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THE MATHEMATICAL  
ASSOCIATION OF VICTORIA

# Maths 300: Creating school-wide consistent practice to embed the proficiencies

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# WARM UP



8	9	6	7	8	3	4	7	1	7
6	2	9	5	0	2	5	8	3	8
3	8	5	9	1	8	4	9	2	7
2	7	4	8	9	4	9	4	5	7
1	4	4	7	8	0	4	6	7	9
4	6	8	3	9	5	1	8	4	7
3	3	8	3	8	5	9	2	8	9
3	6	9	5	7	4	8	5	8	5
4	5	6	3	7	8	7	8	9	0

# Review to Achieve Educational Excellence in Australian Schools, Gonski 2.0



Equip every student to be a  
creative, connected and  
engaged learner in a rapidly  
changing world

- Recommendation 1 Embed a focus on individual student achievement through continuous learning progress in the policies and practices of all schools and systems, with the expectation that each student should achieve at least one year's growth throughout each year of schooling.
- Recommendation 7 Strengthen the development of the general capabilities, and raise their status within curriculum delivery, by using learning progressions to support clear and structured approaches to their teaching, assessment, reporting and integration with learning areas.
- Recommendation 10 Accelerate the development of contemporary pedagogy through the use of collaboration, mentoring, observation and feedback, including from colleagues and students, by incorporating these practices into the core role of teachers and creating the conditions to enable teachers to engage in them.

# High Impact Teaching Strategies



## THE FIVE PRINCIPLES OF DELIBERATE PRACTICE



**PUSH  
BEYOND**  
one's comfort  
zone



Work toward  
well-defined,  
**SPECIFIC  
GOALS**



**FOCUS**  
intently on  
practice  
activities



Receive and  
respond to  
**HIGH-QUALITY  
FEEDBACK**



Develop a  
**MENTAL  
MODEL**  
of expertise

# Why Maths300?

The lessons are the stimulus to generate professional discussions about:

- open-ended inquiry
- investigative, problem-based approaches
- the role of context to give meaning and purpose
- genuine understanding
- thinking, reasoning and communication
- developing mathematical interconnections
- broadening teachers' pedagogical repertoire
- differentiation and equity
- enriching teachers' assessment repertoire
- the role of technology
- non-threatening learning environments
- a level of success for all





# Proficiencies

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- Problem Solving
- Reasoning
- Understanding
- Fluency



# In the Australian Curriculum



## Understanding

(connecting, representing, identifying, describing, interpreting, sorting, ...)



## Fluency

(calculating, recognising, choosing, recalling, manipulating, ...)



## Problem solving

(applying, designing, planning, checking, imagining, ...)



## Reasoning

(explaining, justifying, comparing and contrasting, inferring, deducing, proving, ...)



# Four cube houses

## Memo to Architects

Congratulations!! Our company has won a contract to supply modular houses made of four cubes to a new housing estate.

The construction rules are:

- all cubes are the same size.
- all cubes touch face to face
- there are no 'cantilevered' structures.
- all the houses must be different, ie: cannot be transformed into each other by a simple rotation around a vertical axis



# A mathematician's strategy toolbox includes:

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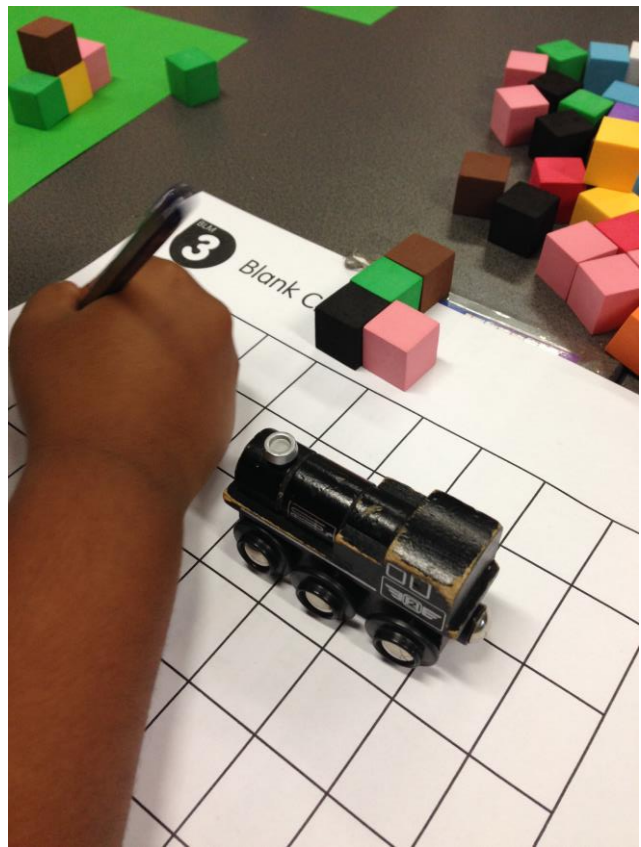


