

ACTIVITY TITLE: Pyramid Art – 3D Geometry in Design

Activity code: ncMPT03



	DURATION	120 minutes
	AGE RANGE	13-14
	TOPICS	3D GEOMETRY PIRAMIDS SOLID CONSTRUCTION SPATIAL REASONING



Description of the project

In this hands-on STEAM activity, students will explore the geometric and cultural dimensions of pyramid structures by constructing and decorating their own 3D models. The purpose of the activity is to merge mathematical understanding with artistic expression while deepening spatial reasoning and cultural awareness.

Students will begin by analyzing the geometry of various pyramid types and constructing 3D solids from 2D nets. They will then design surface decorations using symmetrical patterns, cultural symbols, and creative artistic elements. Throughout the process, they will investigate how pyramids have been used across civilizations as both architectural and symbolic structures. Optional digital modeling tools such as GeoGebra or Tinkercad may be used to extend the activity through virtual construction.

The activity emphasizes 3D geometry, symmetry, cultural symbolism, and personal expression. A tribute to a gender-diverse STEAM figure will also be incorporated into their designs. The session culminates in a collaborative “Pyramid City” installation that showcases students' models, visual storytelling, and reflections.

By the end of the activity, students will:

- Identify and describe key features of pyramids (faces, edges, angles, and base types).
- Construct accurate 3D models using 2D geometric nets.
- Decorate their pyramids using principles of symmetry and cultural symbolism.
- Reflect on the cultural significance of pyramids and incorporate inclusive representation.
- Present their work visually and verbally as part of a collaborative class exhibit.



Objectives: What will I learn?

- **Understand the key geometric properties of pyramids** (including faces, edges, height, base types, and angles) by analyzing visual examples and constructing 3D solids from 2D nets, to recognize and describe the mathematical structure of polyhedral forms in both natural and human-made contexts.
- **Develop skills in spatial reasoning and model construction** by sketching and assembling pyramid nets to build accurate and stable 3D figures and visualize how two-dimensional shapes transform into three-dimensional structures.
- **Apply the principles of symmetry and geometry** by creating original surface designs and patterns on their models to strengthen their understanding of mathematical aesthetics and how symmetry is used across cultures in visual expression.
- **Investigate the cultural significance of pyramids in global history** by researching symbolism from ancient civilizations to critically compare cultural uses of geometry and incorporate meaningful symbolic elements into their own designs.
- **Collaborate in diverse teams** by rotating roles to build communication, creativity, and teamwork skills.
- **Justify their design decisions** by using geometric and cultural reasoning, to articulate connections between form, function, and meaning in their creations.
- **Recognize and honor contributions of underrepresented STEAM figures** by researching a females or minority innovators and incorporating a visual tribute into their model to promote inclusive thinking and gender visibility.



Materials: What do I need?

1. Provided by the teacher/institution:

- Printed worksheets and templates
- Access to projector or interactive whiteboard for class discussions and model showcases
- Reserved space (table or wall display) for the final “Pyramid City” collaborative installation
- Devices (computers or tablets) for digital modeling or research

2. Provided by students:

- Pencil, eraser, ruler, and compass
- Scissors and glue stick or tape
- Colored pencils or fine markers for surface decoration

3. Downloadable resources:

- [Pyramid Art 1 – Mayor Piramids](#)
- [Pyramid Art 1 – Comparison Worksheet](#)
- [Pyramid Art 2 – Pyramids Nets](#)
- [Pyramids Worksheet](#)
- [Tribute to a Female STEAM figure](#)



