



Digital Dimensions: Architectural Geometry in VR

Learning Area

Maths

Year Level

Year 8-9

Introduction

In this immersive lesson, students will delve into the world of geometric shapes as they appear in architecture. Using Tilt Brush, students will explore the geometry of famous buildings and enhance their understanding of how geometric shapes are utilised in architectural design.

Application

[Tilt Brush by Google](#)

Tilt Brush is a VR painting app that lets users create 3D art using VR controllers. It transforms traditional painting into an immersive, interactive experience with dynamic brushes and vibrant colours, offering endless creative possibilities.



Lesson Overview

Lesson Objectives

- Identify and describe various geometric shapes used in well-known architectural structures.
- Analyse the role and significance of geometric shapes in architectural design.
- Use Tilt Brush to create visual representations of geometric

VR/AR Resources

[▶ In 360: Notre-Dame cathedral before t... \(1:32\)](#)

[▶ Al Aqsa, 360° tour of Jerusalem's holie... \(6:38\)](#)


[▶ Tour an Art Deco Masterpiece | The Da...](#)



shapes found in famous buildings.

- Develop a deeper understanding of how geometry influences architectural aesthetics and functionality.

(1:27)

 [Falling Water:4K 360 Degree Videos](#)
/Modern Architecture (1:08)



Before the Immersive Learning Journey

- Teachers and students should familiarise themselves with the IMVR experience using the [Tilt Brush Essentials Guide](#).
- Teachers should preview the VR videos and ensure they meet the needs of their students and context.
- Students should have knowledge of transformation, tessellations and geometric patterns.
- Students should have prior knowledge in generating design ideas.
- Students would be aware of different architectural styles such as Gothic, Islamic, Art Deco, or Modern Architecture. They will select a specific style to investigate during this lesson.
- This lesson byte may be completed over 2x 60-minute lessons.



During the Immersive Learning Journey

- **IMVR Station:** In small groups of 2 or 3, students will create a 3D model of a building or structure using geometric shapes based on a specific architectural style that they selected prior to this lesson. Students will focus on incorporating a variety of shapes, creating a symmetrical pattern using the mirror tool and designing a tessellating pattern. Students can take a photo or video of their final creation.
- **HHVR Station:** Students will watch different 360° videos, recording observational notes based on guiding questions about specific architectural styles known for the use of geometric shapes. Students may record their responses in physical or digital notebooks.

 [In 360: Notre-Dame cathedral before the fire - BBC News](#) (1:32)

Some guiding questions:



- How does geometry play a crucial role in the design and construction of iconic structures like Notre-Dame Cathedral? Explore the specific geometric shapes and forms used in its architecture.
- How do architects employ symmetry and specific proportions to achieve balance and harmony in their designs? Consider how Notre-Dame Cathedral exemplifies these principles.
- How does geometry enhance the visual appeal and uniqueness of architectural designs? Analyse Notre-Dame's ornate details and their geometric origins.
- How does geometry reflect cultural and historical significance? Investigate any specific geometric patterns or motifs present in Notre-Dame's design.

Al Aqsa, 360° tour of Jerusalem's holiest mosque (6:38)

Some guiding questions:

- How does geometry play a role in the design of Al Aqsa Mosque? Investigate the geometric shapes and forms used in its architecture, such as domes, arches, and intricate patterns.
- How do architects employ symmetry and specific proportions to achieve balance and harmony in Al Aqsa's design? Explore the relationship between geometric elements and aesthetic appeal.
- How are geometric forms arranged within Al Aqsa Mosque? Consider the layout of prayer halls, courtyards, and minarets. How does geometry enhance functionality and flow?
- How does geometry reflect the cultural and historical context of Al Aqsa? Explore any specific geometric motifs or patterns unique to Islamic architecture.
- Can geometric design contribute to energy efficiency in buildings? Discuss how Al Aqsa's architectural features optimise natural light and ventilation.



▶ Tour an Art Deco Masterpiece | The Daily 360 | The New York Tim...
(1:27)

Some guiding questions:

- How does the Art Deco style manifest in the architecture of One Wall Street? Investigate geometric motifs, symmetry, and ornamental details.
- How does geometry influence the layout of interior spaces in historic skyscrapers? Analyse the flow, proportions, and functionality within One Wall Street.
- Explore how geometry informs material choices. How do geometric patterns enhance the visual impact of architectural elements?
- What cultural and historical factors influenced the Art Deco movement? Relate these influences to the design decisions in One Wall Street.

▶ Falling Water:4K 360 Degree Videos/Modern Architecture (1:08)

- How does Frank Lloyd Wright's Falling Water exemplify organic geometry? Investigate the seamless integration of the house with its natural surroundings, including the waterfall.
 - Falling Water's daring cantilevered design defies gravity. How does geometry play a role in achieving structural stability while maintaining aesthetic elegance?
 - Explore how geometry influences material choices. Consider the use of stone, concrete, and glass in Falling Water's design.
 - Falling Water seems to emerge from the landscape. How does geometry connect the built environment to the natural world, blurring boundaries between indoors and outdoors?
- **Research and Reflection Station:** Students will research a specific architectural style that they've selected prior to this lesson and/or focus on researching answers to the guiding questions from the HHVR experiences.



After the Immersive Learning Journey

- Facilitate a discussion on the geometric shapes explored during the lesson and their significance in architecture based on guiding questions.
- Create a digital gallery where students can share photos or videos of their Tilt Brush design where they can explain how they incorporated geometric shapes in their creations.
- Discuss the relevance of understanding geometric shapes in everyday life and their real world relevance.