

What is milk made of?

An Early Stage 1 unit of work.

Rationale

This unit works towards the material world strand of the NSW Science and Technology syllabus. Students will observe and discuss objects in their immediate environment and compare them to objects from Belgenny Creamery. They will make suggestions about how objects are designed to provide a solution to identified problems and why different objects are made of different materials. They will also consider the idea that people arrange spaces to suit their own needs.

NSW syllabus outcomes addressed in the unit

Science and Technology:

A student:

- Identifies that objects are made of materials that have observable properties STe-4MW-ST
- Develops solutions to an identified need STe-2DP-T
- Observes, questions and collects data to communicate ideas STe-1WS-S

English

A student:

- Communicates with peers and known adults in informal and guided activities demonstrating emerging skills of group interaction ENe-1A
- Composes simple texts to convey an idea or message ENe-2A
- Responds to and composes simple texts about familiar aspects of the world and their own experiences ENe-11D
- Demonstrates awareness of how to reflect on aspects of their own and others' learning ENe-12E

History:

The unit addresses the historical concept Continuity and Change: some things change over time and others remain the same, eg changes and continuities in students' own lifetimes and that of their families; using the skills sequence familiar objects and events, explore and use a range of sources about the past and identify and compare features of objects from the past and present.

Geography:

This unit addresses the geographical concept Space: the significance of location and spatial distribution, and ways people organise and manage the spaces that we live in; while using maps and visual representations to gather information.

PDHPE

Students will consider milk and its by-products as part of a healthy diet working towards the outcome PHES1.12 Displays basic positive health practices.

Visual Arts

A student:

- Makes simple pictures and other kinds of artworks about things and experiences.
- VAES1.1

Unit at a glance

| Learning experience | Location | Activities | Resources |
|---------------------|------------------|---|---|
| 1 | Classroom | Observation of objects in student's environments; uses and materials; viewing them as technology to assist people. | Learning journal |
| 2 | Classroom | Comparison of objects from local environment to items from Belgenny Farm | Internet access or images downloaded to local computer |
| 3 | Classroom | How the people of Belgenny Farm changed the site to suit their needs and how different objects meet different needs | Internet access or information downloaded to local computer |
| 4 | Onsite or online | Site visit | Internet access if online visit |
| 5 | Classroom | Comparison of cream separator from different eras—materials and uses; how newer designs represent a designed solution to a problem. | Internet access or images and videos downloaded to local computer |
| 6 | Classroom | Grouping objects by differing classifications | Internet access for sourcing images |
| 7 | Classroom | Video journal of learning from unit or class concept map. | Camera or phone/tablet to record videos. |

Learning sequence

Learning experience 1: What's in your world

**Learning
experience 1:**
Science and
Technology
background

Aim: To encourage students to observe objects and areas in their immediate environment, talk about ways of describing them and what service they provide to school members.

Learning intention

Students will be able to talk about the things they see in their environment, including buildings, animals, people, and gardens. They will be able to discuss that there are specific areas for different parts of their day.



Activate prior knowledge

Talk to students about different parts of their day and where they spend them. Ask them to describe those areas to each other. Discuss the need to be able to describe things.



Discuss / Investigate / View

Find a place in the school where students can sit and observe their environment. It would be good to do this with smaller groups so if you have helpers, parents or SLSO support in the class that would be a good time to do this activity.

Ask them to sit quietly and notice all the things they can see and hear and smell.

After a minute or two model a way of describing something then ask students to share with the group one thing that they noticed around them. Encourage/ question them about the size of the object, what it is made of, what it is used for, is there any sound coming from it? Why do they think that object is located or has been left there? Is it the best place for it?

Try to help students see that often in our environment there are areas or zones for different activities for example, the classroom is where many of your lessons take place, the playground is in a different area of the school. Is there a difference in the way they use those areas or the way they act in them? You can also talk about the school garden or the office, library, canteen, the area outside the gates. Often the different zones are made of different materials; the play equipment is probably not made of brick, like the classroom may be.



