BLACKWOOD HIGH SCHOOL
Inspiring Achievement and Respect

STEM in SACE
Increasing mathematical pathways for all students.

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Aitsl

What is instructional coaching?

- A coach working **one-to-one** with a teacher, to model and observe classroom practice and to support reflection and professional conversation. The aim is to build a partnership to develop evidence-based teaching practices.

http://bit.ly/2r3jvwX

Why do students choose to do mathematics at Blackwood High School?

- Teacher / student relationships
- positive attitude towards maths
- achieve success at mathematics
- experienced Teachers
- developing a growth mindset
- introduction of STEM
- real life applications

How have we achieved this?

- Teacher shift in pedagogy
- Student shift in attitude towards Mathematics
- Whole school approach
- Introducing STEM into BHS

How have we achieved this?

Teacher shift in pedagogy by

- Instructional coaching
- sharing best practice
- observing each other in the classroom
- using common Tests and Folio Tasks
- shifting from ‘tell to ask’
- text book work seen differently
- catering for all levels
- responding to feedback from students

Aitsl Feedback

AITSL Learning Frontiers Engagement Survey

Teacher

Class

Subject

Gender

- Male ☐
- Female ☐

1. I am interested in what I am learning in this subject
   - Strongly agree ☐
   - Agree ☐
   - Disagree ☐
   - Strongly disagree ☐

8. For this subject, I sometimes learn from people outside of school (eg members of the community)
   - Strongly agree ☐
   - Agree ☐
   - Disagree ☐
   - Strongly disagree ☐

9. I try hard to do my best in this subject
   - Strongly agree ☐
   - Agree ☐
   - Disagree ☐
   - Strongly disagree ☐

10. I receive useful feedback about my progress in this subject

How have we achieved this?

Student shift in attitude by

- having success in mathematics
- creating positive teacher relationships
- being challenged in mathematics
- having all levels catered for
- finding it OK to say they are good at Maths

- *My son ……..is in one of your Year 8 maths classes. I just wanted to pass on to you how highly he speaks of you. Maths has never been a strong point of ……so having a teacher so engaging is wonderful for him. I just wanted to pass on my thanks, having a child that believes he can do 'ok' at maths now is fantastic. Keep up the great work!*

How have we achieved this?

Whole school approach

- Numeracy Coach in 2013-15
- Creating a new subject Year 10 Extension Maths
- Accelerating students in Maths
  - Primary School student (10 years old) in Yr 10
  - Year 9/10s completing Stage 1 and 2 Maths
- Yr 10 Students completing Essential Maths
- Whole school numeracy plan
- Whole school numeracy focus – each subject area is teaching a numeracy focus lesson in their subject. (Focus on areas of concern from NAPLAN and PAT Maths Data – e.g conversions and reading from tables and charts)

How have we achieved this?

Whole School Approach

- All staff having a positive attitude towards mathematics
- Tracking and monitoring of all student achievement in mathematics from year 8 to year 10. (Data collation from accelerus, stop light system and teacher references)
- Year 6/7 STEM program (over 80 applicants each year, 25-30 selected to be part of our program)
- Year 8 STEM Industry partnership with Haighs chocolate

Data that support the increase in students choosing mathematics after compulsion….

- 2017 Stage 2
  - Specialist Mathematics 27 students
  - Mathematical Methods 60 students
  - General Mathematics 27 students

