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## How to Use this Pack:

- Designed to be used as a whole, or select individual tasks.
- In conjunction with units of work on Science Understanding and Science Inquiry Skills.
- In conjunction with units of work on Visual Arts.

# Introduction



## Follow your interests in...

Each STEM Career Pack provides teachers with a sequential set of tasks and information, including interviews, to take into the classroom. The Packs are aimed at: helping students to understand the nature of scientific knowledge, how science influences society and how society influences science (i.e. Australian Curriculum: Science, Science as a Human Endeavour); and making students aware of the wide variety of exciting STEM careers they could aspire to.

STEM Career Packs 5–8 focus on four interest areas: 3D printing, Art Conservation, Robotics and Forensics. It is anticipated that students who don't typically 'like' 'science' but are interested in 3D printers, art restoration, robots or CSI television shows for example, will come to see how their interests relate to the science they study at school and STEM career possibilities.

## Bringing STEM careers to life:

There is a current shortage of people, particularly women studying and working in STEM (also referred to in these Packs as 'science'). There are many factors at play supported by a substantial body of research; two of these factors are addressed in these Packs. The first of these factors is that students find it difficult to identify themselves with scientists, technologists, engineers and mathematicians; they can't picture themselves working in a STEM career<sup>1</sup>. The second factor addressed here is that many students are simply unaware of the STEM careers available, what day to day work is entailed and what pathways lead into these careers<sup>2</sup>.

Why is it important to address these factors in the middle years? Research has shown that experiences prior to 14 years of age are pivotal in developing students' interests in science, and influencing career choices<sup>3</sup>.

*'When asked about when they became interested in science, 48 per cent of the students traced the origin of their interest to junior secondary school; 12 per cent mentioned primary school...'<sup>1</sup>.*

<sup>1</sup> Office of the Chief Scientist 2012, Health of Australian Science. Australian Government, Canberra.

<sup>2</sup> Panizzon, D & Westwell, M. 2009, Engaging students in STEM-related subjects. What does the research evidence say? Flinders Centre for Science Education in the 21st Century, Adelaide.

<sup>3</sup> Tytler, R, Osborne, J, Williams, G, Tytler, K, Cripps Clark, J, 2008, Opening up pathways: Engagement in STEM across the Primary–Secondary school transition. Australian Department of Education, Employment and Workplace relations, Australia.

# What do we want them to learn?

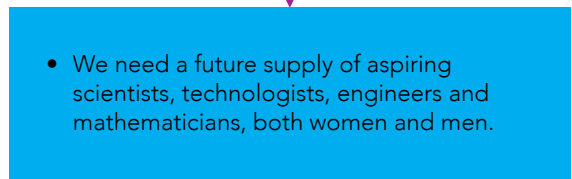
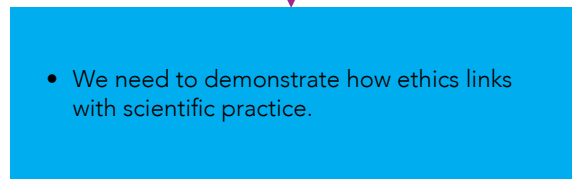
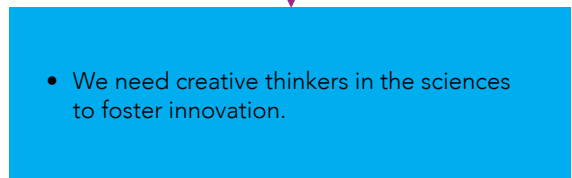
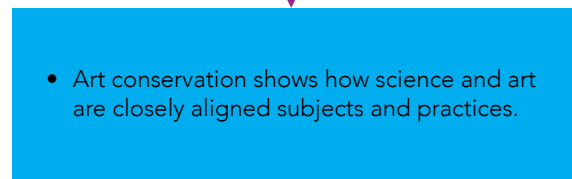
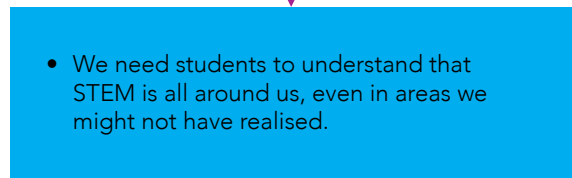
## What is the intended learning?

It is intended that students will learn that art conservators play an important role in preserving our history. In conserving art, they use scientific techniques to analyse and understand what the art work is made of, to understand past conservation, implement new techniques and make decisions about what they can and can't conserve and how to conserve the work. Students will also become aware of the ethical considerations about why we conserve art, what types of art we conserve, and how far we should go in conserving different items. Students also gain an understanding of the careers in art conservation and the role science plays in these careers.

In examining art conservation careers, students will engage with their own ideas and beliefs about science and art and consider ethical questions arising from their discussions.

## What do students bring?

Students have their own conceptions about art, and their own art practice. They have skills and understanding from their education and experience as well as preconceived ideas about what is and is not important in creating and conserving art. Students will have their own ideas about science and art and the similarities and differences between them. Students' own perceptions and their awareness of the ideas of others will be enhanced through this guide.

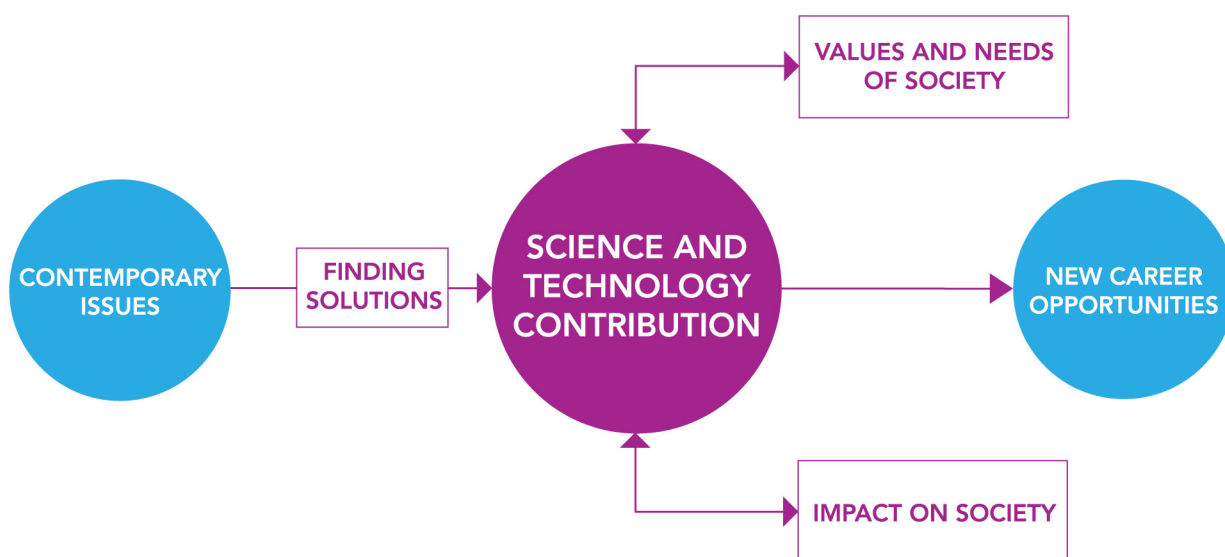


### Planning approach

Planning approach based on the SA Department for Education and Child Development's Learning Design: aligning what and how of teaching and learning in the Australian Curriculum. [www.decd.sa.gov.au/teachingandlearning/pages/Leadersresource/44209/?reFlag=1](http://www.decd.sa.gov.au/teachingandlearning/pages/Leadersresource/44209/?reFlag=1)

# How will we know if they got it?

What could the intended learning look like at this level?



