



Learning
Outcomes
Framework

Year 8 - Form 2

includes Core Curriculum Programme

SCIENCE - level 7 – Learning & Assessment Programme



Directorate for Learning and Assessment Programmes
Department for Curriculum, Lifelong Learning and Employability

The LOF will allow for flexibility in teaching and learning programmes in order to address specific needs and to build up strengths within the context of the learning communities in different colleges and schools. This concept of flexibility is promoted throughout the entire framework. While acknowledging that out-of-school factors such as poverty and social exclusion affect learner achievement, the LOF seeks to improve learners' learning experience by encouraging creativity, critical literacy, entrepreneurship and innovation at all levels. This will allow learners to reach their potential by connecting what they have learnt to their individual contexts. Consequently, this will help learners develop a positive attitude towards learning and a greater appreciation of its usefulness.

The Learning and Assessment Programme (LAP) for Science comprises:

- **The Learning Outcomes Framework (LOF)** – this encompasses a set of subject learning outcomes (SLOs) that set out what a learner is expected to know, understand or be able to do as a result of a process of learning. The LOF will allow for flexibility in teaching and learning programmes in order to address specific needs and to build upon strengths within the context of the learning communities in different colleges and schools. These learning outcomes are designed to be used in a range of delivery contexts and taught using different methods. They state the end result rather than describe the learning process of the learning activities.
- **Notes on Pedagogy and Assessment** – the learning outcomes are written in a way that informs pedagogy and, in conjunction with the assessment strategies related to each outcome, set a clear assessment expectation. This document sets down good practice of teaching and assessment guidelines which educators may wish to take on board and adapt to meet the needs of their learners.

SCIENCE - Level 7

| | LOF SUBJECT FOCUS | UNIT TITLE | Year 7 <i>Form 1</i> | Year 8 <i>Form 2</i> |
|---|--------------------------|--|-------------------------|-------------------------|
| 1 | WHAT DO SCIENTISTS DO? | Scientists at work Forensic Science | ✓ | ✓ |
| 2 | CELLS AND BODY SYSTEMS | Cells and Reproduction Healthy Living | ✓ | ✓ |
| 3 | SENSES | Light and Sound | | ✓ |
| 4 | ENERGY | What is energy? Electricity | ✓ ✓ | |
| 5 | LIFE ON EARTH | Living things and the environment Climate Change Fieldwork | ✓ | ✓ ✓ |
| 6 | CHEMICAL SCIENCE | Understanding matter Elements, Compounds, mixtures and more Separating mixtures Acids and Alkalis | ✓ ✓ | ✓ ✓ |
| 7 | EARTH AND SPACE | Earth and space | | ✓ |

YEAR 8 – FORM 2

| CODE | Page | UNIT TITLE | LOF SUBJECT FOCUS |
|--------------|-------------|--|--------------------------|
| SCI LOF 8.1* | 7 | Healthy Living | Cells and Body Systems |
| SCI LOF 8.2 | 11 | Elements, compounds, mixtures and more | Chemical Science |
| SCI LOF 8.3 | 14 | Separating mixtures | Chemical Science |
| SCI LOF 8.4 | 16 | Light and Sound | Senses |
| SCI LOF 8.5 | 19 | Forensic Science | What do scientists do? |
| SCI LOF 8.6 | 23 | Climate Change | Life on Earth |
| SCI LOF 8.7 | 26 | Fieldwork | Life on Earth |
| SCI LOF 8.8 | 28 | Earth and Space | Earth and Space |

- SCI LOF 8.1 ...Science LOFs – Year 8 (form 2); 1st unit

CROSS CURRICULAR THEMES

The National Curriculum Framework for All (2012) established the Cross Curricular Themes for the Junior and Secondary School cycles of education to be Literacy; Digital Literacy; Learning to Learn and Co-operative Learning; Education for Sustainable Development; Education for Entrepreneurship, Creativity and Innovation and Education for Diversity.

The Science programme promotes an inquiry based and student centred methodology, based on the 5E model in which students engage, explore, explain, elaborate and evaluate. Experiments should be part and parcel of the scientific process. **ENGAGE** students' interest and curiosity. Students observe, **EXPLORE**, predict, plan and conduct investigations, collect and interpret data and give **EXPLANATIONS**. Students are then challenged to **ELABORATE** on their understanding by linking known with new and by applying concepts and skills in new contexts. Students are encouraged to **EVALUATE** 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.

LEARNING OUTCOMES RELATED TO SKILLS AND COMPETENCIES

The following learning outcomes may not be linked to any particular topic but may be reached throughout other subject focus. They are more about skills and competencies rather than subject content and thus students are expected to show progressive improvement in such skills.

1. I can ask simple scientific questions which I can investigate in practice.
2. Collaboratively and individually I can investigate a scientific problem from a provided resource.
3. I can use scientific knowledge to predict the result of an experiment and give a possible explanation.
4. I can identify the variables in a given investigation and carry it out with teacher guidance.
5. I can identify / plan a fair test / investigation.
6. I can assess basic health and safety issues.
7. I can complete a table of results and use it to present my observations.
8. I can explain results from pie charts and bar graphs.

