eclipses

Planetariums: Slovak site, but has translation option http://veda.sme.sk/planety/
site to download freeware http://www.stellarium.org/

Night and day, year, seasons:
http://www.engineeringinteract.org/resources/astroadventure/flash/concepts/earth.htm
http://www.bbc.co.uk/schools/scienceclips/ages/9_10/earth_sun_moon_fs.shtml

Seasons: http://www.youtube.com/watch?v=DuiQvPLWziQ

Moon game: http://www.schoolsobservatory.org/activ/moonsaic
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of teaching experiences and activities</th>
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</tr>
</thead>
<tbody>
<tr>
<td>The teacher will:</td>
<td><strong>Starter suggestion:</strong> Show a clip of the space shuttle, rocket or the International Space Station. Ask students about their interest in space.</td>
<td><strong>STUDENTS CAN:</strong></td>
</tr>
<tr>
<td>1. guide students to understand that the movement of the Earth around the Sun.</td>
<td><strong>Main activity:</strong> Ask the students the time the Sun rises and sets. Find out the number of hours of daylight and darkness. Show that these numbers change but a day is divided between day and night. Explain that night starts as the sun sets and that darkness is the absence of light. Prepare a big ball/paper sphere/globe and a torch/light bulb. Mark a spot on the sphere and shine a light on it. Ask students to describe their observations. Elaborate on their conclusions and show that light is falling on the front half – (hence on the spot as well) and that the back half is in darkness. Turn the spot 180° and show the effect. Use the IWB to elaborate and show that the same thing happens with the Sun and the Earth. Explain that the Earth is spinning continuously and hence day/night take place once every 24 hrs. Ask the students what other changes take place in time such as long/short days, hot/cold weather. Explain that these show that the Earth does not remain in the same place but it is moving around the Sun. The changes are repeated every year. Explain that the Earth takes 1 year to make a complete orbit.</td>
<td>describe day/night in terms of a spinning Earth and explain what an orbit is. (Level 6)</td>
</tr>
<tr>
<td></td>
<td><strong>Other activities:</strong> - Shine a light on various objects and observe the bright side and the dark side. - Students can mime the two movements of the Earth having a bulb as the Sun. - Students make a diagram of the Sun and the Earth and draw light rays falling on the Earth while the back side is shaded to show darkness.</td>
<td>know that there are 365 days in a year. (Level 5)</td>
</tr>
<tr>
<td></td>
<td><strong>Other notes:</strong></td>
<td>recognise a pattern in day and night. (Level 4)</td>
</tr>
</tbody>
</table>
2. help students understand that seasons occur as the Earth moves in its orbit round the Sun.

<table>
<thead>
<tr>
<th>Starter suggestion:</th>
<th>Show pictures depicting different seasons and ask students to identify which season it is.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main activity:</td>
<td>Ask students to name the four seasons and use different pictures showing different weather. Identify weather patterns in each (re heat, rain, length of day, higher or lower Sun, etc). Ask students how long seasons last and identify patterns. Show that this pattern happens every year. Encourage students to elaborate further and ask them to explain how seasons are produced. Use a heat source to represent the Sun. Ask students to move closer to / further away from the heat source. Ask them to make any observations. Compare this to Summer/Winter. Describe Spring / Autumn as the periods in between. Divide the year into four parts – giving three months for each season.</td>
</tr>
</tbody>
</table>

| Other activities:   | - may use models to show the orbiting of the Earth around the Sun. |
|                     | - show a simulation of the movement of the Earth round the Sun. |
|                     | - students may fill a sheet with words / activities describing each season. |
|                     | - Students may stick pictures linking weather with seasons. |

| Other notes:        | describe and identify patterns in different seasons (Level 6) |
|                     | identify the four seasons (Level 5) |
|                     | link seasons to weather patterns. (Level 4) |
3. **guide students to understand what the Moon is and its movement round the Earth.**

<table>
<thead>
<tr>
<th>Starter suggestion: Use a clip to show the human landing on the Moon or the Moon as seen from the Earth. Ask students to pass any comments on the Moon.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main activity: Ask the students to draw the shape of the Moon. Probable students draw different shapes. Ask students why do we come across different shapes of the Moon. Use a spherical model (e.g. polystyrene ball) and a light source and show that the Moon has a spherical shape. Use the model to explain that the Moon is moving round the Earth and different shapes (phases) are seen from Earth depending on it position. Demonstrate that the Moon spins on its own axis.</td>
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<tr>
<td>Other possible activities:</td>
</tr>
<tr>
<td>- Show pictures of the Moon surface to reveal a rocky surface.</td>
</tr>
<tr>
<td>- May show again a clip of the human landing on the Moon. Why do astronauts have to wear space suits? Is it possible to live on the moon?</td>
</tr>
<tr>
<td>- May refer to solar and lunar eclipse as special phenomena taking place from time to time. Do not ask students to identify which is which.</td>
</tr>
<tr>
<td>Other notes:</td>
</tr>
<tr>
<td>- describe that the orbit of the Moon around the Earth takes 28 days. (Level 6)</td>
</tr>
<tr>
<td>- show that the shape of the Moon is a sphere. (Level 5)</td>
</tr>
<tr>
<td>- know that the Moon is a natural object. (Level 4)</td>
</tr>
</tbody>
</table>
4. guide students to identify the main features of the Solar System.