The Australian Curriculum: Science focus for this unit is **Science as a Human Endeavour**.

Students will be able to look at how science influences decisions that are made about art objects, and how advances in technology can change the way we think about art objects. As well as identifying and questioning their own beliefs and those of others, students will understand why such beliefs should be openly questioned and how they can do this in a constructive, respectful manner. Students will be able to demonstrate an increase in their knowledge of science careers and pathways as well as the role of science in society.

Teachers use the intended learning, as indicated in the Quick Reference table for this unit, in conjunction with the Achievement Standards in the integration of the Tasks or the development of whole units of learning and assessment.

Students will demonstrate development towards the following Australian Curriculum skills and dispositions.

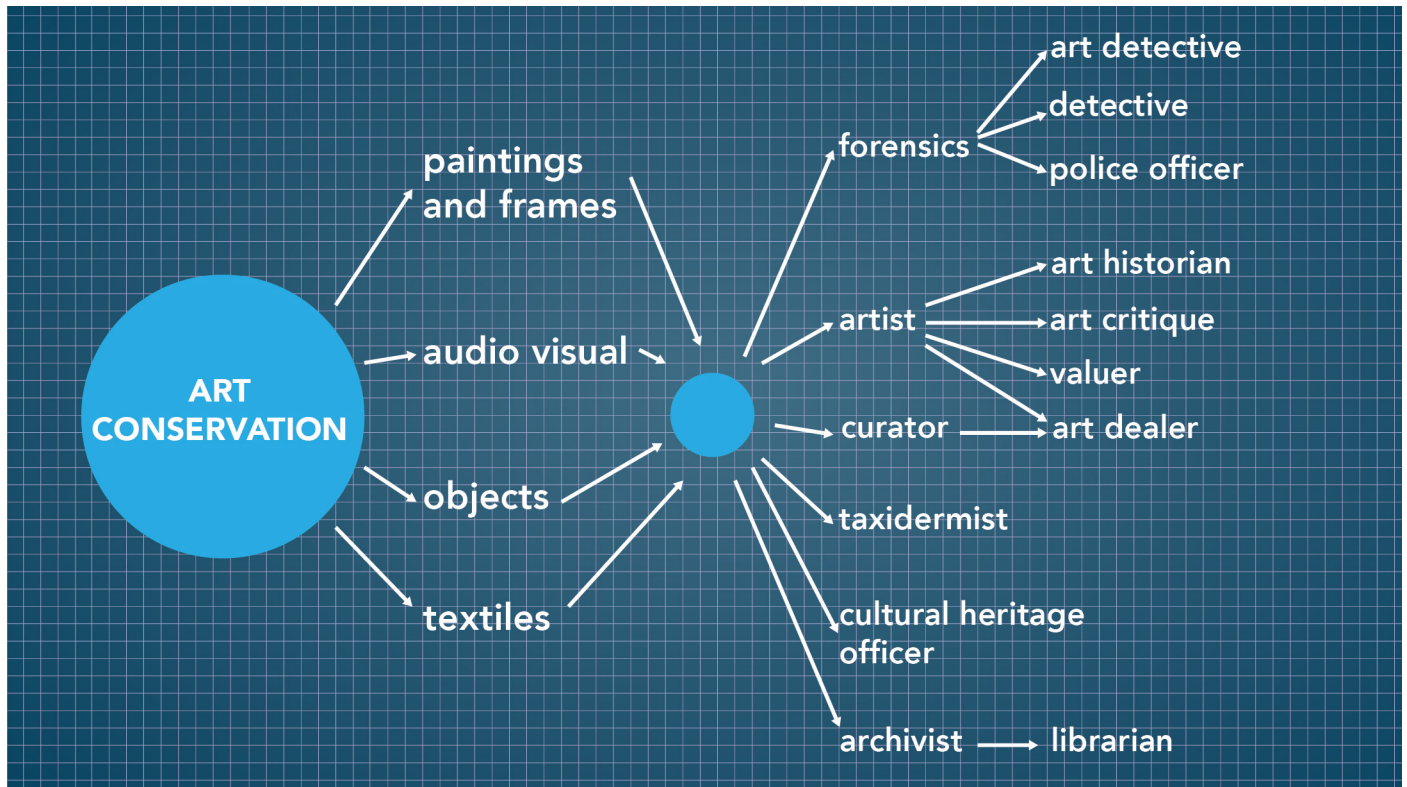
# Quick reference table

## Australian Curriculum: Science as a Human Endeavour

| Australian Curriculum: Science as a Human Endeavour  | Tasks |   |   |   |   |
|--|-------|---|---|---|---|
| Year 7   | 1     | 2 | 3 | 4 | 5 |
| ACSHE120 - Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations.  |       |   |   |   |   |
| ACSHE121 - Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.  |       |   |   |   |   |
| ACSHE224 - People use understanding and skills from across the disciplines of science in their occupations.  |       |   |   |   |   |
| <b>Year 8</b>  |       |   |   |   |   |
| ACSHE135 - Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations.  |       |   |   |   |   |
| ACSHE136 - Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.  |       |   |   |   |   |
| ACSHE227 - People use understanding and skills from across the disciplines of science in their occupations.  |       |   |   |   |   |
| <b>Year 9</b>  |       |   |   |   |   |
| ACSHE158 - Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries.  |       |   |   |   |   |
| ACSHE160 - People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions.   |       |   |   |   |   |
| ACSHE161 - Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities.  |       |   |   |   |   |
| ACSHE228 - The values and needs of contemporary society can influence the focus of scientific research.  |       |   |   |   |   |
| <b>Year 10</b>   |       |   |   |   |   |
| ACSHE192 - Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries.  |       |   |   |   |   |
| ACSHE194 - People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions.   |       |   |   |   |   |
| ACSHE195 - Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities.  |       |   |   |   |   |
| ACSHE230 - The values and needs of contemporary society can influence the focus of scientific research.  |       |   |   |   |   |
| <b>General Capabilities</b>  |       |   |   |   |   |
| The Personal and Social Competence Continuum: social awareness; and self-awareness   |       |   |   |   |   |
| Ethical Understanding: understanding ethical concepts and issues; reasoning in decision making and action; exploring values, rights and responsibilities.  |       |   |   |   |   |
| Critical and Creative Thinking: inquiring – identifying, exploring and clarifying information ideas; generating ideas, possibilities and actions; reflecting on thinking and processes; analysing, synthesising and evaluating reasoning and procedures. |       |   |   |   |   |
| Literacy   |       |   |   |   |   |

# How will we know if they got it?

What evidence will enable us to assess the intended learning?



