



#### Introduction

Educators,



Invent a Sport for Social Distancing Challenge is an opportunity to engage your students in an Engineering Design task as they tackle a real-world problem.

This is not a competition, but an opportunity for your learners to imagine, design and create as they build upon their CESA Key Capabilities. This challenge will focus on:

- Literate, Numerate and Effective Communicators
- Self-Aware, Collaborative and Socially Adept
- Knowledgeable, Inquisitive, and Innovative
- Confident and Careful Creator and User of ICT

Your Role: As a designer of learning you can further develop and contextualise this as an integrated learning unit for your class, embedding connections to your Science, Mathematics and Technologies programs. We have added the Australian Curriculum content descriptors and General Capabilities to support you with your planning.





# Learning Sequence

Students will work in small teams of 2-4 to develop solutions to this challenge. The challenge requires students to invent a sport or game to play during social distancing restrictions.

The challenge was developed around the Engineering Design Process, as this is a process familiar to many primary schools and aligns to the Design and Technologies Curriculum. If your school uses a different process, or variation of this engineering design process, please adjust the activities accordingly.

The challenge is designed to give teachers autonomy in how the challenge is delivered. You know how your students learn best and what learning areas you would like to focus on. The resources and learning activities within this Student Workbook have been created to support teachers in delivering the challenge, but you are free to adapt and adjust them to suit your cohort.

Throughout this challenge there will still be a need for moments of explicit teaching. The content of this teaching will vary from class to class based on their prior learning. For example, if your class has limited experience with representing data in visual formats you will need to include learning opportunities for students to learn this skill.

Primarily, this challenge has been designed as a cross-disciplinary unit between Design & Technology and Mathematics. However, due to the flexibility of this challenge you may also find connections with Health & PE, Science, Digital Technologies, etc. In the pages below we have identified relevant content descriptors for these subjects. Teachers are encouraged to select the subjects most appropriate for their class.



Following is an outline of the learning activities.

Learning Activities	
Ask: Activity 1	A whole class brainstorming task. Does not need to be done simultaneously. Each student has a row in the table to add their thoughts.
Ask: Activity 2	Students work in teams to develop a survey to collect data about sports and games. Students can survey classmates, family, etc Students may like to consider using <u>Microsoft Forms</u> to design their survey and collect data. Once data is collected students will display the results visually.
Ask: Activity 3	Students interview a family member about a sport or game they enjoy. Students design interview questions and can record the interview using notes, drawings, recordings, etc
Ask: Activity 4	Students analyse what makes a sport/game enjoyable to play. They record their opinion in the provided table.
Ask: Group Reflection	Students share with their group what they have learnt during the ASK phase.
Imagine: Activity 1	Students individually generate ideas for a sport or game that can be played while adhering to social distancing protocols. Students create a visual map of their ideas.
Imagine: Activity 2	This activity requires students to group ideate/brainstorm possible solutions. The included infographic provides some rules for this process.



	The group discussion could occur face-to-face, via a Teams meeting with a supervising adult, in a Teams channel, etc	
Imagine: Activity 3	In their groups, students follow the process for judging their ideas and deciding on a final idea to create.	
Imagine: Self Reflection	Students have an opportunity to reflect on their learning thus far. Students will also be asked to go to the CESA Capabilities journal and add their reflections and examples of learning.	
Plan: Activity 1	Students will work with their group to design and plan their sport or game. They are asked to make decisions about a variety of design elements. Again, the group discussion could occur face-to-face, via a Teams meeting with a supervising adult, in a Teams channel, etc	
Create: Activity 1	Students will work together to build their solution. This may start as a paper-based prototype but evolve to a more sophisticated solution using a variety of materials. Students take photos and annotate them.	
Create: Activity 2	As students are building their solutions, they are asked to think about the materials they use and what makes the materials suitable for the task.	
Create: Self Reflection	Students have an opportunity to reflect on their learning thus far. Students will also be asked to go to the CESA Capabilities journal and add their reflections and examples of learning.	
Improve: Activity 1	The group plays and assesses their sport or game, identifying what works and what could be improved. This is an iterative process where groups may adjust and re-test their solutions.	
Improve: Activity 2	The group reflects on the initial criteria and constraints, assessing their solution against them.	
Improve: Activity 3	The group will make an instructional video or presentation about their solution.	





	Students may consider dividing the presentation up with each group member contributing to part of the presentation. Groups ask others to play their sport or game and collect feedback from others. Groups may like to use Microsoft forms to collect feedback.	
Improve: Activity 4	Students reflect on the feedback they receive.	
CESA Capabilities Journal	4 CESA Key Capabilities have been selected for the challenge. The continuum is provided for students to use to self-assess. Students also have the opportunity to identify examples of whe they were developing a particular capability during the project. Students are asked to use the continua at various stages throughout the project and at the end of the project to reflect on their learning.	





