

#### STEM Shark Tank 2018

The AGHS STEM Team initiated and developed two whole STEM days within term 2 2018. Year 8 students participated in STEM in the library where flexible furniture allowed for higher student engagement and authentic learning to be facilitated. Six STEM teaching professionals demonstrated strong collaboration skills in managing the program success.

- The design brief provided to students was to 'develop a product that improves AGHS in one or more of the following aspects: Educationally, Aesthetically, Socially, Emotionally'
- Students were randomly allocated to teams to challenge their collaboration and communication skills.
- Each team had to manage their team roles and finances, developing entrepreneurial skills to design and produce a product using only recyclable materials.
- The community open night showcased student work in a 'Shark Tank' format

Science outcomes	SC4 - 5WS (WS 5.3) SC4 - 8WS (WS8 ABC)	SC4 - 9WS (WS9 A>D) ES3 (A,B,D,E)	
Mathematics outcomes	MA4-1WM MA4-2WM	MA4-3WM MA4-5NA	MA4-6NA MA4-12MG
TAS outcomes	4.1.1, 4.3.1	4.2.1, 4.6.2	

#### Statement of impact

STEM Academy facilitated significant teacher passion, professional development and collegial collaboration that led to the substantial success of the project. The STEM program at Asquith culminated in a highly successful community entrepreneurial showcase. STEM has clearly been established as a subject that motivates students to engage in the future focused skills of creativity, critical thinking, collaboration and communication. Project success has gained whole school support justified timetabling STEM as a subject into teaching and learning in year 8 in 2019.

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#### For more information

**Paul Devonshire** | Asquith Girls' High School

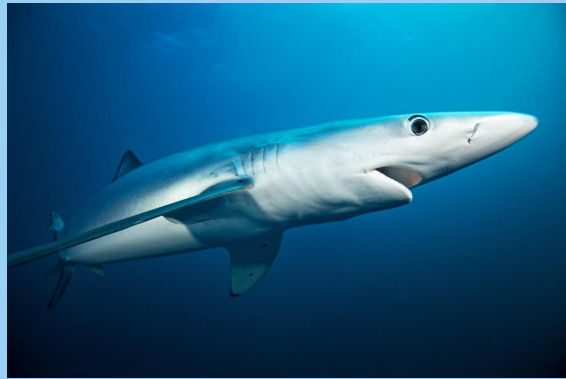
**E** paul.devonshire@det.nsw.edu.au



THE UNIVERSITY OF  
**SYDNEY**

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# STEM SISTAS SHARK



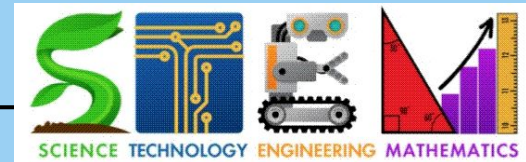
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# WELCOME TO STEM SISTAS SHARK TANK

Thank-you for being part of this initiative.

You will have received a number on coloured card as you entered. You must now form a group whereby each member must hold a card numbered 1 - 5 of the same colour. **Congratulations. You have now formed your company.**

Your company will base its project on innovation and sustainability using recycled AGHS resources.

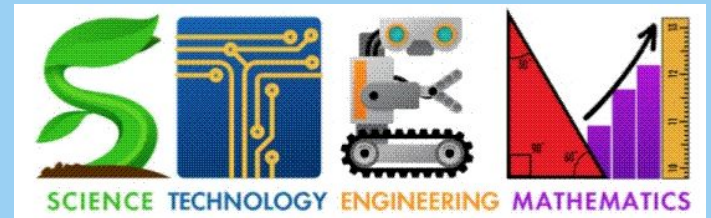


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# DESIGN BRIEF

You have been commissioned by AGHS to develop a product that **improves** AGHS in in one or more of the following aspects:

- Educationally
- Aesthetically
- Socially
- Emotionally



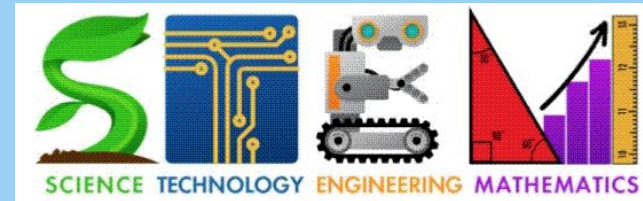
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# DESIGN BRIEF CONTINUED

Your company must design and construct a prototype in the time frame given. The design will need to be marketed and pitched to the STEM Sistas Shark Tank. You will have the opportunity to receive the following awards:

- **STEM Sista Investment Award** - awarded to the recipient of the most Asquith Dollars invested by STEM industry professionals as well as parent visitors.

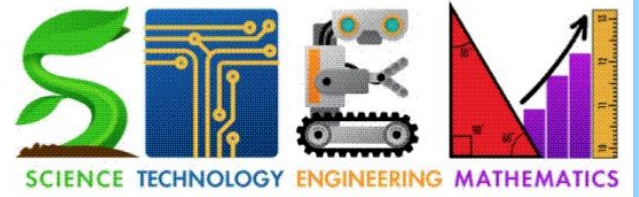
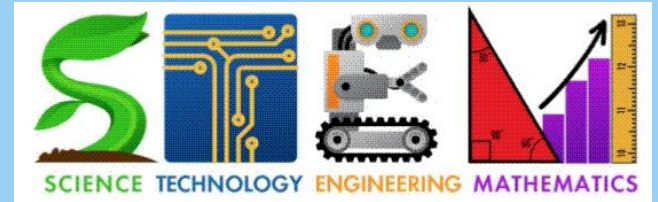
Parents will be allocated \$1500 each to invest.  
STEM investors will be allocated \$10 000.



# INSPIRATION...



# INSPIRATION...



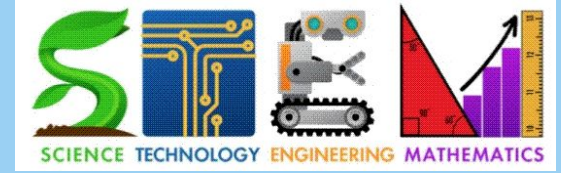
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# LOCAL COMPETITION - RE-MAGINE 2018



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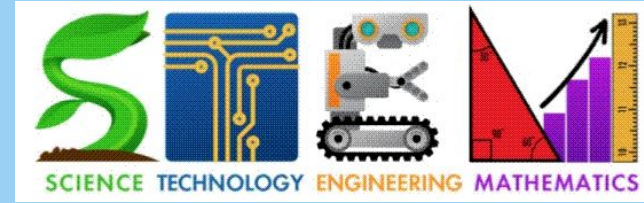
# DESIGN CONSTRAINTS



1. Only resources supplied can be used
  2. Time; must be constructed in the 2 days allocated at school (you cannot work on your product beyond these hours)
  3. Designated Asquith Dollars cannot be exceeded
  4. Groups must be made up of a number 1-5 (no double up of numbers)
  5. Marketing pitch will take place on: **Thursday 21st June**
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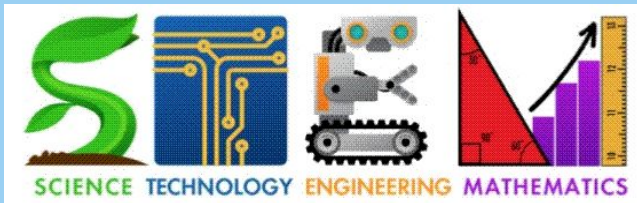
# COST



Available resources include recycled materials, tools for construction and lesson. Each of these are only accessible using **Asquith Dollars**. The costing of each is provided in your booklets and summarised here. But beware, costs will increase over time as your time to work will decrease.