## Science as a Human Endeavour

1. Students' knowledge and understanding of the role of art conservators and issues around the conservation of art.
2. Students' understanding of the role of STEM in art conservation and of relevant STEM careers.

## Personal and Social Capability and Critical and Creative Thinking

3. Students' ability and disposition to reflect on their own and others' beliefs.
4. Students' ability to participate in a whole class discussion.

## Ethical Understanding and Critical and Creative Thinking

5. Students' ability to identify current and future ethical issues relating to art conservation and to articulate their position, with reasons, on these issues.
6. Students' ability to participate in reasoned discussion with peers (in pairs, small groups, or whole class) including the ability and disposition to draw on evidence and an underlying ethical principle when making informed decisions, as well as to evaluate their own and others' reasons.

# What will we do to get there?

How will we engage, challenge and support their learning?



Tasks will draw on students' prior knowledge, relate learning to students' everyday lives and provide opportunities for students to direct their own learning. Throughout the unit, students will be expected to:

- reflect on their own ideas of art and how the ideas of others may differ to their own
- understand the role of conservation in preserving our history and the role of STEM in art conservation
- engage in reflection and analysis during whole class discussions, group activities and peer assessment tasks; and
- understand the ethical considerations in undertaking conservation, including the debate between preservation (stabilising a work in its current condition) and restoration (returning a work to its original condition).

The three big ideas of the South Australia Teaching for Effective Learning framework (TfEL), were used in designing this unit:

### **Create safe conditions for rigorous learning**

Focus – building a community of learners

### **Develop expert learners**

Focus – expanding strategies for thinking, learning and working collaboratively

### **Personalise and connect learning**

Focus – building on learners' understanding.



# Tasks

## Page

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- 14 Task 3: How do art and science link?**  
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- 21 Task 5: Choosing art for conservation**
- 23 Task 6: Personal reflection**

## Task 1: What is art?

| Australian Curriculum Links  |        |        |         |
|--|--------|--------|---------|
| Year 7   | Year 8 | Year 9 | Year 10 |
| -  | -      | -      | -       |
| Personal and Social Capability<br>Critical and Creative Thinking<br>Literacy |        |        |         |

Before beginning this unit it is worthwhile to think about what art is. Sometimes we feel as if we know what something is intuitively but find it hard to explain. This might be the case for knowing what art is. This is also a chance to show students that looking to a dictionary for a definition is not always that helpful, that even dictionaries have differing descriptions about what art is. To understand a concept such as 'art', dictionary definitions often still require thinking for oneself. It can also be very powerful for students to use the group's thinking to derive their own definitions of topic related terms, rather than be given someone else's definition.

This discussion aims to explore the question of what art is in order to open up new thinking for students about the defining qualities of art as well as its purpose. By examining possible examples of art, students will start to think about the reasons why some pieces of art should or should not be conserved.

First, students consider proposed examples (listed here) of art and argue about whether or not they are 'art'. It is important to allow students to construct their own meaning and not tell them what to think. At this stage of the activity, the focus should be on exploring as many different ideas as possible. This part of the task can be done as a whole class, in pairs or as individuals. Small group and individual discussions will then be shared with the whole class, collated and recorded on the board under the headings: Art / Not Art / Reasons.

Students will agree and disagree based on the reasons given so it is important that you ensure they persist in articulating reasons and providing examples to support their arguments. Part of this discussion will include an exploration of the similarities and differences between the listed examples. It will rely heavily on comparisons between the listed examples and other examples that the students suggest when making their points. The results of this discussion are collated on the board and the reasons are distilled down into a definition of what art is. This definition can then be used throughout the rest of the unit and reworked if and when necessary.

Examples:

- Paintings by elephants
- Paintings by children under the age of five
- Photograph in a newspaper
- Architecture – The Parthenon / The Eiffel Tower
- Designer dresses – Princess Kate's wedding dress /etc
- Graffiti
- Tattoos
- Scientific illustrations of internal organs
- A drop of paint spilled by Picasso
- A comic book
- A Ferrari
- A bin put in an art gallery by a famous artist
- A TV commercial
- A poster of a famous painting eg the Mona Lisa
- A musical score
- An elaborate frame for a mirror
- A tribal mask from PNG
- Botanical illustrations
- A tapestry
- A painting /sculpture in an Art Gallery

## Task 2:

# What do art conservators do?

| Australian Curriculum Links  |                                  |  |  |
|--|----------------------------------|--|--|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                                | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 195<br>ACSHE 230 |
| Personal and Social Capability<br>Critical and Creative Thinking<br>Literacy |                                  |  |  |

**Part 1:** Ask students to read the following information on what art conservators do and how their work links to science, maths, engineering and technology.

### Activity: Student reading

Artists hope their work will persist in posterity, but their masterpieces can deteriorate or discolour due to physical, chemical and biological processes and human interference. Art conservators try to preserve these works by undertaking a rigorous three-stage process:

1. The piece selected for conservation must first be thoroughly examined, with the conservator considering the materials that would have been available at the time, the chemical behaviour of these and the ageing mechanisms, to establish the cause of deterioration.
2. Secondly, a record of the examination, and anything else known about the piece, should be clearly documented, generating information for conservation. This documentation should stay with the piece, stored in a way that allows it to be used and continually updated.
3. Finally the piece is treated, with the conservator determining appropriate methods of and performing minimal treatments to stabilise and preserve the work's physical condition.

**For example:** Did you know? Only a few people at a time can visit Da Vinci's Last Supper at the Convent of Santa Maria delle Grazie, Milan, due to the humidity caused by their breathing.



### What careers are there in art conservation?

Art conservators work at art museums, large state and regional galleries, libraries and archives, and often specialise in a particular medium:

- Paintings and frames
- Photographs
- Manuscripts, books and papers
- Textiles
- Sculpture and architecture
- Furniture
- Metal
- Glass
- Electronic media

## Task 2: What do art conservators do?

| Australian Curriculum Links  |                                  |  |  |
|--|----------------------------------|--|--|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                                | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 195<br>ACSHE 230 |
| Personal and Social Capability<br>Critical and Creative Thinking<br>Literacy |                                  |  |  |

What are the practices art conservation carry out?



**Restoration:** All actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often such actions modify the appearance of the item.

