

# PONTOON: THE POLYSTYRENE WHITE DISASTER SPILL

## Resource three - STEM Design Thinking

### LEARNING OVERVIEW

If you future proof something, you are working on a way to change it so it can withstand future situations. In this lesson students take the experiences from the flood event that caused the pontoons break free and apply them to re-design a pontoon. Using a STEM design thinking process to guide student thinking, we start on a hands-on activity to create a plan and prototype of our STEM design.

**FOCUS QUESTION:** Can you redesign a floating pontoon?

**KEY CONCEPTS:** STEM - Science, Technology, Engineering and Maths. redesigning, collaboration and innovating.

### TEACHING STRATEGIES

- STEM design thinking model

### EQUIPMENT & RESOURCES

- A3 paper
- marker pens
- post-it notes
- various items to build prototypes from (recycled materials)

### NATIONAL CURRICULUM LINKAGES

| Lesson | Years 3 and 4                  | Years 5 and 6                  | Years: 7 and 8                 | Years 9 and 10                 |
|--------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 3      | Critical and creative thinking | Critical and creative thinking | Critical and creative thinking | Critical and creative thinking |

|  |   |   |   |   |
|--|---|---|---|---|
|  | Develop questions to examine unfamiliar ideas and topics<br><a href="#">Level 3 (Years 3-4)</a> | Develop questions to examine unfamiliar ideas and topics<br><a href="#">Level 4 (years 5-6)</a> | Develop questions to examine unfamiliar ideas and topics<br><a href="#">Level 5 (years 7-8)</a> | Develop questions to investigate complex issues and topics.<br><a href="#">Level 6 (years 9-10)</a><br><br><b>Science and a human endeavour</b><br>Investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering<br><a href="#">AC9S9H02</a> and <a href="#">AC9S10H02</a> |
|--|---|---|---|---|

## LEARNING INTENTION:

To design a different type of pontoon structure that is future proofed against extreme weather events and flooding.

## SUCCESS CRITERIA

I am successful when I can describe:

- Apply knowledge to design building
- Explain how the design is future proofed.
- Create a model of the design

## ACTIVITY SEQUENCE

### 1. Tuning In:

Designing a pontoon - for a changing climate:

- Can we re-design floating pontoons to withstand flood events?
- What other materials can be used? Why are these better? What is a more sustainable choice?

## 2. Finding out:

What are pontoons made of?

Investigate the materials that go into making a pontoon.

- Start the clip at Pontoon: 17.16 minutes (to watch Kyrone).

Listen to Kyrone Dodd from Noosa Council. As the Waste and Environmental Health Manager, he discusses the materials that go into making pontoons.

Currently pontoon are made of:

- Concrete
- Steel
- Polystyrene
- Plastic liners

He asks us to think of: **How we can rethink the use of these resources when building the pontoons?**

- Each material can be recycled but when they are joined together they cannot be recycled until they are separated.

Is there a better way to design the pontoon?

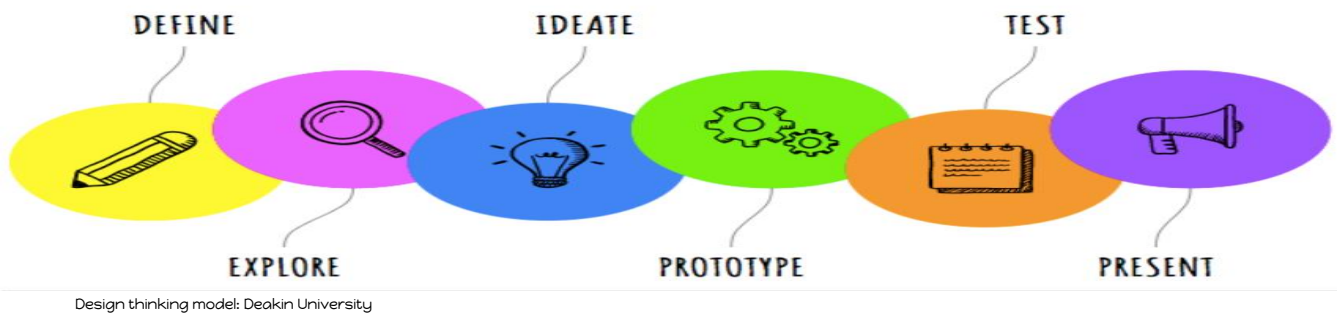
- What other materials could we use?
- Is there a different solution?

## 3. Sorting out:

### Activity 1 : Design thinking process

Using the STEM design thinking model, invite the students to develop innovative ideas to rethink the design of the pontoons.

Follow the steps in the design process to assist the students with their critical thinking approach. Using the planner (see resources section) students can follow the STEM process bringing together science, technology, engineering and maths.



## STEM design thinking process:

use this to help guide the students in the STEM design process:

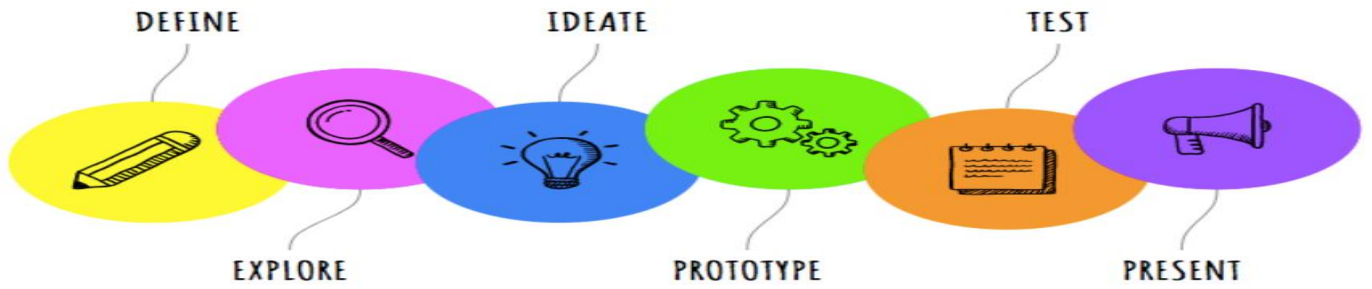
1. **Define:** What is the problem?
  - Make links to the extreme weather event of floods and the pontoons breaking away from their jetty moorings.
2. **Explore:** What is currently being used to make pontoons?
  - Aluminium, air filled, bio plastics
3. **Ideate:** Brainstorm and exciting ideas:
  - What is possible? Are there other materials or ways to make pontoons? What will you choose?
4. **Prototype:** Create a detailed plan of the design and a model.
  - Use a labelled diagram to show your future proofing ideas.
5. **Test:** The idea by discussing the design with others for comment and feedback. Take 3 ideas and see if they can be integrated.
6. **Present:** The project and share if the pontoon solution

## 4. Going further:

### Activity 2 : Connecting STEM ideas

- Integrate STEM elements in the design. Think about how Science, Technology, Engineering and Maths are a part of the design.

# STEM DESIGN THINKING: PONTOON REDESIGN - PLAN



Deakin University STEM design thinking model.

- **Define:** What is the problem? What are you trying to solve?
- **Explore:** What is currently being used to make pontoons?
- **Ideate:** Brainstorm ideas: What is possible?

- **Prototype:** Design and draw:
  - Create a detailed plan of the design.
  - Use a labelled diagram to show your future proofing ideas.



- **Test:** The idea by discussing with others for comment and feedback.
  
- **Present:** The project and share the pontoon solution to your class!