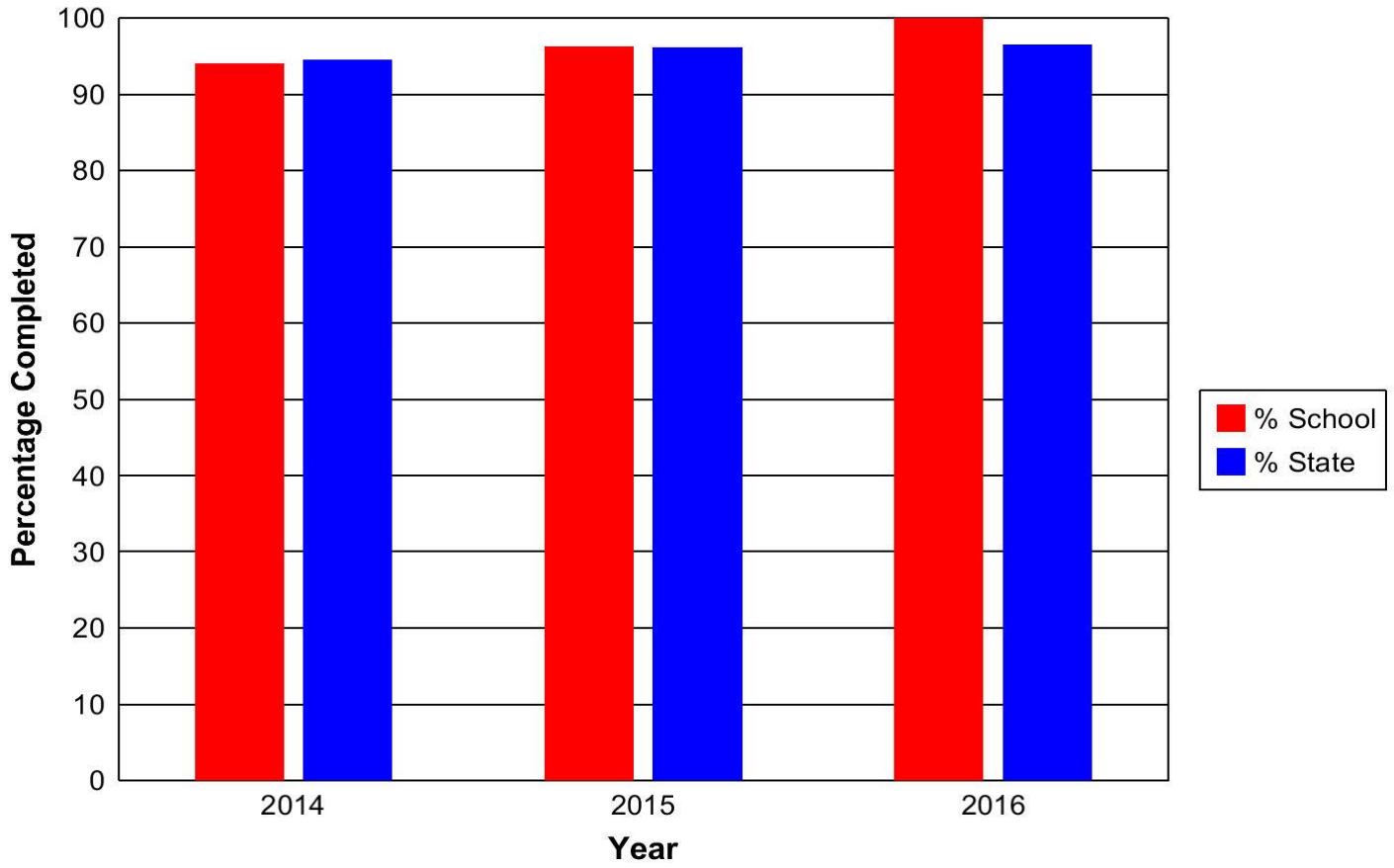
- 2016 Stage 2 Mathematics
  - Specialist Mathematics 25 students
  - Maths Studies 25 Students
  - Mathematical Methods 60 students
  - Maths Applications 12 students

Data that support the increase in students choosing mathematics after compulsion….

- 2017 Stage 1
  - Specialist Mathematics 26 students
  - Mathematical Methods 105 students
  - General Mathematics 63 students
  - Essential 32 students

- 2016 Stage 1 Mathematics
  - Specialist Mathematics 27 students
  - Mathematical Methods 60 students
  - General Mathematics 50 students
  - Essential 45 students

SACE Completion



- at least 10 credits of a mathematics subject at Stage 1 and/or Stage 2;

