PowerAnchor Curriculum mapping – Year 7

**NOTE: Bullet points are ACARA provided elaborations for each outcome for this year level.*

Content Area	Outcome Code	Suggested Teaching Activities	Race and Chase	Helicar	Protocar	Skylap	Downforce Racer
Science Content							
Science Understanding							
Earth and space sciences: Some of Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable • considering what is meant by the term 'renewable' in relation to the Earth's resources • considering timescales for regeneration of resources	(ACSSU116)	Investigate balsawood / HIPS (High Impact Polystyrene) / corflute (polypropylene) to determine the material's sustainability.	✓	✓	✓	✓	✓
Physical sciences: Change to an object's motion is caused by unbalanced forces, including Earth's gravitational attraction, acting on the object • investigating the effects of applying different forces to familiar objects • investigating common situations where forces are balanced, such as stationary objects, and unbalanced, such as falling objects • investigating a simple machine such as lever or pulley system • exploring how gravity affects objects on the surface of Earth	(ACSSU117)	Complete pulley systems reading and activities. Investigate examples and apply to student vehicle constriction.	✓				
Science as a human endeavour							
Use and influence of Science: Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations • relating regulations about wearing seatbelts or safety helmets to knowledge of forces and motion	(ACSHE120)	Investigate seatbelt/safety helmet laws, relating them to forces and motion prior to testing student vehicles. Identify similar forces and motion in test.	✓		✓		✓
Inquiry Skills							

Questioning and predicting: Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge • working collaboratively to identify a problem to investigate • recognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigation • using information and knowledge from previous investigations to predict the expected results from an investigation	(ACSIS124)	Watch the PowerAnchor project DVD. Students work together to identify a problem/challenge to solve using their vehicle (classic stunts as example). Student predict the performance of their vehicle against the problem/challenge based on DVD demonstration and their own initial vehicle testing.	✓	✓	✓	✓	✓
Planning and conducting: Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed • working collaboratively to decide how to approach an investigation • identifying whether the use of their own observations and experiments or the use of other research materials is appropriate for their investigation • developing strategies and techniques for effective research using secondary sources, including use of the internet	(ACSIS125)	Students collaborate to plan an investigation into balsawood / HIPS (High Impact Polystyrene) / corflute (polypropylene) as a construction material. Students collaborate to plan an investigation to determine student vehicle performance.	✓	✓	✓	✓	✓
Planning and conducting: Measure and control variables, select equipment appropriate to the task and collect data with accuracy • recognising the differences between controlled, dependent and independent variables • using a digital camera to record observations and compare images using information technologies • using specialised equipment to increase the accuracy of measurement within an investigation	(ACSIS126)	Students document vehicle performance during PowerAnchor testing using digital technology, this could include using a measurement scale and reviewing video in slow motion to determine vehicle speed. Light gates used to increase accuracy of timing laps around the PowerAnchor	✓	✓	✓	✓	✓

Processing and analysing data and information: Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate • understanding different types of graphical and physical representation and considering their advantages and disadvantages • using spreadsheets to aid the presentation and simple analysis of data • describing the trends shown in collected data	(ACSIS129)	Class reviews data being collected during vehicle testing and types of graphs. Vehicle lap times around the PowerAnchor are recorded in a spreadsheet. Formula used to calculate average speed during laps. Lap time and speeds presented as a graph for trend analysis.	✓	✓	✓	✓	✓
Processing and analysing data and information: Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence • referring to relevant evidence when presenting conclusions drawn from an investigation	(ACSIS130)	Students use data taken from testing to support claims of success or failure against the problem/challenge during the vehicle evaluation process.	✓	✓	✓	✓	✓
Evaluating: Reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements • identifying and considering indicators of the quality of the data when analysing results • suggesting improvements to inquiry methods based on experience	(ACSIS131)	Following the vehicle testing process, student reflect upon accuracy of data collection (such as capturing lap times) and suggest methods of improving accuracy	✓	✓	✓	✓	✓
Evaluating: Use scientific knowledge and findings from investigations to evaluate claims based on evidence • using the evidence provided by scientific investigations to evaluate the claims or conclusions of their peers	(ACSIS132)	Students refer to evidence such as observations and digital images captured during testing to support claims of success or failure against the problem/challenge during the vehicle evaluation process.	✓	✓	✓	✓	✓
Communicating: Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate • presenting the outcomes of research using effective forms of representation of data or ideas and scientific language that is appropriate for the target audience	(ACSIS133)	Students document the design process and the results of problem solving through a computer-generated design portfolio, including appropriate documentation of investigations (such as vehicle	✓	✓	✓	✓	✓

