GIVE NEW LIFE TO OLD CLOTHES!

→ INTRODUCTION

The production of cheap clothing with a limited life span has encouraged 'fast fashion': buying more clothes and throwing them away after a short time. The amount of clothing that is reused is increasing, but most unwanted clothing still ends up as landfill. This landfill has an impact on the environment, because some dyes contaminate soil and groundwater. Fast fashion also has a human toll, with large numbers of people making clothes for meagre wages and in poor conditions.

In this STEM investigation, students will learn about issues relating to fast fashion. They are challenged to consider different uses for everyday items of clothing, beyond their intended use. They explore the properties of clothing materials. They also create an awareness campaign to highlight some of the issues associated with fast fashion.

THE CHALLENGE

Each season, new fashions arrive in clothing stores. Many of the cheaper items are bought and then worn only a few times. This is sometimes called 'fast fashion'. Some people donate their clothes or sell them. But many clothes still end up in landfill.

Your challenge is to think of other uses for clothing and encourage people in your community to reduce their clothing waste. Choose an item of clothing such as a T-shirt and think of different ways to reuse it. As part of this investigation, you will learn about the different properties of materials and about sustainability.

KEY UNDERSTANDINGS

- Different materials have different properties.
- Some properties of materials are flexibility and strength.
- Clothing can be made from natural and processed materials.
- The properties of some materials can lead to waste.

KEY VOCABULARY

biodegradable – able to be broken down into very small parts by bacteria in soil

fibre – a natural or synthetic thread that may be made into products such as fabric

property – a feature of a material, such as strength or ability to change shape

synthetic – made by humans

KEY SKILLS

- Make careful observations.
- Describe the properties of different materials.
- Analyse information.
- Compare and contrast the properties of different materials.
- Transform an idea into something that can be seen, using measurement skills and knowledge of different shapes.
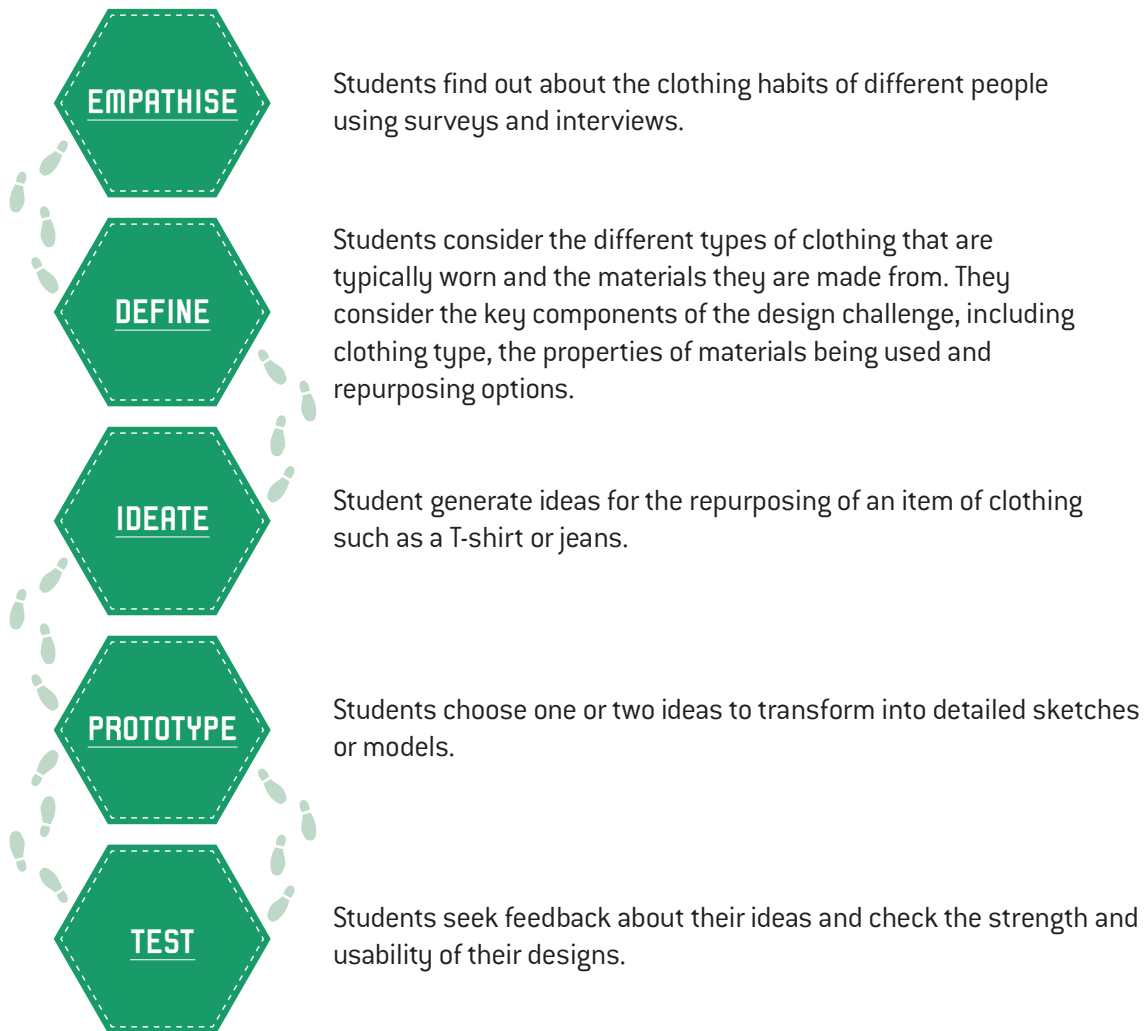
KEY ACTIONS

