

Carnival CapeRs



STEM Innovation Experience
STEMIE

STEM Innovation Experience

Task Information

Carnival Capers

Introduction

Carnivals consisting of entertainment, rides and showbags have long been a tradition in Australia. The first Royal Show, held in Parramatta in 1823, focussed on agriculture, and soon included the introduction of free sample bags (later to become show bags). By 1920 a lively Sideshow Alley was featured.

*Photo courtesy of Royal Agricultural Society of NSW.
Establishment of Sideshow Alley 1920*



The Royal Agricultural and Horticultural Society of South Australia was established in 1844, with shows initially held at Botanic Park and moving to its current location at Wayville Showgrounds in 1925.

Other events outside the Royal Show that also have a carnival atmosphere include circus events, fetes, street parades, markets and festivals.

In Carnival Capers you will learn about some of the science, technology, engineering and mathematics that goes into the planning and running of carnivals.

“Life is a ticket to the greatest show on Earth.”

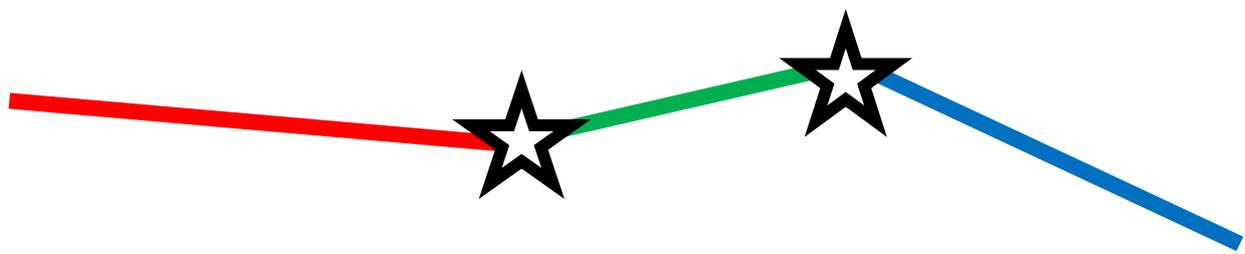
Dr Martin H. Fischer (Physician and Author)

“Happiness is a carnival game. It’s never as easy as it looks, but the dumb ones always seem to be walking around with a big stuffed animal.”

Dov Davidoff (American Comedian)

“Treat life like a ferris wheel ride. You must get past the fear to enjoy the view.”

Linda Poindexter (Author/Writer)



Carnival Capers

The STEM Innovation Experience (STEMIE) will focus on the STEM skills required to plan and run a carnival, including aspects of side show game design, developing a ticket entry system to the venue, investigating the science of show rides and budgeting to make a profit from the event.

The Requirements

Carnival Capers will require completion of the following tasks:

- Research into the science behind carnival rides including a scientific investigation into a feature of a specific ride, as outlined in the Science Component.
- Design a prototype of an entry system for your carnival, as outlined in the Technology Component.
- Design and create a functioning side show game, as outlined in the Engineering Component.
- Creation of an interactive spreadsheet that considers carnival profits and losses, as outlined in the Mathematics Task

Your school also needs to produce a Carnival Event Guide with information about the cost of entry, the safety of your rides, your showbag contents and pricing, and the side show alley attractions, as well as a brief outline about who is running the carnival (i.e. your school's STEMIE team). This will be used in the event of a tie at the Regional Showcase.



<https://www.smh.com.au/national/a-history-of-the-royal-easter-show-20130315-2g5e0.html>





STEMIE – The Three Parts

STEMIE will consist of three parts:

- The Learning Phase
 - This is completed at school and work is submitted through the UniSA STEMIE email address STEMIE@unisa.edu.au. The purpose of this phase is to demonstrate the learning that has occurred within the experience and to provide evidence that students have met the requirements to qualify for the Regional Showcase event.
- The Regional Showcase
 - This part will consist of an online event with University of South Australia staff judging the Science, Technology, Engineering and Mathematics components that have been completed at school. Schools will have a 1 ½ hour judging timeslot to demonstrate their work in these four areas. At the conclusion of all judging, the winning schools will be notified via email. In the event of a tie between schools within a region, the online overall task will be used as a tie breaker to decide the winner.
- The STEMIE Final
 - The winner from each Regional Showcase event, in addition to any wildcard schools (selected by the panel of judges after all Regional Showcase events) will compete in unseen STEM challenges at the University of South Australia. Details of dates and locations can be found in the initial invite emailed to schools and will also be sent again to winning schools.

STEMIE – Referencing

Research elements used within STEMIE Checkpoint Submissions and the Regional Showcase need to be referenced. The preferred style of referencing may vary between each school participating in STEMIE.

UniSA Outreach recommends using the SACE Guidelines (or equivalent in each state) for Referencing Documents when submitting work for assessment within STEMIE.

The Student Guide to Referencing and Guidelines for Referencing documents can be found at this link <https://www.sace.sa.edu.au/learning/research-advice/referencing>

STEMIE – The Learning Phase

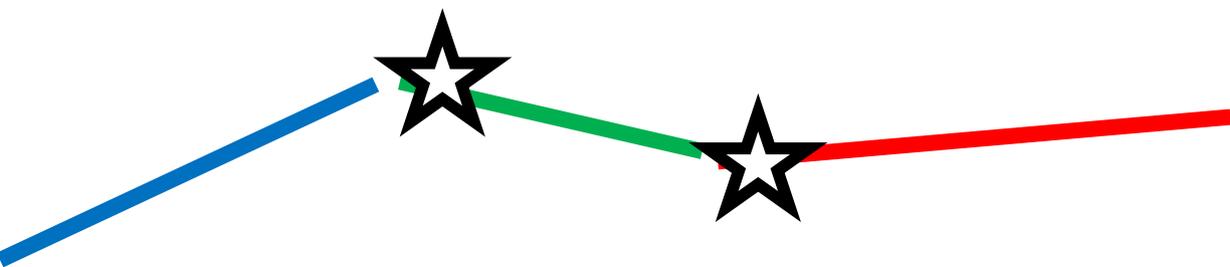
School Leaders and Teachers can choose how they implement The Learning Phase in their school. Components within The Learning Phase have been developed to be scalable from a small group of students to multiple classes interacting in the experience.

Throughout the Learning Phase, there are identified checkpoints where progress must be submitted. There are six (6) required tasks that must be submitted to qualify for the Regional Showcase. The additional tasks are optional for in school use only and do not need to be submitted to UniSA. Schools can use some, none or all of the optional tasks as they progress through STEMIE, but tasks R1 to R6 must be available for viewing via an online platform (website link or equivalent is preferred).

The range of assessment tasks requires team members to hold varied skill-sets, so working in teams with complementary abilities is advantageous. There are five key components within The Learning Phase – the Science, Technology, Engineering, Mathematics and Overall Summary components.



Notes:



STEM Innovation Experience Carnival Capers

Science Component

Science Component – Background Information

Carnival rides are a fundamental part of carnivals and first appeared in the 18th century. These rides were relatively small, made of wood and powered by people. In 1868 steam powered rides were developed including the infamous carousel ride.