**Preventive conservation:** All measures and actions aimed at avoiding and minimizing future deterioration or loss. They are carried out within the context or on the surroundings of an item, but more often a group of items, whatever their age and condition. These measures and actions are indirect – they do not interfere with the materials and structures of the items. They do not modify their appearance.

Examples of preventive conservation are appropriate measures and actions for registration, storage, handling, packing and transportation, security, environmental management (light, humidity, pollution and pest control), emergency planning, education of staff, public awareness, legal compliance.

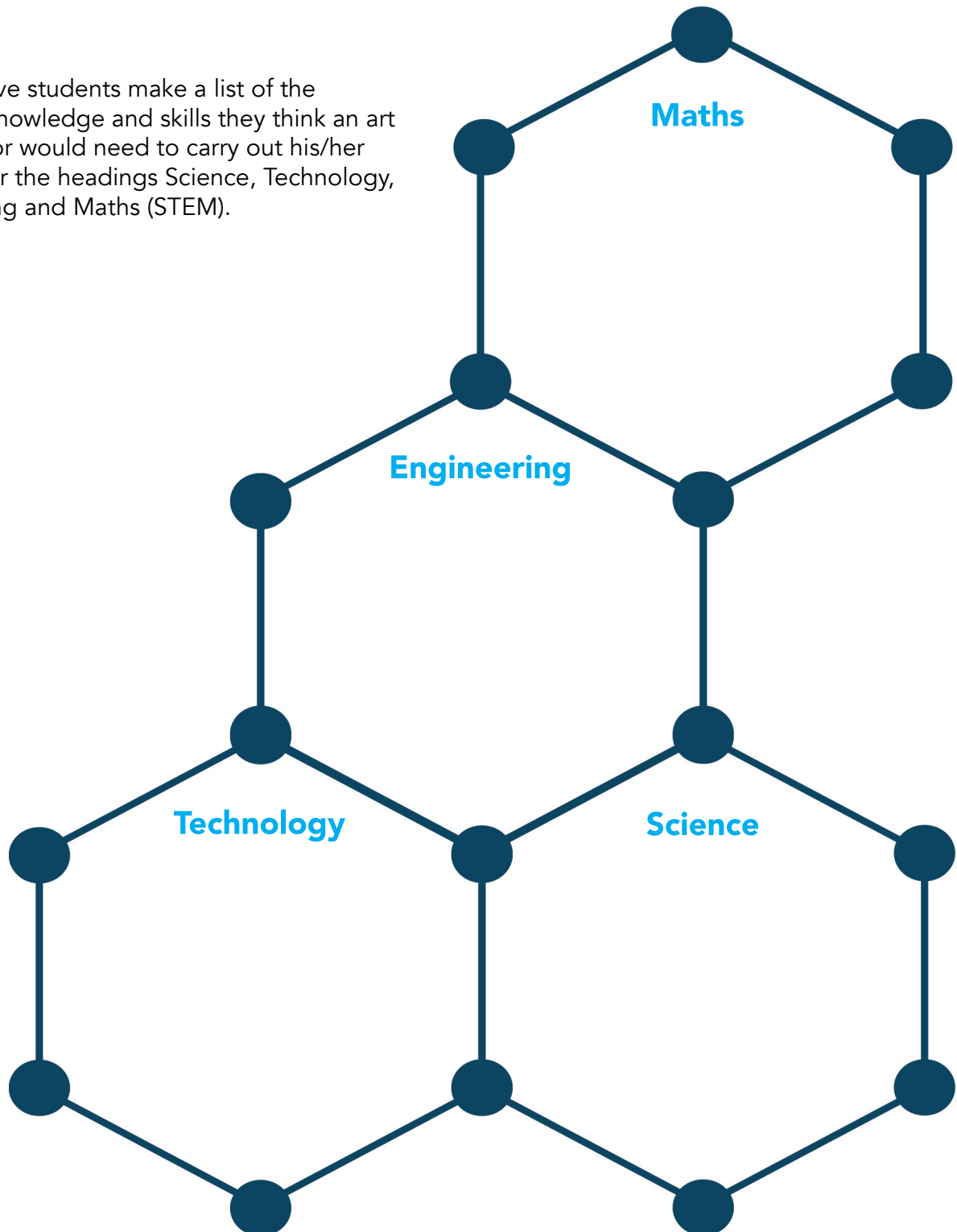
**Remedial conservation:** All actions directly applied to an item or a group of items aimed at arresting current damaging processes or reinforcing their structure. These actions are only carried out when the items are in such a fragile condition or deteriorating at such a rate, that they could be lost in a relatively short time. These actions sometimes modify the appearance of the items. Examples of remedial conservation are disinfestation of textiles, desalination of ceramics, de-acidification of paper, dehydration of wet archaeological materials, stabilisation of corroded metals, consolidation of mural paintings, removing weeds from mosaics.

Source: International Council for Museums – Committee for Conservation  
<http://www.icom-cc.org/242/about-icom-cc/what-is-conservation/>

## Task 2: What do art conservators do?

| Australian Curriculum Links  |                                  |  |  |
|--|----------------------------------|--|--|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                                | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 195<br>ACSHE 230 |
| Personal and Social Capability<br>Critical and Creative Thinking<br>Literacy |                                  |  |  |

Part 2: Have students make a list of the different knowledge and skills they think an art conservator would need to carry out his/her work under the headings Science, Technology, Engineering and Maths (STEM).



## Task 2: What do art conservators do?

| Australian Curriculum Links  |                                  |  |  |
|--|----------------------------------|--|--|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                                | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 195<br>ACSHE 230 |
| Personal and Social Capability<br>Critical and Creative Thinking<br>Literacy |                                  |  |  |

Part 3: Ask students to watch the interviews of Rachel, Rosie, Mary-Anne and Stuart talking about their art conservation work and add to or change their skills and knowledge list where necessary. As a class, discuss what students listed. For example, students should come to see that chemistry is a big part of art conservation in terms of the necessary skills and knowledge.



MARY-ANNE



RACHEL



ROSIE

Note: Although Rachel is not officially an art conservator her work does contribute to the conservation of Indigenous Australian art and objects. Her analysis of such pieces gives conservators the knowledge with which to properly handle and conserve them, as well as helping to understand their history and origin.



STUART

## Task 3: How do art and science link?

| Australian Curriculum Links      |                                  |   |                                   |
|----------------------------------|----------------------------------|---|-----------------------------------|
| Year 7<br>ACSHE 121<br>ACSHE 224 | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 230 |
| Critical and Creative Thinking   |                                  |   |                                   |

**Part 1:** Students are to read the information below on the links between science and art. As a result students may re-evaluate their ideas of art and science stereotypes and think further about the similarities and differences.

### Activity: Student reading

Science is increasingly used in conjunction with art history to document and preserve art works. Chemical analyses and other methods are used to identify materials, determine the mechanisms of deterioration and devise appropriate treatments. Any changes, such as removing varnish from an older painting for cleaning, must be reversible so the art work can be returned to its original condition, so an understanding of cause and effect is vital.

