

Middleton Grange School – Science Triennial Board Report – July 2019

Update:

Science in the Primary School is closely linked with other curriculum areas such as Social Studies and Technology. Following a two-year scheme (See appendix 1), broad themes or threads are investigated. (Appendix 2 shows a cover page for the Term 3 theme/thread for Odd Years.) Based on this termly theme, in this case 'May the Force Be with You', Learning Teams collaboratively plan and teach units that align with a particular thread and encompass multiple aspects of the curriculum. E.g. Reading, Writing, Mathematics, Science, Technology, Social Studies and Visual Art could all be incorporated into the study of one thread over a term. (See Appendix 3 for the unit overview used by the Year 5-6 Learning Team for this Term's study of Flight.) Please note that this Learning Team moved this unit from Term 3 to Term 2 so that it would correlate with timing of Matariki and the Primary Art Exhibition.) Because the threads are very broad the units taught at each level of the school can be very different, while the overarching thread provides continuity across the school in terms of the theme, and FPC and curriculum coverage.

Science is often taught using an Inquiry based approach. This process incorporates many aspects of the key competencies, allows pupils to work collaboratively or independently and often facilitates input from parents and outside community agencies.

Strengths & Weaknesses:

Strengths of the current scheme:

- It allows for collaborative planning covering a wide range of learning contexts.
- It provides scope to tailor learning to the specific needs, events or interests of the pupils.
- It allows variety and creativity for both pupils and teachers.
- It ensures good curriculum coverage and allows different subjects to be easily integrated. Decentralizing subjects often encourages pupils to use and learn subject specific skills and content as a natural part of the inquiry process.
- It allows whole school topics/themes while allowing each Learning Team scope to individualise their units to avoid unnecessary repetition of content.

Weaknesses of the current scheme:

- If Learning Teams do not communicate and regularly check with each other in regards to what focus each team is planning to have, the resources they are going to require, and any fieldtrips or external organisations they are planning to use there is the potential for double ups, last minute changes and frustration.
- There is also the potential for units to stagnate and become 'old' and out of date if they are not developed, refined and reevaluated each time the theme comes up.

Links to Special Character & FPCs:

In the Primary School the FPC's are interwoven into all classroom practice and their incorporation in the teaching and learning of Science is no different. Overt links for each Topic can be seen on the Two Year Scheme (Appendix 1) The intention is that teachers have a close look at these and focus on what is appropriate, topical and possibly what hasn't already been covered as far as the FPCs are concerned.

Achievement Information:

We do not currently collect achievement information across the Primary School in Science. Any assessments that teachers conduct occur to inform their teaching practice and to create next steps for individuals and their class. As a Primary School we will need to have a rigorous korero regarding what and how we will integrate Science into our recording and reporting on Linc-Ed for the end of 2019.

The Future:

We believe that continuing to integrate Science into the established 2-year scheme is the best plan moving forward. It allows creativity and ingenuity when planning while providing a depth of well thought out and proven resources and unit plans.

Our immediate next steps are to:

- Develop appropriate systems for recording and reporting learning achievement in Science using Linc-Ed.
- Integrate/weave the DTHM curriculum into the planning and teaching of Science.

Social Studies, Science and Technology NB: Ideally at least one Inquiry topic per year and one unit involving Scientific Processes