- Do I know a similar problem?
- Guess, check and improve
- Try a simpler problem
- Write an equation
- Make a list or table
- Work backwards
- Break the problem into smaller parts
- Act it out
- Draw a picture or graph
- Make a model
- Look for a pattern
- Try all possibilities
- Seek an exception



# Foundation

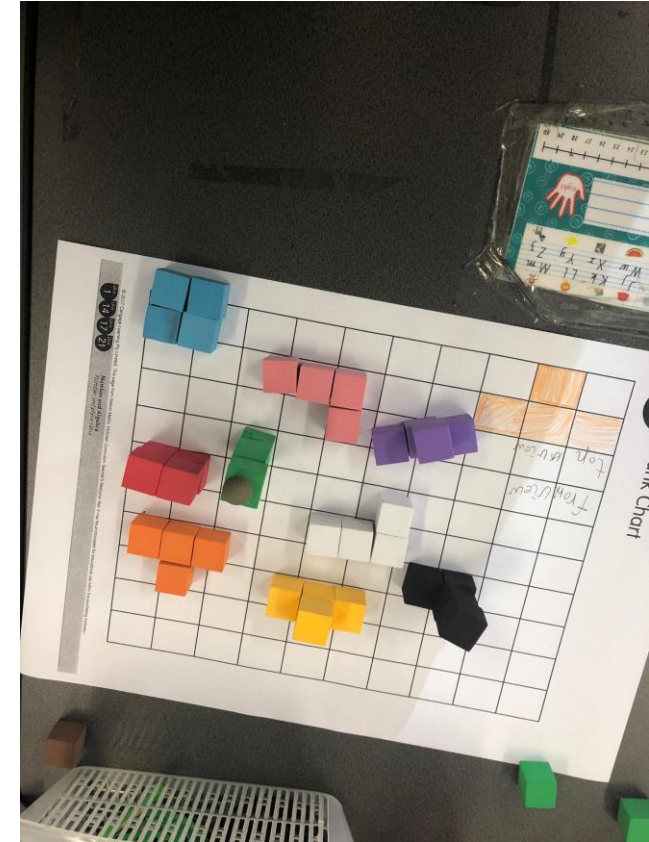
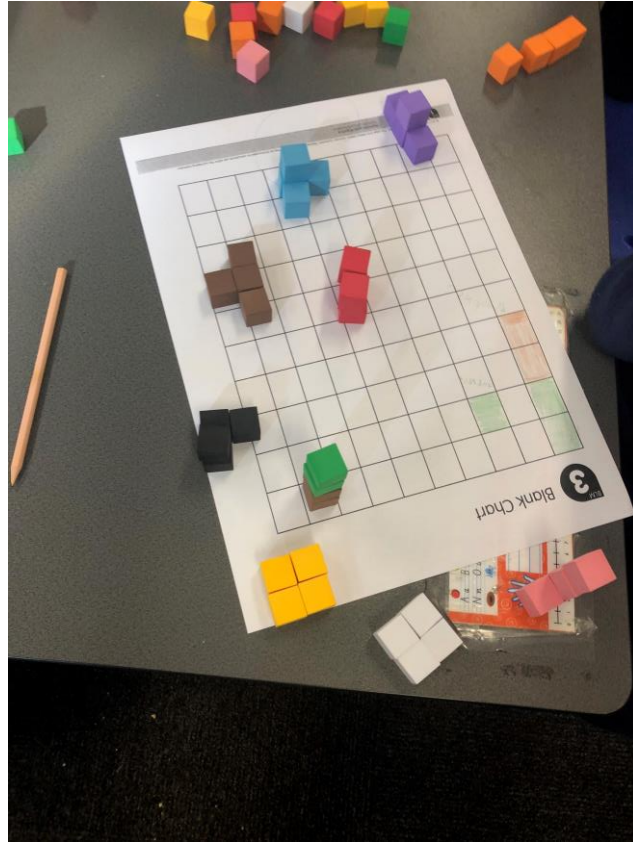
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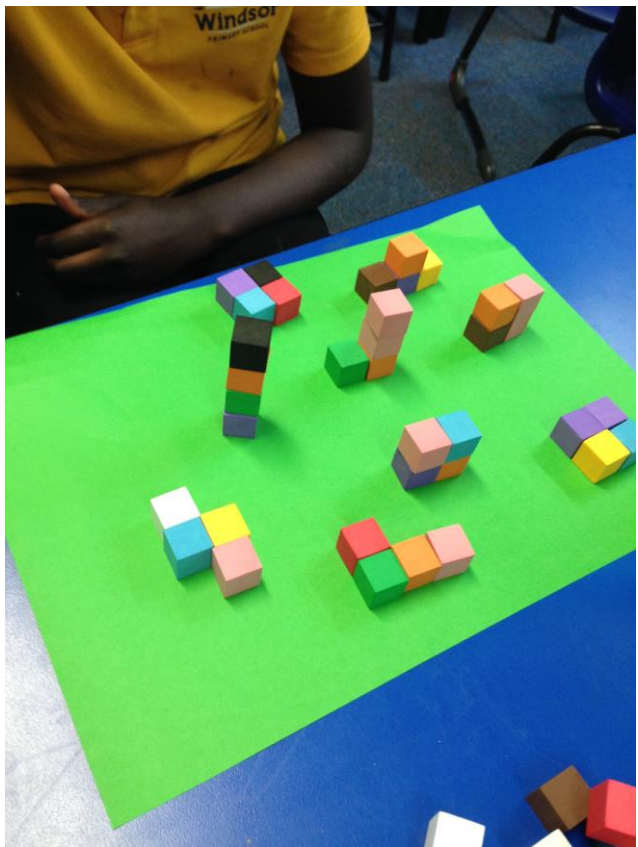
# Year 1 and 2