- Find out about clothing waste.
- Explore the properties of clothing materials, and explore two- and three-dimensional shapes.
- Create new uses for an item of clothing.
- Create an awareness campaign.

→ OVERVIEW OF STAGES

TUNE IN:

Students learn about the rise of fast fashion and the reasons that people like to buy new clothes. They find out about the impact of fast fashion on society and the environment. Students learn about the different properties of materials, and explore two- and three-dimensional shapes.

EMPATHISE
Students find out about the clothing habits of different people using surveys and interviews.

DEFINE
Students consider the different types of clothing that are typically worn and the materials they are made from. They consider the key components of the design challenge, including clothing type, the properties of materials being used and repurposing options.

IDEATE
Student generate ideas for the repurposing of an item of clothing such as a T-shirt or jeans.

PROTOTYPE
Students choose one or two ideas to transform into detailed sketches or models.

TEST
Students seek feedback about their ideas and check the strength and usability of their designs.

SHARE AND EVALUATE:

Final prototypes are shared and evaluated, with opportunities for expert feedback investigated. Students create a fast fashion awareness campaign using their repurposed clothing products to promote reuse and to reduce the negative impact of fast fashion.

→ SUGGESTED SCHEDULE

LESSON	STAGE
1–3	**Tune in**: Learn about fast fashion; explore properties of clothing materials; introduce the student challenge
4–7	**Empathise**: Learn about the clothing habits of different people; find out about attitudes to reusing and recycling clothing, fast fashion and its environmental and economic impacts; collate information; write in journal
8–9	**Define**: Define the main issues; write in journal
10–11	**Ideate**: Develop ideas about different ways to recycle clothing; write in journal
12–15	**Prototype** and **Test**: Conduct prototyping and testing cycles; write in journal
16–18	**Share and evaluate**: Share and evaluate designs and prototypes; create an awareness campaign

→ CURRICULUM LINKS

SCIENCE

YEAR	STRAND	SUB-STRAND AND CONTENT
4	Science Understanding	Chemical sciences: • Natural and processed materials have a range of physical properties; these properties can influence their use
3 & 4	Science as a Human Endeavour	Use and influence of science: • Science knowledge helps people to understand the effect of their actions

TECHNOLOGIES

YEAR	STRAND	CONTENT
3 & 4	Design and Technologies Knowledge and Understanding	• Recognise the role of people in design and technologies occupations and explore factors, including sustainability, that impact on the design of solutions to meet community needs • Investigate how forces and the properties of materials affect the behaviour of a product or system • Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes
	Design and Technologies Processes and Production Skills	• Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions • Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques • Select and use materials, components, tools and equipment using safe work practices to produce designed solutions • Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities • Plan a sequence of production steps when making designed solutions

MATHEMATICS

YEAR	STRAND	SUB-STRAND AND CONTENT
4	Measurement and Geometry	Using units of measurement: • Measure, order and compare objects using familiar metric units of length, mass and capacity Shape: • Compare the areas of regular and irregular shapes by informal means
	Statistics and Probability	Data representation and interpretation: • Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values

This investigation also links to the General Capabilities:

AC

- Literacy
- Numeracy
- Information and Communication Technology (ICT) Capability
- Critical and Creative Thinking

This investigation links to the Cross-Curriculum Priority of Sustainability.