9. I can fill in / write/ complete a simple scientific report of my experiment.
10. I can describe relationships between two properties measured in an investigation.
11. I can discuss and carry out an experiment with my group.
12. I am link different branches of science to different STEM related careers.
13. I can use some common science apparatus and handle this apparatus safely.
14. I can choose the equipment I need for an experiment.
15. I can use appropriate measuring instruments to make accurate measurements of volume, time, length, mass and temperature and express the reading using appropriate units.
16. I can use digital technology to take measurements.
17. I can follow teacher's instructions and put apparatus back in place after finishing an experiment / a practical task in the laboratory.

Subject: **SCIENCE**
LOF Subject Focus: **CELLS AND BODY SYSTEMS**
Unit code and title: **SCI LOF 8.1 HEALTHY LIVING**

Year 8 /Form 2

OBJECTIVES Teacher will:

1. guide students to identify the basic food substances and their use and describe the importance of a balanced diet
2. illustrate the digestive system and guide students to describe the process of digestion.
3. guide students to describe the breathing process.
4. illustrate the blood circulatory system.
5. guide students to identify different microbes and explore ways in which they can be useful.
6. describe how harmful microbes cause diseases and how infections can be spread.
7. guide students to identify (natural) ways of preventing and fighting infections
8. guide students to explore the use of medicines in preventing illnesses and fighting infections.

Key words

Basic food substances, carbohydrates, proteins, fats, minerals, vitamins, enzymes, fibre, water, balanced diet, starch, digestive system, enzymes, mouth, gullet, stomach, small intestine, large intestine, anus, digestion, absorption, breathing, respiration, lungs, windpipe (trachea), bronchi, air sac, diaphragm, ribs, blood circulatory system, heart, arteries, veins, blood vessels, red blood cells, white blood cells, platelets, plasma, microbe, micro-organisms, diseases, bacteria, viruses, fungi, infection, antibodies, infectious disease, immunity, poisoning, vaccination, immunisation, antibiotic.

Points to note

The learning outcomes approach promotes an inquiry based and student centred methodology based on the 5E approach to teaching and learning of science in which students are encourage to engage, explore, explain, elaborate and evaluate.

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 (and even books!) may confuse respiration with breathing

Note the following misconceptions that you might come across:

- Some students may think that all micro-organisms are harmful.
- Some students might mix antibodies with antibiotics.

Resources

Food labels, starch (potato or rice), iodine solution, human torso or organ tunic, heart model, lung model, Smokey Sue, lime water

Digestive system/digestion: <http://kidshealth.org/kid/>

Finding microbes: <http://www.sciencekids.co.nz/gamesactivities/microorganisms.html>
<http://ilovebacteria.com>

Microbes: <http://www.microbeworld.org>
http://kidshealth.org/PageManager.jsp?lic=1&article_set=59296&cat_id=20607

Infectious disease simulations: <http://www.hhmi.org/biointeractive/disease/animations.html>

Vaccination: http://www.youtube.com/watch?v=sGKrs1ED_rw

Resources to support inclusion: <http://www.communication4all.co.uk/>

LEARNING OUTCOMES

SCI LOF 8.1 - Unit: HEALTHY LIVING - Focus: CELLS AND BODY SYSTEMS

Note other Learning Outcomes related to skills and competencies. (p5 & 6)

1. I can identify the basic food substances, their use and sources.
2. I can describe what a balanced diet is.
3. I can apply my understanding of a balanced diet to suggest improvements to what I eat.
4. I can identify reasons why the diet changes with age, occupation and activity.
5. I can label the digestive system and describe the function of the different parts.
6. I can describe the role of enzymes during digestion.
7. I can link certain foods with healthy or unhealthy diets.
8. I can briefly describe the structure of the lungs and explain the role of rib cage and diaphragm during breathing.
9. I can identify tar, nicotine and carbon monoxide as the main harmful ingredients in cigarette smoke.
10. I can describe the effect of smoking on health.
11. I can label the blood circulatory system.
12. I can identify the main components of the blood circulatory system (the blood, heart, arteries and veins).
13. I can name red blood cells, white blood cells, platelets and plasma as the main components of blood and describe their function.
14. I can associate bad eating habits, lack of exercise and smoking with unhealthy lifestyles.
15. I can describe the effect of exercise on the pulse / breathing rate.
16. I can identify an increase in carbon dioxide in the breathed out air and test for it.

17. I can identify examples of microbes (viruses, bacteria and fungi).
18. I can describe how microbes can be harmful and identify examples.
19. I can describe how microbes can be useful and identify examples.
20. I can identify some common diseases and link some diseases with its corresponding microbes.
21. I can describe how some common diseases are spread.
22. I can assess basic hygiene procedures as a way of preventing spread of microbes.
23. I can identify natural barriers (such as skin, tears, sticky mucus, acid in stomach and scabs) which can act to prevent disease.
24. I can use the term 'immune' as meaning resistant to disease.
25. I can describe the white blood cells' action against infections.
26. I can link the use of antiseptics, disinfectants and antibiotics as ways of fighting infections.
27. I can describe how immunisation protects the body against some diseases.
28. I can discuss the importance of vaccines to prevent the disease and slow down the spread of disease.

Subject: **SCIENCE**
LOF Subject Focus: **CHEMICAL SCIENCE**
Unit code and title: **SCI LOF 8.2 ELEMENTS, COMPOUNDS, MIXTURES AND MORE**

Year 8 /Form 2

OBJECTIVES Teacher will:

1. guide students to explore that materials are made up of elements and describe what elements are.
2. illustrate some examples of elements and guide students to understand how elements are sorted out in the periodic table.
3. guide students to identify examples of mixtures.
4. guide students to understand what compounds are.
5. guide students to explore examples of physical and chemical changes.
6. guide students to explore some chemical reactions.
7. guide students to present simple chemical changes as word equations.