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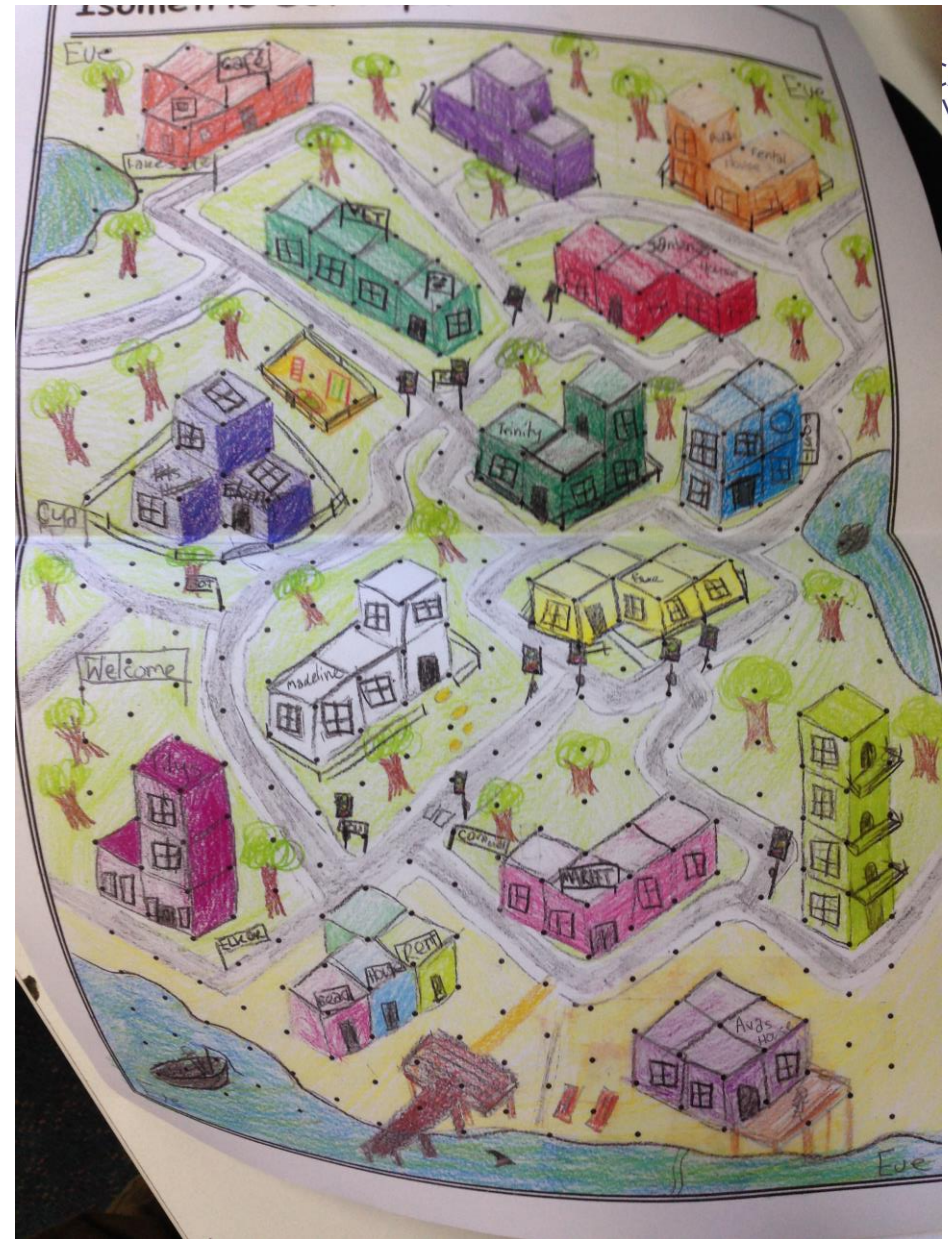
# Year 3 and 4

