## Year 5 unit overview – Australian Curriculum: Science

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| **School Name** | **Unit title** | **Duration of unit** |
| Faith Lutheran College Redlands | Exploring light | 10 weeks |

Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Science for Foundation–10* <www.australiancurriculum.edu.au/Science/Curriculum/F-10>. Retrieved 22nd September 2013

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| **Unit outline** |
| Exploring light.  This unit will utilise the 5 E teaching and learning model. Teaching and learning through the five phases: Engage Explore, Explain, Elaborate, and Evaluate.  The students will investigate:   * The properties of light * The formation of shadows * Explore the role of everyday objects and devices and * Consider how technology has changed devices. |

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| **Identify Curriculum** | | | |
| **Content descriptions to be taught** | | | **General Capabilities**  **Cross-curriculum priorities** |
| **Science Understanding** | **Science as a Human Endeavour** | **Science Inquiry Skills** |
| **Physical Sciences**  Light from a source forms shadows and can be absorbed, reflected and refracted [(ACSSU080](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU080)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg | **Nature and Development of Science**  • Important contributions to the advancement of science  have been made by people from a range of cultures (ACSHE082)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  • Science involves testing predictions by gathering data and using evidence to develop explanations of events  and phenomena (ACSHE081)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  **Use and influence of science**  • Scientific understandings, discoveries and inventions  are used to solve problems that directly affect peoples’ lives (ACSHE083)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg | **Physical Sciences**  •. Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (ACSIS093)  **http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  **Evaluating**  •. Suggest improvements to the methods used to investigate a question or solve a problem (ACSIS091)  **Planning and conducting**  •. Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate (ACSIS087)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  •. Use equipment and materials safely, identifying potential risks (ACSIS088)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  •. With guidance, select appropriate investigation methods to answer questions or solve problems  (ACSIS086)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  **Processing and analysing data and information**  •. Compare data with predictions and use as evidence in  developing explanations (ACSIS218)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  •. Construct and use a range of representations, including tables and graphs, to represent and describe  observations, patterns or relationships in data using  digital technologies as appropriate (ACSIS090)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg  **Questioning and predicting**  •. With guidance, pose questions to clarify practical problems or inform a scientific investigation, and  predict what the findings of an investigation might be  (ACSIS231)  http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpghttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg | **Literacy http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  The particular elements of Literacy addressed by this content description  **Word Knowledge**   * Understand learning area vocabulary   **Critical and creative thinking http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  The particular elements of Critical and creative thinking addressed by this content description  Inquiring – identifying, exploring and organising information and ideas   * Identify and clarify information and ideas   **Personal and social capabilityhttp://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  The particular elements of Personal and social capability addressed by this content description  Self-awareness   * Recognise personal qualities and achievements   Social management   * Make decisions   Social awareness   * Appreciate diverse perspectives   **Information and communication technology capability**  **http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  The particular elements of Information and communication technology capability addressed by this content description  Communicating with ICT   * Understand computer mediated communications * Collaborate, share and exchange   Creating with ICT   * Generate solutions to challenges and learning area tasks   **Intercultural understanding http://personalandsocial.files.wordpress.com/2013/03/general-capabilities.jpg**  The particular elements of Intercultural understanding addressed by this content description  Recognising culture and developing respect   * Explore and compare cultural knowledge, beliefs and practices   **Indigenous Perspectives** |
| **Year 5 Achievement Standard**  Australian Curriculum, Assessment and Reporting Authority, 2013,’ Year 5 Science Curriculum’ Retrieved 10th October 2013 <http://www.australiancurriculum.edu.au/Science/Curriculum/F-10#cdcode=ACSSU080&level=5>  By the end of Year 5, students classify substances according to their observable properties and behaviours. They [explain](http://www.australiancurriculum.edu.au/Glossary?a=&t=Explain) everyday phenomena associated with the transfer of light. They [describe](http://www.australiancurriculum.edu.au/Glossary?a=&t=Describe) the key features of our solar system. They [analyse](http://www.australiancurriculum.edu.au/Glossary?a=&t=Analyse) how the form of living things enables them to function in their environments. Students [discuss](http://www.australiancurriculum.edu.au/Glossary?a=&t=Discuss) how scientific developments have affected people’s lives and how science knowledge develops from many people’s contributions.  Students follow instructions to pose questions for investigation, predict what might happen when variables are changed, and plan investigation methods. They use equipment in ways that are safe and improve the accuracy of their observations. Students construct tables and graphs to organise data and [identify](http://www.australiancurriculum.edu.au/Glossary?a=&t=Identify) patterns. They use patterns in their data to suggest explanations and refer to data when they report findings. They [describe](http://www.australiancurriculum.edu.au/Glossary?a=&t=Describe) ways to improve the fairness of their methods and communicate their ideas, methods and findings using a range of text types. | | | |

