University of South Australia

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Mars MissiOn

STEM Innovation Experience STEMIE

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STEM Innovation Experience

Task Information

Mars Mission

Introduction – The Mars Mission Proposal

Travelling to Mars is a goal for many organisations. NASA has already sent orbiters, landers and rovers to Mars. In 2012 the Curiosity rover collected valuable radiation data and the Opportunity rover has sent nearly 250,000 photos to Earth since landing in 2004, and in 2020 The Perseverance rover was launched to seek signs of ancient life and collect rock samples. NASA has already set the goal of humans reaching the red planet.

Elon Musk and the commercial space agency called SpaceX are also setting their sights on cargo missions and manned missions with up to 100 people per trip to create an inhabited city on the planet.

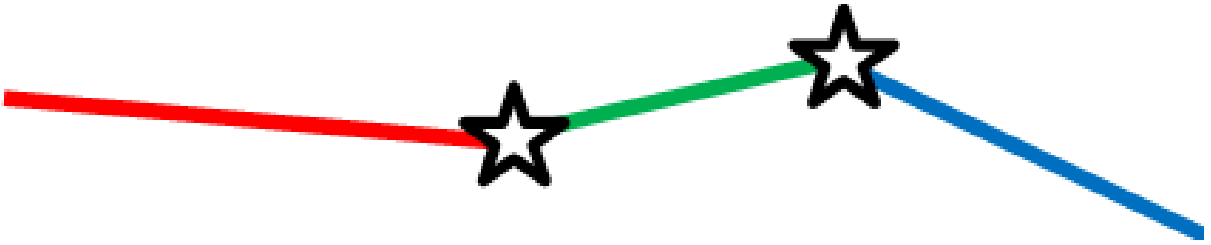
Other organisations have tried joining the space race, but not all have been successful. Mars One started looking for supporters in 2012 to help fund their goal of establishing a permanent human settlement on Mars but declared bankruptcy by 2019.

Australia was the third country in the world to launch a satellite into orbit from Woomera in the 1960's and is eager to once again join the leading space exploring nations. The development of our own space agency was announced on 25 September 2017 and has allowed Australia to be part of the global space industry, worth an estimated $400 billion.

The next step will be the Mars Mission.

"The Earth is a cradle of humanity, but mankind cannot stay in the cradle forever."
Konstantin Tsiolkovsky

"Mars is there, waiting to be reached."
Buzz Aldrin



Mars Mission Proposal

The STEM Innovation Experience (STEMIE) will focus on developing a proposal for the Mars Mission. This will include problem solving for many aspects of the journey and landing requirements.

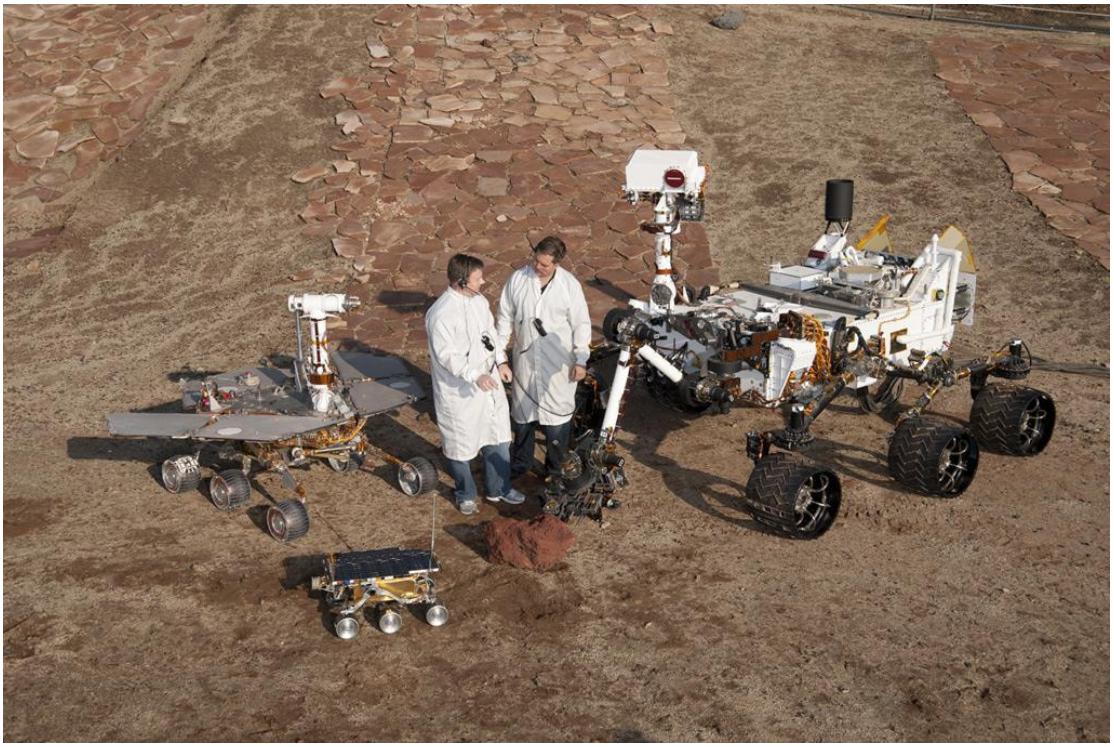
Mars Mission – The Requirements

The Mars Mission proposal will require the following tasks to be completed.

