




# Creating virtual 3D Sydney Metro Northwest stations

Key Learning Area	Unit or lesson title and main focus questions	Most appropriate level and suggested number of lessons
 Science and Technology	<b>Creating virtual 3D Sydney Metro Northwest stations</b> What traditional and modern features do the new Sydney Metro Northwest railway stations need?	Stage 2-3
 Geography		2-3 lessons
 History		

## Teacher briefing

Students consider and compare the features of a traditional railway station and the Sydney Metro Northwest station design plans. Using stage appropriate design processes and strategies, students then create their own virtual 3D Sydney Metro Northwest railway station showcasing both traditional and contemporary features of train travel using design software such as Minecraft on iPads or computers using Google Sketchup 8 or Lego Digital Designer.

Reflecting on key features of past, present and future train stations and the reasons behind design changes over the past 100 years, enables students to identify aesthetic, cultural, safety, sustainability and functionality issues of importance to contemporary passengers.

### Requirements for these lessons

- Interactive whiteboard
- Internet access
- Flipchart or butcher's paper and markers (or whiteboard and whiteboard markers)
- Paper, pen
- Laptops, computers or iPads
- Selected 3D design software (see web links).

### Assessment

There are opportunities for formative assessment on a design task following appropriate design processes and strategies.

### Key terms and vocabulary

Sydney Metro Northwest, train stations, traditional and modern, old Sydney Railway Station, Central Station.

## Web links



To find historical photographs of early Sydney railway stations use PhotoSearch in NSW Government State Records Photo Investigator. Use the search term 'railway station' for example.

<https://www.records.nsw.gov.au/>

### **Some good examples:**

#### **Concourse of North Sydney Station, 1932**

[http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685\\_a007\\_a00704\\_8723000185r](http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685_a007_a00704_8723000185r)

#### **Wynyard Station - Erecting Escalators, 1930**

[http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685\\_a007\\_a00704\\_8735000021r](http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685_a007_a00704_8735000021r)

#### **Wynyard Station, Concourse Floor level, 1932**

[http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685\\_a007\\_a00704\\_8735000030r](http://investigator.records.nsw.gov.au/asp/photosearch/photo.asp?12685_a007_a00704_8735000030r)

#### **Artist's impressions of the planned Sydney Metro Northwest railway stations**

<https://www.sydneymetro.info/map/interactive-map>

#### **An interactive tour of the Sydney Metro Northwest and the new stations**

<https://www.sydneymetro.info/map/interactive-map>

#### **Artist's impressions of each of the planned Sydney Metro Northwest stations are also included in the Sydney Metro Northwest Corridor Strategy documents**

<https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Sydney-Metro-Northwest-Urban-Renewal-Corridor>

## Web links



### Suitable 3D Design software for this lesson:

#### Google Sketchup 8 (free)

<http://www.sketchup.com/products/sketchup-make>

#### Minecraft for computers

<https://minecraft.net>

#### Minecraft lite for iPads (free)

<https://itunes.apple.com/ee/app/minecraft/id479516143?mt=8>

#### Lego Digital Designer virtual building software (free)

<https://www.lego.com/en-us/ldd/download>

## Syllabus links

### Science and Technology K-6

(ST2-2DP-T) selects and uses materials, tools and equipment to develop solutions for a need or opportunity

(ST2-3DP-T) defines problems, describes and follows algorithms to develop solutions

(ST3-3DP-T) defines problems, and designs, modifies and follows algorithms to develop solutions

(ST3-2DP-T) plans and uses materials, tools and equipment to develop solutions for a need or opportunity

Students develop knowledge and understanding of the built environment including engineering principles and systems

### Geography K-10

Stage 3 - Factors that shape places- humans shape places

(GE3-1) describes the diverse features and characteristics of places and environments

(GE3-2) explains interactions and connections between people, places and environments

(GE3-4) acquires, processes and communicates geographical information using geographical tools for inquiry.

## History K-10

Stage 2 - Community and remembrance

(HT2-2) describes and explains how significant individuals, groups and events contributed to changes in the local community over time

(HT2-5) applies skills of historical inquiry and communication.

Stage 3 - The Australian colonies

(HT3-2) describes and explains different experiences of people living in Australia over time

(HT3-5) applies a variety of skills of historical inquiry and communication.

## Learning experiences

### Step 1 - Class discussion

Teacher displays pictures of past, present and future Sydney railway stations such as the old Sydney Railway Station, Central Station, North Sydney Station and Wynyard Station using NSW Government State Record Photo Investigator and the artist's impression video of the Sydney Metro Northwest and the online interactive. (See web links). Photos can be displayed on the interactive whiteboard, or use hard copy printouts.