→ ASSESSMENT

The following resources are provided for assessing students at different stages of the STEM investigations:

- Generic reproducible 1 (Key vocabulary table), for assessing understanding of vocabulary
- Generic reproducible 2 (Self-evaluation), for student self-evaluation of the learning process
- Generic reproducible 3 (Responding to the investigation)
- Generic reproducible 5 (Design thinking assessment rubric), for evaluating student engagement in the design thinking stages
- Learning journal templates 1, 2, 3 and 4, incorporating student reflection and evaluation.

→ GETTING READY FOR THE INVESTIGATION

You can prepare yourself and students for this STEM investigation in the following ways:

- Identify groups of students who will work well together. Organise the class into pairs.
- Review the **Key science knowledge** that supports this investigation, and look at the **Useful links**.
- Investigate the **Useful software**.
- Gather materials for the exploration of different fabrics during the Tune-in session.
- Start collecting additional materials for prototyping (as shown on the **Materials needed** list).
- Determine where prototypes will be kept between lessons.
- Create a wall space where students can share their ideas in the Ideate stage.
- Source sewing machines and/or needles and thread. Find volunteers to assist with basic sewing skills.
- Start thinking about:
  - » sourcing information on impacts of fast fashion
  - » inviting someone to speak about clothing waste and ways of reusing clothing
  - » making connections with clothing manufacturers, retailers and recyclers
  - » time constraints for the task
  - » gathering a panel of advisors or mentors to assist students with modifying their designs
  - » how, when and where the designs will be shared and evaluated
  - » the types of awareness campaigns that students could read about and use.

USEFUL APPS

- App for creating semantic maps (links between different words and/or concepts), such as Popplet or Kidspiration
- App for creating interactive links (for example, between descriptions, videos, images and websites and a main image), such as ThingLink
- App for surveys, such as SurveyMonkey or Typeform
- App for creating multimedia presentations, such as Adobe Spark Video (via a teacher-created class account), Prezi or iMovie
- App for drawing shapes, inserting images and making annotations, such as DrawIsland
- App for sharing ideas, thoughts, questions and images, such as Padlet or Lino
- App for engaging in collaborative tasks, such as OneNote Class Notebook
- App for creating drawings, such as SketchUp

USEFUL LINKS

- Statistics about the garment industry, such as at mea.digital/sm25
- Facts about clothes consumption, such as at mea.digital/sm26
- Physical properties and characteristics of fabrics, such as at mea.digital/sm27
- Environmental impact of the clothing industry, such as at mea.digital/sm28
- Fast fashion video clip, such as at mea.digital/sm29
- Images or videos of repurposing clothes, such as at mea.digital/sm30, mea.digital/sm31
- Shape exploration tool, such as at mea.digital/sm32
- Resources for promoting creativity, such as at mea.digital/sm33

RESOURCES PROVIDED

- Generic reproducibles 1, 2, 3, 4, 5, 6
- Reproducibles 17.1, 17.2, 17.3
- Learning journal templates 1, 2, 3, 4

MATERIALS NEEDED

- Sticky notes (half a pad per pair)
- Paper
- Coloured card
- Pens and markers
- Sticky tape
- Multiple small samples of different natural and synthetic fabrics, such as cotton, denim, nylon, felt, fleece
- Needles, thread and/or sewing machine(s)
- Measuring tape
- Hot glue guns and glue
- Scissors
- String
- Ribbon
- Weights
- Cardboard and paper containers (for disassembling)
- Rulers

Hot glue guns can be dangerous. Make sure students are supervised at all times.

KEY SCIENCE KNOWLEDGE

This section provides an overview of the key science concepts and vocabulary needed for this unit.

TYPES OF CLOTHING MATERIALS

Clothing can be made from natural or **synthetic** materials. Examples of natural materials are cotton, wool, silk, leather, down (fine feathers) and bamboo. Polyester, nylon and spandex are some examples of synthetic materials. Some synthetic materials may have natural materials that are **biodegradable** but most synthetic materials are not biodegradable.