The methods and equipment used by art conservators are continually revised and updated, with technologies like gas chromatographs, infrared spectrometers and even the Australian Synchrotron now being used to analyse works or treat them, without causing any damage to the original materials.

X-rays are increasingly used to obtain information about the art work in question, such as penetrating a painting's layers to reveal cracks below the top layer of paint without causing any damage. In some cases, they have revealed hidden art works under well-known paintings, such as the self-portrait of Australian painter Arthur Streeton, uncovered using the X-ray fluorescence microprobe beamline at the Australian Synchrotron, and the two wrestlers under Van Gogh's Still Life with Meadow Flowers and Roses, revealed using ultra-



violet and X-ray analyses by DESY, the Electron Synchrotron lab in Hamburg, Germany.

At a larger scale, microscopes provide close-up views of artworks, such as tapestries and other textiles, and can be used to identify materials, for example, dyes, yarns and other fibres. Chemistry plays a significant role in art conservation, from analysing the pigments and dyes used in art works to cleaning with solvents. For example, art conservators need to identify and use suitable products that will remove a varnish layer without stripping away the original paint material below. In addition to this, laser cleaning systems are now used, with scientists selecting wavelengths of light that augment the removal of specific layers of dirt or other pollutants from a surface while the original materials, which may have been damaged by more aggressive mechanical or chemical cleaning methods, remain intact.

See for example the conservation of William Charles Piguenit's *The Flood in the Darling 1890*, Art gallery of NSW <http://www.artgallery.nsw.gov.au/channel/clip/417/>

# Task 3: The links between art and science

| Australian Curriculum Links      |                                  |   |                                   |
|----------------------------------|----------------------------------|---|-----------------------------------|
| Year 7<br>ACSHE 121<br>ACSHE 224 | Year 8<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 230 |
| Critical and Creative Thinking   |                                  |   |                                   |

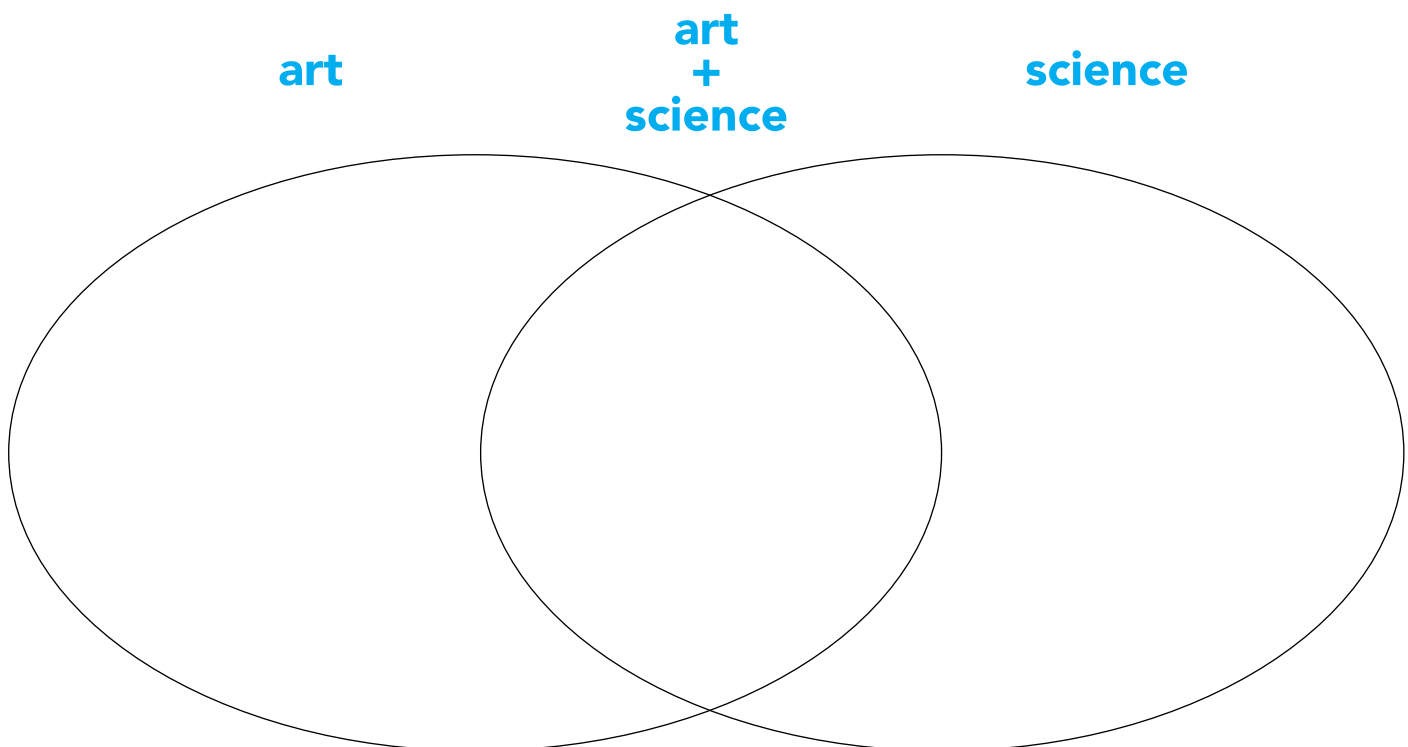
## Part 2: Comparing art and science

Students are to think about and compare the work of an artist and a scientist using the following questions to guide their thinking and record responses in a Venn diagram like the one below. Students are to consider the materials and skills used as well as the processes. The following questions could be asked to stimulate students' thinking.

- What is the thinking process that they go through? Do they do experiments?
- What do they have at end of the process?
- What do they produce?
- What do they need to consider during the process?

- What tools and equipment do they use?
- What safety equipment is required?
- What materials might scientists and artists need before they start a project?
- How is society involved in the art/science process?
- Does public opinion about art works or science theories change or stay the same over time?

Whether students complete this task individually, in small groups or as a whole class you can collate the points by asking students questions such as: Are art and science more alike than they are different? Are they more alike or different than you expected?





## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |



**Part 1:** In this task students read the following information and blog and then consider some of the issues involved in conserving art and provide some preliminary responses. Ultimately, this is a brainstorm activity to encourage students' to think of situations where and why cleaning might be counterproductive to the conservation of a piece of art. These issues and considerations are ethical in nature; that is, how a person treats a piece of art affects those that view/own/appreciate/created that piece. In Parts 2 and 3 of this task students will be making ethical decisions about how to treat various pieces of art. These issues and considerations may not appear obviously ethical to the students. You could start the discussion by simply asking students, during Part 2, if they think these are ethical issues or not?