Suggested activities

Draw a picture showing the way they use one of the areas in the school. Some may be able to label their diagrams with the materials used in constructing the area. If you are using the learning journals there is space in them for students to do this drawing.

Take it further

The story of the Three Little Pigs is a good story to talk about houses made of different materials.

Next

Students will look at how objects are made differently for different purposes.

Learning experience 2: Same object, different purpose

Learning
experience 2:
Place

Aim: Students will compare technology in their immediate environment to that of Belgenny Farm. The aim is for students to think about what some familiar objects are made of and why some objects that meet a similar need are very different in design; how a different design might represent a different time or a different solution.

Learning intention

Students will be able to tell you one similarity and one difference between the school environment and Belgenny Farm as well as one similarity and one difference between objects found at Belgenny Farm compared to a school object.

Review

Review the discussion held previously when students observed objects in their immediate environment. Let them know that they are going to do a similar activity but will be looking at some images from a very different location.

Discuss / Investigate / View

Belgenny Farm images are available on our website ([link](#)) or visit the site remotely on Google Earth ([link](#)) or Six Maps to view some of the structures at Belgenny Farm.

As a class discuss some of the differences they can see between their school environment and the farm environment. You will be able to highlight to students that there are different zones for different activities on farms, just like in your school eg the stables has a large clear area in front of it for working with animals; the blacksmith's shop is at the back of the stables so they had easy access to horses but not connected to any other structures in case of fire; there is a dovecote (a structure provided for pigeons or doves to nest in) is out of the main traffic area but nearby so the pigeons can eat fallen grain.

Allow students time to consider the photos of objects from the site. Ask students what they think about the objects. Ask them to consider the size of the object, what it is made of, what it is used for and whether they think there would be any sound coming from it? Why do they think that object is located or left there? Is it the best place for it?

Images: horse shoe stack; dovecote; bell; old oak tree; water trough; the stables.





Discuss with students why many of these items are different or similar to ones that they use. For example the horse shoe stack is an example of disposal, the dovecote can be compared to keeping a bird in a birdcage, the bell at Belgenny was used to call workers to meals, what is your school bell used for? Compare slab timber buildings to the construction of your classrooms.



Suggested activities

In learning journals students can choose to draw or write about the differences in the objects you have discussed.



Take it further

Extend students' knowledge or understanding of one or more of the objects discussed eg waste management issues or bird cages around the world.

Next

Next you will be looking at how people change or influence the way spaces and objects are used and made.

Learning experience 3: People change places

Learning
experience 3:
People

Aim: Students will consider the idea that people use products and spaces in different ways and change them to suit their needs.

Learning intention

Students will be able to talk about how different areas in their environment are designed to meet different needs. For example compare the classroom to student's living rooms at home or differences between student's homes.

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Review

Review previous lessons about objects and spaces in your immediate environment and Belgenny Farm.

Discuss / Investigate / View

Ask students to think about how different people set up their spaces to suit their needs and likes. For example bedrooms at home, is your bedroom a separate room in the house? Is there a window and a wardrobe—where are they in relation to each other. Is the bed under the window or near the door? What sort of covers do students use in winter to stay warm? Some may use blankets; maybe some have doonas or electric blankets. What about in summer what do they have on their beds when it is warm? Talk about how those products suit different purposes and that they are changed for different seasons.

So the changing of bed covers is a change across one year, as seasons change, what about a change over 200 years? Look at the map of Belgenny farm and discuss the uses of different structures on the site. The long tenure of the Macarthurs and range of agricultural enterprises has left us with a complex site arranged to meet changing needs over time.

Suggested activities

If you are using the learning journals students can record their ideas about how they would arrange a farm site.