Some clothing materials are made from a type of recycled plastic. The plastic is melted, made into **fibre** and then woven into fabrics.

PROPERTIES OF CLOTHING MATERIALS

Physical **properties** of clothing fibres include type, size and length. Texture depends on how these fibres are combined (such as in weaving and knitting). Buyers want clothes to look good and feel comfortable, so colour, texture, weight and light permeability are important properties. Some clothes need to be durable, so manufacturers consider factors such as abrasive strength (tested by rubbing), bursting strength and tearing strength. Lastly, the quality of a material needs to be compared with the cost of creating it.

IMPACTS OF FAST FASHION

Mass clothing production has a social impact – millions of workers in clothing factories are paid below a living wage, work long hours, and many are under working age. The production of synthetic fibres usually uses a lot of energy and can generate hazardous waste. Even natural fibres have an impact; for example, the production of cotton includes considerable use of pesticides. When clothes are discarded in landfill, some of the dyes contaminate the soil and groundwater. Materials such as polyester can take up to 200 years to break down.

In response to the rise of fast fashion, some people are choosing to repurpose clothes, rather than throw them away after a few uses.

KEY VOCABULARY

biodegradable – able to be broken down into very small parts by bacteria in soil

fibre – a natural or synthetic thread that may be made into products such as fabric

property – a feature of a material, such as strength or ability to change shape

synthetic – made by humans

Children's clothing is often made of durable materials such as cotton.

Growing the cotton
A lot of water is used to grow cotton, and harmful chemicals are often used.

Making the fabric
Spinning and weaving cotton uses energy. Most electrical energy is generated using fossil fuels. Chemicals used in factories can pollute the environment.

Manufacturing the T-shirt
Sewing machines in clothing factories use energy.

Packaging the T-shirt
Packaging uses up natural resources and may use non-renewable materials.

Transporting the T-shirt to the store
Planes and trucks burn fossil fuels.

Cleaning the T-shirt
Washing clothes uses energy and water, and detergents can cause water pollution.

→ TUNE IN

1. Ask students to complete **Generic reproducible 1 (Key vocabulary table)** using the key vocabulary for this unit. This reproducible will also be used at the end of the unit, to demonstrate changes in understanding.

2. Throughout the investigation, quiz students about the important terms they are using. This could be through a quick chat or an online tool (see **Useful apps/links**).

3. Introduce the general challenge. Ask students to estimate the number of clothes items they have and to do a rough count at home. Were they surprised? Did they find any clothes that they don't wear very much? What do they do with clothes they no longer wear?

4. Watch a video clip about fast fashion (see **Useful apps/links**). Ask:
   - » What did people do in the past when their clothes started to become worn out?
   - » Why do you think people like new clothes?
   - » What was something new or surprising that you learned?
   - » Were you aware of the working and living conditions of people in some clothing factories?
   - » What other information would you like to find out? How would you go about doing this?

5. Set up the following activities or similar for students to explore the properties of clothing materials as well as different shapes that can be made.

ACTIVITY 1: DIFFERENT TYPES OF MATERIALS

1. Discuss the terms 'natural' and 'synthetic'.
2. Provide students with a range of materials.
3. Students sort and categorise materials as natural or synthetic.
4. Have pairs of students explore the properties of one material. Provide them with **Reproducible 17.1 (Material properties)**. Ask students to find out its origin, how it is processed, common uses and properties. Create a class display for students to refer to during the investigation.

ACTIVITY 2: STRENGTHS OF MATERIALS

1. Provide groups of students with a range of materials. Have them design a way to test strength, for example, how many weights a fabric can hold before tearing.
2. Highlight the importance of a fair test (making sure that each material is tested under the same conditions).
3. Have students make predictions before creating a table to record their observations. Repeat the tests for greater reliability.

ACTIVITY 3: SHAPES EXPLORATION

1. Have students explore different two- and three-dimensional shapes, considering their potential for making new products.
2. Begin with a shape exploration activity (see **Useful apps/links**). Have students explore the ways that shapes can be connected and new shapes can be made.
3. Explore three-dimensional shapes by disassembling old paper or cardboard containers, and create nets for each shape.

6. Introduce the STEM investigation and challenge to the students. Provide them with the student card and read the information together.

