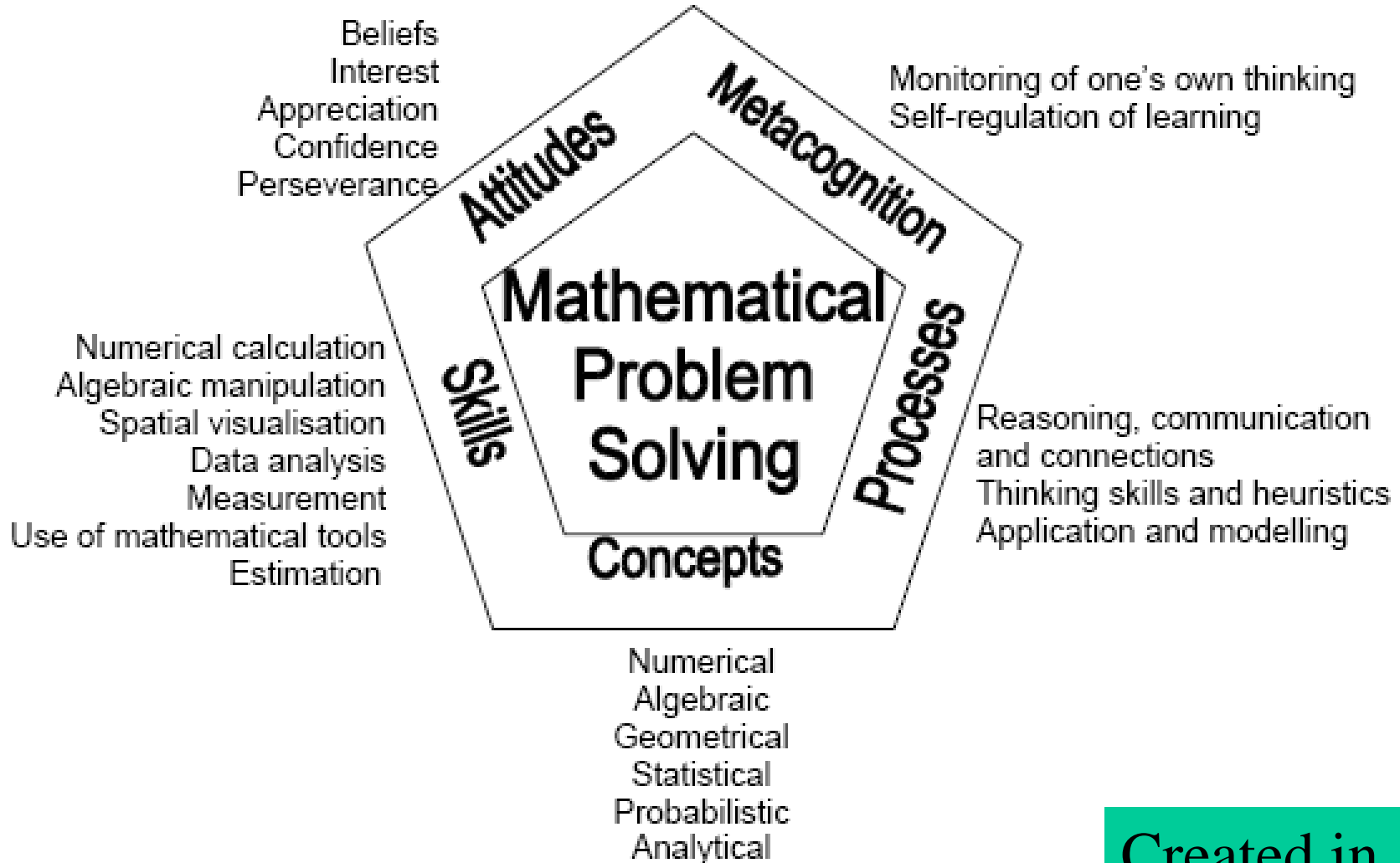


# Pentagon Curriculum Framework



Created in 1989

# Title & Facilitator

## Using the Pentagon Framework to Generate Questions to Assess Mathematics Learning

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# My Background

- 1972, BSc (Hons), Dip Ed (Tasmania)
- 10 years, Malaysia, taught maths, Form 1 – Upper 6
- 1984, PhD (Queensland)
- 1986, 4+ years, Institute of Education (Singapore)
- 1990, 5+ years, Curtin, Murdoch (Perth)
- 1996, 6 years, Universiti Brunei Darussalam
- 2002 – June 2014, 12 years, NIE
- To retire in July, after 40 years in education
- Pedagogy, assessment, curriculum, action research, international studies, Masters, PhD supervision
- Consultancy: Philippines, Hong Kong, Chile, US

# Overview

1. 15 min: Aims
2. 50 min: Design Pentagon Questions
3. 30 min: Questioning Sequence
4. 10 min: Implement and Reflect
5. 5 min: Conclusion

Please ask questions and  
share your ideas: Any time

# Aims

- Pentagon defines: curriculum goals; 5 key factors to help students become better problem solvers
- This session on a new approach: use it to craft different types of questions to plan lessons, to assess student learning
- Pre-planned vs. impromptu, possible student responses

# Advantages

- Cover cognitive, affective, metacognitive domains to enrich student learning, multi-dimensional
- Complement common approach: Bloom taxonomy, convergent vs. divergent questions, high order vs. low order
- Align curriculum goals, teaching and assessment

# Pentagon Questions: Overview

| Components       | Key Ideas   |
|------------------|---|
| Concepts         | <ol style="list-style-type: none"><li>1. Meanings, definitions, representations</li><li>2. Examples, non-examples, facts</li><li>3. Connections</li></ol>               |
| Skills (Methods) | <ol style="list-style-type: none"><li>1. Steps, procedures</li><li>2. Conditions of use</li></ol>   |
| Processes        | <ol style="list-style-type: none"><li>1. Reasoning, inductive justification, deductive proofs</li><li>2. Communication</li><li>3. Applications</li></ol>                |
| Metacognition    | <ol style="list-style-type: none"><li>1. Monitor problem solving process, unstuck</li><li>2. Look back, make sense, extend</li><li>3. Self-regulated learning</li></ol> |
| Attitude         | <ol style="list-style-type: none"><li>1. Motivation, engagement</li><li>2. Enjoyment</li><li>3. Confidence, self-efficacy</li></ol>                                     |

# Question Formats

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Question

What is ... ?

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An instruction as a question

Tell me ...

---

A statement requiring a response

I like to know more about what you are thinking ...

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Different ways to ask the same question



# Design Pentagon Questions

- Handout on Pentagon Questions
- Pentagon Questions Cards (PQC)
- Classification of questions into “rigid” categories, not important; raise awareness of varieties

# Questioning Sequence

- Plan a sequence of questions; variety, levels
- Handout on Consecutive Numbers: Questions to ask for two different approaches

# Q&A and Phases of Lesson

| Phases             | Pentagon Questions |
|--------------------|--------------------|
| Introduction       |                    |
| New concept        |                    |
| Worked examples    |                    |
| Practice, seatwork |                    |
| Closure            |                    |

# Implement & Reflect

- Take many hours to learn new Q&A skills!
- Select questions to trial:
  - Next week
  - Next term
  - Next year
- Reflect on experience:
  - Write teaching log
  - Talk with colleagues at meetings and informally
  - Reading on questioning and discussion

# My Action Plan: Discuss?

| Goals  | Actions |
|--|---------|
| Next week: Write 3 new questions               |         |
| Next term:<br>Questioning sequence for a topic |         |