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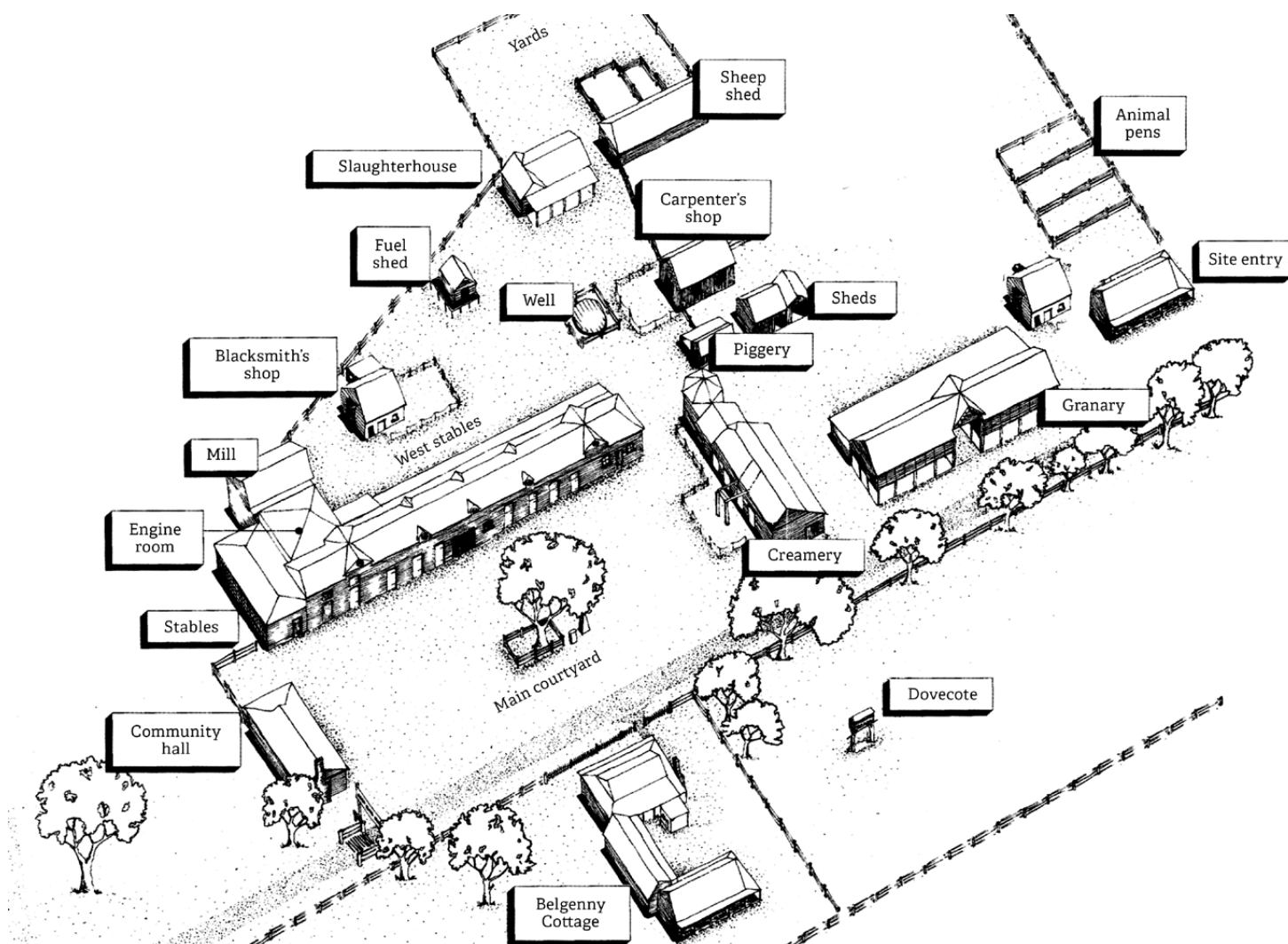
Take it further

If you have started work on personal and family histories, this learning experience can be used as a comparison to the stories that students have to tell about their families.