# STEM SISTA SHOP

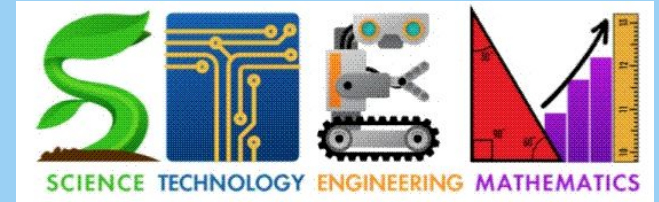


## Recycled Items Price List

<u>Item</u>	<u>Price</u>
Egg Carton	\$2.00
Plastic drink container	\$2.00
Cardboard boxes (cereal, biscuits etc)	\$2.00
Plastic trays (from biscuit packets etc)	\$2.00
Recycled paper (5 sheets)	\$1.00
Shredded paper (per handful)	\$1.00
Aluminium cans	\$2.00
Aluminium tins	\$2.00
Plastic Punnets	\$1.00
Recycled Newspaper (3 double sheets)	\$1.00
Recycled magazines (5 pages)	\$2.00

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# STEM SISTA SHOP - TBC

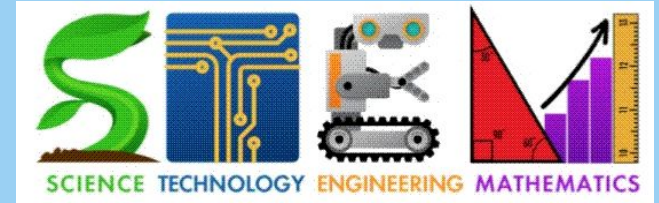


## Resources and price list

- Egg Cartons
  - Milk Bottles
  - Aluminium Cans
  - Newspaper
  - Plastic punnets and food packaging
  - Cardboard boxes
  - Plastic bottles and containers
  - Recycled Paper
  - Shredded Paper
  - Old magazines
  - Scissors
  - Hot glue gun - safety instructions
  - Masking Tape
  - Sticky Tape
  - Stanley Knife - safety instructions
  - Rulers
  - Calculator
  - Pipe cleaners
  - Stapler
  - Cable ties
  - Glue
  - Plain paper
  - Rubber bands
  - Butchers paper - planning or presentation use only
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# TOOLS

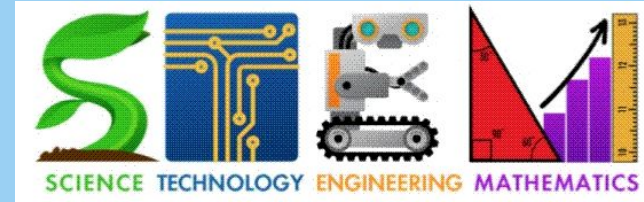


Additional to the recycled materials, you will also have access to:

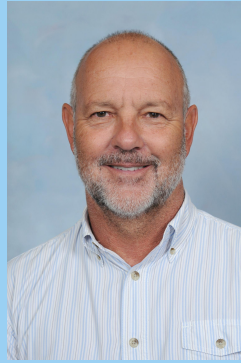
- Scissors
  - Hot glue gun
  - Tape (Masking and/or Sticky)
  - Elastic Bands
  - Cable Ties
  - Stanley Knife
  - Rulers
  - Pipe Cleaners
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# RESOURCES AVAILABLE



You will also have the opportunity to purchase specialised subject specific lessons throughout the 2 days, taught by your teachers.



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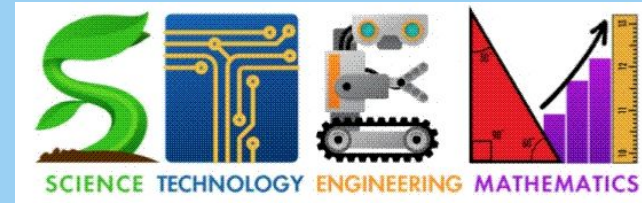
# PURCHASE A LESSON

## MATHEMATICS LESSONS TO SELL

- Creating a budget
- Using a spreadsheet package for algebraic calculations
- Scale drawing