### Step 2 - Class activity

Create a past and future train station Venn diagram. Using the interactive whiteboard, brainstorm key differences and similarities in railway station features of an early railway station, a current Sydney railway station and a planned Sydney Metro Northwest station. Using the responses, create a Venn diagram to record the differences and similarities. Teacher may need to explain Venn diagrams to the class if students are unfamiliar with them.

A Venn diagram can help the class make lists of differences and similarities. A three-circle Venn diagram is harder to fill in, as it takes a lot more careful thought. For example:

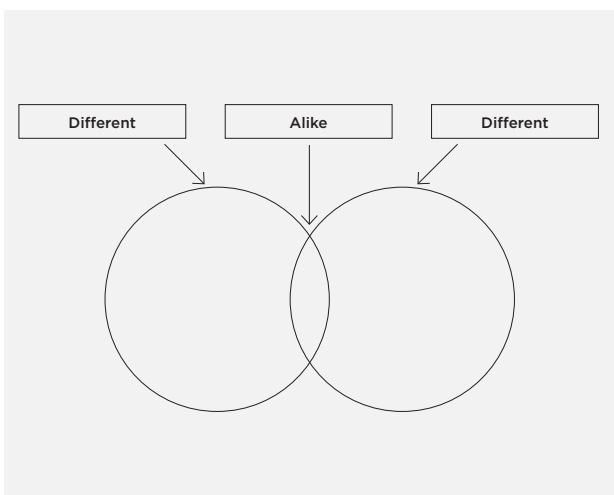


Figure 9: A two-circle Venn diagram.

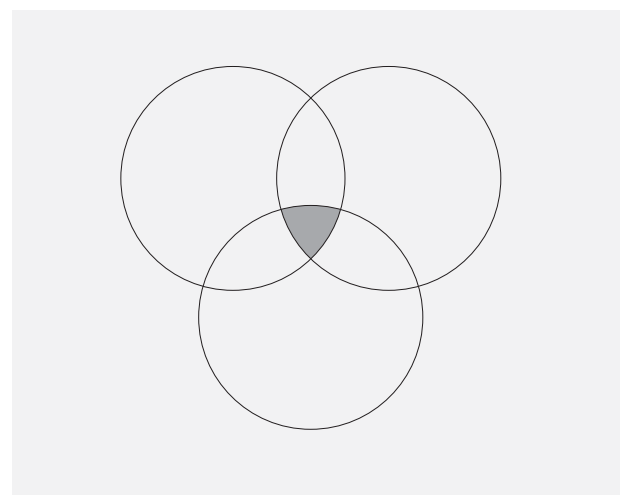


Figure 10: A three-circle Venn diagram

Use these questions as a guide to assist student note-taking while examining the photographs and watching the video:

- What can you see in the photographs/video?
- What are some of the important features of the old Sydney Railway Station (past), current railway stations (present) and Sydney Metro Northwest stations (future)?
- What are the similarities and differences between the stations?
- How have the features of railway stations changed? The primary focus should be for students to consider and discuss developing technologies, and different railway practices in the social context.

### Step 3 – Group activity (two to three students)

Design and create a Sydney Metro Northwest station using 3D software. Students use laptops or iPads to view and use the Sydney Metro Northwest Interactive Tour of the new line and stations (see web links). In small groups, students design a Sydney Metro Northwest station on paper labelling traditional and modern features important in new railway stations. The design criteria can be negotiated between the teacher and students. Aspects to consider are aesthetic, technology, social and safety features.

Using the design sketches, students then use 3D software Minecraft, Google Sketchup 8 or Lego Digital Designer to create virtual 3D Sydney Metro Northwest stations. (See web links for suitable software).



Figure 11: Sydney Metro Northwest railway station examples designed in Minecraft.

## Step 4 – Reflection

Groups present their Sydney Metro Northwest virtual 3D train stations to the class and discuss the features they have included in their design. Groups will need to identify traditional features such as amenities and other modern features such as, ‘Kiss and ride’ drop off areas.

Reflect on the focus question: What traditional and modern features do the Sydney Metro Northwest railway stations need? Tease this out and develop a whole class list of modern and traditional railway station features.



Figure 12: Platform signage.



Figure 13: Wayfinding signage.



Figure 14: Platform screen doors.



Figure 15: Train station location signage.



Figure 16: Emergency help point.



Figure 17: Directional platform signage.