- Investigation on human physiology and developing astronaut selection criteria for astronauts on long missions, as outlined in the Science Component.
- Development of an Environmental Control System using Arduino Coding to detect and respond to changes in environmental conditions, as outlined in the Technology Component.
- The planning, design and construction of an automated vehicle and transit pod, as outlined in the Engineering Component.
- Creation of a tender for the catering component of the Mars Mission, with consideration of the requirements as set out in the Mathematics Component.

Mars Mission –

Your school also needs to produce a Summary Report with a brief outline about how STEMIE was delivered in your school and the learning that was involved. This summary report will be used in the event of a tie at the Regional Showcase.



https://mars.nasa.gov/mer/gallery/press/opportunity/20120117a/PIA15279_3rovers-stand_D2011_1215_D521_br.jpg

STEMIE – The Three Parts

STEMIE will consist of three parts:

- The Learning Phase
    - Students will complete the Science, Technology, Engineering and Mathematics tasks, based around their chosen theme, at school and attend a progress meeting via Zoom to provide evidence of learning. To qualify for the Regional Showcase a completed Summary Report will need to be submitted.

- The Regional Showcase
    - This part will consist of an online event with UniSA 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 Summary Report 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.

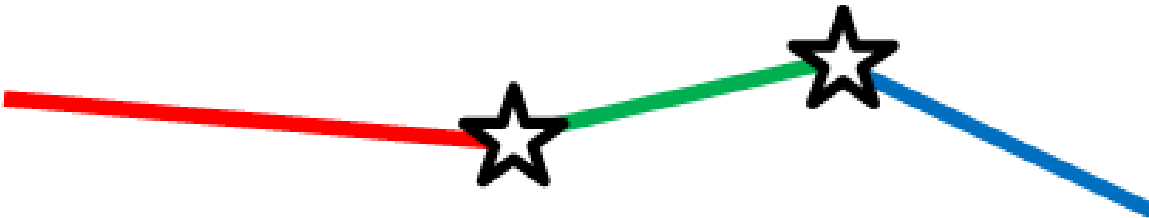
The Student Guide to Referencing and *Guidelines for Referencing* documents can be found at this link https://www.sace.sa.edu.au/learning/research-advice/referencing

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, students will work on the tasks at school. Each school will need to book a progress meeting with UniSA staff at some stage during the learning phase. The meeting will need a teacher and student representatives in attendance and will take approximately 30 minutes to discuss what has been achieved to date. Additional time will be allocated at the conclusion to allow for any questions or task clarifications, ideas and/or feedback.

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.



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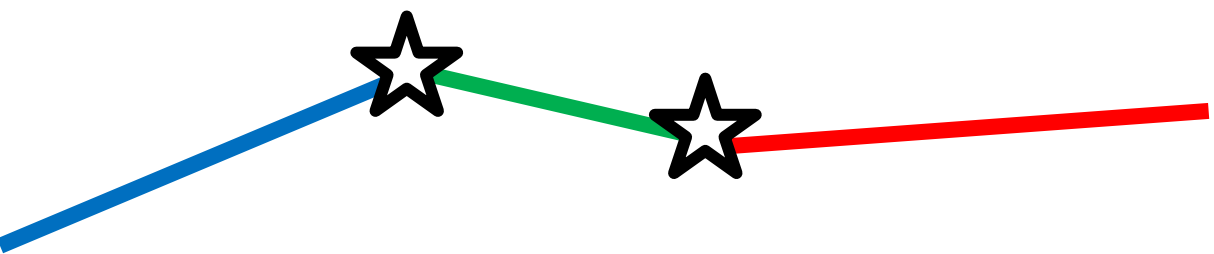

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STEM Innovation Experience
Mars Mission

Science Component

Science Component – Background Information

Humans have long desired to travel into space but there are many factors that impact on the human body and must be considered. There are physical factors such as exposure to radiation and the lack of gravity during space travel impacting on muscle mass, bone density and even changing blood pressure. There are also psychological factors that need to be considered such as the isolation and confinement during the mission.

Space travel has developed substantially since Russian cosmonaut Yuri Gagarin was launched into space in 1961 but with missions now aiming to reach other planets, the journey alone will be many months in duration, leading to a new set of potential problems.

Science Component – The Requirements

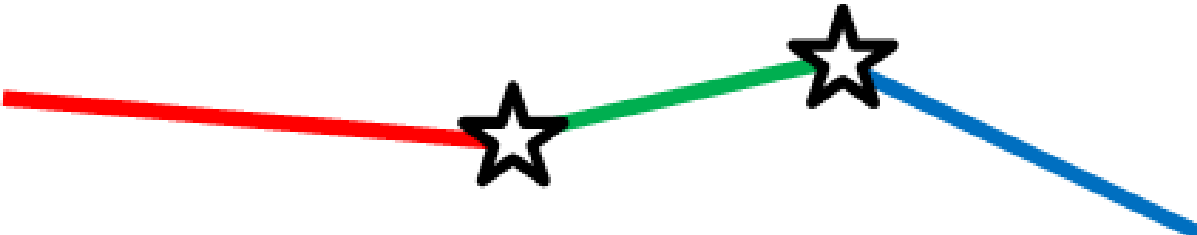
As a group, investigate the aspects that need to be considered when astronauts experience extended durations in microgravity.

Aspects that must be considered include researching current space travel concerns and methods used to reduce muscle atrophy. Additionally, an investigation into human physiology factors is to be completed.

Develop a set of selection criteria for the astronauts and for their Mars Mission journey.