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| **Dimensions of teaching and learning** | |
| **General Capabilities**  **Literacy**  Students will:   * Listen to, read and view published and self created texts and work towards evaluation of its content. * Technical vocabulary and everyday language used in science contexts (e.g. reflection, refraction, transmission, absorption) * Procedural vocabulary (e.g. identify, explain, analyse, measure, predict, collect) * Visual representations (e.g. scientific diagram, tables, graphs) * Conventions and symbols (e.g. degrees (°), ray diagrams).   **Numeracy**  Students will:   * use practical measurements, collect, represent and analyse first- and second-hand data from investigations   and research   * identify trends and patterns from tables and graphs.   **ICT competence**  Students will have opportunities to demonstrate *Student ICT Expectations* in:  **Operating with ICT**   * Navigate virtual and software environments, including learning objects, games, websites and publishing software   **Critical and creative thinking**  Students will:  • generate and evaluate knowledge, ideas and possibilities  • pose questions, make predictions, speculate and solve problems through investigation  • analyse and evaluate evidence and summarise information.  **Personal and social competence**  Students will:  • make responsible decisions  • work effectively in teams  • follow procedures and work safely  • make informed choices about issues that impact their lives.  **Intercultural understanding**  Students will consider how different cultures have contributed to the development of light science and devices.  **Cross-curriculum priorities**  **Aboriginal and Torres Strait Islander histories and cultures**  Students will explore how Aboriginal peoples and Torres Strait Islander peoples have used an understanding of  refraction while spear fishing  The embedding of Aboriginal and Torres Strait Islander perspectives into the curriculum requires more than  addressing curriculum and pedagogy. To ensure holistic learning, teachers need to address the other realms of the  Embedding Aboriginal and Torres Strait Islander Perspectives in Schools (EATSIPS) framework; these are: personal  and professional accountability, community engagement and organisational environment.  For further information refer to the sheet Delivering Aboriginal & Torres Strait Islander perspectives in the classroom.  **Asia and Australia's engagement with Asia**  Students will:  • explore how the communities of Asia have used an understanding of refraction while spear fishing  • consider how the peoples from the communities of Asia have contributed to the development of light science  and devices.  **Relevant prior curriculum**  Students require prior experience from Year 1 with:  **Science Understanding**  **Physical sciences**  • Light and sound are produced by a range of sources and can be sensed  Students require prior experience from Year 3 with:  **Science Understanding**  **Earth and space sciences**  • Earth's rotation on its axis causes regular changes, including night and day  Students require prior experience from Year 4 with:  **Science as a Human Endeavour**  **Nature and development of science**  • Science involves making predictions and describing patterns and relationships  **Use and influence of science**  • Science knowledge helps people to understand the effect of their actions  **Science Inquiry Skills**  **Questioning and predicting**  **Planning and conducting**  **Processing and analysing data and information**  **Evaluating**  **Communicating**  **Curriculum working towards**  The teaching and learning in this unit works towards the following in Year 6:  **Science Understanding**  **Physical sciences**  • Energy from a variety of sources can be used to generate electricity  **Science as a Human Endeavour**  **Nature and development of science**  • Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena  • Important contributions to the advancement of science have been made by people from a range of cultures  **Use and influence of science**  • Scientific knowledge is used to inform personal and community decisions  **Science Inquiry Skills**  **Questioning and predicting**  **Planning and conducting**  **Processing and analysing data and information**  **Evaluating**  **Communicating**  The teaching and learning in this unit works towards the following in Year 9:  **Science Understanding**  **Physical sciences**  • Forms of energy can be transferred in a variety of ways through different mediums  Australian Curriculum, Assessment and Reporting Authority, 2013, ‘*The Australian Curriculum: Science for Prep (F)-10’ Retrieved 8th October 2013*  *<* *http://www.australiancurriculum.edu.au/Science/Curriculum/F-10>* | |
