

These lesson notes have been written for teachers who want their students to participate in the Commissioner's Space to Dream Design Thinking Challenge. These lesson notes and resources are optional. Teachers who prefer a less structured approach can run through the Challenge using the website.



## LESSON NOTES FOR TEACHERS

The Commissioner's **Space to Dream Design Thinking Challenge** asks students to design a toy or gadget for someone their age who is moving to Mars.

Students are challenged to put themselves in this person's shoes and come up with creative solutions. These have been written to support teachers to help their students think more creatively, imagine new possibilities, invent new products and improve upon existing products. Let's give your students Space to Dream!

These lesson notes broadly cater to F-10 students. They can be adapted by teachers to suit specific needs using the Assessment Rubrics that accompany this resource pack. The rubrics have been written across five year-level bands supporting teachers to make adaptations to meet the needs and levels of their students. When using the rubrics, 2 stars is the expected achievement level.

These lesson notes include 6 activities to guide students through a 5-step design thinking process that will support them to complete the Commissioner's **Space to Dream Design Challenge**. Design thinkers are agile problem solvers, making them more empowered digital citizens.

- 1 Understand and Care - Meet an Astronaut  
(**Empathy Map** Activity Sheet)
- 2 Understand and Care - Mars Exploration  
(**Compare and Contrast** Activity Sheet)
- 3 Make a Plan  
(**Problem Profile** Activity Sheet)
- 4 Have Lots of Ideas - Choose the best  
(**Mind Map** Activity Sheet)
- 5 Make It!  
(**'MAKE IT!' Student Design Record** needs to be retained by your school's Challenge Coordinator. Students may wish to go back to amend this after testing their design - next step).
- 6 Can You Make It Better?  
(**Two wishes and a Star** Activity Sheet)

# ACTIVITY ONE

## UNDERSTAND AND CARE — MEET AN ASTRONAUT

(20 MINUTES)



In this activity students will spend some time with former astronaut, Pamela Melroy, to develop an understanding of what it might be like to live in space.

### Resources needed

- Space to Dream PowerPoint presentation (slides 1-11)
- Pamela Melroy video
- Empathy Map Activity Sheet

### Step 1

Explain to your students that they will be designing a toy or gadget for someone their age who is moving to Mars.

### Step 2

Open the Space to Dream PowerPoint.

- Slide 1. Introduces the Commissioner's Space to Dream Design Thinking Challenge.
- Slide 2. Provides an overview of the 5-step design thinking process your students will use to solve the Challenge.
- Slide 3. Introduces the first step in the process – to Understand and Care – because the best designers learn about who they are helping.
- Slide 4. Introduces former NASA astronaut Pamela Melroy and includes a link to a video in which she speaks about her personal experiences in space - video runs for 4 minutes.
- Slides 5-10. Recap main points made by Pamela.
- Slide 11. Supports the **Empathy Map** Activity Sheet.

### Step 3

Ask your students to complete the **Empathy Map** Activity Sheet based on Pamela Melroy's video.

### Step 4

Ask your students to share what they think is the most important thing to keep in mind when designing a toy or gadget for someone moving to Mars. After your students have heard each other's suggestions, they might like to add to their **Empathy Map** Activity Sheets.



# ACTIVITY TWO

## UNDERSTAND AND CARE — MARS EXPLORATION

(20 MINUTES)



In this activity students will find out some interesting facts about Mars and make comparisons to life on Earth.

### Resources needed

- Space to Dream PowerPoint (slides 12-21)
- Internet search engine or books about Mars
- Whiteboard and markers
- Compare and Contrast Activity Sheet

### Step 1

Open the Space to Dream PowerPoint at slide 12.

- Slide 12. Poses the question: Life on Earth. Life on Mars. How do they compare?
- Slides 13-20. Presents 8 perspective changing facts about Mars. Use these to promote discussion.
- Slide 21. Supports the **Compare and Contrast** Activity Sheet.

### Step 2

Ask your students to work in pairs to find 3 more interesting facts about Mars using an internet search engine or books.

### Step 3

Compile a class list of facts about Mars on the whiteboard, including the 8 perspective changing facts provided.

### Step 4

Step 4. Ask your students to complete the **Compare and Contrast** Activity Sheet to record differences and similarities between living on Earth and what they think it might be like to live on Mars.



# ACTIVITY THREE

## MAKE A PLAN

(20 MINUTES)



In this activity students will start to plan their invention by creating a profile of the person they are going to design their toy or gadget for. They will identify a need that this person has and pose an actionable problem question to address.