Key words

element, compound, mixture, atom, molecule, symbol, periodic table, metals, non-metals, chemical and physical change, reversible, irreversible, reactants, products, combustion, precipitate, effervescence, word equation

Points to note

Refer to notes re 5E approach to teaching and learning of science.

This unit links with units *SCI LOF 7.3 Understanding Matter*

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.
- Physical and chemical changes and their reversibility (e.g. cutting a piece of paper is a physical change but may be seen as not reversible).

Atoms and Molecules: There is no reference of molecules in any Learning outcome. Yet some students may ask about molecules. To avoid misconceptions most science curricula (at Level 7) ignore the concept of molecules but they speak about compounds as made up of two or more different elements (or particles) chemically joined together. Others define molecules as a group of two or more atoms (alike or different) strongly joined together. Be aware that not all compounds are made up of molecules (covalent bonding) as some are made up of ions (ionic bonding). For example carbon monoxide is made up of molecules but sodium chloride is made up of ions. Obviously one is not expected to go

into such details with year 7/8 students but try to use terms correctly to avoid misconceptions which might be difficult to correct at a later stage.

Resources

Molecular model kits, periodic table chart, samples of different elements and compounds, concentrated and dilute H₂O₂., manganese (IV) oxide

Interactive elements game and the Periodic Table of elements: <http://www.chemicalelements.com/>

Chemical reactions animations: <http://bio-alive.com/animations/chemistry.htm>

Resources to support inclusion: <http://www.communication4all.co.uk/>

Oxygen:

http://www.youtube.com/watch?v=Jxp_wpDufdg&feature=related

<http://www.sciencekids.co.nz/sciencefacts/chemistry/oxygen.html>

Carbon dioxide:

http://www.youtube.com/watch?v=i5vF4_ggLv8&feature=player_embedded

LEARNING OUTCOMES

SCI LOF 8.2 Unit: ELEMENTS, COMPOUNDS AND MIXTURES – Focus: CHEMICAL SCIENCE

Note other Learning Outcomes related to skills and competencies. (p5 & 6)

1. I can name some examples of elements.
2. I can describe elements as materials made up of one type of particle and identify particles as atoms.
3. I can describe that chemical symbols are used to represent elements and identify some of them.
4. I can identify one property of some common elements.
5. I can describe the periodic table as the list of elements and identify metals and non-metals.
6. I can identify some physical properties and uses of metals and non-metals.
7. I can identify some common mixtures including air.
8. I can identify nitrogen, oxygen and carbon dioxide as the main components of air and give their approximate percentages.
9. I can describe some properties of oxygen and carry out a chemical test to identify it.
10. I can describe mixtures as a group of chemicals not chemically joined together.
11. I can describe compounds as chemicals made up of two or more elements chemically joined together.
12. I can identify the elements present in some simple compounds such as carbon dioxide, rust, salt and water.
13. I can interpret diagrams which show particles in elements, compounds or mixtures.
14. I can distinguish between physical and chemical changes.
15. I can use a set criteria (such as production of a gas, effervescence, change in colour, production of an insoluble substance /precipitate) and identify other changes (such as change in temperature, change in pH, light / sound and a production of a new substance) as an indicator of a chemical change.
16. I can present simple chemical changes, involving two elements, as word equations.

Subject: **SCIENCE**
LOF Subject Focus: **CHEMICAL SCIENCE**
Unit code and title: **SCI LOF 8.3 SEPARATING MIXTURES**

Year 8 /Form 2

OBJECTIVES Teacher will:

1. guide students to identify soluble and insoluble substances and factors affecting solubility
2. guide students to distinguish between mixtures and solutions
3. explore ways of separating different mixtures
4. explore ways of separating solutions.

Key words

Salty water, tap water, soluble, insoluble, suspension, solvent, solute, solution, mixture, by hand, magnet, sieve, dissolving, chromatography, filtration, filter paper, evaporation, distillation

Points to note

Refer to notes re 5E approach to teaching and learning of science.

Link this unit with *SCI LOF 7.3 Understanding matter* and *SCI LOF 8.2 Elements, Compounds and Mixtures*. Note that some students may find the difference between mixtures and compounds difficult to understand and remember.

Note that students often mix dissolving (in Maltese 'jinħall') with melting (in Maltese 'idub').

With regards to separating by magnets, some students may think that all metals are magnetic.

Resources

Salt (coarse and fine), soil, sand, sugar, rice, marble chips, wood shavings, copper sulphate, ink, filter paper, chromatography paper, funnels, crucible, Bunsen burner, Liebig condenser for distillation

Chemistry simulations: <http://phet.colorado.edu/en/simulations/category/chemistry/general>

Distillation: <http://www.purposegames.com/game/simple-distillation-quiz>

Resources to support inclusion: <http://www.communication4all.co.uk/>

LEARNING OUTCOMES

SCI LOF 8.3 - Unit: SEPARATING MIXTURES – Focus: CHEMICAL SCIENCE

1. I can show that some substances dissolve in water (soluble) and others do not (insoluble).
2. I can identify water as a good solvent.
3. I can evaluate the use of different solvents in other situations.
4. I can show and describe the factors which affect solubility.
5. I can identify some soluble and insoluble substances in water.
6. I can describe what a solution is and give some examples.
7. I can identify different examples of mixtures.
8. I can carry out chromatography as a way of separating colours.
9. I can explain the movement of colours in chromatography in terms of solubility.
10. I can remove insoluble substances in water through filtration.
11. I can identify and perform different methods of separating mixtures according to their properties.
12. I can use and describe evaporation to separate a solution.
13. I can describe the process of distillation.
14. I can link the separation techniques of using a sieve, magnets, filtration, evaporation and distillation to everyday processes.
15. I can separate the different components of a mixture using appropriate separation techniques.