Many carnival rides are designed to be quickly set up and taken down, allowing for transport to other locations. Carnival rides cater for people of all ages and people enjoy the effect from the motion of the rides, but safety is always a consideration. Qualified inspectors check the safety of these rides and this requires a strong understanding of science.



Carnival rides vary from the child friendly carousel rides and miniature railways to the thrill-seeking sling shots and adrenalin pumping roller coasters.

Combinations of circular motion, gravity, inertia, and potential and kinetic energy create the falls, spins, twists and even weightlessness sensations on carnival rides.

Science Component – The Requirements

As a group, investigate the science behind carnival rides.

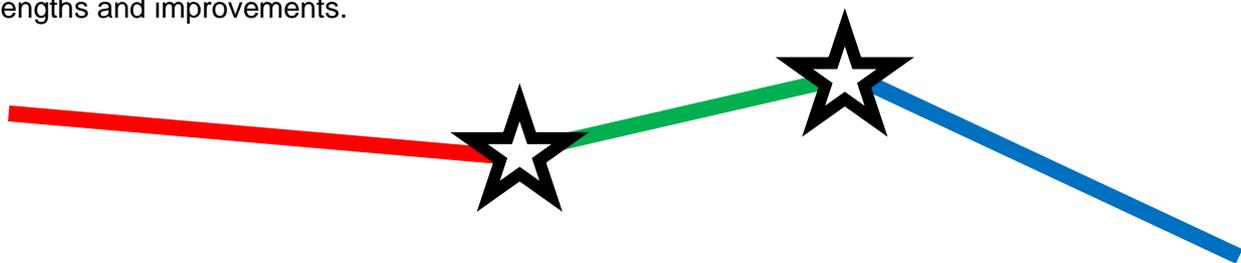
Choose a ride and investigate how it works.

Complete an investigation into one specific aspect of motion/momentum.

Note – Unsafe investigations are not permissible. Ensure that any experiments follow your school's safety procedures and are approved by the relevant people in your school.

This can be achieved by completing some or all of the following:

- Research various types of rides (e.g. merry go round, Ferris wheel, sling shot, ghost train, pirate ship) and the science of keeping them within a safe limit.
- Create and conduct a practical investigation methodology into an aspect of a ride.
- Analyse results and draw conclusions from the practical investigation.
- Adhere to school laboratory safety when conducting the practical investigation.
- Discuss and critically analyse the practical investigation methodology, with reference to strengths and improvements.



Science Component – Practical Investigation

The practical investigation methodology needs to be created to account for a specific aspect of a carnival ride. The purpose for conducting this investigation is to support the research about carnival rides and develop an understanding of how safety limits might be applied.

Ideas for this investigation could include:

- Momentum and motion practicals
- Centripetal forces
- Investigating dizziness, the effects of spinning on balance
- The psychological effects of being scared on a ghost train (heart rates etc)
- Other relevant sets of conditions

The methodology for the investigation can vary from school to school, however the format for the submitted practical write-up must include the following headings:

Practical investigation methodology of carnival ride experiment

- Hypothesis
- Aim
- Materials
- Method (including any safety requirements)

Results and conclusion from carnival ride experiment

- Results
- Conclusion

Discussion and analysis of the investigation methodology

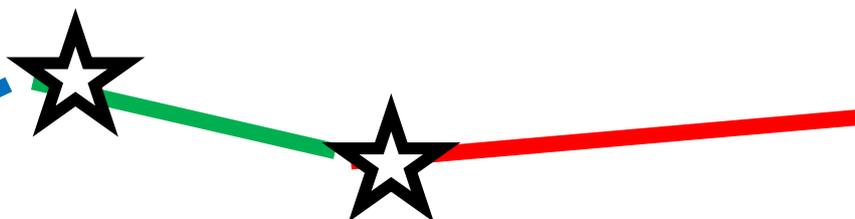
- Accuracy and precision of methodology
- Sources of random error
- Sources of systematic error
- Suggested improvements and limitations

Science Component – Elements for the Regional Showcase event

At the Regional Showcase event, students representing their school will be required to deliver a formal presentation to a workplace safety representative (UniSA Staff) and demonstrate how they know their ride is safe.

This presentation will be held via Zoom, judging timeslots will be allocated in September.

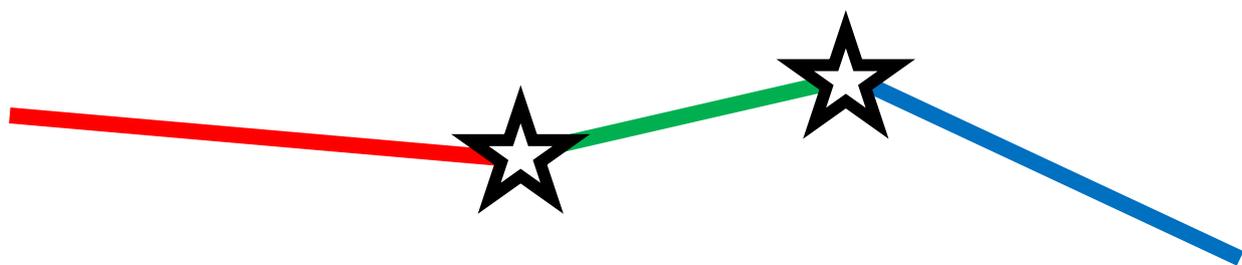
The presentation should be a maximum of seven (7) minutes, with up to an additional three (3) minutes for questions from the workplace safety representative (UniSA Staff).



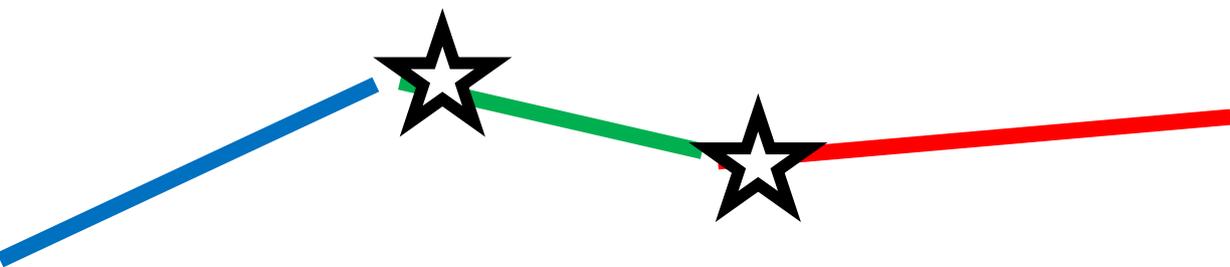
Carnival Capers
STEMIE Regional Showcase
Science Component

School: _____

Criteria	Marks Available	Total Marks
1. Summary of the history and regulations of carnival rides.	3 2 1 0 N/A	
2. Understanding of the science behind a specific carnival ride.	3 2 1 0 N/A	
3. Incorporation of research and practical results into presentation to make informed decisions about the limits of what can be done on that ride.	3 2 1 0 N/A	
4. Delivery of content knowledge, including the ability to answer questions posed by UniSA Staff.	3 2 1 0 N/A	
5. Communication and interaction with UniSA Staff, including the use of visual aids and appropriate presentation timing.	3 2 1 0 N/A	
Total Marks:		/15



Notes:



STEM Innovation Experience Carnival Capers

Technology Component

Technology Component – Background Information

Monitoring the number of people at a venue is an important aspect for the safety of patrons, as well as an essential part of monitoring profits and losses from entry ticket sales. Many companies develop software and systems to improve the process of entering major event venues, making it easy to track the attendance rates.