# Australian Curriculum: Design & Technology

As part of this challenge you could choose to explore the following Design and Technology concepts:

- Engineering Design Process
- Types of materials and their suitability
- Different types of joining techniques
- Ways to work safely with tools

Below are the content descriptors relevant for the Design and Technology subject. Depending on the path you take with your class you may find other content descriptors that are also relevant.

	Knowledge & Understanding	Process & Production Skills	
Years 3-4	Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013)	Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques (ACTDEP015)	
		Select and use materials, components, tools, equipment, and techniques and use safe work practices to make designed solutions (ACTDEP016)	
		Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017)	
Years 5-6	Investigate characteristics and properties of a range of materials, systems, components, tools, and equipment and evaluate the impact of their use (ACTDEK023)	Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended design solutions (ACTDEP024)	







#### Australian Curriculum: Mathematics

As part of this challenge you could choose to explore the following Mathematical concepts:

#### Measurement:

- Explore how big 1m or 1m<sup>2</sup> is
- Number of cm or cm<sup>2</sup> in a metre
- Purpose of decimals in measurement
- Converting between measurements
- Area and perimeter

#### Statistics:

- Writing survey questions
- Interpreting and categorising data
- Different types of data displays and their purpose
- Features of graphs e.g. axis, labels
- Scale
- Digital programs for gathering and creating data displays

Below are the content descriptors relevant for the Mathematics subject. Depending on the path you take with your class you may find other content descriptors that are also relevant.





	Statistics and Probability	Measurement and Geometry
Year 3	Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording (ACMSP068) Collect data, organise into categories, and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies (ACMSP069) Interpret and compare data displays (ACMSP070)	Measure, order and compare objects using familiar metric units of length, mass, and capacity (ACMMG061)
Year 4	Select and trial methods for data collection, including survey questions and recording sheets (ACMSP095) Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values (ACMSP096) Evaluate the effectiveness of different displays in illustrating data features including variability (ACMSP097)	Use scaled instruments to measure and compare lengths, masses, capacities, and temperatures (ACMMG084) Compare objects using familiar metric units of area and volume (ACMMG290)
Year 5	Pose questions and collect categorical or numerical data by observation or survey (ACMSP118)	Choose appropriate units of measurement for length, area, volume, capacity,





	Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies (ACMSP119) Describe and interpret different data sets in context (ACMSP120)	and mass (ACMMG108) Calculate perimeter and area of rectangles using familiar metric units (ACMMG109)
Year 6	Interpret and compare a range of data displays, including side-by- side column graphs for two categorical variables ACMSP147 Interpret secondary data presented in digital media and elsewhere (ACMSP148)	Connect decimal representations to the metric system (ACMMG135) Converts between common measurement of units, length, mass, and capacity (ACMMG13) Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137)

#### Australian Curriculum: Science

As part of this challenge you could choose to explore the following Science concepts: Chemical Science

• Properties of materials for durability

#### Physical Sciences

• Forces with a focus on pushing and pulling

Below are the relevant content descriptors for Science



	Science Understandings
Year 4	<ul> <li>Chemical Sciences:</li> <li>Natural and processed materials have a range of physical properties that can influence their use (ACSSU074)</li> </ul>
	<ul> <li>Physical sciences</li> <li>Forces can be exerted by one object on another through direct contact or from a distance (ACSSU076)</li> </ul>

The following are some resources should you wish to explore forces with your class.







#### Reasoning:

Sport	Push or Pull	Explain Why
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## Australian Curriculum: Health & PE

As part of this challenge you could choose to explore the following Health and PE concepts:

- Positive benefits of playing sports
- Why fairness is important in sports
- Why rules are needed in sports
- Ways sports can be adapted for inclusivity

Below are some of the relevant content descriptors for Health & PE

	Personal, Social and Community Health	Movement and Physical Activity
Year 3-4	Identify and practise strategies to promote health, safety and wellbeing (ACPPS036)	Apply innovative and creative thinking in solving movement challenges ACPMP049
		Apply basic rules and scoring systems, and demonstrate fair play when participating in physical activities ACPMP050





Year 5-6	Plan and practise strategies to promote health, safety and wellbeing (ACPPS054)	Apply critical and creative thinking processes in order to generate and assess solutions to movement challenges (ACPMP068)
		Demonstrate ethical behaviour and fair play that aligns with rules when participating in a range of physical activities (ACPMP069)