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

- Research previous space travel missions and how their length compares to the proposed Mars Mission.
- Create and conduct a practical investigation methodology to observe a relevant aspect of physiology of the human body.
- 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.
- Summarise considerations with reference to the Mars Mission and if it is feasible for humans to travel that distance, what are the selection criteria for astronauts on the mission and what will they be required to do in order to maintain their fitness.



Science Component – Practical Investigation

The practical investigation methodology needs to be created to account for an aspect of human physiology. The purpose for conducting this investigation is to support the research about the impact of space travel on humans, and account for some strategies to reduce muscle atrophy or neuromuscular impairments during space travel while on the proposed Mars Mission.

Ideas for this investigation could include:

- how well circulatory or respiratory systems recover from various activities
- fitness or strength testing over a period of time
- reaction rate testing
- ability to physically function due to extreme stimulus
- Access to energy drinks/ caffeine and how they impact on the body
- Holding your breath or breathing through apparatus and the effect on the body
- 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 tasks must include the following headings:

Practical investigation methodology of human physiology experiment

- Hypothesis
- Aim
- Materials
- Method
- Safety (Note: investigations must be approved by the school as per their requirements)

Results and conclusion from human physiology experiment

- Results
- Conclusion

Discussion and analysis of human physiology investigation methodology

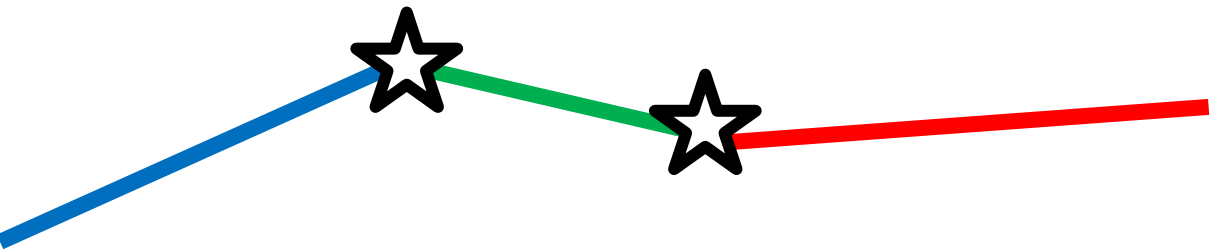
- Accuracy and Precision of Methodology
- Sources of Random Error
- Sources of Systematic Error
- Suggested Improvements and limitations

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 staff from the University of South Australia regarding their astronaut selection criteria for the astronauts during transit.

This presentation will be held online via a Zoom link and time limits will need to be strictly adhered to.

The presentation should be a maximum of seven (7) minutes, with up to an additional three (3) minutes for questions from the Mars Mission Representative (UniSA Staff) judging the presentation.



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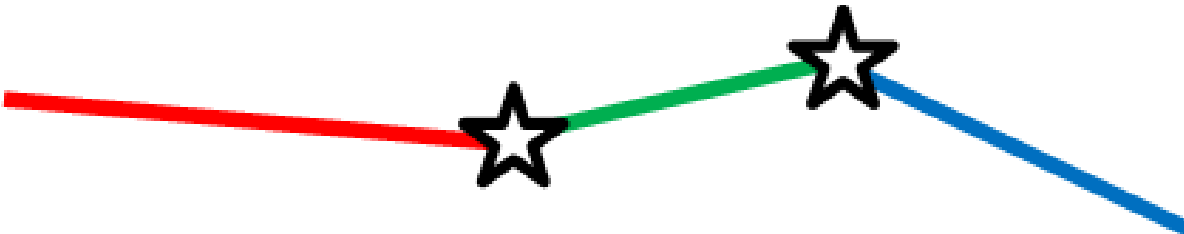
Mars Mission

STEMIE Regional Showcase

Science Component

School: _____

Criteria	Marks Available	Total Marks
1. Summary of conditions in space travel, living requirements and concerns.	**3 2 1 0 N/A**	
2. Understanding of the science behind your astronaut selection criteria, who makes the shortlist, how the astronauts will be chosen.	**3 2 1 0 N/A**	
3. Incorporation of research and practical results into presentation to make informed decisions about the astronaut selection criteria.	**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**



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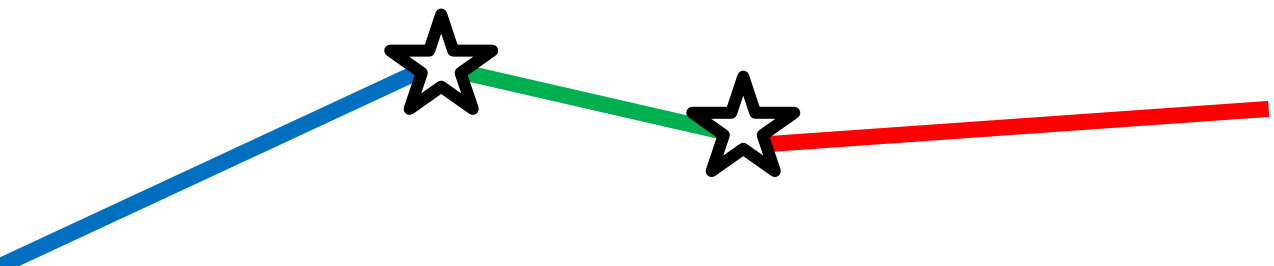

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STEM Innovation Experience
Mars Mission

Technology Component

Technology Component – Background Information

Space travel and potential colonisation of other planets requires strict management of living conditions. Despite many important similarities between the climate on Earth and Mars such as seasonal changes and weather patterns, there are still many differences that make survival reliant on controlling the conditions.