Subject: **SCIENCE**
LOF Subject Focus: **SENSES**
Unit code and title: **SCI LOF 8.4 LIGHT AND SOUND**

Year 8 /Form 2

Subject: **OBJECTIVES** Teacher will:

- 1 guide students to use ray diagrams to show how objects are seen.
2. show the structure of the eye and guide students to explain how our eyes enable us to see.
3. guide students describe sound and identify sound sources.
4. guide students to use the particle theory to explain how sound travels through materials but not through a vacuum.
5. show the structure of the ear and guide students to explain how our ears enable us to hear.

Key words

Transparent, opaque, translucent, luminous, non-luminous, rays, straight line, ray diagrams, mirrors, reflection, the eye, pupil, iris, cornea, image, retina, optic nerve, light energy, sound energy, source, the ear, outer ear, ear canal, ear drum, 3 small bones, nerve, cochlea, detector, medium, vibration, speed of sound, loudness, particle movement, vacuum, decibels

Points to note

Refer to notes re 5E approach to teaching and learning of science.

Link this topic to *SCI 8.11 & 8.12 Earth and Space*. Revisit sources of light, light travelling in straight lines, speed of light and sound travelling through a vacuum. Link this topic to *SCI 7.3 Understanding matter* re matter is made up of tiny particles.

Note that

- some students may think that sound waves are transverse waves (as seen on an oscilloscope screen).
- most students, initially, do not realise that it is the brain that interprets light and sound.
- some students may think that noise pollution is annoying but harmless.

Resources

Large convex lenses, ray box, selection of lenses and mirrors, eye and ear models, selection of transparent/translucent and opaque materials, plastic bowl, uncooked rice, source of sound, water and glass bottles, rubber bands of varying thickness, 2 plastic cups, string, tuning fork, slinky spring, bell jar and vacuum pump

Light travels in a straight line : <https://www.youtube.com/watch?v=WtQsq8s8XzU>

Vibrating sound: <http://sciencekids.co.nz/videos/physics/soundvibrations.html>

Sound travelling through different media (Evelyn Glennie): <http://www.youtube.com/watch?v=IU3V6zNER4g>

Some other resources that can be used:

- <http://www.ibnalhaytham.net/> contains some information about the scientist that discovered that light travelled in a straight line.
- Animals and sound – Pistol shrimp: <http://www.youtube.com/watch?v=XC6I8iPiHT8>
- Humming bird: <http://www.youtube.com/watch?v=2n71TgeWXd0>
- Making music with water: <http://sciencekids.co.nz/experiments/makemusic.html>
- Ear and hearing: <http://www.youtube.com/watch?v=0jyxhozq89g>
- Changing sounds/pitch: <http://sciencekids.co.nz/gamesactivities/changingsounds.html>
- Noise pollution: <http://www.timesofmalta.com/articles/view/20120229/editorial/All-noise-pollution-must-be-strictly-controlled.408965>

LEARNING OUTCOMES

SCI LOF 8.4 - Unit: LIGHT AND SOUND – Focus: SENSES

1. I can identify luminous objects as objects that give off light and non-luminous objects as objects that reflect light.
2. I can draw rays to show how objects can be seen.
3. I can show that light travels in a straight line and thus describe the formation of shadows.
4. I can distinguish between transparent, translucent and opaque objects.
5. I can label the structure of the eye.
6. I can describe the function of the different parts of the eye.
7. I can describe how sounds are produced as a result of vibrations.
8. I can use the slinky spring to demonstrate sound waves.
9. I can describe the movement of sound in solids, liquids and gases.
10. I can explain why sound is absent in a vacuum.
11. I can relate the movement of sound in solids, liquids and gases to the particle model.
12. I can identify examples to show that light travels faster than sound.
13. I can label the structure of the ear.
14. I can describe the function of the different parts of the ear.
15. I can describe how hearing can be damaged.
16. I can state that loudness is measured in decibels.
17. I can recommend possible ways of reducing situations of noise pollution.

Subject: **SCIENCE**
LOF Subject Focus: **WHAT DO SCIENTISTS DO?**
Unit code and title: **SCI LOF 8.5 FORENSIC SCIENCE**

Year 8 /Form 2

OBJECTIVES Teacher will:

1. guide students to describe the importance of forensic science to solve investigations and relate observation skills to forensic science.
2. guide students to collect and process evidence from a crime scene.
3. guide students to use separation techniques to provide evidence.
4. guide students to identify different types of human teeth and their function.
5. guide students to collect and process evidence from a fire.
6. guide students to investigate different surfaces and the effect of friction.
7. guide students to use the light microscope to discover details not visible with the naked eye.