# General Capabilities: Literacy

Composing texts through speaking, writing and creating element	Level 2 End of Year 2	Level 3 End of Year 4	Level 4 End of Year 6
Compose spoken, written, visual and multimodal learning area texts	Compose and edit a small range of learning area texts	Compose and edit a range of learning area texts	Compose and edit learning area texts
Use language to interact with others	Use pair, group and class discussions as learning tools to explore learning area topics, to represent ideas and relationships, and to prepare for creating texts	Use pair, group and class discussions about learning area topics as learning tools to explore and represent ideas and relationships, test possibilities and to prepare for creating texts	Use pair, group and class discussions and informal debates as learning tools to explore ideas and relationships, test possibilities, compare solutions and to prepare for creating texts
Deliver presentations	Plan, rehearse and deliver short presentations on	Plan, rehearse and deliver presentations on learning area topics, incorporating	Plan, research, rehearse and deliver presentations on



learning area topics, incorporating some visual and multimodal elements	some learned content and appropriate visual and multimodal elements	learning area topics, selecting appropriate content and visual and multimodal elements to suit different audiences
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## General Capabilities: Numeracy

Interpreting statistical information element	Level 2 End of Year 2	Level 3 End of Year 4	Level 4 End of Year 6
Interpret data displays	Collect and describe data on a relevant issue based on one variable and display as lists, tables or picture graphs	Collect, record and display data as tables, diagrams, picture graphs and column graphs	Collect, compare, describe and interpret data as 2-way tables, double column graphs and sector graphs, including from digital media
Using measurement element			
Estimate and measure with metric units	Estimate, measure and order using direct and indirect comparisons and informal units to collect and record information about shapes and objects	Estimate, measure and compare the length, temperature, volume, capacity and mass of everyday objects using metric units and scaled instruments	Choose and use appropriate metric units for length, area, volume, capacity and mass to solve everyday problems

### General Capability: ICT

Creating with ICT	Level 2	Level 3	Level 4
element	End of Year 2	End of Year 4	End of Year 6





Generate ideas, plans and processes	Use ICT to prepare simple plans to find solutions or answers to questions	use ICT to generate ideas and plan solutions	use ICT effectively to record ideas, represent thinking and plan solutions
Generate solutions to challenges and learning area tasks	Experiment with ICT as a creative tool to generate simple solutions, modifications or data representations for particular audiences or purposes	Create and modify simple digital solutions, creative outputs or data representation/ transformation for particular purposes	Independently or collaboratively create and modify digital solutions, creative outputs or data representation/ transformation for particular audiences and purposes
Collaborate, share and exchange	Use purposefully selected ICT tools safely to share and exchange information with appropriate local audiences	Use appropriate ICT tools safely to share and exchange information with appropriate known audiences	Select and use appropriate ICT tools safely to share and exchange information and to safely collaborate with others

## General Capability: Critical and Creative Thinking

Inquiring – identifying, exploring and organising information and ideas element	Level 2 End of Year 2	Level 3 End of Year 4	Level 4 End of Year 6
Pose questions	Pose questions to identify and clarify issues, and compare information in their world	Pose questions to expand their knowledge about the world	Pose questions to clarify and interpret information and probe for causes and consequences
Identify and clarify information and ideas	Identify and explore information and ideas from source materials	Identify main ideas and select and clarify information from a range of sources	Identify and clarify relevant information and prioritise ideas



Generating ideas, possibilities and actions element			
Imagine possibilities and connect ideas	Build on what they know to create ideas and possibilities in ways that are new to them	Expand on known ideas to create new and imaginative combinations	Combine ideas in a variety of ways and from a range of sources to create new possibilities
Consider alternatives	Identify and compare creative ideas to think broadly about a given situation or problem	Explore situations using creative thinking strategies to propose a range of alternatives	Identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions
Seek solutions and put ideas into action	nvestigate options and predict possible butcomes when putting deas into action butcomes when putting butcomes		Assess and test options to identify the most effective solution and to put ideas into action
Reflecting on thinking and processes element			
Reflect on processes	Outline the details and sequence in a whole task and separate it into workable parts	Identify pertinent information in an investigation and separate into smaller parts or ideas	Identify and justify the thinking behind choices they have made
Transfer knowledge into new contexts	Use information from a previous experience to inform a new idea	Transfer and apply information in one setting to enrich another	Apply knowledge gained from one context to another unrelated context and identify new meaning
Analysing, synthesising and evaluating reasoning and procedures element			
Draw conclusions and design a course of action	Identify alternative courses of action or possible conclusions	Draw on prior knowledge and use evidence when	Scrutinise ideas or concepts, test conclusions and modify



	when presented with new information	choosing a course of action or drawing a conclusion	actions when designing a course of action
Evaluate procedures and outcomes	Evaluate whether they have accomplished what they set out to achieve	Explain and justify ideas and outcomes	Evaluate the effectiveness of ideas, products, performances, methods and courses of action against given criteria