### Resources needed

- Space to Dream PowerPoint (slides 22-26)
- Problem Profile Activity Sheet

### Step 1

Slide 23 provides some prompting questions to help your students start thinking about the fictional person they are designing a toy or gadget for, and what their needs might be. Ask your students to think about these questions (adding your own prompt questions to this list).

- How old is the person?
- Who is in their family?
- What pets do they have?
- What hobbies do they enjoy?
- What language/s do they speak?
- What do they like to do after school?
- What do they like to do with their friends?
- What skills do they have?
- What would they like to get better at?
- What do they like to eat?
- What sports do they play?
- How do they help others at home or school?
- What will they miss most about their life on Earth?
- Do they have a part-time job or chores they have to do?
- What books, movies, music, or games do they like?

### Step 2

Students complete a profile of their fictional person using the **Problem Profile** Activity Sheet.

# ACTIVITY THREE

## MAKE A PLAN

(CONTINUED)

### Step 3

Slide 24 shows an example of a ‘user need’ statement.

(Describe the person’s need (what they need to do) because (insight about the user).

For example, **a ten-year old who loves dogs** needs a **playful companion** because they **like having fun with their pet**.

Remind students to try not to decide on what they are actually going to invent just yet. If they decide too soon, they might miss out on a great idea they haven’t yet had.

For example, if the user need statement was ‘A ten-year old dog lover needs a robot dog because they love having fun with their pet’, they will have missed the opportunity to come up with lots of different ideas. A robot dog might not end up being the best solution.

### Step 4

Instruct your students to write their user need statements on their **Problem Profile** Activity Sheet.

### Step 5

Ask your students to share their user need statements with a partner and check that they haven’t said what they are going to invent. Remember, the need statement should tell us what the user needs to be able to do and why. It shouldn’t tell us what the student is going to invent to meet that need ... yet!

### Step 6

Slide 25 shows an example of a ‘How might I?’ question.

‘How might I’ questions help us become very clear about the problem we are trying to solve. For example, ‘How might I provide a playful companion for a ten-year old living on Mars?’

### Step 7

Students write their ‘How might I?’ questions on their **Problem Profile** Activity Sheet.

# ACTIVITY FOUR

## HAVE LOTS OF IDEAS — CHOOSE THE BEST

(10-15 MINUTES)



In this activity students brainstorm as many ideas as they can to solve their 'How might I?' problem from Activity 3. This is where students have space to dream to be as creative and imaginative as they can.

### Resources needed

- Space to Dream PowerPoint (slide 27-30)
- Mind Map Activity Sheet
- Coloured markers or highlighter pens

### Step 1

Ask students to revisit their 'How might I?' questions from Activity 3.

### Step 2

Open the Space to Dream PowerPoint at Slide 27.

Slide 28 includes some prompting questions for brainstorming creative ideas:

- What is your craziest idea?
- How could you adapt something you have seen before?
- What if you had lots of money to make your invention?
- What if you didn't have any money?
- What is your most obvious idea?
- What is your funniest or silliest idea?

### Step 3

Slide 29 supports the **Mind Map** Activity Sheet

Students write their 'How might I?' question at the centre of their

**Mind Map** Activity Sheet.

Students use coloured pens or pencils to complete their mind map by coming up with as many different ideas as they can for a toy or gadget that will solve the problem.

### Step 4

Slide 30 supports students to choose their favourite idea.

Students use coloured markers or highlighter pens to highlight their top 3 ideas on their mind map:

- 1 The idea that will probably work.
- 2 The idea that is so crazy it might just work.
- 3 The idea that they feel most excited about inventing.

### Step 5

Students share their top 3 ideas in small groups and give each other feedback.

### Step 6

After listening to peer feedback, students choose their favourite idea for a toy or gadget to design.

# ACTIVITY FIVE

## MAKE IT!

(30-40 MINUTES – OR LONGER!)



In this activity students will design their toy or gadget using either free 3D design software from Challenge partners Maker's Empire, or by hand-drawing their invention.

### Resources needed

- Space to Dream PowerPoint (Slides 31-36)
- Scrap paper for practising and iterating. (This is useful whether students are using Makers Empire or are hand-drawing their designs.)
- 'MAKE IT!' Student Design Record (Every student taking part in the Challenge needs to complete this sheet. At the conclusion of the Challenge, all completed sheets need to be provided to your school's Challenge Coordinator. Schools will select three designs to submit.)