	Term 1	Term 2	Term 3	Term 4
<p>Even Year</p> <p>NB. Conceptual Strands can be moved to different terms within a year to align and integrate with school or team-wide themes</p>	<p>SS Imago Dei (Made in God's image) FPC 2, 4, 10, 11, 13</p> <p>Identity, Culture and Organisation 'Knowing me, knowing you'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • My class, my school • Me and my family, Whanau • Treaty of Waitangi • Christians caring for others • Who am I and what's my impact • Rules and Responsibilities <p>BIG QUESTION: Why are we able to survive on 'Spaceship Earth'?</p>	<p>SC The Existence of God FPC 1, 3, 4, 8</p> <p>Planet Earth and Beyond 'Earth is our Spaceship'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • Earth Systems • Seasons and Tides • The Water Cycle • Astronomical Systems • Solar Energy • Space Exploration • <i>Technology Challenges</i> <p>BIG QUESTION: Why are we able to survive on 'Spaceship Earth'?</p>	<p>SS God's World FPC 4, 8, 12</p> <p>Place and Environment 'Environment and Impact'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • Mapping • Living on an island • Tangata Whenua • Special Places • A Pacific Island Family • Global Citizenship • Natural Disasters • Immigrants and refugees • Helping Agencies • <i>Impact of Technology on Society</i> 	<p>SC Design and Detail FPC 1, 4, 7, 12</p> <p>Material World 'The Mad Scientists Club'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • Scientific Process • Air • Water • Melting and Dissolving • Floating and Sinking • Freezing and Thawing • Mixing and Separating • Making Crystals • Kitchen Chemistry • Predicting, Experimenting, Concluding <p>BIG QUESTION: What chemical changes or properties can we see and explain?</p>
<p>Odd Year</p>	<p>SS Created for Community FPC 4, 5, 10, 11</p> <p>Continuity and Change 'Looking back to look forward'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • God's plan for humanity • Integrate with Scripture or MGS school-wide theme • Work of missionaries • Heroes of the faith • ANZAC/Treaty of Waitangi • Grandparents • Early Canterbury • Times past 	<p>SC Creator and Created FPC 4, 5, 6, 7, 8</p> <p>Living World 'Under the Microscope'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • Creation • Life Processes • Ecology • Classification and change over time • Endangered Animals • Native Flora and Fauna • Ocean Life • Forest Life • Stream or Garden <p>BIG QUESTION: What influences living things?</p>	<p>SC God's Power FPC 1, 4, 12</p> <p>The Physical World 'May the force be with you'</p> <p>Possible Contexts</p> <ul style="list-style-type: none"> • Light, darkness, shadows • Electricity • Forces and Motion • Sound • Gravity and Flight • Heat • Physical laws and Spiritual Laws • Simple Machines • <i>Technological Knowledge</i> <p>BIG QUESTION: How do everyday forces (sound, light, electricity) work?</p>	<p>SS Stewardship FPC 3, 4, 6</p> <p>The Economic World/Technology 'Enterprise, Innovation, and Creativity'</p> <p>Possible Contexts:</p> <ul style="list-style-type: none"> • Down on the Farm • Small business • Using technology • Production and processes • Solving environmental problems • Conserving resources • <i>Technological Practice – Design, create and evaluate</i>

'May the Force Be with You'

(The Physical World)

Term 3: Odd year

DEEP UNDERSTANDINGS

Level One & Level Two: Everyday physical phenomena can be studied and understood. They behave in a consistent and predictable way.

Level Three: We can explore, predict and describe the physical properties of movement, electricity, sound, light and heat.

THE BIG QUESTION

How do everyday forces (sound, light, electricity) work?

FPC 1, 4, 12

POSSIBLE CONTEXTS

Light, darkness & shadows

Torches & simple circuits

Friction, forces & movement

Gravity and flight

Magnification

Mirrors, periscopes, prisms & lenses

Electronics Ice, water, steam

Wheels and machines

Electricity and its uses

Light & spectra



Integration ideas

- Making simple machines or gliders
- EOTC - Science Alive, Steam museum (Ferrymead)
- Reading - Nonfiction
- Maths - speed, ratios, angles (refraction)
- Art - Tessellations using reflection/rotation, kites
- Health - safety with electricity, heat, machines
- Physical laws -vs- spiritual laws

Flight - May the Force Be with You

2019	Level 3	Term 2-3	Aoraki Year 5/6 Team
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School Vision: Middleton Grange School assists families in the education of their children by providing an environment in which the Biblical truths of Jesus Christ are taught and lived.