Key words

evidence, contamination, DNA, genetic material, fingerprints, chromatography, names of human teeth, flame tests, force, friction, rough, smooth, Newton (N), Newton meter, fire triangle

Points to note

Refer to notes re 5E approach to teaching and learning of science. This unit is presented through a number of case studies but may link this unit to other related units. Guide students to take an inquiry approach.

This topic provides 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

One may consider adopting this approach in other units when tackling an investigation through an inquiry approach.

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, Newton metres

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=qESpv6bqBuU>

<http://www.youtube.com/watch?v=58XsN6XJWQ&feature=related>.

Website for teachers – ppt and worksheets: www.sciencespot.net/Pages/classforsci.html

The Science of Collisions: <http://safetythrougheducation.org/>

CASE SCENARIO

This unit is best covered through a number of case scenarios such as the following. Scenario 1 and 2 may be tackled as one.

SCENARIO 1:

Present the following situation: A telephone call reported that thieves entered a house. When the police arrive on the scene, the house is in shambles. Clothes are scattered all around the room, lamps are overturned and there is no sign of the thieves. The police asked the forensic scientist to help. One of the detectives picks up a glass. On its side is a smudged, thumbprint. The scientist takes it down to the lab, where it is analyzed and matched to a recorded set of prints.

Suggested activities- create a crime scene, fingerprinting, footprints

SCENARIO 2:

The police received a report of a robbery and a murder which took place in a shop, earlier in the day. The forensic scientists noticed the following:

The dead body of the shop owner and a bite mark on the victim's arm. Further investigations led the scientists to notice that the body temperature of the victim was 32⁰C; long strands of hair were found on the body of the victim; no fingerprints were found; the bite mark shows a missing front tooth.

Suggested activities- create a crime scene, calculate the estimate time of death, compare hair samples and bite marks, etc.

SCENARIO 3:

A gang was performing a series of burglaries. They were careless, leaving behind clues to their identities. They used a fast sports car to make their escape during which they caused accidents and left traces of car paint behind. One of the robbers even wrote messages on the wall.

The forensic scientist used chromatography to analyse the car paint and the ink on the wall. They also looked for traces of blood.
(adapted from KS3 Collins Bk 2 p70)

Suggested activities - use chromatography to distinguish different inks. Some students may research about different blood groups and DNA fingerprinting.

SCENARIO 4:

The fire fighters were called to the scene of a fireworks explosion. They noted areas where the flames were mostly yellow and other areas with green flames. They took some time to bring the fire under control and remove further danger. No casualties were reported but the forensic scientists were called in to investigate the cause of the explosion.

Suggested activities - revise the fire triangle and try to identify possible causes of explosion; use flame tests to identify unknown chemicals.

SCENARIO 5:

The police were called to investigate a car accident, in which some people were seriously injured. When they arrived at the accident scene, they discovered that two cars had crashed at a cross road. One of the cars left long tyre marks on the tarmac whilst the other car did not leave any markings but was seen by a witness, swirling uncontrollably. Here, the police noticed there was some liquid spread on the road. The police decided to investigate whether this accident was caused by over-speeding or by this liquid spread on the road.

Suggested activities - investigate the effect on type of surface (smooth/rough) on friction; investigate the effect of adding different liquids such as water, oil, soap; measure the force needed to drag an object on different surfaces.

LEARNING OUTCOMES

SCI LOF 8.5 - Unit: FORENSIC SCIENCE – Focus: WHAT DO SCIENTISTS DO?

1. I can recognise that science can be used to test evidence and solve problems.
2. I can identify some forensic investigations which may be used to solve crimes.
3. I can assess simple observations of a situation and match pieces of evidence.
4. I can identify the four types of human teeth.
5. I can describe the separate function of the different human teeth.
6. I can perform chromatography and interpret its results.
7. I can describe that heat, air (oxygen) and a fuel are needed to start a fire.
8. I can carry out a flame test to identify an unknown chemical by comparing results to given data.
9. I can evaluate the effect of friction on different surfaces and its use in everyday life.
10. I can use a Newton meter to measure forces.
11. I can describe what friction is.
12. I can identify applications and implications of friction in everyday life.
13. I can make observations, communicate findings and conclusions effectively.
14. I can use a microscope to magnify objects and observe details not seen with the naked eye.

Subject: **SCIENCE**
LOF Subject Focus **LIFE ON EARTH**
Unit code and title: **SCI LOF 8.6 CLIMATE CHANGE**

Year 8 / Form 2

OBJECTIVES Teacher will:

1. guide students to understand energy production and its implications.
2. engage students to investigate the products of burning fuels.
3. help students to identify the environmental implications of using fossil fuels and issues re climate change.
4. guide students to identify examples of renewable and non-renewable sources of energy and the advantages and disadvantages of each source of energy.
5. guide students to explore sources of air pollution and their effects.
6. guide students to explore sources of land pollution and their effects.
7. guide students to explore sources of water pollution and their effects

Key words

Power station, interconnector power cable, fuel, crude oil, climate change, greenhouse effect, global warming, renewable, non-renewable, sustainable living, solar panel, wind turbine, biomass, pollution, photovoltaic cells, lime water, carbon dioxide, methane, water vapour, energy, carbon footprint, acid rain, greenhouse gases, carbon footprint, ozone, asthma, deforestation, separation of waste, landfill, bring-in-site, 3R's, reduce, reuse, recycle, waste management, biodegradable, oil spill, sewage treatment, fertilisers, pesticides

Points to note

Refer to notes re 5E approach to teaching and learning of science.