Technology Component – The Requirements

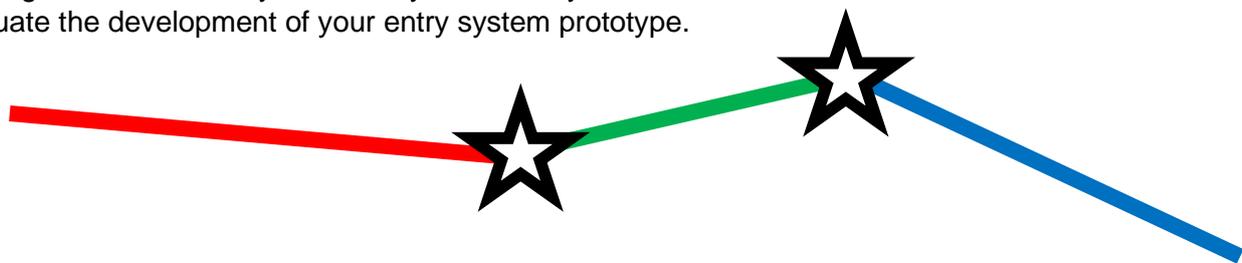
Create a functioning prototype of an entry system.

This should include:

- Clear instructions on how to pass through the entry system
- Ability to count patrons entering the venue
- Ability to count patrons exiting the venue
- A 3D printed component in your prototype
- A team member/s to trouble shoot sample codes

This can be achieved by completing some or all of the following:

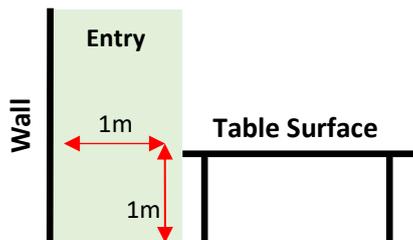
- Brainstorm and investigate entry systems.
- Develop an entry system that counts entry and exit of patrons.
- Develop a way to make your entry system automated.
- Design and create a 3D printed component using a CAD program for your prototype.
- Investigate additional ways to make your ticket system more effective.
- Evaluate the development of your entry system prototype.



Technology Component – Entry System Prototype

Create an entry system that can count the entry and exit of patrons. This prototype must incorporate a way of counting patrons using Arduino coding (manual input or sensor inputs). Computer Aided Design (CAD) software can be used to create 3D printed components for your entry system. The physical attributes of the entry system do not have to be to scale but must be able to demonstrate the functionality of the prototype at the Regional Showcase.

At the Regional Showcase the entry system prototype will need to be set up on a table 1m from the ground, and 1m from a wall to create the entry gateway. All patrons testing the entry system at the Regional Showcase must be over 1m tall.



The entry system prototype must be able to account for people entering through the 1m wide, 1m high, gateway. However, physical devices like boom gates do not have to be to scale - they only need to demonstrate the functionality.

Along with testing the functionality of the device, UniSA Staff will ask students to find simple errors in a sample code. These will be based on aspects of coding covered in the “Introduction to Coding” section of the student workshop on Moodle.

Technology Component – Elements for the Regional Showcase event

At the Regional Showcase event, students representing their school will be required to demonstrate their working entry system prototype.

As a minimum, the device should be able to record people entering and exiting. Additional features could include linking the entry system to a live display of the number of patrons or proceeds, accounting for various types of tickets (e.g. complimentary, family, visitor passes that allow you back in) or visual cues for when the next person can enter.

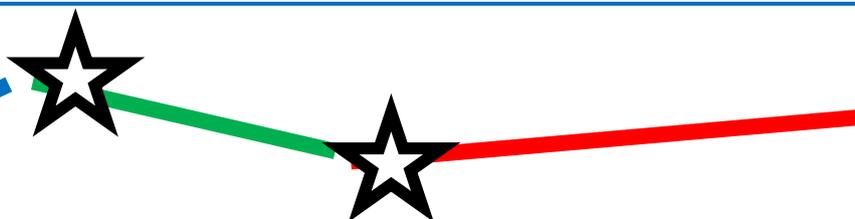
It is recommended that a device such as an iPad or mobile phone is linked to the Zoom meeting to allow judges to see the device from different angles if requested.

Programming Component – Elements for the Regional Showcase event

Along with demonstrating their entry system, students will also be required to complete a trouble shooting activity to find simple errors in a section of Arduino coding. The errors will be based on the activities covered in the student workshop “Introduction to Coding” section of the STEMIE Moodle.

The UniSA Staff will judge the entry system against the Technology Marks Sheet criteria. For additional functions and features to be awarded marks, they must be successfully demonstrated in the allocated judging time.

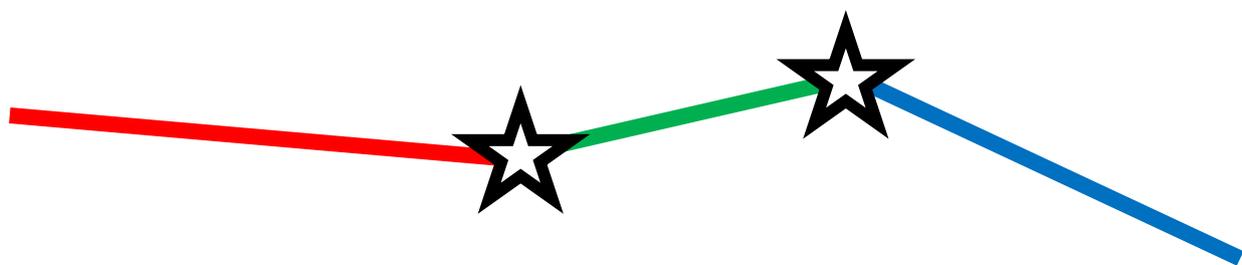
Each school will have a maximum of 10 minutes to demonstrate their entry system prototype. We recommend the prototype be set up before the judging time allocation to streamline the judging process.