Science - Nature of Science	Technology - Technological Practice
<p>Understanding about Science</p> <ul style="list-style-type: none"> Appreciate that science is a way of explaining the world and that science knowledge changes over time. Identify ways in which scientists work together and provide evidence to support their ideas. <p>Investigating in Science</p> <ul style="list-style-type: none"> Build on prior experiences, working together to share and examine their own and other’s knowledge. Ask question, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations. <p>Communicating in Science</p> <ul style="list-style-type: none"> Begin to use a range of scientific symbols, conventions, and vocabulary. Engage with a range of science texts and begin to question the purposes for which these texts are constructed. <p>Participating and Contributing</p> <ul style="list-style-type: none"> Use their growing science knowledge when considering issues of concern to them. Explore various aspects of an issue and make decisions about possible actions. 	<p>Planning for Practice</p> <ul style="list-style-type: none"> Undertake planning to identify the key stages and resources required to develop an outcome. Review planning, identify implications. <p>Brief Development</p> <ul style="list-style-type: none"> Describe the nature of an intended outcome, explaining how it addresses the need or opportunity. <p>Outcome Development and Evaluation</p> <ul style="list-style-type: none"> Investigate a context to develop ideas for potential outcomes. Trial and evaluate.
Technology - Nature of Technology	
	<p>Characteristics of Technology</p> <ul style="list-style-type: none"> Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts... <p>Characteristics of Technological Outcomes</p> <ul style="list-style-type: none"> Understand that technological outcomes are recognizable as fit for a purpose by the relationship between their physical and functional natures.
Science - Physical World	Key Biblical Understandings
<p>Physical Inquiry and Physics Concepts</p> <ul style="list-style-type: none"> Explore, describe, and represent patterns and trends for every day examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat. <p>Specific Learning Outcomes Pupils will:</p> <ul style="list-style-type: none"> Identify the nature and properties of air Experiment with how objects behave in air Explain what flight is Identify things that can fly Examine a bird’s wing and how it is able to fly Understand the four forces of flight (lift, drag, gravity and thrust) Examine the parts of an aircraft and how each part performs in flight Explore how structures and adaptations make flight possible 	<p><i>What key Biblical concept/knowledge/principal will this unit cover? Include passages of Scripture if possible.</i></p> <ul style="list-style-type: none"> God’s creative genius- Birds and Flight, sycamore seeds etc. Social responsibility- The actions of people affect those who are around them and have the potential to either benefit (technological advance) or harm them (misuse of technology, poor stewardship or selfish/sinful behaviour). The greatness in God’s design- discuss and ‘unpack’ the significance of the verse, characteristics of the eagle and God’s promise to those who wait on Him. <p style="text-align: center;">Those who wait upon the Lord will renew their strength, they will mount up with wings like eagles, and they will run and not be weary, they shall walk and not faint. Isaiah 40vs 31</p>

Social Studies	Mathematics
<p>Level 2</p> <ul style="list-style-type: none"> Understand how people make choices to meet their needs and wants. Understand how time and change affect people's lives. <p>Level 3</p> <ul style="list-style-type: none"> Understand how the movement of people affects cultural diversity and interaction in New Zealand. 	<p>Measurement</p> <ul style="list-style-type: none"> Create and use appropriate units and devices to measure length, area, volume and capacity, weight (mass), turn (angle), temperature, and time. Partition and/or combine like measures and communicate them, using numbers and units. <p>Statistical Investigation</p> <ul style="list-style-type: none"> Conduct investigations using the statistical enquiry cycle: posing and answering questions gathering, sorting, and displaying category and whole-number data communicating findings based on the data.
<p>Specific Learning Outcomes Pupils will:</p> <ul style="list-style-type: none"> Identify ways that the advent of powered flight has changed transport, global connectedness and lifestyle. Understand the development history of flight and how social events have influenced it (war and space race) Identify events or individuals that have had a great impact in the history of flight and articulate their understanding of that impact. 	<p>Specific Learning Outcomes Pupils will:</p> <ul style="list-style-type: none"> Make predictions regarding the effect of variables on an outcome Accurately measure volume, length, weight and angles Sort results appropriately Draw conclusions and communicate these to others
Te Ao Māori and Tikanga Māori:	Visual Art
<p>Learning Experiences Pupils will investigate, design and make traditional Maori kites</p> <ul style="list-style-type: none"> Manu taratahi (triangular kite) Upoko tangata (rectangular kite) Manu patiki (diamond kite) <p>https://www.pinterest.nz/pin/597712181764899310/?lp=true</p>	<p>Understanding the Visual Arts in Context</p> <ul style="list-style-type: none"> Investigate the purpose of objects and images from past and present cultures and identify the contexts in which they were or are made, viewed, and valued. <p>Developing Practical Knowledge</p> <ul style="list-style-type: none"> Explore some art-making conventions, applying knowledge of elements and selected principles through the use of materials and processes. <p>Developing Ideas</p> <ul style="list-style-type: none"> Develop and revisit visual ideas, in response to a variety of motivations, observation, and imagination, supported by the study of artists' works. <p>Communicating and Interpreting</p> <ul style="list-style-type: none"> Describe the ideas their own and others' objects and images communicate. <hr/> <p>Learning Experiences</p> <p>Art Exhibition Artwork – Theme Matariki (<i>need to be finished by end of Week 5</i>)</p> <ul style="list-style-type: none"> Te manu tukutuku - Rebecca 3D art – Geoff - Aeroplane window view https://www.huffpost.com/entry/dreamlike-airplane-window-paintings-recapture-the-joy-of-flight_n_55a545ece4b0b8145f73aee0 Pastels – Robyn - plane front view (Marlina Vera) Biography: https://www.marlinavera.com/ Collage: Jan - Shredded paper birds / painted background