• using digital technologies to access information and to communicate and collaborate with others on and off site		testing) and data presented in tables and graphs.					
Design and Technologies Content							
Knowledge and understanding:							
Analyse how motion, force and energy are used to manipulate and control electromechanical systems when designing simple, engineered solutions • experimenting to select the most appropriate principles and systems on which to base design ideas, for example structural components to be tested for strength • calculating an engineered system's outputs, for example speed, brightness of light, volume of sound • producing prototypes and jigs to test functionality, including the use of rapid prototyping tools such as 3D printers • investigating components, tools and equipment, for example testing the durability of batteries, determining the effective range of wireless devices	(ACTDEK031)	Student investigate existing pulley systems and the principal of ratios, experiment with different pulley ratios on vehicles to improve performance. Students use CAD to produce custom parts including pulley wheels / axel or motor housings. Students record PowerAnchor lap time data and calculate average lap speed of vehicles.	✓	✓	✓	✓	✓
Analyse ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment • investigating and selecting from a broad range of technologies − materials, systems, components, tools and equipment − when designing for a range of technologies contexts • considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and the countries of Asia; the properties of textile fibres and fabrics determine end use • considering safe work practices, for example producing a safety information video that details risk management practices for using a piece of equipment in the classroom or within a community	(ACTDEK034)	Students investigate a range of materials to produce a vehicle from, this may include primary research, such as testing durability and workability or secondary research such as cost and sustainability. Student experiment with a range of cutting and joining techniques for the selected material to determine most suitable tools and techniques. Students complete appropriate safety tests and undergo required safety training prior to making their vehicles.	✓	✓	✓	✓	✓

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Processes and production skills:							
Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas • experimenting with traditional and contemporary technologies when developing designs, and discovering the advantages and disadvantages of each approach • investigating emerging technologies and their potential impact on design decisions, for example flame retardant fabrics or smart materials such as self-healing materials, digital technologies and agriculture • examining, testing and evaluating a variety of suitable materials, components, tools and equipment for each design project, for example the differences between natural hardwood and plantation softwood timbers, which determine their suitability for particular uses related to durability, for example interior or exterior use • selecting appropriate materials to acknowledge sustainability requirements by using life cycle thinking	(ACTDEP035)	Students compare and contrast the use of hand/power/machine/CAM techniques for working with the selected material of their vehicle. Students conduct tests of durability, workability and use of the required tools on potential vehicle materials to determine most suitable. Students conduct a life cycle analysis to determine the sustainability of the selected material for their vehicle.	✓	✓	✓	✓	✓
Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques • using a variety of critical and creative thinking strategies such as brainstorming, sketching, 3-D modelling and experimenting to generate innovative design ideas • considering which ideas to further explore and investigating the benefits and drawbacks of ideas, for example using digital polling to capture the views of different groups in the community	(ACTDEP036)	Students sketch and annotate a range of possible vehicle concept designs and provide an analysis to determine the most suitable for construction. Most suitable design progresses to a final workshop drawing, which may include a 3D model and/or physical prototype. Students document the design process and the results of problem solving through a	✓	✓	✓	✓	✓

• identifying factors that may hinder or enhance project development, for example intercultural understanding • developing models, prototypes or samples using a range of materials, tools and equipment to test the functionality of ideas • producing annotated concept sketches and drawings, using: technical terms, scale, symbols, pictorial and aerial views to draw environments; production drawings, orthogonal drawings; patterns and templates to explain design ideas • documenting and communicating the generation and development of design ideas for an intended audience, for example developing a digital portfolio with images and text which clearly communicates each step of a design process		computer-generated design portfolio					
Select and justify choices of materials, components, tools, equipment and techniques to effectively and safely make designed solutions • developing technical production skills and safe working practices with independence to produce quality solutions designed for sustainability • practising techniques to improve expertise, for example handling animals, cutting and joining materials • identifying and managing risks in the development of various projects, for example working safely, responsibly, cooperatively and ethically on design projects, assessing uncertainty and risk in relation to long-term health and environmental impacts • developing innovative ways of manipulating technologies using traditional and contemporary materials, components, tools, equipment and techniques and considering alternatives including emerging technologies that could be substituted to reduce waste or time	(ACTDEP037)	Students develop technical skills through the production of a vehicle by hand, including measuring, cutting and joining materials. This includes working safely and minimising the waste of materials.	✓	✓	✓	✓	✓
Independently develop criteria for success to evaluate design ideas, processes and solutions and their sustainability	(ACTDEP038)	Students develop a criteria for success for measuring against	✓	✓	✓	✓	✓

• developing criteria for success to evaluate the success of designed solutions in terms of aesthetics, functionality and sustainability • considering how to improve technical expertise • evaluating designed solutions and processes and transferring new knowledge and skills to future design projects		the initial design problem/challenge that includes function, aesthetics and sustainability. The criteria is reflected upon during the final evaluation of the student vehicle against the design brief.					
Use project management processes when working individually and collaboratively to coordinate production of designed solutions • explaining and interpreting drawings, planning and production steps needed to produce products, services or environments for specific purposes • organising time, evaluating decisions and managing resources to ensure successful project completion and protection of the work space and local environment • identifying risks and how to avoid them when planning production • investigating the time needed for each step of production	(ACTDEP039)	Students annotate design sketches to include details on how vehicle is constructed. Students write a procedure detailing vehicle construction in the allocated timeframe with appropriate terminology include materials, tools, techniques and risk management.	✓	✓	✓	✓	✓
Mathematics Content							
Number and Algebra							
Real numbers: Recognise and solve problems involving simple ratios • understanding that rate and ratio problems can be solved using fractions or percentages and choosing the most efficient form to solve a particular problem	(ACMNA173)	Students complete activities on ratios. Students produce a detailed, scale sketch of an electric motor consisting of cylindrical prisms based on their own measurements and scale calculations.	✓	✓	✓	✓	✓
Measurement and Geometry							
Shape: Draw different views of prisms and solids formed from combinations of prisms	(ACMMG161)	Students produce design sketches that consist of 3D shapes, presented in a range of	✓	✓	✓	✓	✓

• using aerial views of buildings and other 3-D structures to visualise the structure of the building or prism		views including top (aerial), front and side. Students produce a detailed, scale sketch of an electric motor consisting of cylindrical prisms based on their own measurements.					
Statistics and Probability							
Data representation and interpretation: Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data • understanding that summarising data by calculating measures of centre and spread can help make sense of the data	(ACMSP171)	Vehicle lap times around the PowerAnchor are recorded in a spreadsheet and calculate mean, median, mode and range. Measure of centre and spread calculated.	✓	✓	✓	✓	✓
Data representation and interpretation: Describe and interpret data displays using median, mean and range • using mean and median to compare data sets and explaining how outliers may affect the comparison • locating mean, median and range on graphs and connecting them to real life	(ACMSP172)	Students graph vehicle lap times and locate mean, median and range. Class share individual mean and medians, and investigate how shortest and longest lap time affect them.	✓	✓	✓	✓	✓