7. Introduce the design thinking process by reviewing the stages on the student card. Explain that students will keep a journal about their learning at the different stages of the design.

TOP TIP! Try to make time to teach students some basic sewing skills. It may be useful to have some helpers during this activity, or to run small workshops.

USEFUL APPS/LINKS
- App for quizzing, such as Kahoot or Nearpod
- Video clip about fast fashion, such as at mea.digital/sm29
- Shape exploration activity, such as at mea.digital/sm32

GIVE NEW LIFE TO OLD CLOTHES!

→ EMPATHISE

During the Empathise stage of the design thinking process, students focus on finding out about different points of view. To empathise with others, they need to research some of the challenges associated with fast fashion. This includes finding out about people's shopping habits, and attitudes to recycling and new clothes. Students will take notes, ask questions, draw diagrams and take photos where relevant.

ACTIVITY 1: CLOTHING HABITS SURVEY

1 Students find out about the clothing habits of other people using a survey. Have students consider the types of information they would like to collect.

2 If using technology, demonstrate how to use a survey tool such as Typeform or SurveyMonkey. A class account may need to be set up due to the age of the students. The school learning management system may have an internal survey tool that could be accessed. If using a paper survey, provide students with examples of how to set out information.

3 After the survey has been created, have students survey as many different people as possible within a given timeframe. When the survey has been completed, ask students to create a spreadsheet, tables and/or graphs to present the information. Have students look for interesting information and patterns. Compare the information c ollected from different surveys.

ACTIVITY 2: CLOTHING HABITS INTERVIEW

1 Have students interview one person for a more in-depth insight into their clothing habits. Provide them with **Reproducible 17.2 (Clothing habits interview)** to record their information.

2 Ask students to consider the information they have collected and determine the most important insights they have found out.

PROMPTS

- What are the different amounts of clothing people owned?
- What are some of the attitudes people have to buying used clothes?
- What are some of the reasons for buying new clothes?
- What was one interesting thing you found out?

MORE VOCABULARY

- empathise – understand and consider another person or group's point of view
- point of view – an opinion, attitude or judgement considered in a particular way

JOURNAL TIP

- Ask students to complete **Learning journal template 1 (Empathise page)** while they are doing the different tasks. Remind them to date their notes and include photos of relevant information or pictures.

USEFUL APPS/LINKS

- App for creating surveys, such as Survey Monkey or Typeform
- App for making spreadsheets, graphs and tables, such as Excel or Numbers

ASSESSMENT

This stage of the design thinking process offers opportunities to observe students collecting information, developing questions, and recording their notes and thinking in their journal.

TOP TIP! When creating the interview questions, write the information students want to find out. Then model how to create different types of questions to find out this information. Discuss the difference between open and closed questions. Provide examples of different types of answers, such as yes/no and multiple choice.

EMPATHISE · DEFINE · IDEATE · PROTOTYPE · TEST
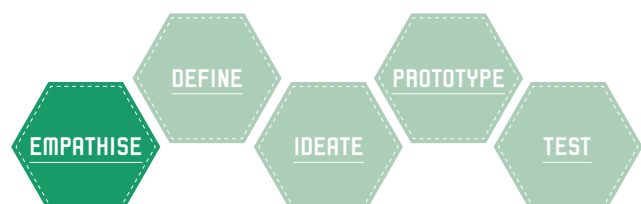
→ DEFINE

The main focus of this stage of the design thinking process is to reframe the challenge. The initial challenge is quite open, so at this stage students learn how to define what needs to be done. This includes noting insights that have been generated.

ACTIVITY 1: CONSIDER OBSERVATIONS

1 Students consider the information they gathered in the Empathise stage. They may work in pairs or small groups. Provide them with a whiteboard, large sheet of paper and/or sticky notes to collate key information. Ask them to consider some issues with the types of clothes that are discarded as well as the materials these clothes are made from.

2 Students should discuss one section of **Learning journal template 2 (Define page)** at a time, write their responses, then continue discussing their ideas for the next section, until the task is complete. This allows students to hear others' responses and provides the teacher with input points.

3 Discuss how the students will be repurposing an item of clothing – finding a new use for it.

4 Display a video clip that shows how clothing can be repurposed (see **Useful apps/links**).

5 Consider and list some of the clothing that people typically wear, such as jeans, shirts and socks.

6 Allow students to research further about fast fashion. Ask them to write other information they would like to know, such as how clothing can be reused, and issues with producing cheap clothing.