### Activity: Student reading

Conservators need a good understanding of how different materials will be affected over time by humidity, fluctuations in temperature, pollution and other environmental factors.

For example, fluctuating moisture levels can cause wood to split, fabrics will fade in strong sunlight, and when canvases absorb water and then dry, they expand and shrink accordingly. Repeated expansion and shrinking of canvas can cause the paint to crack and flake.

Understanding the science behind art conservation is essential. The other essential aspect is to decide *how* the artwork will be conserved. For each piece of art, conservators need to consider what parts are important to preserve and what should be removed, how closely the piece will look like it did when it was originally completed and what are the expectations of the owners and the rest of society. Conservators need to look at the artwork's conservation history and decide whether to remove evidence of previous conservation efforts.

They also need to think about the client they are working for in conserving the piece, who might be a private owner, an institution, a town council, museum, an artist or group of artists. What does the client want the piece to look like – how should the piece be restored or preserved? How much money do they have to spend on the restoration? Is there sentimental value that needs to be considered?

Read Culture Grrl's blog about controversies in art conservation:  
<http://www.artsjournal.com/culturegrrl/2013/05/more-than-a-mere-cleaning-moma-removes-restorers-gunk-from-pollocks-one.html>

## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |

### Part 2: Is cleaning/fixing always a good thing?

Ask students to take a preliminary stance on whether or not they think cleaning or repairing a piece of art is a good thing and to support their stance with reasons and examples. Next, students can work through the following list of conservation examples as a whole class, small group or individually, deciding whether or not the piece should be cleaned and why. You can have students complete this task in one of a number

of ways such as filling out the table, putting the examples on to cards and sorting them or writing the categories 'Yes, Clean/Fix' / 'Don't Clean/Fix' on the board and listing the examples below.

Essentially these issues are ethical in nature and so the same sort of thinking needs to happen here as it does for deciding whether or not mining should be allowed in a National park or whether it's okay to run a red light.

| Conservation examples   | Would you fix/clean this item? Yes/No? | Why or why not? |
|---|--|-----------------|
| Should the blood be cleaned off a WWI soldier's jacket that will be displayed in a war memorial museum?   |  |                 |
| Should the perspiration stains on a vintage couture dress be cleaned from under the arms before it is presented to the public?  |  |                 |
| Should the dirt be removed from the shoes of children who survived the Holocaust?   |  |                 |
| The children's shoes (as above) have holes in them. Should the holes be sewn up?  |  |                 |
| Should new graffiti be cleaned off a graffiti-styled mural in an inner city concrete under-passage walkway?   |  |                 |
| An 18th century restoration attempt on a famous English painting involved spraying it with a clear lacquer that has now started to turn yellow. Should an attempt be made to remove the protective lacquer layer? |  |                 |

## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |

### Suggestions for Assessing Part 2

Here you should look for whether or not students recognise the ethical issues faced by art conservators. What is important here is that students practice giving reasons and evaluating their own and others' reasons. This is an important disposition and set of skills to develop in students in relation to science and everyday life. Raising and addressing ethical questions in the classroom ought to be encouraged and is supported by the Australian Curriculum in the Ethical Understanding General Capability.



EXTRA  
Ethical issues ... compilation clip

To assess students' reasoning skills you could develop your own checklist using the criteria for Community of Inquiry discussions<sup>1</sup> or use the checklist on the RiAus website: [http://riaus.org.au/wp-content/uploads/2013/05/SBTH\\_Reasoning\\_Skills\\_checklist.pdf](http://riaus.org.au/wp-content/uploads/2013/05/SBTH_Reasoning_Skills_checklist.pdf). Ultimately you want students to be skilled at clearly articulating their position and reasons on an issue and be prepared to reassess this position and their reasons in the light of new evidence or circumstances or other relevant considerations.

Note: the terms 'morally' and 'ethically' are used interchangeably in this resource.

<sup>1</sup> There are many resources to support teachers in this task, most notably, resources captured under 'Philosophy for Children' and 'Community of Inquiry'. Here are some resources that will be helpful: Institute for the Advancement of Philosophy for Children (IAPC) [www.montclair.edu/cehs/academics/centers-and-institutes/iapc/what-is/](http://www.montclair.edu/cehs/academics/centers-and-institutes/iapc/what-is/)

- DeHaan, C., MacColl, S. & McCutcheon, L. (1995) *Philosophy with Kids*, Book 3, Hawthorn: ACER, pp. 13-17
- Cam, P. (1995) *Thinking Together*, Sydney: Hale & Iremonger, pp. 41-54
- White, T (1988) *Right and wrong a brief guide to understanding ethics*. New Jersey, Prentice Hall.
- Burgh, G., Field, T. & Freakley, M. (2006) *Ethics and the Community of Inquiry: education for deliberative democracy*. Australia: Thomson Social Science Press.

The Philosophy for Children movement uses Community of Inquiry as its primary methodology. In the pack 'You can be a scientist' the Community of Inquiry method was referred to in relation to whole class guided discussions. This same methodology should be used for whole class discussions of ethical questions.

## Task 4: Issues and considerations when conserving art?

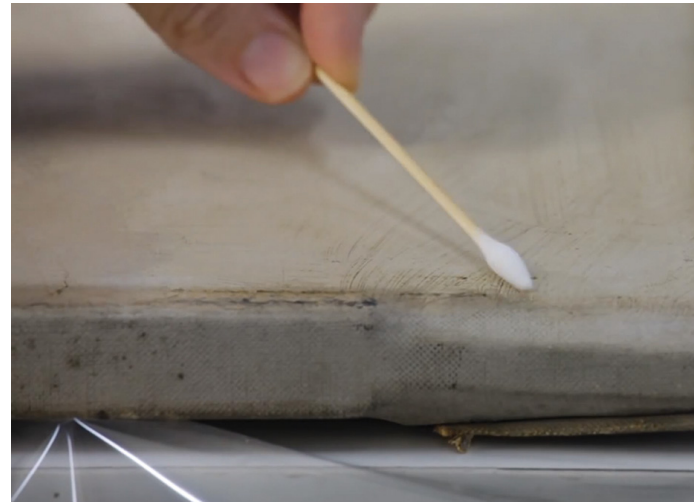
| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |

### Part 3: Criteria for cleaning/fixing

Having guided students through the conservation examples in Part 2, ask students to make a list of the criteria that an art conservator could use to help make decisions about when and when not to clean/fix a piece. Alternatively, students could put together a list of the essential questions that an art conservator ought to consider when making a decision about when and when not to clean/fix a piece.

You can use the following examples to help students develop a list of criteria or as a guide for the sorts of questions that should appear in the students' list for conservators.

- What is the historical value of the art?
- What is the relationship of the dirt or stain to the item?
- Will the artwork be damaged by the cleaning?
- Should irreversible steps be taken to preserve an object for the long term even if it means removing potentially valuable or historically significant dirt or corrosion?
- Should the artist's original intent be considered?
- If the artist is still alive and available, should they be consulted during the restoration process?
- If there are many artists involved in a piece and their opinion differs on what conservation should be carried out, how might you go about resolving this conflict?