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# Year 5 and 6



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## Foundation

Story shell: Read book The Three Little Pigs (Preps would be the architects to build new houses for the pigs)

Students used a toy train or car and drove alongside the house and stopped. Draw the view out of the window (front view).

Pretended to be birds and 'flew above' the house to reveal the bird's eye view (top view).

Recorded on blank square tile paper.

## Year 1 and Two

Story shell: Read book The Three Little Pigs

Students built then drew the houses on square paper from different perspectives.

They then cut out 3-4 houses and are planning to use the bee bots to code a path for the pigs to 'drive' so they can view the houses & see which they would like to build.

### **Year 3 and 4**

Story shell: Discussed the process of how Prahran High School was designed & built.

Mentioned to vacant block of land next to it & the council wants to build houses on the land & students would be designing these houses using the 4 cubes.

Recorded estate plans on isometric paper

Costings for will vary from \$5-\$100 for each square unit to ten thousands

### **Year 5 and 6**

Same story shell as Year 3 and 4

Recorded estate plans on isometric paper and or square paper

Costings \$10,000 for each square unit of land covered, \$4000 for each square unit of external wall, \$6,000 for each square unit of roof.

Extension, higher values varied values such as \$10,675 – \$106, 675

# Context

Small (200 students), inner east primary school with extremely diverse socioeconomic and cultural diversity.



Maths Active School – history of desire to improvement



PMS – build teacher capacity and consistent approach to working with the proficiencies.