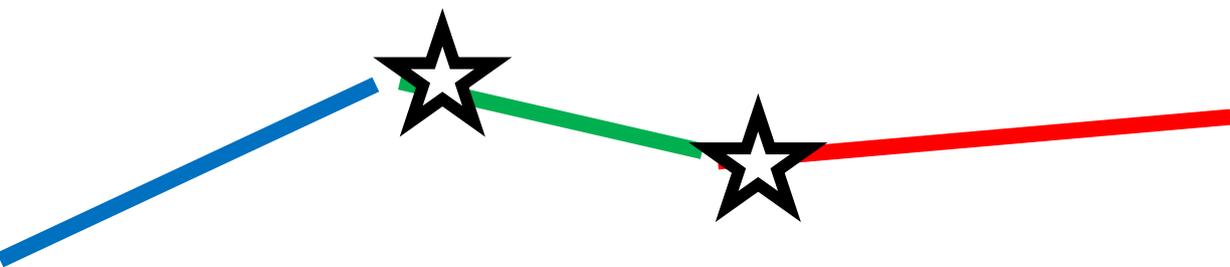
Carnival Capers STEMIE Regional Showcase *Technology Component*

School: _____

Criteria	Marks Available	Total Marks
3D printed component	<p>1 Mark – Printed but has visible scaffolding/rafting or general flaws in the print, and no obvious function in the device</p> <p>2 Marks – Well printed but only serves an aesthetic purpose</p> <p>Or 3 Marks – Well printed and has a set function in the device</p>	
Input Detection <i>Does the ticket system count?</i>	<p>1 Mark – Can detect but count is inaccurate</p> <p>2 Marks – Can detect and count accurately but requires manual input (e.g. button)</p> <p>Or 3 Marks – Can detect and count accurately and autonomously (e.g. sensor)</p>	
Output Response	<p>+1 Mark – Visual output on entry/exit</p> <p>+1 Mark – Audio output on entry/exit</p> <p>+1 Mark – Displays the number of patrons at the venue</p>	
Additional Features <i>These must be successfully demonstrated within the judging time limit</i>	<p>+1 Mark – Additional relevant ECS feature is successfully demonstrated</p> <p>+1 Mark – Another additional relevant feature successfully demonstrated</p> <p>+1 Mark – Another additional relevant feature successfully demonstrated</p>	
Can find errors in the sample code	<p>1 Mark – Can find 2 errors in the sample code</p> <p>+1 Mark – Can find additional errors in the sample code</p> <p>+1 Mark – Can find all errors in the sample code</p>	
Total Marks:		/15



Notes:



STEM Innovation Experience Carnival Capers

Engineering Component

Engineering Component – Background Information

Side show games can vary from skill-based games, such as shooting basketball hoops, to those based on pure luck, such as choosing a floating rubber duck to reveal a number that corresponds to a prize. Many side show games are aimed at the family market, appealing to both children and adults.



Throughout history, side show games have had a reputation for cheating their players, but well-designed games, based on either probabilities or skills, can still create a profit while being reputable. The most profitable games factor in how easily the game can be won and allocate prizes accordingly.

Engineering Component – The Requirements

Design and construct a functioning side show game that will be played by students during the Regional Showcase to demonstrate the game in action.

Note - Ensure that any equipment or practices are suitable for safe indoor participation and are approved by the relevant people in your school.

This can be achieved by completing some or all of the following:

- Brainstorm and investigate existing side show games.
- Sketch designs for construction and testing.
- Test the properties of different types of construction materials (e.g. glue, masking tape, Lego, balsa wood, etc.) to evaluate the best construction method.
- Construct and test the side show game.
- Explain the functions of the preferred design.
- Produce sketches of the chosen design (by drawing and/or CAD packages).
- Construct the chosen design for playing at the Regional Showcase event.



Engineering Component – Prototype Requirements

The game must be suitable to play indoors. If there is a throwing aspect of the game, netting may be required to contain the game within the area specified. Any materials can be used in construction except entirely pre-constructed game devices. The game needs to be appealing to play but at the same time not too easy to win so that profits are maximised.

Side Show Game Specifications

- Must be suitable to play indoors
- Must be able to be played repeatedly on the day
- Pre-existing games in their entirety cannot form any part of the prototype
- The supply of building materials is the responsibility of the school

Playing specifications

- The game will need to be set up ready to play before the judging timeslot begins.
- A student will need to demonstrate the game in action live during the Regional Showcase judging allocation.
- We recommend having either an iPad, mobile phone or similar device connected to the Zoom meeting to allow judges to view the game from requested angles.
- The game will need to be played a number of times to demonstrate repeatability during the allocated judging time.
- The game playing may use an allocation of imaginary UniSA cash to demonstrate the likelihood of winning the prizes or making a profit in the process of playing the game.
- There will be a profit margin score based on the appeal of the game versus the difficulty to win the major prizes. Games that give no prizes away will potentially lack repeat plays, games that give prizes away too easily will not make a profit.

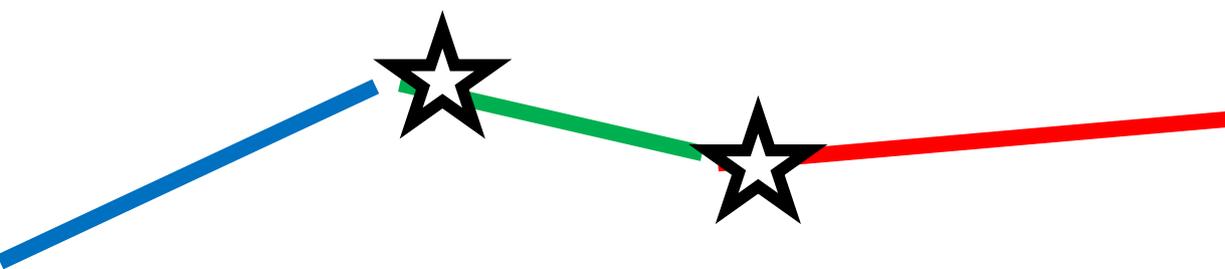
Engineering Component – Elements for the Regional Showcase event

At the Regional Showcase event judging will be online via Zoom, we recommend having a mobile device or similar connected to the meeting to allow the judges to view the game from requested angles. The side show game will need to be set up before the judging commences.

A member of the team will need to demonstrate the game in action as requested by the UniSA Staff.

Games can be “staffed” by another member of the team to reset the game as required (unless the game can function completely autonomously)

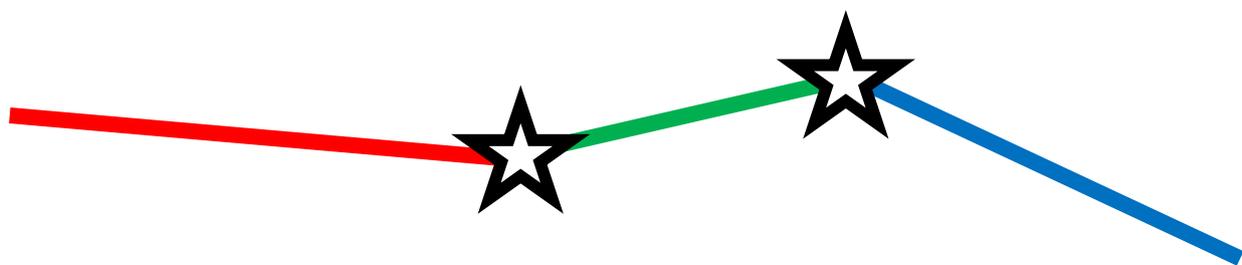
Schools will be marked against the supplied criteria, additional features must be demonstrated during the game play.