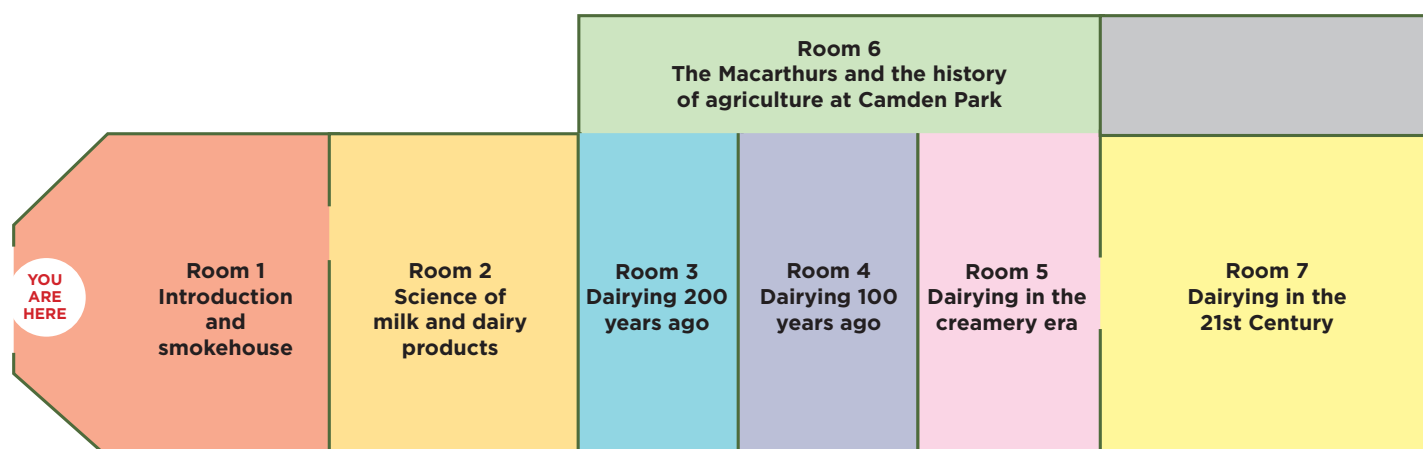
Next

Next, students will visit Belgenny Farm to look at the Creamery where they will be looking again at how the building was changed to suit different needs.

Learning experience 4: Map of site



Guide to Creamery



Learning experience 4: The site visit

Learning experience 4: Site visit

Room 1 - Smokehouse

There is a poster on the wall that shows how this building has changed as the Macarthurs used the buildings for different purposes.

The coach house (the other end of this building) was built in the 1820s to store horse drawn carriages. This room is the smokehouse and it was built in the 1830s or 1840s. In the 1830s there was no refrigeration available to keep meat from going bad quickly. The solution was to smoke the meat. This room was designed for this purpose, the meat hung from the roof and a small fire on the floor burnt for up to two weeks to dry the meat and keep it safe to eat. This room was not originally connected to the buildings next to it because of the risk of it burning down when they were smoking meat.

Eventually the two buildings were joined—as smoking meat was less common in 1898 the Macarthurs built a creamery over the coach house to separate cream from milk and sell to make into butter and cheese.



Optional learning journal activity

If you are using the learning journals, you will be able to number the pictures of the building from oldest to newest—number one next to the oldest.

Room 2 - Science of milk

Milk is a natural product produced by mammals to feed their young. Humans use milk from animals including cows to meet their nutritional needs, but did you know you could be eating milk and not even realise it? Milk, or parts of milk, is made into lots of different products. Can you think of some? Have a look at the posters in this room and see if you can find some things that we eat that are made from milk...



Optional learning journal activity

In your learning journal tick the products that are made from milk.

Room 3 - Dairying 200 years ago

Two hundred years ago there were no supermarkets; farmers needed to provide their own milk and vegetables and they also consumed meat from the property. All of the farmer's jobs were designed to make sure they could meet their own needs for food, water and shelter and then any extra produce they made, they could sell. They also didn't have access to a lot of the tools that dairy farmers have today; in fact some of the things that they used look a bit strange.

Have a look at the objects in the room and think about what you think they are used for and what they are made of. Read the information about each object after students have observed and predicted what they think the objects are.

Objects include; skimmer, settling pan, wooden bucket, dash churn.