## TAS LESSONS TO SELL

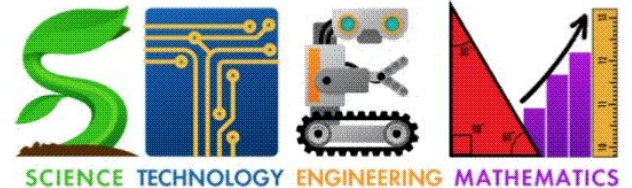
- Web design
  - Logo design
  - Idea generation
  - Construction Techniques
  - HS; Supervision of tools
  - Video creation/editing
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## SCIENCE LESSONS TO SELL

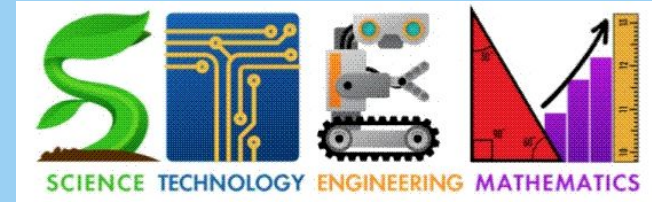
- Safely using a glue gun
- Safely using soldering equipment
- The influence of human activity on the surface of the Earth and the atmosphere.

# ALLOCATE YOUR ROLES WITHIN THE TEAM



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# CRITERIA TO EVALUATE SUCCESS



For your company's project to take out the STEM Sistas Business Idea of the Year Award it must meet the following criteria:

- Completed and pitched within timeframe
  - Design to be justified through Science, Technology and Mathematics outcomes
  - Physical prototype using only provided resources constructed
  - Innovative design idea
  - Must improve AGHS in one of the categories; **educationally, aesthetically, socially, or emotionally**
  - Company budget recording on spreadsheet and presented in marketing pitch
  - Scaled drawing of design prototype
  - Volume of recycled material calculations
  - Justification of the impact of recycled material wasn't being recycled and left in the environment
  - Evaluate energy efficiency of production and recycling material.
  - Engaging, persuasive marketing campaign that includes company logo and multimedia presentation
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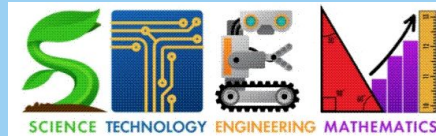
# TIME MANAGEMENT



## DAY 1; Week 5. Wednesday 30th May, 2018

TIMING	ACTIVITIES
PERIOD 1	<ul style="list-style-type: none"><li>Teacher information session; what is STEM Sistas, what is the project</li></ul>
PERIOD 2	<ul style="list-style-type: none"><li>Idea generation; dreams and gripes (TAS)</li><li>What do you want to achieve? What category of AGHS will it improve?</li></ul>
RECESS	
PERIOD 3	<ul style="list-style-type: none"><li>Sketching design ideas, finalising designs</li><li>Marketing campaign idea generation; brand name decided, logo sketches begun,</li></ul>
PERIOD 4	<ul style="list-style-type: none"><li>Prototype modelling and experimentation</li></ul>
LUNCH	
PERIOD 5	<ul style="list-style-type: none"><li>Prototype modelling and experimentation</li><li>Marketing campaign development</li></ul>

# TIME MANAGEMENT

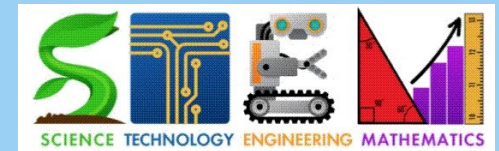
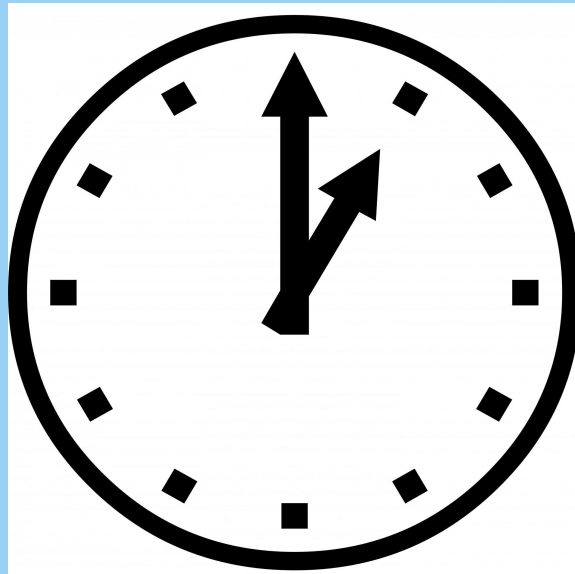