Link this unit with *SCI LOF 7.4 What is Energy?* *SCI LOF 7.5 Electricity and* *SCI LOF 7.6 Acids and Alkalis.*

The subject of energy resources is very topical in the media. It would be useful to look for cross-curricular links (for example with Geography), news websites and websites of fuel companies. The term non-renewable can be misleading as it does not mean that no more fossil fuels will ever be formed but that we are using up our resources much faster than they are forming. The discussion of reducing fossil fuels use should lead to less air pollution and making our supplies of fuels last longer. Note that greenhouse effect is one of the causes of global warming. Note that most students usually mix up both terms or use interchangeably, which is incorrect. Most students are aware of the 3R's but most identify various waste management initiatives as recycling even though they might be a reduction or reuse of waste material.

Re sustainable use of water link with the Geography teachers as this theme is extensively covered within the form 2 Geography curriculum.
Re sustainable living, students are expected to know various initiatives that at a personal level can help to reduce our negative effect on the environment.

Climate Change refers to the changes in the global climate which result from the increasing average global temperature. These include changes in precipitation pattern, increased prevalence of droughts, heat waves and other extreme weather.
Thus the greenhouse gas emissions are causing global warming which in turn is causing climate change.

Can link this unit with a visit to a waste management site, Ta' Kandja underground water galleries; Reverse Osmosis Plant (Contact Water Services Corporation).

Do not attempt to go through all sources of pollution. The learning outcomes should guide your line of thought.

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, marble chips, dilute hydrochloric acid, antacid tablets, vinegar, posters and other resources by Wasteserve.

Global warming – interactive <http://environment.nationalgeographic.com/environment/global-warming/gw-impacts-interactive/>
<http://environment.nationalgeographic.com/environment/global-warming/gw-overview-interactive.html>

Science behind climate change: http://www.bbc.co.uk/sn/hottopics/climatechange/climate_challenge/aboutgame.shtml

WasteServ: <http://www.wasteservmalta.com/>

Water Services Corporation: <http://www.wsc.com.mt/>

3R's: <http://www.recycling-guide.org.uk/rrr.html>

Resources to support inclusion

<http://www.communication4all.co.uk/>

LEARNING OUTCOMES

SCI LOF 8.6 - Unit: CLIMATE CHANGE – Focus: LIFE ON EARTH

1. I can identify various ways of generating electricity.
2. I can identify some environmental implications in electricity production.
3. I can explain what climate change is and identify some signs of climate change.
4. I can identify carbon dioxide and water as the products of combustion of a fuel.
5. I can describe and carry out experiment to test for carbon dioxide as a product of combustion of a fuel.
6. I can link the burning of fuels with air quality and identify examples of how fuel consumption can be reduced.
7. I can use the term carbon footprint to describe my impact on the environment.
8. I can describe greenhouse effect and global warming.
9. I can identify energy sources as renewable (solar, wind and biomass) or non-renewable (fossil fuels, nuclear).
10. I can describe the main advantages and disadvantages of using different types of renewable and non-renewable sources of energy.
11. I can assess ways of reducing air pollution.
12. I can evaluate ways of reducing land pollution.
13. I can identify and describe the 3R's as the basis of waste management.
14. I can recommend ways of reducing sources of water/sea pollution.
15. I can describe the impact of air, land, water/sea pollution on the environment and health.
16. I can describe sustainable practices to reduce pollution.

Subject: **SCIENCE**
LOF Subject Focus: **LIFE ON EARTH**
Unit code and title: **SCI LOF 8.7 FIELDWORK**

Year 8/ Form 2

OBJECTIVES Teacher will:

1. Guide students to investigate different habitats on the Maltese islands.
2. Guide students to identify the human impact on the environment.
3. Guide students to discuss the importance of conservation of habitats and species

Key words

Garigue, valley, freshwater, marine, coast, cultivated fields, woodland, sandy seashore, rocky seashore, quadrat, line transect, conservation, NGOs (Non-Governmental Organisations), endemic, indigenous, alien species, endangered, rubble walls, nature reserves, human impact, sampling techniques.

Points to note

Main activity: Students use prepared worksheets to guide them through this activity.

Activities may include investigating the role of rubble walls; the effect of urbanisation (road / building construction – destruction of habitats); identification of different examples of pollution; introduction of alien species (and thus competition with local species); measurement of some environmental conditions such as the temperature, humidity, pH, wind speed; animal and plant identification; identification of some endemic, endangered and/or indigenous plant and animal species; silent exercise; studying an area by using a quadrat and/or line transect; pitfall traps; identifying man-made and/or natural features in the environment; identification of conservation initiatives; examples and roles of environmental NGOs; marine fieldwork in which pH, visibility and temperature of water are measured; collection and analysis of data.

Fieldwork may be carried out in various locations such valleys, Buskett, Majjistral Park, Xrobb I-Għagin, Dwejra (Gozo) Ramla I-Ħamra / Għajn Tuffieħa sand dunes, rocky sea shore, Yacht Marinas. One might consider organising the fieldwork trip in conjunction with other subjects such as Geography.

Take note of safety precautions, parent consent forms and other logistics when planning a fieldwork activity.

Resources

Quadrat, measuring tape, anemometer/wind meter, pH meter, thermometer, fieldwork worksheets, others (at the discretion of the teacher).