Optional learning journal activity

In learning journals students can indicate which of the containers shown would be used to collect milk when hand milking a cow.

Room 4 - Dairying 100 years ago

One hundred years ago advances in technology meant better machines were available to help dairy farmers do their work. In the late 1800s a mechanical cream separator was installed here at Belgenny and in the 1900s farmers got access to milking machines. These developments meant that fewer people needed to keep house cows as dairy farms were able to milk more cows per day. Around the same time transport technology was also developing, meaning that farmer's produce could be sent to markets faster.

Have a look at the objects in the room and discuss some ideas about what some of these objects were for? Read the information about each product after students have observed and predicted what they think the objects are.

Objects include; steam engine, milk jug, dipper, milk bottles.



Optional learning journal activity

In learning journals students can indicate which is the oldest style of container that people used to buy milk in.

Room 5 - Dairying in the creamery era

This end of the building was built first (in the 1820s) initially it was a coach house for horse-drawn vehicles. Look up, the upper level was added so the building could be used as a creamery. It was added nearly eighty years later in 1898. The creamery was established before pumps were available so farmers relied on gravity to move the milk and cream around. Cans of milk were hauled to the top floor from carts parked outside, underneath the part that juts out. The milk was tipped into a vat and flowed into a machine called a separator where the cream is separated from the milk. After separating, the cream was taken to Menangle Central Creamery to be sold or made into butter. The skim milk (the milk product remaining after the cream has been separated) was fed to pigs on Camden Park which could be eaten by the people living here or sold.



Optional learning journal activity

In learning journals there is a diagram of the building with part missing, ask students to join the dots to complete the diagram and show the new section for the creamery.

Room 6 - The Macarthurs

These are all members of the Macarthur family, the first ones that lived here are John and Elizabeth Macarthur with their children. The Macarthur's still live in a house nearby and lots of the Macarthurs between then and now have worked and lived on the farm. Many of them made changes to the farm in terms of what they grew and sold from the farm and what the buildings were used for.



Optional learning journal activity

In your learning journal put a number one under the pictures of John and Elizabeth and then number the others in the order that they lived here. Hint: they are in order on the wall.

Room 7 - Dairying in the 21st century

The Macarthurs often tried new farming technologies to improve their productivity and quality of produce, usually in the early stages of development. This room shows how far technology in the dairy industry has come. Have a look at the objects in this room, how have things changed? What do you see in this room that you didn't in other rooms?

- Edward Macathur Onslow who developed and built the rotolactor here in the 1950s

would probably never have believed that one day robots would milk cows, but they do in some dairies.

- There is a model of the rotolactor in this room. It was one of only three in the world and was the start of rotary dairying that many modern dairies use now. A rotary dairy allows farmers to milk many more cows, faster, than they can in individual stalls.
- At one stage there was also a robotic dairy on Camden Park, robotic dairies are a gentle way of milking cows as the computer that operates the milking machines can tell (by reading the cows identification tag) which cow is in the stall, how long she needs to be milked and how much feed she needs. The computer can also tell if she is getting sick by testing the milk—if a cow is getting sick the farmer can arrange for the vet to come and treat her so she gets well again soon.



Optional learning journal activity

In your learning journal indicate the dairy equipment that is the MOST modern.

Learning experience 5

Aim: Students will review the activities from the site visit and then look at cream separators in more detail, talking about the materials they are made from and how and why they have developed over time.

Learning experience 5:
Reinforce science and technology outcome

Learning intention

Students will be able to describe the process of cream rising when raw milk is left to sit and how a mechanical separator speeds up that process.

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Review

Discuss the relationship between changing needs and materials and developing technology as shown in your visit to Belgenny Farm.

Discuss / Investigate / View

Did you know that when milk comes from the cow it contains cream? How do you think the cream is taken out of the milk? Think back to your visit to Belgenny.

Look at the settling pan image on our website ([link](#)), how would that help to get the cream out of milk? Who thinks they can describe how it works? Ask students to talk amongst friends for a minute ... and then describe to the class how it works? View the [video](#) on our website.