| **Feedback** | **Supportive learning environment** |
| **Feedback to students**  Establish active feedback partnerships between students and parents to find out:  • what each student already knows and can do  • how each student is going  • where each student needs to go next.  Ensure feedback is timely, ongoing, instructive and purposeful.  Feedback may relate to misunderstandings and common alternative conceptions. In this unit this may include:  **Light**  • Students may believe that the Moon is a source of light. Explain to students that the Moon reflects light from the Sun.  • Students may believe that when we see things the light is coming from our eyes and onto the object. This will become noticeable in ray diagrams. Explain to students that light enters our eyes after reflecting off a surface.  • Students may believe that light is able to bend as reflection is often referred to in this way. Explain to students that light always travel in a straight line.  • Students may believe that reflection of light can only occur on smooth or shiny surfaces. Explain that light reflects off all surfaces and then enters our eyes, but the rougher the surface the more the light rays scatter.  **Shadows**  • Students may believe that shadows are created when light shines on an object and creates a dark reflection of the object. Explain that shadows are the absence of light. The light is being blocked.  • Students may believe that shadows come from people and objects. Explain that shadows are only present when there is a light source that is being blocked.  • Students may believe that a shadow is something that exists on its own. Explain that a shadow will not exist in a completely dark place because of the lack of light. | **Differentiation**  What do your students already know and what do your students need to learn?  Consider the individual needs of your students - including ESL, gifted and talented, and students requiring additional support.  Start where students are at and differentiate teaching and learning to support the learning needs of all students. Plan and document how you will cater for individual learning needs.  The learning experiences within this unit can be differentiated by increasing:  • the frequency of exposure for some students  • the intensity of teaching by adjusting the group size  • the duration needed to complete tasks and assessment  For guided and/or independent practice tasks:  • student groupings will offer tasks with a range of complexities to cater for individual learning needs  • rotational groupings allow for more or less scaffolding of student learning. |
| **Assessment**  What do students understand and can do?  How well do they know and do it?  **Engage:**  **Diagnostic assessment:** designed to identify areas of weakness and strength. Diagnostic assessment may include: checklists, running records, continua and formal assessment tools  **Explore:**  **Formative assessment:** used to map/monitor learning progress during a unit of work. Formative assessment provides ongoing feedback to teachers and students. The assessment provides information on progress, and identifies and addresses areas that require further development e.g. writing folios, work conferencing, teacher questioning, learning journals, portfolios, digital portfolios, reading logs, observations, interviews, and continua such as the Year 2 Net.  **Explain:**  **Formative assessment:** used to map/monitor learning progress during a unit of work. Formative assessment provides ongoing feedback to teachers and students. The assessment provides information on progress, and identifies and addresses areas that require further development e.g. writing folios, work conferencing, teacher questioning, learning journals, portfolios, digital portfolios, reading logs, observations, interviews, and continua such as the Year 2 Net.  **Elaborate**  **Summative assessment:** generally completed at the end of a unit of work to document the level of achievement. Summative assessment may include: written tests, oral presentations, concept maps, problem solving activities, project work, essays, formal assignments and exams. This assessment can provide feedback to the teacher about the effectiveness of the unit of work.  **Evaluate:**  **Summative assessment:** generally completed at the end of a unit of work to document the level of achievement. Summative assessment may include: written tests, oral presentations, concept maps, problem solving activities, project work, essays, formal assignments and exams. This assessment can provide feedback to the teacher about the effectiveness of the unit of work.  