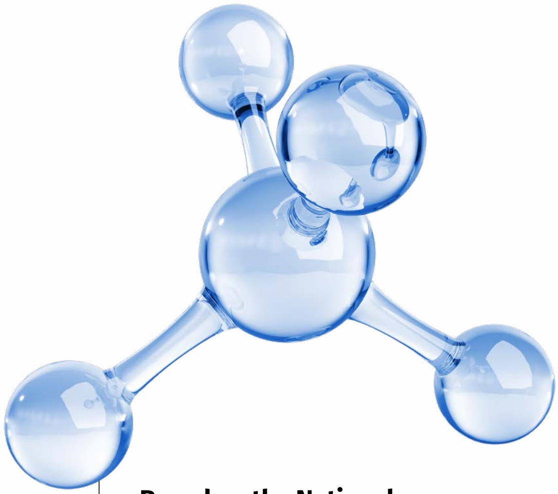
Australian Government

ANSTO

National Science Week 2025



National Science Week 2025 – ANSTO Design Challenge

Learning Objective

Students apply design thinking methods to a problem that requires them to work collaboratively, combine scientific and design skills, and communicate ideas.

The Big Idea

Science has its own language – from mathematical equations to the patterns found in nature. This language helps scientists describe, predict, and understand the universe, from the tiniest quantum particles to the vastness of space. But many of these concepts are complex, abstract, and difficult to communicate.

Why Does This Matter?

Science relies on clear and universal communication so that researchers across the world can collaborate and solve real-world problems. By breaking down complex ideas, we can make science more inclusive, engaging, and accessible to everyone.

The Challenge

Using the design thinking process, create a tangible, innovative solution that makes the hidden languages of nature – mathematics, quantum science, and cosmic physics – more accessible, interactive, and engaging for a chosen end-user. You will select a creative format and a technical word/ scientific concept (from the list provided) to teach to a specific audience (end-user). Use the Design Challenge Toolkit to help assist in planning your project.

Success Criteria

Students come up with tangible solutions to enhance understanding and appreciation of the fundamental languages of nature, uncovering the hidden patterns in mathematics, quantum science, and the cosmos to reveal the unseen forces shaping our universe. Students are required to decide who their audience is.

Your solution should:

- **Unpack a scientific concept** and make it easier to understand while ensuring the accuracy of the science.
- **Use creative and innovative methods** to communicate the concept (without just using scientific jargon).
- **Consider different audiences –** how would you explain this concept to a younger student, a teacher, or even someone with no science background?

Materials to prepare in advance:

- ☐ Printed copies of the Design Mini-Challenge Tool Kit – Student Edition
- ☐ Whiteboard or butcher's paper
- ☐ Markers
- ☐ Post-it notes
- ☐ Blu-Tack
- ☐ Assorted optional prototyping material (e.g. coloured paper, glue, scissors, pipe-cleaners, wires, Styrofoam shapes, paint, playdough, wooden craft sticks)

Based on the National Science Week theme:

Decoding the Universe – Exploring the Unknown with Nature's Hidden Language

In this activity, students will be introduced to the process of design thinking and have an opportunity to apply this process to a mini challenge based on exploring the fundamental languages of nature. The templates provided in the ANSTO Design Mini-Challenge Tool Kit will guide you through the process.

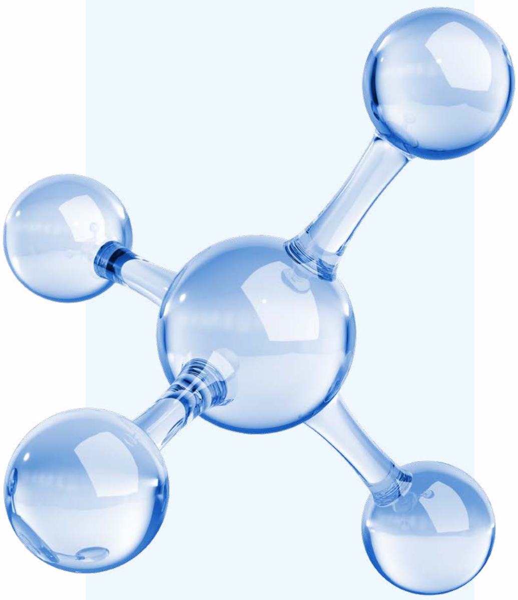
Activity Steps

Use the table below to:

1 Choose an end-user

(who needs this and why)