Carnival Capers STEMIE Regional Showcase *Engineering Component*

School: _____

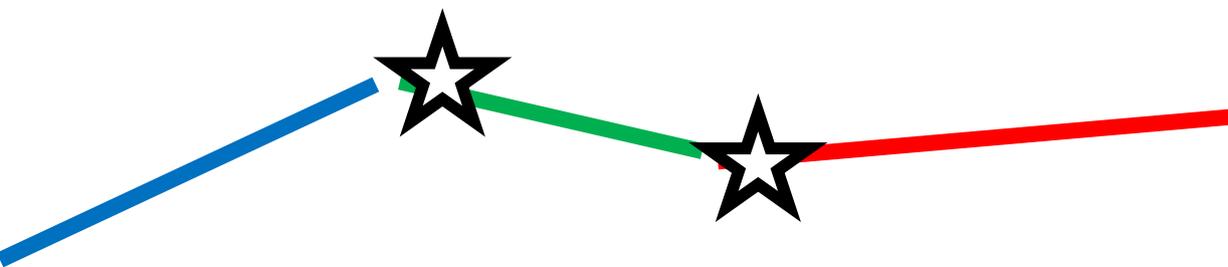
Criteria	Marks Available	Total Marks
Functionality	<p>1 Mark – Game has clear concept but not fully functional</p> <p>Or 2 Marks – Game has clear concept and fully functioning game play</p> <p>+1 Mark – Game is presented well to attract participants</p> <p>+1 Mark – Has a moving component in the game</p> <p>+ 1 Mark – Game is not too easy to win, has the potential to make a profit.</p>	
Accuracy <i>Clear prize levels</i>	<p>1 Mark – How to win a participation prize is clear, but how to win minor or major prizes is unclear</p> <p>Or 2 Marks – How to win a participation, minor and major prize is clear</p> <p>+ 1 Mark - Game functions accurately as designed</p> <p>+1 Mark – Game accurately displays the score</p>	
Autonomy	<p>1 Mark – Has an automated audio component</p> <p>+1 Mark – Has an interactive audio or visual component</p> <p>+1 Mark – Can reset autonomously</p>	
Additional Features	<p>+1 Mark – Additional relevant feature</p> <p>+1 Mark – Additional relevant feature</p> <p>+1 Mark – Additional relevant feature</p>	
Total Marks:		/15





University of
South Australia

Notes:



STEM Innovation Experience

Carnival Capers Mathematics Component

Mathematics Component – Background Information

Carnivals have a small window of opportunity to create a profit compared to venues that are open all year round. Perth Royal Show was in jeopardy when, in the years 2015 and 2016, it incurred an almost 5-million-dollar loss. Profits need to be maximised to ensure the events can run again in the future.

In the early days market stalls were often incorporated into the carnival, but these days food stalls dominate this profitable area. Other profits are gained from ticket sales, carnival rides and side show games. Show bags were initially free sample bags until the introduction of brightly decorated bags for the cost of a small fee, competing for income from the younger consumer market.



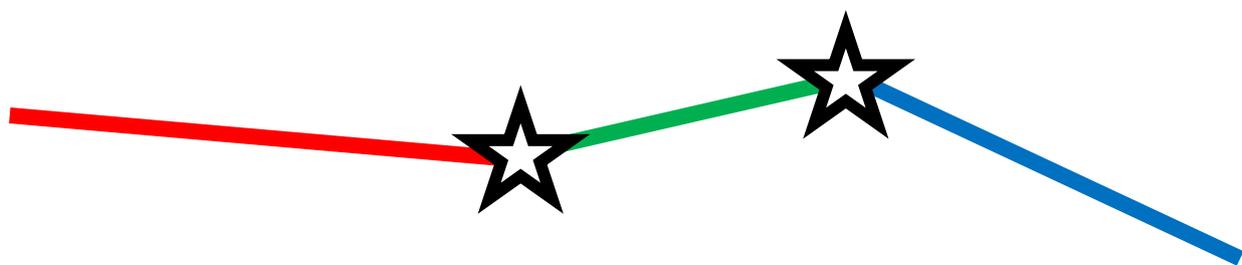
Royal Easter Show in Sydney 2019 attracted 900,000 show goers through the gates over the 12 days and sold over 1.6 million show bags*. It's not always easy to sell merchandise though, just have to look at the impact of COVID-19 which stopped many shows occurring at all.

*<https://www.eastershow.com.au/about-us/media/press-releases/>

Mathematics Component – The Requirements

Create an interactive spreadsheet that can account for various costing aspects of running a carnival and predict the profit/loss for your carnival, based on attendance numbers.

List any assumptions made in your spreadsheet calculations and prepare answers for the seen questions.



Mathematics Component – Carnival Capers Budget Breakdown

The spreadsheet needs to account for:

- Ticket sales (can include various levels, adult/child/family/complimentary)
- Income from show bag sales
- Income from side show games (this can be linked with the engineering task)
- Income from show rides
- Income from food stall sites
- Running costs (including venue hire, staffing, show bag purchases)

Note – Food stall sales and marketing costs for your show do not need to be considered.

A spreadsheet will need to be created (including a graph) that can account for changes in profit/loss when there is an increase or decrease in the estimated number of patrons attending. This spreadsheet will be demonstrated at the Regional Showcase.

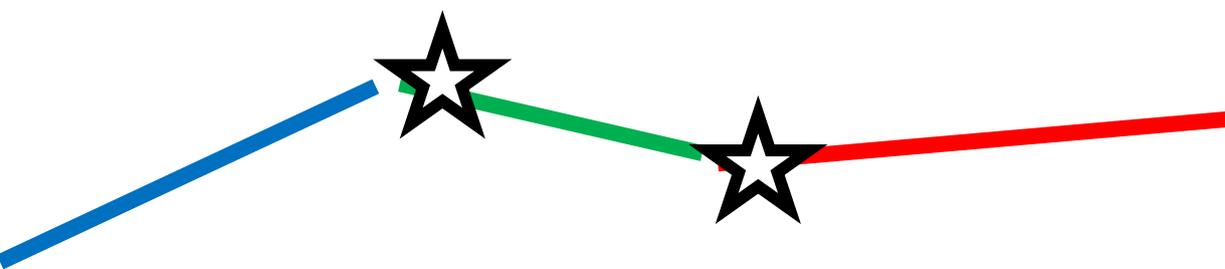
Mathematics Component – Elements for the Regional Showcase event

At the Regional Showcase event, students representing their school will be required to present their budget and spreadsheet to UniSA Staff for judging. Schools will be assessed by means of Question and Answer. From a list of five (5) seen questions, students will need to respond to two (2) questions chosen by the judge, before being asked to respond to one (1) unseen question. Students will also need to demonstrate how the spreadsheet can recalculate the carnival profit/loss when there are changes to attendance numbers and running costs.

Each school will be allocated 10 minutes to answer questions in their timeslot for judging at the Regional Showcase. The spreadsheet will need to be shared from the device that is connected to the Zoom meeting to allow judges to view it.