- Would the work look better restored or not?
- If displaying a piece of art damages it, should it go on display unrestored (which would dramatically reduce its longevity) or spend the rest of its life entombed in preservative conditions?

### Suggestions for Assessing Part 3

Here you could ask students to describe, in a written piece, what they see as the ethical issues for art conservators. What you are looking for is that students recognise there are ethical issues even in the work of art conservators.

## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |



### Part 4: What special considerations are needed for public art in public spaces?

Explain to the students that some public art is susceptible to a wide range of complex and unpredictable elements not usually relevant to art that is stored in a protective environment such as an art gallery. When an artist creates a piece of public art, they must consider how the elements will affect their art piece and, therefore, how to preserve their work.

Ask students to reflect on the public art pieces that have been installed in the parks and other public spaces near where they live, or on famous monuments they might have visited or know of. Ask the questions: Did you touch them or climb on them? Perhaps you have helped restore them? Have you noticed the materials used in the art change over time (such as marble discolouring or dissolving, or copper oxidising and turning green).

Students are then to identify the special issues with maintaining and preserving public art in public places compared to art in galleries; brainstorm some ideas about how art in the public spaces might need special conservation compared to art kept in private homes and offices by thinking about ways that it might be damaged or affected by the elements. Some issues that students might come up with include: graffiti, bird droppings, birds nesting, sun, rain, acid rain, cost of cleaning, chewing gum, finger prints, spilt drinks, exposure to vehicle and factory pollution, sprinklers, do-gooder people who bring heavy-duty cleaners to clean the art but actually damage it, protective sealants or easy-clean coatings that might change the look and feel of the artwork, people sitting or skating on the art.

## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
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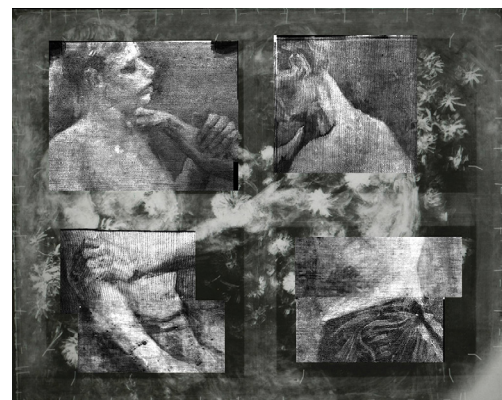
### Part 5: Which image to save?

In this task students are to consider three cases (follow the links to suggested resources) where one painting has been discovered under another and then brainstorm the value of each of the two paintings. They can use their questions or criteria from Part 3 of this task to help make the decision about which of the two paintings they think should be conserved and provide their reasons.

1. Lost Leonardo da Vinci masterpiece 'hidden' behind Vasari painting in Florence, The Telegraph, March 30, 2014  
<http://www.telegraph.co.uk/culture/culturepicturegalleries/9138636/Lost-Leonardo-da-Vinci-masterpiece-hidden-behind-Vasari-painting-in-Florence.html>
2. Magritte's missing nudes found hidden under paintings after 80 years, The Guardian, Oct 4, 2013  
<http://www.theguardian.com/artanddesign/2013/oct/03/rene-magritte-missing-nudes-uncovered>
3. Disputed painting revealed as a Van Gogh, NewScientist, March 2012  
<http://www.newscientist.com/blogs/culture-lab/2012/03/disputed-painting-revealed-as-a-van-gogh.html>



Still Life Meadows Flowers and Roses  
Van Gogh



The Wrestlers  
Van Gogh

## Task 4: Issues and considerations when conserving art?

| Australian Curriculum Links   |   |  |   |
|---|---|--|---|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224                       | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 158<br>ACSHE 160<br>ACSHE 161<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194<br>ACSHE 195<br>ACSHE 230 |
| Ethical Understanding<br>Critical and Creative Thinking<br>Literacy |   |  |   |

| Painting on top layer                               | Reasons for conserving this painting | Painting beneath top layer          | Reasons for conserving this painting |
|---|--------------------------------------|-------------------------------------|--------------------------------------|
| Vasari's battle scene                               |                                      | Da Vinci's masterpiece              |                                      |
| Magritte's The Portrait & The Red Model             |                                      | Sections of Magritte's 'lost' nudes |                                      |
| Van Gogh's Still Life with Meadow Flowers and Roses |                                      | Van Gogh's Wrestlers                |                                      |

## Task 5: Choosing art for conservation

| Australian Curriculum Links                             |   |                     |                                   |
|---|---|---------------------|-----------------------------------|
| Year 7<br>ACSHE 120<br>ACSHE 121<br>ACSHE 224           | Year 8<br>ACSHE 135<br>ACSHE 136<br>ACSHE 227 | Year 9<br>ACSHE 228 | Year 10<br>ACSHE 192<br>ACSHE 194 |
| Ethical Understanding<br>Critical and Creative Thinking |   |                     |                                   |

### Which criteria do we use when choosing art for conservation?

Students are to watch the following video about how a painting called *The Flood in the Darling* 1890 was restored at the Art Gallery of NSW using funds provided by an investment bank.



<http://www.artgallery.nsw.gov.au/channel/clip/417/>

Ask students to imagine they are an art lover and rich benefactor that would like to work with the local art gallery to restore one of their paintings. They are given a tour of the warehouse and are presented with a number of options. Then consider the following paintings and decide which one they will provide funds for. What you would expect to see is that students make the connection between the criteria they developed in Part 3, Task 4 and this Task.

**Option 1** – An extremely valuable and relatively recent European painting that cost the gallery millions of dollars. It is one of the most recent and expensive purchases but cannot be displayed until it is cleaned and has its frame fixed.

**Option 2** – An Australian painting by an unknown artist with strong cultural significance as it includes images of indigenous rock art that no longer exists.

**Option 3** – There is going to be an exhibition in six months' time at this art gallery and this painting would make a significant contribution to that collection.

**Option 4** – One of the most damaged pieces in the collection. This painting has been neglected for years and is slowly getting worse. Although not by a famous artist, it will make a significant contribution one day.

**Option 5** – The least damaged and smallest painting by a moderately known artist, it will be finished the soonest and will cost the least for you to restore.

**Option 6** – A rare piece by a famous artist. Display of this painting would enrich our knowledge of the artist's range of talents.



## Task 5: Choosing art for conservation

| Australian Curriculum Links                             |   |                     |                                   |
|---|---|---------------------|-----------------------------------|
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| Ethical Understanding<br>Critical and Creative Thinking |   |                     |                                   |



Students are to answer the following questions:

1. Which piece will you choose to restore and why?
2. Did the other members of your class agree with you or did they have different ideas?
3. Which option was the least popular and why?
4. If you were to be the benefactor of another painting the following year, would you necessarily make the same choice for the same reasons as you did this year?
5. How much do you think your enjoyment of the painting (because you find it beautiful or inspiring) would influence your decision?
6. Do you think the gallery's art conservator would have a preference? If so, which do you think s/he might try to persuade you to restore?