#### 3D modelling option:

- Students' tablets or laptops installed with free Makers Empire 3D modelling software (instructions at Slide 35).

OR

#### Unplugged hand-drawn option:

- Black pens - coloured pens / pencils optional (instructions at Slide 36).

School site access to Makers Empire at Department of Education schools: Makers Empire has been centrally configured to work within the eduCONNECT LearnLink Filtering Service.

Risk management considerations when using 3rd party software:

- Please note that information stored on the Makers Empire site is stored in the USA where privacy laws are different to Australian privacy laws.
- Teachers are encouraged to not sync Google classroom with Makers Empire and to ensure students follow the school's ICT acceptable use policies.
- Schools using Makers Empire may wish to ask parents / carers of children aged under 18 years to sign a consent form as the content on the Makers Empire site is created by members of the public.

### Step 1

Slide 32 provides some information about what a prototype is:

*When an inventor has a good idea, they make a prototype. A prototype is a model or drawing of their invention, which is good enough to test out on others. A prototype isn't completely finished, but close enough for other people to understand how it will work.*

### Step 2

Slide 33 supports students / teachers to decide how the designs will be made. They can either be created using the free 3D modelling tools from Makers Empire or they can simply be hand-drawn onto the **Make It! Design Sheet** using black pen (colouring and labels optional).

### Step 3

Slide 34 supports the **'MAKE IT!' Student Design Record**. Each student will use their sheet to record details of their design whether they use Makers Empire or hand-draw their design. Slide 35 supports the Makers Empire 3D modelling option. Slide 36 supports the hand-drawn option.

# ACTIVITY FIVE

## MAKE IT!

(CONTINUED)

Inventors need to know how to use their tools before they can really be creative with their inventions. Before they start creating their toy or gadget it will be helpful to allow your students time to get to know the Makers Empire 3D modelling software and practise using the different tools.

If students are creating their inventions with Makers Empire software, they might like to sketch their design ideas before modelling them in 3D.

### Step 4

Give students plenty of time to design their inventions. Great inventions take time and need lots of tweaking, testing and iterating to get them right. Students might create several 3D models or drawings before their design is ready to share with others.

### Step 5

When students save their design onto the Makers Empire website they will be asked to give their invention a name. For their design to be visible, they will need to give it the title SPACE TO DREAM. They also need to record their Makers Empire username onto their **'MAKE IT!' Student Design Record**.

### Step 6

All students (whether using Makers Empire or drawing their designs) are asked to name their invention and to write a description about what it does and/or how it works on their **'MAKE IT!' Student Design Record**.

Make sure you collect a **'MAKE IT!' Student Design Record** from every student who took part at the conclusion of the Challenge.

All completed **'MAKE IT!' Student Design Records** need to be handed to your school's Challenge Coordinator. They will need them to complete the Challenge Completion Form.



# ACTIVITY SIX

## CAN YOU MAKE IT BETTER?

(20-30 MINUTES)



In this activity students will give and receive feedback about each other's toy and gadget inventions. They will reflect on their designs and make further iterations to improve on them.

### Resources needed

- Space to Dream PowerPoint (slide 37-39)
- Two Stars and a Wish Activity Sheet
- 3D designs or drawings from Activity 5

### Step 1

*All good inventors test their inventions and get feedback to help make them even better.*

Students will use their 3D designs or drawings from Activity 5 as prototypes for collecting feedback from other students.

### Step 2

Slide 39 supports the **Two Stars and a Wish** Activity Sheet.

Students collect 'Two Stars and a Wish' feedback from 3 other students.

Using the 'Two Stars and a Wish' method is a good way for your students to provide positive and helpful feedback to their peers.

**A star** is something that you like about the design or something you think it does well.

**A wish** is a suggestion for how you think the invention could be made even better.

When giving and receiving feedback it is important that students think about the 'How Might I?' problem the invention is trying to solve. Students record these details on their **Two Stars and a Wish** Activity Sheet.

### Step 3

*Inventors think about the feedback they have received and decide what changes they want to make to their designs. These changes are called iterations.*

Students are given time to reflect on the feedback they have received and make changes they wish to make to their 3D designs or drawings.

Students who used Makers Empire can go back and edit their design via the 'My Designs' tab on the Makers Empire software.

Students who drew their design may want a new **'MAKE IT!' Student Design Record** if they would like to make a lot of changes.

### Step 4

Slides 41-44 give instructions on submitting your school's designs to the Commissioner for Children and Young People.