UniSA Staff will ask for a brief explanation and overview of the spreadsheet before they assess the responses to the two (2) seen and one (1) unseen questions.

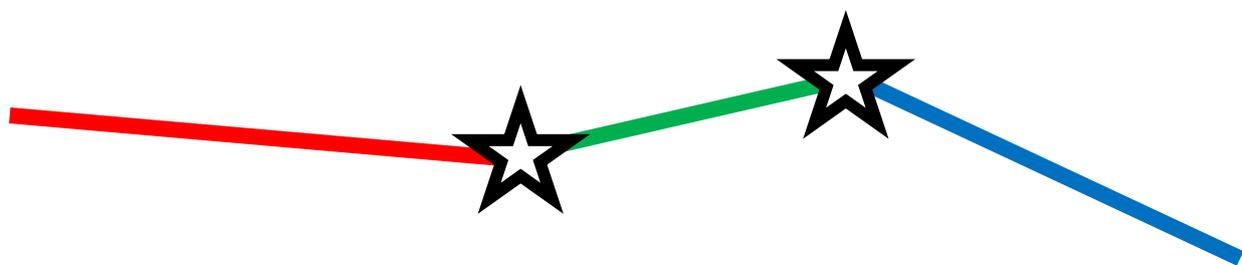
They will also ask for a demonstration of the dynamic spreadsheet, the spreadsheet will need to be shared in the meeting.



Carnival Capers STEMIE Regional Showcase *Mathematics Component*

School: _____

Questions	Marks Available	Total Marks
1. Reflect on your graph showing the total profit/loss.	3 2 1 0 N/A	
2. Describe how you accounted for show bag profits.	3 2 1 0 N/A	
3. Justify how you intend to maximise profit from the side show games.	3 2 1 0 N/A	
4. Explain how you worked out costing for the show rides.	3 2 1 0 N/A	
5. Explain how many people need to attend your event to break even.	3 2 1 0 N/A	
Demonstrate 2 variations using your spreadsheet (as requested by the UniSA Staff). Spreadsheet variation 1 – Show how a change in the number of people attending will impact on your carnival profit/loss. Spreadsheet variation 2 – Show how a change in the running costs will impact on your carnival profit/loss.	3 2 1 0 3 2 1 0	
Unseen Question 1.	3 2 1 0	
Total Marks:		/15



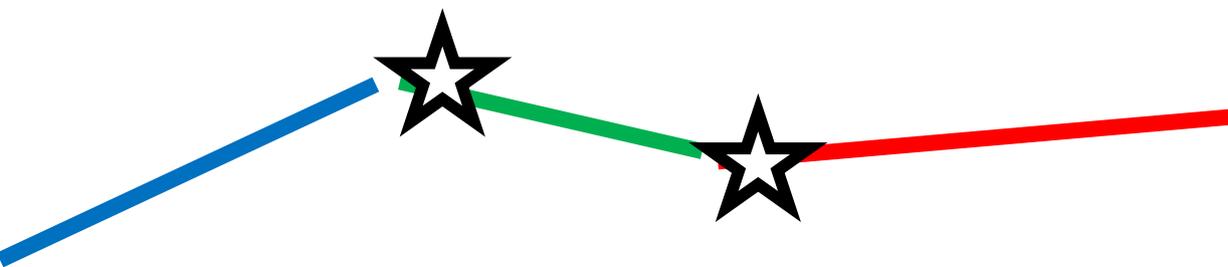


University of
South Australia



UniSA | Education Futures

Notes:



STEM Innovation Experience Carnival Capers

Checkpoint Tasks and Overall Summary Component

Checkpoint Tasks and Overall Summary Component – Background Information

The Required Tasks need to be available for viewing via an online platform by the checkpoint dates. We recommend a website or similar platform with access via a link. If this is not possible, individual checkpoint tasks (R1-R6) can be submitted via a Google drive, drop box or similar with unrestricted access.

The purpose of these tasks is to ensure that progress has been made throughout The Learning Phase. It also allows the UniSA team to gather information relating to the implementation of STEMIE at each school site, and to gather any evidence of promotion of STEM within the school and the local and broader communities.

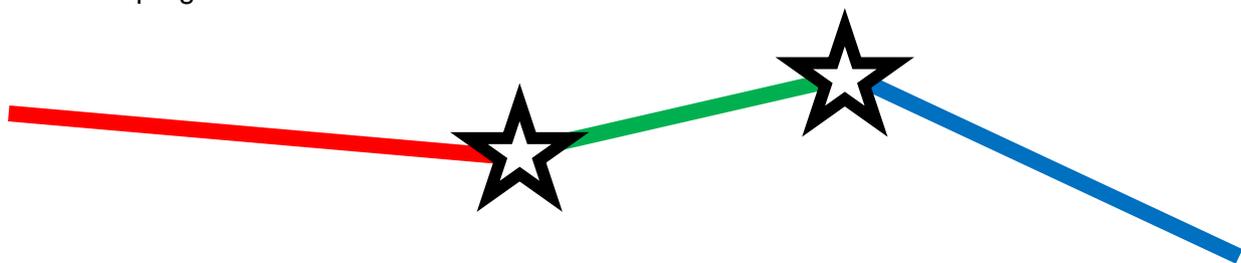
Overall Summary Component – The Requirements

The Overall Summary Component consists Required Task 6 (R6), this is the production of a Carnival Event Guide. This guide will contain information about how STEMIE was delivered in the school and the STEM challenges completed.

A copy of the guide will need to be accessible online, email the link to STEMIE@UniSA.edu.au

Carnival Event Guide (R6) criteria:

- Length must not exceed an 8-page booklet (A5 size) including pictures
- The guide must contain information about:
 - The cost of entry
 - The safety of the rides
 - Show bag contents and pricing
 - Side show alley attractions (specifically your side show game)
 - Brief outline about who is running the carnival (details about your school's STEMIE team)
 - The challenges encountered during STEMIE and how they were overcome
- Signed UniSA Media Release Forms must be supplied for anyone that appears in any photographs in the Carnival Event Guide, and for anyone attending a Regional Showcase or STEMIE Final.
- In the event of a tie at the Regional Showcase, this task will be used to decide the winner that will progress to the STEMIE Final.



STEM Innovation Experience Checkpoint Task Assessment

Assessment within STEMIE will be through an online platform (Website link is the preferred platform) Schools must submit the 6 required tasks to a satisfactory standard to qualify for the Regional Showcase event. There are 20 Assessable Tasks, only 6 are **required** and the 14 remaining tasks are **optional**. If students or teachers have any questions they can send them to the UniSA STEMIE email address STEMIE@unisa.edu.au

Assessment – The Process

At school, groups of students will need to work through STEMIE to produce evidence of Assessable Tasks (at a satisfactory standard) for submission at Checkpoints throughout the year.