STEM example

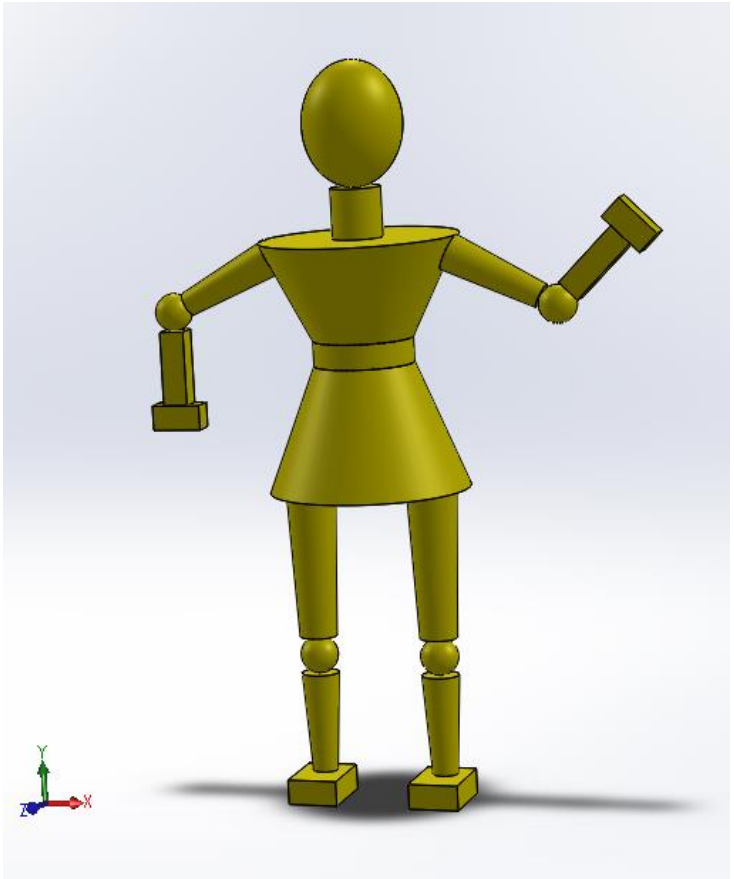
Year 10 Folio Task on Designing a Tin Man

- The need for this folio was discussed after introduction of General Mathematics measurement task in 2016 and NAPLAN volume/capacity conversion were areas of concern.

STEM

Tin Man Design

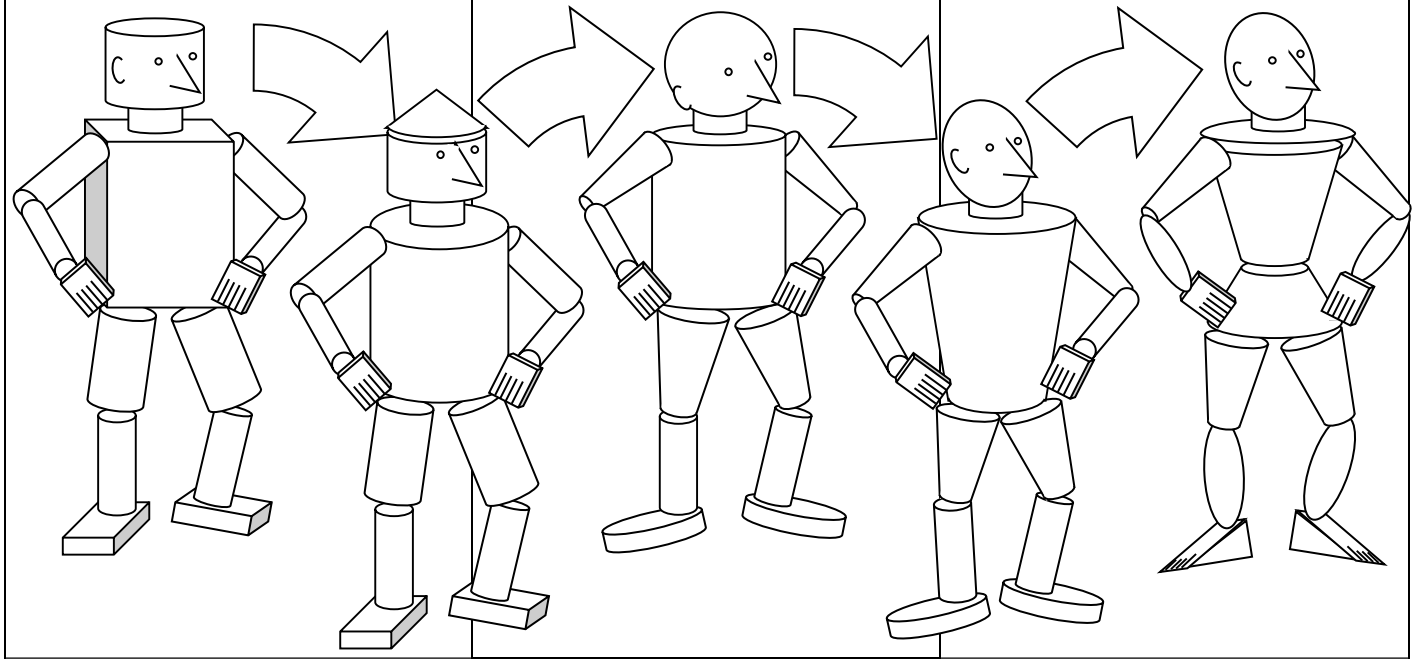
- Explores 3D drawings
- Scale Drawing
- Surface Area
- Volume
- Cost



