



Subject Area: Mathematics
Unit Title: Geometry
Grade Level: 9th Grade
Lesson Number: 1 of 10

Duration: 90 minutes
Date: March 12, 2024
Teacher: Ms. Johnson
Room: Room 204

Curriculum Standards Alignment

Content Standards:

- Understand the properties of 2D and 3D shapes
- Identify and describe the characteristics of various 3D shapes
- Apply knowledge to solve problems involving volume, surface area, and spatial reasoning

Skills Standards:

- Critical thinking and problem-solving
- Communication and collaboration
- Technology integration and digital literacy

Cross-Curricular Links:

- Science: understanding of spatial relationships and structures
- Art: application of geometric shapes in design and architecture

Essential Questions & Big Ideas

Essential Questions:

- What are the properties of 2D and 3D shapes?
- How do 2D and 3D shapes relate to real-world applications?
- How can we use technology to explore and understand 2D and 3D shapes?

Enduring Understandings:

- 2D and 3D shapes have unique properties and characteristics
- Understanding 2D and 3D shapes is essential for problem-solving and critical thinking
- Technology can enhance our understanding and exploration of 2D and 3D shapes

Student Context Analysis

Class Profile:

- Total Students: 25
- ELL Students: 5
- IEP/504 Plans: 3
- Gifted: 2

Learning Styles Distribution:

- Visual: 40%
- Auditory: 30%
- Kinesthetic: 30%



Pre-Lesson Preparation

Room Setup:

- Arrange desks in a U-shape to facilitate group work and discussion
- Set up technology stations with geometric software and 3D modeling tools

Technology Needs:

- Geometric software (e.g. GeoGebra, SketchUp)
- 3D modeling tools (e.g. Tinkercad, Blender)
- Computers or laptops with internet access

Materials Preparation:

- Printed copies of the lesson plan and activity worksheets
- Whiteboard and markers
- 3D models and shapes for demonstration and exploration

Safety Considerations:

- Ensure students understand the proper use of technology and materials
- Supervise students during group work and activities

Detailed Lesson Flow

Introduction (10 minutes)

- Introduce the topic of 2D and 3D shapes
- Review 2D shapes and introduce the concept of 3D shapes

Direct Instruction (20 minutes)

- Use multimedia resources to explain the properties and characteristics of various 3D shapes
- Use geometric software to demonstrate and explore 3D shapes

Engagement Strategies:

- Think-pair-share to encourage discussion and critical thinking
- Gallery walk to showcase student work and promote peer feedback

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Guided Practice (25 minutes)

- Have students work in groups to identify and describe 3D shapes using models and geometric software
- Circulate around the room to provide guidance and support

Scaffolding Strategies:

- Provide temporary support and guidance to students who need it
- Encourage students to use visual aids and diagrams to support their understanding

Independent Practice (25 minutes)

- Provide students with problems involving volume, surface area, and spatial reasoning to solve individually
- Allow students to use geometric software and 3D modeling tools to explore and solve problems

Assessment and Conclusion (15 minutes)

- Administer a quiz to assess understanding of 2D and 3D shapes
- Conclude the lesson with a group discussion on key takeaways and areas for further exploration



Differentiation & Support Strategies

For Struggling Learners:

- Provide additional support and guidance during group work and activities
- Offer one-on-one instruction and feedback

For Advanced Learners:

- Provide additional challenges and extensions to the lesson
- Encourage students to create and share their own 3D models and shapes

ELL Support Strategies:

- Provide visual aids and diagrams to support understanding
- Use simple language and definitions

Social-Emotional Learning Integration:

- Encourage students to work collaboratively and support each other
- Promote self-awareness and self-regulation through reflection and self-assessment

Assessment & Feedback Plan

Formative Assessment Strategies:

- Observations of student participation and engagement
- Review of student work and assignments

Success Criteria:

- Students can identify and describe the properties of 2D and 3D shapes
- Students can apply their knowledge to solve problems involving volume, surface area, and spatial reasoning

Feedback Methods:

- Verbal feedback during group work and activities
- Written feedback on assignments and quizzes

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Homework & Extension Activities

Homework Assignment:

Have students create and share their own 3D model or shape using geometric software or 3D modeling tools.

Extension Activities:

- Have students research and create a presentation on a real-world application of 2D and 3D shapes
- Have students design and create a 3D model or shape using different materials and techniques

Parent/Guardian Connection:

Encourage parents and guardians to ask their child about their learning and provide feedback and support.

Teacher Reflection Space

Pre-Lesson Reflection:

- What challenges do I anticipate?
- Which students might need extra support?
- What backup plans should I have ready?

Post-Lesson Reflection:

- What went well?
- What would I change?
- Next steps for instruction?



Introduction to 2D and 3D Shapes

Definition of 2D Shapes:

2D shapes are flat and have length and width but no depth.

Examples of 2D Shapes:

- Squares
- Rectangles
- Triangles
- Circles

Definition of 3D Shapes:

3D shapes have length, width, and depth.

Examples of 3D Shapes:

- Cubes
- Spheres
- Pyramids
- Cylinders

Properties of 2D and 3D Shapes

Properties of 2D Shapes:

- Number of sides
- Number of vertices
- Number of edges
- Angles and measurements

Properties of 3D Shapes:

- Number of faces
- Number of vertices
- Number of edges
- Volume and surface area



Geometric Software and 3D Modeling

Geometric Software:

- GeoGebra
- SketchUp
- Autodesk

3D Modeling Tools:

- Tinkercad
- Blender
- Fusion 360

Benefits of Geometric Software and 3D Modeling:

- Enhances understanding of 2D and 3D shapes
- Develops problem-solving and critical thinking skills
- Prepares students for real-world applications and careers

Using Geometric Software and 3D Modeling in the Classroom

Lesson Ideas:

- Have students create and explore 2D and 3D shapes using geometric software
- Have students design and create 3D models using 3D modeling tools
- Have students solve problems involving volume, surface area, and spatial reasoning using geometric software and 3D modeling tools

Assessment Ideas:

- Have students submit their geometric software and 3D modeling projects for assessment
- Have students complete quizzes and tests on geometric software and 3D modeling concepts
- Have students participate in class discussions and activities to assess their understanding



Real-World Applications of 2D and 3D Shapes

Architecture and Engineering:

- Designing buildings and bridges
- Creating blueprints and models

Art and Design:

- Creating sculptures and installations
- Designing graphics and logos

Science and Technology:

- Understanding molecular structures
- Designing and creating prototypes

Case Studies and Examples

Case Study 1:

A architecture firm uses geometric software to design and create a new building.

Case Study 2:

An artist uses 3D modeling tools to create a sculpture for a public installation.

Case Study 3:

A scientist uses geometric software to understand and visualize molecular structures.



Conclusion

Summary of Key Points:

- 2D and 3D shapes have unique properties and characteristics
- Geometric software and 3D modeling tools can enhance understanding and exploration of 2D and 3D shapes
- Real-world applications of 2D and 3D shapes are diverse and widespread

Final Thoughts:

By incorporating geometric software and 3D modeling into the classroom, teachers can provide students with a comprehensive and engaging learning experience that prepares them for real-world applications and careers.

Assessment and Evaluation

Assessment Methods:

- Quizzes and tests
- Projects and presentations
- Class discussions and activities

Evaluation Criteria:

- Understanding of 2D and 3D shapes
- Ability to apply geometric software and 3D modeling tools
- Quality of projects and presentations