7 Provide students with **Generic reproducible 4 (Key question table)** to assist them to record their questions, findings and sources.

ACTIVITY 2: CONSIDER INSIGHTS

1 Students think of at least one insight they have gained so far; for example, material can be knotted to add strength.

2 Students add this to **Learning journal template 2** and then explain what needs to be created.

3 When considering insights, students could consider the following:
» What was something unexpected that you saw or found out?
» How was it unexpected?
» How will you decide which item of clothing to repurpose?
» Is there any other information that you need or would like to know? How will you find out?

ACTIVITY 3: CONSIDER CONSTRAINTS

At this stage, let students know the constraints of the challenge, by describing the timeframe, available materials, how and when designs will be shared, and whether or not products will be created or just designed. Provide students with **Reproducible 17.3 (Repurposing project planner)** for recording specifications.

PROMPTS
- What did you discover?
- What were the most important pieces of information that you gathered?
- What was something new that you learned?
- What other information do you need?

MORE VOCABULARY
- define – state the meaning of something
- insight – an accurate understanding of someone or something
- point of view – an opinion, attitude or judgement considered in a particular way

JOURNAL TIP
Discuss the term 'insight' and explain that it relates to something students have learned about the people and their responses to the surveys as well as information gathered through research or excursions. You could refer to **Learning journal template 2**.

USEFUL APPS/LINKS
- How to turn a T-shirt into a bag, such as at mea.digital/sm31

DEFINE
PROTOTYPE
EMPATHISE
IDEATE
TEST
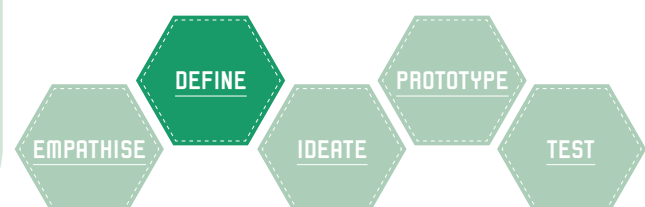
→ IDEATE

The Ideate stage of the design thinking process is all about generating lots of ideas. Students need to be flexible in their thinking and be able to move beyond obvious ideas. At this stage, ideas are not judged, just generated and gathered.

ACTIVITY: GENERATE IDEAS

1 Review some of the important vocabulary relating to the investigation. Write some of the key properties of materials onto coloured card and have students randomly choose a word to explain to their partner.

2 Ask groups of students to draw or write their ideas. Each new idea should be on a separate piece of paper or sticky note.

3 Ask students to group ideas on a wall or board.

4 Ask students to look at the different ideas and provide feedback to each other. It is important that students don't defend their ideas at this stage. They should just be listening to the feedback.

5 After the initial feedback, ask students to come up with more ideas. Encourage them to be creative and even radical.

6 Ask students to choose three of their ideas to write down in their journal. Students use **Learning journal template 3 (Ideate page)** to do this. Ask students to choose one idea to explore further and explain the reasoning behind their choice.

TOP TIP!

At this stage, students may have produced a series of drawings, showing some of the ways that clothing can be turned into another useful item. These drawings should be annotated with information about purpose, materials, colour and so on. They may have a collection of sticky notes, which they can organise into related ideas. Encourage students to view and read others' ideas before giving feedback. Feedback could be within small groups or between partners. Considering others' ideas is an important part of this process, so students can build on their own ideas as they continue to ideate.

At each stage of this activity, ask students to discuss their thoughts before writing their responses. This will help them to think through their ideas and select their final ideas to develop.

PROMPTS

- How do these ideas relate to creating a new purpose for the clothing you have selected?
- How might you test your design?
- How can you make it more useful?
- How can you change your design into something completely different?
- What if you had to use different materials?

MORE VOCABULARY

- feedback – information about, for example, a person's performance or the design of a product, which can be used to make improvements
- ideate – generate many ideas without making judgements about the ideas

JOURNAL TIP

When choosing three ideas to include in the journal, try to choose three ideas that aren't related. Remind students to think about ideas for their awareness campaign, too.