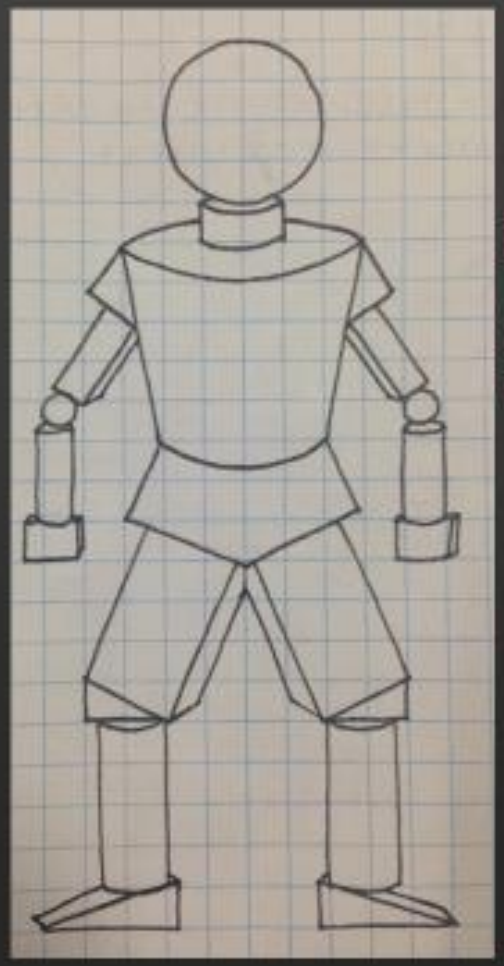
Tin Man

Human Body Volume and Surface Area Estimation Task

Consider the following 3-dimensional (3D) geometric models of the human body. There are many variations on these, with different combinations and shapes to better approximate different bodies.

Standard	Advanced	Extension
This figure uses two types of regular prisms to approximate parts of the human body (Tibbertsma 1986).	This figure uses a combination of regular prisms with regular curved surface objects for a more accurate approximation.	This figure combines regular prisms with regular and irregular curved surface objects for a more realistic model.
		

measurements



shapes / measurements

Sphere:
R= 2cm²

Cylinder:
R= 1cm² H= 1cm

Truncated cone:
BR= 2cm UR= 3 cm
H= 5cm

Truncated square pyramid:
a (base)= 3cm b (top)= 2cm
H= 2cm

Rectangular pyramid:
L= 2cm W= 1cm
H= 1cm

Rectangular prism:
L= 1cm W= 1cm
H= 3cm

Cylinder:
R= 0.5cm H= 3cm

Cube:
L= 1 W= 1cm
H= 1cm

Rectangular prism:
L= 2cm W= 2cm
H= 4cm

Triangular prism:
L= 2cm W= 1
H= 1cm

Cylinder:
R= 1cm H= 4cm

Triangular prism:
L= 3cm W= 1cm H= 1cm

STEM

Tin Man Design

- 2D and 3D drawings from autodesk / CAD
- students drew free hand
- producing scale diagrams became an issue
- challenge came from design – choosing shapes with challenge
- scaffolding for all levels
- written report introduced assumptions and limitations