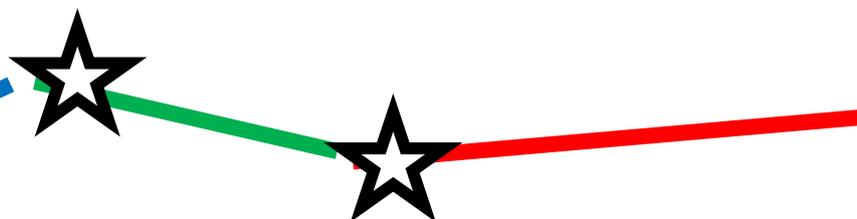
The submission requirements for each of the three Checkpoints are as follows:

- Checkpoint 0 (End of May) – optional checkpoint task
Feedback will be provided for any schools that have sent a link to view tasks by the end of May. This is not a required deadline; it is optional for early feedback on qualification status to those schools working on STEMIE in Semester 1.
- Checkpoint 1 (Friday, Week 2 of Term 3)
Required Task (R1) Submission of Timeline showing proposed dates and progress
- Checkpoint 2 (Friday, Week 8 of Term 3)
Required Tasks (R2-5) Submission of required tasks in each of the Science, Technology, Engineering and Mathematics components
- Checkpoint 3 (Last day of Term 3) – **Final Progress task**
- **Required Task (R6)** Submission of STEMIE Summary Task

The deadline for all checkpoints is 8:00pm on the dates listed above. The link to access the content (website link, drop box link or other) need to be emailed to STEMIE@unisa.edu.au by this deadline so checkpoint submissions can be viewed online.

The link will be shared with other qualifying schools after checkpoint 3 so that students can see each other's progress. Unlisted links are recommended so they are not found by searching the content, but can be viewed when the specific link is supplied. Schools will need to ensure any students in the content have school media consent, or ensure the student can not be identified from any images on the platform.

School checkpoint tasks will be assessed to ensure they meet a satisfactory level. Work that does not demonstrate a satisfactory completion will be returned via email with feedback, along with an opportunity to resubmit. For a school to qualify to compete at their Regional Showcase event, all 6 required tasks must be submitted by Checkpoint 3.



Assessment

There should only be one submission to UniSA for each required task, regardless of how many students are working on STEMIE at the school. As long as the six required task submissions are to a satisfactory standard the school will qualify to compete at the Regional Showcase.

The link containing the required tasks needs to be emailed to STEMIE@UniSA.edu.au. The link must be viewable without the use of passwords. Websites or similar online platforms are preferred, but if this is not possible the link can be to a Google Drive or Drop Box.

Any unsuccessful submissions will have feedback and an opportunity to resubmit. Marks earned in the process of qualifying for the Regional Showcase event do not carry over into the event. That is, each school starts on an even level at the commencement of the Regional Showcase event.

The winner of the Regional Showcase event will be the school who, at the end of the event, has gained the highest number of marks at the Regional Showcase event. Winners will be emailed once all schools in that region have completed the judging process.

Assessment – Optional Tasks

The remaining 14 tasks on the matrix are optional, schools can choose to use them as part of their own assessment at school level, but they do not need to be submitted to UniSA. They are not compulsory.

Assessment – The STEMIE Final

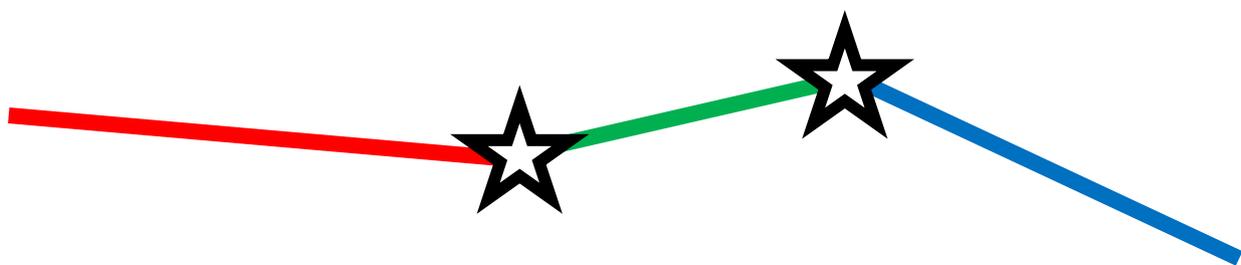
One school from each Regional Showcase will progress to the STEMIE Finals.

The school who wins their Regional Showcase event will be invited to the STEMIE Final, to be held at The University of South Australia, in November. Specific details will be supplied to winning schools.

In addition to the winners of the Regional Showcase events, there may be potential Wildcard entries into the STEMIE Final. These positions will be awarded to schools by UniSA Outreach at the conclusion of all the Regional Showcase events.

Marks awarded at the Regional Showcase do not carry over into the STEMIE Final. Each of the schools competing at the State Final will start on an even level with no advantage awarded to any school.

The school who gains the most marks at the STEMIE Final event will be crowned the winners of the STEM Innovation Experience for that year.



STEM Innovation Experience

Assessment Matrix

Science Tasks	Score	Technology Tasks	Score	Engineering Tasks	Score	Maths Tasks	Score	Overall Tasks	Score
S1. Referenced research into carnival rides	1	T1. Referenced research into entry systems used for public or private venues	1	E1. Referenced research into types of side show games at carnivals	1	M1. Referenced research into anticipated carnival income and expenses	1	R1. Checkpoint 1 Timeline, showing tasks and proposed progress	1
S2. Practical investigation of a carnival ride, including methodology, results and discussion	1	T2. Explanation of the entry system, its components and their function with annotated code samples	1	E2. Sketch or digital 3D model (using CAD design program) of the side show game design	1	M2. Mathematical justification of human resources, side shows, rides and consumables	1	O1. One page summary outlining how STEMIE is implemented at school	1
S3. Explanation of the science behind the safety aspects of a chosen carnival ride	1	T3. Evaluation of entry system development and discussion of any additional features	1	E3. Summary of progress and changes to the prototype and explanation of final design features	1	M3. Interactive spreadsheet that can adjust the profit/loss totals when ticket sales and carnival costs are modified	1	O2. Promotion of STEMIE within the school community, local community or wider community	1
R2. Checkpoint 2 Photos of progress on investigation, with dates and captions	1	R3. Checkpoint 2 Photos of entry system development and screen shots of code development, with dates	1	R4. Checkpoint 2 Photos of side show game development and testing, with dates and captions	1	R5. Checkpoint 2 Carnival Capers mathematical calculations/screenshots/photos with dates	1	R6. Checkpoint 3 Carnival Event Guide and accompanying information	1
Possible Marks	4	Possible Marks	4	Possible Marks	4	Possible Marks	4	Possible Marks	4
Possible Total									20

Note: Only the Required Tasks (R1-R6) need to be shared with UniSA.

All other tasks are for optional use within any internal school assessment.