- Elderly
- Parents
- Primary Teacher
- Secondary Teacher
- Primary School Students
- High School Students
- University Students
- Visually Impaired Students
- Hearing Impaired Students
- Other (needs to be approved by your teacher)



2 Choose a scientific term

(decipher its meaning – research what it means and why it's important in depth)

Mathematical & Physical Patterns:

- Fibonacci sequence & golden ratio
- Fractals
- Crystal formation

Quantum Science and Atomic Structure:

- Nature of light (wave vs particle)
- Atomic structure
- Radioisotopes

Cosmic Physics & Space Science:

- Dark Matter
- Redshift
- Background radiation
- Neutrinos
- Fusion in Stars

Scientific Naming & Classification:

- Periodic table organisation
- Crystal structures
- Taxonomy

Fundamental Forces & Energy:

- Gravity (forces & motion)
- Electromagnetic Spectrum / Waves
- Nuclear Fission vs. Fusion
- Radioactive decay

Australia-specific Science Connections:

- Synchrotron radiation
- Cosmic ray detection
- Uranium or Thorium (decay chain or fission)

Terms are drawn from the Australian Curriculum for Years 7–10 Science

3 Choose a creative format to communicate the term

Spoken & Live Presentations:

- Oral presentation
- Live Demonstration
- Podcast Segment
- Debate
- Elevator Pitch
- Live demonstration (e.g. hands-on experiment)
- Science Song / Rap
- Theatrical Performance (Act out the concept)
- Fast facts challenge (describe it in 30 seconds verbally or 25 words in writing).

Video & Digital Media:

- Short video (Tiktok/ YouTube reel style)
- Animated Video (e.g. Canva, Powtoon)
- Stop-Motion Video
- Documentary-style report

Visual/ Artistic Representation:

- Science Pictionary (use no words)
- Artwork/ Digital design
- Infographic or Poster
- Comic Strip or Illustrated Story
- Physical Model/ Sculpture
- Photographic Essay

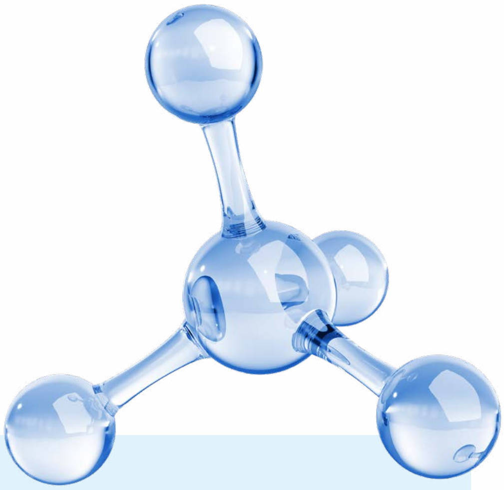
Written Based:

- Research report or Essay
- Creative writing (e.g. short story, poem, diary entry)
- Newspaper article or blog post
- Instruction manual or guide

Action-based Demonstration:

- Charades
- Puzzle / Board game / Quiz / App
- Live demonstration (e.g. hands-on experiment)

Doing Design Thinking



Design thinking is a process that uses empathy, creativity and innovation to solve complex problems.

The keystone to this process is the opportunity for students to identify and consider people who are experiencing a problem and give them a chance to be heard. This allows the students to discover the root problem that they will try and solve. Often, the root problem is more than meets the eye.

The stages of design thinking are:

EMPATHISE:

Understand your end-users. Who are they? What do they do? Why do they do it? What do they need?

DEFINE:

Uncover the real problem. This is where the students will attempt to make sense of a complex problem and identify the most important root problem. If they can already think of a solution or if there is only one pathway to solve it, it's not the right problem!

IDEATE:

Challenge assumptions and generate ideas. Try to think outside the box and be as creative as possible. It might be helpful to sart and group ideas based on their feasibility, importance to the user and relevance to the problem.

PROTOTYPE:

Make and break solutions. Prototypes don't have to be polished models — and they usually shouldn't be! They can be sketches. role plays. cardboard cut-outs, wireframes — anything that helps you communicate concepts and receive feedback.

TEST:

Bring it to users for feedback. This is how we understand if the idea has truly solved the problem and met the end-user's needs. This is also the stage where students will pitch their ideas to the class.

These stages generally follow each other but can work in back-and-forth feedback loops. Repetition of the process is key. You might start with understanding your end-users, define a problem, brainstorm some solutions, and then realise you need to do more user research. This is all part of the process.