Movies like *The Martian* have highlighted the need for Environmental Control Systems. Air supply, temperature, light levels and available water all need to be managed for humans to survive in these hostile environments.

Technology Component – The Requirements

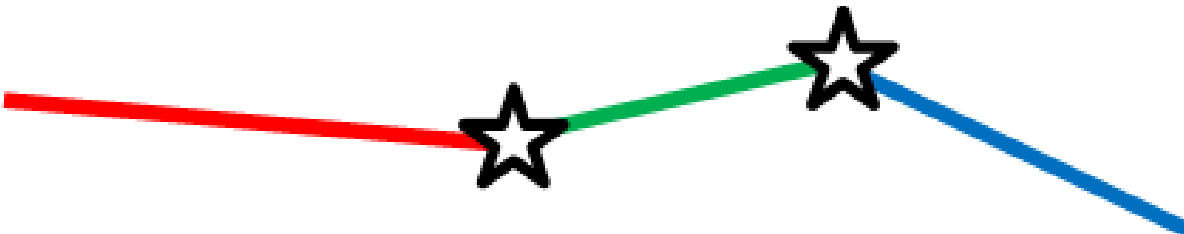
As a group, design, develop, prototype and test an Arduino coded Environmental Control System (ECS) to detect and respond to environmental changes.

The device must detect light and temperature changes and respond to these changes. More sophisticated technology can be included to detect and respond to other environmental conditions.

The device must also contain a 3D printed component.

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

- Brainstorm and research environmental conditions that would need to be monitored.
- Develop and code a working Environmental Control System (ECS) device that can detect a change in these conditions, using Arduino and appropriate code comment conventions.
- Investigate and develop additional features of the ECS device to respond to a change in conditions.
- Evaluate the development of the prototype and final ECS device which will be used for testing at the Regional Showcase event.



Technology Component – ECS Device Production

Create an Environmental Control System (ECS) that will detect changes to environmental conditions and respond to those changes appropriately.

The intended purpose of this ECS is to control the living conditions during transit through space or at a colonised location on Mars. For the purposes of judging, the conditions that will be tested are a change in temperature, light intensity and then other additional features can be demonstrated for additional marks.

Computer Aided Design (CAD) software can be used to create 3D printed components for your device.

Technology Component – Elements for the Regional Showcase event

At the Regional Showcase event, students representing their school will be required to demonstrate a working ECS device.

As a minimum, the device should be able to detect and show changes to temperature and light levels.

To be awarded further points, the ECS will need to demonstrate a response to a change in temperature and light intensity. Additional points will be awarded for detecting additional conditions and responding to these and for additional features, such as remote options.

The judging will be held online via a Zoom link. We recommend having a mobile phone, iPad or similar device in the meeting to allow the prototype to be viewed from different angles.

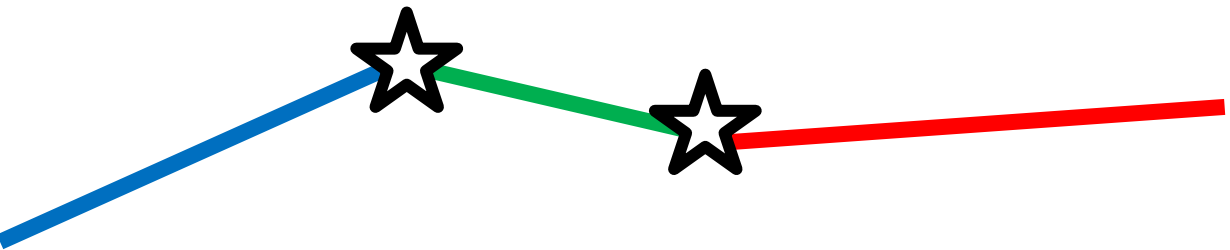
Programming Component – Elements for the Regional Showcase event

Students will also be required to complete a trouble shooting activity to identify simple errors in a section of Arduino code. The errors will be based on the activities covered in the student workshop “Introduction to Coding” section of the STEMIE Moodle.

The UniSA Staff judging the ECS device will work through the criteria on the marks sheet. For additional features to be awarded marks, they must be successfully demonstrated in the allocated judging time.

Troubleshoot a sample code with errors (errors will be based on the introduction to coding activities on the STEMIE Moodle) This will have a 2 minute time limit.

Each school will have a maximum of 10 minutes to demonstrate their prototype and 2 minutes to find the errors in the sample code supplied.



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Mars Mission
STEMIE Regional Showcase
Technology Component

School: _____

Criteria	Marks Available	Total Marks
3D printed component	**1 Mark** – Printed but has visible scaffolding/rafting or general flaws in the print, and no obvious function in the device **2 Marks** – Well printed but only serves an aesthetic purpose **Or 3 Marks** – Well printed and has a set function in the device	
Input Detection *Does the ECS detect changes in the environment?*	**1 Mark** – Detects changes to light **+1 Mark** – Detects changes to temperature **+1 Mark** – Detects changes autonomously using a sensor	
Output response *Can the ECS respond to the environmental change?*	**1 Mark** – Responds to a change in light **+1 Mark** – Responds to a change in temperature **+1 Mark** – Can display light and/or temperature readings	
Additional Features *These must be successfully demonstrated within the judging time limit*	**+1 Mark** – Additional relevant ECS feature is successfully demonstrated **+1 Mark** – Another additional relevant feature successfully demonstrated **+1 Mark** – Another additional relevant feature successfully demonstrated	
Can find errors in the sample code	**1 Mark** – Can find 2 errors in the sample code **+1 Mark** – Can find additional errors in the sample code **+1 Mark** – Can find all errors in the sample code	
Total Marks:		**/15**