Refer to the websites of local NGOs for information re local environment. <http://www.naturetrustmalta.org/> <http://www.birdlifemalta.org/>
<http://www.bicref.org/> <http://new.faa.org.mt/> <http://www.ramblersmalta.org/> <http://www.foemalta.org/home/>

LEARNING OUTCOMES

SCI LOF 8.7 - Unit: FIELDWORK – Focus: LIFE ON EARTH

1. I can carry out observations during fieldwork activities. *
2. I can collect data during fieldwork activities (refer to *Points to note* page 26). *
3. I can analyse data collected during a fieldwork.
4. I can identify examples of local habitats including garigue, valleys, freshwater, marine, coast, cultivated fields and/or woodland. *
5. I can explain the terms endemic, indigenous, alien and endangered plant and animal species.
6. I can identify examples of endemic, indigenous, alien and endangered plant and/or animal species. *
7. I can identify adaptations of some animals and plants to survive in their habitat.
8. I can state/explain the relevance of using sampling techniques including quadrat and line transect.
9. I can use quadrats and/or line transect as sampling techniques. *
10. I can evaluate the importance of rubble walls. *
11. I can identify examples of positive and negative human impacts on the environment.
12. I can describe different conservation practices.
13. I can describe the role of environmental NGOs.
14. I can name any two local environmental NGOs.
15. I can describe the importance of nature reserves.
16. I can identify examples of nature reserves on the Maltese islands.
 - *** These LOs are meant to be covered during a fieldwork trip and thus WILL NOT feature in the annual paper.**
 - **Students who were absent for the fieldwork trip for a valid reason (and did not have the opportunity to join another group) will be offered an extra question during the exam.**

Subject: **SCIENCE**
LOF Subject Focus: **EARTH AND SPACE**
Unit code and title: **SCI LOF 8.8 EARTH AND SPACE**

Year 8 / Form 2

OBJECTIVES Teacher will:

1. illustrate the movement of the Earth around the Sun and help students describe day/night and a year.
2. help students to explain the causes of seasons.
3. guide students to explore the movement of the Moon around the Earth.
4. engage students to explain what happens during an eclipse.
5. engage students to explore the main features of the Solar System and beyond.
6. help students describe what gravity is and recognise that it keeps things in orbit.
7. illustrate the difference between mass and weight.
8. present the Sun and stars as light sources and help students understand light.
9. engage students to explore space exploration and describe why satellites are useful.

Key words

Earth, tilt of Earth, axis, orbit, year, spinning, leap year, Northern Hemisphere, Southern Hemisphere, direct sunlight, full Moon, new Moon, phases of the Moon, natural satellite, solar eclipse, lunar eclipse, planet, names of planets of the Solar system, dwarf planet, asteroids, telescope, moon, gravity, gravitational pull, atmosphere, mass, weight, orbit, path, Sun, stars, light, shadows, luminous & non-luminous sources, reflection, galaxy, universe.

Points to note

Refer to notes re 5E approach to teaching and learning of science. May link this topic with a visit to the Planetarium at Esplora.

Link this unit with *SCI LOF 8.4 Light and Sound*.

Students may find difficulty in describing the phases of the Moon. Note that

- Pluto is no longer classified as a planet (due to its small size) but older resources may still 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 at times, even Maths' textbooks refer to weight in terms of kg
- note that some students may think that there is no gravity on the Moon rather than there is less gravity than Earth.

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, large rubber ball, tennis ball, mass balance, bathroom scale, power supply, light bulb, Focus Educational Software (KS3 Physics) or other simulations available. Use photographs and clips showing the phases of the Moon, Earth from the Moon, eclipses.

Esplora: <http://esplora.org.mt/>

Planetariums : site to download freeware <http://www.stellarium.org/>

Night and day ,year, seasons: <http://www.engineeringinteract.org/resources/astroadventure/flash/concepts/earth.htm>

Lesson re Mass, weight and Gravity: <http://www.schoolsworld.tv/node/304?terms=720>

Mass & weight explained <http://www.design-simulation.com/ip/curriculum/misccontent/demoinstructions/weightmassandgravity.php>

NASA website: <http://www.nasa.gov/>

Life on other planets : Information <http://www.newscientist.com/article/dn11710>

The Sun: <http://www.youtube.com/watch?v=TOErr4xntHE>

Newton' story: Instead of just watching Newton's story at <http://www.youtube.com/watch?v=jwPc0kK9VHU&feature=related>, students can be asked to animate Newton's story about gravity using online software like <http://www.xtranormal.com/>. Alternatively they can use this software to describe a space mission of their choice in the form of a story-telling exercise.

Resources to support inclusion

<http://www.communication4all.co.uk/>

LEARNING OUTCOMES

SCI LOF 8.8 - Unit: EARTH AND SPACE – Focus: EARTH AND SPACE

1. I can recall the number of days in a year and the number of hours in a day.
2. I can describe the orbit of the Earth around the Sun.
3. I can describe day and night in terms of the spinning of the Earth on its axis.
4. I can identify the four seasons and link seasons with the tilt of the Earth.
5. I can describe that the orbit of the Moon around the Earth takes 28 days.
6. I can refer to different shapes of the Moon as the phases of the Moon.
7. I can describe what happens during a solar or a lunar eclipse.
8. I can name the planets of the Solar system in their proper order.
9. I can identify some of the features of the planets in the Solar System.
10. I can distinguish between rocky and gaseous planets.
11. I can describe the Solar System as made up of the Sun and all the planets orbiting it.
12. I can describe some features beyond the Solar System such as galaxies and the Universe.
13. I can link the downward movement of objects to gravity.
14. I can describe weight as the downward force caused by gravity.
15. I can identify gravitational pull as the force that keeps things in orbit.
16. I can describe what happens to the gravitational pull as the distance between objects increases.
17. I can describe what happens to the gravitational pull as the mass of the objects increases.
18. I can put a number of celestial objects in order according to their size.