Previous preparation

- Begin the session by explaining the purpose of the activity: to explore how geometric structures like pyramids are constructed, symbolized, and reimagined across cultures, merging mathematics, art, and social meaning. Discuss how pyramids appear in ancient architecture and in modern design (e.g., the Louvre Pyramid), and how their geometry connects to principles of structure, symmetry, and symbolism. The question to activate the relevance of this topic could be:
 - Why have so many cultures built pyramids?
 - What makes the pyramid shape strong?
 - How can art express identity or values through geometry?
 Afterward, play the video “[Why so many different civilizations built pyramids](#)”
 You can also use the visual guide *Pyramid_Art 1 – Major Pyramids* to spark curiosity and global connection.
- **Highlight Role Models and Equity Themes**
 Introduce gender representation and cultural inclusion by presenting diverse creators in design and engineering. Show a video from [Zarah Hussein](#) (Islamic geometric art) and discuss:
 - What contributions have these figures made?
 - Why is it important to see women and underrepresented creators in these roles?
 - What connections can she have with the topic we are working on?
- **Activate Prior Knowledge**
 Facilitate a brief whole-class discussion to gauge what students already know about pyramids and related topics. The prompts can be:
 - What do you already know about how pyramids are built?
 - Have you seen pyramids in real life, movies, or books? Where were they from?
 - What shapes make up the sides of a pyramid? Can you name the parts (faces, base, edges)?
 - Why do you think pyramids are often symmetrical?
 - What symbols or artwork have you seen on pyramids or ancient buildings?
- **Organize Groups and Assign Rotating Roles**
 Form inclusive teams of 3–4 students and assign rotating roles to ensure equitable participation across the activity. Suggested roles:
 - *Designer* – sketches and plans the layout and decoration

- *Model Constructor* – cuts, folds, and assembles the pyramid
- *Presenter* – prepares and delivers the model’s explanation
- *Cultural Researcher* – investigates symbolism and tribute figure
- **Prepare Technical and Material Setup**

Print and distribute the downloadable resources, set up projector or screen to preview pyramid examples and tribute creators (for discussion) and check all devices are ready (connection) to work on the activity.



RESEARCH



Have a look at these resources

Why This Matters – Context and Relevance

At first glance, building a paper pyramid might seem like a simple geometry task—but pyramids are one of the most enduring architectural forms in human history. Found across continents and time periods, pyramids reflect mathematical mastery, artistic symbolism, cultural beliefs, and engineering ingenuity.

In this activity, we will act as geometric designers, artists, and historians, exploring how the same shape, built with lines, angles, and symmetry, can carry vastly different meanings. From the towering Egyptian pyramids to the stepped temples of the Maya, from the glass Louvre Pyramid to futuristic eco-structures, each form tells a story of power, belief, and beauty.

Real-World Examples: Why It’s Relevant Today

- Engineers and architects use pyramid-like forms in earthquake-resistant buildings and sustainable structures.
- Cultural pyramids are still built today, like memorials, monuments, and urban landmarks that use geometric symbolism.
- Artists and designers blend traditional forms with modern technology in digital art, sculpture, and installations.
- The Louvre Pyramid in Paris blends ancient geometry with modern transparency and controversy, showing how form carries meaning.
- Across cultures, symmetry and symbols in pyramid design reflect identity, spirituality, and power.

Key Questions to Spark Inquiry and Engagement

- How have different civilizations used pyramid shapes to represent power, belief, or knowledge?
- What are the ethical and symbolic meanings behind preserving or reimagining ancient structures today?

- How do modern designers balance tradition and innovation when adapting ancient forms like pyramids?
- How can I use geometry not just to build—but to tell a story or raise awareness?
- What stories are missing from architectural history—and how can we include them in our designs?
- Can art and structure serve as tools for social commentary or change? If so, how could a pyramid do that?



CREATE



Some things you need before beginning

Before you start building and designing your 3D pyramid, let's explore why this shape has lasted for thousands of years—and what it can teach us today about math, art, culture, and even identity.