USEFUL APPS/LINKS

- Tools for creating ideas, such as at mea.digital/sm49
- Tips to achieve creativity and innovation, such as at mea.digital/sm99
- Resources for promoting creativity, such as at mea.digital/sm239

ASSESSMENT

At the Ideate stage, assessment could include observations about the number and diversity of student ideas, and their ability to provide feedback and create additional ideas. Reflection in the journal should provide an insight into some of the reasoning behind student choices.

EMPATHISE DEFINE IDEATE PROTOTYPE TEST
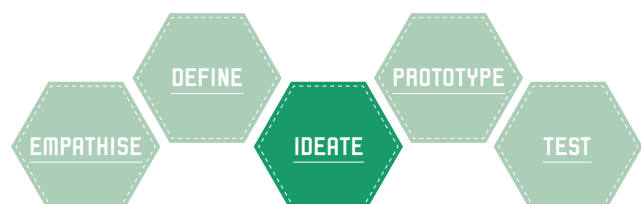
→ PROTOTYPE

At this stage, students are asked to create a physical prototype of a solution. Students need to get their ideas out of their heads and present them in a way that engages other students and helps them to understand the concept. When students create, it helps them to think and solve problems and disagreements. Students can role-play, make a storyboard or use sticky notes when they prototype. The most important feature is that viewers can interact with whatever is produced.

Encourage students to photograph or film during the Prototype and Test stages. This information can be used to show the learning behind the design thinking process in action.

ACTIVITY: TRANSFORM IDEAS INTO PROTOTYPES

1. Students review the ideas generated at the Ideate stage. Provide them with an A3 copy of **Generic reproducible 6 (In the frame)** so they can organise their ideas into two sections: least relevant and most relevant. Provide students with question prompts to support discussion of the ideas; for example:
   » Why do you think this idea could be used?
   » What would need to be changed for this idea to be used?
   » Why do you think this idea is not so relevant to the challenge?
   Students continue until they have an idea to start prototyping.
2. Provide students with a range of materials to use to create their prototype. Remind students that a prototype should be created rapidly and it is not meant to look 'nice'.
3. After a prototype has been created, ask students to see if it works and get feedback from others.
4. Students then use the feedback to prototype again.

Ask students to fill in the Prototype part of **Learning journal template 4 (Prototype and test page)**. See the Journal tip for further student guidance.

PROMPTS

- What worked?
- How could it be improved?
- What else do you need to know, do or have?
- What other suggestions do you have?

TOP TIP!

The Prototype stage is often very messy. It is important that students are focusing on their ideas, rather than the end product. Provide them with lots of materials – recycling depots can be a useful source of resources. Student may add labels to prototypes to explain some of the main features. Photographing and annotating pictures of prototypes can be useful.

When giving feedback, students could ask:
- What is the main feature of your prototype?
- How does it work?
- Which parts work best? What will you keep?
- Which parts need changing?
- What other materials might you need?

MORE VOCABULARY

- feedback – information about, for example, a person's performance or the design of a product, which can be used to make improvements
- prototype – an initial version of a model of a product or process that is used to develop a final model

JOURNAL TIP

Remind students to highlight the main features of their prototype. If students are creating an electronic journal, they can insert a photo of their prototype and annotate it.

USEFUL APPS/LINKS

- App for creating interactive links (for example, between descriptions, videos, images and websites and a main image), such as ThingLink
- App for making notes using text, drawings, images, weblinks and audio, such as Notability
- App for drawing shapes, inserting images and making annotations or adding to the inserted image, such as DrawIsland

ASSESSMENT

Observe students as they make changes to their designs. Are they able to consider feedback, make modifications and move rapidly through this process, or do they have difficulties with holding on to an idea and accepting feedback?

EMPATHISE — DEFINE — IDEATE — PROTOTYPE — TEST
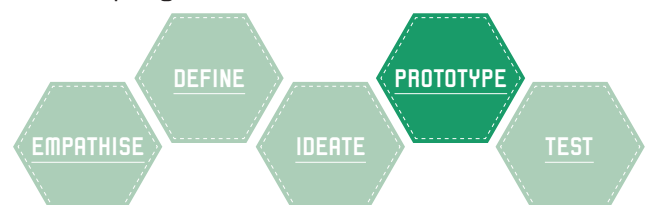
→ TEST

At this stage of the design thinking process, students test their prototype to see how it meets the criteria in the challenge.