STEM

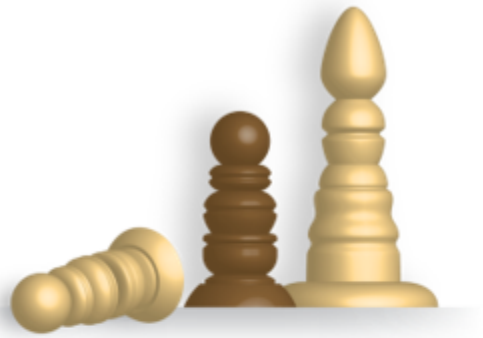
Design a Chess Piece –STAGE 1 General Mathematics Folio task

Stage 1 General Mathematics

Assessment Type 2: Mathematical Investigation

Topic 2: Measurement

Outdoor Chessmen

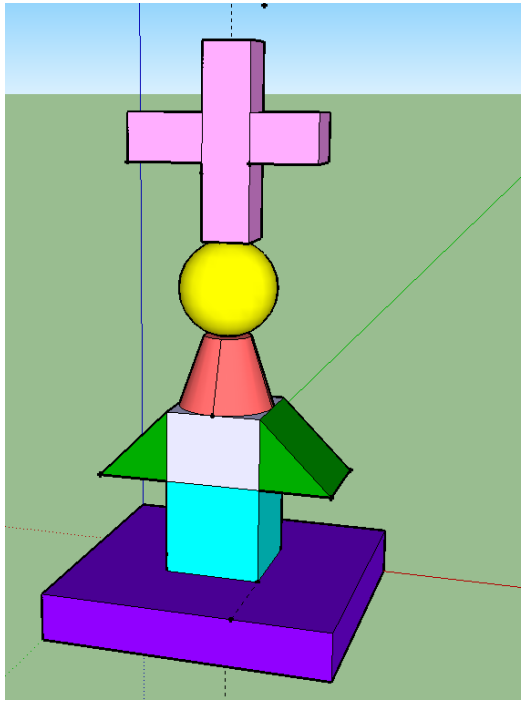


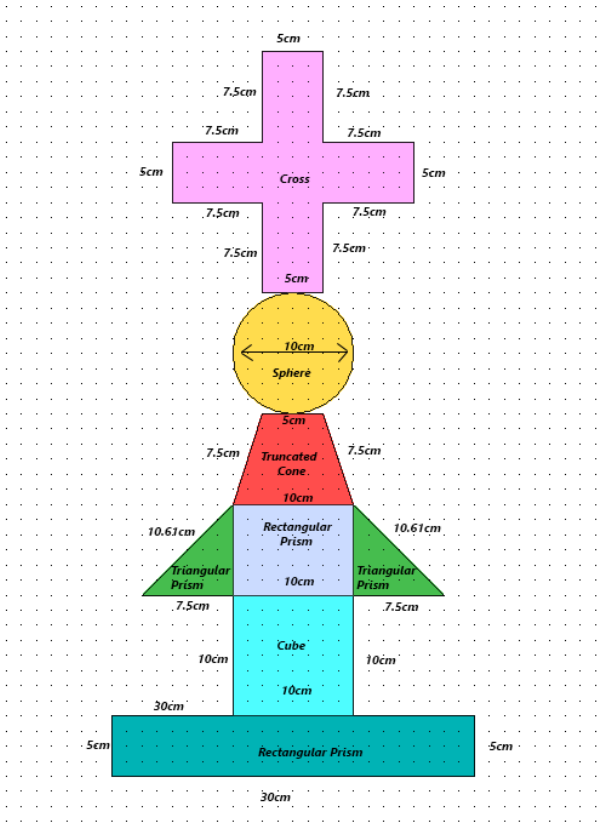
Your task is to design one chess piece for an outdoor chess set.

You need to decide which piece you are going to design – Pawn, Knight, Rook (castle), Bishop, King or Queen.