- Pyramids are one of the most stable 3D shapes in geometry. Their wide base and pointed top make them highly resistant to external pressure.
- You'll find pyramids across the globe. From the stepped temples of the Maya and the Great Pyramids of Giza to Chinese burial mounds and Nubian spires in Sudan, different cultures created pyramids for religious, spiritual, and political purposes.
- Modern architects still use pyramid shapes. The Louvre Pyramid in Paris (1989) blends tradition with innovation, built from glass and steel, it was controversial at first but is now one of the most iconic structures in the world.
- Geometry isn't just about numbers, it tells stories. Angles, edges, and symmetry can communicate ideas like power, balance, or even peace.
- Decorative patterns often follow rules of symmetry. In Islamic art, for example, geometric patterns are used to reflect infinity and unity. Understanding symmetry helps you create beauty that feels balanced and meaningful.
- Artists and designers use geometry and structure to create meaning. Look at Zaha Hadid's architecture or Neri Oxman's work with nature-inspired design. Both merge art and science to build futures that reflect diverse ideas and voices.



Now, follow these steps

Step 1. Investigate and Compare Global Pyramids

- Use the handout “Pyramid_Art 1 – Major Pyramids” to explore pyramid forms from five regions: Egypt, Mesoamerica, Sudan, China, and France.
- As a group, choose two pyramids from different cultures.
- Research more information about those pyramids and compare their materials, purpose,

decoration, symbolism, and structure. Fulfill the worksheet “Pyramid Art 1- Comparison worksheet”

Step 2. Explore Geometry with Physical Nets

- Use “Pyramid_Art 2 – Pyramid Nets” and the Pyramids Worksheet to study base shapes and their effect on structure.
- After fulfilling the worksheet, choose a base: triangle, square, pentagon, or beyond (hexagon–dodecagon available).
- Sketch and label your net. Cut, fold, and assemble the model carefully.

Step 3. Design Symbolic Decorations with Equity in Mind

- It is time to decorate the model created in step 2. Use the “Design Decoration Guidelines resource” to guide the design and symbolic decisions. The following will be taken into account
 - Personal: Express something important to your identity or values.
 - Cultural: Integrate symbols detected in pyramids (two) chosen in step 1 (forms, colors, etc.)
 - Social: Use colors, shapes, or icons to raise awareness of a sustainable global issue. Quickly research about it and integrate a symbol to represent that issue in your design, in order for your design to speak up.
- Once your decisions are clear, use colored pencils, markers, or printed symbols to include them in your model.

Step 4. Research about a female figure related to this topic

- Use the worksheet “Tribute to a Female STEAM figure” Research and honor a female figure who has made an important contribution in a field related to your pyramid project such as geometry, architecture, design, visual art, cultural heritage, or sustainability.
- Choose a female figure connected to at least one of the following areas:
 - Geometry or mathematical art
 - Architecture or structural design
 - Sustainable or ecological design
 - Cultural symbolism or anthropology
 - Visual storytelling or design activism
- Here are some suggested figures to research:
 - Zarah Hussein – Islamic geometric artist
 - Neri Oxman – bio-architect and designer
 - Mary Blair – Disney concept artist and color theorist
 - Galia Solomonoff – Argentinian-American architect
 - Tatiana Bilbao – sustainable Mexican architect
 - Abeer Seikaly – architect known for refugee shelter design

Step 6. Digital Re-Creation or Augmentation

Use the following tool to explore or recreate your design digitally: [Tinkercad](#). Then, measure base

angles or face areas using Tinkercad.



COMMUNICATE

To close the activity, the class will create an interactive and meaningful gallery-style exhibition of all student work titled: *“Pyramid City/museum: Geometry, Culture, and Expression”*

- All completed pyramids will be displayed in a central space (tables, stands, or bulletin board format) as if forming a mini urban landscape of symbolic structures.
- Each group will prepare a small presentation (max.2 minutes) to present their model to classmates.
- Each group’s display must include:
 - *Name Tag*: A creative name or title for their pyramid.
 - *Tribute Label*: A brief explanation of the female STEAM figure they honored, their slogan, and why she inspired the pyramid.
 - *Symbol Map*: A short visual guide or legend that clearly shows all the symbols used on their pyramid and what they mean:
 - Personal symbols (identity, values, beliefs)
 - Cultural references from Step 1 pyramids
 - Social message symbol related to a global issue
 - Tribute-based symbol inspired by the female figure researched
 - The Decorated Pyramid Model
- The oral presentation must include:
 - *Geometric decisions*: What base they chose, what net they used, and how they ensured stability and accuracy.
 - *Symbolic elements*: What personal, cultural, or social messages are represented in the decoration.
 - *Tribute inspiration*: Who they honored and how that figure influenced their work and slogan.
 - *What they learned*: A takeaway from the design process, cultural comparisons, or sustainability challenge.