## DAY 2; Week 8. Thursday 21st June, 2018

TIMING	ACTIVITIES
PERIOD 1	<ul style="list-style-type: none"><li>• Prototype building</li><li>• Marketing campaign development</li><li>• Finance officer compiling spreadsheet</li></ul>
PERIOD 2	<ul style="list-style-type: none"><li>• Prototype building</li><li>• Marketing campaign development</li><li>• Finance officer compiling spreadsheet</li></ul>
RECESS	
PERIOD 3	<ul style="list-style-type: none"><li>• Finalise budget spreadsheet</li><li>• Finalise design sketches</li><li>• Finalise marketing campaign; logo and multimedia presentation</li></ul>
PERIOD 4	<ul style="list-style-type: none"><li>• STEM Sista Shark Tank evaluation (WWW, EBI)</li><li>• STEM Sista future project ideas</li></ul>
LUNCH	
PERIOD 5	<ul style="list-style-type: none"><li>• Market boards and resources set up for Shark Tank display</li></ul>

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THE CLOCK IS TICKING....



# PERIOD 2.....

- Idea generation; dreams and gripes (TAS)
- What do you want to achieve? What category of AGHS will it improve?



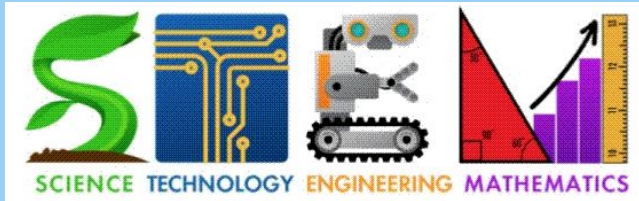
# PERIOD 3.....

- Sketching design ideas, finalising designs
- Marketing campaign idea generation; brand name decided, logo sketches begun



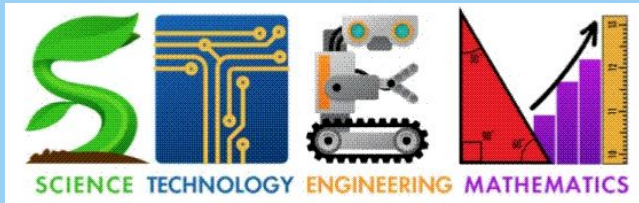
# PERIOD 4.....

- Construction!



# PERIOD 5.....

- Construction
- Marketing campaign development

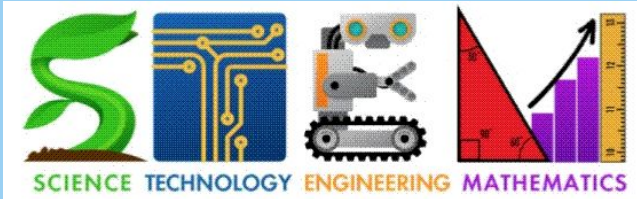


# DAY 2 STEM SISTAS SHARK TANK

TIMING	ACTIVITIES
PERIOD 1	<ul style="list-style-type: none"><li>• Prototype building</li><li>• Marketing campaign development</li><li>• Finance officer compiling spreadsheet</li></ul>
PERIOD 2	<ul style="list-style-type: none"><li>• Prototype building</li><li>• Marketing campaign development</li><li>• Finance officer compiling spreadsheet</li></ul>
RECESS	
PERIOD 3	<ul style="list-style-type: none"><li>• Finalise budget spreadsheet</li><li>• Finalise design sketches</li><li>• Finalise marketing campaign; logo and multimedia presentation</li></ul>
PERIOD 4	<ul style="list-style-type: none"><li>• STEM Sista Shark Tank evaluation (WWW, EBI)</li><li>• STEM Sista future project ideas</li></ul>
LUNCH	
PERIOD 5	<ul style="list-style-type: none"><li>• Market boards and resources set up for Shark Tank display</li></ul>