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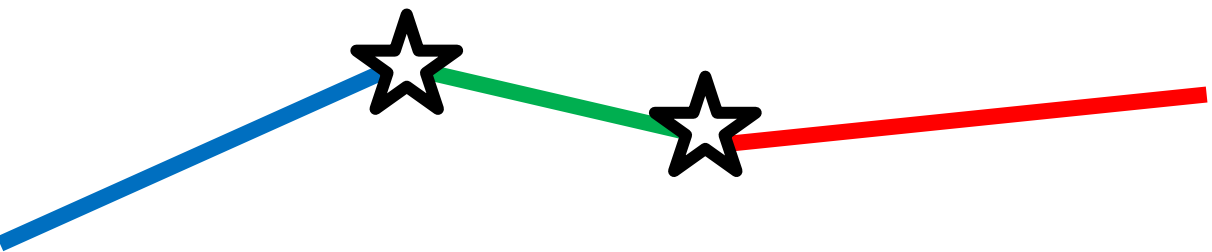

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STEM Innovation Experience
Mars Mission

Engineering Component

Engineering Component – Background Information

The Mars Mission aims to travel to the red planet with humans and allow them to start colonising the new land. On arrival, the people will need some method of transport on the surface of the planet.

Engineering Component – The Requirements

As a group, design and construct a model of a vehicle that can cover the set terrain as well as a transit pod to house the vehicle.

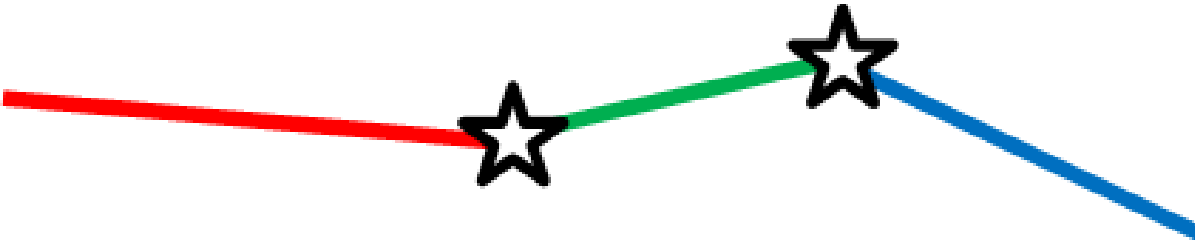
The vehicle must be able to fit within the transit pod. The best vehicle will be able to complete the entire terrain track and stop at the end.

A prototype for a transport vehicle that can fit within the transit pod will need to be developed. The vehicle will need to be able to navigate a test track and fit within the pod for transit. This can be achieved by completing some, or all of the following:

- Brainstorm and investigate existing terrestrial vehicles used in space exploration, while identifying their strengths and weaknesses.
- Sketch designs of vehicles and the transit pod 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 a transit pod and vehicle. (Pre-constructed vehicles not permitted)
- Explain the functions of the preferred design.
- Produce sketches of the chosen design (by drawing and/or CAD packages).
- Construct the chosen design for testing at the Regional Showcase event.

Engineering Component – Vehicle and Transit Pod Construction

The model of the transit pod must not exceed 30cm x 30cm x 30cm and must be able to house the vehicle completely inside. The transit pod must house the vehicle but also allow it to exit the capsule without vertical lifting unless the lifting device forms part of the transit POD itself (there will be no crane access on Mars). Any materials can be used in construction except pre-constructed vehicles without modification. The vehicle should be able to navigate the test track and stop at the 3 metre mark.



Transit Pod Specifications

- **Length, Width and Height: Maximum 30cm for each dimension**
- **Note, if the transit pod shape is irregular the widest, tallest and longest points will be used to measure the dimensions.**

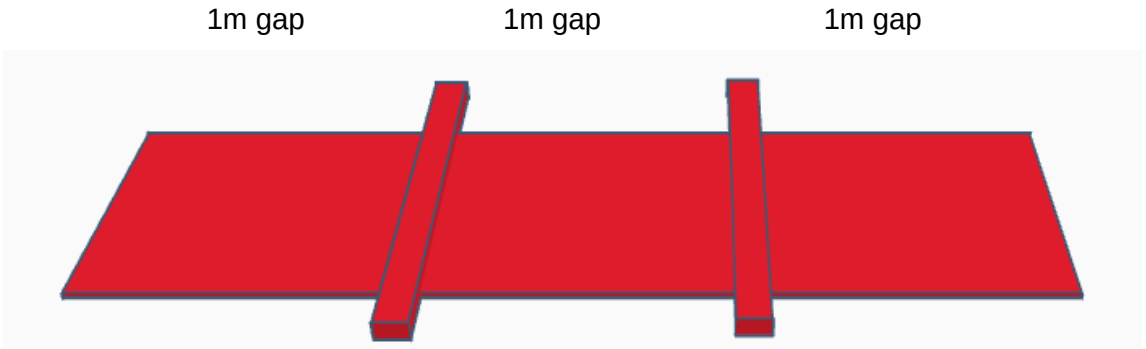
Vehicle Specifications

- **Must fit completely inside the transit pod**
- **Can exit the transit pod without requiring manual vertical lifting**
- **Can navigate the terrain track autonomously once released**
- **Can stop at the end of the terrain track**

Requirements:

- Materials are not prescribed but it is an advantage to keep the vehicle and transit pod clearly under the size limits to ensure eligibility.
- The vehicle must be able to exit the transit pod without manual vertical lifting.
- The vehicle can be adjusted and set up on the track, but once released it must function autonomously for the duration of it's run.
- The vehicle needs to be able to navigate as far along the test track as possible.
- The vehicle needs to be able to stop at the end of the terrain track (3m mark).