**Starter suggestion:** Present a picture of the Earth. Make sure everybody can recognise the Earth. Ask students how they can recognise the Earth.

**Main activity:**
- Present pictures of the first four planets (Mercury, Venus, Earth and Mars). Ask students to find similarities and differences. Refer to shape, colour, type of surface, size, number of moons. Name the planets.
- Explain that all these planets are orbiting the Sun at different distances.
- Now present pictures of the four giant planets (Jupiter, Saturn, Uranus and Neptune. Once again as students to talk about their observations. Guide students to elaborate on their thinking. Refer to the size of planets, type of surface, number of moons and special features such as the rings. Name these planets.

**Other possible activities:**
- Use and interactive ‘drag and drop’ activity where students link a planet with one characteristic.
- May use the planet model to show the relative size and position wrt the Sun
- Colour polystyrene balls to create a model of the Solar System.
- Plan an interactive quiz about the Solar System.

**Other notes:**
- identify the Sun and the planets as the main components of the Solar System. (Level 6)
- name some of the planets. (Level 5)
- identify the Earth as one of the planets. (Level 4)
5. describe the Sun and stars.

**Starter suggestion:** Prepare a shoe box lined with black paper inside. Cut out a small rectangle or circle on one side. Insert a small bulb connected to a battery. Place a small object inside the box. With the light off ask the students to say what is inside. Note their answers.

**Main activity:** Light the bulb and ask the students to look again. Explain that light is what helps us to see objects. Ask what objects can be used instead of the bulb. They may mention a torch, a small mobile phone, a candle, a match, etc. Explain that these objects all give out light.

Guide students to give more examples of light sources. Refer to the Sun as the biggest source of light (ref to Objective 1) but it also gives out heat energy. Show pictures of the Sun showing flares and fire storms.

Explain that the stars are very distant suns and so their light is faint and the heat is not felt.

**Other activities:**
- May refer to the difference in temperature between day and night.
- Students may use a torch or a light bulb to explore shadows.
- May show pictures of distant stars

**Other notes**

describe the stars as distant light sources. (Level 6)

identify the Sun as the main source of light. (Level 5)

identify sources of light (Level 4)
6. to explore the use of artificial satellites.

**Starter suggestion:** Use a mobile phone and ask students whether it is possible to phone/sms someone in foreign country. Mention a near and a distant foreign country. Ask how this is possible.

**Main activity:** Explain that a mobile phone connects with a satellite. Use a simulation to show satellites orbiting the Earth. Some students may have a satellite dish at home. Ask students to elaborate on their use. Ask for more examples. Some students may refer to GPS, internet, TV stations, weather forecasting. Refer to other examples such as in military use, fish finders, Google Earth, etc.

**Other activities:**
- Guide students to compile a list of activities that can be done through the internet.
- May show a video of a satellite launch in space.
- May build a model of Earth and satellites in orbit.
- May refer to the International Space Station.

**Other notes**

**identify some uses of satellites. (level 6)**

**know that a satellite is an object orbiting the earth. (level 5)**

**understand that objects can be sent into space. (level 4)**
7. to illustrate the history of space exploration.

**Starter suggestion:** Ask students whether they would like to become an astronaut and why.

**Main Activity:** Show some pictures of the night sky and make the students aware that the human being has been interested in space for ages. Ask them to think reasons why this was so. Show a picture of an astronomer using a telescope. Explain that for some time this was the only (and best) way people could observe space.

Use pictures to go through the main events of space exploration. May include first satellite in space, rocket launching, first astronaut in space, human landing on the Moon, first woman in space, spacewalking, Space Shuttle, International Space Station, destination to Mars, outer space, other life in space and so on.

Discuss how astronauts manage to live in space.

**Other activities:**
- May refer to exploration of other planets
- Ask students to draw pictures of life in outer space.
- If available, make use of a telescope.
- Ask students to drag and drop pictures of important events in space exploration in order.

**Other notes:**

understand that space exploration took place gradually. (Level 6)

link rockets with space exploration. (Level 5)

understand that scientists used telescopes to observe objects in space. (Level 4)