ACTIVITY: TEST FEEDBACK

1 Students take their last prototype and consult with one of the people who completed their initial survey, or who they interviewed.

2 Ask students to check whether or not their design works and what they need to do to make it work if it doesn't.

3 Provide the opportunity to cycle through the Prototype and Test stages again.

Ask students to fill in **Learning journal template 4 (Prototype and test page)**. See the **Journal tip** for further student guidance.

PROMPTS

- Does your prototype do what you wanted it to do?
- Are there other features that need to be added?

MORE VOCABULARY

- evaluate – assess something, perhaps considering what worked and what didn't
- feature – a specific aspect of something, such as size, shape, colour, quality
- feedback – information about, for example, a person's performance or the design of a product, which can be used to make improvements
- prototype – an initial version of a model of a product or process that is used to develop a final model
- review – consider an idea, process or product and assess what works and what needs to be changed

JOURNAL TIP

Ask students to think about why it is important to test their ideas before they build their final design.
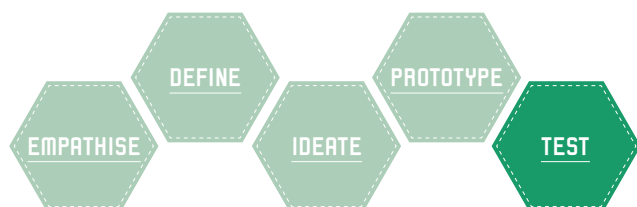
→ SHARE AND EVALUATE

At this stage of the investigation, students are provided with an opportunity to share their final design, as well as the processes involved in the investigation. Students evaluate their learning journals as well as their solutions.

ACTIVITY 1: BRING THE DESIGNS TOGETHER

1 Allow students time to create final designs.

2 Students can create an iMovie or use Adobe Spark Video (via a teacher-created class account) or Prezi to demonstrate the process and thinking behind the designs.

3 Provide students with time to create their awareness campaign. They will need to review their information and decide if any more is needed. They will need to make a decision about the format of their campaign.

4 Students should include their learning journals with the display so others can see the different stages of the design process.

ACTIVITY 2: EVALUATE AND GIVE FEEDBACK

1 Provide students with **Generic reproducible 2 (Self-evaluation)** to complete.

2 Ask students to provide feedback to each other about the most interesting features, the aspects that were most difficult and the changes that they would make if they repeated the task.

3 Provide students with opportunities to share their designs with the wider community. It may be possible to share some of the videos with an expert for design feedback.

ASSESSMENT

Ask students to again complete **Generic reproducible 1 (Key vocabulary table)** using the key vocabulary for this unit. Compare their table with the one they completed at the Tune-in stage, to demonstrate changes in understanding.

Students complete **Generic reproducible 3 (Responding to the investigation)**. Compare their responses to their responses to **Generic reproducible 2**.

Teachers complete **Generic reproducible 5 (Design thinking assessment rubric)** for each student. Students compare the feedback they are given by the teacher with their self-assessment of how they used the design thinking process to solve problems **(Generic reproducible 3)**.

EMPATHISE — DEFINE — IDEATE — PROTOTYPE — TEST

TUNE IN

STEM
INVESTIGATIONS

Name: --

Date: --

Name of material:	This material is:
	☐ natural
	☐ synthetic
Picture or sample of material:	This material is used for:
This material feels:	Describe some of the properties of this material. Here are some useful words:
	strong, flexible, transparent, opaque, woven, knitted, waterproof, durable
This material is made in:	

EMPATHISE

STEM
INVESTIGATIONS

Name:

Date:

Interview someone to find out about their clothing habits. The last two rows have been left blank for your own questions.

Question	Notes
How many different items of clothing do you think you own?	
How often do you buy new clothes?	
Have you ever bought clothes that are not brand new? Why/why not?	
What do you do with the clothes you no longer want to wear?	
What do you know about where your clothes are made and who makes them?	

DEFINE

STEM
INVESTIGATIONS

Name: --

Date: --

Use this table to help plan and organise your repurposing investigation. Add information to it as you work through your challenge.

Item of clothing to repurpose	
Material(s) clothing is made from	
Time allowed to complete the task	
Final design idea	
Materials selected to use	
Reasons for choice of materials	
Equipment or tools needed	
Awareness campaign audience	
Format of awareness campaign (e.g. speaker, school social media release, poster, local newspaper)	