Note – the supply of building materials is the responsibility of the school.



2'x 4' terrain markers (approx. 5cm x 10cm)

Engineering Component – Elements for the Regional Showcase event

At the Regional Showcase event, students representing their school will be required to demonstrate their vehicle. This test track will need to be set up before the allocated judging timeslot begins. We recommend a smooth surface and clearly marked perimeters, such as the use of masking tape to show the track width limit and start and finish marks.

The judging will be held online via a Zoom link. We recommend having a mobile phone or iPad in the meeting to allow the device to be easily viewed from different angles.

Each school will have two (2) attempts at the track (as per diagram above) and the best result will be recorded.

Functionality of the POD and vehicle, accuracy of the travel and autonomous features will need to be demonstrated to the UniSA Staff. Additional features also need to be demonstrated within the judging time limit.

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Mars Mission

STEMIE Regional Showcase

Engineering Component

School: _____

Transit pod dimensions			Total distance travelled on the terrain test track	
Width	Height	Length	Run 1	Run 2

Criteria	Marks Available	Total Marks
Functionality *Vehicle and Transit pod* *Release of vehicle from transit pod*	**1 Mark** – Vehicle fits inside the pod **+1 Mark** – Vehicle can be removed from the transit pod without damaging the pod **+1 Mark** – Vehicle can become larger than the transit pod after release **+ 1 Mark** – Vehicle can be released without vertical lifting **+1 Mark** – Vehicle can be returned to the POD after the test run without vertical lifting.	
Accuracy Travel distance on the terrain test track within perimeter boundaries	**1 Mark** – Vehicle moves to first hurdle **+1 Mark** – Vehicle navigates over the first hurdle **+1 Mark -** Vehicle navigates over the second hurdle **+1 Mark -** Vehicle reaches the end of the terrain track (3m mark)	
Autonomy *Ability to travel*	**+1 Mark** – Vehicle can be released remotely/autonomously from the pod **+1 Mark** – Vehicle starts travel remotely/autonomously after release from the pod **+1 Mark** – Vehicle can stop autonomously at the end of the terrain track	
Additional features	**+1 Mark** – Additional relevant feature **+1 Mark –** Additional relevant feature **+1 Mark –** Additional relevant feature	
Total Marks:		**/15**

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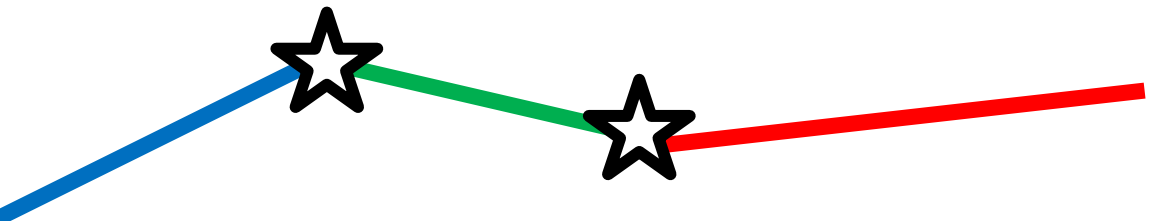

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STEM Innovation Experience

Mars Mission

Mathematics Component

Mathematics Component – Background Information

Space food has improved dramatically since the early missions where food was limited to tubes of semi liquid meals or freeze-dried powders that were difficult to rehydrate. Now astronauts can select from a variety of meals that incorporate fruit, vegetables, meat, and even special requests provided they meet the nutrition plan.

Food in space needs to be as light weight as possible to reduce transit costs. Dehydrated foods are often used for this reason and with access to hot water can be rehydrated and heated in a similar time frame to making a snack at home.

https://humans-in-space.jaxa.jp/en/life/food-in-space/

Mathematics Component – The Requirements

Create an interactive spreadsheet for the catering costs on the Mars Mission.

The spreadsheet will need to meet set parameters, show variations in meal plan requirements and needs to be mathematically justified. It needs to account for costing changes if astronaut dietary requirements or length of travel changes.

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

- Brainstorm the requirements to consider for the meal plan
- Demonstrate a variety of foods in the meal plan, including catering for an astronaut with a dietary requirement such as, gluten free, vegetarian or low FODMAP diet
- Calculate costing of meals
- Develop a contingency plan for an additional 20% travel time in the event of a delay and justify this cost mathematically
- Produce a spreadsheet for the catering costs for the Mars Mission

Mathematics Component – Mars Mission Catering Tender

The Catering Tender needs to:

- Account for the dietary requirements for six (6) astronauts for the duration of the journey. This can be:
    - based on standard recommended dietary intake (RDI) values
    - based on basal energy expenditure calculations
    - linked to the selection criteria for astronaut selection in the Science Component

- Show that the plan can accommodate for a dietary requirement (gluten free, vegetarian, low FODMAP etc)
- Demonstrate a variety in the meal plan
- Demonstrate a contingency plan including costing for an additional 20% journey duration

It is suggested that online tools such as GeoGebra and food label calculators such as the one at http://www.foodstandards.gov.au/industry/npc/Pages/default.aspx could be utilised in the process of developing a mathematically justified Catering Tender. This list is not exhaustive, and groups should use resources available to them to work through this component.