You might like to have a look at designs that other people have used before you make your own design. There are plenty of outdoor chess set images on the internet for you to get some inspiration from. There's a really way out set made for outdoor playing in a desert at night to be seen at the web site http://www.curple.com/chess/ if you're interested.

STEM





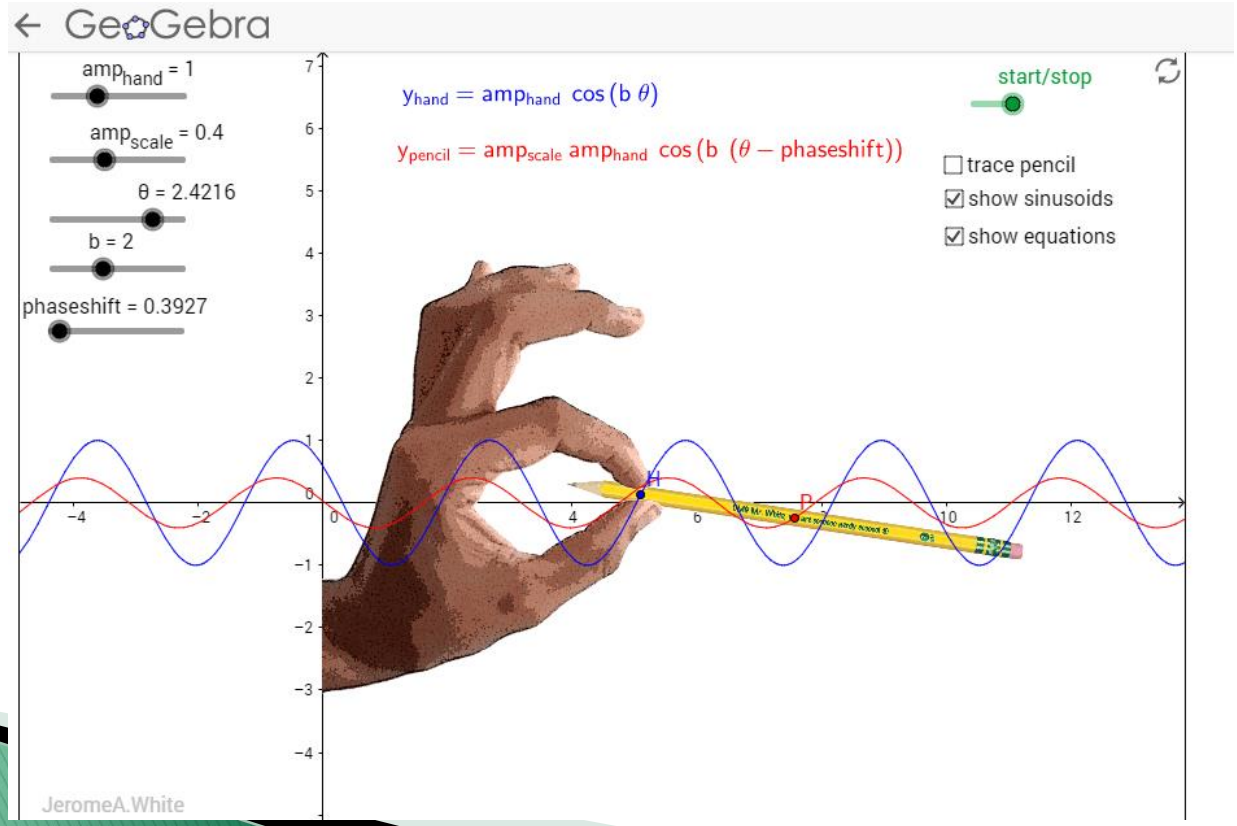
Design a Chess Piece

- STEM 3D print each chess piece in 2018

STEM

Maths Methods Stage 2

- Using GeoGebra as a teaching and learning tool in all year levels
- Stage 2 Methods folio task – design a rollercoaster)



Blackwood High School Strategies to Improve student pathways in mathematics

Improved Student attitudes and dispositions

Improve classroom pedagogy to support student learning

Increase in student engagement, achievement and choices.

Whole School Support