It is time to share!

Share your amazing work and inspire others!

#PyramidArt

- LinkedIn: <https://www.linkedin.com/company/steambrace-project/posts/?feedView=all>
- Instagram: https://www.instagram.com/steambrace_eu/
- X: https://www.instagram.com/steambrace_eu/



KEEP ON LEARNING



How can I make a similar project by myself?

- **What would a symbolic structure for the future look like?**
- Would it be underground? Floating? Made of light?
- What values would it protect or represent (peace, memory, nature, identity)?
- Who is allowed to enter and what happens inside?
- **Can you write or draw a short visual story about someone who finds a mysterious ancient pyramid?**
- What secrets does it hold? What emotions does it awaken?
- Can you use only shapes and colors (no words) to tell that story?
- **Can you create your own symbolic alphabet where each shape stands for something meaningful (e.g., triangle = protection, square = trust)?** Use it to write a secret message, draw a sigil, or design your own flag.
- **If your life were a building, what base shape would it have?**
- What would each face or side represent (e.g., family, dreams, challenges)?
- Can you build it using paper, cardboard, or a digital tool like Tinkercad?
- **Can you draw or model a whole city based on geometric forms?**
- Maybe one district is made of circles, another of triangles.
- What do the shapes say about how people live there?
- **Could you turn your pyramid design into a geometry puzzle?**
- Or a board game about rebuilding lost civilizations through math and storytelling?



Which are other connected projects?

1. Design a Sacred Space for the Future

- Imagine a building for peace, healing, or connection in the year 2100.
- What shape would protect people or memories?
- What materials would you use glass, clay, living plants, light?
- Include a symbol for who it belongs to and write a 1-sentence motto that expresses its purpose.

2. Symbolic Object: Geometry of Memory

- Create a memory object that uses 3D geometry (pyramids, domes, spirals, etc.) to tell a story from your life.
- It could be a sculpture, digital model, or foldable paper piece.
- Decorate it with colors and symbols that represent events, people, or values.
- Add a label that explains your choices.

3. Shape Justice Poster

- Choose a global issue (e.g., climate justice, equality, education)

- Invent a geometric icon for that cause.
 - Design a poster or campaign using only shapes, color, and one short phrase.
 - Option: Add a tribute to a real changemaker related to the issue.
- 4. Architectural Remix: Rebuilding History**
- Pick a real pyramid from Step 1. Now reimagine it:
 - What if it was rebuilt as a school? A public space? A monument for peace?
 - Keep its original geometry but change its function and decoration.
 - Present your remix with a drawing or 3D model and a short “architect’s explanation.”
- 5. Voice of the Stone – Audio Story**
- Record a first-person story from the point of view of a pyramid:
 - “I was built by... I have seen... I hold...”
 - Combine historical facts with imagination.
 - Option: include a female architect, artist, or builder from history as a character in the story.
- 6. Geometric Fashion: Wearable Symbols**
- Design a clothing item or accessory that uses:
 - Pyramid or triangle shapes
 - Cultural patterns you’ve researched
 - A color scheme based on emotion or identity
 - Add a short explanation: *Who is it for? What message does it send?*



LINKS FOR FURTHER INFORMATION

- BBC Bitesize - 3D Shapes and Nets - <https://www.bbc.co.uk/bitesize/topics/zt7xk2p/articles/z247tv4>
- Neri Oxman- Architect of the Future (TED Talk)- https://www.ted.com/talks/neri_oxman_design_at_the_intersection_of_technology_and_biology
- Louvre Pyramid – Architecture history - <https://youtu.be/vCOE5zWAjQ0>

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