Education Queensland, Department of Education Training and Employment 2013, ‘ Assessment’, Retrieved 10th November 2013.  <http://education.qld.gov.au/staff/learning/diversity/teaching/assessment.html>  . | **Monitoring student learning**  Student learning can be monitored throughout the teaching and learning process to determine student progress and learning needs.  Each lesson should provide opportunities to gather evidence about how students are progressing and what they need to learn next.  An example of this could be:  **Recorded observations and discussions**   * Through observations and discussions across the unit, monitor how well students can: * classify objects as opaque, transparent, translucent * present information collected in investigations * understand how light is reflected, refracted and absorbed in a variety of contexts * understand the formation of shadows * question, predict, plan and develop scientific explanations within investigations.   **Student response to activity – Periscope**  **investigation**  Check students' responses to gauge their capacity to:   * develop scientific questions and predictions under guidance * create scientific procedures and explanations under guidance * record observations, using diagrams as appropriate, and identify patterns in their results * evaluate the effectiveness of a procedure * apply their knowledge of reflection, refraction, absorption and transmission to solve a problem |
| **Sequence teaching and learning.** | **Teaching Plan** |
| For the components of the teaching material and sequencing of this unit I have considered the case study discussed in Skamp (2012 p 201-204) and Light Fantastic (Australian Academy of Science 2008). I have individualised these resources with numerous digital resources. I have considered   * What do my students already know and can do? * What do my students need to learn? How do I teach it?   I will start with what students already know and set goals for the  next steps for learning.  I will provide multiple opportunities for all students to explore and consolidate ideas, skills and concepts by considering how students learn best and by using a variety of teaching strategies.  I will use the 5 E model suggested by both Skamp (2012 p 201-204) and Light Fantastic (Australian Academy of Science 2008). These phases being:  **Engage.**  This is designed to stimulate the students curiosity and create questioning that will both elicit understandings and create a framework for adjustments based on those understandings or misconceptions.  **Explore:**  The students will use hands on strategies to collect evidence and learn how to discuss observations and journal them using appropriate language and concepts. This phase lends itself to students working in groups and sharing ideas.  **Explain:**  Students will consider existing scientific views and deepen their own understanding. They will discuss interactions within their observations and develop scientific explanations. I will be able to monitor their understandings and provide feedback.  **Elaborate:**  Students will conduct an investigation that will enable them to apply and extend their theoretical understandings and extend them to a new context. I will use the students reports to assess their achievements and learning outcomes for this unit.  **Evaluate:**  This phase will give the students an opportunity to reflect on their learning’s. I will as the students to generate a literacy conclusion that will represent their understanding. I will then access all of the evidences to identify the extent of the students achieving and learning outcomes for the unit. | Please refer to lesson plans and lesson overview for further information and focus.  **Engage:**  Lesson 1 What is light?  Lesson 2 In the dark.  Lesson 2a Looking for light.  **Explore**  Lesson 3 How we see.  Lesson 4 How does light travel?  Lesson 5 Make way for light.  Lesson 6 Shadows  **Explain:**  Lesson 7 Periscope investigation  **Elaborate:**  Lesson 8 Properties of light  Lesson 9 Shadow puppets  **Evaluate:**  Lesson 10 The Maze trick |
| **Reflection on the unit plan**  Identify what worked well during and at the end of the unit for future planning. Reflection may include:  • activities that worked well and why  • activities that could be improved and how  • monitoring and assessment that worked well and why  • monitoring and assessment that could be improved and how  • common student misconceptions that need, or needed, to be clarified  • Differentiation and future student learning needs. | |

References:

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Skamp, Keith 2012, *Teaching primary science constructively*, 4th ed, Cengage Learning, South Melbourne, Vic