Mathematics Component – Elements for the Regional Showcase event

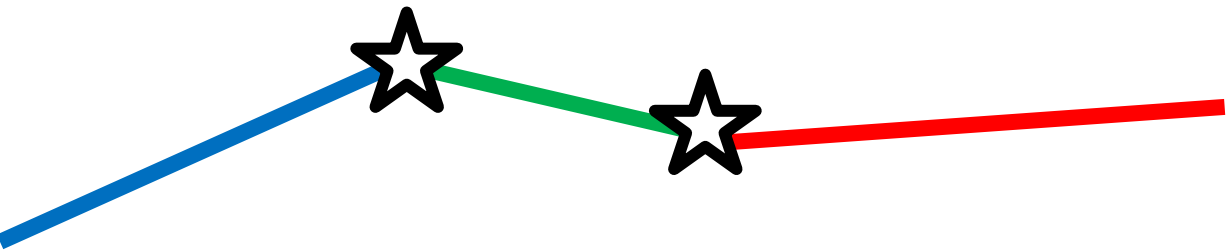
At the Regional Showcase event, students representing their school will be required to present their Catering Tender to the UniSA Staff for judging. Schools will be assessed by means of Question and Answer. From a list of five (5) seen questions, schools will need to respond to two (2) questions chosen by the judge, before being asked to respond to one (1) unseen question. Students will also need to demonstrate how the spreadsheet can cater for dietary requirements and contingency plans.

Each school will be allocated a 10-minute timeslot for judging at the online Regional Showcase. The spreadsheet will need to be shared in the Zoom meeting during the judging timeslot.

UniSA Staff will judge the responses in a Question and Answer session, incorporating two (2) seen and one (1) unseen questions.

They will also judge the ability to demonstrate adjustments for dietary requirements and contingency plans.

The spreadsheet will need to be on the device that is logged in to the Zoom meeting to allow it to be shared and viewed in the judging timeslot.



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Mars Mission
STEMIE Regional Showcase
Mathematics Component

School: _____

Questions	Marks Available	Total Marks
1. Explain the criteria you have used to determine what the astronaut's dietary requirements are?	**3 2 1 0 N/A**	
2. Describe how you have created variety in the meal plan?	**3 2 1 0 N/A**	
3. Reflect on the graph of your costing of the food supplies for the trip?	**3 2 1 0 N/A**	
4. Justify mathematically how the dietary requirements are being met in your plan.	**3 2 1 0 N/A**	
5. Explain how the incorporation of variety and/or dietary requirement in your meal plan altered the cost?	**3 2 1 0 N/A**	
Demonstrate variations using your spreadsheet (as requested by UniSA Staff) Variation One – Show how the cost would change if the number of astronauts with dietary requirements changed. Variation two – Show how you have accounted for the contingency plan if additional food is needed during transit. Show how total cost changed when adding food needed if the trip was extended.	**3 2 1 0** **3 2 1 0**	
Unseen Question 1.	**3 2 1 0**	
Total Marks:		**/15**

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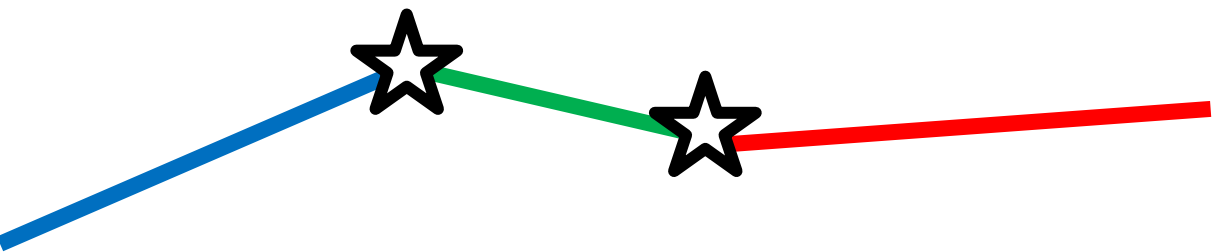


STEM Innovation Experience

Progress Meeting and Overall Summary Component

Background Information

At school, students will need to work through STEMIE and then discuss their learning at a progress meeting. This meeting can involve all the students that have been involved or a small group of representatives. A STEMIE teacher will also need to be present at the meeting. Schools will need to book a 30-minute Zoom meeting to be held in term 2 or term 3. While every effort will be made to accommodate preferred session times, some negotiation may be required to finalise a time. At the end of the 30-minute progress meeting, there will be the option to stay on for an optional Q and A session. Sessions can be booked by emailing STEMIE@unisa.edu.au

The purpose of this meeting 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.

The Progress Meeting

The meeting will cover:

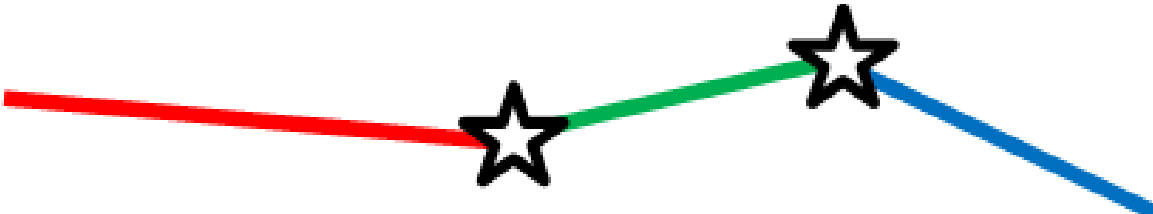
- Discussion about the STEMIE team, who is involved, how it is delivered, and what theme has been chosen.
- Discussion about the Science, Technology, Engineering and Mathematics tasks and the progress so far, and future plans to complete them.
- Discussion of any issues that have occurred.
- Opportunity at the end to ask questions about the tasks/rules/showcase requirements, etc.

