

MSTEM LESSON PLAN - MATHEMATICS

METAVERSE-BASED STEM EDUCATION FOR A SUSTAINABLE AND RESILIENT FUTURE 2023-1-FR01-KA220-SCH-000151516



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Purpose of Lesson:

The purpose of this lesson is to help students understand the importance of polygons in geometry, particularly their role in architecture and engineering. By exploring the basic properties of polygons and their practical applications in real-world designs, students will gain an appreciation for how geometry shapes the structures around us.

Description of Lesson:

This lesson on polygons introduces students to the fundamental geometric shapes that form the basis of many structures in architecture, engineering, and product design. The lesson begins by defining polygons—flat, two-dimensional shapes made up of straight line segments called sides that meet at points known as vertices. Students will explore various types of polygons such as triangles, squares, pentagons, and hexagons, and understand how each polygon has unique properties that make it suitable for different applications.

Throughout the lesson, students will learn how polygons are integral to real-world structures like buildings, bridges, and monuments. They will observe how architects and engineers use polygons to create stable, efficient, and aesthetic designs.

Lesson Teaching Method:

The teaching method for this lesson on polygons incorporates a combination of direct instruction, visual aids, and hands-on activities to engage students and deepen their understanding. The lesson aims to combine theoretical knowledge with practical application, making learning both informative and interactive.Create virtual classrooms where students can manipulate 3D polygons, exploring properties such as area, perimeter and angles interactively.



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Lesson Objectives:

By the end of this lesson, students will be able to:

- Identify the different types of polygons based on the number of sides.
- Understand the concept of polygons, their properties and classifications.
- Explore how polygons are used in various areas of technology, engineering and science (STEM).
- Promote the use of technological tools to simulate and design polygons.

What are Polygnos?

- Polygons are flat, closed geometric figures delimited by straight line segments.
- Some examples of polygons are triangles, squares, and rectangles.
- Types of Polygons: Triangles, Quadrilaterals, Pentagons, Hexagons, Heptagons, Octagons
- Properties of Polygons: Sides, Internal Angles, Diagonals
- Classification of Polygons Regular and Irregular





Lesson Plan

1.Introduction (10m)

- Start with a brief review of geometric figures, highlighting polygons.
- Explain that polygons are flat figures formed by straight line segments that meet at points called vertices.
- Present examples of polygons in everyday life (architecture, product design, civil engineering) and how they are important for building stable and efficient structures.

2.Main Lesson (25m)

Uses of Polygons in Daily Life, Architectural Design:

Designing Architectural structures and monuments is extremely important for engineers. If we carefully observe, almost every architecture is a product of geometric analysis done with precision and accuracy.





3.Practical Activity (20m)

Objectives:

The teacher aims to help students apply geometry in a practical way, simulating the use of calculations and technologies to solve construction problems.

It also aims to encourage teamwork and the communication of ideas to solve a real problem.

• Construction of Polygons:

- Divide the students into groups and hand out materials (cardboard, ruler and compass).

- Each group must construct different polygons (triangles, quadrilaterals, pentagons, hexagons), drawing them and marking the vertices and sides.

-For each polygon, calculate and mark the sum of the internal angles.

Digital Exploration:

Use programs like GeoGebra to have students draw polygons digitaUse programs like GeoGebra to have students draw polygons digitally, visualizing how angles and properties change as they change sides.lly, visualizing how angles and properties change as they change sides.







4. Conclusion (10m)

• Presentation of Projects: each group presents its construction to the rest of the class, explaining the choices made in terms of geometric shapes and calculations performed.

• Discussion: o What did you learn about how geometry is used in real constructions? How has technology helped in the design and problem-solving process?





Lesson table

Lesson Plan	
Introduction (10m)	Define polygons and identify their key properties. Classify polygons based on the number of sides. Identify real-life applications of polygons in architecture, product design, and civil engineering.
Main Lesson (25m)	Understand the role of polygons in architecture and engineering. Recognize the use of polygons in creating stable, efficient structures
Practical Activity (20m)	Divide the students into groups Each group must construct different polygons GeoGebra
Conclusion (10m)	Presentation of Projects Discussion





Lesson resources

Lesson resources:

• Tablets, computers or smartphones with geometric modeling software (GeoGebra, Tinkercad).

- Paper and pen for initial sketches and calculations.
- Projector for demonstrations and visualizations.

Resources used to create the lesson:

Books: - "How to Solve It: A New Aspect of Mathematical Method" -George Pólya Publisher: Princeton University Press

Geogebra Link: https://www.geogebra.org

MIT OpenCourseWare - Mathematics Link: https://ocw.mit.edu/courses/mathematics/

Desmos Link: https://www.desmos.com

STEM Resource Center (NCTM) Link: https://www.nctm.org





Work and homework

Homework:

Research how they think geometric concepts can be applied in other fields, such as science and engineering. With practical examples.

Evaluation/ Assessment:

Students are assessed based on: - Participation in practical activities.

- In the application of mathematical concepts in constructions and calculations.

- Creativity in applying concepts in 3D modeling.
- Clarity and precision in project presentations.





Evaluation and indicators

Evaluation is essential to measure students' understanding and progress in learning polygons.

Project-Based Assessment – Ask students to create a poster or presentation on real-life polygon applications.

Homework/Practical Activity – Students find real-world polygons (e.g., road signs, windows) and explain their characteristics.

Evaluation and Indicators Specifics	
Expected Outcomes	These outcomes will ensure students grasp the concept of polygons effectively while developing critical thinking and problem-solving skills
Assessment Methods	 Worksheets & Exercises Classify polygons based on given diagrams. Calculate the perimeter of different polygons. Label polygons correctly based on their sides and angles
	 Real-Life Application Assignment (Homework) Find and take pictures/draw polygons seen in daily life (tiles, windows, road signs). Write a short explanation of how polygons are used in different fields (architecture, nature, design)
Success Indicators	Knowledge-Based Indicators (Understanding the Concept) Skill-Based Indicators (Application & Problem- Solving) Engagement & Participation Indicators





Overview of the lesson

This lesson on polygons aimed to introduce students to the basic geometric shapes that form the foundation of many structures in architecture, engineering, and design. By exploring the properties of polygons and their practical applications, students will gained a deeper understanding of how geometry contributes to the stability, efficiency, and aesthetic appeal of the built environment.