Teaching and Learning Activities:

Week 1 & 2

Book 30

- The nature and properties of air
- How objects behave in air

Activities

- Air is something pg8
- What is wind pg9
- Push in air pg10

Week 3-4

Kites (Forces of Lift and Drag)

- Classic design and characteristics of kites.
- Traditional Maori designs, artwork etc.

Art Exhibition Artwork – Theme Matariki (need to be finished by end of Week 5)

- Te manu tukutuku - Rebecca
- 3D art – Geoff - Aeroplane window view https://www.huffpost.com/entry/dreamlike-airplane-window-paintings-recapture-the-joy-of-flight_n_55a545ece4b0b8145f73aee0
- Pastels – Robyn - plane front view (Marlina Vera) Biography: <https://www.marlinavera.com/>
- Collage: Jan - Shredded paper birds / painted background
- Matariki artwork – stars?

Week 5

Book 17

- What is flight? What is not flight?
- What can fly?

Week 6

Art Exhibition

Introduce Fair Scientific Testing

- Changing one variable at a time to measure the effect on the outcome

Week 7

Principles of flight – 4 forces experiments

- Paper Parachutes, Running experiments (Drag)
- Paper Helicopters, Paper airfoil (Lift)

- Rocket Challenge starts

Week 8

Visit the Air Force Museum

- The history of flight
- Technical developments over time
- Social impacts of advances in flight technology
- Discuss that the creativity and subsequent developments in flight technology were motivated by war, the Space Race, etc

Week 9-10

Bottle Rocket Design Project

- Define variables affecting bottle flight (Amount of water in bottle (Thrust), wings vs fins (Drag/Lift), nose weight (gravity), ramp angle (Lift))
- Conduct fair tests to identify the optimum for each variable
- Design, build, modify and test Bottle Rockets

Resources:

Ministry of Education – Building Science Concepts Book 30, 17

Dave Elder (Staff member who is a pilot)

<http://www.sciencekids.co.nz/lessonplans/flight.html>

<https://howthingsfly.si.edu/forces-flight>

Movie: Paper Planes

The Aerodynamics of Flight <https://www.youtube.com/watch?v=5ltjFEei3AI>

How do airplane wings work? - Live Experiments (Ep 43) - Head Squeeze

<https://www.youtube.com/watch?v=Mgz2n4hR3Jw>

Kites

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Aero_p016/aerodynamics-hydrodynamics/fly-a-kite#background
<https://my.christchurchcitylibraries.com/te-manu-tukutuku/>

Journals

Pt 3/3/2003: Bottles into Rockets

Pt 4/2/1997: Round the Pole Flying

Pt 3/1/2003: The Bishop, the Boeing and Billy the Pigeon

L3/May/2015: Tautai

Story Library: Flying High

L3/Nov/2016: Turbulence

Connected 2 2002: Manu Tukutuku

Connected 1 2004: Air Air Everywhere

Pt 2/3/1997 Race You to Breakfast

Readers

Flying Ace (Year 6)

Connected 3 Matariki: 2003

library resources
<http://health.tki.org.nz/Key-collections/Exploring-te-ao-kori/Learning-experiences/Games-and-pastimes/Kite-making-Manu-aute>
<https://teara.govt.nz/en/kites-and-manu-tukutuku/page-3>

Assessment Schedule:

Practical Tasks
Teacher Observation

Unit Evaluation: