

9ITD: Design Aerodynamics & Specifications – CO2 Dragster

Achievement Standard: By the end of Year 10 students will have had the opportunity to design and produce at least four designed solutions focused on one or more of the five technologies contexts content descriptions. Students use design and technologies knowledge and understanding, processes and production skills and design thinking to produce designed solutions to identified needs or opportunities of relevance to individuals and regional and global communities. Students work independently and collaboratively. Problem-solving activities acknowledge the complexities of contemporary life and make connections to related specialised occupations and further study. Students create designed solutions for one or more of the technologies contexts based on a critical evaluation of needs or opportunities. They establish detailed criteria for success, including sustainability considerations, and use these to evaluate their ideas and designed solutions and processes. They create and connect design ideas and processes of increasing complexity and justify decisions. Students communicate and document projects, including marketing for a range of audiences. They independently and collaboratively apply sequenced production and management plans when producing designed solutions, making adjustments to plans when necessary. They select and use appropriate technologies skilfully and safely to produce high-quality designed solutions suitable for the intended purpose. Students identify the steps involved in planning the production of designed solutions. They develop detailed project management plans incorporating elements such as sequenced time, cost and action plans to manage a range of design tasks safely. They apply management plans, changing direction when necessary, to successfully complete design tasks. Students identify and establish safety procedures that minimise risk and manage projects with safety and efficiency in mind, maintaining safety standards and management procedures to ensure success. They learn to transfer theoretical knowledge to practical activities across a range of projects.

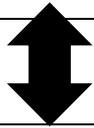
Engineering principles and systems

Engineering principles and systems is focused on how forces can be used to create light, sound, heat, movement, control or support in systems. Knowledge of these principles and systems enables the design and production of sustainable, engineered solutions. Students need to understand how sustainable engineered products, services and environments can be designed and produced as resources diminish. Students will progressively develop knowledge and understanding of how forces and the properties of materials affect the behaviour and performance of designed engineering solutions. They can do this by learning about and working with materials, specifications and design production processes. Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials either discretely in the development of products or through producing designed solutions for a technologies specialisation; for example engineering the CO2 Dragster.

READING / VIEWING / LISTENING:

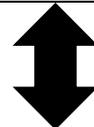
Core Text 2: What is Aerodynamics and how does it affect a Dragster Design?
Inquiry Charts with a review of forces and movement.

COMPREHENSION SKILL FOCUS:
Science connection overviews
Quick writes – learning logs



THINKING:

Sequence, sketch, draw, explain and evaluate



WRITTEN / SPOKEN / MULTI-MODAL TEXTS
Power point, Access and use of Scaffolded written folio.

HIGHLY VALUED LANGUAGE FEATURE FOCUS:
Design and Technology language and vocabulary

WORKSHOP PRACTICES

This project involves gaining knowledge, attitude, and skills, required to select, measure and cut materials according to job specifications, within the quality tolerances and requirements, realistic job completion timeframes, safety and personal conduct requirements of a workshop based production.

Key take home skills;

- Have a clear understanding of design requirements
- Demonstrate knowledge of WH&S by using correct PPE and practical demonstration in the workshop
- Demonstrate basic practical skills such as the use of relevant tools
- Perform a sequence of routine tasks given clear directions
- Select only two tools out and in use at one time
- Work at allocated vice /space with a safe attitude
- Correct way and attitude to stand in a teacher demonstration (semi-circle single file)
- Produce a series of sketches and final drawing as part of a design folio
- Accurately measure and cut materials according to product requirements
- Entry and exit procedures into the workshop
- Bags must be locked in the bag box locked for lesson
- All students must have a pencil and pen for ITD lessons
- Margin and date in books
- Housekeeping clean up procedures
- Timeline for project completion

Assessment:
Student Workbook
Practical Project:
CO2 Dragster
Design 10 weeks
Due Term 2 Week 5



9 ITD																
	<ul style="list-style-type: none"> • creation of designed solutions for one or more of the technologies contexts based on a critical evaluation of needs or opportunities • creation and connection of design ideas and processes of increasing complexity • justification of decisions • communication and documentation of projects, including marketing for a range of audiences 															
4	In addition to Score 3, in-depth inferences and applications that go beyond what was taught. <ul style="list-style-type: none"> • I can make decisions throughout the design process to generate a solution with the resources available. 															
3.5																
3	I can: <ul style="list-style-type: none"> • devise a designed solution for timber/plastic/metal contexts based on an analysis of needs or opportunities • connect design ideas and processes of increasing complexity in Generating and Designing phase • explain decisions • communicate and document projects for target audiences I exhibit no major errors or omissions.															
2.5																
2	I will know that I have learned it when I can: <ul style="list-style-type: none"> • Recall basic vocabulary such as: <table border="1" style="width: 100%; text-align: center;"> <tbody> <tr> <td>Plastics</td> <td>Dragster</td> <td>Tung Drum</td> </tr> <tr> <td>Acrylic</td> <td>Aero Dynamic</td> <td>Finger joint</td> </tr> <tr> <td>Transparent</td> <td>Drag</td> <td>Mitre joint</td> </tr> <tr> <td>Properties</td> <td>Force</td> <td>Vibration</td> </tr> <tr> <td>Density</td> <td>Accelerate</td> <td>Hardwood</td> </tr> </tbody> </table> • perform basic processes, such as: <ul style="list-style-type: none"> ○ identify key elements from the design brief ○ recognise and make connections between the properties of materials, manufacturing methods and existing designs ○ sketch preliminary design ideas and describe key features via annotations ○ recognise the 'pros' and 'cons' of each design and determine the best solution ○ identify and logically organise evidence to support the best solution However, I exhibit major errors or omissions regarding the more complex ideas and processes.	Plastics	Dragster	Tung Drum	Acrylic	Aero Dynamic	Finger joint	Transparent	Drag	Mitre joint	Properties	Force	Vibration	Density	Accelerate	Hardwood
Plastics	Dragster	Tung Drum														
Acrylic	Aero Dynamic	Finger joint														
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Properties	Force	Vibration														
Density	Accelerate	Hardwood														
1.5																
1	With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes is demonstrated.															

Guaranteed Vocabulary:	Design Question Three Strategies:	Design Question Four Strategy:	21 st Century Skill:
<ul style="list-style-type: none"> • Equipment/names/uses/safety when using equipment • Personal safety, Machine and tool safety • Knowledge of materials • Procedures and processes • Measuring equipment/ templates • Product modification • Individual work • Team work 	<p>ELEMENTS AND STRATEGIES</p> <p>Art and Science of Teaching</p> <p>Element 6-Chunking the content</p> <p>Presenting content in small sequentially related steps</p> <p>Allowing processing time between chunks</p> <p>Element 7- Processing content</p> <p>Thinking hats or Think pair share</p> <p>Element 8- Recording and representing knowledge</p> <p>Academic note books</p> <p>Informal outlines and processes</p> <p>Combination of notes pictures and summaries</p> <p>Summaries – questions to support summary writing</p> <p>Identify big ideas and smaller details into informal outline</p>	<p>ELEMENTS AND STRATEGIES</p> <p>Element</p> <p>9- structured practice sessions</p> <p>10-Examining similarities and differences</p> <p>11-Examining errors in reasoning</p>	<ul style="list-style-type: none"> • Collaboration and teamwork. • Creativity and imagination. • Critical thinking. • Problem solving.
Guaranteed Skills/Language Features:	Reading Comprehension Skill and Strategy:	Cognitive Verbs:	ICT to Enhance Learning:
<ul style="list-style-type: none"> • PMI & evaluation – this text structure is taught and used for evaluation after each practical lesson • Cornell note taking – this technique is taught and used for taking notes and revising and summarising key information • Design Portfolio – this text structure is taught and used when completing a Design Brief 	<ul style="list-style-type: none"> • Hands on Reading (Buehl, 2017) problem solving the meaning of technical texts to enable the reader to complete the practical task. • Question-Answer Relationships (Buehl, 2017), alert students to balance what an author tells them with what the author expect them to already know. • Structured note-taking (Buehl, 2017), to assist students to see the connections between provided information, subsequent practical lessons and discussions giving an opportunity for visual representation of the information required. 	<ul style="list-style-type: none"> • Select: pick out, choose in preference • Sequence: arrange in a particular order • Investigate: carry out an examination or formal inquiry in order to establish or obtain facts and reach new conclusions • Explain: make an idea or situation plain or clear by describing it in more detail or revealing relevant facts • Evaluate • Compare: display recognition of similarities and differences and recognise the significance of these similarities and differences • Manipulating/operating/using equipment – displaying competence choosing and using an implement to perform a given task effectively 	<ul style="list-style-type: none"> • Research – students research existing Acrylic cutlery to present solutions to a design brief (e.g. meeting a specified time requirement, using a specified materials, utilising specified skills, utilising a specified tools and equipment) • WPH&S – Act and effect in workplaces like schools.

Learning Goals:

Australian Curriculum Content Descriptors	Kirwan High Goals
KNOWLEDGE AND UNDERSTANDING	
<p>Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved ACTDEK040</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> Analyse factors that lead to safe operating processes including social and sustainability factors establishment of detailed criteria for success in the design of a CO2 car
<p>Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions ACTDEK041</p> <ul style="list-style-type: none"> explaining the consequences of social, ethical and sustainability decisions for products, services and environments, for example a managed public environment such as a theme park 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Use the design process to make adjustments to meet design briefs and challenges Creation of designed solutions for one or more of the technologies contexts based on a critical evaluation of needs or opportunities Use of materials like Hoop Pine in the production of the CO2 cars.
<p>Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions ACTDEK046</p> <ul style="list-style-type: none"> critiquing the design of an existing product to identify environmental consequences of material selection justifying decisions when selecting from a broad range of technologies – materials, systems, components, tools and equipment analysing and explaining the ways in which the properties and characteristics of materials have been considered in the design of a product with specific requirements 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Follow workshop expectations, entry and exit procedures Safely and correctly use tools and equipment following and creating safe operating procedures
PROCESSES AND PRODUCTION SKILLS	
<p>Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas ACTDEP048</p> <ul style="list-style-type: none"> identifying appropriate tools, equipment, techniques and safety procedures for each process and evaluating production processes for accuracy, quality, safety and efficiency 	<p>Students will be able to:</p> <ul style="list-style-type: none"> select and demonstrate correct, safe use of tools and equipment demonstrate correct technique for use of materials, tools and equipment critique their use of tools and equipment for future practices
<p>Work flexibly to effectively and safely test, select, justify and use appropriate technologies and processes to make designed solutions ACTDEP050</p> <ul style="list-style-type: none"> explaining safe working practices required for a specific classroom design project for individual or community use modifying production processes to respond to unforeseen challenges or opportunities 	<p>Students will be able to:</p> <ul style="list-style-type: none"> make judgements of a finished product against criteria to meet a design brief read and modify texts safe workshop practices and practises for specified design brief work in a team of students to complete a task (practical)
<p>Develop project plans using digital technologies to plan and manage projects individually and collaboratively taking into consideration time, cost, risk and production processes ACTDEP052</p> <ul style="list-style-type: none"> creating production flowcharts using digital technologies to ensure efficient, safe and sustainable sequences 	<p>Students will be able to:</p> <ul style="list-style-type: none"> write detailed design process to meet a design brief or specified criteria follow safe operation procedures to complete a project individually reflect on and evaluate the design process used against specified criteria

Possible Habit of Mind: Managing Impulsivity

Exploring Meaning of the HOM By the end of this unit students will be able to: <ul style="list-style-type: none"> • 	Expanding Capacity for using the HOM By the end of this unit students will be able to: <ul style="list-style-type: none"> • 	Increasing Alertness for the HOM By the end of this unit students will be able to:	Extending Values of the HOM By the end of this unit students will be able to: <ul style="list-style-type: none"> • 	Building Commitment towards the HOM By the end of this unit students will be able to: <ul style="list-style-type: none"> •
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General Capabilities – (highlight what you are covering)

Literacy	Comprehend texts	Navigate, read and view learning area texts	Listen and respond to learning area texts	Interpret and analyse learning area texts	Express opinion and point of view	Understand learning area vocabulary	Use spelling knowledge
	Compose texts	Compose spoken, written, visual and multimodal learning area texts	Deliver presentations	Use knowledge of text structures	Use knowledge of sentence structures	Understand how visual elements create meaning	
Numeracy	Understand and use numbers in context	Estimate and calculate	Use money	Recognise and use patterns and relationships	Interpret proportional reasoning	Apply proportional reasoning	
	Visualise 2D shapes and 3D objects	Interpret maps and diagrams	Interpret data displays				
ICT	Recognise intellectual property	Apply digital information security practices	Apply personal security protocols	Identify the impacts of ICT in society	Define and plan information searches	Locate, generate and access data and information	Select and evaluate data and information
	Generate ideas, plans and processes	Generate solutions to challenges and learning area tasks	Understand computer mediated communications	Collaborate, share and exchange	Manage digital data	Select and use hardware and software	Understand ICT systems
Critical and creative thinking	Pose questions	Identify and clarify information and ideas	Organise and process information	Imagine possibilities and connect ideas	Consider alternatives	Seek solutions and put ideas into action	
	Think about thinking (metacognition)	Reflect on processes	Transfer knowledge into new contexts	Apply logic and reasoning	Draw conclusions and design a course of action	Evaluate procedures and outcomes	
Personal and social capabilities	Recognise emotions	Understand themselves as learners	Develop reflective practice	Express emotions appropriately	Develop self-discipline and set goals	Work independently and show initiative	Become confident, resilient and adaptable
	Appreciate diverse perspectives	Contribute to civil society	Understand relationships	Communicate effectively	Work collaboratively	Make decisions	Negotiate and resolve conflict
	Develop leadership skills						
Ethical understanding	Recognise ethical concepts	Explore ethical concepts in context	Reason and make ethical decisions	Consider consequences	Reflect on ethical action	Examine values	Explore rights and responsibilities
	Consider points of view						
Intercultural understanding	Investigate culture and cultural identity	Develop respect for cultural diversity	Explore and compare cultural knowledge, beliefs and practices	Communicate across cultures	Consider and develop multiple perspectives	Empathise with others	
	Reflect on intercultural experiences	Challenge stereotypes and prejudices	Mediate cultural difference				

Cross Curriculum Priorities:

<input type="checkbox"/> Aboriginal and Torres Strait Islander histories and cultures	<input type="checkbox"/> Asia and Australia's engagement with Asia	<input type="checkbox"/> Sustainability
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Differentiation [for small groups or individuals]:

Choice of product will be adjusted for specific skills and tools where required.
 Written LENGTH of responses will be adjusted for individuals where required.
 Scaffolding of student worksheets for individuals where required.

