Shining a Light on Communication for a Sustainable Future

**Challenge Based Learning Activities**

**Title: Designing New Buildings which aren’t Cuboids or Rectangular Prisms: Do Walls have to be Straight?**

Lead Teachers: Vanessa Fay, Oksana Hollidge, Feresh Agahi Pizarro

This challenge is about sustainable architecture and sustainable structures. You are buying a block of land in a new subdivision. Design a dramatic and interesting structure without straight walls to live in.

Explore a range of mathematically architectural options before selecting your ideal structural shape.

Explore existing adventurous architecture in Adelaide.

Design your own building to present at the end of the International Science Fair.

What limits the feasibility of the mathematical shapes – and what equations are used in your design?

Subject Focus: Mathematics, Architecture, Technology, Engineering

**Title: Choose your own STEM Adventure!**

Lead Teachers: Matt Verdon, Cat Stone

Students choose anything that they’re like to work on / investigate / have a go at making / designing / investigating / thinking. First day, students set their own challenge, identifying realistic outcomes and what they will present, and how it relates to the theme. Then work over the next couple of days to make a presentation explaining to the group what they have found / made / done.

Previous successful projects included a model computer virus & scanner, 3D printed ocarinas, technologically mixed music, a great presentation on tesseracts, a model Stirling engine, progress on an Arduino satellite… the possibilities are endless!

Subject Focus: Engineering/Maths/Science/Depends on students!
**Title: Depressurising App (girls only team)**

Lead Teachers: Neil Davies, Maja Williams, Uma Sivakumar

Using App Inventor, create a game which will help in an immediate reduction of stress or anxiety, down to a level which can be controlled. Students will research about anxiety and stress as well as game design and put these concepts together. Research will raise awareness of what matters in stress reduction. Students will use IT and gaming to protect and help people feel safe.

An excursion on the first day to the Flinders University, Tonsley Campus, will provide students with a tutorial in game design and development using App Inventor. No prior knowledge is needed.

Subject Focus: Psychology and ICT.

**Title: Dragon’s Den**

Lead teachers: Geetha Nair, Kate Smith.

The Dragon's Den is an incubator for designing, developing and testing a product from idea to implementation. You will need to develop a product concept, business plan and marketing strategy. You will make your final pitch to a team of investment evaluators from the New Venture Institute of Flinders University.

Subject Focus – Business/Science & Technology.

**Title: Fight for the Future**

Lead Teachers: Penny Collins, Ben Mattson

Students form 'political parties' and must put forward a particular plan of action in response to a major environmental issue.

Parties develop their arguments separately before coming together to express and debate their ideas. A vote is held at the end of the session.

Potential issues:
Great Barrier Reef?
Climate change?
Preserving biodiversity?

Subject focus: Environmental challenges
Title: It's Just another Plant in the Wall

Lead Teachers: Caroline Dean (0.8), Maryann Dolette, Emily Paterson, Michael Pride, Anne Mignone

Students will research, design and construct models which test and evaluate the effectiveness of living walls and roof gardens in improving a range of measurable indicators of sustainability. Scientific testing and concept modelling of your solutions will provide vital data so that we are confident of their effectiveness and practicality.

Subject Focus: Vertical gardens

Title: Feast

Lead Teachers: Kay Gillett, Lisa Pope, David Cowan, Kevin Nelson

The Australian diet is predominantly based upon a mix of introduced ‘invader’ plants and animals. Why is this so? Can we utilise a greater number of indigenous species in commercial food production?

The group will explore indigenous bush foods via a visit to the Living Kaurna Centre at the Warraparinga Wetlands and undertake a guided tour of the site highlighting edible species in the local environment.

Research will be undertaken into indigenous food usage and in small groups students will develop a recipe utilising at least one indigenous food. We will visit the Adelaide Botanical Gardens and undertake their indigenous food trail before moving to the Adelaide Central Market and exploring the food options available.

The final day will focus on preparing and consuming a feast utilising our indigenous foods.

Subject Focus - Indigenous foods – how extensively can we use them as part of the Australian diet?

Title: Storytelling through Computer Games

Lead Teachers: Chris Heddes, Tristan Miller, Trystan Perry (Flinders University)

In this challenge, you will design a game that tells a story. The first day will be spent planning the overall game design. We will then work out groups for subsequent development:

- Game mechanics
- Character/Environment art
- Music
- Level design/storytelling

For the remainder of the week we will be working in small groups with regular (twice-daily) check ins with the whole group to track progress.

We will have a demo/display on the final day (preferably with Oculus Rift)

Subject Focus: Physics, English, Game theory (maths), Music, Visual design
**Title: What Happens if the Cars of the Future go Rogue?**

Lead Teachers and students: Ash Brook, Jo Kellaway

How can we stop a google car with the least amount of damage to the car and its Passengers?
Participants will explore how autonomous cars function, find their way and avoid obstacles.

They will consider two scenarios – causing a “safe” collision, considering motion, dynamics and materials,
AND
Shutting down the car or re-instating the original programs, considering communication, remote control and programming/robotics

Subject Focus: Physics, Programming, communication

**Title: Trash Palace**

Lead Teachers: Andy Stone, Alicia Coleman, Tisha Beasley

In this Activity you will be challenged to collaboratively design and build a sustainable micro-home for a homeless charity in 18 hours.

We will start by immersing you in the possibilities of your design and its purpose. After some time to consolidate your design ideas, we will venture to salvage yards to source materials, and get inspiration.

The majority of our time will be spent building the micro-home, before donating it to a suitable organisation.

'RufUs' a charity organisation will be our partner in this project!!  [http://rufus.org.au/](http://rufus.org.au/)

Subject Focus: Design and Technology with an environmental/sustainable perspective.

**Title: ISF’s Fastest Rocket Car**

Lead Teachers: Jules Potiki and John Rowe

Students will work in small groups of up to 3 to design and make rocket cars. They will test their design and improve it ahead of the final day of racing.

There will be 3 categories of competition:
- Stability (Carries a Go-Pro camera to the end of the track at the highest speed)
- People carrier (Carries a Lego passenger or hardboiled egg with no damage – at highest speed)
- Pure speed!!!

Subject Focus: Technology, Physics, Maths
**Title: Overpopulation Just Became Your Problem**

Lead Teachers: Amanda Watkin and Kerry-Ann Grace

How can we develop and implement realistic and appropriate policies to help reduce population levels?

In teams, students will take on the role of a country’s government (or equivalent) and mathematically investigate the effect of different policies on populations using simulations. They will then prepare a presentation for the leader of their country, outlining the proposed culturally appropriate policy and psychologically and politically effective method of implementing the policy.

Subject focus: Politics, Psychology, Society, Mathematics

**Title: Media Team (ASMS students only)**

Lead Teachers: Marcus Roberts

A group of students dedicated to the documentation and sharing of the fantastic learning that is taking place over the course of the ISF.

Subject Focus: Media Studies, English, IT

**Title: Citizen Science - World as Lab (ASMS students only)**

Lead Teachers: Charlotte Twizel and supported by Sivam Krish

1) To explore the laws of nature through Phones, using video and apps to capture data.

Students will use their phones to capture real world data and apply laws of physics to it. The intent is to explore physics outside the lab, starting with premade customizable experiments moving on to more complex unstructured experiments that students will develop themselves.

2) To explore the world in 60X, open ended exploration of the natural world. Students will photograph discuss and cirque each other’s work – to be run like a design studio, but on a peer to peer mode.

The project is to engage non-scientist in science using their own phones

Subject focus: Physics, Math & Biology