## General Capability: Personal and Social

Self-awareness element	Level 2 End of Year 2	Level 3 End of Year 4	Level 4 End of Year 6
Recognise personal qualities and achievements	Identify and describe personal interests, skills and achievements and explain how these contribute to family and school life	Describe personal strengths and challenges and identify skills they wish to develop	Describe the influence that personal qualities and strengths have on their learning outcomes
Develop reflective practice	Reflect on what they have learnt about themselves from a range of experiences at home and school	Reflect on personal strengths and achievements, based on self-assessment strategies and teacher feedback	Monitor their progress, seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential
Self-management element			





Work independently and show initiative	Work independently on routine tasks and experiment with strategies to complete other tasks where appropriate	Consider, select and adopt a range of strategies for working independently and taking initiative	Assess the value of working independently, and taking initiative to do so where appropriate	
Become confident, resilient and adaptable	Undertake and persist with short tasks, within the limits of personal safety	Persist with tasks when faced with challenges and adapt their approach where first attempts are not successful	Devise strategies and formulate plans to assist in the completion of challenging tasks and the maintenance of personal safety	
Social management element				
Work collaboratively	Identify cooperative behaviours in a range of group activities	Describe characteristics of cooperative behaviour and identify evidence of these in group activities	contribute to groups and teams, suggesting improvements in methods used for group investigations and projects	
Make decisions	Practise individual and group decision making in situations such as class meetings and when working in pairs and small groups	Contribute to and predict the consequences of group decisions in a range of situations	Identify factors that influence decision making and consider the usefulness of these in making their own decisions	





### Assessment/Evidencing

The following table is a guide to the formative and summative assessments which can form part of this challenge for each phase of the engineering Design Process. You do not need to use all these tasks as assessments.

	Ask	Imagine	Plan	Create	Improve
Assessment for Learning	Activity 2: Peer survey regarding sports and games Activity 3: What do others like about sports and games?	Activity 2: Generating ideas Activity 3: Judging ideas		Self-Reflection Journals 1-2	Activity 1: Test and Reflect
Assessment as Learning	Self- Assessment using CESA Key Capabilities	Self- Assessment using CESA Key Capabilities	Self- Assessment using CESA Key Capabilities	Self- Assessment using CESA Key Capabilities Create: Self Reflection entries	Activity 2: Critical Analysis Self- Assessment using CESA Key Capabilities Activity 4: Self Reflection
Assessment of learning			Activity 1: Design your sport or Games	Self-Reflection Journals 3-5	Activity 3: Presentation of game Self- Reflection Journal





#### Assessment Rubric

The following is an outline of a rubric for assessing students. The rubric should be coconstructed with students, allowing students to identify and discuss what achievement looks like.

We have included a wide variety of criteria, which do not all need to be assessed for this challenge. Please only select the criteria that students have had the opportunity to deeply engage with.

Criteria	Not meeting outcomes	Developing	Working At	Working Beyond	Exceeding
Mathematical Understanding					
Poses questions to collect selected data					
Constructs data displays from survey sources					
Able to interpret and explain data					
Design and Technology					
Identify needs and requirements					
Evaluate ideas and designs					
Identify appropriate materials					
Construct solutions using safe and sustainable practices					
Health & PE					
Apply strategies for working together and applying rules					
Decision making and problem solving to stay safe, active and healthy					
Use movement skills to solve challenges					





Critical and Creative Thinking			
Ability to pose questions			
Ability to identify and clarify information			
Ability to imagine possibilities and connect ideas			
Ability to consider alternatives			
Ability to seek solutions and put ideas into action			
Ability to reflect on themselves as learners			
Reflective of processes used			
Able to transfer Science, Mathematics and Technology concepts			
Personal and Social Capability			
Recognises personal qualities and achievements			
Develops reflective practices			
Works independently and shows initiative			
Becoming confident, resilient and adaptable			
Works collaboratively			
Makes decisions			
Literacy			
Composes spoken, written, visual and multimodal learning area texts			
Uses language to interact with others			





Delivers presentations			
Science Understanding			
Ability to explain different types of forces used			
Identifies natural and processed materials that have a range of physical properties that can influence their use			

#### References

This challenge was inspired by the John Spencer prompt <u>Invent a Sport That Can Be Played with Social</u> <u>Distance</u> Further information and resources by John Spencer can be found at <u>http://www.spencerauthor.com/</u>

What makes a good game? <u>https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/think-like-an-inventor/what-makes-a-good-game</u>