### Suggestions for Assessing Task 5

The students' ability to list relevant criteria will demonstrate their ability to assess art for conservation, develop their own values, and apply their thinking to a practical situation. Students could apply the criteria (from Part 3, Task 4) when selecting a painting to conserve, which will test for consistency of ideas.

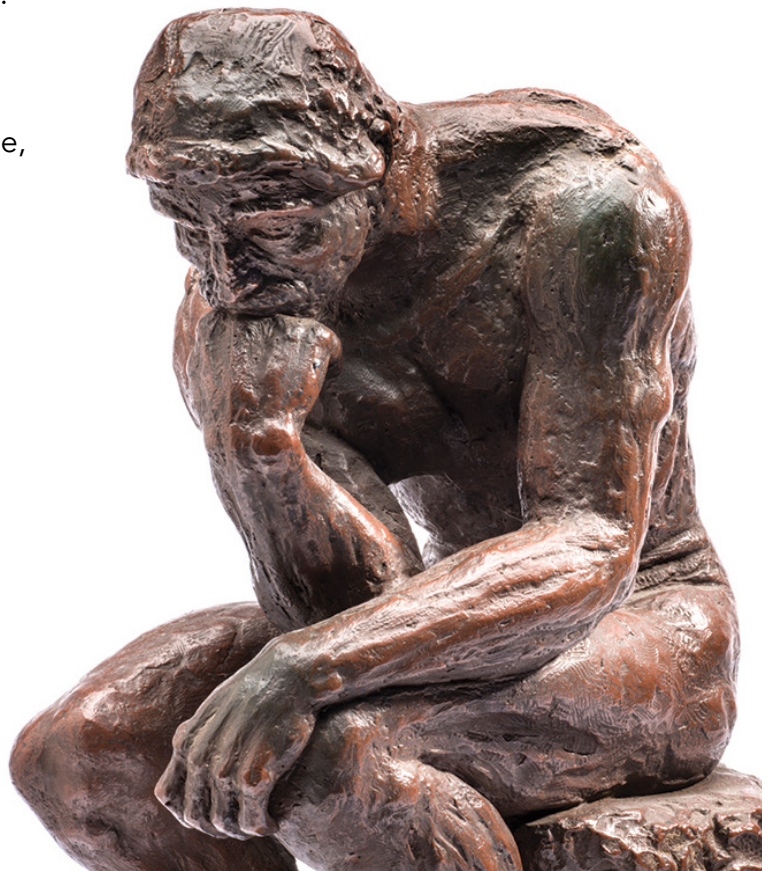
## Task 6: Personal reflection

There are a number of ways to engage students in reflection of the tasks they have completed. You could use some or all of the following options.

Ask students:

- What did you enjoy learning most about art conservation?
- How has science and technology helped us to understand the processes involved in art conservation?
- If you were going to be an art conservator would you study science or art as a priority? Why?

Is there an art piece outdoors in the school or local community? Could students visit the piece, learn about what it is made from, how the materials are changing over time and reacting with the natural elements?



# Resources

## Websites

Centre for Contemporary Art Conservation, Queensland Art Gallery | Gallery of Modern Art  
<http://www.qagoma.qld.gov.au/research/conservation>

Codes and Ethics of Practise, The Australian Institute for the Conservation of Cultural Material (AICCM)  
<http://www.aiccm.org.au/who-we-are/code-ethics-and-code-practice>

Collection Conservation, National Gallery of Australia  
<http://nga.gov.au/Conservation/>

Conservation of The Flood in the Darling 1890, Art Gallery of NSW  
<http://www.artgallery.nsw.gov.au/channel/clip/417/>

Conservation Science, AICCM  
<http://www.aiccm.org.au/conservation/our-specialisations/conservation-science>

Exploring the science of art, Australian Government Australian Research Council  
[http://www.arc.gov.au/media/feature\\_articles/July13\\_FreeRadicals\\_Art.htm](http://www.arc.gov.au/media/feature_articles/July13_FreeRadicals_Art.htm)

New tools for preserving the past, Australian Synchrotron website  
<http://www.synchrotron.org.au/index.php/news/publications/lightspeed-newsletter/lightspeed-articles/516-new-tools-for-preserving-the-past>

UNESCO Text of the Convention for the Safeguarding of Intangible Cultural Heritage  
<http://www.unesco.org/culture/ich/index.php?pg=00006>

## Collection institutions

- Australian War Memorial
- National Archives of Australia
- National Film and Sound Archive
- National Gallery of Australia
- National Library of Australia
- National Museum of Australia

# Resources

## Relevant articles/reports

Art Restoration: the fine line between art and science, Yale Scientific, December 1, 2010  
<http://www.yalescientific.org/2010/12/art-restoration-the-fine-line-between-art-and-science>

Da Vinci and the science of seeing art's secrets, The Conversation, Streeton, 12 April, 2012  
<http://theconversation.com/streeton-da-vinci-and-the-science-of-seeing-arts-secrets-6343>

X-rays show why Van Gogh paintings lose their shine, Science Daily, Feb 14, 2011  
<http://www.sciencedaily.com/releases/2011/02/110214142340.htm>

Synchrotron reveals details of artist's cover-up  
<http://www.synchrotron.org.au/index.php/aussynbeamlines/x-ray-fluorescence-microprobe-x-ray-microspectroscopy/highlights-xfm/synchrotron-reveals-artists-cover-up>

Disputed painting revealed as a Van Gogh  
<http://www.newscientist.com/blogs/culturelab/2012/03/disputed-painting-revealed-as-a-van-gogh.html>

X-ray vision uncovers hidden self-portrait, Royal Society of Chemistry, March 2012  
<http://www.rsc.org/chemistryworld/News/2012/March/hidden-art-painting-restoration-x-ray-arthur-streeton.asp>

## Video

Contemporary Art Conservation at Smithsonian's Hirshhorn Museum  
<https://www.youtube.com/watch?v=ALxLQqPhTq4>

The Art and Science of Conservation: Behind the Scenes at the Freer Gallery of Art  
<https://www.youtube.com/watch?v=UeDG8XDt2mc>

The Process of Art Restoration  
<https://www.youtube.com/watch?v=Nal8zLsPXwg>

# Ri Aus STEM careers

STEM Careers Pack 6: Follow your interest in ... Art Conservation is a publication of RiAus (Royal Institution of Australia) in partnership with DECD (Department for Education and Child Development). 2014.

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**STEM Careers Pack 6:  
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**Government of South Australia**  
Department for Education and  
Child Development