These images show Sydney Metro wayfinding signage.

## Teacher references and extension work

### Stage modifications: Early stage 1 and 2

These lessons may be simplified by providing more explicit instruction for each activity, and using teacher demonstration of step-by-step virtual 3D train station construction with student assistance. A class may develop a set of traditional and modern features in teacher-led discussion, in place of group work. Alternatively, the activity could be transformed into a Creative Arts lesson focusing on using pencil and paper to sketch a train station followed by students creating a sustainable design using recycled materials.

### Extension activities

Students convert their virtual 3D Sydney Metro Northwest station designs into physical models using cardboard and recycled materials. Students incorporate energy efficient features in their designs focusing on using less energy and natural resources.

Individually, or in small groups, design a physical or virtual excursion to a new Sydney Metro Northwest station site suitable for primary school students. The excursion activity could include:

- Location of the excursion site
- Mode of transport to and from the excursion
- Activities while at the site
- Key features to be noted at the site
- Safety considerations
- Follow up activities.

## Teacher references: Station design

The following passages may be helpful when talking about the features of a railway station.

### Chapter 6 Project Description – operation (Part 1 of 2)

<https://www.sydneymetro.info/northwest/project-overview>

The stations would be designed to provide:

- Ease of access for all customers, including those with specific accessibility needs (e.g. wheelchair users, those with restricted mobility, reduced vision and hearing and customers with strollers)
- A safe environment
- Emergency access and egress
- A comfortable environment (e.g. weather protection, ventilation/cooling, daylighting)
- Customer facilities (e.g. toilets, seating, ticket facilities, coverage for modern telecommunications and bicycle storage)
- Public areas (i.e. unpaid concourse, paid concourse and platforms)
- Activation opportunities such as retail space



- Staff facilities
- Station systems – electrical and mechanical services.

Design principles for stations and service facilities which aim to create places that:

- Are memorable, vibrant new focal points for the community where customers feel safe
- Are protected from the weather
- Offer an enjoyable and uplifting experience
- Offer opportunity for customers to easily transfer between different modes of transport or readily access local facilities and services
- Are informed by local character including natural systems and the surrounding built environment
- Provide a positive and lasting legacy for future generations.

Design principles for stations, associated service buildings and service facilities that meet the following requirements:

- The built elements of the project must contribute to creating good public spaces by providing a high quality experience for customers, including direct, equitable, safe and convenient connections between transport modes and integration with adjacent land uses
- The architecture and urban design of the built elements of the project must balance a contextually responsive approach with a consistent project wide design that ensures value for money
- Intrusive, above ground structures must be minimised as far as practicable; where required, visually prominent structures must be well considered when viewed visually at human scale
- All of the rail infrastructure elements of the station and service facilities (such as power and fresh air ventilation) must be integrated into the design holistically, while being able to be easily maintained
- Urban design elements of the project must respond to, or facilitate active uses such as local retailing and services around stations, active and passive public spaces, good quality landscaping and sustainable car parking
- Material selection and design should provide for robust and easily maintained finishes that consider protection from graffiti, the effects of dust, rain and high usage
- The built elements of the project must incorporate feasible and reasonable noise mitigation
- The built elements of the project must incorporate sustainability initiatives (such as water sensitive urban design and energy harvesting), use resources and materials efficiently and have a low carbon footprint, and support the ability of current and future generations to create healthy and liveable communities
- The urban design elements of the project must consider and respond to 'safer by design' principles.



## Images of railway stations, past and future



Figure 18: Concourse of North Sydney Station, 1932.



Figure 19: Bella Vista Station.



Figure 20: Old Sydney Station, Devonshire St, 1885.



Figure 21: Norwest Station.



Figure 22: Wynyard Station: erecting the escalators, 1932.



Figure 23: An underground metro railway station.



Figure 24: Wynyard Station: Concourse Floor Level, 1930.



Figure 25: Kellyville Station.



**Figure 26:** Interior of the old Sydney Railway Station, 1885. Source: State Records NSW.

[http://investigator.records.nsw.gov.au/asp/photossearch/photo.asp?17420\\_a014\\_a0140000247](http://investigator.records.nsw.gov.au/asp/photossearch/photo.asp?17420_a014_a0140000247)



**Figure 27:** Western side of the old Sydney Railway Station, 1879.

Source: State Records NSW.

[https://www.records.nsw.gov.au/image/17420\\_a014\\_a0140000248](https://www.records.nsw.gov.au/image/17420_a014_a0140000248)





Topic Three:  
Planning, designing  
and building a railway