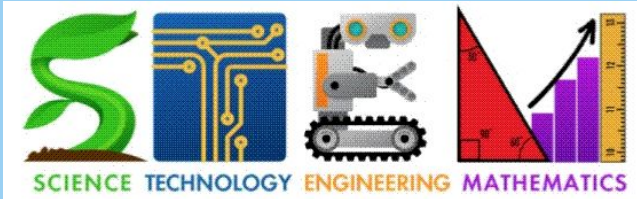
# DAY 2 PERIOD 1....

- Prototype building
- Marketing campaign development
- Finance officer compiling spreadsheet



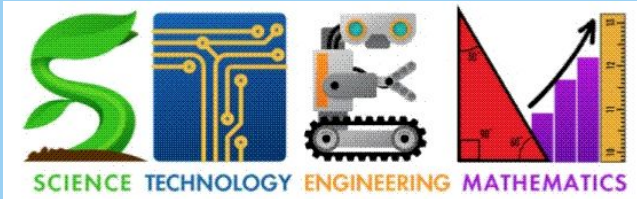
# DAY 2 PERIOD 2....

- Prototype building
- Marketing campaign development
- Finance officer compiling spreadsheet



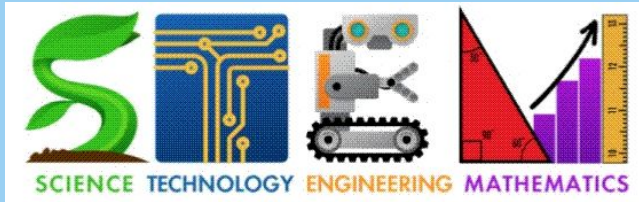
# DAY 2 PERIOD 3.....

- Finalise budget spreadsheet
- Finalise design sketches
- Finalise marketing campaign; logo and multimedia presentation



# DAY 2 PERIOD 4.....

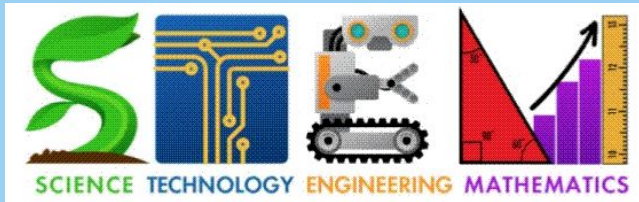
- STEM Sista Shark Tank evaluation (WWW, EBI)
- STEM Sista future project ideas



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# DAY 2 PERIOD 5....

- Market boards and resources set up for Shark Tank display



# STEM SISTAS SHARK TANK

*Lesson Plan for Year 8 STEM Sistas Immersion*

*Prepared by A.Avery, K.Bird, D.Lavy, N.Terry, M.Fang and P.Devonshire*

## OVERVIEW & PURPOSE

- 2 x full days of immersing Year 8 into a STEM based activity
- All within Term 2

## STRATEGY DESCRIPTION

- Students are placed in groups of 5
- Ss work together to produce a product using only recyclable materials
- Ss must have a job role and it must improve the quality of AGHS in some way
- Ss will market their final prototype to a board of directors- Principal, Deputies, STEM team of teachers with a fully prepared marketing campaign

## STRATEGY OR PROJECT TITLE

- STEM SISTAS

## TARGET YEAR GROUP(S)

- Year 8 for the STEM Academy initiative

## SCIENCE OUTCOMES

- SC4 - 5WS (WS 5.3)
- SC4 - 8WS (WS8 ABC)
- SC4 - 9WS (WS9 A>D)
- ES3 (A,B,D,E)

## MATHEMATICS OUTCOMES

- MA4-1WM communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols

Drawing diagrams of models and using appropriate symbols to express mathematics used