Overall Summary Component – The Requirements

The Overall Summary Component consists of information about how STEMIE was delivered in the school and how the STEM challenges were completed.

A copy of the Overall Summary Report will need to be emailed to STEMIE@UniSA.edu.au when booking a timeslot for the Regional Showcase. This task, along with the progress meeting, will be requirements for qualification to present competitively at the Regional Showcase.

In the event of a tie at the Regional Showcase, the Overall Summary Report will be used as the tiebreaker.



Overall Summary Report:

- Length must not exceed 2 pages
- The report must contain information about:
  - What theme was chosen for STEMIE and why
  - Who was involved (year level, number of students, teachers, community members, etc)
  - How was it run (in class as a subject, lunchtime STEM club, etc)
  - Summary of the learning that occurred in STEMIE
  - What problems occurred and how they were overcome
  - How STEMIE was promoted in the school, local, or broader community (this can include screenshots of newsletter articles, etc)
  - A reflection on your learning from the STEMIE theme you have chosen including an informed decision, conclusion or comment.

Progress meetings will be held throughout terms 2 and 3. Session times can be booked by emailing STEMIE@unisa.edu.au

Reminder emails to book progress meetings will be sent to the school key contact teachers.

Schools are welcome to assess components of STEMIE within school structures, but any assessment by UniSA is only to confirm qualification for the Regional Showcase.

For a school to qualify to compete at their Regional Showcase event, they will need to demonstrate progress at the meeting and provide the summary report.

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

Regional Showcases and The STEMIE Final

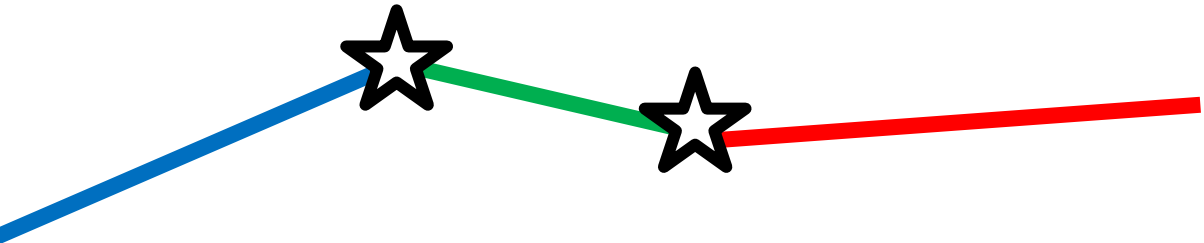
One school from each Regional Showcase will progress to the STEMIE Finals. Winning schools will be contacted via email once all schools in the region have completed the judging process.

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



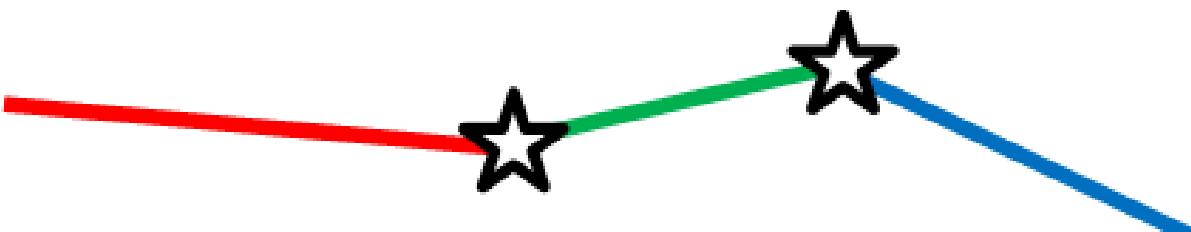
STEM Innovation Experience
Rules and Requirements

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, schools need to attend a progress meeting and submit the Overall Summary Report Component.
- Any additional tasks completed in STEMIE can be used for internal school assessment but do not need to be submitted to UniSA.
- 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, and 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 Progress Meeting session needs to be booked in term 2 or 3. The Summary Report must be emailed to the UniSA STEMIE email STEMIE@unisa.edu.au prior to the confirmation of the Regional Showcase Judging timeslot.
- It is the responsibility of the school to keep copies of all work.
- 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.
- Additional students and teachers are welcome to watch the presentations and assist with IT issues, holding cameras, etc. but cannot be part of the official team of six that deliver any content that is judged.



STEM Innovation Experience
Regional Showcase

STEMIE – The Regional Showcase
Signed UniSA Media Release Forms must be supplied for anyone attending a Regional Showcase or STEMIE Final. These can be found on the STEMIE Moodle and a direct link will be emailed to the key contact teacher once the judging timeslot is confirmed.

Once qualified, a team of up to six (6) students will represent your school. Students will present a selection of their work in a judging timeslot via Zoom for the Regional Showcase.

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 August; links will be sent to the school's 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 of 1 ½ hours for their official judging timeslot, during which they will complete all assessments 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 Summary Report will be used to determine the winner. This needs to be emailed to STEMIE@unisa.edu.au before the Regional Showcase Judging timeslot occur.

STEM Innovation Experience
Task Information

The STEMIE Final

STEM Innovation Experience – STEMIE Final

The winners from each of the Regional Showcase events 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 (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 the duty of care for their students at all times, including lunch breaks.

All students who 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