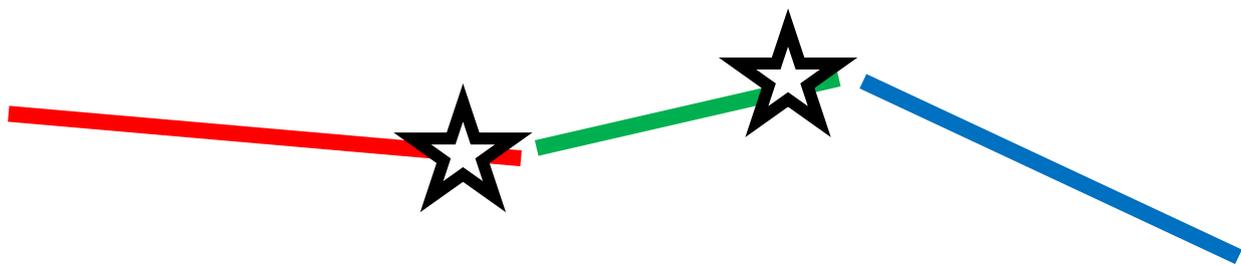
STEM Innovation Experience Rules and Requirements

STEMIE Rules and Regulations

- While there is a competitive aspect to STEMIE, where possible, schools are actively encouraged to collaborate to share ideas, methodologies and resources.
- Accessing assistance from the wider community is also encouraged, should the required expertise to complete tasks not be available within the school.
- The first point of contact for any questions or queries relating to STEMIE is the Moodle site <https://lo.unisa.edu.au/course/view.php?id=25118> This site contains electronic copies of resources provided to schools, additional web links, resources and student workshop activities.
- Additional questions can be sent to STEMIE@unisa.edu.au Teachers and their students are welcome to use this address to get assistance with their work.
- Question and Answer sessions can also be booked by schools (subject to staff availability). This will allow a UniSA staff member to Zoom link with your students and answer any potential questions they have or provide feedback on their ideas.

STEMIE Regional Showcase Judging Requirements

- To qualify for the Regional Showcase event, Required Tasks R1-R6 must be available for viewing online by the checkpoint deadlines, and to a satisfactory standard.
- The additional tasks on the assessment matrix are for optional use at school, they do not need to be submitted to UniSA for assessment.
- It is the responsibility of each school to ensure that the requirements for assessment at the Regional Showcase event are set up and that devices required to demonstrate the work during the Zoom meeting are functional.
- Each of the other Regional Showcase elements will have an allocated judging time, this will need to be strictly adhered to. Content of presentations or answers to questions that exceed the allocated judging time will not be considered.
- The supervision of students and set up of equipment for the Regional Showcase event is the responsibility of the school.
- Please ensure you have tested your devices and installed any required apps to access Zoom prior to the allocated judging time. One device must be portable during the judging of the technology and engineering tasks to allow the judges to view the prototypes from requested angles.
- The deadline for all Checkpoint items is 8:00pm on the date listed in the timeline. All submissions must be available online by this time and link received electronically via the UniSA STEMIE email STEMIE@UniSA.edu.au
- It is the responsibility of the school to keep copies of all work submitted
- Please ensure the student team representing the school and presenting ANY CONTENT at the Regional Showcase does not exceed a total of six (6) students.
- Teachers contributing to content during the judging allocations could result in the team being ineligible for the STEMIE Final position.
- Students and teachers are welcome to watch the presentations and assistance with IT issues, holding cameras etc. are not considered content linking in the judging process.



STEM Innovation Experience

Regional Showcase

STEMIE – The Regional Showcase

Students present a selection of their work in a judging timeslot via Zoom for the Regional Showcase.

Once qualified, a team of six (6) students will represent your school.

Each school will be judged on the following:

- Science Component – Formal presentation of the learning in the science activity.
- Technology Component – Judging of the Arduino coded prototype linked to their chosen theme.
- Engineering Component – Judging the function of the Engineering prototype
- Mathematics Component – “Question and Answer” session of seen and unseen questions and demonstration of their dynamic spreadsheet.

The dates for each of the Regional Showcase events are as follows:

- Allocation of judging timeslots opens in September; links will be sent to the schools contact teacher.
- Judging occurs as per allocated timeslots.
- Emails will be sent to announce the winners of each Regional Showcase once all the schools within that region have completed the judging process.

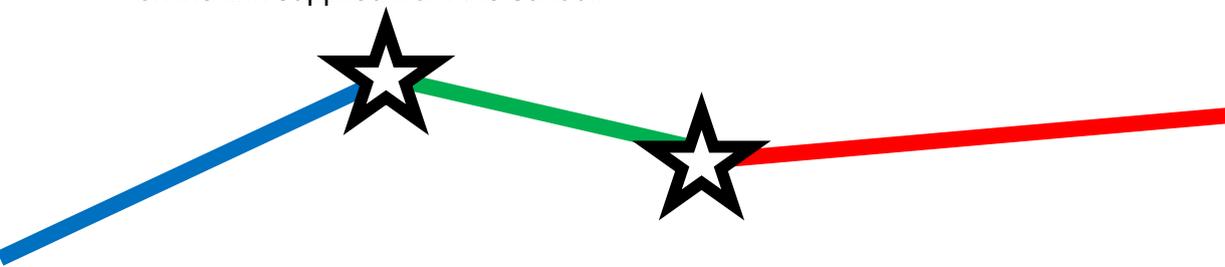
Schools will need to have the following on the day:

- Six (6) student representatives to present to judges, and their teacher to supervise.
- Presentation materials for the science component.
- Arduino coded Prototype for demonstration.
- Engineering device to be tested and judged.
- Dynamic spreadsheet and prepared answers to seen questions.
- Access to the Zoom link that will be sent to the school contact teacher on an iPad, Tablet, mobile device or similar to allow judges to view prototypes.
- Access to the Zoom link on a device that can share science presentation content and/or the mathematics spreadsheet.

Each school will be allocated a total on 1 ½ hours for their official judging timeslot, during which they will complete all assessment for the Regional Showcase event.

Students and their teacher will be required to be logged into the Zoom meeting for the duration of the judging timeslot.

In the event of a tie within a region, the overall task (Required Task 6) will be used to determine the winner. This needs to be available from the date of checkpoint 3, until the STEMIE Final date, via the online link supplied from the school.



STEM Innovation Experience Task Information

The STEMIE Final

STEM Innovation Experience – STEMIE Final

The winners from each of the Regional Showcase event and any Wildcard entries will be eligible to compete at the STEMIE Final to be held at the University of South Australia.

The STEMIE Final will consist of a series of unseen STEM and teamwork challenges to be completed against the clock. Errors will result in time penalties, so accuracy is important. Schools from across South Australia and any participating interstate teams will be competing at the event. The winning team will be the fastest team (including any time penalties) to complete all the challenges on the day.

The event will be held in November. Specific details will be sent to the winning schools and can be found in the *Key Dates* tab on the STEMIE Moodle.

<https://lo.unisa.edu.au/course/view.php?id=25118>

A maximum of six (6) students per participating school, accompanied by their teacher, will compete in unseen STEM challenges on the day. The teacher will have duty of care for their students at all times, including lunch breaks.

All students that participate in the STEMIE Final will require a signed UniSA Media Release Form.

Note – Transport of students to and from the STEMIE Final is the responsibility of the school.

Further details about the event will be provided via email to the Regional Showcase event winners and any Wildcard entries closer to the date.

If you have any questions about STEMIE you can email
STEMIE@unisa.edu.au