Look at the mechanical separator image on our website ([link](#)), how does that get the cream out of milk? Who thinks they can describe how it works? Ask students to talk amongst friends for a minute ... and then describe to the class how it works? Watch the [video](#) together

Which one do you think is the most modern? Which is the oldest? Why?

Suggested activities

Students can add labels or drawings to the illustrations in their learning journals to show how each of the separators work. Number the separators 1 for the oldest, 3 for newest.

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Take it further

Investigate how cream is separated from milk in factories.

Next

Students will be looking at how some of our everyday objects are used and made and start to think about grouping them.

Learning experience 6

Aim: Students observe a broader range of objects made of different materials from either school, your classroom environment or students lunch boxes and think about ways of classifying groups of objects.

Learning experience 6:
Activities designed to apply learning to a new situation

Learning intention

Students will be able to tell you at least two ways objects can be grouped eg by purpose, operation, material, age.

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Review

What are some of the objects that you saw at Belgenny?

Discuss / Investigate / View

Can you think of as many of the things made of wood as we can? What about things made of glass? Metal?

What about some of the things that were operated by hand? Or by machine? Were there any operated by computers?

Discuss a range of ways that we could group the things that we have been looking at, such as grouping by material, operation and technology, as we have done with the items at Belgenny.

Suggested activities

The learning journal activity asks students to think about they ways to group different object, students can then make suggestions about items from their lives that could be included in the groups.

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Take it further

Play 'Guess what I am' using objects in the classroom. In this game one person chooses an object and the rest of the players try to guess what it is by asking questions. For example if I have chosen a chair, the other players may ask Is it made of wood? No. Is it yellow? Yes. Do we use it every day? Yes. The game can be shortened or extended by setting rules for questions ie more experienced players may be restricted to yes or no answers (is it yellow?) or open ended question will speed the game up and help younger players (what colour is it?). Early stage 1 players will probably need some help at first to think of questions but will soon catch on.

Next

The next learning experience is a chance for students to reflect on their learning in the unit.

Learning experience 7

Learning experience 7:
Application of learning to a creative endeavour

Aim: Make a video reflection or diary of student's experience of Belgenny Farm.

Learning intention

Students will be able to tell you one thing they learnt about dairies or farms in general from their work on Belgenny. Some students will talk specifically about what they learnt about objects being made of particular materials or for particular purposes and how that has changed over time.

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Review

Have a class discussion about the things you have talked about in the unit.

Discuss / Investigate / View

Talk to the students about how you might make a record of some of things you have learnt in this unit. If you decide to make a video journal the following is a format that we have found useful:

- Give the students time to think about what they found most interesting—they may turn to the person next to them and practice telling them.
- Record a teacher introduction ... Hello this is ... from ... we visited Belgenny Farm on ... and looked at These are the things that we learnt ... (student responses).
- Ask students to record one thing that they remember or have learnt and how they might be able to use this in other situations. Eg 'I learnt that cream comes from the cow's milk' or 'I learnt that milk used to be delivered in bottles' or 'Robots can milk cows'.

We would love to see these. To share them with us send them to schools.program@dpi.nsw.gov.au

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Take it further

Share the video with other classes, families or at a school assembly so students can share their learning with others.

Appendix 1

Australian Curriculum outcomes

Science:

Recognise that objects can be composed of different materials and describe the observable properties of those materials AC9SFU03

Share questions, predictions, observations and ideas with others AC9SFI05

English

Understand that texts can take many forms such as signs, books and digital texts AC9EFLA03

Interact in informal and structured situations by listening while others speak and using features of voice including volume levels AC9EFLY02

Interact in informal and structured situations by listening while others speak and using features of voice including volume levels AC9EFLY02

Geography

Features of familiar places they belong to, why some places are special and how places can be looked after AC9HSFK03

Share a perspective on information, such as stories about significant events and special places AC9HSFS03

The arts—media arts

Create arts works that communicate ideas AC9AVAF01

Share their arts works with audiences AC9AVAFP01