- MA4-2WM applies appropriate mathematical techniques to solve problems

Identify mathematical processes required to work through elements of project

- MA4-3WM recognises and explains mathematical relationships using reasoning

Uses mathematics to evaluate / explain the impacts of their concept

- MA4-5NA operates with fractions, decimals and percentages

Calculation of discounted prices / percentage of budget spent

- MA4-6NA solves financial problems involving purchasing goods

Budget of expenditure using spreadsheet

- MA4-7NA operates with ratios and rates, and explores their graphical representation

Scale drawing of model

- MA4-8NA generalises number properties to operate with algebraic expressions
- MA4-10NA uses algebraic techniques to solve simple linear and quadratic equations

Develop a formula to explain expenditure and potential cost

- MA4-12MG calculates the perimeters of plane shapes and the circumference of circles

Links to scale drawing of model through actual measurement of materials

- MA4-13MG uses formulas to calculate the areas of quadrilaterals and circles, and converts between units of area
- MA4-14MG uses formulas to calculate the volume of prisms and cylinders, and converts between units of volume

Volume of recycled material used

- MA4-20SP analyses single sets of data using measures of location, and range

Calculations of statistics to analyse trials / survey results of concept

## TAS OUTCOMES

- 4.1.1, 4.3.1, 4.2.1, 4.6.2

## PROJECT CONTACT PERSON

- Paul Devonshire

## DESIGN SITUATION

A group of numbers 1-5 will form a company who bases their projects on innovation and sustainability. Each company is provided a designated amount of Asquith Dollars to fund the companies project.

## DESIGN BRIEF

You have been commissioned by AGHS to develop a product that improves AGHS in some way in one or more of the following manners:

- Educationally
- Physically
- Socially
- Emotionally

You must only use the recycled resources available that include the following:

- Egg Cartons
- Milk Bottles
- Aluminium Cans
- Newspaper
- Plastic punnets and food packaging
- Cardboard boxes
- Plastic bottles and containers
- Recycled Paper
- Shredded Paper

Additional to the recycled materials, you will also have access to:

- Scissors
- Hot glue gun
- Masking Tape
- Electrical Tape
- Stanley Knife
- Rulers

You and your team of innovators must design and construct a prototype in the time frame given. The design will need to be marketed and pitched on the STEM Sistas Shark Tank. Your company will have the opportunity to receive the following awards:

- STEM Sista Investment Award; most Asquith dollars invested by STEM industry professionals as well as parent visitors. Parents will be allocated \$1500 each to invest. STEM investors will be allocated \$10 000.

You will also have the opportunity to purchase specialised subject specific lessons throughout the 2 days, taught by your teachers.

Everything listed above; recycled resources, additional resources and lessons are only accessible using your Asquith dollars. The costing of each is provided in your booklets and summarised here:

- Egg Cartons = \$3

## DESIGN CONSTRAINTS

- Only resources supplied can be used
- Time; must be constructed in the 2 days allocated
- Designated Asquith Dollars cannot be exceeded
- Groups must be made up of a number 1-5 (no double up of numbers)
- Marketing pitch will take place on:
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## CRITERIA TO EVALUATE SUCCESS

In order for your companies project to take out the STEM Sistas Business Idea of the Year Award it will need to meet the following criteria:

- **Completed and pitched within timeframe**

- Design to be justified through Science, Technology and Mathematics outcomes
- Physical prototype using only provided resources constructed
- Innovative design idea
- Must improve AGHS in one of the categories; Physical, social, education and emotionally
- Company budget recording on Excel spreadsheet and presented in marketing pitch
- Scaled drawing of design prototype
- Volume of recycled material calculations
- Justification of the impact of recycled material wasn't being recycled and left in the environment
- Evaluate energy efficiency of production and recycling material.
- Engaging, persuasive marketing campaign that includes company logo and multimedia presentation

## SCIENCE LESSONS TO SELL

- Safely using a glue gun
- Safely using soldering equipment
- Explore the humans use resources from the Earth
- The influence of human activity on the surface of the Earth and the atmosphere.