Modelled teaching/coaching approach

Push beyond

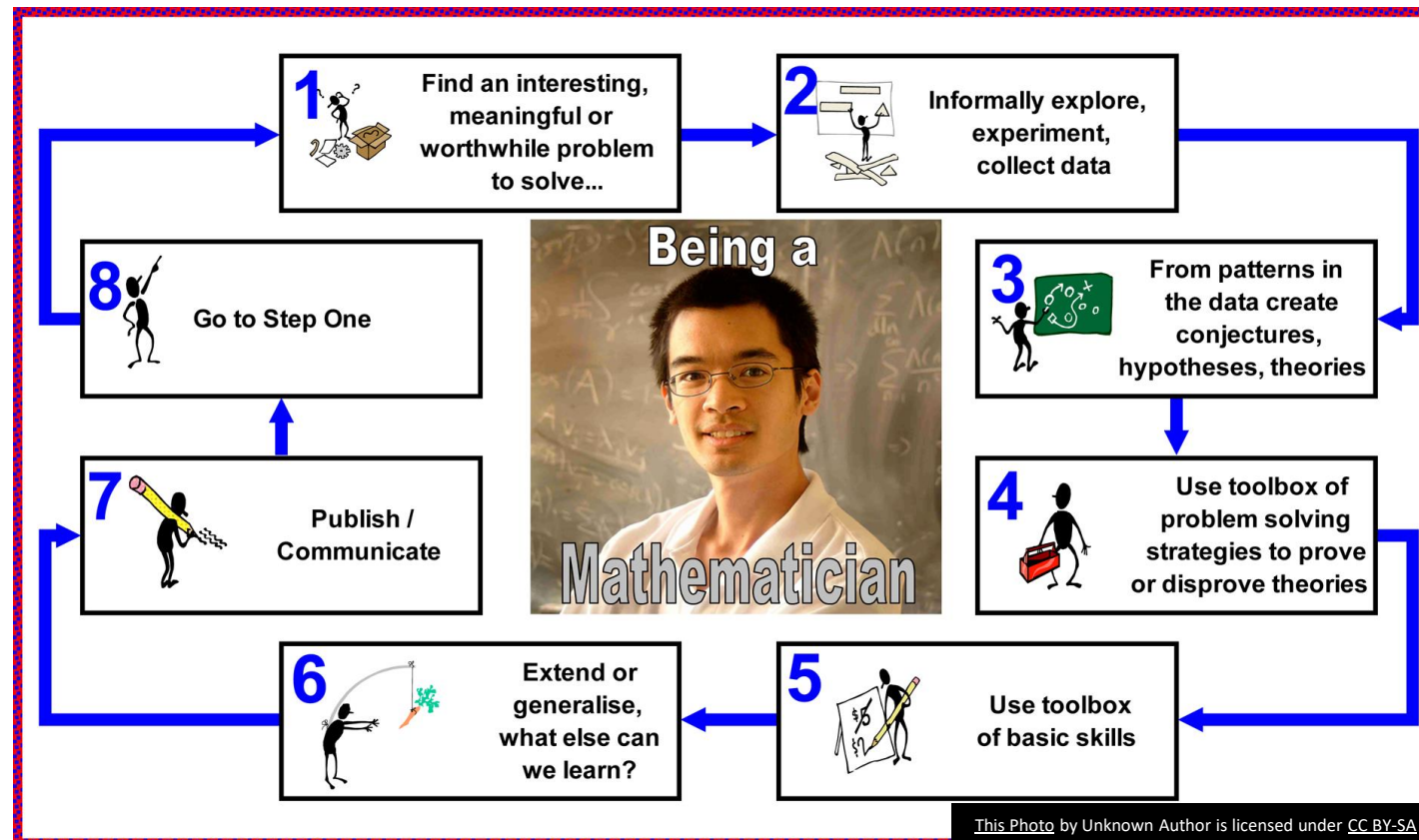
Specific goals

Focus

Feedback

Mental model

# Find a task for you!





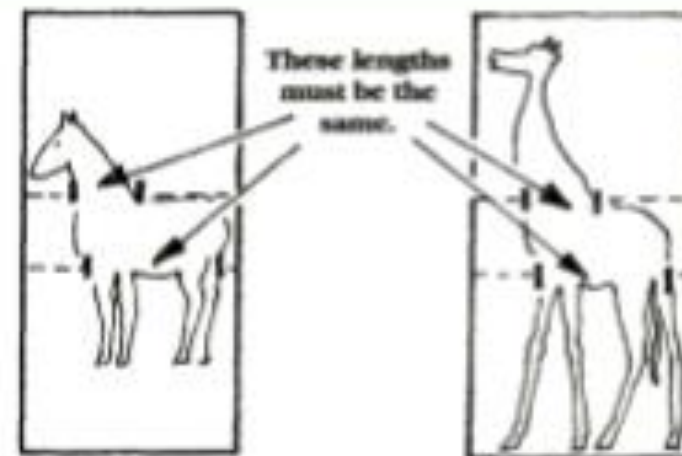
<http://www.maths300.com/>

Username: maths300

Password: maths300

# Crazy Animals

How do the people who make the books make sure that the parts join up?



Would you like to make one of these books yourself?



Summary

How would you  
create an activity  
for Four Cube  
Houses for a prior  
to school setting?