19. I can measure mass and weight using appropriate measuring instruments and units.
20. I can describe mass and weight of an object and the relationship between them.
21. I can identify the Sun as a star and our main light source.
22. I can identify stars as distant light sources.
23. I can assess the importance of some events which have taken place during space exploration.
24. I can explain some benefits of space exploration such as the use of GPS, weather forecasting and communication.



Directorate for Learning and Assessment Programmes
Department for Curriculum, Lifelong Learning and Employability

Integrated Science Curriculum Core Curriculum Programme

Year 8 – Form 2 Appendix

| | |
|-----------------|-------------------------|
| SCI CCP LOF 8.1 | HEALTHY LIVING |
| SCI CCP LOF 8.2 | INVESTIGATING CHEMICALS |
| SCI CCP LOF 8.3 | FORENSIC SCIENCE |
| SCI CCP LOF 8.4 | FIELDWORK |
| SCI CCP LOF 8.5 | EARTH AND SPACE |

LEARNING OUTCOMES - Core Curriculum Programme

SCI CCP LOF 8.1 - Unit: HEALTHY LIVING - Focus: CELLS AND BODY SYSTEMS

Note other Learning Outcomes related to skills and competencies. (p5 & 6)

1. I can identify examples of basic food substances, their use and sources.
2. I can choose a balanced diet from a sample of different presented diets.
3. I can suggest improvements to what I eat.
4. I can label the digestive system.
5. I can link certain foods with healthy or unhealthy diets.
6. I can describe the effect of smoking on health.
7. I can identify bad eating habits, lack of exercise and smoking as unhealthy habits.
8. I can describe the effect of exercise on the pulse / breathing rate.
9. I can describe how some common diseases are spread.
10. I can identify basic hygiene procedures as a way of preventing spread of microbes.
11. I can link the use of antiseptics, disinfectants and antibiotics as ways of fighting infections.
12. I can identify vaccines as a way to prevent the disease.

LEARNING OUTCOMES

SCI CCP LOF 8.2 Unit: INVESTIGATING CHEMICALS – Focus: CHEMICAL SCIENCE

Note other Learning Outcomes related to skills and competencies. (p5 & 6)

1. I can name some examples of chemicals.
2. I can identify one property of some common elements.
3. I can identify nitrogen, oxygen and carbon dioxide as the main components of air.
4. I can carry out a chemical test for oxygen.
5. I can link some changes such as production of a gas or change in colour as an indicator of a chemical change.
6. I can conduct simple chemical reactions involving two chemicals.
7. I can show that some substances dissolve in water (soluble) and others do not (insoluble).
8. I can carry out chromatography as a way of separating colours.
9. I can use a sieve and /or magnet to separate small things.
10. I can remove insoluble substances in water through filtration.
11. I can use evaporation to separate a solution.

LEARNING OUTCOMES

SCI CCP LOF 8.3 - Unit: FORENSIC SCIENCE – Focus: WHAT DO SCIENTISTS DO?

1. I can identify some forensic investigations which may be used to solve crimes.
2. I can make simple observations of a situation and match pieces of evidence.
3. I can identify some types of human teeth.
4. I can link the function of the different human teeth with the correct type of tooth.
5. I can use chromatography to identify one colour from a number of given colours.
6. I can show that heat, air (oxygen) and a fuel are needed to start a fire.
7. I can compare colours from a flame test with some examples of colours from different chemicals.
8. I can show how friction acts on different surfaces.
9. I can use a Newton meter to measure forces.

LEARNING OUTCOMES

SCI CCP LOF 8.4 - Unit: FIELDWORK – Focus: LIFE ON EARTH

1. I can link the burning of fuels with air quality.
2. I can identify some examples of renewable sources of energy.
3. I can describe some advantages of using renewable sources of energy.
4. I can give some examples how the 3Rs may be used.
5. I can identify some ways how pollution may be reduced.
6. I can carry out observations during a fieldwork activity (refer to *Points to note* page 26).
7. I can collect some data during a fieldwork activity.
8. I can identify some differences between different habitats.
9. I can show adaptations of some animals and plants to survive in their habitat.
10. I can link examples of human behaviour as examples of positive or negative impact on the environment.

LEARNING OUTCOMES

SCI CCP LOF 8.5 - Unit: EARTH AND SPACE – Focus: EARTH AND SPACE

1. I can identify objects that give off light and objects that reflect light.
2. I can recall the number of days in a year and the number of hours in a day.
3. I can describe the orbit of the Earth around the Sun.
4. I can describe day and night in terms of the spinning of the Earth on its axis.
5. I can identify the four seasons.
6. I can name some planets of the Solar system.
7. I can describe the Solar System as made up of the Sun and the planets orbiting it.
8. I can identify the Sun as a star and our main light source.
9. I can identify stars as distant light sources.