## MATHEMATICS LESSONS TO SELL

- Creating a budget
- Using a spreadsheet package for algebraic calculations
- Scale drawing

## TAS LESSONS TO SELL

- Web design
- Logo design
- Idea generation
- Construction Techniques
- HS; Supervision of tools
- Video creation/editing

## GROUP JOBS ROLES AND RESPONSIBILITIES

- 1 x Graphic designer/artist
- 1 x Finance officer
- 1 x Engineer
- 1 x Marketing campaigner
- 1 x General Manager

## STEM DAY OUTLINE

<div>DAY 1; Week 5</div> <div>Wednesday 30th May, 2018</div>	
TIMING	ACTIVITIES
PERIOD 1	<ul style="list-style-type: none"> <li>• Teacher information session; what is STEM Sistas, what is the project</li> </ul>
PERIOD 2	<ul style="list-style-type: none"> <li>• Idea generation; dreams and gripes (TAS)</li> <li>• What do you want to achieve? What category of AGHS will it improve?</li> </ul>
RECESS	
PERIOD 3	<ul style="list-style-type: none"> <li>• Sketching design ideas, finalising designs</li> <li>• Marketing campaign idea generation; brand name decided, logo sketches begun,</li> </ul>
PERIOD 4	<ul style="list-style-type: none"> <li>• Construction</li> </ul>
LUNCH	
PERIOD 5	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Marketing campaign development</li> </ul>

## DAY 2; Week 8

### Thursday 21st June, 2018

TIMING	ACTIVITIES
<b>PERIOD 1</b>	<ul style="list-style-type: none"> <li>• Prototype building</li> <li>• Marketing campaign development</li> <li>• Finance officer compiling spreadsheet</li> </ul>
<b>PERIOD 2</b>	<ul style="list-style-type: none"> <li>• Prototype building</li> <li>• Marketing campaign development</li> <li>• Finance officer compiling spreadsheet</li> </ul>
<b>RECESS</b>	
<b>PERIOD 3</b>	<ul style="list-style-type: none"> <li>• Finalise budget spreadsheet</li> <li>• Finalise design sketches</li> <li>• Finalise marketing campaign; logo and multimedia presentation</li> </ul>
<b>PERIOD 4</b>	<ul style="list-style-type: none"> <li>• STEM Sista Shark Tank evaluation (WWW, EBI)</li> <li>• STEM Sista future project ideas</li> </ul>
<b>LUNCH</b>	
<b>PERIOD 5</b>	<ul style="list-style-type: none"> <li>• Market boards and resources set up for Shark Tank display</li> </ul>

## STEM SISTA SHARK TANK EVENING;

### Thursday 21st June, 2018

TIMING	ACTIVITIES
<b>3:30 - 4:30 pm</b>	<ul style="list-style-type: none"> <li>• Project display</li> <li>• Companies marketing projects to investors</li> <li>• Parent and STEM investors choose where to invest their money</li> </ul>
<b>4:30 - 5:00 pm</b>	<ul style="list-style-type: none"> <li>• Guest Speaker</li> <li>• STEM Sista student speech (what they enjoyed, how they found it challenging, if they are inspired by the STEM Sista Shark Tank, what jobs they may look into in the future in STEM etc)</li> </ul>

	<ul style="list-style-type: none"> <li>• STEM Sista helpers count investors money behind the scenes</li> </ul>
<b>5:00 - 5:30 pm</b>	<ul style="list-style-type: none"> <li>• Winners of STEM Sista Investor Awards announced; 1st, 2nd, 3rd</li> <li>• STEM gifts presented (Barista Sista vouchers, ??)</li> </ul>
	<ul style="list-style-type: none"> <li>• STEM Sista Shark Tank evaluation (WWW, EBI)</li> <li>• STEM Sista future project ideas</li> </ul>
	<ul style="list-style-type: none"> <li>• Market boards and resources set up for Shark Tank display</li> </ul>